

Notice of Intent Application

Proposed Coastal Dune Restoration for the Town of Hull



May 2019

PREPARED FOR:
The Town of Hull
253 Atlantic Ave
Hull, MA 02045

PREPARED BY:
Woods Hole Group, Inc.
A CLS Company
107 Waterhouse Road
Bourne, MA 02532 USA

107 Waterhouse Road
Bourne, MA 02532
Phone: 508-540-8080
Fax: 508-540-1001
e-mail: WHGroup@whgrp.com
www.whgrp.com

Notice of Intent Contents:

- A. Notice of Intent Application
- B. Project Description
- C. Performance Standards Compliance Narrative
- D. NHESP Submittal Letter and Proof of Submission
- E. MESA Fee
 - Copy of \$300.00 check made payable to Commonwealth of Mass. - NHESP for MESA filing fee
- F. Abutters List (Abutter Notification Provided and Distributed by Conservation Commission)
- G. Project Map and Plans
 - Hull USGS Map, identifying locus
 - Plan entitled, "Proposed Dune Restoration, Town of Hull, Hull, MA" dated May 21, 2019.

Section A

Notice of Intent Application



WPA Form 3 – Notice of Intent

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

| |
|-----------------------------|
| MassDEP File Number |
| Document Transaction Number |
| Hull |
| City/Town |

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



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

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

| | | |
|--|-----------------------|----------------|
| Town-owned layout of Beach Ave, opposite 131-145 Beach Avenue | Hull | 02045 |
| Latitude and Longitude: | b. City/Town | c. Zip Code |
| N/A | 42°17'21.40" N | 70°52'25.87" W |
| f. Assessors Map/Plat Number | d. Latitude | e. Longitude |
| | N/A | |
| | g. Parcel /Lot Number | |

2. Applicant:

| | | |
|-----------------------------|--------------------------|------------------|
| Phil | Lemnios | |
| a. First Name | b. Last Name | |
| Town Manager - Town of Hull | | |
| c. Organization | | |
| 253 Atlantic Ave | | |
| d. Street Address | | |
| Hull | MA | 02045 |
| e. City/Town | f. State | g. Zip Code |
| | plemnios@town.hull.ma.us | |
| h. Phone Number | i. Fax Number | j. Email Address |

3. Property owner (required if different from applicant): Check if more than one owner

| | | |
|-------------------|---------------|------------------|
| a. First Name | b. Last Name | |
| c. Organization | | |
| d. Street Address | | |
| e. City/Town | f. State | g. Zip Code |
| h. Phone Number | i. Fax Number | j. Email address |

4. Representative (if any):

| | | |
|---------------------|---------------|------------------|
| Mitchell | Buck | |
| a. First Name | b. Last Name | |
| Woods Hole Group | | |
| c. Company | | |
| 107 Waterhouse Road | | |
| d. Street Address | | |
| Bourne | MA | 02532 |
| e. City/Town | f. State | g. Zip Code |
| 508-495-6210 | 508-540-1001 | m buck@whgrp.com |
| h. Phone Number | i. Fax Number | j. Email address |

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

| | | |
|-------------------|-------------------|-----------------------|
| N/A town project | | |
| a. Total Fee Paid | b. State Fee Paid | c. City/Town Fee Paid |



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A. General Information (continued)

6. General Project Description:

Proposed Coastal Dune restoration along the original Town-owned layout of Beach Avenue, opposite 131-145 Beach Avenue.

7a. Project Type Checklist:

- | | |
|---|---|
| 1. <input type="checkbox"/> Single Family Home | 2. <input type="checkbox"/> Residential Subdivision |
| 3. <input type="checkbox"/> Limited Project Driveway Crossing | 4. <input type="checkbox"/> Commercial/Industrial |
| 5. <input type="checkbox"/> Dock/Pier | 6. <input type="checkbox"/> Utilities |
| 7. <input type="checkbox"/> Coastal Engineering Structure | 8. <input type="checkbox"/> Agriculture (e.g., cranberries, forestry) |
| 9. <input type="checkbox"/> Transportation | 10. <input checked="" type="checkbox"/> Other |

7b. Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. Yes No If yes, describe which limited project applies to this project:

2. Limited Project

8. Property recorded at the Registry of Deeds for:

Plymouth

a. County

1181

c. Book

b. Certificate # (if registered land)

187-192

d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

- Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
- Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

| Resource Area | Size of Proposed Alteration | Proposed Replacement (if any) |
|--|--|-------------------------------|
| a. <input type="checkbox"/> Bank | 1. linear feet | 2. linear feet |
| b. <input type="checkbox"/> Bordering Vegetated Wetland | 1. square feet | 2. square feet |
| c. <input type="checkbox"/> Land Under Waterbodies and Waterways | 1. square feet 3. cubic yards dredged | 2. square feet |

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.



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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Resource Area, Size of Proposed Alteration, Proposed Replacement (if any)
d. [] Bordering Land Subject to Flooding
e. [] Isolated Land Subject to Flooding
f. [] Riverfront Area
2. Width of Riverfront Area (check one):
[] 25 ft. - Designated Densely Developed Areas only
[] 100 ft. - New agricultural projects only
[] 200 ft. - All other projects
3. Total area of Riverfront Area on the site of the proposed project:
4. Proposed alteration of the Riverfront Area:
5. Has an alternatives analysis been done and is it attached to this NOI?
6. Was the lot where the activity is proposed created prior to August 1, 1996?

3. [X] Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

See Attached Project Description and Performance Standards Narrative

Resource Area, Size of Proposed Alteration, Proposed Replacement (if any)
a. [] Designated Port Areas
b. [] Land Under the Ocean
c. [X] Barrier Beach
d. [] Coastal Beaches
e. [X] Coastal Dunes

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.



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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

| | <u>Size of Proposed Alteration</u> | <u>Proposed Replacement (if any)</u> |
|--|---|---|
| f. <input type="checkbox"/> Coastal Banks | _____ | |
| | 1. linear feet | |
| g. <input type="checkbox"/> Rocky Intertidal Shores | _____ | |
| | 1. square feet | |
| h. <input type="checkbox"/> Salt Marshes | _____ | _____ |
| | 1. square feet | 2. sq ft restoration, rehab., creation |
| i. <input type="checkbox"/> Land Under Salt Ponds | _____ | |
| | 1. square feet | |
| | _____ | |
| | 2. cubic yards dredged | |
| j. <input type="checkbox"/> Land Containing Shellfish | _____ | |
| | 1. square feet | |
| k. <input type="checkbox"/> Fish Runs | Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above | |
| | _____ | |
| | 1. cubic yards dredged | |
| l. <input checked="" type="checkbox"/> Land Subject to Coastal Storm Flowage | _____ | |
| | 12,200 | |
| | _____ | |
| | 1. square feet | |
| 4. <input type="checkbox"/> Restoration/Enhancement | If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here. | |
| | _____ | _____ |
| | a. square feet of BVW | b. square feet of Salt Marsh |
| 5. <input type="checkbox"/> Project Involves Stream Crossings | | |
| | _____ | _____ |
| | a. number of new stream crossings | b. number of replacement stream crossings |

C. Other Applicable Standards and Requirements

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project 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)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://www.mass.gov/dfwele/dfw/nhosp/regulatory_review/priority_habitat/online_viewer.htm.

a. Yes No **If yes, include proof of mailing or hand delivery of NOI to:**

**Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581-3336**

August 2017

b. Date of map



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C. Other Applicable Standards and Requirements (cont'd)

If yes, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.C, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.1.d, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

1. c. Submit Supplemental Information for Endangered Species Review*

1. Percentage/acreage of property to be altered:

| | |
|----------------------------------|--------------------|
| (a) within wetland Resource Area | 0.032 |
| | percentage/acreage |
| (b) outside 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 ****
 - (a) Project description (including description of impacts outside of wetland resource area & buffer zone)
 - (b) Photographs representative of the site
 - (c) MESA filing fee (fee information available at: http://www.mass.gov/dfwele/dfw/nhosp/regulatory_review/ mesa/ mesa_fee_schedule.htm).
Make check payable to "Commonwealth of Massachusetts - NHESP" and **mail to NHESP** at above address

Projects altering 10 or more acres of land, also submit:
 - (d) Vegetation cover type map of site
 - (e) Project plans showing Priority & Estimated Habitat boundaries

d. 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, http://www.mass.gov/dfwele/dfw/nhosp/regulatory_review/ mesa/ mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)
2. Separate MESA review ongoing.

| | | |
|---------------------|----------------------------|--|
| | | |
| a. NHESP Tracking # | b. Date submitted to NHESP | |

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see <http://www.mass.gov/dfwele/dfw/nhosp/nhosp.htm>, regulatory review tab). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.



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C. Other Applicable Standards and Requirements (cont'd)

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

2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. Not applicable – project is in inland resource area only

b. Yes No If yes, include proof of mailing or hand delivery of NOI to either:

South Shore - Cohasset to Rhode Island, and the Cape & Islands:

North Shore - Hull to New Hampshire:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

DMF.EnvReview-South@state.ma.us

DMF.EnvReview-North@state.ma.us

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

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

a. Yes No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC

4. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

a. Yes No

5. 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)?

a. Yes No

6. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

a. Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

1. Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

2. A portion of the site constitutes redevelopment

3. Proprietary BMPs are included in the Stormwater Management System.

b. No. Check why the project is exempt:

1. Single-family house

Online Users:
Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.



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C. Other Applicable Standards and Requirements (cont'd)

- 2. Emergency road repair
- 3. Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

- 1. USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
- 2. Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.
- 3. Identify 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.), and attach documentation of the methodology.
- 4. List the titles and dates for all plans and other materials submitted with this NOI.

Proposed Dune Restoration, Town of Hull, Hull, MA

a. Plan Title

Woods Hole Group

b. Prepared By

5/21/2019

d. Final Revision Date

Mitchell A. Buck, P.E.

c. Signed and Stamped by

1" = 20'

e. Scale

f. Additional Plan or Document Title

g. Date

- 5. If there is more than one property owner, please attach a list of these property owners not listed on this form.
- 6. Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.
- 7. Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.
- 8. Attach NOI Wetland Fee Transmittal Form
- 9. Attach Stormwater Report, if needed.



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E. Fees

- Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

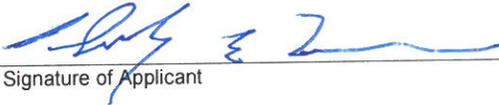
Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

| | |
|------------------------------------|-----------------------------------|
| 2. Municipal Check Number | 3. Check date |
| 4. State Check Number | 5. Check date |
| 6. Payor name on check: First Name | 7. Payor name on check: Last Name |

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

| | |
|--|--------------------|
|  1. Signature of Applicant | 5/20/19 2. Date |
| 3. Signature of Property Owner (if different) | 4. Date |
| 5. Signature of Representative (if any) | 6. Date |

For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:

If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Section B

Project Description



B. PROJECT DESCRIPTION

1.0 Introduction

The naturally occurring coastal dune along the east side of the road between 133 and 143 Beach Avenue has been altered over time and used as an unauthorized parking area (Figure 1). The area of altered dune stretches approximately 400 ft in a north-south direction, and extends another 30 ft east of the paved edge of Beach Avenue. The 12,000 square foot area is located in the original Town-owned road layout of Beach Avenue. A naturally occurring coastal dune is present along the east side of Beach Avenue further to the north and south of the altered dune. As part of essential flood protection and mitigation planning efforts, the Town is proposing to restore and enhance the existing altered coastal dune and integrate it with the coastal dunes to the north and south (opposite 131-145 Beach Ave; project locus). This project is intended to both restore degraded habitat as well as provide storm damage protection for inland properties.

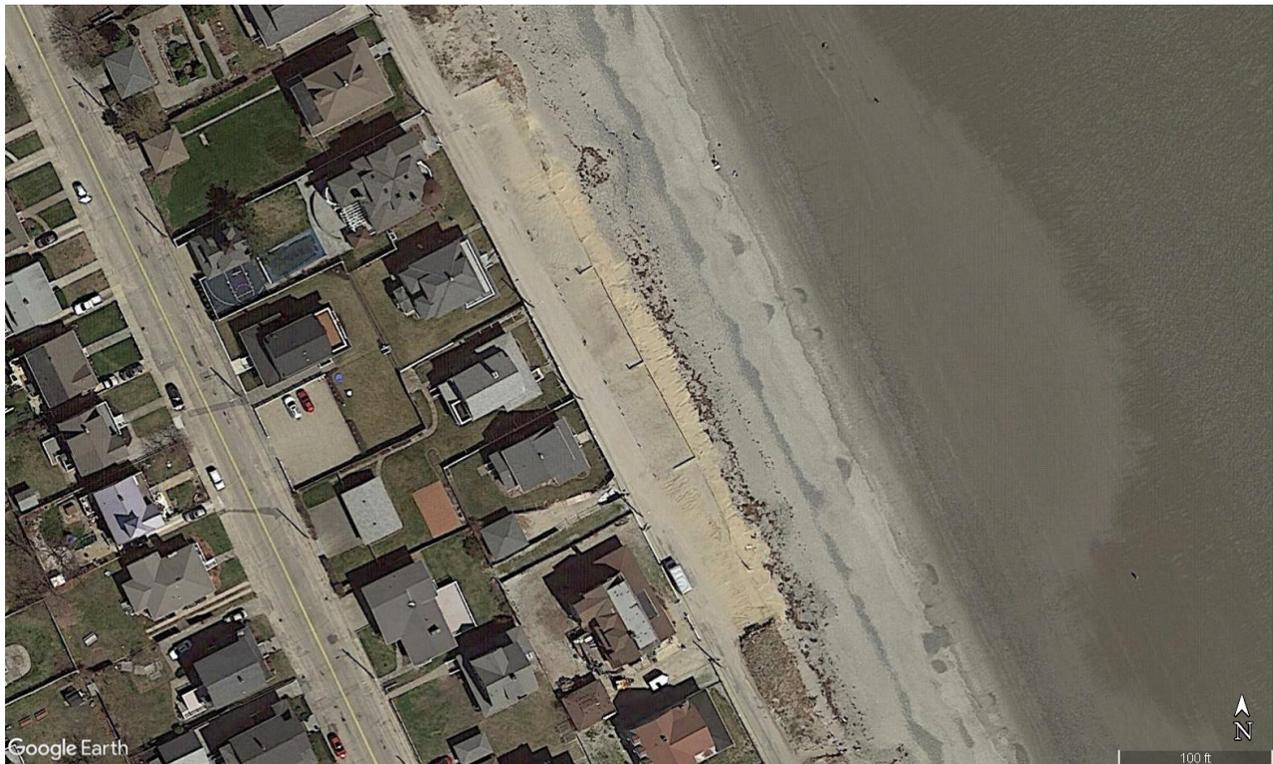


Figure 1. Google earth image showing the altered dune area opposite 133-143 Beach Ave.

