Jackknife Beach Living Shoreline
Shoreline and Salt Marsh Restoration

Ecological Restoration Limited
Notice of Intent at Jackknife Beach, Chatham, MA
June 30, 2022

WILKINSON ECOLOGICAL DESIGN

ORLEANS • CHATHAM • BREWSTER • HARWICH

PLEASANT BAY ALLIANCE

Notice of Intent and Supplemental Materials for Jackknife Beach Shoreline and Salt Marsh Restoration

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Eligibility Checklist

Provided by MassDEP:

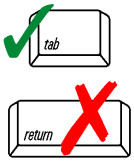
MassDEP File Number

Document Transaction Number

Chatham, MA
City/Town

This Ecological Restoration Limited Project Eligibility Checklist guides the applicant in determining if their project is eligible to file as an Inland or Coastal Ecological Restoration Limited Project (310 CMR 10.53(4) or 310 CMR 10.24(8) respectively). These criteria must be met when submitting the Ecological Restoration Limited Project Notice of Intent to ensure that the restoration and improvement of the natural capacity of a Resource Area(s) to protect and sustain the interests identified in the WPA is **necessary** to achieve the project's ecological restoration goals.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Regulatory Features of All Coastal and Inland Ecological Restoration Limited Projects

(a) May result in the temporary or permanent loss of/or conversion of Resource Area: An Ecological Restoration Limited Project that meets the requirements of 310 CMR 10.24(8) may result in the temporary or permanent loss of Resource Areas and/or the conversion of one Resource Area to another when such loss is necessary to the achievement of the project's ecological restoration goals.

(b) Exemption from wildlife habitat evaluation: A NOI for an Ecological Restoration Limited Project that meets the minimum requirements for Ecological Restoration Projects and for a MassDEP Combined Application outlined in 310 CMR 10.12(1) and (2) is exempt from providing a wildlife habitat evaluation (310 CMR 10.60).

Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

(c) The following are considerations for applicants filing an Ecological Restoration Limited Project NOI and for the issuing authority approving a project as an Ecological Restoration Limited Project:

☒ The condition of existing and historic Resource Areas proposed for restoration.

☐ Evidence of the extent and severity of the impairment(s) that reduce the capacity of the Resource Areas to protect and sustain the interests identified in M.G.L. c. 131, § 40.

☐ The magnitude and significance of the benefits of the Ecological Restoration Project in improving the capacity of the affected Resource Areas to protect and sustain the other interests identified in M.G.L. c. 131, § 40.

☐ The magnitude and significance of the impacts of the Ecological Restoration Project on existing Resource Areas that may be modified, converted and/or lost and the interests for which said Resource Areas are presumed significant in 310 CMR 10.00, and the extent to which the project will:

a. avoid adverse impacts to Resource Areas and the interests identified in M.G.L. c. 131, § 40, that can be avoided without impeding the achievement of the project's ecological restoration goals.

b. minimize adverse impacts to Resource Areas and the interests identified in M.G.L. c. 131, § 40, that are necessary to the achievement of the project's ecological restoration goals.

c. utilize best management practices such as erosion and siltation controls and proper construction sequencing to avoid and minimize adverse construction impacts to resource areas and the interests identified in M.G.L. c. 131, § 40.

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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8))

Complete this Eligibility Criteria Checklist ***before*** filling out a Notice of Intent Application to determine if your project qualifies as a Coastal Ecological Restoration Limited Project. (310 CMR 10.24(8)) Sign the Eligibility Certification at the end of Appendix A, and attach the checklist with supporting documentation and the Eligibility Certification to your Notice of Intent Application.

General Eligibility Criteria for All Coastal Ecological Restoration Limited Projects

Notwithstanding the requirements of 310 CMR 10.25 through 10.35, 310 CMR 10.54 through 10.58, and the Wildlife Habitat evaluations in 310 CMR 10.60, the Issuing Authority may issue an Order of Conditions permitting an Ecological Restoration Project listed in 310 CMR 10.24(8)(e) as an Ecological Restoration Limited Project and impose such conditions as will contribute to the interests identified in the WPA M.G.L. provided that the project meets all the requirements in 310 CMR 10.24 (8).

☐ The project is an Ecological Restoration Project as defined in 310 CMR 10.04 and is a project type listed below [310 CMR 10.24(8)(e)].

☐ Tidal Restoration.

☒ Shellfish Habitat Restoration.

☒ Other Ecological Restoration Limited Project Type.

☒ The project will further at least one of the WPA (M.G.L. c. 131, § 40) interests identified below.

- ☐ Protection of public or private water supply.
- ☐ Protection of ground water supply.
- ☐ Flood control.
- ☒ Storm damage prevention.
- ☐ Prevention of pollution.
- ☐ Protection of land containing shellfish.
- ☐ Protection of fisheries.
- ☒ Protection of wildlife habitat.

☐ If the project will impact an area located within estimated habitat which is indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands, a NHESP preliminary written determination is attached to the NOI submittal that the project will not have any adverse long-term and short-term effects on specified habitat sites of Rare Species or the project will be carried out in accordance with an approved NHESP habitat management plan.

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Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8)) (Cont.)

General Eligibility Criteria for All Coastal Ecological Restoration Limited Projects (cont.)

☒ If the project is located in a Coastal Dune or Barrier Beach, the project avoids and minimizes armoring of the Coastal Dune or Barrier Beach to the maximum extent practicable.

☒ The project complies with all applicable provisions of 310 CMR 10.24(1) through (6) and 310 CMR 10.24(9) and (10).

Additional Eligibility Criteria for Specific Coastal Ecological Restoration Limited Project Types

These additional criteria must be met to qualify as an Ecological Restoration Limited Project to ensure that the restoration and improvement of the natural capacity of a Resource Area to protect and sustain the interests identified in the WPA is **necessary** to achieve the project's ecological restoration goals.

☒ This Ecological Restoration Limited Project application meets the eligibility criteria for Ecological Restoration Limited Project [310 CMR 10.24(8)(a) through (d) and as proposed, furthers at least one of the WPA interests is for the project type identified below.

☐ **Tidal Restoration Projects**

☐ A project to restore tidal flow that will not significantly increase flooding or storm damage impacts to the built environment, including without limitation, buildings, wells, septic systems, roads or other man-made structures or infrastructure.

☒ **Shellfish Habitat Restoration Projects**

☒ The project has received a Special Projects Permit from the Division of Marine Fisheries or, if a municipality, has received a shellfish propagation permit.

☐ The project is made of cultch (e.g., shellfish shells from oyster, surf or ocean clam) or is a structure manufactured specifically for shellfish enhancement (e.g., reef blocks, reef balls, racks, floats, rafts, suspended gear).

☒ **Other Ecological Restoration Projects** that meet the criteria set forth in 310 CMR 10.24(8)(a) through (d).

☐ Restoration, enhancement, or management of Rare Species habitat.

☐ Restoration of hydrologic and habitat connectivity.

☐ Removal of aquatic nuisance vegetation to impede eutrophication.

☒ Thinning or planting of vegetation to improve habitat value.

☐ Fill removal and re-grading.

☐ Riparian corridor re-naturalization.

☐ River floodplain re-connection.

Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8)) (Cont.)

Additional Eligibility Criteria for Specific Coastal Ecological Restoration Limited Project Types

- ☒ In-stream habitat enhancement.
- ☐ Remediation of historic tidal wetland ditching.
- ☐ Eelgrass restoration.
- ☐ Invasive species management.
- ☐ Installation of fish passage structures.
- ☒ Other. Describe: Salt Marsh riparian restoration, enhancement, and management to address future conditions

☐ This project involves the construction, repair, replacement or expansion of public or private infrastructure (310 CMR 10.24(9).

- ☐ The NOI attachment labeled _____ is an operation and maintenance plan to ensure that the infrastructure will continue to function as designed.
- ☐ The operation and maintenance plan will be implemented as a continuing condition in the Order of Conditions and the Certificate of Compliance.

☐ This project proposes to replace an existing stream crossing (310 CMR 10.24(10). The crossing complies with the Massachusetts Stream Crossing Standards to the maximum extent practicable with details provided in the NOI. The crossing type:

- ☐ Replaces an existing non-tidal crossing that is part of an Anadromous/Catadromous Fish Run (310 CMR 10.35)
- ☐ Replaces an existing tidal crossing that restricts tidal flow. The tidal restriction will be eliminated to the maximum extent practicable.

☐ At a minimum, in evaluating the potential to comply with the standards to the maximum extent practicable the following criteria have been consider site constraints in meeting the standard, undesirable effects or risk in meeting the standard, and the environmental benefit of meeting the standard compared to the cost, by evaluating the following:

- ☐ The potential for downstream flooding;
- ☐ Upstream and downstream habitat (in-stream habitat, wetlands);
- ☐ Potential for erosion and head-cutting;
- ☐ Stream stability;
- ☐ Habitat fragmentation caused by the crossing;
- ☐ The amount of stream mileage made accessible by the improvements;
- ☐ Storm flow conveyance;

Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8)) (Cont.)

Additional Eligibility Criteria for Specific Coastal Ecological Restoration Limited Project Types

- ☐ Engineering design constraints specific to the crossing;
- ☐ Hydrologic constraints specific to the crossing;
- ☐ Impacts to wetlands that would occur by improving the crossing;
- ☐ Potential to affect property and infrastructure; and
- ☐ Cost of replacement.

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4))

Complete this Eligibility Criteria Checklist ***before*** filling out a Notice of Intent Application to determine if your project qualifies as an Inland Ecological Restoration Limited Project. (310 CMR 10.53(4)) Sign the Eligibility Certification at the end of Appendix A, and attach the checklist with supporting documentation and the Eligibility Certification to your Notice of Intent Application.

General Eligibility Criteria for All Inland Ecological Restoration Limited Projects

Notwithstanding the requirements of any other provision of 310 CMR 10.25 through 10.35, 310 CMR 10.54 through 10.58, and 310 CMR 10.60, the Issuing Authority may issue an Order of Conditions permitting an Ecological Restoration Project listed in 310 CMR 10.53(4)(e) as an Ecological Restoration Limited Project and impose such conditions as will contribute to the interests identified in M.G.L. c. 131, § 40, provided that:

☐ The project is an Ecological Restoration Project as defined in 310 CMR 10.04 and is a project type listed below [310 CMR 10.53(4)(e)].

- ☐ Dam Removal
- ☐ Freshwater Stream Crossing Repair and Replacement
- ☐ Stream Daylighting
- ☐ Tidal Restoration
- ☐ Rare Species Habitat Restoration
- ☐ Restoring Fish Passageways
- ☐ Other (describe project type): _____

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

General Eligibility Criteria for All Inland Ecological Restoration Limited Projects

☐ The project will further at least one of the WPA (M.G.L. c. 131, § 40) interests identified below.

- ☐ Protection of public or private water supply
- ☐ Protection of ground water supply
- ☐ Flood control
- ☐ Storm damage prevention
- ☐ Prevention of pollution
- ☐ Protection of land containing shellfish
- ☐ Protection of fisheries
- ☐ Protection of wildlife habitat

☐ If the project will impact an area located within estimated habitat which is indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands, a NHESP preliminary written determination is attached to the NOI submittal that the project will have no adverse long-term and short-term effects on specified habitat sites of Rare Species or the project will be carried out in accordance with an approved NHESP habitat management plan.

☐ The project will be carried out in accordance with any time of year restrictions or other conditions recommended by the Division of Marine Fisheries for coastal waters and the Division of Fisheries and Wildlife in accordance with 310 CMR 10.11(3).

☐ If the project involves the dredging of 100 cubic yards of sediment or more or dredging of any amount in an Outstanding Resource Water, a Water Quality Certification has been applied for or obtained.

☐ The project complies with all applicable provisions of 310 CMR 10.53(1), (2), (7), and (8).

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

Additional Eligibility Criteria for Specific Inland Ecological Restoration Limited Project Types

These additional criteria must be met to qualify as an Ecological Restoration Limited Project to ensure that the restoration and improvement of the natural capacity of a Resource Area to protect and sustain the interests identified in the WPA is **necessary** to achieve the project's ecological restoration goals.

☐ This project application meets the eligibility criteria for Ecological Restoration Limited Project in accordance with [310 CMR 10.53(4)(a) through (d) and as proposed, furthers at least one of the WPA interests is for the project type identified below:

☐ **Dam Removal**

☐ Project is consistent with MassDEP's 2007 Dam Removal Guidance.

☐ **Freshwater Stream Crossing Repair and Replacement**. The project as proposed and the NOI describes how:

☐ Meeting the eligibility criteria set forth in 310 CMR 10.13 would result in significant stream instability or flooding hazard that cannot otherwise be mitigated, and site constraints make it impossible to meet said criteria.

☐ The project design ensures that the stability of the bank is NOT impaired.

☐ To the maximum extent practicable, the project provides for the restoration of the stream upstream and downstream of the structure as needed to restore stream continuity and eliminate barriers to aquatic organism movement.

☐ The project complies with the requirements of 310 CMR 10.53(7) and (8).

☐ **Stream Daylighting Projects**

☐ The project meets the eligibility criteria for Ecological Restoration Limited Project [310 CMR 10.53(4)(a) through (d)] and as proposed the NOI describes how the proposed project meets to the maximum extent practicable, consistent with the project's ecological restoration goals, all the performance standards for Bank and Land Under Water Bodies and Waterways.

☐ The project meets the requirements of 310 CMR 10.12(1) and (2) and a wildlife habitat evaluation is not included in the NOI.

☐ **Tidal Restoration Project**

☐ Restores tidal flow.

☐ the project, including any proposed flood mitigation measures, will not significantly increase flooding or storm damage to the built environment, including without limitation, buildings, wells, septic systems, roads or other man-made structures or infrastructure.

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

☐ **Other Ecological Restoration Projects** that meet the criteria set forth in 310 CMR 10.53 (4) (a) through (d).

- ☐ Restoration, enhancement, or management of Rare Species habitat.
- ☐ Restoration of hydrologic and habitat connectivity.
- ☐ Removal of aquatic nuisance vegetation to impede eutrophication.
- ☐ Thinning or planting of vegetation to improve habitat value.
- ☐ Riparian corridor re-naturalization.
- ☐ River floodplain re-connection.
- ☐ In-stream habitat enhancement.
- ☐ Fill removal and re-grading.
- ☐ Flow restoration.
- ☐ Installation of fish passage structures.
- ☐ Invasive species management.
- ☐ Other. Describe: _____

☐ This project involves the construction, repair, replacement or expansion of public or private infrastructure. (310 CMR 10.53(7))

- ☐ The NOI attachment labeled _____ is an operation and maintenance plan to ensure that the infrastructure will continue to function as designed.
- ☐ The operation and maintenance plan will be implemented as a continuing condition in the Order of Conditions and the Certificate of Compliance.

☐ This project replaces an existing stream crossing (310 CMR 10.53(8)). The crossing type:

- ☐ Replaces an existing non-tidal crossing designed to comply with the Massachusetts Stream Crossing Standards to the maximum extent practicable with details provided in the NOI.
- ☐ Replaces an existing tidal crossing that restricts tidal flow. The tidal restriction will be eliminated to the maximum extent practicable.

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

☐ At a minimum, in evaluating the potential to comply with the standards to the maximum extent practicable the following criteria have been consider site constraints in meeting the standard, undesirable effects or risk in meeting the standard, and the environmental benefit of meeting the standard compared to the cost, by evaluating the following:

- ☐ The potential for downstream flooding;
- ☐ Upstream and downstream habitat (in-stream habitat, wetlands);
- ☐ Potential for erosion and head-cutting;
- ☐ Stream stability;
- ☐ Habitat fragmentation caused by the crossing;
- ☐ The amount of stream mileage made accessible by the improvements;
- ☐ Storm flow conveyance;
- ☐ Engineering design constraints specific to the crossing;
- ☐ Hydrologic constraints specific to the crossing;
- ☐ Impacts to wetlands that would occur by improving the crossing;
- ☐ Potential to affect property and infrastructure; and
- ☐ Cost of replacement.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent
Appendix A: Ecological Restoration Limited Project Checklists

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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Required Actions (310 CMR 10.11)

Complete the Required Actions before submitting a Notice of Intent Application for an Ecological Restoration Project and submit a completed copy of this Checklist with the Notice of Intent.

☒ **Massachusetts Environmental Policy Act (MEPA) / Environmental Monitor**
https://www.mass.gov/service-details/the-environmental-monitor

For Ecological Restoration Limited Projects, there are no changes to MEPA requirements.

☒ Submit written notification at least 14 days prior to the filing of a Notice of Intent (NOI) to the Environmental Monitor for publication. A copy of the written notification is attached and provides at minimum:

☒ A brief description of the proposed project.

☒ The anticipated NOI submission date to the conservation commission.

☒ The name and address of the conservation commission that will review the NOI.

☒ Specific details as to where copies of the NOI may be examined or acquired and where to obtain the date, time, and location of the public hearing.

☒ **Massachusetts Endangered Species Act (MESA) /Wetlands Protection Act Review**

☐ Preliminary Massachusetts Endangered Species Act Review from the Natural Heritage and Endangered Species Program (NHESP) has been met and the written determination is attached.

☐ Supplemental Information for Endangered Species Review has been submitted.

1. ☐ Percentage/acreage of property to be altered:

   a. Within Wetland Resource Area _____ Percentage/acreage

   b. Outside Wetland Resource Area _____ Percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

3. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work.

4. ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

5. ☐ Photographs representative of the site

6. ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review)

Required Actions (310 CMR 10.11) (cont.)

Make check payable to "Commonwealth of Massachusetts - NHESP" and mail to NHESP:

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

7. Projects altering 10 or more acres of land, also submit:

   a. ☐ Vegetation cover type map of site

   b. ☐ Project plans showing Priority & Estimated Habitat boundaries

OR Check One of the Following:

1. ☐ Project is exempt from MESA review.

Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/ma-endangered-species-act-mesa-overview; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59 – see C4 below)

2. ☐ Separate MESA review ongoing.

a. NHESP Tracking # _____ b. Date submitted to NHESP _____

3. ☐ Separate MESA review completed. Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

☒ **Estimated Habitat Map of State-Listed Rare Wetlands Wildlife**

If a portion of the proposed project is located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP), complete the portion below. To view habitat maps, see the **Massachusetts Natural Heritage Atlas** or view the maps electronically at: https://www.mass.gov/guides/masswildlife-publications#-massachusetts-natural-heritage-atlas-

☐ A preliminary written determination from Natural Heritage and Endangered Species Program (NHESP) must be obtained indicating that:

☐ Project will NOT have long- or short-term adverse effect on the actual Resource Area located within estimated habitat indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife published by NHESP.

☐ Project will have long- or short-term adverse effect on the actual Resource Area located within estimated habitat indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife published by NHESP. A copy of NHESP's written preliminary determination in accordance with 310 CMR 10.11(2) is attached. This specifies:

☐ Date of the map: _____

Required Actions (310 CMR 10.11) (cont.)

☐ If the Rare Species identified is/are likely to continue to be located on or near the project, and if so, whether the Resource Area to be altered is in fact part of the habitat of the Rare Species.

☐ That if the project alters Resource Area(s) within the habitat of a Rare Species:

☐ The Rare Species is identified;

☐ NHESP's recommended changes or conditions necessary to ensure that the project will have no short or long term adverse effect on the habitat of the local population of the Rare Species is provided; or

☐ An approved NHESP habitat management plan is attached with this Notice of Intent.

Send the request for a preliminary determination to:
Natural Heritage & Endangered Species Program
MA Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

☒ **Division of Marine Fisheries**

☐ If the project will occur within a coastal waterbody with a restricted Time of Year, [see Appendix B of the Division of Marine Fisheries (DMF) Technical Report TR 47 "Marine Fisheries Time of Year Restrictions (TOYs) for Coastal Alteration Projects" dated April 2011 https://www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/MA/TR-47.pdf].

☒ Obtain a DMF written determination stating:

☐ The proposed work does NOT require a TOY restriction.

☐ The proposed work requires a TOY restriction. Specific recommended TOY restriction and recommended conditions on the proposed work is attached.

☐ If the project may affect a diadromous fish run [re: Division of Marine Fisheries (DMF) Technical Reports TR 15 through 18, dated 2004: https://www.mass.gov/service-details/marine-fisheries-technical-reports]

☐ Obtain a DMF written determination stating:

☐ The design specifications and operational plan for the project are compatible with the passage requirements of the fish run.

☐ The design specifications and operational plan for the project are not compatible with the passage requirements of the fish run.

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Required Actions (310 CMR 10.11) (cont.)

Send the request for a written or electronic determination to:

South Shore – Cohasset to Rhode Island border, and the Cape & Islands:
Division of Marine Fisheries –
South Coast Field Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

North Shore – Hull to New Hampshire border:

Division of Marine Fisheries –
North Shore Field Station
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

☒ **Division of Fisheries and Wildlife –** https://www.mass.gov/orgs/division-of-fisheries-and-wildlife

☐ Projects that involve silt-generating, in-water work that will impact a non-tidal perennial river or stream and the in-water work will not occur between May 1 and August 30.

☐ Obtain a written determination from the Division of Fisheries and Wildlife (DFW) as to whether the proposed work requires a TOY restriction.

☒ The proposed work does NOT require a TOY restriction.

☐ The proposed work requires a TOY restriction. The DFW determination with TOY restriction and other conditions is attached.

☒ **MassDEP Water Quality Certification**

☐ Project involves dredging of 100 cubic yards or more in a Resource Area or dredging of any amount in an Outstanding Resource Water (ORW). A copy and proof of the MassDEP Water Quality Certification pursuant to 314 CMR 9.00 is attached to the NOI.

☐ This project is a Combined Permit Application for 401 Dredging and Restoration (BRP WW 26).

☒ **MassDEP Wetlands Restriction Order**

Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

☐ Yes ☒ No

☒ **Department of Conservation and Recreation**

Office of Dam Safety

☐ For Dam Removal Projects, obtain a written determination from the Department of Conservation and Recreation Office of Dam Safety that the dam is not subject to the jurisdiction of the Office under 302 CMR 10.00, a written determination that the dam removal does not require a permit under 302 CMR 10.00 or a permit authorizing the dam removal in accordance with 302 CMR 10.00 has been issued.

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Required Actions (310 CMR 10.11) (cont.)

Areas of Critical Environmental Concern (ACECs)

Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

☒ Yes ☐ No

If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations).

Pleasant Bay ACEC
Name of ACEC

Minimum Required Documents (310 CMR 10.12)

Complete the Required Documents Checklist below and provide supporting materials before submitting a Notice of Intent Application for an Ecological Restoration Project.

☒ This Notice of Intent meets all applicable requirements outlined in for Ecological Restoration Projects in 310 CMR 10.12. Use the checklist below to ensure that all documentation is included with the NOI.

