

1. Conservation Commission Pack 06/11/20

Documents:

CHUCKROW NOMINEE TRUST_25 QUAISE ROAD (26_12) SE48_3241.PDF
CROQUET PITCH LLC _ 24 WESTCHESTER STREET (42 4 3_57)
SE48_3305.PDF
62 CLIFF ROAD REALTY TRUST _ 62 CLIFF ROAD (41-20) SE48_3306.PDF
AMENDED ORDER _11 MEADOW LANE LLC _ 11 MEADOW LANE (41 448 1)
SE48_3098.PDF
COC REQUEST THE CONSTANCE K CHEEVER REVOCABLE TRUST _ 23
MONOMOY ROAD (54_205) SE48_3061.PDF
COC REQUEST 46 SHIMMO POND ROAD NOMINEE TRUST _46 SHIMMO
POND ROAD (43_77) SE48_3037.PDF
EXT REQUEST 43 W CHESTER STREET REALTY TRUST_43 WEST CHESTER
STREET (41_231) SE48_2987.PDF
EXT REQUEST TOWN OF NANTUCKET _ SESACHACHA ROAD (21_20)
SE48_2967.PDF
EXT REQUEST LISA AND SIMON J VAN DEN BORN _ 135 WAUWINET ROAD
(11_12) SE48_2961.PDF
DRAFT MINUTES 05_28_20.PDF
SBPF DAILY LOGS 05_25_2020 THRU 05_29_2020.PDF
NCC COMMENTS REGARDING ORDER OF CONDITIONS SE48_1659 AND
SE48_1602.PDF



NOTICE OF INTENT APPLICATION

**FOR INSTALLATION OF A STEEL BULKHEAD
ALONG AN EXISTING TIMBER BULKHEAD**

At

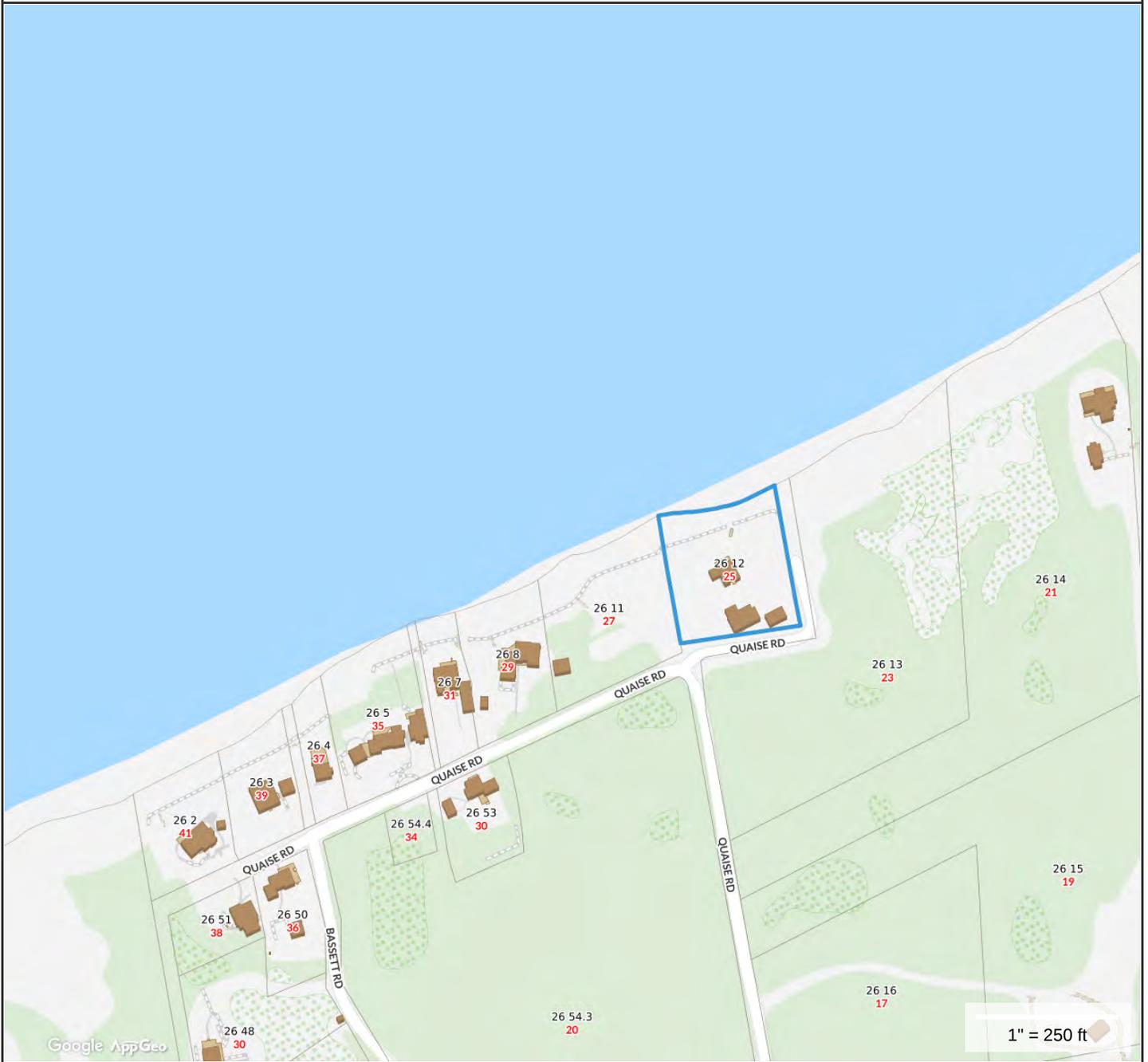
25 QUAISE ROAD

AUGUST 2019

Prepared For

CHUCKROW NOMINEE TRUST

Locus Map



Property Information

Property ID 26 12
Location 25 QUAISE RD
Owner GUERNSEY CAROL C & STULGIS AMY



**MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT**

Town and County of Nantucket, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Geometry updated 11/13/2018
Data updated 11/19/2018



August 23, 2019

Ms. Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

Re: Notice of Intent
25 Quaise Road
Map 26 Parcel 12

Dear Ms. Erisman:

On behalf of the property owner, Chuckrow Nominee Trust, Nantucket Engineering & Survey, P.C. is submitting this Notice of Intent (NOI) to the Nantucket Conservation Commission for proposed activities within the Buffer Zone, Coastal Bank, Coastal Beach and Land Subject to Coastal Storm Flowage resource areas at the above referenced property (the "Site") in Nantucket, Massachusetts.