2.0 Project Need

Hull is exposed to the open waters of Massachusetts Bay, Boston Harbor and Hingham Bay, and is therefore highly vulnerable to coastal flooding, long-term impacts of sea level rise, and increased storm surge. In 2016, Kleinfelder and Woods Hole Group conducted a Coastal Climate Change Vulnerability Assessment and Adaptation Study for the Town of Hull. The study found that numerous streets within the North Nantasket Beach area are at high risk for flooding in near time horizons. In 2030, most of the North Nantasket Beach area is projected to have a



2-5% annual probability of flooding, with the exception of areas in the vicinity of Beach Avenue which have a 10-25% annual probability of flooding. The altered coastal dune at the project locus was identified in the 2016 Kleinfelder and Woods Hole Group study as a flood pathway during storms (Figure 2).

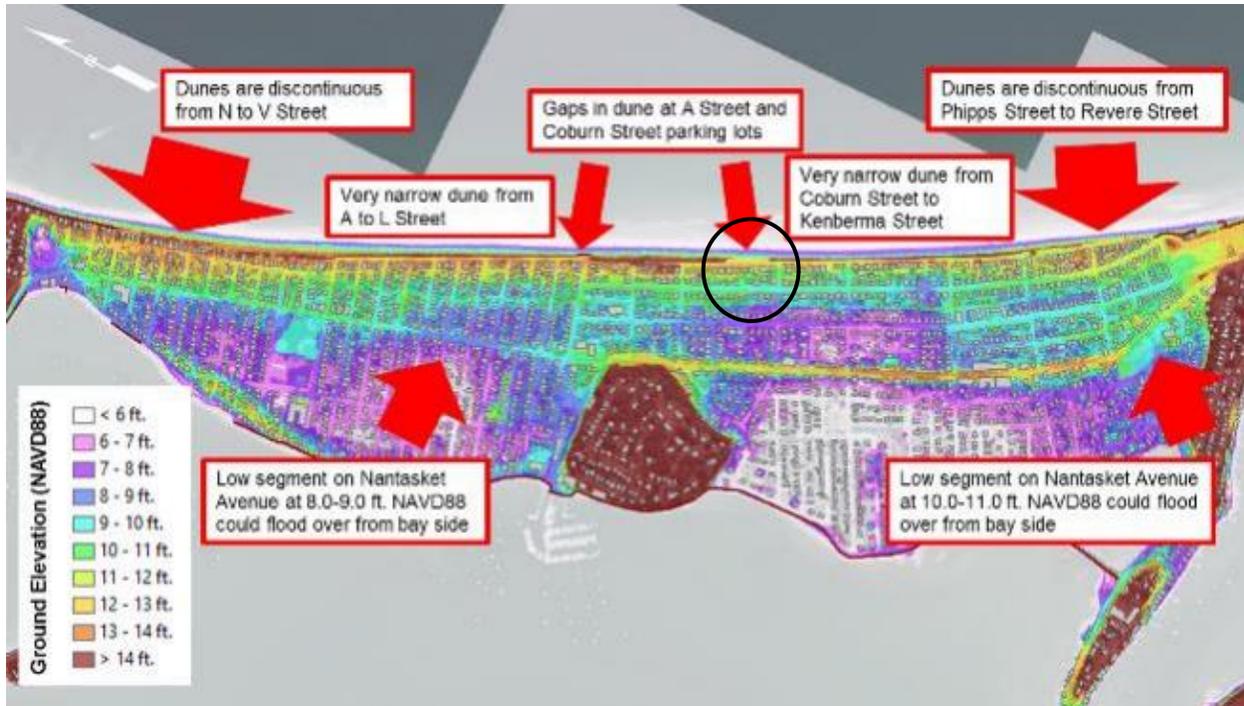


Figure 2. Sources of flooding for high risk areas along North Nantasket Beach.

Once flood waters pass through the break in the coastal dunes at the project locus, they flood more landward low-lying developed areas to the west. As shown in Figure 2 above, the flood pathway at the project locus allows storm surge to inundate and become impounded in an approximate 6 by 2 block area bound by Kenberma St., Nantasket Ave., Irwin St., and Manomet Ave. Once flood waters reach the more low-lying areas, it is slow to drain causing additional problems long after the storm has passed. Figures 3 and 4 show flooding in these areas during two recent storms.



Figure 3. Photograph of flooding at the intersection of Manomet Ave. and Alden St.



Figure 4. Photograph of flooding along Coburn St. immediately adjacent to the project locus.



The residential infrastructure within the Town of Hull has experienced significant damage due to storm surge and coastal flooding over the years. In Hull, a total of 229 repetitive loss properties have been identified by the National Flood Insurance Program (NFIP). The NFIP defines a repetitive loss property as any property for which the NFIP has paid two or more flood claims of \$1,000 or more in any given 10-year period since 1978. There were 749 repetitive loss claims in Hull between 1978 and 2015, totaling \$7,618,446 in damages. The Town has identified 10 concentrated areas of repetitive loss properties as shown in Figure 5. The proposed project is within Area 6 which contains 14 repetitive loss properties with a total of 36 claims since 2017. The flood pathway created by the altered dune between 133 and 143 Beach Avenue has increased the vulnerability of developed properties in this area, leading to an increase in the number of repetitive loss properties. With predicted increases in sea level rise and frequency of extreme coastal storms, flood insurance claims and repetitive loss properties in Hull's low lying, flood prone areas will continue to rise.

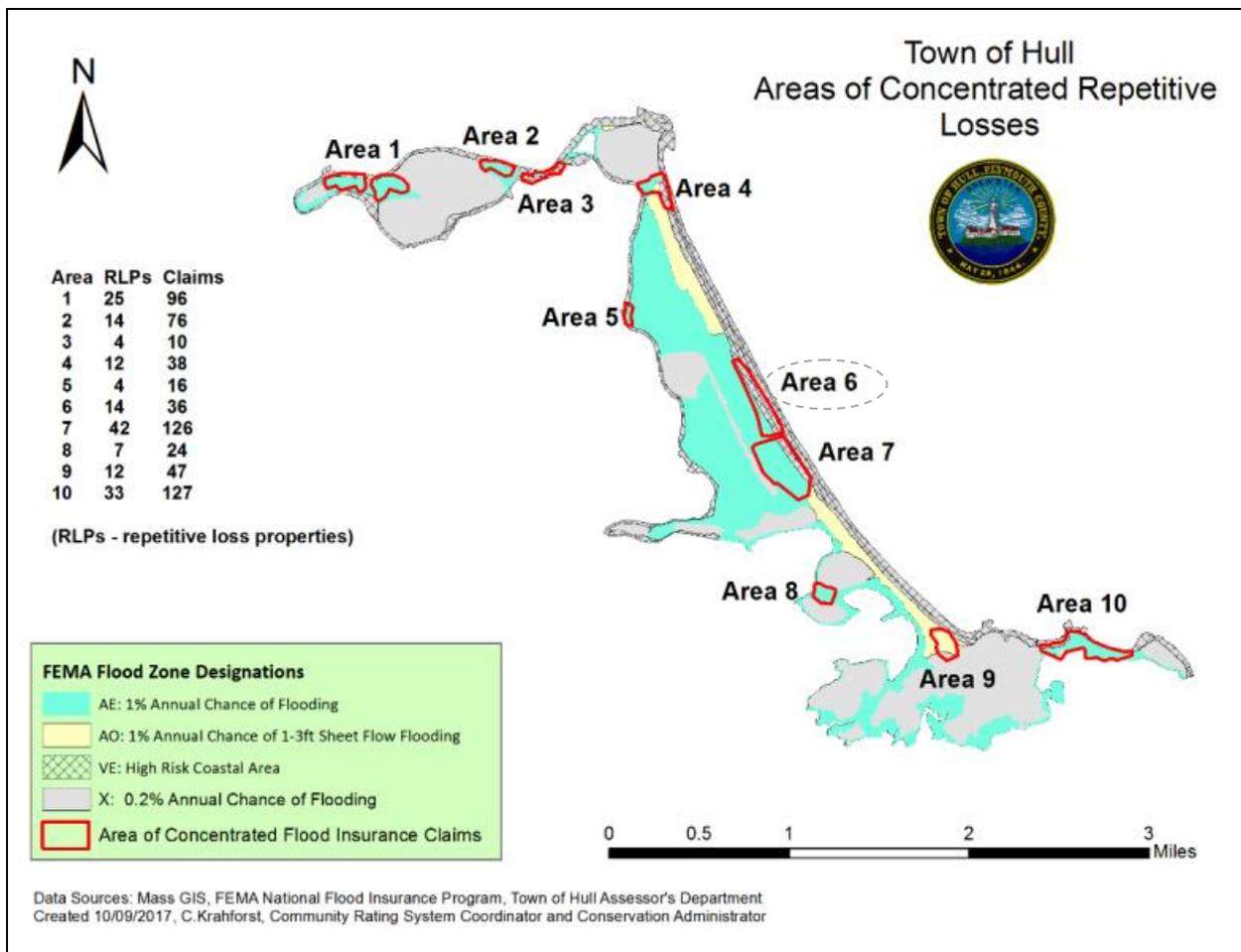


Figure 5. Areas of concentrated repetitive loss properties and National Flood Insurance Claims, 1978-2015.



3.0 Existing Environment

3.1 Coastal Dune

The project locus has been delineated as a coastal dune and is therefore protected under the Wetlands Protection Act (WPA) 310 CMR 10.28. The area meets the definition for coastal dune in that it is (i) a naturally occurring mound of sediment that is part of a larger natural ridge shaped landform, (ii) landward of the coastal beach, and (iii) composed of fine-grained sediment deposited by wind action (Figures 6-8). The altered dune area is part of a larger ridge shaped landform that currently stretches from the beach to Manomet Ave and extends north to Beach Ave near S St. and south to the area of the DCR's Nantasket Beach just below Phipps St. If not for the human alteration to accommodate parking, the site would be similar in size and configuration to the unaltered dunes to the north and south (Figure 7). The project locus is located within a Primary Frontal Dune as shown on the effective December 13, 2017 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel #25023C0036J. It is also located within a state designated Barrier Beach.

Despite the altered nature of the landform, it continues to serve the important storm damage protection and flood control functions of a coastal dune. In terms of function the following items must be considered:

- The WPA indicates that all coastal dunes on barrier beaches, and the coastal dune closest to the beach also known as the primary frontal dune or primary dune, are per se significant to storm damage protection and flood control.
- Because dunes on barrier beaches and the coastal dune closest to the beach are singled out as intrinsically important to storm damage prevention and flood control, they warrant greater scrutiny (finding in the matter of Stephen D. Peabody Trustee, Docket No. 2002-053, Final Decision, January 25, 2006, affirmed by Essex Superior Court sub nom Peabody v. Department of Environmental Protection, ESCV 2006-00299, September 21, 2007, and affirmed in Massachusetts Appeals Court November 8, 2012).
- The coastal dune resource at the site has been altered and therefore some of the typical functions of a coastal dune that allow it to serve the interests of storm damage prevention and flood control have been diminished. These include dune volume, dune form, and vegetative cover.
- Despite the altered nature of the dune at the site, it continues to provide some functions that allow it to serve the interests of storm damage prevention and flood control. These include dissipation of wave energy during storms across the area of the dune, supply of sediment to the beach during storms, ability to shift and change form both landward and laterally as a result of storm activity and wind-blown (aeolian) transport.



Figure 6. Altered coastal dune at project locus, showing naturally occurring dunes to the north and south.



Figure 7. View of naturally occurring coastal dune north of the project locus.



Figure 8. Northern end of altered dune where the landform transitions into natural coastal dune north of the timber retaining wall.

3.2 Barrier Beach

The project site is located within a state designated Barrier Beach. This portion of the barrier beach is comprised of coastal dunes as described above.