At a minimum, a Notice of Intent for an Ecological Restoration Project shall include the following:

☒ Description of the project's ecological restoration goals;

☒ The location of the Ecological Restoration Project;

☒ Description of the construction sequence for completing the project;

☒ A map of the Areas Subject to Protection Under M.G.L. c. 131, § 40, that will be temporarily or permanently altered by the project or include habitat for Rare Species, Habitat of Potential Regional and Statewide Importance, eel grass beds, or Shellfish Suitability Areas.

☒ The method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.) is attached with documentation methodology.

☒ List the titles and dates for all plans and other materials submitted with this NOI.

Jackknife Harbor Restoration Plan
a. Plan Title

Wilkinson Ecological Design	John Ramsey, PE
b. Prepared by	c. Signed and Stamped by
June 2022	variable
d. Final Revision Date	e. Scale

	June 2022
f. Additional Plan or Document Title	g. Date

☐ If there is more than one property owner, attach a list of these property owners not listed on this form.

☒ Attach NOI Wetland Fee Transmittal Form.

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Minimum Required Documents (310 CMR 10.12)

☒ An evaluation of any flood impacts that may affect the built environment, including without limitation, buildings, wells, septic systems, roads or other man-made structures or infrastructure as well as any proposed flood impact mitigation measures;

☒ A plan for invasive species prevention and control;

☐ The Natural Heritage and Endangered Species Program written determination in accordance with 310 CMR 10.11(2), if needed;

☒ Any Time of Year restrictions and/or other conditions recommended by the Division of Marine Fisheries or the Division of Fisheries and Wildlife in accordance with 310 CMR 10.11(3), (4), (5), if needed;

☒ Proof that notice was published in the Environmental Monitor as required by 310 CMR 10.11(1;

☒ A certification by the applicant under the penalties of perjury that the project meets the eligibility criteria set forth in 310 CMR 10.13;

☐ If the Ecological Restoration Project involves the construction, repair, replacement or expansion of infrastructure, an operation and maintenance plan to ensure that the infrastructure will continue to function as designed;

☐ If the project involves dredging of 100 cubic yards or more or dredging of any amount in an Outstanding Resource Water, a Water Quality Certification issued by the Department pursuant to 314 CMR 9.00;

☒ If the Ecological Restoration Project involves work on a stream crossing, information sufficient to make the showing required by 310 CMR 10.24(10) for work in a coastal resource area and 310 CMR 10.53(8) for work in an inland resource area; and

☒ If the Ecological Restoration Project involves work on a stream crossing, baseline photo-points that capture longitudinal views of the crossing inlet, the crossing outlet and the upstream and downstream channel beds during low flow conditions. The latitude and longitude coordinates of the photo-points shall be included in the baseline data.

☐ This project is subject to provisions of the MassDEP Stormwater Management Standards. A copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) is attached.

☐ Provide information as the whether the project has the potential to impact private water supply wells including agricultural or aquacultural wells or surface water withdrawal points.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent
Appendix A: Ecological Restoration Limited Project Checklists

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

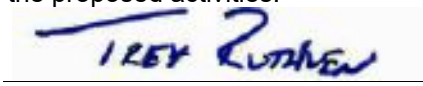
MassDEP File Number

Document Transaction Number

Chatham, MA
City/Town

Certification that the Ecological Restoration Project Meets the Eligibility Criteria

I hereby certify under penalties of perjury that the Ecological Restoration Project Notice of Intent application does not meet the Eligibility criteria for an Ecological Restoration Order of Conditions set forth in 310 CMR 10.13, but does meet the Eligibility Criteria for a Ecological Restoration Limited Project set forth in 10.24(8) or 10.53(4) whichever is applicable. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.



Signature of Applicant or Authorized Agent

Trey Ruthven
Printed Name of Applicant or Authorized Agent

June 28, 2022
Date

The certification must be signed by the applicant; however, it may be signed by a duly authorized agent (named in Item 2) if this form is accompanied by a statement by the applicant designating the agent and agreeing to furnish upon request, supplemental information in support of the application.

ATTACHMENT 1: USGS M**AP**


USGS
US Topo
Project Site


Project Site
Round Cove
Nickersons Neck
Avalon Point
Crows Pond
Ryder Cove
FOX HILL RD
CROWS POND RD
ORLEANS RD
SEAPINE RD
WOODLAND WAY
RIVERVIEW DR
TRAINING FIELD RD
LANDING LN
Stillwater Pond

ATTACHMENT 2: Project Description

2.1 Introduction

This document is an Ecological Restoration Limited Notice of Intent for Jackknife Beach Living Shoreline restoration project in the Town of Chatham, Massachusetts. The living shoreline restoration project was developed through a partnership between the Pleasant Bay Alliance, Town of Chatham, and Massachusetts Coastal Zone Management (MCZM). The collaboration began with Pleasant Bay Alliance and Town of Chatham receiving a FY20 MCZM Coastal Resilience Grant to assess salt marsh vulnerability, develop a range of living shoreline applications, and developed conceptual plan for living shoreline application. A second Coastal Resilience Grant in FY21 grant built on the initial work by refining site characterization and physical processes, conducting an alternatives analysis to develop the living shoreline conceptual plan into an implementable design which is what is presented in this Ecological Restoration Limited Notice of Intent filing.

This Ecological Restoration Limited Notice of Intent is submitted on behalf the Town of Chatham Natural Resources Department to the Chatham Conservation Commission. The submission of Ecological Restoration Limited Notice of Intent requires the following additional information above a standard Notice of Intent:

1. The project's ecological restoration goals:
   - The project seeks to stabilize this existing salt marsh along the tidal channel to Muddy Creek to enhance and restore the salt marsh resources which have been lost to erosion and climate change.
   - A key project goal was to utilize ‘green’ or nature-based solutions. The project design was able to achieve this goal and incorporate “living shorelines” components through the inclusion of ribbed mussels to further stabilize the marsh bank.
   - The project will restore portions of the salt marsh lost along the backside of the marsh utilizing cobble reinforced marsh (CRM). The CRM will be located just landward of the existing fringing marsh community to avoid impacting existing salt marsh. The proposed design profile of a CRM matches the elevation of the bordering marsh and then gradually increases in height to provide a transition as water level increase and then gradually slopes downward to meet existing grades on the landward side.
   - The design has been developed to address ongoing erosion and undercutting of the base of the channel banks, reduce the continued loss of salt marsh and restore salt marsh, which can naturally abate storm energy coupled with rising sea levels.

2. Location of the Ecological Restoration Project: The location of the Project is shown on the MassGIS Statewide Basemap presented below in Figure 2.1

Figure 2.1 Location of Jackknife Beach.

3. The construction sequencing and methodologies to complete the project are present below in Attachment 8 with the Project Plans following in Attachment 9.
4. The project is not located within the following resource areas: NHESP Priority and Estimated Habitats, DEP's Habitat of Potential Regional and Statewide Importance, there are no eel grass beds near the project site. The tide channel into Muddy Creek is mapped as a Shellfish Suitability Area. The project is proposing to incorporate shellfish into the living shoreline design. The Chatham Shellfish Division is a part of the project team and is currently growing ribbed mussels for the project. As designed the project will not cause any damage to Areas Subject to Protection under M.G.L. c. 131, § 40.
5. The proposed project is a living shoreline restoration and enhancement project along the outer tidal channel to Muddy Creek at Jackknife Beach. Due to the nature of the project, it is low in elevation and below the Annual High Tide line. As such, the project will not alter the coastal flooding impacts experienced within the project area or adjacent areas.
6. A plan for invasive species prevention and control. Invasive species control is outlined in the Maintenance and Monitoring Plan included in Attachment 6. There are presently no invasive plant species in the project area. Monitoring following the installation will include monthly visual inspects for the presence of any invasive plant species that could be introduced in the establishing marsh vegetation. If

invasive plant species are identified during the inspections process, they should be cataloged and hand weeded. The following monthly inspections should note if the invasive plant species has further established. If the invasive species has become further establish, a vegetation management plan to control the species should be created with the oversite of a knowledgeable consultant and implemented.

7. Any preliminary written determinations obtained from the Natural Heritage and Endangered Species Program (NHESP) in accordance with 310 CMR 10.11(2). The project is not located in a NHESP Priority or Estimated Habitats, therefore NHESP has not issued any determinations.
8. Time of Year restrictions and/or other conditions recommended by the Division of Marine Fisheries (DMF) or the Division of Fisheries and Wildlife in accordance with 310 CMR 10.11(3) through (5). DMF has provided comments on the project and set the Time of Year restriction period of May 1 to July 31 to avoid impacts to horseshoe crab eggs, larvae, and newly settled juveniles. The comment letter from DMF is attached in Attachment 3.
9. Proof that notice was published in the Environmental Monitor as required by 310 CMR 10.11(1). The notice was published on June 24, 2022 in the Environmental Monitor. A copy of the public notice is provided in Attachment 4.
10. A certification by the applicant under the penalties of perjury that the project meets the eligibility criteria set forth in 310 CMR 10.13, 10.24(8) or 10.53(4), whichever is applicable;
11. The proposed project does not involve the dredging of 100 cubic yards or more or dredging of any amount in an Outstanding Resource Water. Therefore a Water Quality Certification issued by the Department pursuant to 314 CMR 9.00: 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the United States Within the Commonwealth is not required before submission of the Notice of Intent to the Chatham Conservation Commission.

2.2.1 Description of Project Area

Jackknife Beach is located east of Route 28 and serves as the outlet of Muddy Creek into Pleasant Bay. Muddy Creek is a tidal river that discharges into the main basin of Pleasant Bay and serves as boundary between the Towns of Harwich and Chatham (Figure 2.1). Jackknife Beach is also a popular public recreation area under the jurisdiction of the Chatham Park and Recreation Commission, and one of only three public beach locations in Pleasant Bay.

The salt marsh that boarders the tidal channel into Muddy Creek and backside of Jackknife Beach, has been evolving for decades based on climate and estuarine processes, as well as anthropogenic (i.e., human use) changes to the system. The constantly evolving conditions and active recreational uses have stressed sections of the salt marsh leading to ongoing loss of marsh vegetation. The loss of salt marsh can be attributed to a number of factors; erosion and cleaving of the marsh bank along the tidal channel, trampling of salt marsh vegetation by recreational users seeking to utilize the beach, recreational kayakers/boaters accessing the water and storing boats on the marsh, shellfishermen accessing the channel and outer ebb shoal, as well as movement of

vehicles along the public accessway which is spatially limited due to the salt marsh bordering seaward edge and steep coastal bank on the landward boundary.

2.3 Project Area History

In the late 1800's a roadway bridge was installed at the mouth of Muddy Creek. Historic records indicate that the bridge spanned a majority of the marsh with the roadway supported on piles, which likely did not significantly affect tidal flows into Muddy Creek. The bridge was replaced with earthen fill embankment to support the roadway which separated Pleasant Bay from Muddy Creek around 1899. Initially, the upper basin was separated from Pleasant Bay allowing the upper system to change from a brackish estuary to a freshwater system. The embankment was breached, likely by the Hurricane of 1938, allowing brackish conditions to return to Muddy Creek. The upper estuarine system was hydraulically connected to Pleasant Bay through a pair of stone box culverts, which were approximately 2.5-feet wide, 3.75-feet in height, and 100-feet in length. The box culverts were undersized for the tidal prism causing a significant tidal restriction between Muddy Creek and Pleasant Bay. The small and restrictive hydraulic connection was shown to have a direct effect on water quality and wetland health upstream of Route 28 (MDEP, 2007). The Alliance modeled the size of inlet opening (Applied Coastal, 2009) that would be needed to restore water quality in Muddy Creek and determined that a single span bridge was the preferred alternative. The Alliance also estimated the likely habitat (Fuss & O'Neill, 2012) and water quality changes (SMAST UMASS-Dartmouth, 2011) and determined that the removal of the culverts to restore tidal flow would serve multiple ecological and community benefits.

Acting on this information, in 2016, the Towns of Chatham and Harwich replaced the box culverts with a single span bridge to restore the upstream creek to estuarine conditions and improve water quality. The tidal channel beneath the new bridge is trapezoidal, with a 22-foot wide base with side slopes opening up on 1.7:1 (horizontal to vertical) slope (Fuss & O'Neill, 2012). Increasing the hydraulic opening from Pleasant Bay to Muddy Creek intensified tidal flow in and out of Muddy Creek due to the resulting increase in tidal prism upstream of Route 28. Water quality monitoring conducted after opening of bridge indicated improvements to water quality within the upstream estuarine system. The marsh system upstream has also responded with increased productivity of salt marsh vegetation and species along with reductions of invasive and freshwater species which previously encroached on the salt marsh communities due to the limited tidal exchange and increased salinity in the upper system (Horsley Witten and Pleasant Bay Alliance, 2017). Downstream along Jackknife Beach, the Muddy Creek tidal channel has undergone morphological changes in response to the increased tidal flow and wider channel beneath the Route 28 bridge. Human activities have also impacted the salt marsh, ranging from damage along the parking areas to trampling vegetation along pathways to the beach and water.

Tidal hydrodynamics in Pleasant Bay have been rapidly evolving since the breaching of the Nauset Beach during a nor'easter on January 2, 1987, which in turn affect the tidal hydrodynamics along Muddy Creek. Breaching of the barrier beach initiated a period of cyclic evolution and inlet transition for Pleasant Bay (Giese 2019). The January 1987 breach rapidly deepened and developed into the dominant inlet for Pleasant Bay and Chatham Harbor. The eventual dominance of the 1987 Inlet resulted in a transition phase where the inner tidal channels within the Bay underwent morphological changes due to the formation of shoals and changes in tidal exchange between the inlets. In 2007, a second breach occurred approximately 2.5 miles north of the 1987 breach opposite Minister's Point. This inlet is now referred to as North Inlet and the more southern, 1987

inlet as South Inlet. The southern tip of North Beach Island, the remnant barrier island lying between the two inlets, subsequently grew and migrated south resulting in the coincident southern migration of South Inlet. During the April Fools storm of 2017, South Inlet breached the connection from the Chatham mainland to South Beach creating Fool's Inlet. Incoming flood tidal waters through South Inlet (and Fool's Inlet) now flow predominantly toward Nantucket Sound causing North Inlet to function as the dominant inlet to Pleasant Bay (Giese 2019).

The changing inlets and shoal dynamics over the past decades have influenced the evolution of Jackknife Beach and Muddy Creek, through continual changes in tidal elevations and range, as well as associated flow patterns. Variations in inlet position, number, and dominance have also influenced the natural response to storm conditions within Pleasant Bay. All of these factors can have a significant impact on the salt marsh along the backside of Jackknife Beach due to the narrow range in elevation across the marsh surface and inability of the marsh to migrate landward in response to trends in tidal elevations and sea level driven by inlet dynamics of Pleasant Bay and large-scale changes in sea level and storm intensity.

2.4 Existing Conditions

The initial assessment of Jackknife Beach as a potential living shoreline site identified a number of concerns related to the degradation of salt marsh adjacent to the upland areas. These concerns included losses of salt marsh along the tidal inlet channel to Muddy Creek, and decreasing salt marsh vegetation east of the bridge opening on the northside of the channel. Before evaluating measures and methods for stabilizing and preventing further loss of salt marsh, a field survey was conducted by Wilkinson Ecological Design (Wilkinson) and Applied Coastal Research and Engineering (Applied Coastal). The field survey delineated existing salt marsh boundaries, characterized the low coastal dunes and accompanying wetland resource areas, documented the site and marsh conditions through photography, and collected additional topographic and bathymetric data.

2.5 Salt Marsh Delineation

Edge of the salt marsh was delineated and flagged across the entire Jackknife Beach complex east of Route 28 on November 7, 2020 by Wilkinson. The low coastal dunes adjacent to the salt marsh were located and flagged. Flagging was then surveyed by Applied Coastal using a Leica Viva GS08 GNSS receiver RTK network rover coupled with a Leica Viva CS15 3.5G Data Collector system. The survey data was collected in Massachusetts State Plane Coordinates Horizontal Datum and North American Vertical Datum of 1988 (NAVD88). The delineated salt marsh boundary is shown in Figure 2.2, along with the project area being considered for solutions to restore and minimize losses to the salt marsh.

The seaward crest of the salt marsh was surveyed along the tidal channel during the November 2020 field evaluation. A series of four bank surveys were conducted in 2016 (Applied Coastal 2017) as part of the Route 28 bridge construction monitoring program conducted by the Pleasant Bay Alliance, and once in 2015 prior to construction by Massachusetts Division of Ecological Restoration. The addition of updated bank survey data provides the ability to identify areas of movement in the channel and examine if there has been sustained migration or movement in the channel over the past 4 years. The comparison of bank surveys is shown in Figure 2.3, which depicts the bank crest positions between 2015 and 2021. Changes in shoreline position are presented in Figure 2.4 through graphical representation of calculated annual erosion/accretion rates between the

2016 and 2020 surveys. The rates of change are calculated along shore-perpendicular transects illustrated in the figure. The northern shoreline of the channel has experienced erosion ranging from 0.5 to 1.5 feet per year. The erosion of the salt marsh along the shoreline is partially attributable to intensification in ebb tide currents associated with increases in tidal prism upstream of Route 28. Additionally, the marsh surface was also noted in 2016 as being lower in elevation than the adjoining marsh. The low elevation relative to the surrounding marsh increases the likelihood of prolonged inundation and drowning of the vegetation and loss of root systems to help stabilize the peat soils.

The southern side of the tidal channel shows that the channel immediately after the bridge has remained stable with minimal change in shoreline position. The survey data does not illustrate the undercutting of the bank occurring along this stretch of salt marsh. Undercutting was measured from the bank face and ranged from 0.5 - 1.6 feet, as shown in Figure 2.5 and Figure 2.6. At the time of the November 2020 survey, a fissure in marsh peat surface was observed running parallel to the tidal channel. Over the next two-months the undercutting continued, and gravity caused the peat surface to collapse into the tidal channel as shown in Figure 2.7 and Figure 2.8. The calculated erosion rates in Figure 2.4 do not illustrate or predict the episodic erosion resulting from the undercutting due to the relative short time interval between surveys relative to the episodic erosion occurrences. Shoreline change data shows a significant amount of erosion occurring around the first 90-degree bend downstream from the Route 28 bridge with erosion rates ranging from 0.5 to 1.75 feet/year. Erosion was observed in this area during the 2016 monitoring program. The marsh plain along the channel bend was noted to be lower in elevation than the surrounding marsh, making the salt marsh vegetation more susceptible to prolonged inundation which can lead to the drowning of salt marsh vegetation and loss of root systems to help stabilize the peat soils. Spartina alterniflora can tolerate being submerged, but if the low elevation and effects of sea level rise push the rate of submergence beyond the tolerance limit the marsh vegetation will not survive. It is possible that the loss of the healthy root system contributed to the erosion. The edge of the marsh actively retreated during the 2016 six-month monitoring period, so it is foreseeable that erosion has continued resulting in the loss of salt marsh on the outside bend of the tidal channel.

Figure 2.2 Salt Marsh and regulatory resource areas along Jackknife Beach.

Figure 2.3 Measured bank position in 2015 (blue markers) and 2021 (red markers).

Figure 2.4 Shoreline erosion rates along the inlet channel to Muddy Creek between 2016 and 2020.

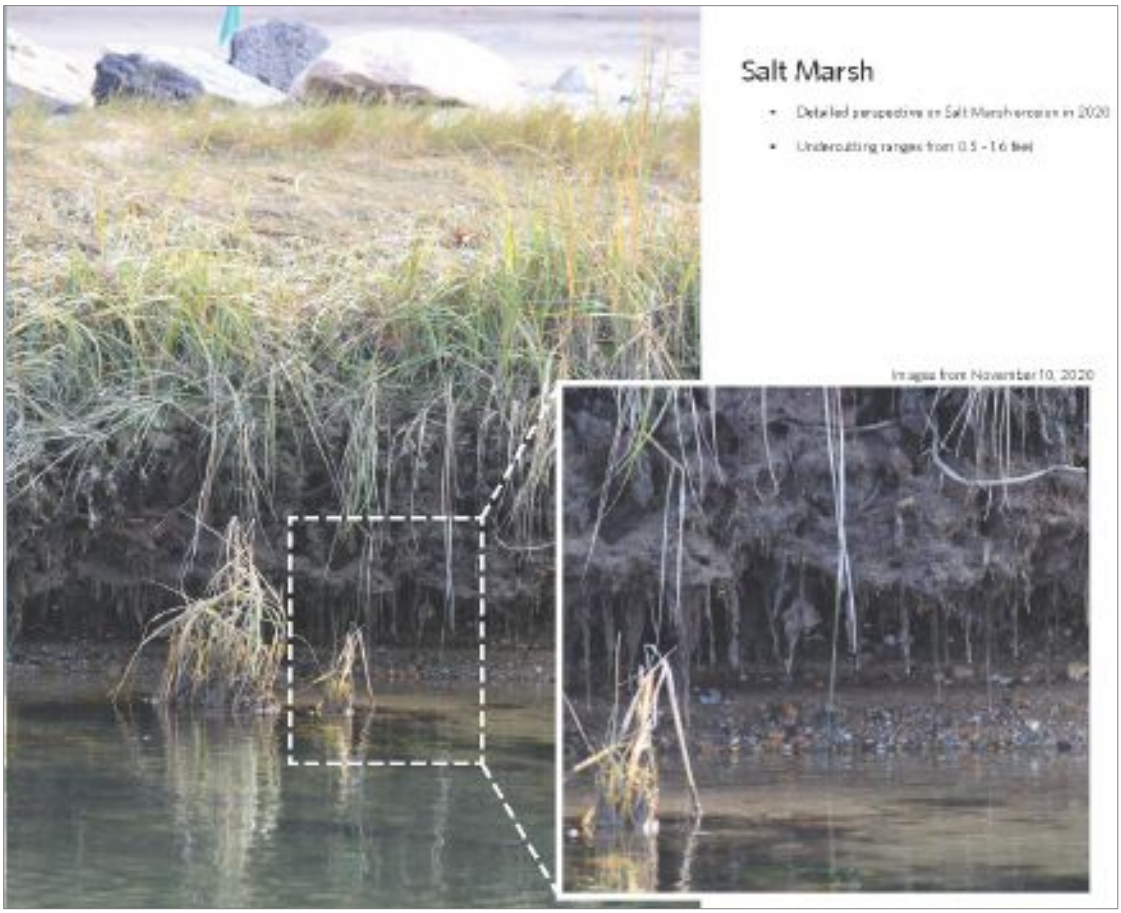


Figure 2.5 Detailed perspective of the peat bank undercutting along the tidal channel on November 10, 2020.

Figure 2.6 Detailed perspective of the peat bank undercutting along the tidal channel on November 10, 2020.

Figure 2.7 Photographs of a fissure developing in the salt marsh peat surface along the inlet tidal channel on November 10, 2020.