Proposed activities at the Site consist of installing a steel sheet bulkhead along a failing timber bulkhead, plus a return along the easterly property line. Attached are permit drawings, including plans showing a site locus, existing conditions including resource area locations, and proposed construction areas.

A completed WPA Form 3 – Notice of Intent is attached along with the NOI Wetland Fee Transmittal Form including checks for \$273.50, \$498.50, \$25 and \$200 to cover the WPA filing fee, Nantucket Wetland by-law fee and the Nantucket Expert Review fee. Also included is a check for \$291.40 to the Inquirer & Mirror for publication of the notice of the public hearing.

Notification of this NOI filing was provided to all abutting property owners by certified mail. This property owner listing was obtained from the Town of Nantucket Assessor's office. Documentation of the notification is provided including a copy of the notification letter, the property owner listing and certified mail receipts.

SITE DESCRIPTION

The subject property is approximately one-acre in size and is located in the Quaise area of Nantucket Island. The property is located at the northern end of a gravel road in an area of

20 Mary Ann Drive • Nantucket, MA 02554
508-825-5053 • www.NantucketEngineer.com

residential development. The lot is currently armored by a timber bulkhead and contains three residential use structures which pre-date 1978.

The Wetland Resource Areas on-site subject to jurisdiction of the Commission are Coastal Bank, Coastal Beach and Land Subject to Coastal Storm Flowage, and the respective Buffer Zones.

A review of the August 1, 2017 "Massachusetts Natural Heritage Atlas", prepared by the Massachusetts Natural Heritage and Endangered Species Program (NHESP), indicates that the work area is not within the known range of state listed rare wildlife species defined by the Estimated Habitat mapping.

WORK DESCRIPTION

The access for the work will be from the existing driveway, through the yard, where materials will be stockpiled. A sand ramp will be created from the top of the bank to the top of the bulkhead. The steel sheets will be driven by an excavator with a vibratory attachment. The area between the bulkheads will be filled with flowable fill, then a concrete and/or timber cap will be installed over both. All disturbed resource area will be planted with American Beach Grass and upland areas covered with a minimum of 6" of topsoil and planted with grass seed.

CONCLUSION

The installation of steel sheeting will not result in an adverse impact on the areas or the interests protected by the Commission including flood control, erosion control, storm damage prevention, prevention of pollution, wildlife, and wetland scenic views. Further, the project represents responsible maintenance of an existing structure which if left to deteriorate could have an adverse impact on the aforementioned protected interests.

I plan to attend the Public Hearings for this application to address any questions, comments or concerns that the Commission may have.

Sincerely,



Arthur D. Gasbarro, PE, PLS

Cc: MassDEP
Chuckrow Nominee Trust



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
NANTUCKET
City/Town



A. General Information

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

<u>25 Quaise Pastures Road</u>	<u>Nantucket</u>	<u>02554</u>
a. Street Address	b. City/Town	c. Zip Code
Latitude and Longitude:	<u>41d17'56"N</u>	<u>70d02'01"W</u>
	d. Latitude	e. Longitude
<u>26</u>	<u>12</u>	
f. Assessors Map/Plat Number	g. Parcel /Lot Number	

2. Applicant:

<u>Amy P. & Carol C.</u>	<u>Chuckrow & Guernsey, Trustees</u>	
a. First Name	b. Last Name	
<u>Chuckrow Nominee Trust</u>		
c. Organization		
<u>402 Hancock Rd</u>		
d. Street Address		
<u>Williamstown</u>	<u>MA</u>	<u>01267</u>
e. City/Town	f. State	g. Zip Code
<u></u>	<u></u>	<u></u>
h. Phone Number	i. Fax Number	j. Email Address

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

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

4. Representative (if any):

<u>Arthur D.</u>	<u>Gasbarro, PE, PLS</u>	
a. First Name	b. Last Name	
<u>Nantucket Engineering & Survey, PC</u>		
c. Company		
<u>20 Mary Ann Drive</u>		
d. Street Address		
<u>Nantucket</u>	<u>MA</u>	<u>02554</u>
e. City/Town	f. State	g. Zip Code
<u>508-825-5053</u>	<u>art@nantucketengineer.com</u>	
h. Phone Number	i. Fax Number	j. Email address

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

<u>\$972 + \$25 + \$200</u>	<u>\$473.50</u>	<u>\$498.50 + \$25 + \$200</u>
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid



WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
NANTUCKET
City/Town

A. General Information (continued)

6. General Project Description:

The Applicant proposes to to install a steel bulkhead with a cap seaward of an existing timber bulkhead, and an extension/return along the easterly property line. Access will be from the upland portion of the bank with a ramp to the area above the bulkhead. Disturbed areas behind the bulkhead will be filled with clean, compatible sand then planted with American Beach Grass. Please refer to the attached Project Narrative and Site Plan for additional information.

7a. Project Type Checklist:

- 1. Single Family Home
2. Residential Subdivision
3. Limited Project Driveway Crossing
4. Commercial/Industrial
5. Dock/Pier
6. Utilities
7. Coastal Engineering Structure
8. Agriculture (e.g., cranberries, forestry)
9. Transportation
10. 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:

NANTUCKET 14,726
a. County b. Certificate # (if registered land)
c. Book d. Page Number

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

- 1. 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.
2. 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.

Table with 3 columns: Resource Area, Size of Proposed Alteration, Proposed Replacement (if any). Rows include Bank, Bordering Vegetated Wetland, and Land Under Waterbodies and Waterways.