3.3 Priority and Estimated Habitats of Rare Wildlife

According to the Massachusetts Natural Heritage & Endangered Species Program (NHESP), the project locus is partially located within priority and estimated habitats of rare wildlife and rare species. Two protected species, Piping Plover (*Charadrius melodus*), and Common Tern (*Sterna hirundo*), have been found within the project area. The Piping Plover is listed as “Threatened” on both the State and Federal level pursuant to U.S. Endangered Species Act (ESA, 50 CFR 17.11). The Common Tern is listed as a species of “Special Concern” in Massachusetts. Both species are protected under the Massachusetts Endangered Species Act and its implementing regulation (321 CMR 10.00), as well as the Wetlands Protection Act and its implementing regulation (310 CMR 10.37).

The beach area east of the altered dune has been used historically by shorebirds for nesting. The Town contracts with Mass Audubon to monitor shorebird habitat along the entire beach and follows established protocols for protection of these habitat areas (Figure 9). Figure 10



shows that the proposed project footprint (black outline) partially extends within NHESP mapped habitat (green hatching) at the northern and southern ends of the project site as well as along the retaining wall as shown in Figure 10.



Figure 9. Protected bird nesting area abutting proposed project site in June of 2018.

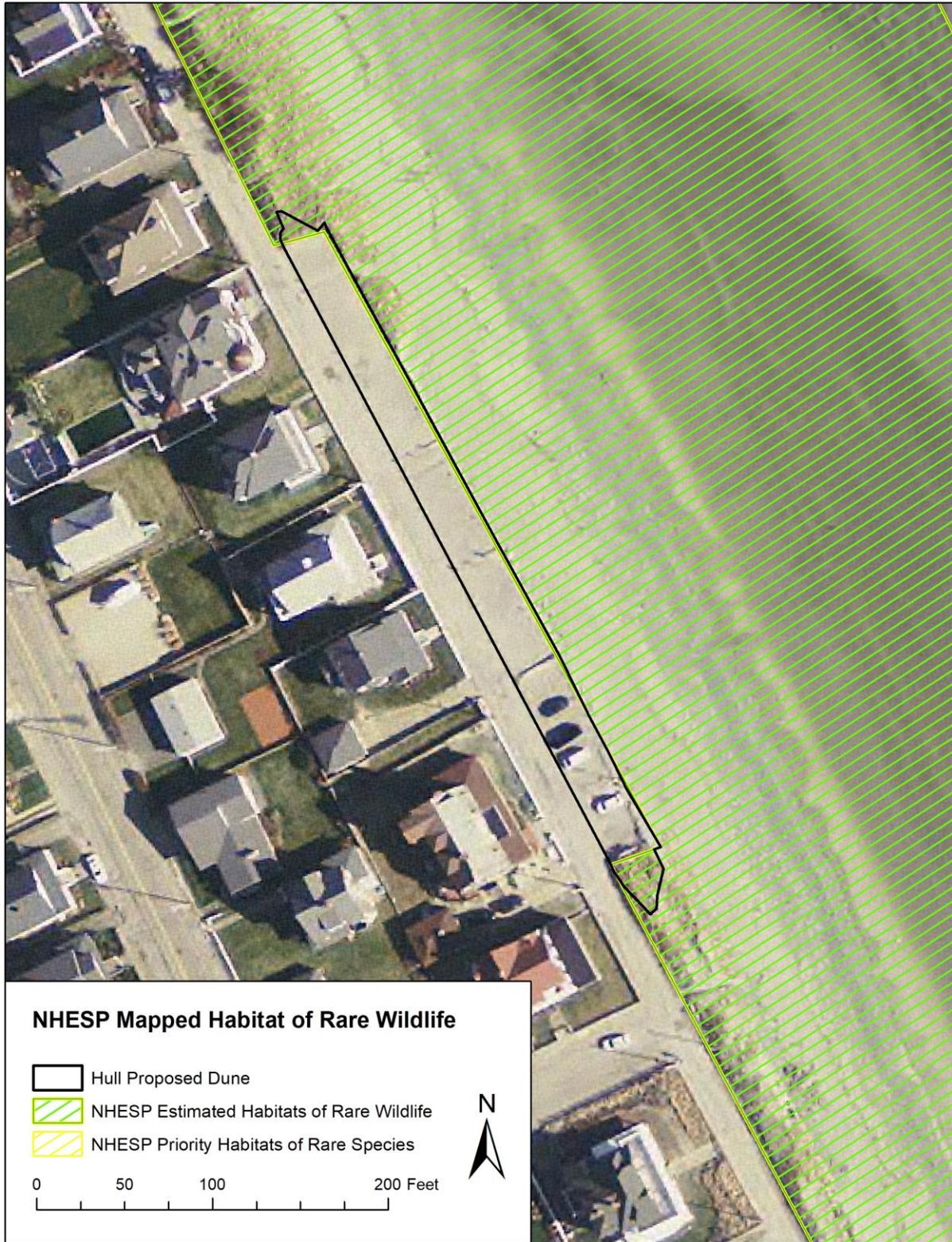


Figure 10. NHESP mapped Estimated Habitat of Rare Wildlife as of August 2017



3.4 Land Subject to Coastal Storm Flowage

Land Subject to Coastal Storm Flowage is 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, and can be found from the December 13, 2017 effective FEMA FIRM Panel #25023C0036J. The FIRM for the Town of Hull shown in Figure 11 indicates that the entire project area is mapped in a “VE Zone” where the “VE” designation indicates an area that is flooded and has additional wave velocity during the 100-year storm with wave heights of at least 3-feet. The number after the “VE” designation on Figure 11 refers to the Base Flood Elevation (BFE) in feet above the NAVD88 datum. The BFE is the water elevation during the 100-year storm event resulting from the combination of storm surge, wave setup, and wave height and runup above the storm surge elevation. For the project site, the VE(14) designation indicates that there is 1% annual risk of flooding and wave action to 14 feet NAVD88, and therefore the entire area is classified as Land Subject to Coastal Storm Flowage. The FEMA FIRM also shows the project locus to be within the primary frontal dune.

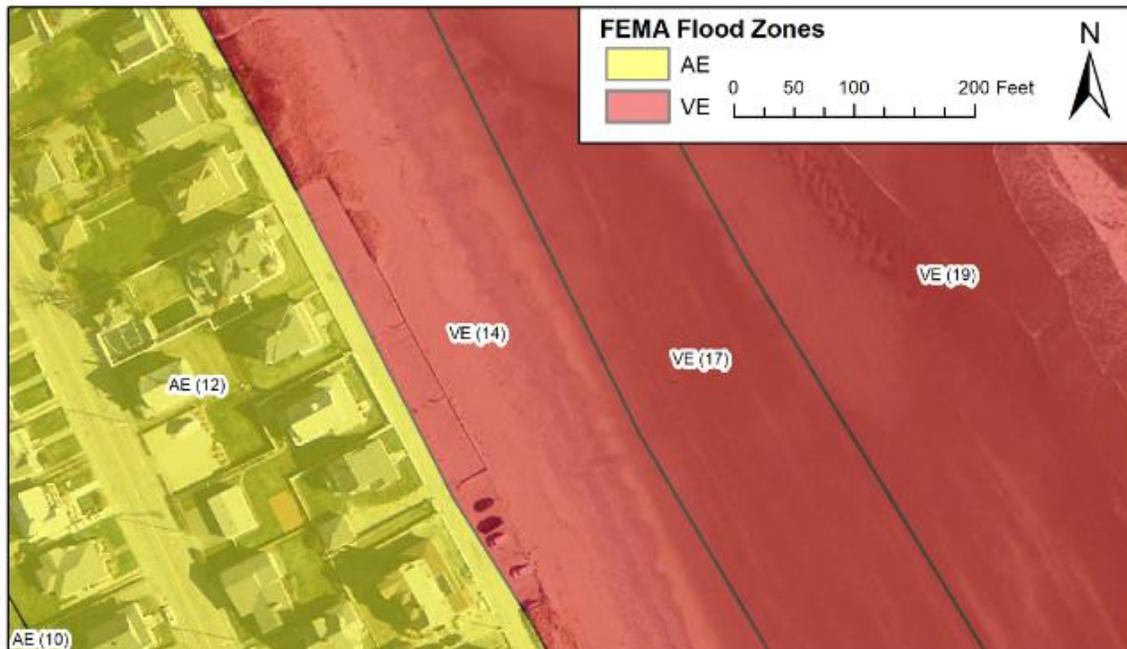


Figure 11. Effective FEMA flood zones and BFEs for the project area.

3.5 Man-made Infrastructure

The site contains multiple man-made structures within the project locus. The eastern edge of the site contains a low-lying concrete wall with a number of openings for foot traffic to access the beach (Figure 12). Embedded concrete walkways are located at many of the openings for access between the road and the beach. Abutting the low-lying concrete wall there are four (4) perpendicular separator walls that extend approximately 10 to 15 ft in a westerly direction towards Beach Avenue. The northern boundary of the project locus has a dilapidated timber retaining wall; this wall separates the altered dune area used for parking from the natural dune



to the north (Figure 13). Multiple wooden and plastic posts are also distributed throughout the project area.



Figure 12. View of low-lying concrete wall, concrete separator walls, and wooden posts.



Figure 13. Photo of dilapidated timber retaining wall along the northern boundary of the project site.



3.6 Sediment Characterization

A series of grab samples were collected at the project locus to characterize the native sediments. Two (2) samples were collected from the natural dunes north and south of the project locus, and two (2) additional samples were collected from the nearby high tide beach (Figure 14). The samples were sent to the laboratory for grain size analyses and the sediment distributions are shown in Figure 15. The samples were all relatively uniform, being comprised of fine to medium-grained sand with a D50 between 0.25 and 0.31 mm. Shallow borings were also sampled in the altered dune/unauthorized parking area. The sediments were consistent with sand found on the adjacent dunes and there was no evidence of an underlying hardened surface such as asphalt or concrete.



Figure 14. Sediment sample locations.

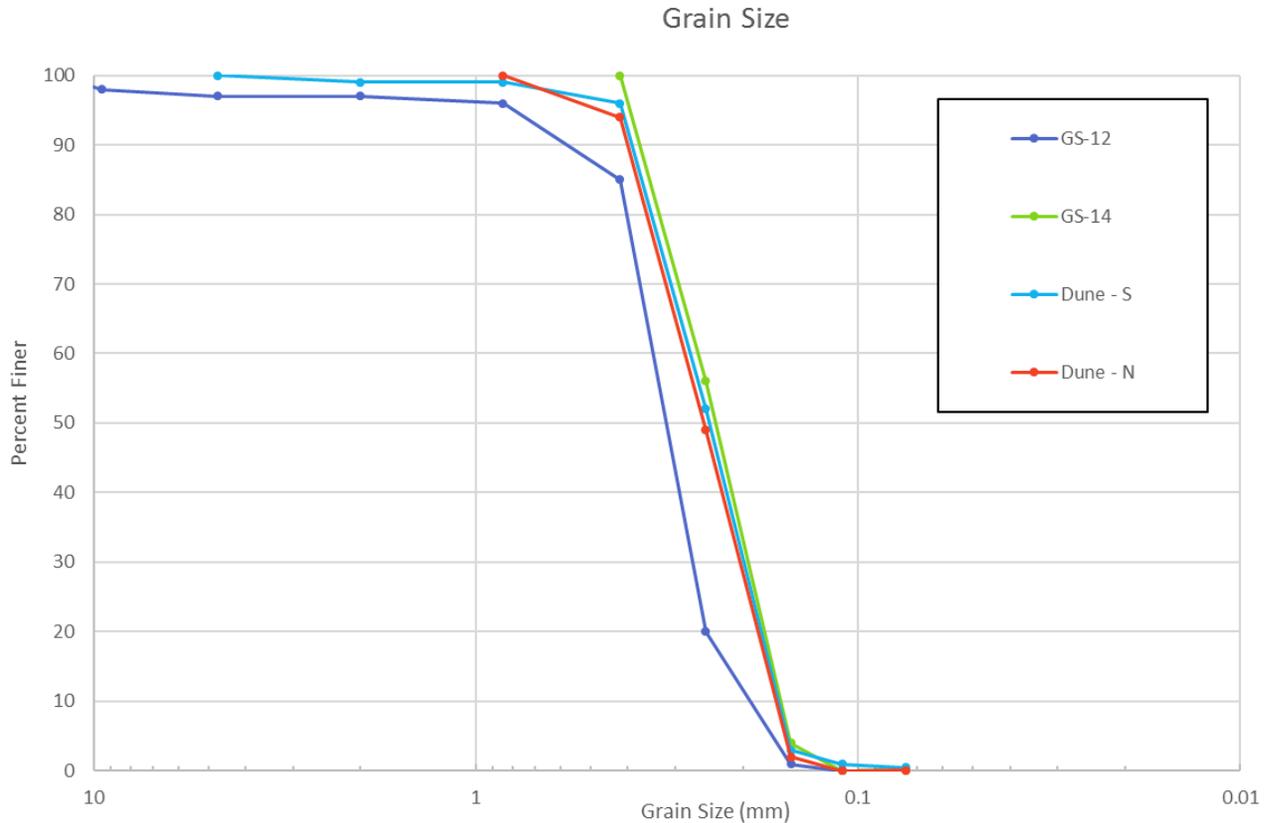


Figure 15. Grain size distribution for sand at the project locus.