Figure 2.8 Photographs of the collapse of salt marsh bank between November 10, 2020 to March 31, 2021

2.6 Observed Conditions within the Salt Marsh

During two site visits to Jackknife Beach in November 2020 and March 2021 several different areas of concern were noted which need to be addressed as part of the restoration process to prevent continued degradation and loss of salt marsh. These factors are related to public use of Jackknife Beach, including vehicle passage and parking, foot traffic and trampling of marsh vegetation, and launching of paddle craft over the salt marsh, as shown in Figure 2.10 through Figure 2.11. Vehicle passage and parking along the earthen roadway has resulted in damage to the landward salt marsh edge, as shown in and will be important to address during the development of design alternatives. The Town of Chatham has taken steps to minimize the damage by setting large stones and concrete blocks to prevent vehicles from crossing into the salt marsh, however additional measures need to be considered to provide more prominent visual barriers and expand the limits of the barriers to protect the marsh edge. Visual barriers could also be effective in minimizing the public from straying from access pathways onto the vegetated marsh.

Signage could also provide educational information and directions on ways to minimize damage; for example, a signed and marked area for the launching and recovery of paddle craft could minimize the usage of marsh surface by recreational users looking to minimize the distance from their vehicles and the water.

Figure 2.9 A unvegetated areas of highly impacted salt marsh adjacent to the parking area. The areas have been depressed by tires and pedestrians and collect water during high tides and rainfall events resulting in the loss of salt marsh vegetation.

Figure 2.10 Photograph representing the heavy public usage of the Jackknife recreational area during the summer. The lack of boundaries between the salt marsh and parking areas has resulted in unintended parking and passage on vegetated salt marsh surface. An un-vegetated area of highly impacted salt marsh adjacent to the parking area has been depressed by tires is holding standing water on the left side of the photograph.

Figure 2.2 Illustration of the heavy public use of the Jackknife recreational area during the summer. Boats have been left on fringing areas of salt marsh vegetation. The lack of designated boat racks and boundaries between the salt marsh and the public recreational spaces has resulted in unintended damage to the salt marsh and coastal dune vegetation.

2.7 Topographic and Bathymetric Survey

A topographic and bathymetry survey of the entire Jackknife Beach complex was conducted to support the development, design, and permitting of alternatives. The survey was conducted by Coastal Engineering Company for the Town of Chatham. Coastal Engineering Company has been collecting monitoring data for years along this shoreline on behalf of the abutting property owner, Eastward Ho Country Club. Eastward Ho agreed to allow the Town of Chatham and Pleasant Bay Alliance to utilize the past monitoring data as a basis for the existing conditions survey. The wetland flagging data was shared with Coastal Engineering Company along with locations of the channel transects which had been part of the 2016 monitoring. The surveyors were able to locate the transect positions and measure an updated set of profiles. The survey was completed in February of 2021 and utilized by the Project Team as part of the alternative development.

2.8 Evaluation of Cross-Channel Geometry

Cross-channel bathymetry sections were established and surveyed upstream and downstream of Route 28 beginning in 2015 by Massachusetts Division of Ecological Restoration prior to the construction of the bridge over Muddy Creek. The transect endpoints are permanently marked with PVC pipe set vertically into the marsh. Two

additional transects were added to the post-construction monitoring conducted in 2016. The additional transects were added to the outer channel, in the vicinity of the Jackknife Beach access road, due to concerns about erosion and shifting of the channel that potentially could alter the functionality of the access road. During the existing conditions survey the transects downstream of Route 28 were measured to provide an updated view of the changes occurring.

Plots of the cross-channel profile data are presented in Figure 2.13 through Figure 2.19. The transect plots are presented from Pleasant Bay progressing upstream toward the Route 28 bridge. The numerical sequence of the transect order is presented in Figure 2.12. Each cross-section figure shows the data from the Fall of 2015 pre-construction survey and the June, July, September, and November 2016 post-construction surveys (There is no pre-construction survey data for Transects 10 and 11) and the February 2021 updated conditions survey.

Figure 2.3 Locations of the cross-channel monitoring transects.

The focus of examining the transect data is to look for sustained changes in channel geometry which could be attributed to degradation or losses in the marsh. Transect 1 is closest to Pleasant Bay and depending on the stage of the tide and storm surge levels is open to wave energy from a Nor'easter type storm event. The cross-sectional profiles for Transect 1 are shown in Figure 2.13, the data from 2021 shows a significant shift in the channel to the south. This can also be seen in the plan view of the bank data shown in Figure 2.3. A review of historic aerial photographs shows that the inlet to Muddy Creek has historically oscillated in position as the ebb shoal and shoreline

shifted, likely driven by Nor'easter storm events and nearshore littoral sediment migration. During March of 2018, three significant nor'easters resulted in noteworthy water levels within Pleasant Bay along with large locally generated waves which flooded the site and reportedly shifts in the beach spit. Similar shifts in inlet position should be expected to continue into the future. Review of Transect 2 (Figure 2.14) shows that the cross-section has not experienced any significant shifts similar to Transect 1, but it does show a significant retreat of the eastern marsh bank. The eastern edge of the channel has contained the main flow conveyance channel since 2016, the higher magnitude flows in this section of channel can scour weak or damaged sections of marsh along the channel edge causing eventual collapse into the channel as the peat soil is washed away or undercut. A deepening of the channel along the eastern bank is also shown in Transect 3, Figure 2.15, which corresponds to erosion shown in this area which was discussed above and shown in Figure 2.3. Transect 4, 10, 5, and 11 (Figure 2.16 to Figure 2.19 in the order of occurrence) show that channel geometry has remained relatively stable over the past four years. This trend is expected to continue with some minor adjustment as the system continues to respond to the changes in tidal range and winter storms. Erosion of marsh along the northside of the channel, which was discussed previously, can be seen in Transects 4 and 10. The steepening and cutting back of the southern shoreline is observable in Transect 5 and 11, corresponding to the erosion shown in Figure 2.4. At the time of the survey, the bank in this area had yet to cleave away and settle into the channel. The increase in depth on the southern side of the channel has resulted in bank being undercut and loss of salt marsh along the edge of the marsh plain. The slow continual undercutting is expected to continue at the sand/peat interface at the base of the channel, repeating the cycle of salt marsh cleaving away from the remaining marsh over time. This is an area where a designed nature-based enhancement of the bank face could minimize future erosion.

Overall, the erosional areas are predominately located within 150-feeto after the armored channel through the bridge along the straight section of channel and at channel bends where the complex nature of the tidal flows caused by curvature effects generate secondary currents. The secondary currents occur in the plane normal (across channel towards the marsh banks) to the primary flow direction (along channel the axis). The secondary currents appear at bends due to skewing of a portion of the cross-stream vorticity into the along-stream direction. The main, skew-induced secondary cell drives fast, near-surface water outwards at a bend, and carries slow, near-bed water inwards. The high intensity outward flow scours sediment along the face of the channel bank, while the near-bed return flow carries sediment to the inside of the bend where it is deposited as the flow velocities decrease. The changes in channel geometry resulting from the secondary flows can be clearly observed in the historic progression shown in the cross-sectional plots.

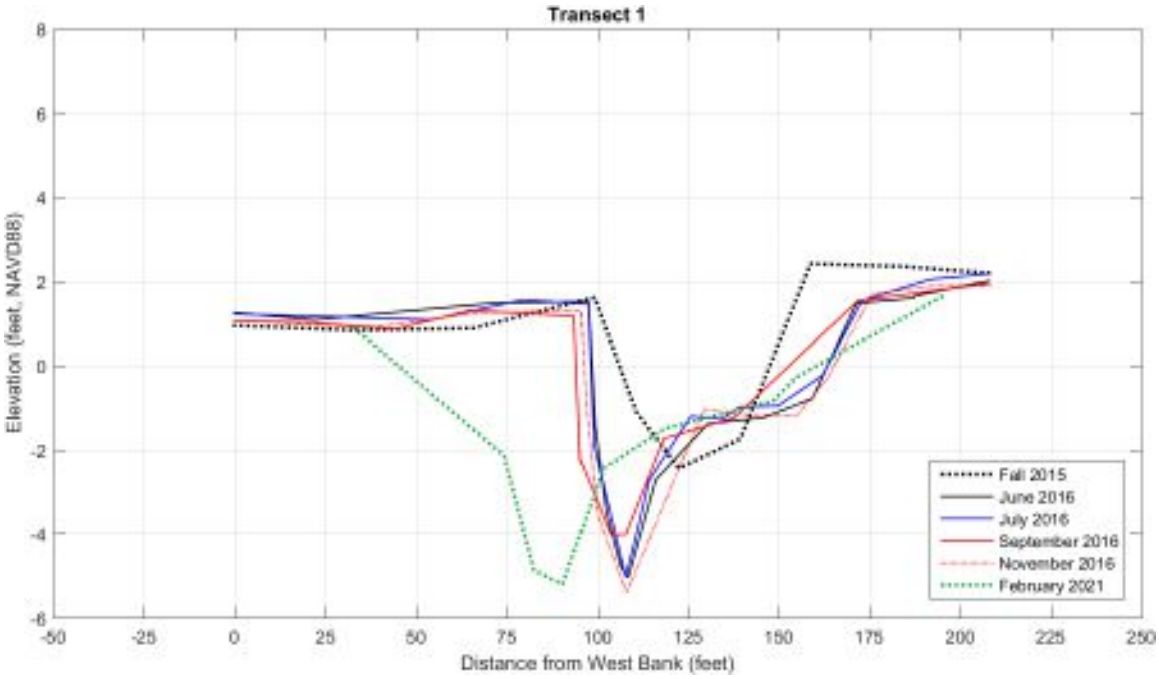


Figure 2.13 Cross-channel monitoring Transect 1. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

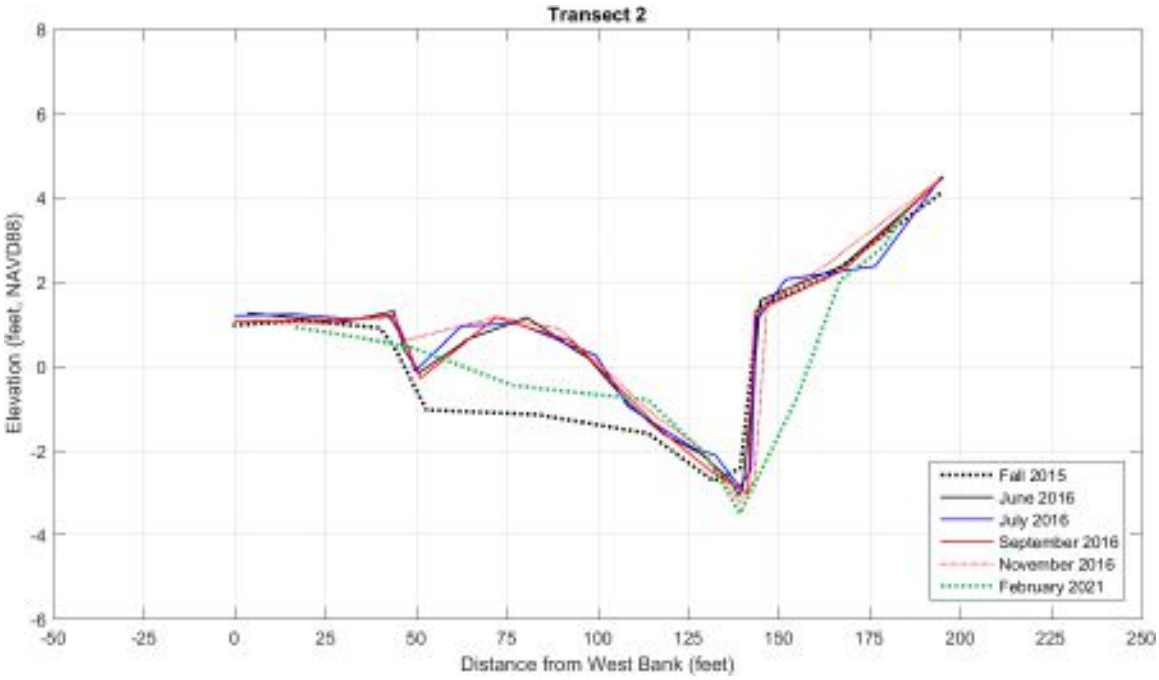


Figure 2.44 Cross-channel monitoring Transect 2. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

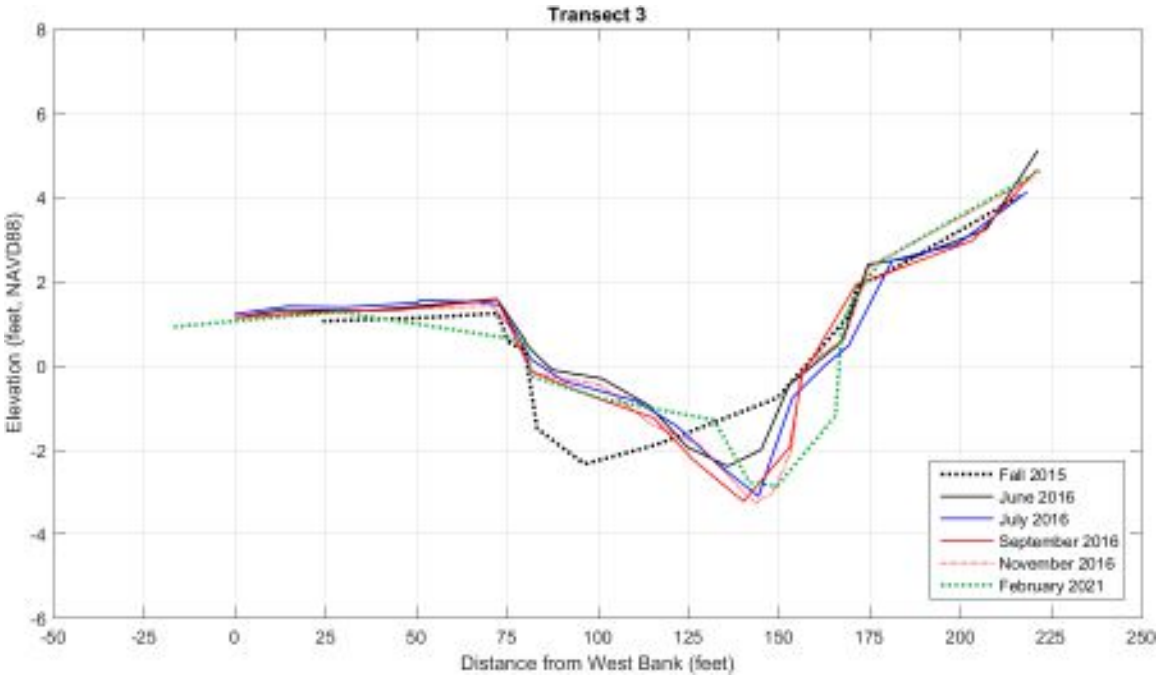


Figure 2.5 Cross-channel monitoring Transect 3. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

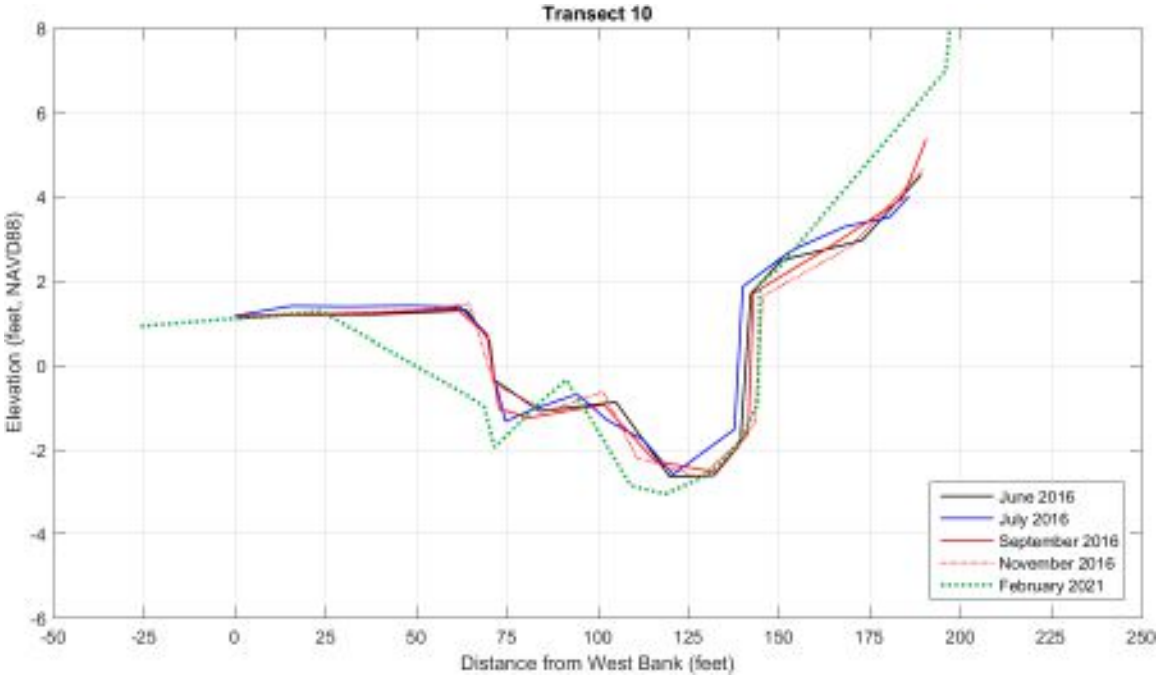


Figure 2.6 Cross-channel monitoring Transect 10. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

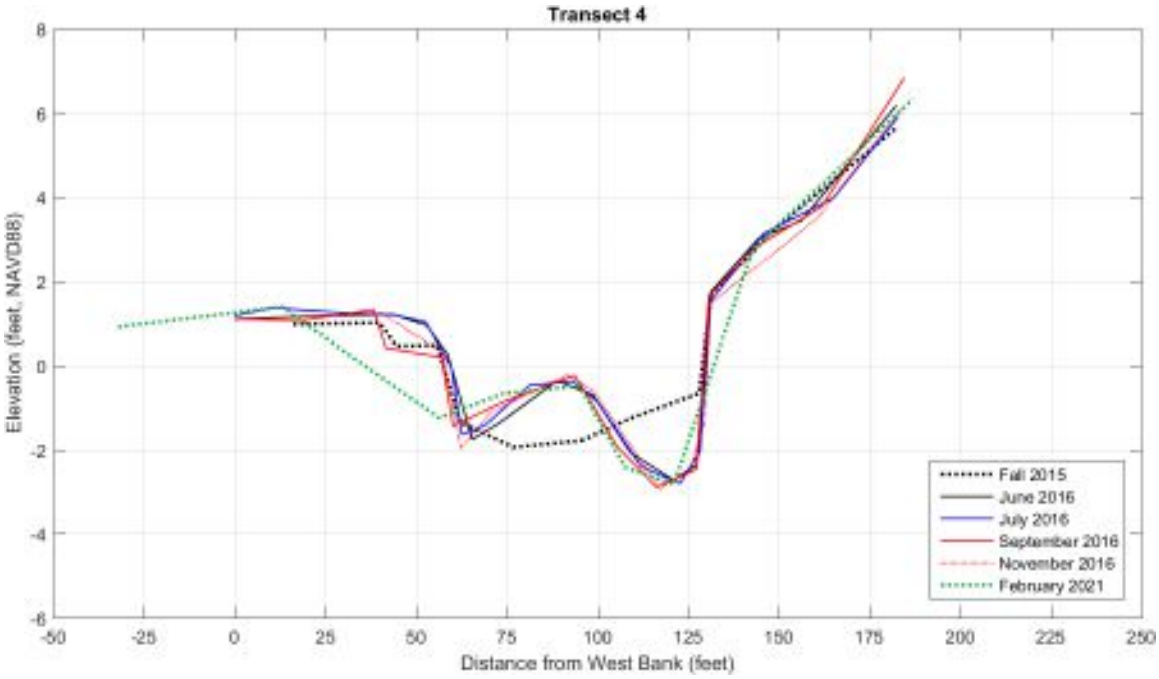


Figure 2.7 Cross-channel monitoring Transect 4. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

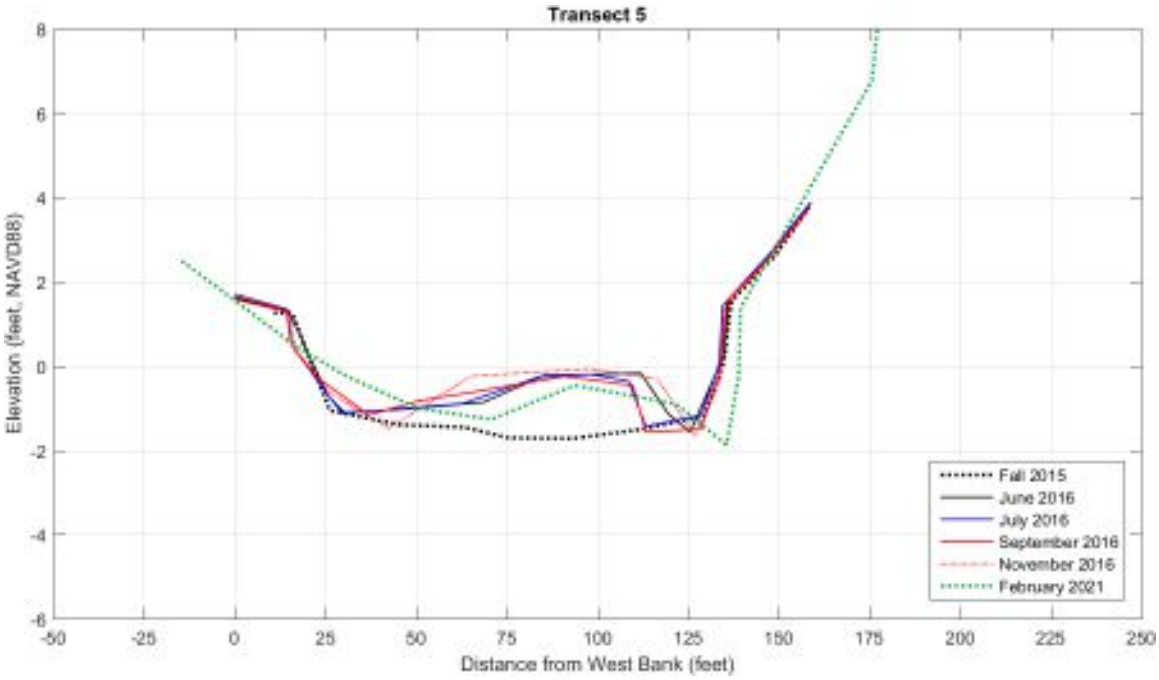


Figure 2.8 Cross-channel monitoring Transect 5. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

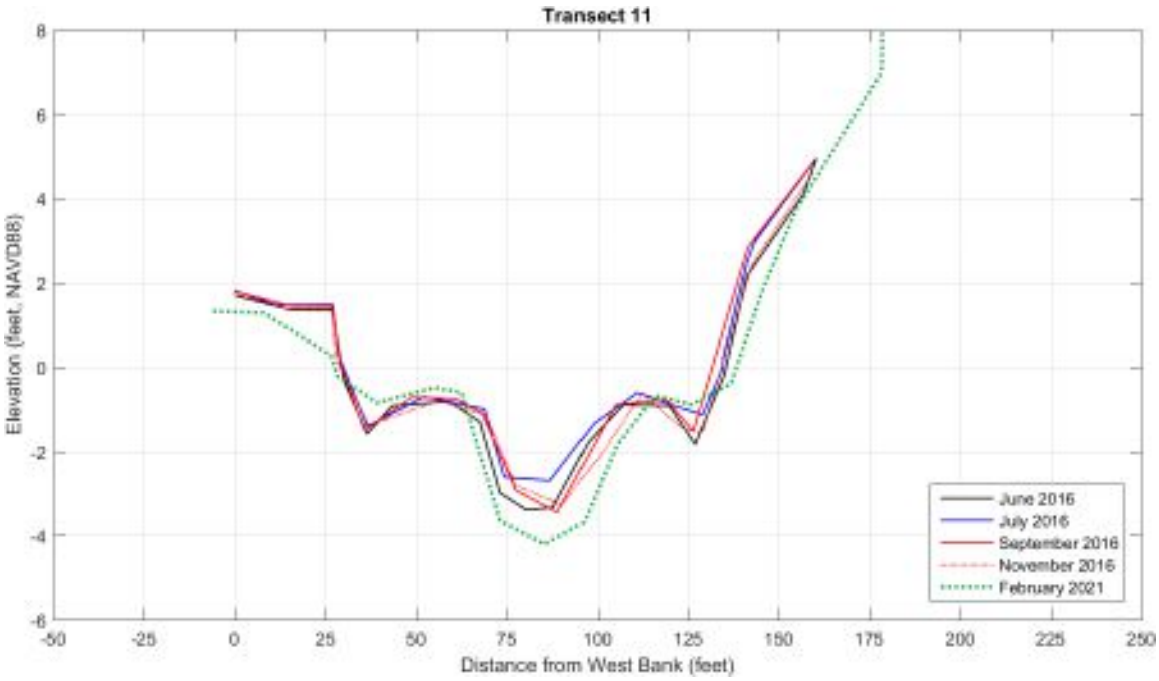


Figure 2.9 Cross-channel monitoring Transect 11. Distance are relative to the West Channel Bank and datum elevations are given relative to NAVD88.