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



26 12

QUAISE RD

QUAISE RD

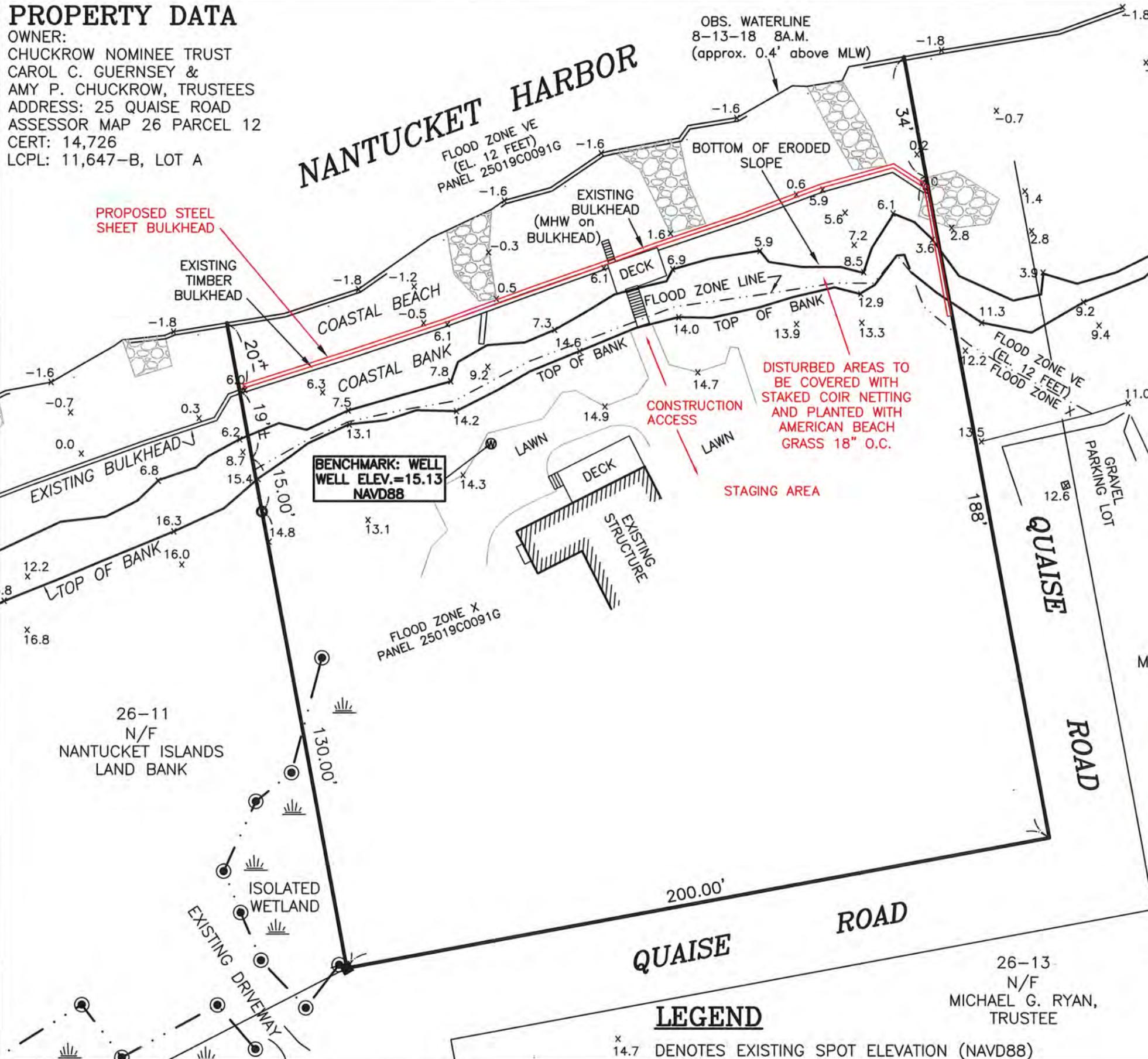
QUAISE RD

41.29896,-70.033744

PROPERTY DATA

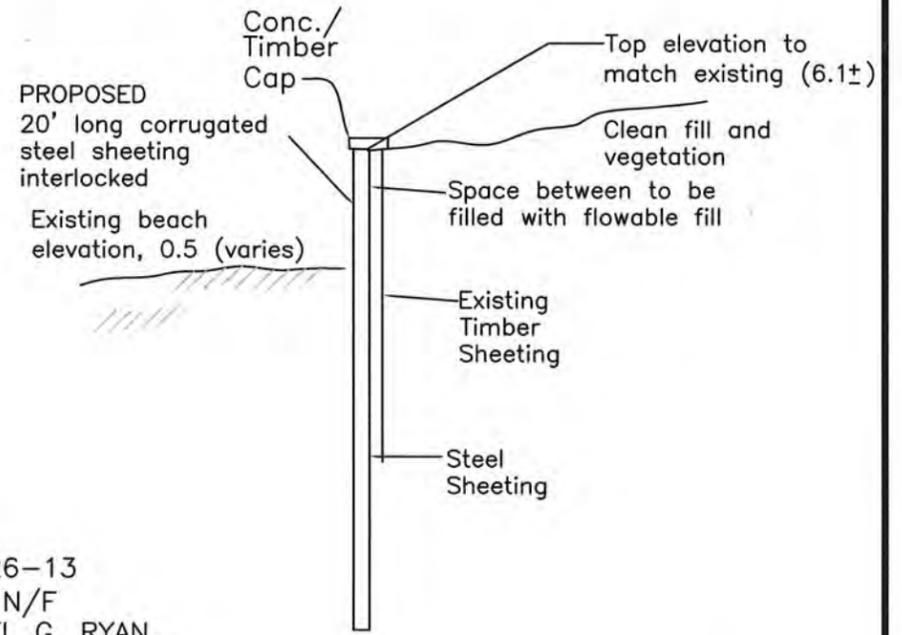
OWNER:
 CHUCKROW NOMINEE TRUST
 CAROL C. GUERNSEY &
 AMY P. CHUCKROW, TRUSTEES
 ADDRESS: 25 QUAISE ROAD
 ASSESSOR MAP 26 PARCEL 12
 CERT: 14,726
 LCPL: 11,647-B, LOT A

NANTUCKET HARBOR



THIS PLOT PLAN WAS PREPARED FOR THE NANTUCKET CONSERVATION COMMISSION ONLY AND SHOULD NOT BE CONSIDERED A PROPERTY LINE SURVEY. THIS PLAN SHOULD NOT BE USED TO ESTABLISH PROPERTY LINES, FENCES, HEDGES OR ANY ANCILLARY STRUCTURES ON THE PREMISES. THE PROPERTY LINES SHOWN RELY ON CURRENT DEEDS AND PLANS OF RECORD. THIS PLOT PLAN IS NOT A CERTIFICATION AS TO TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT ASSESSOR RECORDS.