4.0 Proposed Project

The purpose of this project is to restore the coastal dune resource area across and seaward of 131-145 Beach Ave, as shown on the attached permit plans and details. The total length of the proposed dune restoration project is 450 feet, which accounts for approximately 25 feet on either side of the 400 feet altered area to blend the ends of the proposed dune in with the existing adjacent dune. The proposed footprint is approximately 12,200 square feet and approximately 1,210 cubic yards of dune compatible sand will be placed in the project footprint. The sand selected for the project will be analyzed to ensure that it is compatible with the existing dune sediment, in both size and color. To provide the town with the flexibility to identify suitable sources, it is proposed that a grain size compatibility analysis will be conducted on the selected source, and submitted to the Hull Conservation Commission, or their designee, for approval prior to restoration. The dune crest will be restored to match adjacent sections of vegetated dune as shown in Figure 16, with a crest elevation of 16 ft NAVD88 and a crest width of 8 feet (Figure 17). Side slopes will be 3H:1V (Figure 17).

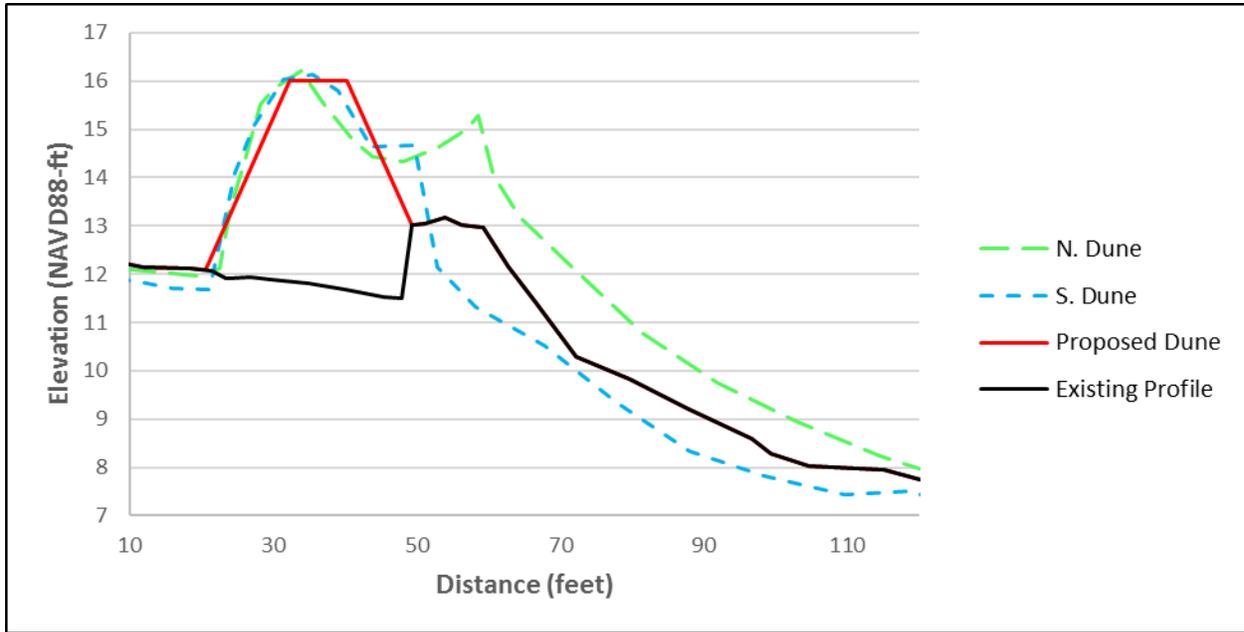


Figure 16. Comparison of proposed dune restoration (red line) versus the existing adjacent dunes to the north (dashed green) and south (dashed blue).

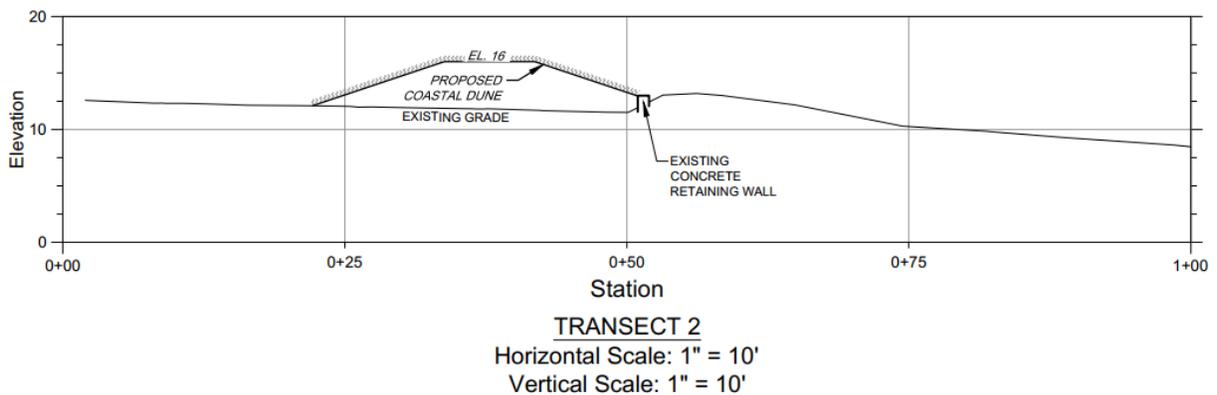


Figure 17. Engineering design at Transect 2 for the proposed dune restoration at 131-145 Beach Ave (location of Transect 2 shown on the engineering plans in Section G).

During placement, the dune sand will be graded to the widths, slopes and elevations indicated on the plans shown in Section G. Following final grading, the dunes will be planted with Cape American beach grass (*Ammophila breviligulata*) as bare root culms with 2-3 culms per hole, 7-9 inches deep, and 18 inches on-center in staggered rows as shown in the plans. This planting plan complies with the 2018 Town of Hull North Nantasket Beach Management Plan (BMP, 2018). A four-foot wide vegetated buffer strip will be planted along the landward toe (Beach Ave. side) of the dune using native salt tolerant shrubs such as beach plum (*Prunus maritima*), or similar. The shrubs will be planted 5 feet on-center in staggered rows. Beach grass will be planted between the shrubs to ensure that there are no bare spots. Sand fencing will be



installed at the landward (Beach Ave.) toe of the restored dune to prevent uncontrolled foot traffic through the dune, and to help capture wind-blown sand before it reaches the road. A rendition of the proposed enhanced dune is shown in Figure 18.

A single pedestrian access path is proposed over the central portion of the dune, however, its exact placement and orientation may be determined during construction. The path will be 48 inches wide and oriented to the southeast, which will conform with the specifications in the 2018 BMP. The path will be delineated using sand fending or equivalent in an effort to contain foot traffic within the path.



Figure 18. Photographic rendition of proposed dune restoration between 131-145 Beach Ave.

Annual maintenance of the proposed dune will include both sand nourishment to maintain crest height and width as well as plantings and fencing, as needed. The proposed design is not expected to be a long-term solution as the dune is susceptible to erosion during coastal storms and potentially significant erosion during large coastal storms. Performance of the dune during storms is discussed below.

5.0 Proposed Dune Evaluation

The proposed dune restoration was evaluated using the computer model SBEACH, which is an empirically based numerical model for simulating two-dimensional cross-shore beach change. The model was initially formulated using data from prototype-scale laboratory experiments and



further developed and verified based on field measurements (Larson, Kraus, & Byrnes, 1990)¹. The model predicts the time-dependent evolution of beach and dune profiles for specified water levels and wave conditions. In addition to beach elevation data, the model requires a time series of wave heights, wave periods and water levels as forcing inputs. The specific storm information required by SBEACH is a time history of total water level (tide plus surge), as well as wind, wave height and period.

Storm information for the project was developed using several sources. Return period storm surge stillwater elevations, wave height and periods for the 10-year, 50-year, and 100-year return period storm events (i.e., 10%, 2%, and 1% annual chance of occurrence) were obtained from the November 4, 2016 effective FEMA Flood Insurance Study (FIS) for Plymouth County. In addition, due to the extent of inundation and damage caused during the March 2018 storms, the March 1-3, 2018 nor'easter was also modeled. Water levels and waves for this storm were taken from NOAA Stations 8443970 and 44013, respectively. A summary of the storm surge and wave conditions simulated using SBEACH is shown in Table 1. As can be seen from Table 1, the March 1-3, 2018 storm was between a 10-year and 50-year event.

Table 1. SBEACH input data for return period storm events and March 2018 storm.

| Storm Event | Storm Surge Elevation (ft) | Wave Height [H _{mo} (ft)] | Peak Wave Period [T _p (sec)] |
|-------------|----------------------------|------------------------------------|---|
| March 2018 | 9.2 | 26.8 | 16.0 |
| 10-Year | 8.9 | 23.0 | 10.2 |
| 50-Year | 9.7 | 28.2 | 11.3 |
| 100 -Year | 10.0 | 30.5 | 11.8 |

The SBEACH input beach profile for the existing conditions was constructed using topography based on the Woods Hole Group June 11, 2018 survey and supplemented with the 2016 USGS CoNED Topobathymetric Model data. The proposed dune profile was then constructed within the project footprint, and an iterative approach was employed to determine the optimum dune dimensions given the existing site constraints. It was found that a 3H:1V slope allowed for a dune crest to be constructed that closely matched the elevation and width of the adjacent dune sections. While this is steeper than what would typically be used for dune construction, the slope is actually equivalent to or less steep than the slope of the existing adjacent dune sections. In addition, a shallower 4H:1V slope does not allow for a crest with any width to be constructed, which would compromise the storm resilience of the dune. Both the existing conditions and proposed dune were evaluated in SBEACH to demonstrate the storm damage protection functions that the proposed dune will provide. In addition, a third scenario was evaluated where the same dune configuration (i.e., height, slope, width) was constructed seaward of the concrete retaining wall. This third foredune scenario was evaluated to demonstrate the importance of the dune placement.

¹ Larson, M., N. Kraus, and M. Byrnes. 1990. SBEACH: Numerical Model for Simulating Storm-Induced Beach Change. Report 2. Numerical Formulation and Model Tests. 120 pp.



Results of the SBEACH modeling for the March 2018 storm event for the existing conditions, proposed dune, and foredune are shown in Figures 19-21, respectively. The vertical axis represents elevation (in feet relative to the NAVD88 vertical datum), while the horizontal axis represents the cross-shore distance along the profile in feet. The solid black line shows the existing topography with the altered dune. The yellow line shows the proposed dune restoration or foredune, and the red line shows the final eroded profile. The dashed blue line represents the total water elevation (TWL), which is the maximum still water level associated with the March 1-3, 2018 Storm, including the effects of wave setup.

Figure 19 shows the pre- and post-storm profiles for the existing conditions subject to the March 1-3, 2018 storm. It should be noted that the Town, under an Emergency Order, placed sand in the project locus and over the existing low-lying concrete wall prior to the March 2018 storms to enhance storm damage protection; however, most of the material was eroded leaving a small 1-2 ft high mound of sand seaward of the concrete wall as shown in Figure 19. The model simulation did not account for the larger volume of sand placed by the Town, nor did it account for the presence of the low-lying concrete wall. As such, the model predicted significant lowering of the beach profile as shown by the red dashed line in Figure 19. While modeled response of the beach profile likely over estimates the erosion and beach lowering, it is clear that water levels during the storm overtopped the sand mound and concrete wall, allowing flood waters to inundate Beach Ave. and nearby properties. The model results for existing conditions demonstrate the vulnerability of the site without the protection of a dune in place.

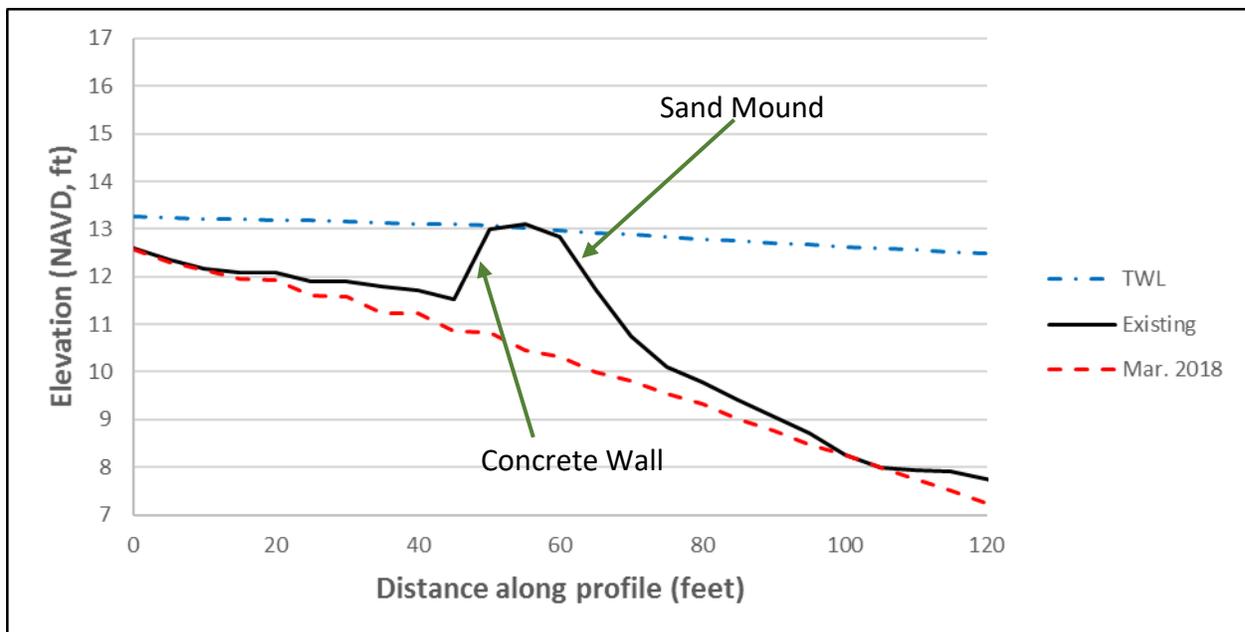


Figure 19. SBEACH model results of the March 2018 storm for the existing beach profile.