2.9 Shellfish Survey

Town of Chatham Department of Natural Resources, Shellfish Division conducted a shellfish survey of Muddy Creek on April 14, 2021 and provided as Appendix A. The survey area was limited to Chatham waters within Muddy Creek. The survey did not locate significant abundance of shellfish in the project area. The survey report noted there were no indications of siphon holes which would indicate live soft-shell clams (Mya arenaria), quahogs (Mercenaria mercenaria) and/or razor clams (Ensis directus) within the project area. The most abundant shellfish resource surveyed in Muddy Creek were sub-legal quahogs, in addition to ribbed mussels attached to peat, blue mussels, a single sea clam, legal-sized quahog, and oyster (Chatham DNR, 2021). Figure 2.20 shows ribbed mussels attached to the peat bed along Muddy Creek.

Figure 2.10 Ribbed mussels were also observed within the Salt Marsh. Images below were taken within the project area March 11, 2021.

2.10 Proposed Project Description

The proposed living shoreline project incorporates 3,900 square feet of Cobble Reinforced Marsh (CRM) along the landward edge of the fringing salt marsh adjoining the public accessway and parking area. Along the channel bank, 12- to 18-inch coir rolls colonized with ribbed mussel will be used to minimize undercutting and erosion of the bank, as shown in Figure 2.21, for a total of 908 square feet. The coir rolls will be supported on bio-degradable coir envelope filled with marsh sediments to fill any areas of undercutting and restore portions of the bank which have been lost. The CRM will be vegetated with appropriate salt marsh vegetation along with areas within the fringing marsh where vegetation has been lost. Physical and visual barriers will be incorporated along the public accessway and parking areas to prevent future damage to the marsh.

The proposed design addresses the key issues by recreating bank along the channel through nature-based stabilization methods which incorporate salt marsh substrate, the mussel colonized coir rolls will slow and redirect tidal currents off the bank, the addition of shellfish will strengthen and stabilize the existing and new marsh bank. High marsh along the public access way and parking area will be restored utilizing a CRM technique which help the marsh adapt to climate change and sea level rise by allow the migration of sediment both seaward and landward. Augment the sediment pathways will enhance the transport of sediment onto the adjoining marsh plane to allow for natural adaptation of marsh surface.

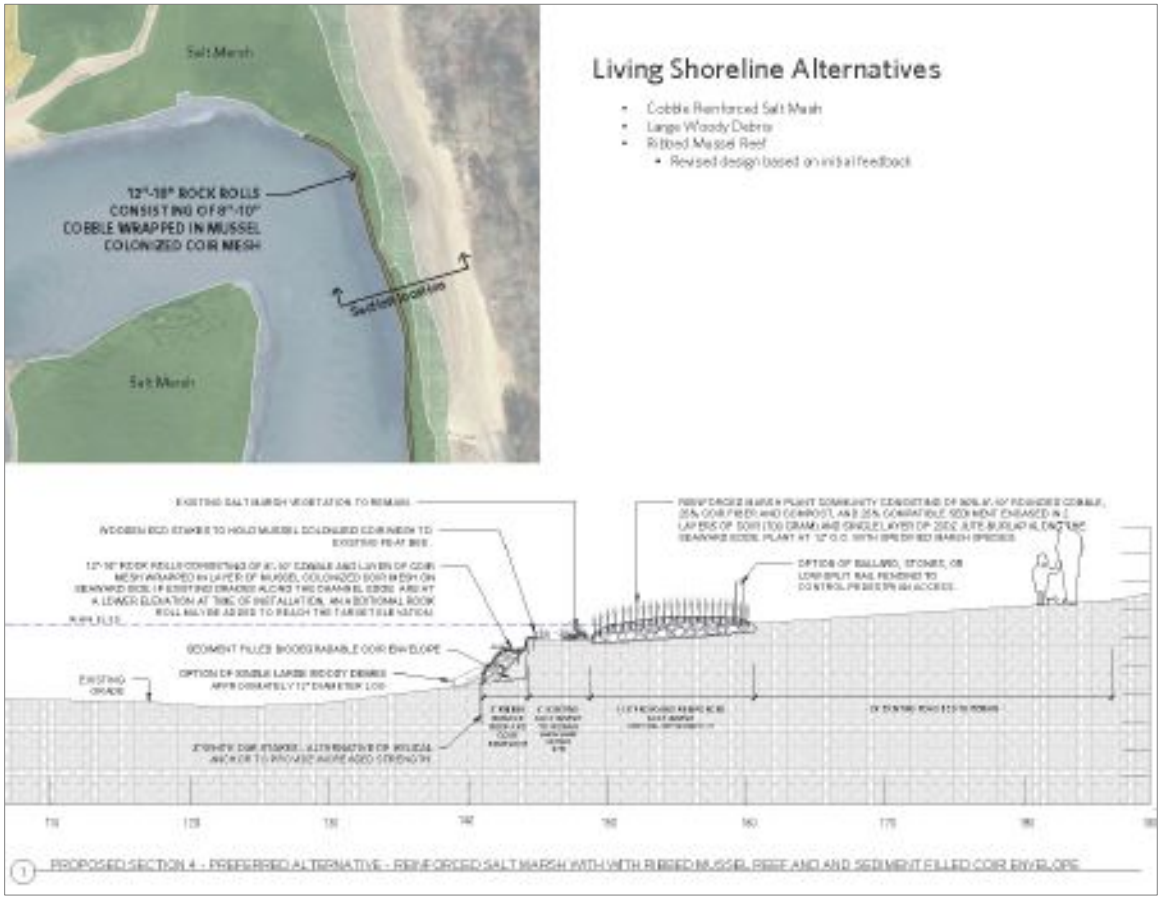


Figure 2.21 The preferred nature-based alternative to address salt marsh erosion along Jackknife Beach and Muddy Creek.

Additionally, public access corridors will be established to prevent the recreational users for unknowingly damaging the salt marsh. Initial public corridors were implemented over the Summer of 2021 utilizing 1-inch oak stakes and cord to demark the edge of pathways and prevent trampling of the marsh. The system worked well due to the ease of deployment and maintenance, the public utilized the marked corridors, and areas of trampled marsh began to reestablish. If required larger 4-inch posts could be utilized in high traffic areas and utilize cord/rope between the posts. This type of access corridor system will minimize the trapping of wrack material (e.g. seaweed, sticks, washed up debris, etc.) on the marsh surface and not impede water associated with tidal or storm flooding.

2.11 Potential Environmental Effects of Preferred Design

The proposed project has been designed and will be constructed using the best available measures to minimize adverse impacts to coastal and wetland resource areas as defined by the Massachusetts Wetlands Protection Act (WPA). The Proposed project is located within and/or abutting the following coastal resource areas:

- Land Subject to Coastal Storm Flowage (310 CMR 10.04)
- Salt Marsh (310 CMR 10.32)
- Land Containing Shellfish (310 CMR 10.34)
- Banks of or Land under the Ocean, Ponds, Streams, Rivers, Lakes, or Creeks that Underlie an Anadromous/Catadromous Fish Run ("Fish Run") (310 CMR 10.35)

The project is also located within an ACEC. An ACEC is not a designated resource area under the WPA, but makes the presumption that resource areas subject to 310 CMR 10.21 through 10.37 contained within an ACEC shall presume to be significant to any of the interests of M.G.L. c. 131, § 40 and the issuing authority shall presume that such area is significant to those interests. This designation is important to the proposed project because under 310 CMR 10.24 General Provisions it states any proposed project in or impacting that portion of the ACEC shall have no adverse effect upon those interests which would prevent the use of the proposed nature based solutions to restore and enhance the eroding salt marsh. The General Provisions does offers exceptions, which under 310 CMR 10.24(8) for Ecological Restoration Limited Project allows for restoration, enhancement, or management of riparian corridor re-naturalization and in-stream habitat enhancement. The preferred alternative has been designed around both those functions. The coir envelopes and rock rolls along the edge of the channel will enhance and stabilize the eroding salt marsh bank allowing for enhancement and stabilization of the salt marsh landward and above. The chosen materials will also enhance the instream habitat for planting of marsh vegetation at the higher elevations and shellfish within the water column. The outer layers of the rock rolls will have ribbed mussels naturally imbedded into the coir fabric allowing for enhancement of shellfish resources while protecting the salt marsh and minimizing the erosive force along the tidal channel. The CRM reinforced marsh proposed landward of the existing salt marsh, will restore lost fringe marsh and allow the salt marsh to migrate landward while providing a gradual increase in elevation to offset the current effects of sea level rise.

The following discussion and table presented below provide definitions of coastal resource areas that will be affected by the proposed project, a description of the proposed

work to occur within each resource area, and how the Project meets performance standards. A summary of resource areas is provided in Table 1.

Table 1 Summary of resource area impacts for proposed project

Resource Area	Anticipated Impact (square feet)
Land Subject to Coastal Storm Flowage	4,808
Salt Marsh	275
Land Containing Shellfish	908
Banks of or Land under the Ocean, Ponds, Streams, Rivers, Lakes, or Creeks that Underlie and Anadromous/Catadromous Fish Run	908
Coastal Beach	1,450
Area of Critical Environmental Concern (ACEC)	4,808

Land Subject to Coastal Storm Flowage

Pursuant to 310 CMR 10.04, Land Subject to Coastal Storm Flowage (LSCSF) means "land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater". The areas mapped by the Federal Emergency Management Agency (FEMA) on community Flood Insurance Rate Maps (FIRM) as the 100-year flood plain within the coastal zone are included within LSCSF. LSCSF may be significant to the interests of storm damage prevention, flood control, pollution prevention, and wildlife habitat. LSCSF in this area contains other jurisdictional resource areas which are important for storm damage prevention and flood control.

The current flood insurance rate map for this area, depicted as Figure 2.22, indicates that the entire Project Area is within the VE zone and is therefore subject to inundation by a 100-year storm with additional hazards due to wave activity. There are currently no performance standards for work in LSCSF. The proposed cobble reinforced marsh (CRM) will affect approximately 4,808 ft^2 (0.1 acres) of LSCSF. The proposed project will not alter existing flood pathways or flooding magnitudes. The proposed restoration project will enhance the storm damage prevention capacity of the site.

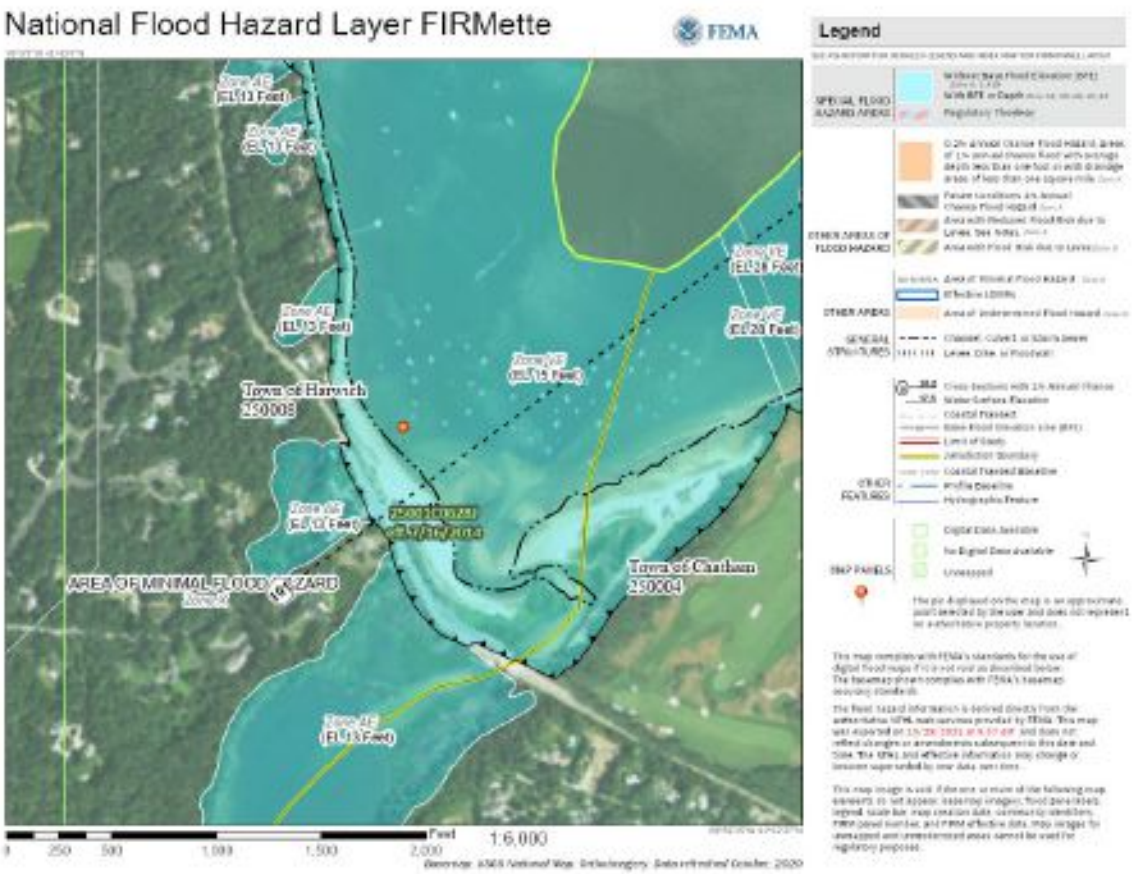


Figure 2.22 FEMA flood hazard layer FIRMette.

Salt Marsh

Salt Marsh is defined at 310 CMR 10.32(2) as "a coastal wetland that extends landward up to the highest high tide line, that is, the highest spring tide of the year, and is characterized by plants that are well adapted to or prefer living in, saline soils…". Some small overwash events are beneficial to salt marsh health. The coir material will be laid over and staked adjacent to the seaward edge of salt marsh along the channel. It is proposed to be done when the marsh is dormant, allowing the marsh to grow through the coir in the spring and therefore have minimal adverse effects. It is anticipated that there will be no impact to the salt marsh, however an area of 275 square feet (0.0006 acres) of fringing marsh has been identified adjacent to the proposed CRM as an area that could be temporarily impacted due to construction. The proposed project has been designed to avoid such impacts, but with construction occurring during the dormant season, overlap of the fringing marsh could occur on a limited basis.

The proposed project will adhere to performance standards for Salt Marsh (310 CMR 10.32(3 and 5) as follows:

a. 310 CMR 10.32(3): *The proposed CRM will not destroy or have an adverse effect on the productivity of the salt marsh; it will enhance the existing marsh and restore its resiliency effects by stabilizing the existing undercut marsh.*

b. 310 CMR 10.32(5): *The proposed project will restore or rehabilitate the existing salt marsh and therefore may be permitted in accordance with 310 CMR 10.11 through 10.14, 10.24(8), and/or 10.53(4)*

Land Containing Shellfish

Land Containing Shellfish is defined as "those resource areas likely to contain shellfish, to provide criteria for determining the significance of land containing shellfish, and to establish regulations for projects which will affect such land." Land Containing Shellfish can include Land under the Ocean, Tidal Flats, Rocky Intertidal Shores, Salt Marshes, and Land under Salt Ponds when any such land contains shellfish. Based on the Division of Marine Fisheries (DMF) suitability characterization, the sediments within the project area support soft shelled clams, as shown in Figure 2.23. The shellfish survey performed by the Town of Chatham did not recover any soft-shelled clams, however they did recover the following organisms:

- 6 sub-legal quahogs, all approximately 25mm
- 1 legal size quahog
- 1 sub-legal sea clam (approximately 3 inches)
- 3 ribbed mussels, attached to clumps of peat
- 3 blue mussels approximately 2.5 inches
- 1 oyster, approximately 2.5 inches

Also noted were two small flounder (most likely winter flounder), 1 green crab and 1 horseshoe crab. Further details of the survey are provided in Attachment 6.

There will be a temporary impact to Land Containing Shellfish with an overall area of 908 square feet (0.02 acres). It is important to note that the Town of Chatham Shellfish Constable is proponent of the project and working with the project team on the pilot project to test shellfish recruitment. The Shellfish Constable considers the proposed work a temporary disturbance and not a detriment to shellfish habitat in Muddy Creek or the surround area.

Figure 2.23 Shellfish suitability map from MassGIS.

Banks of or Land under the Ocean, Ponds, Streams, Rivers, Lakes, or Creeks that Underlie an Anadromous/Catadromous Fish Run ("Fish Run")

Pursuant to 310 CMR 10.35, banks of or land under ocean, ponds, streams, rivers, lakes, or creeks that underlie an anadromous/catadromous fish is defined as area within estuaries, ponds, streams, creeks, rivers, lakes or coastal waters, which is a spawning or feeding ground or passageway for anadromous or catadromous fish and which is identified by the Division of Marine Fisheries or has been mapped on the Coastal Atlas of the Coastal Zone Management Program. 'Fish Runs' are significant to protection of marine fisheries. Anadromous and catadromous fish ("the fish") are renewable protein resources that provide recreational, aesthetic and commercial benefits. In addition, throughout their life cycle such fish are important components of freshwater, estuarine, and marine environments and are food sources for other organisms. The coir rolls will be placed on land that underlies an anadromous/catadromous fish run. This will impact 908 square feet (0.02 acres).

The proposed project will adhere to performance standards for 310 CMR 10.35(3 through 5) as follows:

a. 310 CMR 10.35(3): *The proposed project will not have an adverse effect on the anadromous or catadromous fish run by impeding or obstructing the migration of the fish, changing the volume or rate of flow of water within the fish run, or impairing the capacity of spawning or nursery habitats necessary to sustain the various life stages of fish. The proposed stabilized salt marsh*

and ribbed mussel reefs will provide increased nursery habitat for young fish and additional food sources.

b. 310 CMR 10.35(4): *The project will adhere to the time of year restriction required by Massachusetts Division of Marine Fisheries (Attachment 3), which requires any work activities seaward of the marsh edge should occur outside of the time of year (TOY) restriction period of* ***May 1 to July 31*** *to avoid impacts to horseshoe crab eggs, larvae, and newly settled juveniles.*
c. 310 CMR 10.35(5): *The proposed project will not have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.*

Coastal Beach

Pursuant to 310 CMR 10.27(2), Coastal Beach refers to unconsolidated sediment subject to wave, tidal, and coastal storm action which forms the gently sloping shore of a body of salt water and includes tidal flats. Coastal beaches extend from the mean low water line to the coastal bank or the seaward edge of existing man-made structures. Coastal beaches dissipate wave energy, serve as sediment source, serve the purposes of storm damage prevention and flood control by dissipating wave energy, and provide habitats for shellfish, marine fisheries, birds and marine mammals.

Based on the project plans only a small section (approximately 70-feet in length) of the bank downstream of bridge could be classified as a coastal beach. The area represents a total of approximately 1,450 sf of Coastal Beach, measured from the existing mean low water line to the toe of the coastal bluff. The proposed project will not have an adverse impact on beach area along the tidal channel. The proposed project will enhance the surrounding salt marsh and increase the sediment supply to the overall marsh and beach system. The proposed project will not increase erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent downdrift coastal beach.

ATTACHMENT 3: MEPA CERTIFICATE and DMF Commment Letter With Time Of Year Restrictions

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
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Boston, MA 02114

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June 10, 2022

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Jackknife Beach Shoreline and Salt Marsh Restoration
PROJECT MUNICIPALITY	: Chatham
PROJECT WATERSHED	: Cape Cod
EEA NUMBER	: 16550
PROJECT PROPONENT	: Town of Chatham
DATE NOTICED IN MONITOR	: May 11, 2022

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61-62L) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project **does not require** an Environmental Impact Report (EIR).

Project Description

As described in the Environmental Notification Form (ENF), the project proposes ecological restoration activities (nature based and living shoreline) at Jackknife Beach in Chatham to address ongoing erosion and undercutting of channel banks, reduce the continued loss of salt marsh, and restore salt marsh. Proposed restoration incorporates 3,900 square feet (sf) of cobble reinforced marsh (CRM) along the landward edge of salt marsh bordering the public accessway and parking area. Along the channel bank, 12- to 18-inch natural fiber coir rolls, which have been colonized with ribbed mussels and weighted in the center with natural rounded cobble will be used to minimize undercutting and erosion of the bank. The coir rolls will be supported on a biodegradable coir envelope filled with marsh sediments to fill any areas of undercutting and restore portions of the bank which have been lost. The CRM will be vegetated with a mix of appropriate salt marsh vegetation along with areas within the fringing marsh where vegetation has been lost. Physical and visual barriers will be incorporated along the public accessway and parking areas to prevent future damage to the marsh. Additionally, public access corridors will be established to prevent recreational users unknowingly damaging salt marsh. Initial

public corridors were implemented and successfully used over the Summer of 2021 using oak stakes and cord to demark the edge of pathways and prevent trampling of the marsh. With the implementation of the restoration project, the Pleasant Bay Alliance (Alliance) and Town of Chatham (Town) will develop educational materials about the project which will be placed at appropriate locations around the site.