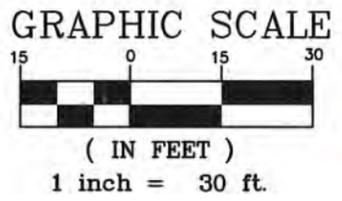
Bulkhead Cross-Section



26-13
 N/F
 MICHAEL G. RYAN,
 TRUSTEE



SITE PLAN OF LAND TO ACCOMPANY A NOTICE OF INTENT IN NANTUCKET, MA PREPARED FOR CHUCKROW NOMINEE TRUST 25 QUAISE ROAD MAP 26 PARCEL 12 AUGUST 14, 2019 SCALE: 1"=30'



LEGEND

x 14.7 DENOTES EXISTING SPOT ELEVATION (NAVD88)

26-13
 N/F
 MICHAEL G. RYAN,
 TRUSTEE



January 17, 2020

Jeff Carlson, Administrator
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

RE: Notice of Intent – SE48-3241
25 Quaise Road

Dear Jeff:

I am writing to provide a revised site plan which relocates the project access from the east, to the west side of the house. In consultation with the contractor, this will minimize disturbance of the buffer zone.

I plan to attend the public hearing on this matter, though please feel free to contact me should you have any questions or concerns with this request in the meantime.

Sincerely,
Nantucket Engineering & Survey, P.C.
By: Arthur D. Gasbarro, PE, PLS

A handwritten signature in blue ink that reads "Arthur D. Gasbarro".

Date: November 19, 2019 at 11:59:15 AM EST

To: Jeff Carlson <JCarlson@nantucket-ma.gov>

Subject: For ConCom: Living Shorelines as an Alternative to Repairing Failing Bulkheads

Hi Jeff,

I am sending three documents that discuss the appropriateness of using living shorelines in place of repairing bulkheads.

https://galvbay.org/wp-content/uploads/2014/03/LS_alternative.pdf

<http://www.seattle.gov/documents/Departments/SDCI/Vault/ShorelineMasterProgram/GreenShorelines.pdf>

https://www.cbf.org/document-library/cbf-publications-brochures-articles/Living_Shorelines011a.pdf

Although these documents are not from New England, they outline the design considerations and options available for using living shorelines in place of bulkheads, given different wave energy environments. They also discuss hybrid projects, in which a fringe marsh of other vegetative community is planted in combination with a structural technique. In some cases this is as easy as moving the bulkhead back and planting a living shoreline in front of it and in other cases a more complicated approach is taken.

Given that in our local regulations for Land Under the Ocean, Coastal Beach, and Coastal Bank, the Performance Standards indicate that "Bulkheads may be rebuilt only if the Commission determines there is no environmentally better way to control an erosion problem, including in appropriate cases the moving of the threatened building", I believe that it is prudent to raise the issue of environmentally better ways to control erosion with applicants seeking permits for bulkhead repair projects.

Please enter this information into the record as it will be relevant for the 11/20/19 meeting in reference to the Chuckrow Nominee Trust, 25 Quaise Rd application. I have also spoken to Dr. Jen Karberg on this issue and she is aware of additional regional evidence that living shorelines, especially hybrid projects, have been shown to work. She needs to find the references but once she does will send them to me and I can share with the Commission. These materials will be helpful in moving forward on this topic and assuring that we uphold the Performance Standards.

If you deem it beneficial, please also share this information with the other commissioners and/or the applicant I referenced.

Thanks,
Seth

Date: December 2, 2019 at 8:31:50 AM EST

To: Jeff Carlson <JCarlson@nantucket-ma.gov>

Subject: FW: For ConCom: Living Shorelines as an Alternative to Repairing Failing Bulkheads

Hi Jeff,

2 additional pieces for the 'Living Shorelines' file; 1 peer-reviewed journal article and 1 popular piece (These came from Jen Karberg as part of the journal club). Is it possible to make a folder of the resources somewhere that we can add to as new articles develop?

<https://www.scientificamerican.com/article/rebuilt-wetlands-can-protect-shorelines-better-than-walls/>

Thanks,
Seth

GREEN

shorelines

Bulkhead alternatives
for a healthier
Lake Washington



Lake Washington embodies the best of Western Washington: clean water, bountiful recreational opportunities, striking mountain views, and access to thriving cities. These qualities have inspired thousands of people to make their homes on the shores of the lake, transforming a forested waterfront to a residential one over the past 100 years. This change has led to a variety of problems, including loss of important wildlife habitat and some of the area’s natural charm, but lakefront homeowners are finding new ways to protect the lake.

note

This guidebook is about alternatives to the use of bulkheads and other shoreline armoring. Hard engineering is currently the standard approach for erosion control around the lake, but it has several negative impacts on nearshore habitats as well as the fish and wildlife that depend on them. More sustainable practices, referred to in this guidebook as green shorelines, use plants, beaches, and other natural materials to protect private property and the environment.

Green shorelines provide three types of benefits for homeowners:

- 1 they substantially improve habitat for Chinook salmon and other wildlife while maintaining shoreline stability;
- 2 they allow improved water access for homeowners and guests, making swimming and shoreline enjoyment easier;
- 3 they offer a softer, more natural aesthetic that can enhance views by adding variety and seasonal interest.

While homeowners often find green shorelines attractive, many have concerns about effectiveness, reliability, building and maintenance costs, the permitting process, and the potential loss of lawn. This guidebook specifically addresses these and other concerns by assembling technical information from a wide range of sources and providing local examples.