Figure 20 shows the proposed dune restoration (yellow line) constructed over the existing topography (black line) subject to the March 1-3, 2018 storm. The eroded profile (dashed red line) shows that while the proposed dune suffers damage during the storm, it remains largely



intact and able to provide resilience for future storms. Storm surge is limited to the seaward face of the proposed dune, which also limits the amount of runup and overtopping, and prevents flood waters from inundating Beach Ave. Figure 21 shows SBEACH model results for the same dune configuration constructed as a foredune seaward of the concrete wall.

Under this scenario the foredune is completely eroded by the March 1-3, 2018 storm, and flood waters are able to inundate Beach Ave. Based on this information, the SBEACH model demonstrates that the foredune scenario is not a viable alternative since it does not provide an adequate level of storm damage protection.

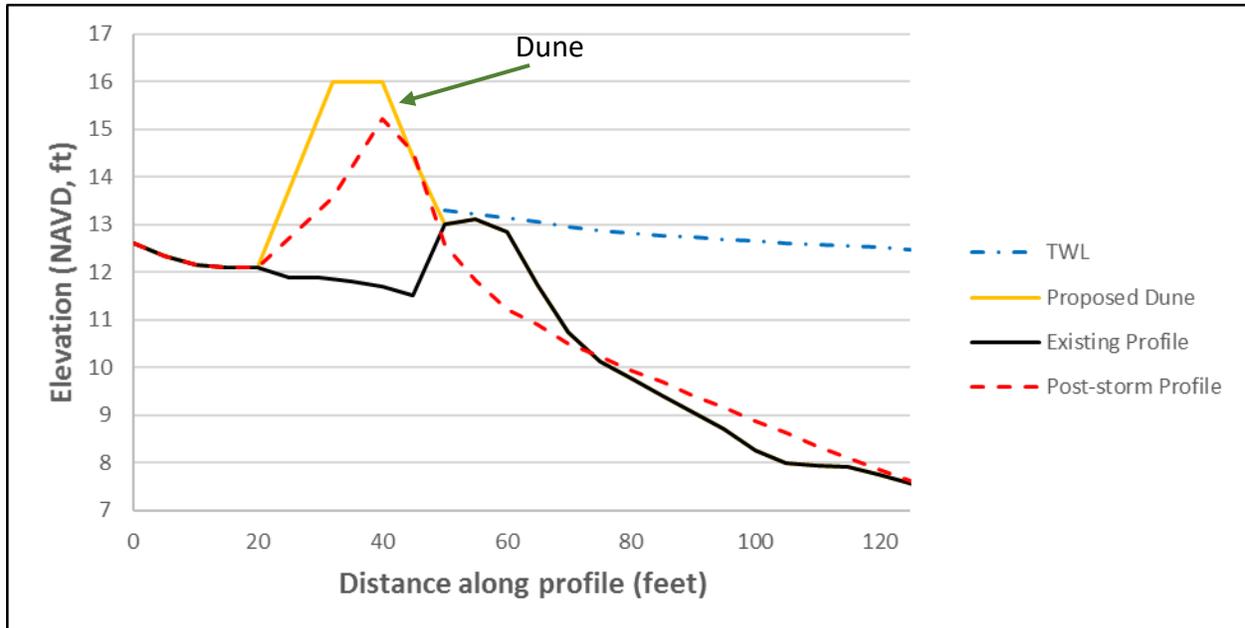


Figure 20. SBEACH model results of the March 2018 storm for the proposed dune restoration project.

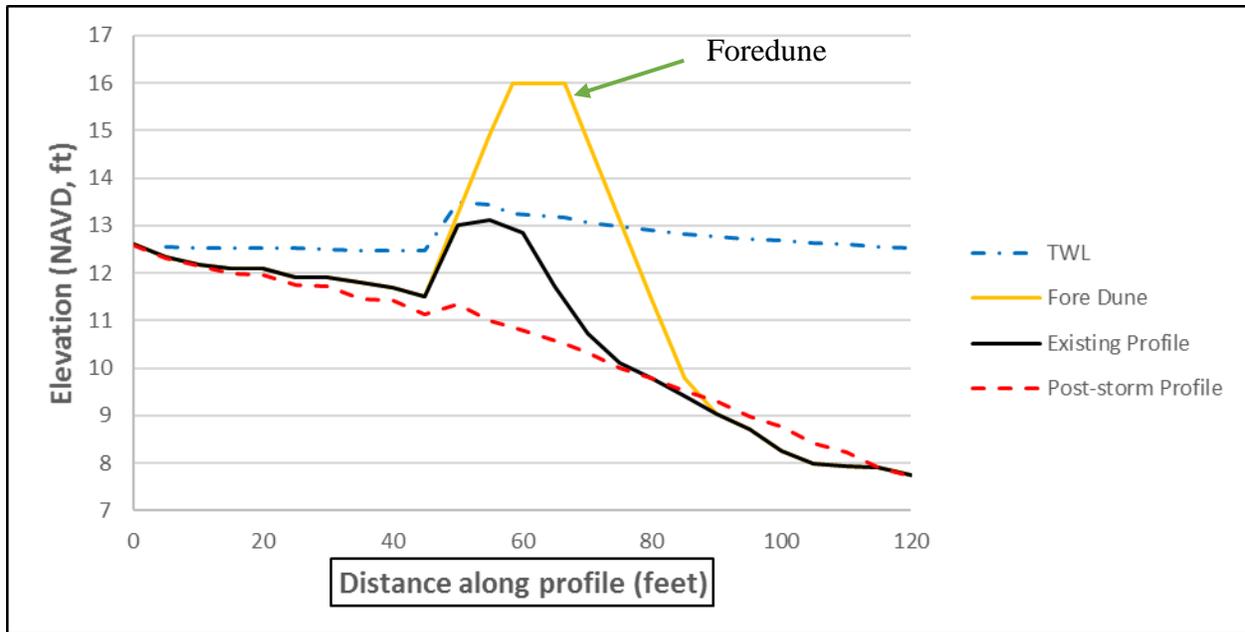


Figure 21. SBEACH model results of the March 2018 storm for a foredune.

6.0 Construction Methodology

The proposed dune restoration will be constructed completely within the approximate 30-foot wide project footprint located seaward of and adjacent to the built portion of Beach Avenue, and is completely contained within the Town-owned road layout of Beach Avenue. Construction access will therefore be directly from Beach Avenue, which will provide access along the full length of the project. The footprint will be staked at the beginning of the project to delineate the limit of work. Prior to construction, existing manmade structures will be removed including the concrete walkways, wooden posts, concrete separator walls, and the timber retaining wall. The existing concrete retaining wall that marks the seaward boundary of the project footprint will remain in place.

Approximately 1,210 cubic yards of compatible sand will be placed within the project footprint. It is anticipated that the source of sand for the project will come from an upland (e.g. quarry) sources. Therefore, a sediment grain-size analysis will be performed to ensure sediment compatibility with the existing dune. In addition, the color of the sand will be compared to ensure that it is not significantly different than the existing dune. All information regarding sediment compatibility will be presented to the Conservation Commission for review prior to construction. The nourishment sand will be placed directly in the project footprint from the road, and then a front end loader will be used to grade the sand to the proper elevations (16 ftNAVD88) and slopes (3H:1V) as indicated on engineering drawings. Once the final grading has been completed, the access path will be staked out, and then the beach grass, buffer strip plantings and sand fencing will be installed.

Construction of the proposed project is expected to take approximately 1-2 weeks and will commence in the fall of 2019. The plantings may be delayed depending on the timing for initial



dune restoration, as the plantings need to be installed between November 15 and April 15 to comply with the 2018 BMP.

Section C

Performance Standards Compliance Narrative



C. PERFORMANCE STANDARDS COMPLIANCE NARRATIVE

The project will have impacts on the following Wetland Resources:

- Coastal Dune
- Estimated Habitats of Rare Wildlife (for coastal wetlands)

Excerpts from 310 CMR 10.28 – Coastal Dune

(2) *Definition.* Coastal Dune means any natural hill, mound or ridge of sediment landward of a coastal beach deposited by wind action or storm overwash. Coastal dune also means sediment deposited by artificial means and serving the purpose of storm damage prevention or flood control.

WHEN A COASTAL DUNE IS DETERMINED TO BE SIGNIFICANT TO STORM DAMAGE PREVENTION, FLOOD CONTROL OR THE PROTECTION OF WILDLIFE HABITAT, 310 CMR 10.28(3) through (6) SHALL APPLY:

(3) Any alteration of, or structure on, a coastal dune or within 100 feet of a coastal dune shall not have an adverse effect on the coastal dune by:

- (a) affecting the ability of waves to remove sand from the dune;
- (b) disturbing the vegetative cover so as to destabilize the dune;
- (c) causing any modification of the dune form that would increase the potential for storm or flood damage;
- (d) interfering with the landward or lateral movement of the dune;
- (e) causing removal of sand from the dune artificially; or
- (f) interfering with mapped or otherwise identified bird nesting habitat.

The proposed project is expected to have a positive impact on the coastal dune resource because it will supply a much needed sediment source to the nearby beach and dune systems. The project will not take away the ability of waves to remove sediment from the dune. The project will establish a vegetative cover to stabilize the dune. The project will restore the dune form similar to areas to the north and south, improving the ability of the dunes to provide storm damage prevention and flood control to surrounding areas. The project will not interfere with the natural landward movement of the dune. The project will not result in a removal of sand from the dune but rather will add sediment. The only portion of the project within mapped habitat is at the extreme northern and southern ends. This portion of the site already contains dune habitat and the proposed project will not interfere with this habitat.

(4) Notwithstanding the provisions of 310 CMR 10.28(3), when a building already exists upon a coastal dune, a project accessory to the existing building may be permitted, provided that such work, using the best commercially available measures, minimizes the adverse effect on the coastal dune caused by the impacts listed in 310 CMR 10.28(3)(b) through



10.28(3)(e). *Such an accessory project may include, but is not limited to, a small shed or a small parking area for residences. It shall not include coastal engineering structures.*

The proposed project will restore an altered dune used as an unauthorized parking area and remove several associated unpermitted manmade structures within the dune except for the existing concrete retaining wall.

(5) The following projects may be permitted, provided that they adhere to the provisions of 310 CMR 10.28(3):

- (a) pedestrian walkways, designed to minimize the disturbance to the vegetative cover and traditional bird nesting habitat;*
- (b) fencing and other devices designed to increase dune development; and*
- (c) plantings compatible with the natural vegetative cover.*

A 4-foot wide vegetated buffer strip will be planted along the landward toe of the dune with native salt tolerant shrubs. Sand fencing will be installed between the buffer strip and road to prevent foot traffic and help capture aeolian sand transport over the crest before it reaches the road. The dune will be planted with Cape American beach grass.

(6) Notwithstanding the provisions of Sections 10.28(3) through (5), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

The northern and southern extent of the proposed project is located in coastal dune mapped as habitat. The coastal dune is immediately adjacent to coastal beach areas that are mapped as habitat. The proposed project will not encroach upon the beach habitat. Sand placed in the dune will act as a source of sediment to the bird habitat during storms as material is eroded from the dune and transported to the beach. Mass CZM, Mass DEP, and NHESP conducted a site visit with the applicant and a representative of the Town.

310 CMR 10.37 - Estimated Habitats of Rare Wildlife (Endangered Species)

See discussion above. in 10.28(3)(f), and 10.28(6)

Section D

NHESP Submittal Letter and Proof of Submission

May 22, 2019

Job No. 2018-0093

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

Via Overnight Mail

Re: Notice of Intent Application
Proposed Coastal Dune Restoration
Town of Hull
Town-owned layout of Beach Ave (opposite 131-145 Beach Ave)
Hull, MA

Dear Sir/Madam:

Enclosed please find a copy of the Notice of Intent application we have filed with the Hull Conservation Commission for the above referenced project. The proposed project/limit of work is located in an area designated as an Estimated Habitat, therefore subject to the endangered species protection provisions of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.28, & 10.37) and your review.

The proposed project is also located in an area designated as a Priority Habitat, which is subject to a Massachusetts Endangered Species Act (MESA) review under 321 CMR 10.18. Enclosed please find a \$300.00 check made payable to the Commonwealth of Mass. - NHESP for the MESA filing fee.

If you have any questions or require additional information, please give me a call at 508-495-6210.