Project Site

The 0.11-acre project site includes Jackknife Beach, which is located east of Route 28 in Chatham and serves as the outlet of Muddy Creek (a tidal river) into Pleasant Bay. Muddy Creek serves as the boundary between the Towns of Harwich and Chatham. Jackknife Beach is a popular public recreational area under the jurisdiction of the Town. Muddy Creek and adjacent areas have been significantly altered over past centuries by human activities. After more than a century of tidal restriction, tidal flow was restored to Muddy Creek in 2016 by replacement of an earthen dike and culvert system with a single span bridge. The bridge has resulted in some impact on current velocities adjacent to Jackknife Beach.

The northern shoreline of the channel has experienced erosion ranging from 0.5 to 1.5 feet per year between 2016 and 2020. Erosion of salt marsh along the shoreline is partially attributable to intensification in ebb tide currents associated with increases in tidal prism upstream of Route 28 due to the bridge. In 2016, the marsh surface was also noted as being lower in elevation than the adjoining marsh, which increases the likelihood of prolonged inundation and drowning of vegetation and loss of root systems to help stabilize peat soils. The southern side of the tidal channel, immediately after the bridge, has remained stable with minimal change in shoreline position; however, it has experienced undercutting, which has caused episodic erosion as peat surfaces collapse. Shoreline change data shows a significant amount of erosion occurring around the first 90-degree bend downstream from the Route 28 bridge with erosion rates ranging from 0.5 to 1.75 feet/year. Erosion was observed in this area during the 2016 post-construction monitoring program. The marsh plain in the bend was noted to be lower in elevation than surrounding marsh, making the salt marsh vegetation more susceptible to prolonged inundation and erosion. The edge of the marsh actively retreated during the 2016 six-month post-construction monitoring period; the ENF indicates that it is foreseeable that erosion has continued resulting in the loss of fringing salt marsh on the outside bend of the tidal channel.

The project site is located within the Pleasant Bay Area of Critical Environmental Concern (ACEC). Wetland resource areas in the project area include Coastal Dune, Coastal Beach, Salt Marsh, Land Containing Shellfish (LCS), Land Under Ocean (LUO), Bank along a Fish Run and Land Subject to Coastal Storm Flowage (LSCSF). According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (Panel No. 25001C0628J, effective July 16, 2014), the entire project site is located within the VE Zone with a Base Flood Elevation (BFE) of 15 feet[1]. This region of Muddy Creek includes shellfish habitat for quahog and soft-shell clam; a shellfish survey (2021) identified live quahog, ribbed mussel, blue mussel, American oyster, and surf clam resources in the project area. Muddy Creek also provides passage for a variety of diadromous fish species including Alewife, American eel, white perch, and Atlantic tomcod. Shorelines near the project site have also been mapped as horseshoe crab nesting habitat.

[1] All elevations referenced in this Certificate are based on North American Vertical Datum of 1988 (NAVD88) unless otherwise specified.

The project site is not located within a Designated Geographic Area (as defined in 301 CMR 11.02) of an Environmental Justice (EJ) population.[2]

Environmental Impacts and Mitigation

Potential environmental impacts associated with the project include temporary alteration of coastal wetland resource areas including Coastal Beach (1,450 sf), Salt Marsh (275 sf), Bank along a Fish Run/LCS (908 sf), and LSCSF (4,808 sf). Measures to avoid, minimize and mitigate environmental impacts will include adherence to time-of-year (TOY) restrictions, enhancement of salt marsh and shoreline stabilization, and construction period best management practices (BMPs) including sediment and erosion controls measures.

Jurisdiction and Permitting

The project is undergoing MEPA review and requires preparation of an ENF pursuant to 301 CMR 11.03(3)(b)(1)(b) and 11.03(11)(b) because it requires Agency Actions and will result in the alteration of 500 or more lf of bank along a fish run or inland bank and is located within a designated ACEC. The project requires a Section 401 Water Quality Certification (WQC) and a Chapter 91 (c. 91) License/Permit from the Massachusetts Department of Environmental Protection (MassDEP). The Town received Coastal Resiliency Grants from the Massachusetts Office of Coastal Zone Management (CZM) in 2020 and 2021 for development, engineering, and permitting of the project, and may seek additional funding for project construction. The project is subject to Federal Consistency Review by CZM.

The project is seeking an Ecological Restoration Order of Conditions from the Chatham Conservation Commission (or in the case of appeal, a Superseding Order of Conditions from MassDEP). The project also requires submittal of a pre-construction notification (PCN) to the U.S. Army Corps of Engineers (ACOE) seeking authorization under the General Permits[3] for Massachusetts in accordance with Section 404 of the Federal Clean Water Act, and Project Notification to the Massachusetts Board of Underwater Archaeological Resources (BUAR).

Because the Town may seek additional Financial Assistance for project implementation, MEPA jurisdiction is broad in scope and extends to all aspects of the project that may cause Damage to the Environment, as defined in the MEPA regulations.

Review of the ENF

The EENF includes a description of existing site conditions, project description, an alternatives analysis and conceptual plans of proposed conditions including cross-sections. It provides a preliminary assessment of impacts and identifies proposed mitigation measures. Consistent with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, the EENF contains an output report from the MA Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (RMAT) (the "MA Resilience Design Tool"),[4] together with information on climate resilience strategies to be undertaken by the project. The Town has participated in several pre-filing meetings with Agencies

[2] "Environmental Justice Population" is defined in M.G.L. c. 30, § 62 under four categories: Minority, Income, English Isolation, and a combined category of Minority and Income.
[3] Specifically, General Permit 23 – Aquatic Habitat Restoration, Enhancement, and Establishment Activities.
[4] https://resilientma.org/rmat_home/designstandards/

including CZM, MassDEP, and the Massachusetts Division of Marine Fisheries (DMF). CZM has provided technical assistance throughout this process and its comments identify support for this restoration effort and the conceptual design of the project. DMF comments support the project's combined approach of combatting both tidal erosion as well as anthropogenic sources of marsh erosion at the site (i.e., installation of dinghy racks and/or signage clearly identifying suitable storage locations for small watercraft, creation of a designated launch area, etc.).

Alternatives Analysis

In addition to the No Action Alternative, the ENF includes a detailed evaluation of six alternatives (both "green" or nature-based solutions and traditional coastal engineering approaches) to stabilize and restore portions of the salt marsh within an ACEC including: Natural Fiber Roll Array and Envelopes; Open Weave Synthetic Fiber Rolls and Envelopes; Rock Sills, Stone Revetments, or Sheet Pile Seawalls; CRM; CRM with Large Woody Debris; and CRM with Ribbed Mussel Reef (the Preferred Alternative, as described herein). Alternatives were compared against the following criteria: quality of erosion protection; potential environmental impacts; constructability; maintenance; and protection of Jackknife Beach.

The No Action Alternative would allow the ongoing loss of salt marsh and erosion along the channel bank to continue at its present or higher rate in the near future. Jackknife Beach is an important public recreational area for the residents of Chatham. Future repairs and maintenance to the access way and parking area would continue until they were no longer feasible or permittable. In addition, loss of vegetation on the surface would likely expand areas of public use, further degrading adjacent salt marsh and banks along the tidal channel. No significant area exists for landward migration of the marsh over time. With the continued loss of marsh which can naturally abate storm energy coupled with rising sea levels, Jackknife Beach would likely experience exacerbated nuisance and storm flooding of the upland areas of the beach, parking area, and access road from Route 28. Fill may be required to preserve public access as water levels increase. The No Action Alternative was eliminated from further consideration because it will result in the continued loss of salt marsh associated with active and ongoing erosion and undercutting of the base of the channel banks and ongoing encroachment of the public on the marsh surface (i.e., foot and vehicle traffic, launching and storage of paddle craft) and does not provide long-term viability for Jackknife Beach.

The Natural Fiber Roll Array and Envelopes Alternative would include a temporary soft shore protection system to address erosion and stabilize coastal bank by reducing and minimizing the loss of the peat and natural sediments from the base of the channel bank to allow for additional stabilization and restoration of the salt marsh vegetation above. However, the natural degradation of these fibers which are regularly submerged would not provide sufficient time for a plant community to become fully established based on the intertidal characteristics of Muddy Creek. While this alternative would provide good erosion protection, is biodegradable and includes straightforward construction process, it was dismissed because it is generally not designed to withstand the daily tidal inundations or associated tidal currents and would degrade before establishment of a plant community to help stabilize marsh sediment, would require monitoring and potential maintenance or reconstruction after storms, and is not expected to prevent the medium and long-term continued loss of salt marsh or prevent future damage to the public access way to Jackknife Beach. It is anticipated the roadway could be severely compromised in a period of 10 years, depending on storm severity and the rate of sea level rise.

The Open Weave Synthetic Fiber Rolls and Envelopes Alternative would include use of synthetic fibers in conjunction with natural fibers as part of a temporary shore protection system to prevent the structural fabric from degrading as rapidly and allow vegetation to grow through the fabric. Use of synthetic fibers could potentially extend the design life five to 10 years over the natural fiber solutions. While this alternative would provide good erosion protection designed to withstand daily tidal inundations, includes an increased design life to allow vegetation to fully establish and withstand storm energy, and includes straightforward construction process, it was dismissed because of potential UV degradation of synthetic materials and potential lack of regulatory approval for synthetic materials within an ACEC (which can be released into the environment when erosion occurs) when natural fiber materials exist that can be designed to provide similar levels of protection and function.

The Rock Sills, Stone Revetments, or Sheet Pile Seawalls Alternative would include a hardened shore protection system along the eroding channel banks to prevent further erosion of the salt marsh. While this alternative would provide moderate erosion protection, include straightforward construction, and require limited maintenance, it was dismissed for a number of reasons including regulatory limitations for this type of structure within the ACEC; requirement of a variance from the Wetlands Protection Act (WPA) and ACEC Regulations; potential acceleration and redirection of tidal flows causing increased erosion at the ends of the structure and scour at the toe of the structures; and potentially significant impacts to wetland resource areas during construction and in the long-term that could ultimately threaten the larger salt marsh system, access way, and parking area.

The CRM Alternative (living shoreline) would incorporate a shoreline stabilization approach to mimic features of the natural environment (create or enhance habitat or wetland resources) and reduce erosion. The critical design parameters of a living shoreline system along Muddy Creek are tidal range, elevation, soil bearing capacity, and height. The proposed design profile of a CRM would match the elevation of the bordering marsh and then gradually increase in height to provide a transition as water level increases and then gradually slope downward to meet existing grades on the landward side. The CRM is encased with two layers of coir and single layer of jute-burlap along the seaward edge. The coir envelope will be filled with a mix of sediments tailored to the site conditions. The surface of the CRM is planted with marsh species on 12-inch centers, resulting in a stable low relief extension of the salt marsh landward of existing marsh boundary. While the CRM Alternative would restore or increase the overall extent of salt marsh, additional solutions would be required to address the undercutting and loss of salt marsh along the channel edge at Jackknife Beach because the CRM would need to be located just landward of existing fringing marsh community to prevent damage to it. Therefore, ongoing erosion of the peat bank, which underlays the fringing marsh would continue unabated. The CRM is expected to ultimately become undermined. All biodegradable components of a CRM would be fully biodegraded by the time erosion may threaten it, and the cobble stone components, which would enter the inlet channel if the CRM was undermined by erosion is similar to cobble amongst sediments naturally found within the tidal channel.

The CRM with Large Woody Debris (LWD) Alternative would use CRM and add natural wood logs along the channel banks to stabilize and reduce the tidal/wave energy to reduce erosion. Logs are anchored into the banks extending into the channel to create turbulence as the current moves around them, which dissipates energy and flow velocities. The reduction in erosive forces can aid in the reestablishment of banks and minimize scour and undercutting of channel bank. Naturally occurring LWD of varying sizes is presently located in Muddy Creek in the vicinity of the project area, and no impacts, other than the accretion of sand, have been observed. Based on the tidal and environmental

forces occurring along Muddy Creek, logs could be incorporated in two locations along the channel to dissipate energy and minimize the undercutting of the bank. Public safety concerns about tidal currents carrying people along the channel and into the logs and recreational uses of the channel for shellfishing, boating, and swimming along the channel were considered; it was determined that open root systems may not be appropriate for this site and the volume of logs would need to be limited to avoid impacts to the public. Without the enhanced turbulence generated as flow passes by the submerged root system, additional logs would be required to generate the same level of scour reduction. LWD would be installed either in an existing peat bed where no salt marsh exists or under the salt marsh surface within peat beds which support fringing salt marsh. This alternative would offer good erosion protection, minor to moderate environmental impacts, straightforward construction process, limited maintenance (though regular monitoring and adaptive management is recommended), and good protection of Jackknife Beach with the inclusion of LWD to redirect and create turbulence in the tidal currents and dissipate tidal energy to help minimize the scour forces undermining the existing fringing marsh and enhance the viability of the existing marsh and newly created area of CRM. The Town is still considering using LWD in selected locations in conjunction with the Preferred Alternative described below.

The Preferred Alternative (CRM with Ribbed Mussel Reef) would incorporate shellfish into the CRM (living shoreline) to increase the resiliency of the project while enhancing habitat diversity. Addition of shellfish can have multiple benefits such as reducing erosion, dissipating wave energy and floods, filtering water, attracting wildlife, and storing carbon and nitrogen. Pairing ribbed mussel reefs with the CRM will help to ensure sustainability and longevity of the eroding marsh bank by both protecting the eroding peat shelf from further erosion and creating turbulence in the regular tidal currents to dissipate tidal energy and trigger a moderate attenuation of sediment out of the water column. If colonization of the ribbed mussels is ultimately unsuccessful, the coir rolls along the bank would remain and protect the bank from erosion. This alternative would offer good erosion protection, minor environmental impacts, straightforward construction process, limited maintenance (though regular monitoring and adaptive management is planned as part of the project), and good protection of Jackknife Beach with the inclusion of a ribbed mussel reef to manage the immediate erosion of the salt marsh bank.

The ENF describes additional stabilization measures to address both the environmental factors resulting in the decline of salt marsh adjacent to Jackknife Beach and the outer channel of Muddy Creek and the human component to ensure any restoration project maximizes the probability of success. Measures include symbolic fencing corridors to minimize the intrusion of vehicles and people onto the vegetated salt marsh; a kayak, canoe, paddleboard launching area; and locations for boat racks to minimize the storage of boats on salt marsh.

Wetlands, ACEC and Waterways

The project includes temporary impacts to coastal wetland resources including Coastal Beach, Salt Marsh, LCS, Fish Runs, and LSCSF. The Chatham Conservation Commission will review the project for its consistency with the Ecological Restoration Limited Project provision of the Wetland Protection Act (WPA), the Wetlands Regulations (310 CMR 10.00) and associated performance standards. MassDEP will also review the project for consistency with the c. 91 regulations (310 CMR 9.00). The project is subject to CZM federal consistency review and must be found to be consistent with CZM's enforceable program policies. I refer the Town to comments from CZM, MassDEP, and DMF which provide guidance and recommendation for further analysis and identify outstanding issues that

must be addressed during permitting.

The project involves placing a sand filled coir bag and one or two 12-to-18-inch diameter coir and jute wrapped rock rolls on the scarped face of the existing salt marsh. The rolls are proposed to be filled with coconut fiber and 8-to-10-inch rounded cobble, similar to the natural cobble found in Massachusetts beaches and streams. The ENF describes how the project is consistent with the guiding principles of the 2018 resource management plan for the Pleasant Bay ACEC to sustain and regenerate the health and productivity of the Bay's eco-system; encourage levels of recreational activity in the Bay and its watershed; enhance opportunities for public access to and enjoyment of the Bay; and preserve features that contribute to the Bay's unique character. The project proposes to balance public access with preservation of the saltmarsh to allow both to coexist and thrive. Any project impacting portions of ACEC determined to be significant to the WPA cannot have an adverse effect on those interests pursuant to 310 CMR 10.24(5); exceptions include Ecological Restoration Projects (310 CMR 10.24(8)) such as the proposed project. Work should be performed in accordance with any TOY restrictions determined by DMF to avoid impacts to marine fisheries resources as further described below. The project should avoid impacts to the 275-sf area of fringe salt marsh near the project area during construction pursuant to 310 CMR 10.32(3).

As part of the permitting process, DMF and CZM comments recommend that the Town consider using one coir wrapped rock roll instead of two; identify the source of ribbed mussels proposed for colonization of coir rolls; justify, and modify as necessary, the proposed salt marsh species mix and percent composition; provide more representative cross-sections depicting the actual height of the scarp and proposed treatments; refine the range in the diameter of rounded cobbles that will be used; develop more details to explain how the peat and vegetation will be handled during construction to address the variety of sizes of pieces of salt marsh calving off the shoreline (describe whether the rock roll will go around pieces of marsh and if fill will be placed in any gaps); refine the design of the CRM by raising the grade or regrading the dirt access roadway behind the proposed marsh enhancement to help minimize ponding of water behind the newly restored marsh; consider additional barriers to discourage use of any alternative access points over marsh vegetation (e.g., fencing); develop an adaptive management plan if initial designs prove to be ineffective in reducing or eliminating foot traffic over marsh habitat; further develop monitoring plans in consultation with Agencies (the ENF presents a proposed monitoring and maintenance plan in Section 4.0 which identifies preparation of monitoring reports). Any work activities seaward of the marsh edge should occur outside of the TOY restriction period of May 1 to July 31 to avoid impacts to horseshoe crabs.

Comments from the MassDEP Waterways Regulation Program (WRP) indicate that portions of the project site appear to include filled tidelands subject to c. 91 jurisdiction. WRP has determined that proposed activities would be classified as a water-dependent use pursuant to 310 CMR 9.12 and will require authorization through a c. 91 Waterways License. WRP will perform a full technical review of the project once detailed plans are submitted with the c. 91 License Application that meet the minimum filing standards set forth in 310 CMR 9.11(3) including using best available information to establish the Historic Mean High-Water elevation.

Climate Change Adaptation and Resiliency

Effective October 1, 2021, all MEPA projects are required to submit an output report from the MA Resilience Design Tool to assess the climate risks of the project. Based on the output report

attached to the ENF, while the project has a moderate project score for ecosystem benefits, it has a high exposure rating based on the project's location for the climate parameter sea level rise/storm surge. The MA Resilience Design Tool recommends a target planning horizon of 2030 for this climate parameter, based on user inputs estimating the useful life of the project to be ten years. A recommendation for a design storm event was not given as "Natural Resource project assets" do not receive an asset risk rating through the MA Resilience Design Tool. As described in the ENF, the Alliance conducted a shoreline and salt marsh vulnerability assessment in the Pleasant Bay area, evaluated vulnerable shoreline areas for suitability for a range of living shoreline applications, and developed and refined conceptual plans for living shoreline applications in two municipally owned locations, one of which is the project site.

Restoration is proposed in response to salt marsh erosion that has been attributed to both increased tidal erosion following a dike and culvert replacement project as well as well as erosion from foot traffic, vehicle movement, and boat storage. Salt marsh can naturally abate storm energy coupled with rising sea levels. The project will address threats to fringing marsh through use of nature-based stabilization methods (living shoreline). Along the edge of the channel bank natural fiber rolls colonized with mussel and weighted by natural rounded cobble will stabilize the existing eroding bank and restore marsh bank along portions of the tidal channel. Higher fringing marsh along the public access way and parking area will be restored using a CRM technique which help the marsh adapt to climate change and sea level rise while also feeding sediment onto the adjoining marsh plane to allow for natural adaptation of marsh surface. The project will not alter floodwater pathways or velocities. The use of beach and marsh compatible sediments will allow flood and stormwater to continue to flow across the project area, or during small events the project will enhance the ability of the marsh to allow water to naturally soak and filter into the groundwater. The proposed project will not alter the flooding characteristics of any neighboring properties. The Town should develop a comprehensive plan to assess, implement and track nature-based solutions that will aid in mitigating damage from SLR and storm surge in Muddy Creek and Pleasant Bay.

Construction Period

All construction activities should be managed in accordance with applicable MassDEP regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). The Town will install BMPs on the project site to control erosion and sedimentation during the construction period. The project should include measures to reduce construction period impacts (e.g., noise, dust, odor, solid waste management, etc.) and emissions of air pollutants from equipment, including anti-idling measures in accordance with the Air Quality regulations (310 CMR 7.11). I encourage the Town to require contractors to use construction equipment with engines manufactured to Tier 4 federal emission standards or select project contractors that have installed retrofit emissions control devices or vehicles that use alternative fuels to reduce emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and particulate matter (PM) from diesel-powered equipment. Off-road vehicles are required to use ultra-low sulfur diesel fuel (ULSD). If oil and/or hazardous materials are found during construction, the Town should notify MassDEP in accordance with the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). The Town should develop a spills contingency plan. All construction activities should be undertaken in compliance with the conditions of all State and local permits. I encourage the Town to reuse/recycle construction debris to the maximum extent.

Conclusion

The ENF has adequately described and analyzed the project and its alternatives, and assessed its potential environmental impacts and mitigation measures. Based on review of the ENF and comments received on it, and in consultation with Agencies, I have determined that an EIR is not required.

June 10, 2022
Date

Bethany A. Card

Comments Received:

05/26/2022 Massachusetts Office of Coastal Zone Management (CZM)
05/31/2022 Massachusetts Department of Environmental Protection (MassDEP) – Southeast Regional Office (SERO)
05/31/2022 Massachusetts Division of Marine Fisheries (DMF)

BAC/PPP/ppp

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

MEMORANDUM

TO: Bethany Card, Secretary, EEA
ATTN: Purvi Patel, MEPA Office
FROM: Lisa Berry Engler, Director, CZM
DATE: May 26, 2022
RE: EEA-16550, Jackknife Beach Saltmarsh Restoration, Chatham

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the above-referenced Expanded Environmental Notification Form (EENF), noticed in the *Environmental Monitor* dated May 11, 2022, and offers the following comments.

Project Description

The proposed saltmarsh restoration project is located at the mouth of Muddy Creek and is within the Pleasant Bay Area of Critical Environmental Concern (ACEC). The project design incorporates 3,900 square feet of cobble reinforced marsh (CRM) along the landward edge of the fringing salt marsh adjoining the public accessway and parking area. Along the channel bank, 12- to 18-inch natural fiber coir rolls, which have been colonized with ribbed mussel and weighted in the center of the roll with natural rounded cobble will be used to stop undercutting and erosion of the bank. The coir rolls will be supported on a bio-degradable coir envelope filled with marsh sediments to fill any areas of undercutting and restore portions of the bank which have been lost. The CRM will be vegetated with appropriate salt marsh vegetation along with areas within the fringing marsh where vegetation has been lost. Physical and visual barriers will be incorporated along the public accessway and parking areas to prevent future damage to the marsh. Additionally, public access corridors will be established to prevent recreational users unknowingly damaging salt marsh.