Although the guidebook was written by the City of Seattle, the principles described here can be applied to homes all around Lake Washington. Additionally, most of the information provided here is relevant to Lake Sammamish. Technical advice in these pages is offered as guidance; it is not building code. In the case of any discrepancies, defer to local, state, and federal regulations for shoreline development.

Green shorelines are attractive, reliable, and sustainable. The idea of having your own beach is a major motivator for many people to buy waterfront property – why give up your beach for a bulkhead?



Contents

GREEN SHORELINES Bulkhead alternatives for a healthier Lake Washington

Introduction	4
Green Shoreline Practices	
Full Beaches	6
Beach Coves	8
Setting Back Bulkheads	10
Log installation	12
Shoreline Plantings	
Vegetated Buffers	12
Slope Bioengineering	14
Plant List	18
Selecting the Right Approach	20
Building Better Docks	22
Estimated Costs and Maintenance	24
Choosing a Shoreline Professional	26
Getting Permits	28
Resources	32
Contacts	33
Glossary	34
Acknowledgements	35



Introduction

The water's edge

People love to live in places where water and land meet. Shorelines provide work and recreation opportunities, mild climates, and tranquil views. Rapid growth in the communities around Lake Washington and Lake Sammamish is a clear demonstration of our desire to live near water.

People are not the only ones drawn to shorelines, however. Due to the diverse resources and habitats that occur along lakeshores, they tend to be biologically rich and productive places. Again, Lake Washington is no exception—numerous plant, bird, fish, mammal, and insect species call the lake's shorelines home.

Problems with “business as usual”

Unfortunately, some of the natural elements that attract people to waterfront properties are often casualties of development. Trees, shrubs, and wildflowers are cleared to make way for houses, lawns, and open views. Bulkheads built to control bank erosion displace beaches and cause erosion below the water line. Removal of vegetation along the shore allows contaminants to flow directly into the lake. As beaches and vegetation are replaced by lawn and concrete, prime wildlife habitat disappears, taking with it birds, beneficial insects, and fish.

Residential development on Lake Washington has taken a particularly heavy toll on Chinook salmon. These iconic fish of the Pacific Northwest hatch in the Cedar River, Issaquah Creek, and Bear Creek. Many rear in the lake for several months. Once they become smolts, Chinook swim through Lake Washington and Seattle's Ship Canal to reach the ocean. As they migrate through the lake, juveniles follow the shoreline, staying close to the shallow-water areas that help them to escape from predators and safely forage for food.

Bulkheads and docks have altered or eliminated much of the shallow-water habitat around the lake. A 2001 study found that 70% of Lake Washington's shoreline was armored with concrete, riprap, sheetpile, or another type of bulkhead. By reflecting wave energy back into the lake, these structures tend to wash away nearshore sediment, causing deeper water over time. Lawns have replaced much of the diverse vegetation that provided cover for young fish. While many factors are contributing to the decline of Puget Sound's endangered Chinook salmon populations, loss of rearing and refuge habitat is among the most serious problems.

Bulkheads also can compromise homeowners' access to the water and negatively affect views. Entering the water from a bulkhead can be awkward or even dangerous; shoreline armoring accelerates nearshore erosion, deepening the water and making wading difficult. Further, the widespread use of shoreline armoring is bad for waterfront aesthetics—while homeowners typically prefer greener, natural-looking lakeshores, armoring creates a more heavily developed look along the shoreline.

Attractive alternatives

The good news is that people are finding new strategies for protecting their property while also protecting and restoring habitat. Instead of concrete and sheetpile, these practices use a combination of plantings, gravel, stone, logs, and slope modification to protect against shoreline erosion.

The ideal is to set structures back far enough to preserve the natural shoreline and vegetation. However, given that the majority of Lake Washington is already developed, this guidebook focuses on positive steps that can be taken to reduce the impact of existing waterfront homes. Whether your site can accommodate a full beach restoration or only incremental improvements, a wide range of options is available, including:

- Full beaches
- Beach coves
- Setting back bulkheads
- Log installation
- Vegetated buffers
- Slope bioengineering

The following sections explain and illustrate how these approaches work, where they might be used, and what they look like. Although described separately, keep in mind that in most cases, these strategies are typically used in combination with one another. While the concepts outlined here will give you a broader understanding of the options for improving your shoreline, it is advisable for you to seek professional assistance to get your project designed and built. Suggestions for selecting designers and contractors are provided in the section titled “Choosing a Shoreline Professional.”

When this guidebook uses the term “restoration,” it does not mean returning Lake Washington to its pre-development condition. Rather, it refers to restoring specific ecological processes. The shorelines shown in this publication look different than they did 150 years ago, but they still can protect fish, wildlife, and water quality in many of the same ways.

note

Together with design and construction advice, this guidebook also provides suggestions to help you get through your permitting process more quickly. Because Lake Washington is home to multiple species on the Endangered Species list, lakeshore construction has to be approved by local, state, and federal agencies. While specifics vary, the growing trend across regulatory agencies is to encourage projects that improve shoreline habitat quality through requirements, incentives, and streamlined permitting. Following the principles in this guidebook can help you avoid unnecessary permitting hurdles (see “Getting Permits”).

Photos of restored shorelines throughout the guidebook help demonstrate specific green shoreline techniques, and they also display the aesthetic benefits of natural beaches and plantings. Further, they provide samples of the diverse shoreline restoration projects that already exist around Lake Washington.





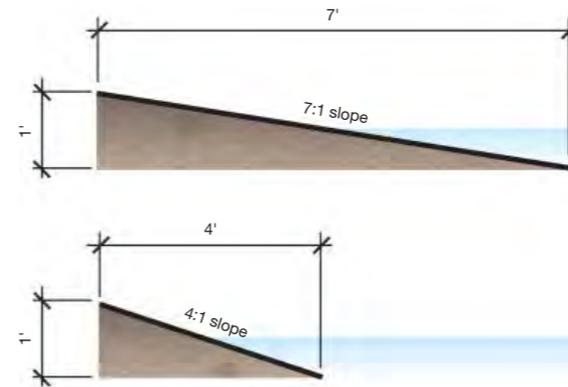
Green shoreline practices

Full beaches

Restoring a beach along your entire lakeshore frontage is the ideal Green Shoreline improvement. On the right site, beach restoration can be straightforward: after removing your bulkhead, lay back the slope to a stable angle, and add appropriate gravel and plants. A few guidelines apply to most beach restoration projects.