Sincerely,



Mitchell Buck, P.E.
Coastal Engineer

MAB/ker

Enclosure

cc: Mass. DEP/SERO – Wetlands
Hull Conservation Commission
Phil Lemnios, Town of Hull

UPS Internet Shipping: View/Print Label

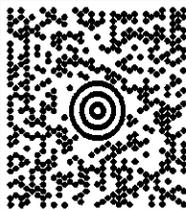
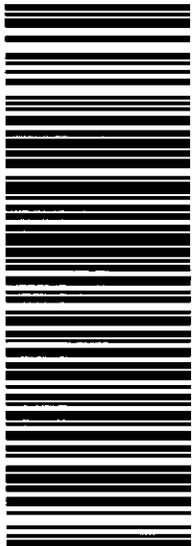
1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.
2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
3. **GETTING YOUR SHIPMENT TO UPS**
Customers with a Daily Pickup
Your driver will pickup your shipment(s) as usual.

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Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
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MASHPEE ,MA 02649

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|---|--|---|--|---|
| <p>1 LBS 1 OF 1</p> <p>KALINDA ROBERTS 508-540-8080 WOODS HOLE GROUP 107 WATERHOUSE ROAD BOURNE MA 02532</p> <p>SHIP TO: NHESP 1 RABBIT HILL ROAD DIVISION OF FISHERIES & WILDLIFE WESTBOROUGH MA 01581-3336</p> | <p>MA 016 9-03</p>   | <p>UPS NEXT DAY AIR</p> <p>TRACKING #: 1Z 290 9W1 01 9523 1864</p> <p>1</p> |  | <p>BILLING: P/P</p> <p>Reference#1: 18-0093-00-004.1</p> <p>UPS 21.1.25. WINTNV50 12.0A 04/2019</p>  |
|---|--|---|--|---|

Section E

MESA Fee



107 Waterhouse Road,
MA BOURNE , 02532 - UNITED STATES
+1(508)540-8080

BANK OF THE WEST
LOS ANGELES , CALIFORNIA

005654

PAY TO THE ORDER OF: THREE HUNDRED US DOLLARS
COMMONWEALTH OF MASS-NHESP

DATE 05/17/2019 AMOUNT USD 300.00

CH REQ ROBERTS

Natt Padmalader
AUTHORIZED SIGNATURE

⑈005654⑈ ⑆121100782⑆ 041108945⑈

Details on Back
Security Features Included

Section F

Abutters List

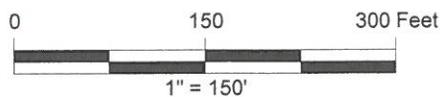


For assessment purposes only: not to be used in legal boundary descriptions.



Town of Hull
Assessors Office
253 Atlantic Avenue
Hull, MA 02045
781-925-2205

Abutters List Locus Map



May 20, 2019

Multiple Subject Parcels Selected
Radius: 300'



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....
Parcel No.:
Owner:
Address: 145 BEACH AVE

May 20, 2019
4:05:00PM

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|--------------------------------|-----------------|---------------------------|--|
| WALL ROBERT S TRS | 129 MANOMET AVE | 19-134 50805-20 | WALL ROBERT S TRS 129 MANOMET AVENUE HULL, MA 02045-0000 |
| STEINBERG STANLEY J & KAREN F | 131 MANOMET AVE | 19-135 33779-324 | STEINBERG STANLEY J & KAREN F 20 WHITTER RD NEEDHAM, MA 02492 |
| BEATRICE HILARY TRS | 133 MANOMET AVE | 19-136 26539-144 | BEATRICE HILARY TRS 133 MANOMET AVE HULL, MA 02045 |
| MCGREEVY BRIAN & CYNTHIA | 133 MANOMET AVE | 19-137 50123-2 | MCGREEVY BRIAN & CYNTHIA 133A MANOMET AVE HULL, MA 02045 |
| GROSSMAN RICHARD A & THEODOR | 135 MANOMET AVE | 19-138 50008-265 | GROSSMAN RICHARD A & THEODORA 600 SO.OCEAN BLVD APT 805 BOCA RATON, FL 33432 |
| PETERS LEONARD & LYNN | 137 MANOMET AVE | 19-139 23732-315 | PETERS LEONARD & LYNN 137A MANOMET AVE HULL, MA 02045-0000 |
| POPKIN RACHEL TRS RACHEL POPKI | 137 MANOMET AVE | 19-140 8210-68 | POPKIN RACHEL TRS RACHEL POPKI 131 WOODBINE CIRCLE NEEDHAM, MA 02494 |
| MEIROVITZ MANUEL N & BARBARA | 139 MANOMET AVE | 19-141 9150-250 | MEIROVITZ MANUEL N & BARBARA 23 COLGATE RD NEEDHAM, MA 02492 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....
Parcel No.:
Owner:
Address: 145 BEACH AVE

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|--------------------------------|-----------------|---------------------------|--|
| PATTERSON ROBERT K & ANN FLAH | 141 MANOMET AVE | 19-142 4374-13 | PATTERSON ROBERT K & ANN FLAHE 141 MANOMET AVE HULL, MA 02045-0000 |
| ZABLATSKY MARC H TRS 2009 | 145 MANOMET AVE | 19-143 37603-22 | ZABLATSKY MARC H TRS 2009 147 LELAND FARM RD ASHLAND, MA 01721 |
| DIENGOTT RUTH L TRS DIENGOTT N | 180 SAMOSET AVE | 19-145 14530-282 | DIENGOTT RUTH L TRS DIENGOTT N 280 NEWTONVILLE AVE APT 306 NEWTONVILLE, MA 02460 |
| JACOBS MARION TRS LEONARD JAC | 178 SAMOSET AVE | 19-146 14054-78 | JACOBS MARION TRS LEONARD JACO 52 PORTER ST GRANBY, MA 01033 |
| NIERMAN SHELDON & SHEILA | 176 SAMOSET AVE | 19-147 42507-330 | NIERMAN SHELDON & SHEILA 10856 NORTHGREEN DRIVE WELLINGTON, FL 33449 |
| PORTER MICHAEL T & DEBBIE L | 174 SAMOSET AVE | 19-148 50684-293 | PORTER MICHAEL T & DEBBIE L 310 CEDAR ST ASHLAND, MA 01721 |
| PORTER MICHAEL T & DEBBIE L | 174 SAMOSET AVE | 19-148 50684-293 | PORTER MICHAEL T & DEBBIE L 310 CEDAR ST ASHLAND, MA 01721 |
| SCHMITT BRIAN J & JUDITH | 172 SAMOSET AVE | 19-149 23229-20 | SCHMITT BRIAN J & JUDITH 172 SAMOSET AVE HULL, MA 02045-0000 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....

Parcel No.:
Owner:
Address: 145 BEACH AVE

May 20, 2019
4:05:00PM

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|-------------------------------|-------------------|---------------------------|--|
| HELLER EDWARD B & CHARLOTTE | 170 SAMOSET AVE | 19-150 3779-157 | HELLER EDWARD B & CHARLOTTE 211 CENTRAL ST UNIT #A316 NORWOOD, MA 02062-0000 |
| HELLER EDWARD B & CHARLOTTE | 170 A SAMOSET AVE | 19-150 3779-157 | HELLER EDWARD B & CHARLOTTE 211 CENTRAL ST UNIT #A316 NORWOOD, MA 02062-0000 |
| EPSTEIN RHODA-KANET | 170 SAMOSET AVE | 19-151 4822-19 | EPSTEIN RHODA-KANET 170 SAMOSET AVE HULL, MA 02045-0000 |
| SOLOD DIANNA D. & VALENTINA | 168 SAMOSET AVE | 19-152 5524-4 | SOLOD DIANNA D. & VALENTINA 216 NEWPORT RD HULL, MA 02045 |
| DOHERTY ANN M & PAUL S TRS | 26 ADAMS STREET | 19-153 45365-277 | DOHERTY ANN M & PAUL S TRS 1 WINDSOR LANE BURLINGTON, MA 01803-0000 |
| MAGUIRE ROBERT F & JOAN G TRS | 144 MANOMET AVE | 19-154 16758-350 | MAGUIRE ROBERT F & JOAN G TRS 144 MANOMET AVE HULL, MA 02045-0000 |
| GOLDBERG ROBERT L & FRANCES Z | 138 MANOMET AVE | 19-155 42136-105 | GOLDBERG ROBERT L & FRANCES Z 56 WILSHIRE DRIVE SHARON, MA 02067-0000 |
| MONOSSON ADOLF F | 136 MANOMET AVE | 19-156 9910-91 | MONOSSON ADOLF F 385 CHESTNUT HILL AVE BOSTON, MA 02135 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....
Parcel No.:
Owner:
Address: 145 BEACH AVE

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|-------------------------------|-----------------|---------------------------|--|
| MURPHY FRANCES A TRS | 130 MANOMET AVE | 19-161 599-119 | MURPHY FRANCES A TRS 24 RIDGEWOOD CROSSING HINGHAM, MA 02043 |
| MURPHY FRANCES ANN TRS MURPH | 128 MANOMET AVE | 19-162 507-80 | MURPHY FRANCES ANN TRS MURPHY 44 WANDERS DR HINGHAM, MA 02043-0000 |
| MONOSSON GLORIA | 147 BEACH AVE | 19-166 563-200 | MONOSSON GLORIA 385 CHESNUT HILL AVE BOSTON, MA 02135 |
| GOLDBERG ROBERT L & FRANCES Z | 149 BEACH AVE | 19-167 42135-141 | GOLDBERG ROBERT L & FRANCES Z 56 WILSHIRE DR SHARON, MA 02067-0000 |
| BICKOFF GERALD P & DEBRA B | 151 BEACH AVE | 19-168 20816-218 | BICKOFF GERALD P & DEBRA B 63 LAKE AVE NEWTON, MA 02459 |
| WINIG MAXINE | 153 BEACH AVE | 19-169 17491-83 | WINIG MAXINE 97 OLD FARM RD NEEDHAM, MA 02492 |
| AIELLO DARLENE M | 126 MANOMET AVE | 21-001 9336-79 | AIELLO DARLENE M 24 FABIANO DRIVE BRAintree, MA 02184-0000 |
| FURMAN MEL PATRELL TRS | 124 MANOMET AVE | 21-002 44711-303 | FURMAN MEL PATRELL TRS 1403 MAPLE AVENUE EVANSTON, ILL 60201 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....

Parcel No.:

Owner:

Address:

145 BEACH AVE

May 20, 2019

4:05:00PM

Page 5

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|-------------------------------|-----------------|---------------------------|--|
| LARSEN | 122 MANOMET AVE | 21-003 27249-049 | LARSEN 122 MANOMET AVE HULL, MA 02045-0000 |
| LEMKIN AMY M | 81 COBURN ST | 21-004 35035-271 | LEMKIN AMY M 81 COBURN ST HULL, MA 02045 |
| GORDON LEONARD & COLLIER DAR | 166 SAMOSET AVE | 21-009 18427-326 | GORDON LEONARD & COLLIER DARYL PO BOX 0555 HULL, MA 02045-0555 |
| HENDERSON WILLIAM III & NANCY | 164 SAMOSET AVE | 21-010 3944-515 | HENDERSON WILLIAM III & NANCY 164 SAMOSET AVENUE HULL, MA 02045-0000 |
| PALEY BERTRAM R & MARJORIE B | 162 SAMOSET AVE | 21-011 34017-262 | PALEY BERTRAM R & MARJORIE B 15 UNION ST LAWRENCE, MA 01840-0000 |
| ROBERTS DOUGLAS & DEBRA | 160 SAMOSET AVE | 21-012 14864-101 | ROBERTS DOUGLAS & DEBRA 15 CANTERBURY RD WINDHAM, NH 03087-0000 |
| RICHARDSON KEVIN & CHRISTINA | 65 COBURN ST | 21-014 16934-173 | RICHARDSON KEVIN & CHRISTINA 65 COBURN STREET HULL, MA 02045-0000 |
| KAPLAN KAREN PERRY TRS | 119 MANOMET AVE | 21-015 42628-1 | KAPLAN KAREN PERRY TRS 65 CLOVERDALE RD NEWTON, MA 02461-1810 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....

Parcel No.:
Owner:
Address:

145 BEACH AVE

May 20, 2019
4:05:00PM

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|-------------------------------|-----------------|---------------------------|--|
| GRASZ JONATHAN T & MELISSA L | 121 MANOMET AVE | 21-016 45205-137 | GRASZ JONATHAN T & MELISSA L 121 MANOMET AVE HULL, MA 02045 |
| DOWNS KIMBERLY A MCNEIL & AL | 123 MANOMET AVE | 21-017 476-151 | DOWNS KIMBERLY A MCNEIL & ALDE 123 MANOMET AVE HULL, MA 02045-0000 |
| BARLETTO LOUIS J JR & LINDA M | 125 MANOMET AVE | 21-018 4918-79 | BARLETTO LOUIS J JR & LINDA M 125 MANOMET AVE HULL, MA 02045-0000 |
| KANE JAMES P | 127 MANOMET AVE | 21-019 38396-55 | KANE JAMES P 98 BROOK ST WELLESLEY, MA 02482 |
| NUTTER GALE | 121 BEACH AVE | 21-052 31079-015 | NUTTER GALE 121 BEACH AVE HULL, MA 02045-0000 |
| GAINOR LOUIS S & ELLEN M | 123 BEACH AVE | 21-053 33957-287 | GAINOR LOUIS S & ELLEN M 123 BEACH AVENUE HULL, MA 02045 |
| LOEW HONEY J | 129 BEACH AVE | 21-054 8HP287-5E | LOEW HONEY J PO BOX 239 HULL, MA 02045-0000 |
| COLVIN BARBARA LEE | 118 MANOMET AVE | 21-055 48867-281 | COLVIN BARBARA LEE 1540 RAPHS ROYALE BLVD ENGLEWOOD, FL 34223-1888 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....