The permits required for the project include U.S. Army Corps of Engineers General Permit, MassDEP Chapter 91; Massachusetts CZM federal consistency certification, Notice of Intent for an Ecological Restoration Limited Project from Chatham Conservation Commission.

Project comments

The project received Coastal Resiliency Grants from CZM in 2020 and 2021 for the development, engineering, and permitting of the project, and CZM has provided technical assistance throughout this process. CZM is supportive of this restoration effort and the conceptual design of the project.

The preferred alternative involves placing a sand filled coir bag and one or two 12-to-18-inch diameter coir and jute wrapped rock rolls on the scarped face of the existing salt marsh. The rolls are proposed to be filled with coconut fiber and 8-to-10-inch rounded cobble, similar to the natural cobble found in Massachusetts beaches and streams. Based on site observations, it appears one coir wrapped rock roll would be sufficient at this site. The proponent should provide several more representative cross-sections depicting the actual height of the scarp and the proposed treatments to help inform discussions during permitting. The EENF states that 8-to-10-inch rounded cobbles would be used, however a wider range of stone was discussed at the MEPA site visit. This should be refined in permitting.

The conceptual plan shows the eroded scarp of the salt marsh as a relatively straight line. However, as shown in the pictures and observed at the MEPA site visit, there are various size pieces of salt marsh calving off the shoreline along the project site. More details will need to be developed during the permitting process to explain how the peat and vegetation will be handled during construction. These details should describe whether the rock roll will go around the pieces of marsh and will fill be placed in any gaps as part of the construction. This information will be important to quantify the impacts and ensure clear direction to the contractor during construction.

Ponding of floodwater occurs along the access road landward of the salt marsh due to tidal flooding and runoff. The proposed cobble reinforced marsh will be higher in elevation than the existing marsh. Raising the grade or regrading the dirt access roadway behind the proposed marsh enhancement would help minimize ponding of water behind the newly restored marsh. To ensure the success of the project, the design should be refined in permitting to address this issue.

Federal Consistency Review

The proposed project may be subject to CZM federal consistency review and if so must be found to be consistent with CZM's enforceable program policies. For further information on this process, please contact Robert Boeri, Project Review Coordinator, at robert.boeri@mass.gov, or visit the CZM web site at https://www.mass.gov/federal-consistency-review-program.

LE/sm/rh

cc: Ted Keon, Coastal Resource Director, Chatham, MA
Trey Ruthven & John Ramsey, Sustainable Coastal Solutions, North Falmouth, MA
Dan Gilmore & Nate Corcoran, MassDEP, Southeast Regional Office
Stephen McKenna, Rebecca Haney, Adrienne Pappal, CZM

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CHARLES D. BAKER, Governor
KARYN E. POLITO, Lt. Governor
BETHANY A. CARD, Secretary
RONALD S. AMIDON, Commissioner
DANIEL J. MCKIERNAN, Director

May 26, 2022

Secretary Bethany A. Card
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office
Purvi Patel, EEA No. 16550
100 Cambridge Street, Suite 900
Boston, MA 02114

Dear Secretary Card:

The Division of Marine Fisheries (MA DMF) has reviewed the Expanded Environmental Notification Form (EENF) by the Town of Chatham for the Jackknife Beach Shoreline and Salt Marsh Restoration Project at 0 Orleans Road in the Town of Chatham. MA DMF also attended a pre-application meeting for this project on May 27, 2021. The project site borders Muddy Creek and Pleasant Bay. Restoration is proposed in response to salt marsh erosion that has been attributed to both increased tidal erosion following a dike and culvert replacement project as well as well as erosion from foot traffic, vehicle movement, and boat storage. The proposed restoration would consist of the installation of 3,900 square feet of cobble reinforced marsh (CRF) along the marsh edge bordering the public accessway and parking area. Coir rolls colonized with ribbed mussels (*Geukensia demissa*) and weighted with cobble would be installed along the channel bank. A biodegradable coir envelope filled with sediment would be installed beneath the coir rolls. The CRM would then receive plantings of a mix of salt marsh vegetation including *Spartina alterniflora*, *S. patens*, *Distichlis spicata*, *Juncus gerardii*, and *Solidago sempervirens*. Existing marine fisheries resources and habitat and potential project impacts to those resources are outlined in the following paragraphs.

The project site directly borders and proposed to restore salt marsh habitat. Salt marsh provides a variety of ecosystem services, including habitat and energy sources for many fish and invertebrate species (Boesch & Turner, 1984; Deegan & Garritt, 1997; Deegan *et al.*, 2000).

This region of Muddy Creek includes shellfish habitat for quahog (*Mercenaria mercenaria*) and soft shell clam (*Mya arenaria*). Additionally, a shellfish survey performed on April 14, 2021 by The Town of Chatham Department of Natural Resources identified live quahog, ribbed mussel, blue mussel (*Mytilus edulis*), American oyster (*Crassostrea virginica*), and surf clam (*Spisula solidissima*) resources in the project area. Land containing shellfish is deemed significant to the interest of the Wetlands Protection Act (310 CMR 10.34) and the protection of marine fisheries.

Muddy Creek also provides passage for a variety of diadromous fish species. Alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrata*), white perch (*Morone americana*), and Atlantic tomcod (*Microgadus tomcod*) all seasonally occupy this system (Evans *et al.*, 2011).

Shorelines near the project site have also been mapped as horseshoe crab (*Limulus polyphemus*) nesting habitat. Horseshoe crabs deposit their eggs in the upper intertidal regions of sandy beaches from late spring to early summer during spring high tides. Adult crabs congregate in deep waters during the day while they wait to spawn on nearby beaches at night. Eggs hatch approximately two to four weeks later.

MA DMF offers the following comments for your consideration:

- The source of ribbed mussels proposed for colonization of the coir rolls should be identified in the permitting process.
- The salt marsh planting described in Table 4.1 of the EENF proposes a 50/50 mix of *Spartina alterniflora* and *Distichlis spicata* in the "low marsh" CRM planting zone. A *S. alterniflora* monoculture would seem more appropriate as *D. spicata* is most commonly found at higher elevation. The proposed species mix and percent should be further justified and modified as necessary through the permitting process.
- MA DMF supports the project's combined approach of combatting both tidal erosion as well as anthropogenic sources of marsh erosion at the site. For the latter, installation of dinghy racks and/or signage clearly identifying a suitable (i.e., unvegetated) storage location for small watercraft would aid in reducing marsh loss associated with seasonal boat storage. Relatedly, the project's plan to create a designated launch area should reduce foot traffic related impacts but the plan should also include adequate barriers to discourage use of any alternative access points (i.e., over marsh vegetation) that may provide a more direct route to the water. The currently installed rock barricades shown in Figure 3.13 appear adequate as vehicle barriers but additional barriers are needed to discourage foot traffic across those marsh areas (e.g., fencing). Finally, an adaptive management plan should be developed if initial designs prove to be ineffective in reducing or eliminating foot traffic over marsh habitat.
- As noted in the EENF, monitoring plans should be further developed through the permitting process in consultation with resource agencies.
- Any work activities seaward of the marsh edge should occur outside of the time of year (TOY) restriction period of **May 1 to July 31** to avoid impacts to horseshoe crab eggs, larvae, and newly settled juveniles. The proposal to do the work "when the marsh is dormant" (EENF P. 55) appears to be consistent with avoidance of this TOY restriction window.

Questions regarding this review may be directed to John Logan in our New Bedford office at john.logan@mass.gov.

Sincerely,

Daniel J. McKiernan

Director

cc: Chatham Conservation Commission
Trey Ruthven, Sustainable Coastal Solutions
Kaitlyn Shaw, NMFS
Rebecca Haney, Robert Boeri, CZM
Rachel Croy, Ed Reiner, EPA
Brendan Mullaney, DEP
Tori LaBate, DFG
Simi Harrison, Emma Gallagher, Keri Goncalves, Amanda Davis, DMF

References

Boesch, D. F., & Turner, R. E. (1984). Dependence of fishery species on salt marshes: the role of food and refuge. *Estuaries*, *7*, 460–468.

Deegan, L. A., & Garritt, R. H. (1997). Evidence for spatial variability in estuarine food webs. *Marine Ecology Progress Series*, *147*, 31–47.

Deegan, L. A., Hughes, J. E., & Rountree, R. A. (2000). Salt marsh ecosystem support of marine transient species. In M. P. Weinstein & D. A. Kreeger (Eds.), *Concepts and Controversies in Tidal Marsh Ecology* (pp. 333–365). Kluwer Academic Publisher, The Netherlands.

Evans, N. T., Ford, K. H., Chase, B. C., & Sheppard, J. (2011). Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Massachusetts Division of Marine Fisheries Technical Report, TR-47. https://www.mass.gov/doc/time-of-year-recommendations-tr-47/download. Accessed September 29, 2021.

DM/JL/sd

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Bethany A. Card
Secretary

Martin Suuberg
Commissioner

May 31, 2022

Bethany A. Card,
Secretary of Environment and Energy
Executive Office of Energy and
Environmental Affairs
100 Cambridge Street, Suite 900
ATTN: MEPA Office
Boston, MA 02114

RE: EENF Review. EOEEA 16550
CHATHAM Jackknife Beach Shoreline and
Salt Marsh Restoration at 0 Orleans Road

Dear Secretary Card,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Expanded Environmental Notification Form (EENF) for the Proposed Jackknife Beach Shoreline and Salt Marsh Restoration at 0 Orleans Road, Chatham, Massachusetts (EOEEA # 16550). The Project Proponent provides the following information for the Project:

The preferred design incorporates 3,900 square feet of cobble reinforced marsh (CRM) along the landward edge of the fringing salt marsh adjoining the public accessway and parking area. Along the channel bank, 12- to 18-inch natural fiber coir rolls, which have been colonized with ribbed mussel and weighted in the center of the roll with natural rounded cobble will be used to stop undercutting and erosion of the bank. The coir rolls will be supported on bio-degradable coir envelope filled with marsh sediments to fill any areas of undercutting and restore portions of the bank which have been lost. The CRM will be vegetated with appropriate salt marsh vegetation along with areas within the fringing marsh where vegetation has been lost. Physical and visual barriers will be incorporated along the public accessway and parking areas to prevent future damage to the marsh.

The preferred alternative will address the important issues that are threatening the fringing marsh through the use of nature-based stabilization methods. Along the edge of the channel bank natural fiber rolls colonized with mussel and weighted by natural rounded cobble will stabilize the existing eroding bank and allow for the recreation of marsh bank along portions of the tidal channel. Higher fringing marsh along the public access way and parking area will be restored utilizing a CRM technique which help the marsh adapt to climate change and sea level rise while also feeding sediment onto the adjoining marsh plane to allow for natural adaptation of marsh surface. Additionally, public access corridors will be established to prevent recreational users unknowingly damaging salt marsh.

Bureau of Water Resources (BWR) Comments

Wetlands The applicant will need to submit a Notice of Intent (NOI) to DEP and the Chatham Conservation Commission for the Project. DEP notes that if the minimum submittal requirements have been met a File Number will be issued. It is anticipated that the Chatham Conservation Commission will conduct a Public Hearing and issue an Order of Conditions. A final Order of Conditions must be obtained before any work within Areas Subject to Jurisdiction commences.

The proposed Project is located within the Pleasant Bay Area of Critical Environmental Concern (ACEC). General Provisions 310 CMR 10.24(5) states that when any portion of ACEC is determined to be significant to the Act, any Project impacting those areas shall have no adverse effects on those interests. This provision does have exceptions which includes 310 CMR 10.24(8) Ecological Restoration Projects, which the proposed Project is planning to be filed as.

Work should be performed in accordance with any Time of Year Restrictions as determined by the MA Division of Marine Fisheries, to avoid impacts to marine fisheries resources.

The ENF has identified a 275 square foot area of fringe salt marsh near the Project area. In order to adhere to the standard at 310 CMR 10.32(3), this area should be avoided during construction.

Waterways. This Project will require the submittal of a Chapter 91 License Application (BRP WW01).

Based on the information contained in the ENF, the Waterways Program has determined that the proposed activities would be classified as a water-dependent use Project pursuant to the Waterways Regulations at 310 CMR 9.12.

Portions of the Project site appear to be within filled tidelands. The Project Proponent should utilize best available information to establish the Historic Mean High Water elevation on the plan set for the Chapter 91 License Application.

Bureau of Waste Site Cleanup (BWSC) Comments

Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that have occurred at or might impact the proposed Project area. A disposal site is a location where there has been a release to the environment of oil and/or hazardous material that is regulated under M.G.L. c. 21E, and the Massachusetts Contingency Plan [MCP – 310 CMR 40.0000].

There are no listed MCP disposal sites located at or in the vicinity of the site that would appear to impact the proposed Project area. Interested parties may view a map showing the location of BWSC disposal sites using the MassGIS data viewer at MassMapper. Under the Available Data Layers listed on the right sidebar, select "Regulated Areas", and then "DEP Tier Classified 21E Sites". MCP reports and the compliance status of specific disposal sites may be viewed using the BWSC Waste Sites/Reportable Release Lookup at: https://eeaonline.eea.state.ma.us/portal#!/search/wastesite

The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this Project, notification pursuant to the Massachusetts Contingency Plan (310 CMR 40.0000) must be made to MassDEP, if necessary. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. The

LSP may evaluate whether risk reduction measures are necessary if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup.

Bureau of Air and Waste (BAW) Comments

Air Quality. Construction and operation activities shall not cause or contribute to a condition of air pollution due to dust, odor or noise. To determine the appropriate requirements please refer to:

310 CMR 7.09 Dust, Odor, Construction, and Demolition
310 CMR 7.10 Noise

Construction-Related Measures

The Project Proponent reports the following measures: "Construction would require appropriate light construction equipment to drive any required anchors, excavate, and place material along the salt marsh and beach area.' Constructability - straight-forward with the appropriate heavy equipment to place the stone or seawall sheets. Close consideration should be given to the adjacent salt marsh to prevent any negative impacts to this coastal resource area, which may prove challenging due to the size of equipment."

MassDEP requests that all non-road diesel equipment rated 50 horsepower or greater meet EPA's Tier 4 emission limits, which are the most stringent emission standards currently available for off-road engines. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified, or MassDEP-approved diesel oxidation catalysts (DOCs) or Diesel Particulate Filters (DPFs). The Proponent should maintain a list of the engines, their emission tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review.

Massachusetts Idling Regulation

The EENF is silent in its Project's idling requirements.

MassDEP reminds the Proponent that unnecessary idling (*i.e.,* in excess of five minutes), with limited exception, is not permitted during the construction and operations phase of the Project (Section 7.11 of 310 CMR 7.00). With regard to construction period activity, typical methods of reducing idling include driver training, periodic inspections by site supervisors, and posting signage. In addition, to ensure compliance with this regulation once the Project is occupied, MassDEP requests that the Proponent install permanent signs limiting idling to five minutes or less on-site.

Spills Prevention. A spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases.

Solid Waste Management.

1. *Compliance with Waste Ban Regulations*: Waste materials discovered during construction that are determined to be solid waste (e.g., construction and demolition waste) and/or recyclable material (e.g., metal, asphalt, brick, and concrete) shall be disposed, recycled, and/or otherwise handled in accordance with the Solid Waste Regulations including *310 CMR 19.017: Waste Bans*. Waste Ban regulations prohibit the disposal, transfer for disposal, or contracting for disposal of certain hazardous, recyclable, or compostable items at solid waste facilities in Massachusetts, including, but not limited to, metal, wood, asphalt pavement, brick, concrete,

and clean gypsum wallboard. The goals of the waste bans are to: promote reuse, waste reduction, or recycling; reduce the adverse impacts of solid waste management on the environment; conserve capacity at existing solid waste disposal facilities; minimize the need for construction of new solid waste disposal facilities; and support the recycling industry by ensuring that large volumes of material are available on a consistent basis. Further guidance can be found at: https://www.mass.gov/guides/massdep-waste-disposal-bans.

MassDEP recommends the Proponent consider source separation or separating different recyclable materials at the job site. Source separation may lead to higher recycling rates and lower recycling costs. Further guidance can be found at: https://recyclingworksma.com/construction-demolition-materials-guidance/

For more information on how to prevent banned materials from entering the waste stream the Proponent should contact the RecyclingWorks in Massachusetts program at (888) 254-5525 or via email at info@recyclingworksma.com. RecyclingWorks in Massachusetts also provides a website that includes a searchable database of recycling service providers, available at http://www.recyclingworksma.com.

2. *Clean wood:* As defined in 310 CMR 16.02, clean wood means "discarded material consisting of trees, stumps and brush, including but limited to sawdust, chips, shavings, bark, and new or used lumber"…etc. Clean wood does not include wood from commingled construction and demolition waste, engineered wood products, and wood containing or likely to contain asbestos, chemical preservatives, or paints, stains or other coatings, or adhesives. The Proponent should be aware that wood is not allowed to be buried or disposed of at the Site pursuant to 310 CMR 16.00 & 310 CMR 19.000 unless otherwise approved by MassDEP. Clean wood may be handled in accordance with 310 CMR 16.03(2)(c)7 which allows for the on-site processing (i.e., chipping) of wood for use at the Site (i.e., use as landscaping material) and/or the wood to be transported to a permitted facility (i.e., wood waste reclamation facility) or other facility that is permitted to accept and process wood.

If you have any questions regarding the Solid Waste Management Program comments above, please contact Mark Dakers at Mark.Dakers@mass.gov.

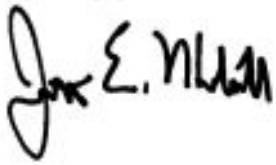
Proposed s.61 Findings

The "Certificate of the Secretary of Energy and Environmental Affairs on the Expanded Environmental Notification Form" may indicate that this Project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the Project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Other Comments/Guidance

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this EENF. If you have any questions regarding these comments, please contact George Zoto at George.Zoto@mass.gov or Jonathon Hobill at Jonathan.Hobill@massgov.

Very truly yours,



Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Millie Garcia-Serrano, Regional Director
David Johnston, Deputy Regional Director, BWR
Gerard Martin, Deputy Regional Director, BWR
John Handrahan, Acting Regional Director, BWSC
Seth Pickering, Deputy Regional Director, BAW
Jennifer Viveiros, Deputy Regional Director, ADMIN
Dan Gilmore, Chief, Wetlands and Waterways
Nate Corcoran, Wetlands, BWR
Brendan Mullaney, Waterways, BWR
Mark Dakers, Solid Waste, BAW
Elza Bystom, Solid Waste, BAW
Allen Hemberger, Site Management, BWSC

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CHARLES D. BAKER, Governor
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BETHANY A. CARD, Secretary
RONALD S. AMIDON, Commissioner
DANIEL J. MCKIERNAN, Director

May 26, 2022

Secretary Bethany A. Card
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office
Purvi Patel, EEA No. 16550
100 Cambridge Street, Suite 900
Boston, MA 02114

Dear Secretary Card:

The Division of Marine Fisheries (MA DMF) has reviewed the Expanded Environmental Notification Form (EENF) by the Town of Chatham for the Jackknife Beach Shoreline and Salt Marsh Restoration Project at 0 Orleans Road in the Town of Chatham. MA DMF also attended a pre-application meeting for this project on May 27, 2021. The project site borders Muddy Creek and Pleasant Bay. Restoration is proposed in response to salt marsh erosion that has been attributed to both increased tidal erosion following a dike and culvert replacement project as well as well as erosion from foot traffic, vehicle movement, and boat storage. The proposed restoration would consist of the installation of 3,900 square feet of cobble reinforced marsh (CRF) along the marsh edge bordering the public accessway and parking area. Coir rolls colonized with ribbed mussels (*Geukensia demissa*) and weighted with cobble would be installed along the channel bank. A biodegradable coir envelope filled with sediment would be installed beneath the coir rolls. The CRM would then receive plantings of a mix of salt marsh vegetation including *Spartina alterniflora*, *S. patens*, *Distichlis spicata*, *Juncus gerardii*, and *Solidago sempervirens*. Existing marine fisheries resources and habitat and potential project impacts to those resources are outlined in the following paragraphs.

The project site directly borders and proposed to restore salt marsh habitat. Salt marsh provides a variety of ecosystem services, including habitat and energy sources for many fish and invertebrate species (Boesch & Turner, 1984; Deegan & Garritt, 1997; Deegan *et al.*, 2000).

This region of Muddy Creek includes shellfish habitat for quahog (*Mercenaria mercenaria*) and soft shell clam (*Mya arenaria*). Additionally, a shellfish survey performed on April 14, 2021 by The Town of Chatham Department of Natural Resources identified live quahog, ribbed mussel, blue mussel (*Mytilus edulis*), American oyster (*Crassostrea virginica*), and surf clam (*Spisula solidissima*) resources in the project area. Land containing shellfish is deemed significant to the interest of the Wetlands Protection Act (310 CMR 10.34) and the protection of marine fisheries.

Muddy Creek also provides passage for a variety of diadromous fish species. Alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrata*), white perch (*Morone americana*), and Atlantic tomcod (*Microgadus tomcod*) all seasonally occupy this system (Evans *et al.*, 2011).

Shorelines near the project site have also been mapped as horseshoe crab (*Limulus polyphemus*) nesting habitat. Horseshoe crabs deposit their eggs in the upper intertidal regions of sandy beaches from late spring to early summer during spring high tides. Adult crabs congregate in deep waters during the day while they wait to spawn on nearby beaches at night. Eggs hatch approximately two to four weeks later.

MA DMF offers the following comments for your consideration:

- The source of ribbed mussels proposed for colonization of the coir rolls should be identified in the permitting process.
- The salt marsh planting described in Table 4.1 of the EENF proposes a 50/50 mix of *Spartina alterniflora* and *Distichlis spicata* in the "low marsh" CRM planting zone. A *S. alterniflora* monoculture would seem more appropriate as *D. spicata* is most commonly found at higher elevation. The proposed species mix and percent should be further justified and modified as necessary through the permitting process.
- MA DMF supports the project's combined approach of combatting both tidal erosion as well as anthropogenic sources of marsh erosion at the site. For the latter, installation of dinghy racks and/or signage clearly identifying a suitable (i.e., unvegetated) storage location for small watercraft would aid in reducing marsh loss associated with seasonal boat storage. Relatedly, the project's plan to create a designated launch area should reduce foot traffic related impacts but the plan should also include adequate barriers to discourage use of any alternative access points (i.e., over marsh vegetation) that may provide a more direct route to the water. The currently installed rock barricades shown in Figure 3.13 appear adequate as vehicle barriers but additional barriers are needed to discourage foot traffic across those marsh areas (e.g., fencing). Finally, an adaptive management plan should be developed if initial designs prove to be ineffective in reducing or eliminating foot traffic over marsh habitat.
- As noted in the EENF, monitoring plans should be further developed through the permitting process in consultation with resource agencies.
- Any work activities seaward of the marsh edge should occur outside of the time of year (TOY) restriction period of **May 1 to July 31** to avoid impacts to horseshoe crab eggs, larvae, and newly settled juveniles. The proposal to do the work "when the marsh is dormant" (EENF P. 55) appears to be consistent with avoidance of this TOY restriction window.