Slopes of 7:1 or less are ideal for restored beaches, although slopes up to 4:1 can be stable.



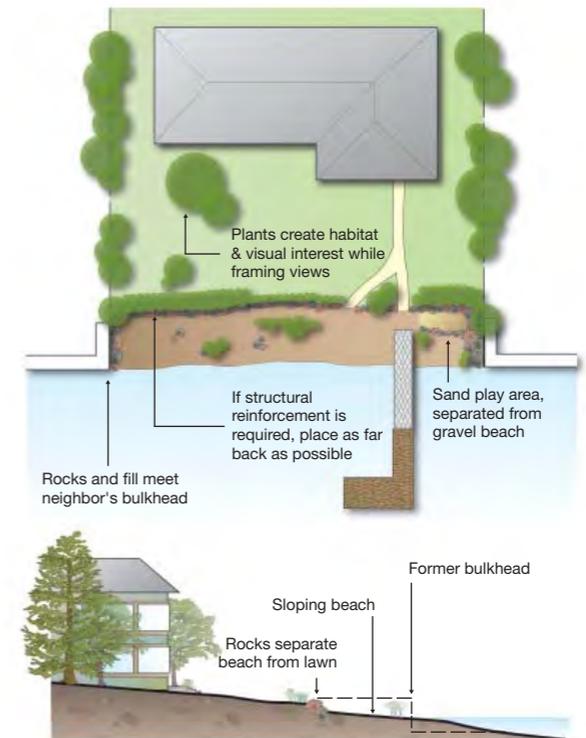
Beach slope is a critical component of a successful restoration project. A well-designed slope provides resistance to erosion, reducing the need for maintenance. Slopes of 7:1 or flatter are ideal (seven horizontal feet for each vertical foot), but slopes up to 4:1 can be stable in some circumstances.

New beaches should be made of an appropriate gravel material. Although people tend to think of sand when they think of shorelines, sand erodes quickly in most parts of Lake Washington. Instead, use clean, well-rounded gravel 1/8" to 2" size – specifics will depend on wave energy and your proximity to known sockeye spawning grounds. Contact the Washington State Department of Fish and Wildlife to learn about requirements in your area (see "Contacts"). If sand is desired it should either be placed well above the water line or physically separated from the gravel beach using stone or wood.

Additionally, a successful design for a restored beach must address how the beach will meet neighboring properties. This is not a concern if your neighbors already have or are restoring their own beaches, but it is necessary to plan how the edges of a beach will meet any neighboring bulkheads.

There are two strategies for meeting adjacent bulkheads:

- 1 Install rocks, wood, plantings, or concrete walls at the edges of your beach to reinforce the transition area from beach to bulkhead – these areas will be subject to greater erosive forces.
- 2 Add extra fill below the water line at the edges of your property – this protects your beach from the erosive forces of neighboring bulkheads and protects the bulkheads from undercutting. For shoreline restoration purposes, 25 cubic yards of fill are allowed outright in the water so long as they do not create dry land. More may be approved depending on site conditions.



Some erosion to beaches is normal over time. This can be offset by beach nourishment, the periodic addition of gravel. When a project is designed and installed properly, some nourishment is likely to be necessary every five to ten years.

To make beach nourishment easier, it is ideal to include periodic fill as part of the maintenance plan in your initial construction permit. This can help you avoid needing to obtain a local permit to add gravel to your beach in the future. If nourishment is not covered in your initial permit, you will need to obtain a shoreline exemption for each instance of beach nourishment. Time and costs for this process depends on your local jurisdiction.

Regardless of whether a local permit is necessary, beach nourishment projects need permits from the Washington State Department of Fish and Wildlife and Army Corps of Engineers. Both have relatively simple application processes so long as your nourishment project will be adding 25 cubic yards of fill or less. Total wait time for both agencies is likely to be 10 to 30 days, and neither permit requires a fee (see "Getting Permits").



Beach coves

Beach coves or “pocket beaches” are currently the most common type of green shoreline installed around Lake Washington. A beach cove is a beach along a portion of a property’s waterfront, flanked on both sides with hard structural elements. This is a useful strategy to improve habitat quality and water access while keeping armoring if it is necessary. While recommended slope, width, and depth of beach coves vary depending on site conditions, several features are advisable for most beach cove projects.

Like full beaches, beach coves should use appropriately sized gravel, and typically not sand. Beach nourishment will be needed with about the same frequency as with a full beach restoration (every 5-10 years), but less fill is needed since the beach area is smaller.

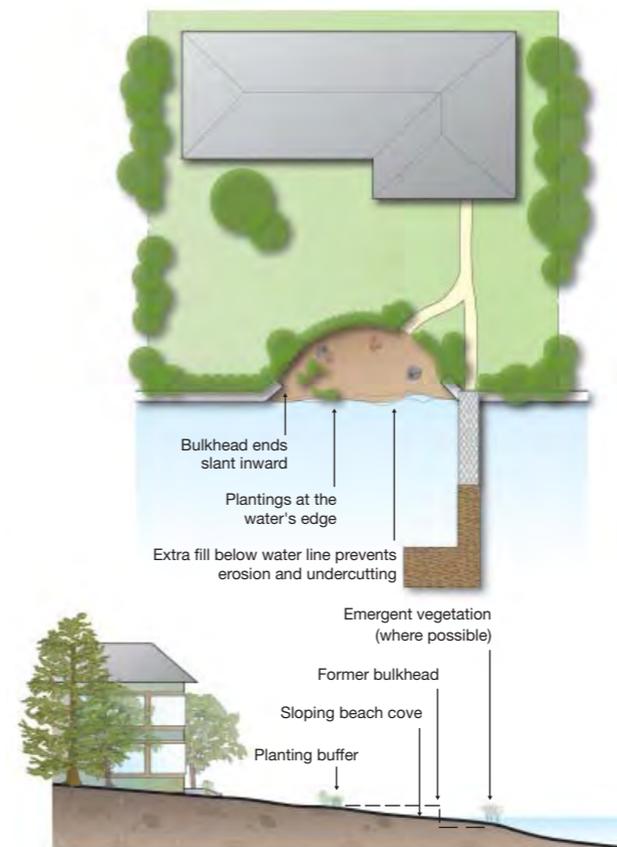
Localized erosion can occur where the bulkhead meets the beach on either side of the cove. Two techniques that help prevent this from happening include:

- 1 Angling the ends of the bulkhead away from the water to dissipate wave energy and decrease erosion.
- 2 Adding extra gravel fill below the water line to help prevent undercutting of the bulkhead.