Parcel No.:
Owner:
Address:

145 BEACH AVE

May 20, 2019
4:05:00PM

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|-------------------------------|-----------------|---------------------------|--|
| CANAVAN JAMES A & LISA A | 116 MANOMET AVE | 21-056 18615-106 | CANAVAN JAMES A & LISA A 116 MANOMET AVE HULL, MA 02045-0000 |
| MCDONNELL MARY T | 114 MANOMET AVE | 21-057 9090-328 | MCDONNELL MARY T 114 MANOMET AVE HULL, MA 02045-0000 |
| KNOCHIN HAROLD & NANCY | 112 MANOMET AVE | 21-058 8689-140 | KNOCHIN HAROLD & NANCY 40 CHEROKEE RD CANTON, MA 02021-0000 |
| MULKERN JOSEPH B & KIMBERLY B | 110 MANOMET AVE | 21-059 48122-146 | MULKERN JOSEPH B & KIMBERLY B 76 WILLIAMS ST MANSFIELD, MA 02048 |
| VERROCHII JENNIFER R | 111 MANOMET AVE | 21-070 48748-60 | VERROCHII JENNIFER R 111 MANOMET AVENUE HULL, MA 02045 |
| SALTZBERG ROBERT | 115 MANOMET AVE | 21-071 43689-94 | SALTZBERG ROBERT 115 MANOMET AVE HULL, MA 02045-0000 |
| BAKERMAN MICHAEL M & CINDY E | 117 MANOMET AVE | 21-072 36808-336 | BAKERMAN MICHAEL M & CINDY E 199 SE ETHAN TERR STUART, FL 34997 |
| BAKERMAN MICHAEL & CINDY E | 70 COBURN ST | 21-073 36808-339 | BAKERMAN MICHAEL & CINDY E 199 SE ETHAN TERR STUART, FL 34997 |



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....

Parcel No.:

Owner:

Address:

145 BEACH AVE

May 20, 2019
4:05:00PM

Page 8

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|-------------------------|------------------------|-----------------------------------|---|
| CASTRO VICTOR M & MEGAN | 66 COBURN ST | 21-074 51015-158 | CASTRO VICTOR M & MEGAN 66 COBURN ST HULL, MA 02045 |

WALL ROBERT S TRS
129 MANOMET AVENUE
HULL, MA 02045-0000

DIENGOTT RUTH L TRS DIENGOTT N
280 NEWTONVILLE AVE APT 306
NEWTONVILLE, MA 02460

DOHERTY ANN M & PAUL S TRS
1 WINDSOR LANE
BURLINGTON, MA 01803-0000

STEINBERG STANLEY J & KAREN F
20 WHITTER RD
NEEDHAM, MA 02492

JACOBS MARION TRS LEONARD JACO
52 PORTER ST
GRANBY, MA 01033

MAGUIRE ROBERT F & JOAN G TRS
144 MANOMET AVE
HULL, MA 02045-0000

BEATRICE HILARY TRS
133 MANOMET AVE
HULL, MA 02045

NIERMAN SHELDON & SHEILA
10856 NORTHGREEN DRIVE
WELLINGTON, FL 33449

GOLDBERG ROBERT L & FRANCES Z
56 WILSHIRE DRIVE
SHARON, MA 02067-0000

MCGREEVY BRIAN & CYNTHIA
133A MANOMET AVE
HULL, MA 02045

PORTER MICHAEL T & DEBBIE L
310 CEDAR ST
ASHLAND, MA 01721

MONOSSON ADOLF F
385 CHESTNUT HILL AVE
BOSTON, MA 02135

GROSSMAN RICHARD A & THEODORA
600 SO.OCEAN BLVD APT 805
BOCA RATON, FL 33432

PORTER MICHAEL T & DEBBIE L
310 CEDAR ST
ASHLAND, MA 01721

MURPHY FRANCES A TRS
24 RIDGEWOOD CROSSING
HINGHAM, MA 02043

PETERS LEONARD & LYNN
137A MANOMET AVE
HULL, MA 02045-0000

SCHMITT BRIAN J & JUDITH
172 SAMOSET AVE
HULL, MA 02045-0000

MURPHY FRANCES ANN TRS MURPHY
44 WANDERS DR
HINGHAM, MA 02043-0000

POPKIN RACHEL TRS RACHEL POPKI
131 WOODBINE CIRCLE
NEEDHAM, MA 02494

HELLER EDWARD B & CHARLOTTE
211 CENTRAL ST UNIT #A316
NORWOOD, MA 02062-0000

MONOSSON GLORIA
385 CHESNUT HILL AVE
BOSTON, MA 02135

MEIROVITZ MANUEL N & BARBARA
23 COLGATE RD
NEEDHAM, MA 02492

HELLER EDWARD B & CHARLOTTE
211 CENTRAL ST UNIT #A316
NORWOOD, MA 02062-0000

GOLDBERG ROBERT L & FRANCES Z
56 WILSHIRE DR
SHARON, MA 02067-0000

PATTERSON ROBERT K & ANN FLAHE
141 MANOMET AVE
HULL, MA 02045-0000

EPSTEIN RHODA-KANET
170 SAMOSET AVE
HULL, MA 02045-0000

BICKOFF GERALD P & DEBRA B
63 LAKE AVE
NEWTON, MA 02459

ZABLATSKY MARC H TRS 2009
147 LELAND FARM RD
ASHLAND, MA 01721

SOLOD DIANNA D. & VALENTINA
216 NEWPORT RD
HULL, MA 02045

WINIG MAXINE
97 OLD FARM RD
NEEDHAM, MA 02492

AIELLO DARLENE M
24 FABIANO DRIVE
BRAINTREE, MA 02184-0000

GRASZ JONATHAN T & MELISSA L
121 MANOMET AVE
HULL, MA 02045

KNOCHIN HAROLD & NANCY
40 CHEROKEE RD
CANTON, MA 02021-0000

FURMAN MEL PATRELL TRS
1403 MAPLE AVENUE
EVANSTON, ILL 60201

DOWNS KIMBERLY A MCNEIL & ALDE
123 MANOMET AVE
HULL, MA 02045-0000

MULKERN JOSEPH B & KIMBERLY B
76 WILLIAMS ST
MANSFIELD, MA 02048

LARSEN
122 MANOMET AVE
HULL, MA 02045-0000

BARLETTO LOUIS J JR & LINDA M
125 MANOMET AVE
HULL, MA 02045-0000

VERROCHII JENNIFER R
111 MANOMET AVENUE
HULL, MA 02045

LEMKIN AMY M
81 COBURN ST
HULL, MA 02045

KANE JAMES P
98 BROOK ST
WELLESLEY, MA 02482

SALTZBERG ROBERT
115 MANOMET AVE
HULL, MA 02045-0000

GORDON LEONARD & COLLIER DARYL
PO BOX 0555
HULL, MA 02045-0555

NUTTER GALE
121 BEACH AVE
HULL, MA 02045-0000

BAKERMAN MICHAEL M & CINDY E
199 SE ETHAN TERR
STUART, FL 34997

HENDERSON WILLIAM III & NANCY
164 SAMOSET AVENUE
HULL, MA 02045-0000

GAINOR LOUIS S & ELLEN M
123 BEACH AVENUE
HULL, MA 02045

BAKERMAN MICHAEL & CINDY E
199 SE ETHAN TERR
STUART, FL 34997

PALEY BERTRAM R & MARJORIE B
15 UNION ST
LAWRENCE, MA 01840-0000

LOEW HONEY J
PO BOX 239
HULL, MA 02045-0000

CASTRO VICTOR M & MEGAN
66 COBURN ST
HULL, MA 02045

ROBERTS DOUGLAS & DEBRA
15 CANTERBURY RD
WINDHAM, NH 03087-0000

COLVIN BARBARA LEE
1540 RAPHIS ROYALE BLVD
ENGLEWOOD, FL 34223-1888

RICHARDSON KEVIN & CHRISTINA
65 COBURN STREET
HULL, MA 02045-0000

CANAVAN JAMES A & LISA A
116 MANOMET AVE
HULL, MA 02045-0000

KAPLAN KAREN PERRY TRS
65 CLOVERDALE RD
NEWTON, MA 02461-1810

MCDONNELL MARY T
114 MANOMET AVE
HULL, MA 02045-0000

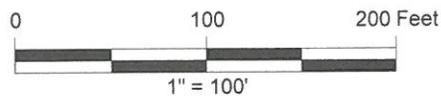


For assessment purposes only; not to be used in legal boundary descriptions.



Town of Hull
 Assessors Office
 253 Atlantic Avenue
 Hull, MA 02045
 781-925-2205

Abutters List Locus Map



May 20, 2019

Subject Parcel ID: 21-054
 Address: 129 BEACH AVE



**Town of Hull
Assessors Office**

LIST OF ABUTTERS TO....

Parcel No.: 21-054
 Owner: LOEW HONEY J
 Address: 129 BEACH AVE

May 20, 2019
 4:08:29PM

| Abutter's Name | Parcel Location | Parcel No. Book - Page | Mailing Address |
|--------------------------------|-----------------|---------------------------|--|
| KIERNAN SARAH | 141 BEACH AVE | 19-163 542-199 | KIERNAN SARAH 197 RIVERSIDE DRIVE NORWELL, MA 02061 |
| KRAAN ARJAN J & MADDEN MITZAN | 143 BEACH AVE | 19-164 459-84 | KRAAN ARJAN J & MADDEN MITZANN 143 BEACH AVE HULL, MA 02045-0000 |
| HASS JUDITH & BARRY | 145 BEACH AVE | 19-165 501-113 | HASS JUDITH & BARRY 145 BEACH AVENUE HULL, MA 02045-0000 |
| DAILEY WILLIAM J JR & MARYELEN | 131 BEACH AVE | 21-005 3991-366 | DAILEY WILLIAM J JR & MARYELEN 114 MARRETT RD LEXINGTON, MA 02421-0000 |
| MAHONEY JOSEPH F | 133 BEACH AVE | 21-006 30733-066 | MAHONEY JOSEPH F 133 BEACH AVE HULL, MA 02045-0000 |
| DAVID A SMOOKLER TRUSTEE | 137 BEACH AVE | 21-007 601-30 | DAVID A SMOOKLER TRUSTEE 4 SEZLAND ROAD NEWTON, MA 02459 |
| AIELLO ROGER E & DARLENE M | 139 BEACH AVE | 21-008 406-184 | AIELLO ROGER E & DARLENE M 24 FABIANO DRIVE BRAintree, MA 02184-0000 |

KIERNAN SARAH
197 RIVERSIDE DRIVE
NORWELL, MA 02061

KRAAN ARJAN J & MADDEN MITZANN
143 BEACH AVE
HULL, MA 02045-0000

HASS JUDITH & BARRY
145 BEACH AVENUE
HULL, MA 02045-0000

DAILEY WILLIAM J JR & MARYELEN
114 MARRETT RD
LEXINGTON, MA 02421-0000

MAHONEY JOSEPH F
133 BEACH AVE
HULL, MA 02045-0000

DAVID A SMOOKLER TRUSTEE
4 SEZLAND ROAD
NEWTON, MA 02459

AIELLO ROGER E & DARLENE M
24 FABIANO DRIVE
BRAintree, MA 02184-0000

Section G

Project Map and Plans



Locus



107 Waterhouse Road
Bourne, MA 02532

Town of Hull
Coastal Dune Restoration
Hull, MA

USGS Hull Quadrangle



MASSACHUSETTS BAY

Location Map Not to Scale

LEGEND

- (10)--- Existing 5' Contour
- (4)--- Existing 1' Contour
- 15--- Proposed 5' Contour
- 14--- Proposed 1' Contour
- NHESP Priority Habitat Boundary
- GS12 Grain Size Sample Location

Notes:

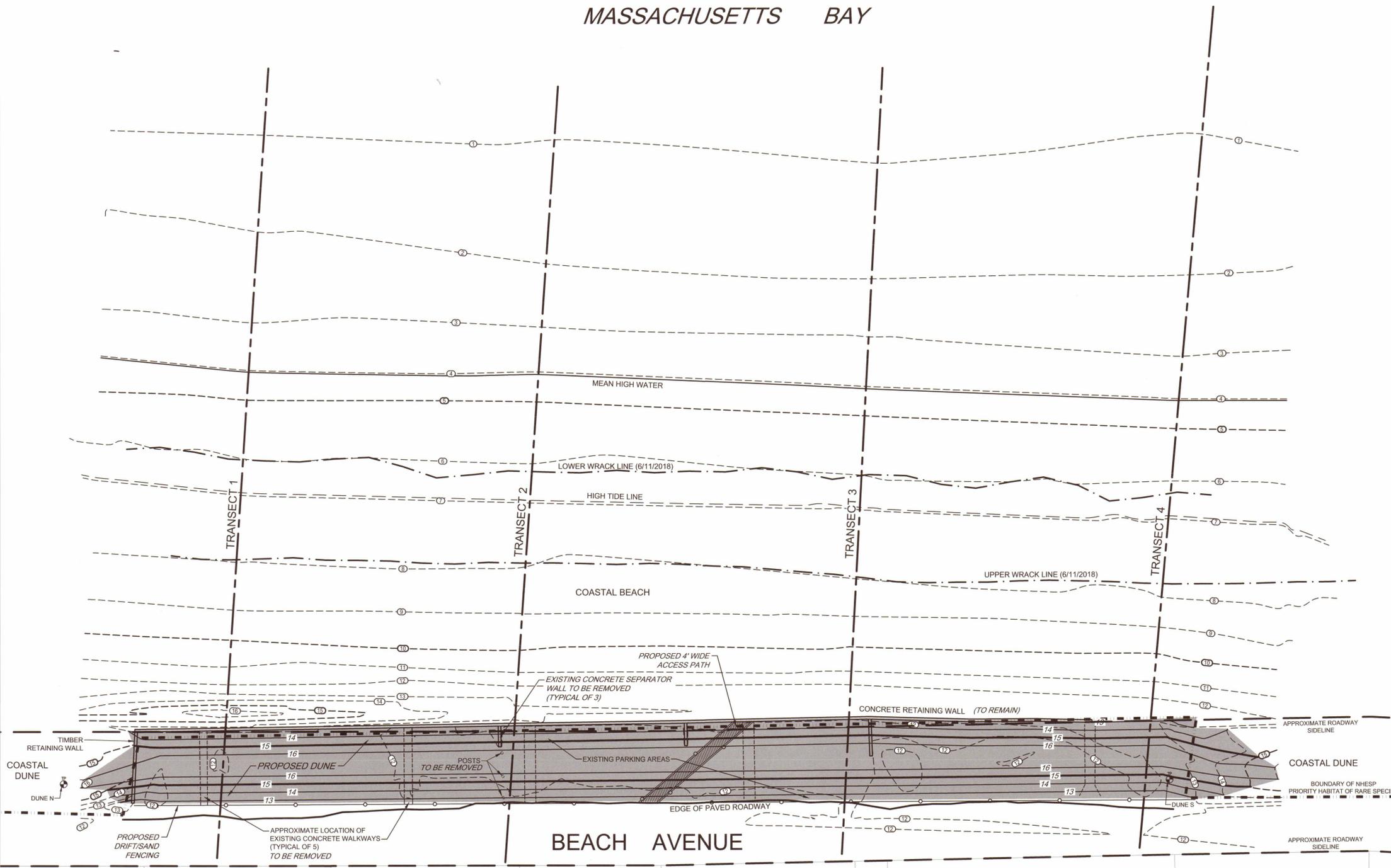
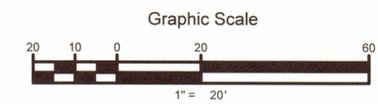
1. Elevations shown are based on the NAVD (1988) vertical datum.
2. Topography was performed by Woods Hole Group on June 11, 2018 with additional information compiled from Existing Conditions Plan prepared by Nantasket Survey Engineering, LLC dated 2-27-2009.
3. Flood Zone VE (El. 14) transitions to an AE (El. 12) at the seaward edge of the road delineated by the Primary Frontal Dune (PFD) based on FEMA FIRM Panel #25023C0036J.
4. Mean Low Water Elevation is approximately -4.95 feet NAVD88.
5. Mean High Water Elevation is approximately +4.05 feet NAVD88.
6. High Tide Line Elevation is approximately +6.92 feet NAVD88.
7. The dune nourishment project presented herein is intended to provide limited protection from storm damage and wave overtopping.
8. The length of the proposed dune restoration project is 450 feet and the proposed footprint is approximately 12,200 square feet (0.3 acres).
9. Prior to construction, existing manmade structures will be removed including the concrete walkways, wooden posts, concrete separator walls and the timber retaining wall. The existing concrete retaining wall will remain in place.
10. Approximately 1,210 cubic yards of beach compatible sand will be placed in the project footprint. Sand will be analyzed to ensure that it matches the existing grain size (~0.3 mm) and color found in the adjacent sections of dune.
11. The dune crest will be restored to match adjacent sections of vegetated dune at 16 feet NAVD88 with 3H:1V side slopes.
12. Following final grading of the dune nourishment, the dune shall be planted with Cape American beach Grass as bare root culms with 2-3 culms per hole and 18" on-center as shown on Sheet 2.
13. A 4 foot wide vegetated buffer strip will be planted along the landward toe of the dune with native salt tolerant shrubs, American beach grass, beach plum, or equivalent.
14. 400 linear feet of sand fencing will be installed between the buffer strip and road to prevent foot traffic and help capture aeolian sand transport over the crest before it reaches the road.
15. A 4 foot wide pedestrian access pathway shall be placed over the dune in the central portion of the proposed dune restoration area. The path shall be oriented southeasterly to reduce impacts from Nor'easter storm events. The path boundaries shall be marked with snow fencing or equivalent.
16. Annual maintenance of the proposed dune will include both sand nourishment to maintain crest height and width as well as plantings and fencing, as needed.
17. The proposed design is not expected to be a long term solution, and the dune is susceptible to erosion during coastal storms and potentially significant erosion during large coastal storms.

| Date | Revisions |
|------|-----------|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |

Surveyed By:
WOODS HOLE GROUP
A CLS COMPANY
107 WATERHOUSE ROAD
BOURNE, MA 02532

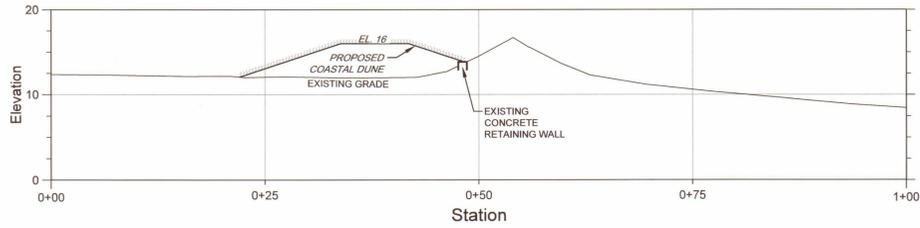
PROPOSED DUNE RESTORATION TOWN OF HULL HULL, MA LAYOUT PLAN

Title:
Project Number: 2018-0093
Dwg File: 2018-0093-SP.DWG
Scale: 1" = 20'
Date: 05/21/2019
Approved:
Drawn: JRK

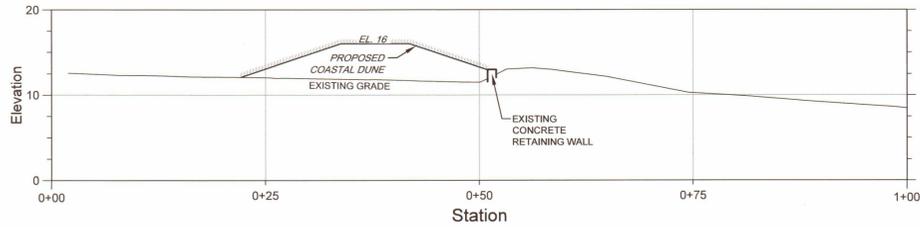


- 19-165 #145 BEACH AVENUE Judith & Barry Hass
- 19-164 #143 BEACH AVENUE Arian J. Kraan & Mitzann M. Madden
- 19-163 #141 BEACH AVENUE Sarah Kiernan
- 21-008 #139 BEACH AVENUE Roger E. & Darlene M. Aiello
- 21-007 #137 BEACH AVENUE David A. Smockler Trust, etal
- 21-006 #133 BEACH AVENUE Joseph F. Mahoney
- 21-005 #131 BEACH AVENUE Maryelen E. & William J. Dalley, Jr.

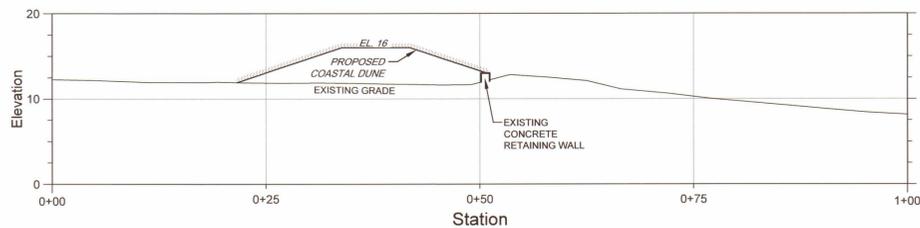




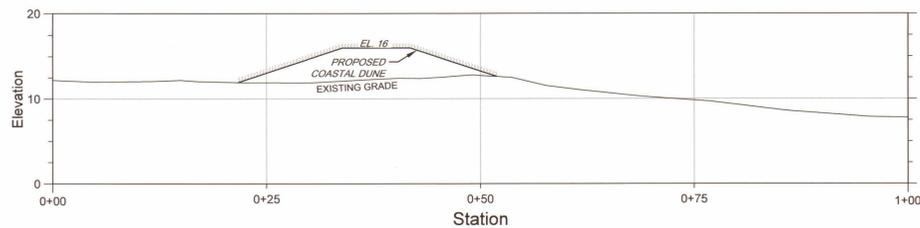
TRANSECT 1
Horizontal Scale: 1" = 10'
Vertical Scale: 1" = 10'



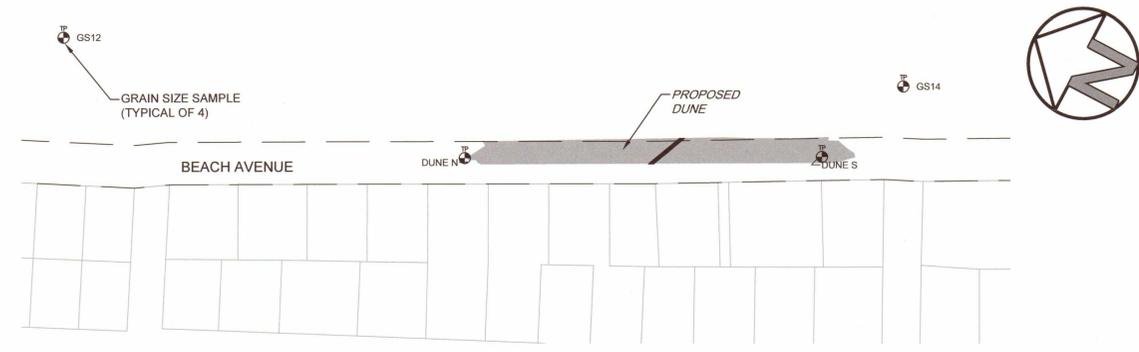
TRANSECT 2
Horizontal Scale: 1" = 10'
Vertical Scale: 1" = 10'



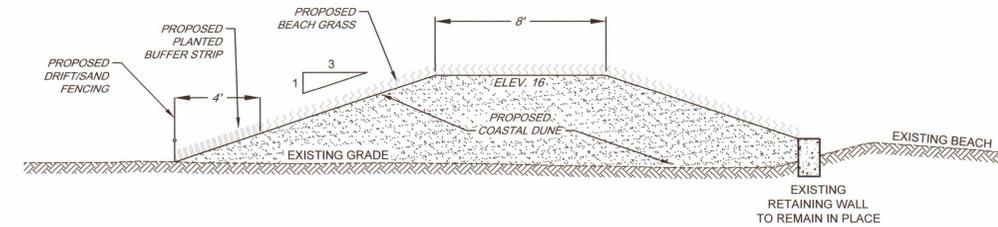
TRANSECT 3
Horizontal Scale: 1" = 10'
Vertical Scale: 1" = 10'



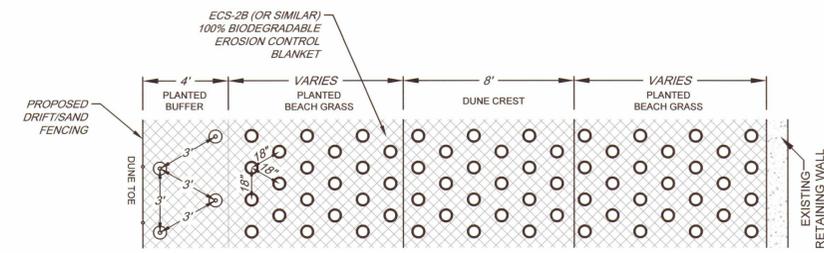
TRANSECT 4
Horizontal Scale: 1" = 10'
Vertical Scale: 1" = 10'



GRAIN SIZE SAMPLE LOCATIONS
SCALE: 1" = 100'

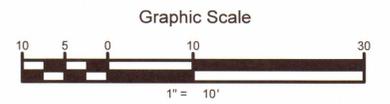


PROPOSED DUNE - TYPICAL CROSS SECTION
SCALE: 1" = 4'



- PLANTS - PLUGS OR 1-GALLON POTTED PLANTS @ 36" ON-CENTER
- BEACH PLUM
- GRASS - BARE ROOT CULMS, 2-3 CULMS PER HOLE @ 18" ON-CENTER
- AMERICAN BEACH GRASS

PROPOSED DUNE PLANTING - TYPICAL LAYOUT
SCALE: 1" = 4'



| Date | Revisions |
|------|-----------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Surveyed By:
WOODS HOLE GROUP
A CLS COMPANY
107 WATERHOUSE ROAD
BOURNE, MA 02532

**PROPOSED DUNE RESTORATION
TOWN OF HULL
HULL, MA
TRANSECTS & CROSS SECTION**



Title:
Project Number: 2018-0093
Dwg File: 2018-0093-SP.DWG
Scale: AS SHOWN
Date: 05/21/2019
Approved:
Drawn: JRK