Questions regarding this review may be directed to John Logan in our New Bedford office at john.logan@mass.gov.

Sincerely,

Daniel J. McKiernan

Director

cc: Chatham Conservation Commission
Trey Ruthven, Sustainable Coastal Solutions
Kaitlyn Shaw, NMFS
Rebecca Haney, Robert Boeri, CZM
Rachel Croy, Ed Reiner, EPA
Brendan Mullaney, DEP
Tori LaBate, DFG
Simi Harrison, Emma Gallagher, Keri Goncalves, Amanda Davis, DMF

References

Boesch, D. F., & Turner, R. E. (1984). Dependence of fishery species on salt marshes: the role of food and refuge. *Estuaries*, *7*, 460–468.

Deegan, L. A., & Garritt, R. H. (1997). Evidence for spatial variability in estuarine food webs. *Marine Ecology Progress Series*, *147*, 31–47.

Deegan, L. A., Hughes, J. E., & Rountree, R. A. (2000). Salt marsh ecosystem support of marine transient species. In M. P. Weinstein & D. A. Kreeger (Eds.), *Concepts and Controversies in Tidal Marsh Ecology* (pp. 333–365). Kluwer Academic Publisher, The Netherlands.

Evans, N. T., Ford, K. H., Chase, B. C., & Sheppard, J. (2011). Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Massachusetts Division of Marine Fisheries Technical Report, TR-47. https://www.mass.gov/doc/time-of-year-recommendations-tr-47/download. Accessed September 29, 2021.

DM/JL/sd

ATTACHMENT 4: Proof That Notice was Published in Environmental Monitor

Energy & Environmental Affairs
https://www.mass.gov/orgs/massachusetts-environmental-policy-act-office)

MEPA Environmental Monitor

The Environmental Monitor is a bi-weekly publication that provides notice of new projects that have been submitted to the MEPA Office for review, other projects currently under review, certificates, and public notices.

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Year: 2022

Publication Date: Jun 24, 2022

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Publication: Jun 24, 2022 | Volume 95 | Issue 12

Please be informed that the MEPA Office has finalized amendments to 301 CMR 11.00 for promulgation on December 24, 2021. Two protocols relative to environmental justice have been issued with effective dates of January 1, 2022.

In addition, an amended Environmental Notification Form (ENF) is in effect as of January 1, 2022.

For more information, please visit https://www.mass.gov/orgs/massachusetts-environmental-policy-act-office(https://www.mass.gov/orgs/massachusetts-environmental-policy-act-office).

This edition of the e-monitor contains projects submitted and certificates issued between Jun 1, 2022 and Jun 15, 2022*. If you are looking for a certificate issued after this date range please visit the Recent Decisions(https://eeaonline.eea.state.ma.us/EEA/MEPA-eMonitor/recentDecisions) page.

Download Publication PDF (javascript:void(0);)

NEW PROJECTS(#NEW) SITE VISITS(#SITEVISITS) PROJECTS UNDER REVIEW (#REVIEW) SECRETARY'S CERTIFICATES(#CERTIFICATES)
ADVISORY OPINION(#ADVISORYREQUEST) PUBLIC NOTICES(#PUBNOTICES)

Public Notices

Notice Type	Municipality	Agency	Actions
Notice of Rights of Affected Third Parties- (javascript:void(0);)	New Bedford	MassDEP	VIEW ATTACHMENTS(1)
Notice of Application for a 401 Water Quality Certificate- (javascript:void(0);)	Fitchburg	MassDEP	VIEW ATTACHMENTS(1)
Notice of Application and Issuance of a Draft Groundwater Discharge Permit- (javascript:void(0);)	Franklin	MassDEP	VIEW ATTACHMENTS(1)
Notice of Intent to Initiate an Ecological Restoration Project- (javascript:void(0);)	Chatham	Conservation Commission	VIEW ATTACHMENTS(1)
Notice of Intent to Initiate an Aquatic Plant Management Program- (javascript:void(0);)	Lunenburg	Conservation Commission	VIEW ATTACHMENTS(1)

Notice Type	Municipality	Agency	Actions
Notice of Scope of Work for a Hydrogeological Evaluation- (javascript:void(0);)	Carver	MassDEP	VIEW ATTACHMENTS(1)
Notice of Intent to Initiate an Ecological Restoration Project- (javascript:void(0);)	Quincy	Conservation Commission	VIEW ATTACHMENTS(1)
Notice of Application for a 401 Water Quality Certificate- (javascript:void(0);)	West Newbury	MassDEP	VIEW ATTACHMENTS(1)
Notice of Application for a Combined Chapter 91 License and 401 Water Quality Certification- (javascript:void(0);)	Barnstable, Edgartown, Nantucket	MassDEP	VIEW ATTACHMENTS(1)
Notice of Application for a 401 Water Quality Certificate- (javascript:void(0);)	Dennis	MassDEP	VIEW ATTACHMENTS(1)
Notice of Intent to Initiate an Ecological Restoration Project- (javascript:void(0);)	Mount Washington	Conservation Commission	VIEW ATTACHMENTS(1)

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Total Results: 50/Page

ATTACHMENT 5: Town of Chatham Department Of Natural Resources Shellfish Division Shellfish Report

TOWN OF CHATHAM

DEPARTMENT OF NATURAL RESOURCES
SHELLFISH DIVISION
(508)-945-5184 Fax: (508) 945-5183

April 15, 2021
Shellfish Survey: Muddy Creek
For: Jackknife Harbor Living Shoreline Project

The Shellfish Division conducted the shellfish survey at Muddy Creek on April 14, 2021 at approximately 10:45 am for a projected 11:04 low for Pleasant Bay South. Only a small portion of the flats within Muddy Creek were exposed. The survey area was limited to Chatham waters within Muddy Creek. An initial walk-through identified areas of new sugary sand deposits and more compact silty sand with an abundance of dead shell on the surface comprise primarily of soft-shell clams (*Mya arenaria*). We found no indications of siphon holes which would indicate live soft-shell clams, quahogs (*Mercenaria mercenaria*) and/or razor clams (*Ensis directus)* within the mapped area which would indicate. Our original intention was to utilize the survey protocol employed by the Town within inter-tidal areas and adopted by the Center for Coastal Studies for their shellfish surveys throughout Pleasant Bay by which all material within a 0.25 m2 quadrat, approximately 18cm in depth, is sieved and animals counted. Unfortunately, the tide did not cooperate, and a very limited area was exposed. Next, we focused on the hard packed sediment (as more viable shellfish habitat) and mapped 8 transects from the Chatham line to the deep water channel adjacent to the north side peat bank. One transect followed the center contour of the Creek and random areas were checked throughout the study area (see attached map). Transects were approximately 2 feet wide and 6 inches deep. Two long handled "Ribb Rakes" were employed, and the following shellfish were noted:

- 6 sub-legal quahogs, all approximately 25mm
- 1 legal size quahog
- 1 sub-legal sea clam (approximately 3 inches)
- 3 ribbed mussels, attached to clumps of peat
- 3 blue mussels approximately 2.5 inches
- 1 oyster, approximately 2.5 inches

Also noted were two small flounder (most likely winter flounder), 1 green crab and 1 horseshoe crab.

ATTACHMENT 6: Maintenance and Monitoring Plan

The marsh and tidal channel at Jackknife Beach have been monitored by the Town of Chatham and Pleasant Bay Alliance since 2015 (Section 2.0 above presents the data and monitoring that has been collected to date). That monitoring program and data will form the basis for future monitoring. As this project moves forward seeking regulatory approval, it is important the monitoring continues, so that natural evolution of the site can be cataloged and the project details updated if needed to reflect significant changes. It is anticipated that the Monitoring Plan will evolve in scope and detail throughout the regulatory process. This will be based on feedback during the regulatory process, as well as, lessons learned from similar marsh restoration/stabilization projects which have been implemented in the past year as part of the MCZM Coastal Resiliency Program. The feedback received during the ENF process has been incorporated into the monitoring plan, it is anticipated that the plan will continue to evolve as the Regulatory Agencies provide feedback.

Monitoring Following Installation

Monitoring and maintenance of the bioengineering materials, native plants, and ribbed mussel is critical to ensure success of the living shoreline project. Thus, the project shall include regular monitoring and repairs to the coir fabric or replanting of the marsh species, if necessary, during the establishment. The following monitoring protocol outlines the key assessments that should take place in order to identify required maintenance of the bioengineer materials and replacement of the establishing vegetation to ensure establishment. All work described below will be performed by the Town or, in the case of more technical analyses, by a consultant hired by the Town.

<u>During growing season</u>

Between April 1 - October 15 the project area should be visually inspected at least once per month. Additional episodic monitoring should occur immediately after a named storm event to access damage to any living shoreline project elements. An increased frequency of monitoring may be required if foot traffic over the establishing reinforced marsh is observed.

Visible inspection of bioengineering material:

- The visible coir fabric of the reinforced marsh, rock rolls, and mussel reef should be inspected for damage and/or degradation and structural integrity.
    a. If the coir fabric of reinforced marsh is damaged, assess for loss of cobble or planting matrix from the interior of the reinforced marsh. Realignment or replacement of the cobble and planting matrix should take place if observed. Plants should then be replaced.
    b. If the coir fabric of rock rolls or mussel reef is damaged, assess for loss of cobble or mussels. Loss of these materials will be to be repaired as soon as possible.
- Note any lose, broken, or missing stakes and rope and the need for replacement or tightening to ensure the coir blanketing remains in place during the first season.

- Visual inspection of any installed large woody debris for movement from installed location.

Visible inspection of plantings:

- Inspection of the new planting for health and making note of the quantity of plants in poor health, dead, or missing from the reinforced marsh.
    a. Plants in poor health, dead, or missing should be replaced.
    b. If plant death has occurred due to foot traffic, re-planting should be delayed until the foot traffic had been addressed.
- Inspection of wrack deposits or other debris on reinforced marsh plantings and existing marsh vegetation. If wrack is thick enough to smother the plantings it should be removed to protect the salt marsh vegetation.
- Presence of algae on the coir fabric and if it is excessive enough to smother the planted marsh species.

Visible inspection of area just adjacent to project area:

- Signs of erosion, or accelerated near the terminal ends of the living shoreline installation
- Presence of any invasive plant species that could be introduced in the establishing marsh vegetation.

<u>During dormant season</u>

Between October 16 – May the project area should be visually inspected once per month. Dormant season monitoring will be similar to monitoring in the growing season, only with less emphasis on plant heath and foot traffic. Additional episodic monitoring should occur immediately after a named storm event to access damage to any living shoreline project elements.

Visible inspection of bioengineering material:

- The visible coir fabric of the reinforced marsh, rock rolls, and mussel reef should be inspected for damage and/or degradation and structural integrity.
    a. If the coir fabric of reinforced marsh is damaged, assess for loss of cobble or planting matrix from the interior of the reinforced marsh. Realignment or replacement of the cobble and planting matrix should take place if observed. Plants should then be replaced.
    b. If the coir fabric of rock rolls or mussel reef is damaged, assess for loss of cobble or mussels. Loss of these materials will be to be repaired as soon as possible.
- Note any lose, broken, or missing stakes and rope and the need for replacement or tightening to ensure the coir blanketing remains in place during the first season.
- Visual inspection of any installed large woody debris for movement from installed location.

Visible inspection of plantings:

- Monitoring of the plantings in the dormant season should typically include noting of missing plants from the reinforced marsh so they can be replaced at the next available opportunity.

Visible inspection of area just adjacent to project area:

- Signs of erosion, or accelerated near the terminal ends of the living shoreline installation
- Presence of any invasive plant species that could be introduced in the establishing marsh vegetation.

Annual Monitoring Reports

The annual monitoring reports will include detailed measurements of the salt marsh bank position, monitoring cross-sections through the Jack Knife beach complex which capture upland and tidal channel topography and bathymetry. Salt marsh has been delineated across the site and will continue to be monitored to document the spatial extent and movement. In addition, to document the response of the salt marsh and tidal channel with the proposed project, addition transects will be included every 25-feet throughout the restoration area to measure the following:

- Elevation along the established monitoring transects from the edge of the coastal bank across the Muddy Creek tidal channel (see Figure 5.1, which is also shown in the NOI Narrative as Figure 2.12).
- Landward and seaward edge of salt marsh position and elevation.
- Density and types of salt marsh vegetation along the transects.
- The general condition of the bioengineering materials and planted marsh species.
- Condition of the rock rolls and coir materials colonized by ribbed mussels, noting change in size of mussels, colonized areas, and health of mussels.
- Photographs from set documentation points to record the changes overtime and provide a visual record to accompany the data.

The data, observations, and results from the pilot project will be important to inform and answer questions raised by the regulators and will serve as the basis for the post construction monitoring that will be required as part of regulatory approval. The ongoing monitoring can also evaluate and test the applicability of various monitoring protocols. required of other projects and access if the observations/measurements ultimately provide data which can be used to evaluate the success of the project, inform maintenance schedules and needs, and assist in the design of other marsh restoration projects.

Figure 5.1 Locations of the cross-channel monitoring transects.

ATTACHMENT 7: SITE PHOTOGRAPHS

Chatahm Living Shoreline
Jackknife Harbor

Resource Areas:

- Land Under Ocean (Adjacent in Pleasant Bay)
- Land Subject to Coastal Storm Flowage
- Land Containing Shell Fish
- River Front
- Coastal Beach
- Coastal Dune
- Salt Marsh
- Area of Critical Environmental Concern
- Coastal Bank

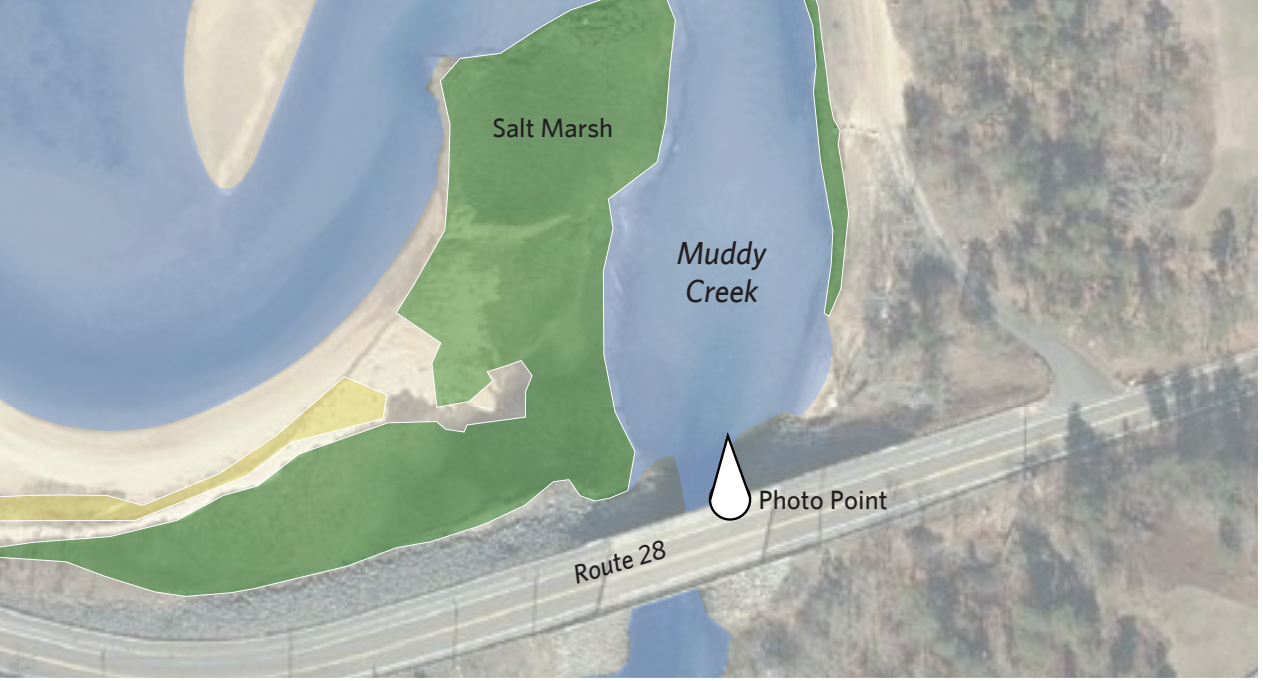
Salt Marsh

- Healthy marsh vegetation is found in the Salt Marsh not directly adjacent to Muddy Creek or the access road/parking area. Salt Marsh directly along the Creek edge is in varied degrees of health and function. Salt Marsh at the edge of the access road/drive does show impacts from vehicle and foot traffic.

Salt Marsh - 2016

- Healthy marsh vegetation is found in the Salt Marsh not directly adjacent to Muddy Creek or the access road/parking area. Salt Marsh directly along the Creek edge is in varied degrees of health and function. Salt Marsh at the edge of the access road/drive does show impacts from vehicle and foot traffic.

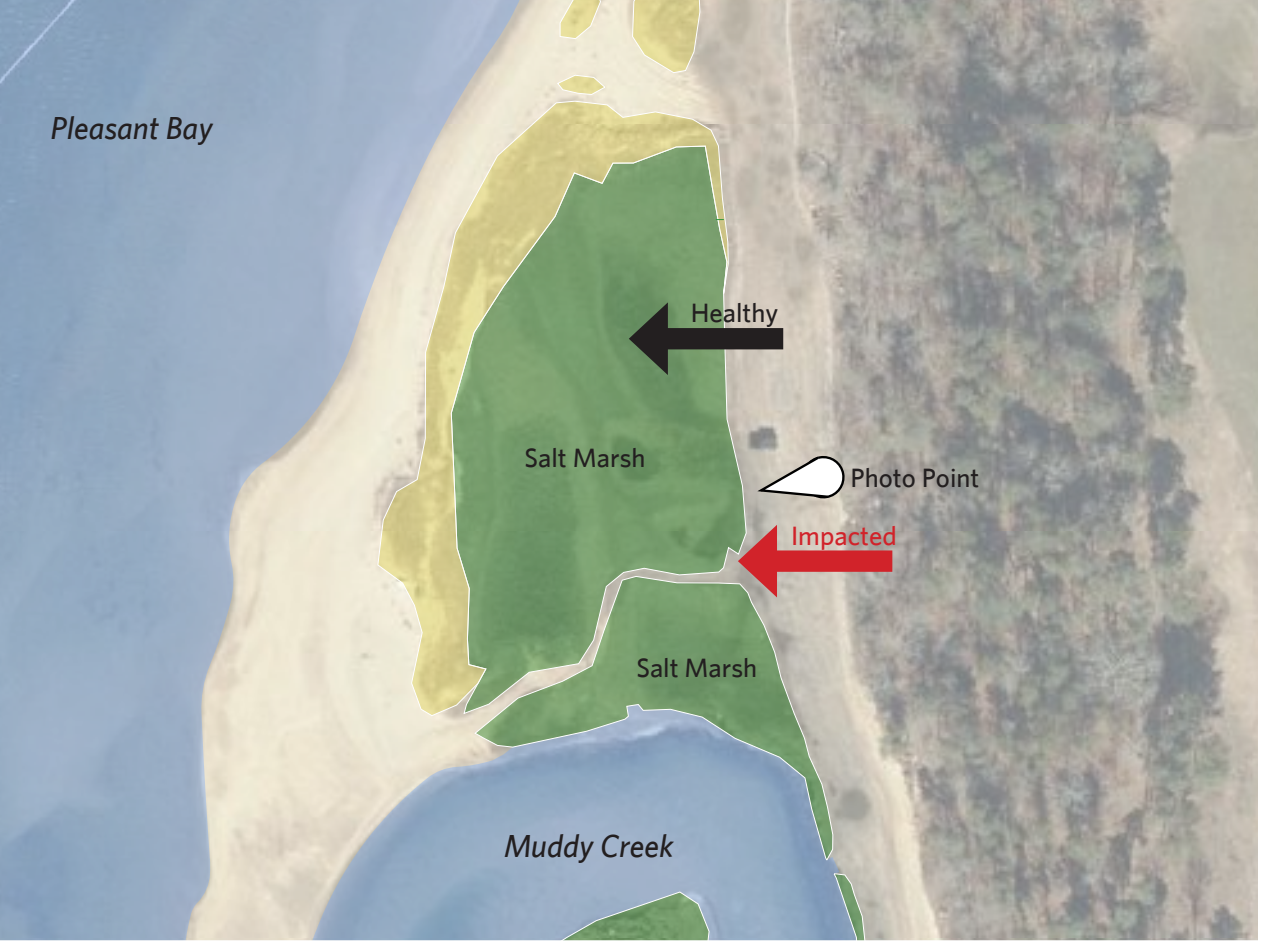
Photo View Point- Image from June, 2016



Salt Marsh - 2021

- Healthy marsh vegetation is found in the Salt Marsh not directly adjacent to Muddy Creek or the access road/parking area. Salt Marsh directly along the Creek edge is in varied degrees of health and function. Salt Marsh at the edge of the access road/drive does show impacts from vehicle and foot traffic.

Photo View Point- Image from March 12, 2021



Salt Marsh

- The photo below shows the area of healthy Salt Marsh beyond the dirt access/parking area. The healthy Salt Marsh is marked by the black arrow on both the photo and diagram to the left. Areas of marsh highly impacted by vehicle and pedestrian traffic are marked with the red arrows.

Photo View Point- Image from November 10, 2020

Salt Marsh

- Salt Marsh vegetation along the eastern shore of Muddy Creek has been cleaving due to erosion of sediments undercutting the peat bed.

- Bank is eroding 0.25 - 0.75 feet/year on average since 2016, however the bank loss is episodic and generally ~1.0 – 1.5 feet per event.

Salt Marsh

- Detailed perspective on Salt Marsh erosion in 2020
- Undercutting ranges from 0.5 - 1.6 feet

Images from November 10, 2020

Salt Marsh

- Detailed perspective on Salt Marsh erosion in 2020
- Undercutting ranges from 0.5 - 1.6 feet

Image from November 10, 2020

Salt Marsh - 2020

- Detailed perspective on Salt Marsh erosion in 2020

Photo View Point- Image from November 10, 2020

Salt Marsh - 2021

- Detailed perspective on Salt Marsh erosion in 2021

Photo View Point- Image from March 31, 2021

Salt Marsh - 2020 to 2021

- Detailed perspective on Salt Marsh erosion between November 10, 2020 to March 31, 2021

Image from November 10, 2020

Photo View Point- Image from March 31, 2021

Salt Marsh

- The erosion of sediment under the existing peat layer has cause a fissure in the Salt Marsh at one location. This fissure and eventual detachment of the Salt Marsh has been documented in photos from 2016 to March 31, 2021.

Image from July 2016

Photo View Point - Image from November 10, 2020

Salt Marsh

- The erosion of sediment under the existing peat layer has cause a fissure in the Salt Marsh at one location. This fissure and eventual detachment of the Salt Marsh has been documented in photos from 2016 to March 31, 2021.