As with full beaches, beach cove slopes should typically be no steeper than 4:1, i.e., four horizontal feet to one vertical foot. Again, 7:1 is a good goal, but steeper slopes can be stable when appropriate materials are used.

Beach coves should not be the first choice if your property can accommodate full beach restoration. They provide less shoreline for wading and other beach activities, and they do less to improve habitat. While fish biologists have observed juvenile salmon using pocket beaches around Lake Washington, research suggests that the fish gravitate to larger beaches and plantings when they are available.

Specific criteria to help you consider the practicality of a cove versus a full beach are discussed in “Selecting the Right Approach.”



“I like beaches, but my property is worth too much to give up any land.”

Some homeowners are reluctant to consider partial or full beach restoration because they are concerned about losing property. Although it is true that green shorelines sometimes result in smaller lawns, the square footage of dry land remains the same since these projects add beach and planting areas. Essentially, you are converting parts of your property from one use to another. A good design will maintain the ordinary high water line such that there is no loss of dry land.

Further, most homeowners do not actively use the full extent of their lawns. Green shorelines property owners often find that they use their beaches more than they did their lawns, and that plant diversity and visiting wildlife improve their yard’s aesthetics by adding visual variety. One homeowner reported that a beach cove installed by previous owners had become his favorite place to entertain company. “I wasn’t the one that had the foresight to build it, but I like to claim credit for it,” he admitted. “Guests love sitting out there in the evening.”

note





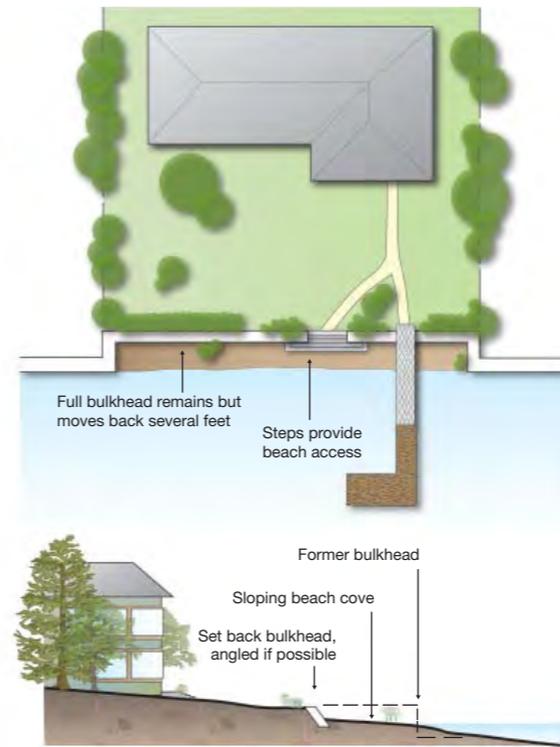
Setting back bulkheads

When houses have been built too close to the water, fewer options for shoreline management remain. If there is not an adequate setback between the water line and the house, a bulkhead really may be necessary to protect houses or other structures. In many cases, however, the bulkhead can at least be moved back from the high water mark, providing benefits to the homeowner and the lake ecosystem.

It is a simple concept but one that can make a big difference for access and ecological function. By moving a bulkhead back several feet from the water line, homeowners gain a beach and many of its advantages: safe wading and swimming access, an easy way to launch hand-carried boats, and waterfront play areas. The bulkhead is still there to help accommodate the grade change from house to water or to provide protection during large storms.

Part of the bulkhead can be set back to create a reinforced beach cove, or the whole thing can be set back to create new a new beach all across the shoreline.

If you need to keep a bulkhead because of how the site was developed, setting the bulkhead back from the water can simplify your permitting process. The Army Corps of Engineers does not claim jurisdiction above the ordinary high water line, so no federal permit is likely to be required for the new bulkhead provided that it is built before the existing bulkhead is removed. If the old bulkhead you are removing is located at high water, that part of the construction will still require an Army Corps permit.



As with beach coves, a project that sets back a bulkhead need not result in any loss of property. As long as beach fill is properly installed, the high water mark will remain the same distance away from your house as it was before renovation. You may displace some lawn or other upland planting area, but that area will be converted to usable beach. Like other beaches, a beach created by setting back a bulkhead will need periodic additions of gravel fill (see “Full Beaches”).

Whether you are setting a bulkhead back or replacing it in the same location, angling back the batter (the slope of the bulkhead) is generally a good idea. With every wave that hits it, a vertical bulkhead reflects most of the wave energy back into the lake. This leads to turbulence and erosion, which results in deeper water at the bulkhead’s base. A sloped bulkhead does a better job of absorbing and dissipating energy, creating less erosion and lengthening the service life of your investment. For Lake Washington, engineers generally recommend a bulkhead slope of 3:1 where site constraints will allow it.

“Won’t a beach attract more geese to my yard?”