Image from surface of Salt Marsh looking down into fissure, November 2020

Images from November 10, 2020

Salt Marsh

- The erosion of sediment under the existing peat layer has cause a fissure in the Salt Marsh at one location. This fissure and eventual detachment of the Salt Marsh has been documented in photos from 2016 to March 31, 2021.

- Salt Marsh vegetation along the eastern shore of Muddy Creek has been slumping and cleaving due to erosion of sediments undercutting the peat bed. In areas that have not cleaved recently, the over hang of peat has been measured at 12" to 22", on March 31, 2021.

Image from November 10, 2020

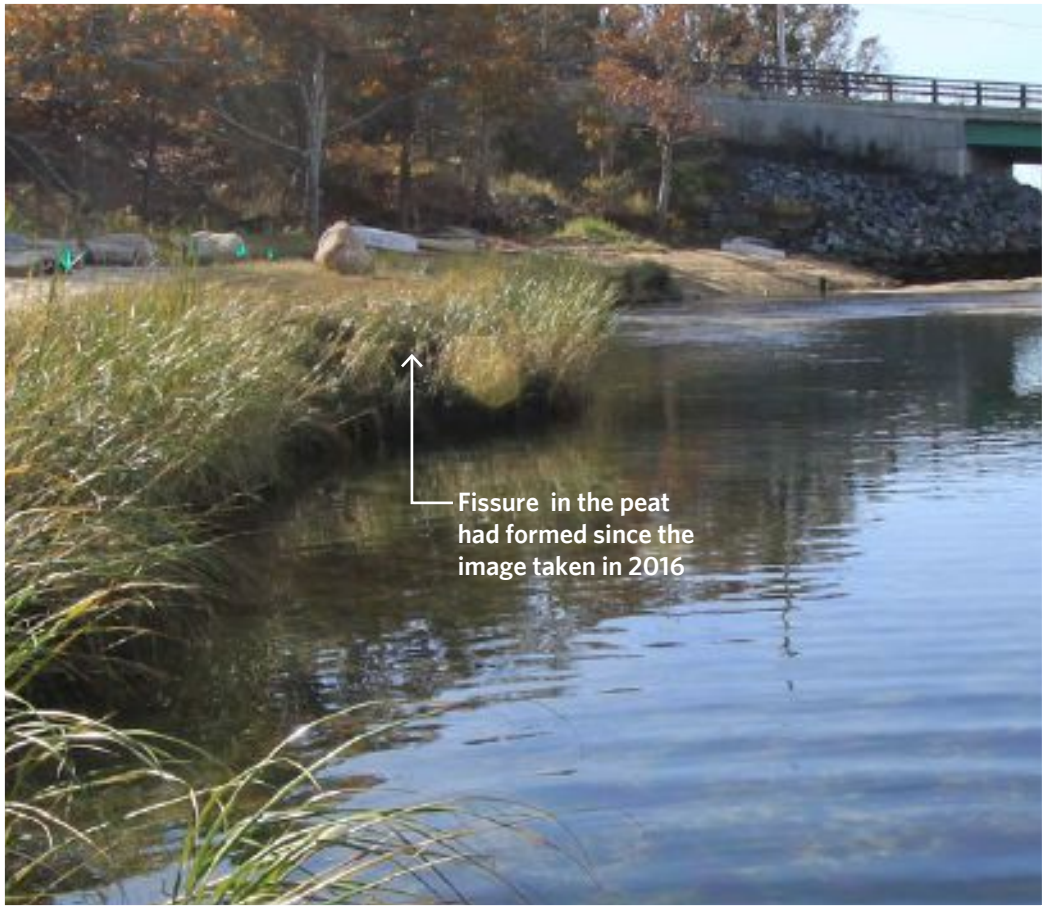


Image from March 31, 2021

Salt Marsh

- The Salt Marsh along this shore of the Creek has also been in decline due to vehicle traffic, vehicle parking, foot traffic, and possible launching of paddle craft over the Salt Marsh.

Salt Marsh

- The Salt Marsh along this shore of the Creek has also been in decline due to vehicle traffic, vehicle parking, foot traffic, boat storage, and launching of paddle craft over the Salt Marsh.

Salt Marsh

- The Salt Marsh along this shore of the Creek has also been in decline due to vehicle traffic, vehicle parking, foot traffic, boat storage, and launching of paddle craft over the Salt Marsh.

Image from August 2020

Image from August 2020

Image from November 10, 2020


Pleasant Bay
Coastal Dune
Salt Marsh
Coastal Beach
Photo Point 2
Photo Point 1
Salt Marsh
Muddy Creek


1


2

Salt Marsh

- Healthy marsh vegetation is found in the Salt Marsh not directly adjacent to Muddy Creek. Salt Marsh directly along the Creek edge is in varied degrees of health and function. Salt Marsh at the edge of the dirt road/drive does show impacts from vehicle and foot traffic.

- Depressions forming and hold water, further altering the pathways through the marsh utilized by the public.

Image from November 10, 2020

Salt Marsh

- The Salt Marsh along this shore of the Creek has also been in decline due to vehicle traffic, vehicle parking, foot traffic, boat storage, and launching of paddle craft over the Salt Marsh.
- One portion of the creek edge is completely un-vegetated.

Image from November 2016

Image from May 2021

Salt Marsh

- The Salt Marsh along the eastern shore of the Creek has also suffered pressure from vehicle traffic, vehicle parking, foot traffic, and possible launching of paddle craft over the Salt Marsh.
- One portion of the creek edge is completely un-vegetated.
- Stones were installed to discourage parking directly on the Salt Marsh.

Image from November 10, 2020

Land Containing Shell Fish

- From Town of Chatham DNR Shellfish Division Memorandum dated, February 23,2021. Historically, most of the shellfish resource was located in sub-tidal waters only; areas that never go dry on a LLMW.
- No indications of siphon holes which would indicate live soft-shell clams, quahogs (Mercenaria mercenaria) and/or razor clams (Ensis directus) within the mapped area which would indicate.
- The most abundant resource in Muddy Creek were sub-legal quahogs. In addition to ribbed mussels attached to peat, blue mussels, single sea clam, legal quahog, and oyster.
- Periodic sets of quahogs were also historically noted in this area though not in abundance, along with non-commercially viable ribbed mussels.

Land Containing Shell Fish

- From Town of Chatham DNR Shellfish Division Memorandum dated, February 23,2021. "Historically, most of the shellfish resource was located in sub-tidal waters only; areas that never go dry on a LLMW. The most abundant resource in Muddy Creek were soft-shell clams. Periodic sets of quahogs were also historically noted in this area though not in abundance, along with non-commercially viable ribbed mussels."

- Ribbed mussels were also observed within the fringing Salt Marsh. Images below were taken within the project area March 11, 2021.

Images from March 11, 2021

ATTACHMENT 8: CONSTRUCTION SEQUENCE

Construction Sequence

Installation of the living shore line shall be from the existing dirt drive leading into Jackknife Harbor/Beach. The installation is proposed to begin after the salt marsh within the work area has become dormant to limit impacts on existing native vegetation. In addition, the intent is to limit the machine work to the area landward of the fringing marsh. The machine equipment will be needed for installation of the CRM and will be utilized to lift materials over the exiting marsh for work along the bank. The work seaward along the marsh bank will be conducted using hand labor to set and construct the living shoreline.

The landward edge of the existing salt marsh and soils will be further protected by the use of ground protection mats. The ground protection mats will be equivalent to AlturnaMats© made of recycled and rugged 0.5" HDPE material. The protection mats will allow access in a manner which will have no negative effects on existing vegetation or the stability of creek edge during installation.

The installation protocols have been color coded for quick reference to the corresponding component on the proposed conditions section.

- **Coir envelope Installation** - Installation will begin with the sediment filled coir envelope along the base of the creek edge. The sediment will be comprised of 30-percent by volume coir fiber and compost and 70-percent sediment that is grain size compatible with the fringing marsh. This coir envelope will help to fill voids formed by undercutting of the peat beds along the creek edge. The envelope will also create the surface required for installation of the proposed rock rolls. A temporary cofferdam would be installed parallel along the creek edge. The work area within the cofferdam is required for complete installation of the coir materials and sediment before being exposed to tidal inundation. The cofferdam will be constructed utilizing a series of geotextile flood bags (Beluga or similar manufacturer) placed adjacent to one another. The system is a unique large sand filled geotextile square bag (3-feet by 3-feet and approximately 40-inches high) flood control system that can be used to construct temporary cofferdams and dikes. The bags are brought onto site, filled with beach/marsh compatible sediment, and lifted over the marsh and set onto the channel bed. The series of bags will be set along the bank edge, forming barrier to allow for dewatering of the bank edge to allow for the installation of coir envelope. It is anticipated the cofferdam will be in for a maximum of three weeks. The cofferdam will only be dewatered during installation and allowed to naturally fill during overnight or weekends when installation work is suspended. Once the installation is complete, the bags will be lifted out of the channel and taken offsite.

The envelope will be constructed of a single layer of biodegradable jute-burlap and two layers of 900 gram coir fabric filled with sediment that is compatible with sediment underlying the peat bank and sediment within Muddy Creek as specified above. Figure 8.1 shows a proposed section with the coir envelope shown in blue.

- **Rock Roll Installation** - Installation of the rock rolls will begin after completion of the coir envelope. The 12" to 18" diameter rock rolls will be comprised of a mixture of 4" to 10" cobbles sewn within rolls/tubes of 1000 gram coir mesh. The rock rolls would be constructed in place starting along the base of the completed coir envelope. Subsequent rows would be installed to reach the target elevation shown on the Restoration Plan which are presented in Appendix B. If existing grades along the channel edge are at a lower elevation at time of installation, an additional rock roll may be added to reach the target elevation. Figure 8.1 shows a proposed section with the rock roll shown in purple.

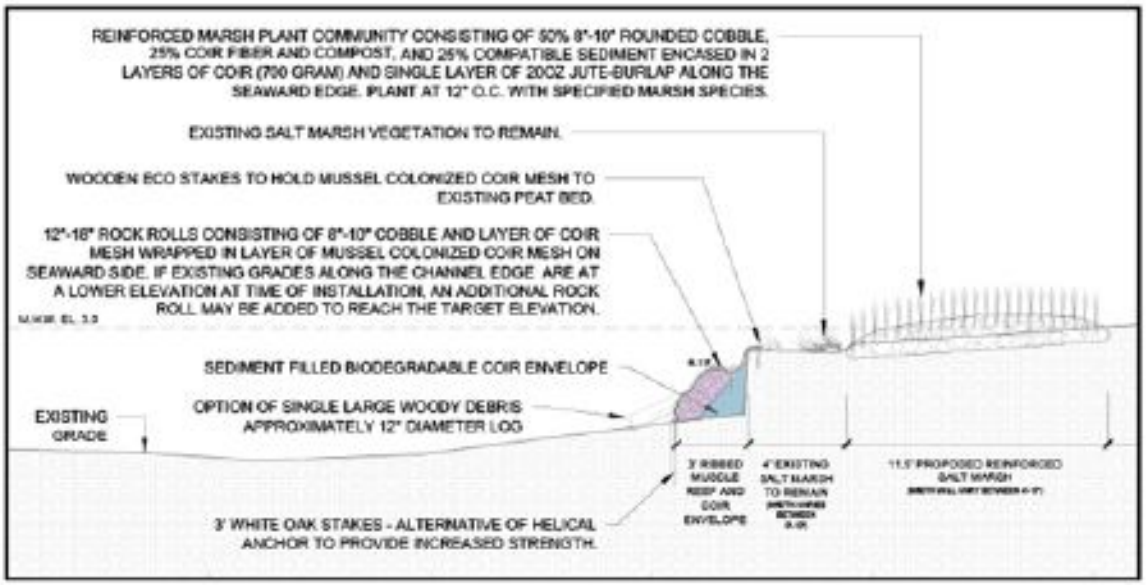


Figure 8.1 Proposed Section – Reinforced salt marsh with ribbed mussel reef and sediment filled coir envelope. Coir envelope installation is shown in blue and rock roll installation is shown in purple.

- **Ribbed Mussel Colonized Coir Installation (Mussel Reef)** - The seaward side of the rock rolls will be covered in a layer of coir mesh that has been colonized by ribbed mussel prior to, or at the time of installation. Mussel colonized coir will be laid by hand over the rock rolls and will extend over a portion of the existing peat bed. The position of the mussel colonized coir is highlight in orange in Figure 8.3. The top edge of mussel colonized coir will be secured to the peat bed using 100% biodegradable wooden Eco-Stakes. An image of these stakes can be seen in Figure 8.2. Biodegradable rope/twine will be connected to 3' oak stakes that will be secured along the base of the rock rolls. The rope/twine will be laced in a cross pattern through the stakes and tensioned to secure the mussel colonized coir against the rock rolls and peat.

Figure 8.2 Image of eco stake.

- **CRM Installation** - The reinforced marsh will consist of rounded cobbles and 100% biodegradable materials. Volume will include: 50-percent by volume of 8-to-10-inch rounded cobble, 25-percent by volume coir fiber and compost, and 25-percent sediment that is grain size compatible with the fringing marsh and contains a similar organic content to the fringing marsh seaward of the cobble marsh which will be determined by grain size testing. The mixture of cobble, coir fiber, compost, and compatible sediment will be encased in two layers of 700-gram coir fabric and one layer of 20 ounce jute-burlap.

The installation of the reinforced marsh begins by laying out the two layers of 700-gram coir fabric landward of the existing fringing marsh to avoid impacts to the existing fringing marsh vegetation. The sandy soils and parking lot fill within the CRM footprint will then be excavated and graded so that once completed the marsh will meet the design grades and elevations. One layer of 20 ounce jute-burlap is added to form a barrier along the seaward edge of the reinforced marsh to hold sediments. These layers will become the exterior shell following completion. The cobble and growing medium are then placed over the layers of coir and burlap and a plate compactor used to assist inclusion of the growing medium into voids between the cobbles. A proposed section can be seen in Figure 8.3 with reinforced marsh shown in green. When the addition of cobble and growing medium has reached the specified height shown on the Restoration Plan (Restoration Plan is contained in Attachment 9), the two layers of 700-gram coir fabric and one layer of 20-ounce jute-burlap are folded back over and sewn together. Within the first growing season following construction, the native forbs and grasses shall be planted through the coir fabric into the reinforced marsh with the species and densities specified on the Restoration Plan. An 18-inch tall fence, utilizing 1-inch oak posts with bio-degradable coir fabric, will be temporarily installed along the seaward edge of the reinforced marsh to protect the plantings from smothering due to wrack accumulation (e.g. seaweed, sticks, washed up debris, etc.). This temporary fence will only be in place for two to three years during the growing season to allow for successful establishment of the plantings. The monitoring of the wrack fence will be incorporated into the regular monitoring and maintenance plan during the growing season, wrack fence should be removed in the dormant season November 1st through April 1st.

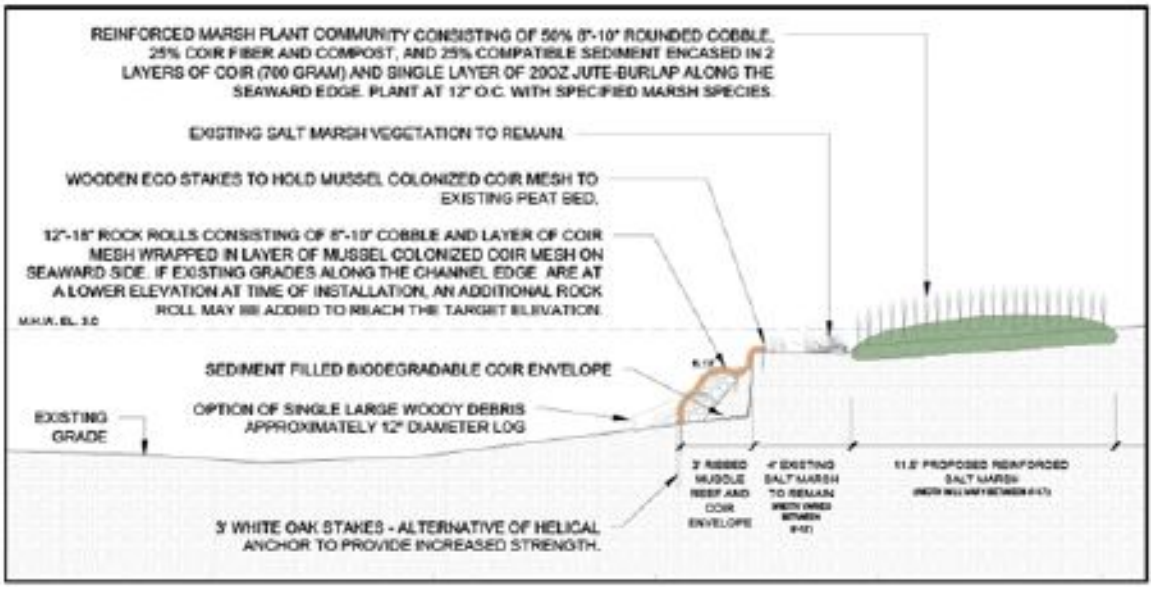


Figure 8.3 Proposed Section – CRM with ribbed mussel reef and sediment filled coir. CRM installation shown in green and ribbed mussel reef and sediment filled coir shown in orange.

- **Planting Plan** - Native forbs and grasses will be planted into the installed CRM at 12-inch on center in a staggered grid pattern. The three planting zones within the cobble reinforce marsh (low, mid, and high marsh) will be determined on site after the installation is complete to ensure proper elevation delineation for the establishment and health of each species. Generally, the low marsh species will be planted along the seaward edge of the installation, mid marsh species within the middle section, and the high marsh

species along the landward edge as shown in Plant Plan in Attachment 10. This planting shall be completed by hand using soils knives or similar hand tools to insert the plugs through the coir and jute layers into the planting medium. The specific of the vegetation requirements for the three planting zones is presented in Table 8.1.

Table 8.1 Vegetation Specifications for CRM Planting Zones

LOW MARSH PLANT SPECIES TO BE PLUGGED AT 12" ON CENTER			
% of species	common name	scientific name	size
50%	Smooth Cordgrass	*Spartina alternifloria*	5" plug
50%	Spike Grass	*Distichlis spicata*	5" plug
MID MARSH PLANT SPECIES TO BE PLUGGED AT 12" ON CENTER			
% of species	common name	scientific name	size
20%	Black-grass	*Juncus gerardii*	5" plug
40%	Saltmarsh Hay	*Spartina patens*	5" plug
40%	Spike Grass	*Distichlis spicata*	5" plug
HIGH MARSH PLANT SPECIES TO BE PLUGGED AT 12" ON CENTER			
% of species	common name	scientific name	size
90%	Saltmarsh Hay	*Spartina patens*	5" plug
10%	Seaside Goldenrod	*Solidago sempervirens*	5" plug

ATTACHMENT 9: PROJECT PLANS

RESTORATION PLAN - PREFERRED OPTION - LIVING SHORELINE ALTERNATIVE C - COBBLE REINFORCED MARSH WITH RIBBED MUSSEL REEF

1

N

0 20' 40'

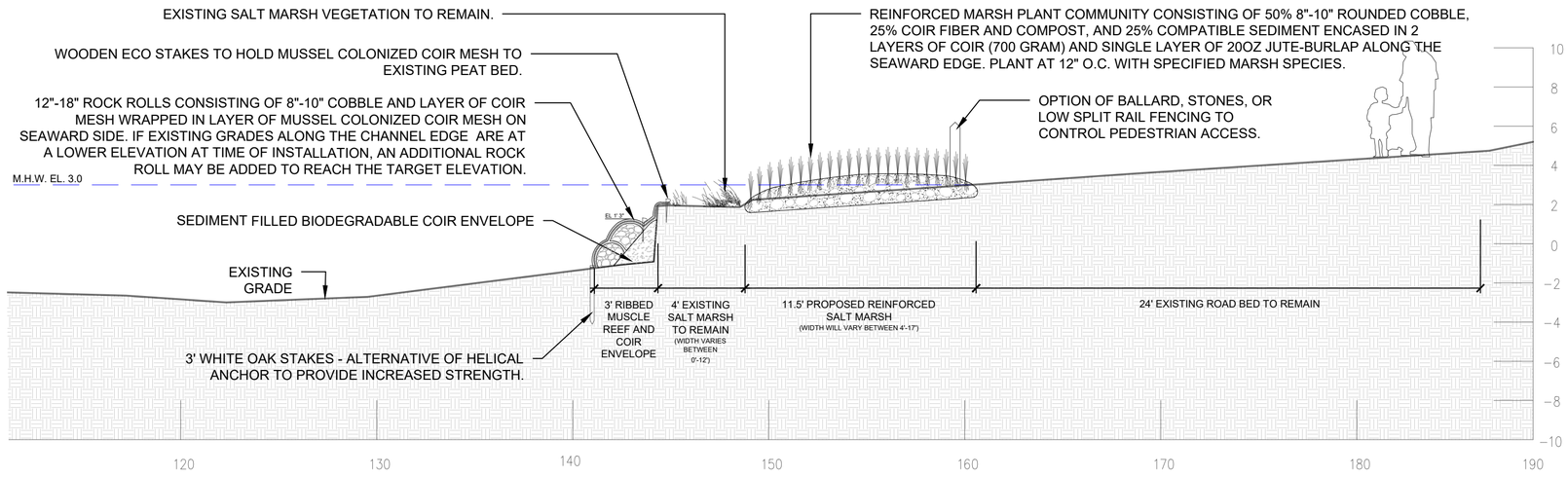
Scale: 1"= 20'

DETAILED PLAN VIEW - PREFERRED ALTERNATIVE - REINFORCED SALT MARSH WITH WITH RIBBED MUSSEL REEF AND AND SEDIMENT FILLED COIR ENVELOPE

2

0 5' 10'

Scale: 3/16"= 1'



PROPOSED SECTION 4 - PREFERED ALTERNITIVES - REINFORCED SALT MARSH WITH WITH RIBBED MUSSEL REEF AND AND SEDIMENT FILLED COIR ENVELOPE

3

Scale: 3/16"= 1'

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REV	DATE	DESCRIPTION

NOTES:

DRAFT

FOR PERMITTING PURPOSES ONLY
THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION

TOWN OF CHATHAM

JACKKNIFE HARBOR
CHATHAM, MA

DATE: 5/3/2021	SCALE: VARIES
DRAWN BY: JS	CHECKED BY: XX

RESTORATION PLAN

1 OF 1

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ATTACHMENT 10: AFFIDAVIT OF SERVICE AND NOTIFICATION TO ABUTTERS

ATTACHMENT 11: PROOF OF SUBMITTAL TO MASSACHUSETTS DMF AND EPA

Notice of Intent

Prepared in partnership with Massachusetts Coastal Zone Management Coastal Resilience Grant Program FY21 & FY22

Prepared by:

Sustainable Coastal Solutions,

Wilkinson Ecological Design, and

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