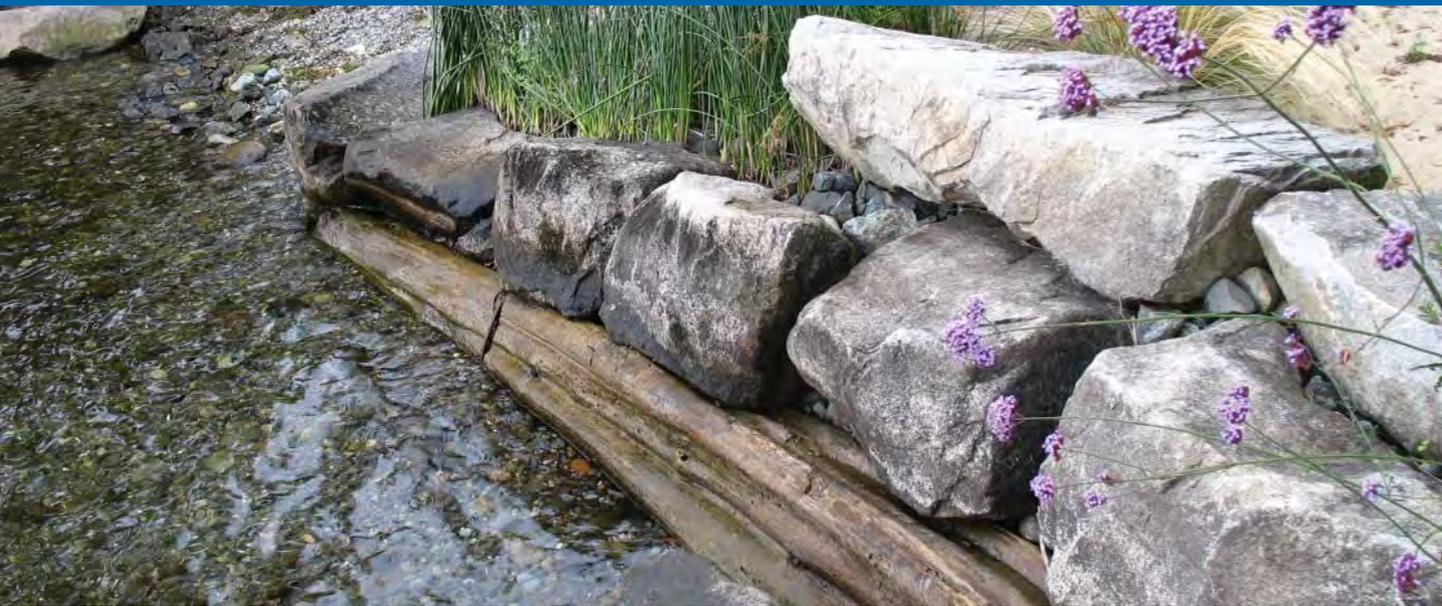
While wildlife sightings are a major benefit of living on the water, all creatures are not greeted with equal enthusiasm; the noise, aggressive behavior, and messy habits of Canada geese frequently make them unwelcome guests. Although many worry that creating a new beach may draw more geese into their yard, a more natural shoreline can actually decrease the number of visiting geese. A lawn extending to the lakeshore is a goose’s equivalent of a 24-hour salad bar – geese eat turf grass and snails, and they prefer open areas with no shrubs and trees for predators to hide behind.

Two strategies, used separately or together, act as effective deterrents to geese. First, separating the beach from your yard by a few steps makes the ascent too much of a hassle for most geese. Second, plantings of native vegetation between your yard and the water can act as a visual and physical barrier, separating the geese from your grass. Even with a path through the plantings to allow beach access, geese are reluctant to walk through taller vegetation.

“Our old yard was a landing strip for geese. Since we shrank the lawn area and added plants, the geese almost never come here anymore,” reports a Bellevue homeowner. In addition to discouraging Canada geese, diverse plantings are likely to increase visits by songbirds and other desirable wildlife.



note



Logs must be anchored securely in place. Although the dense, weathered wood used for these projects does not float easily, a little buoyancy can be enough to pull a log loose during a storm. A loose log can be hazardous to people, structures, or boats. There are several ways to secure a log, but it is most commonly done using duckbill anchors and cables or by partially burying the log.

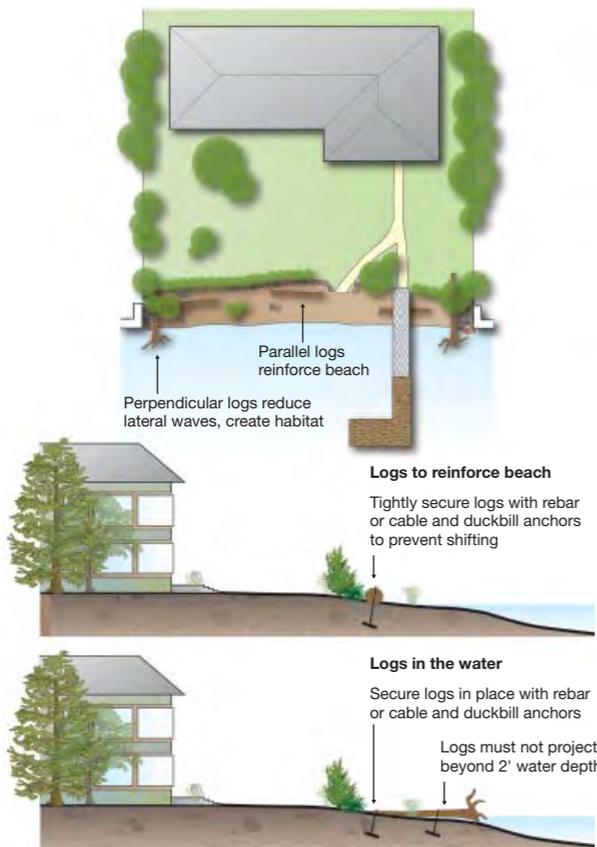
While logs in the water can improve nearshore habitat by creating salmon refuge areas, they should not extend beyond a depth of 2' below ordinary high water. Anything beyond this is thought to create habitat for predator fish species that prey on salmon. In some cases, logs are not allowed to extend beyond the water line, since they can interfere with natural movement of sediments.

Also, shorelines that place logs below or partially below the water line must be designed with particular care. Some restoration efforts around the lake have installed logs perpendicular to the shoreline to enhance fish habitat.

If logs are used for habitat enhancement, they should be as complex as possible, with root wads and some branches still attached.

Log installation

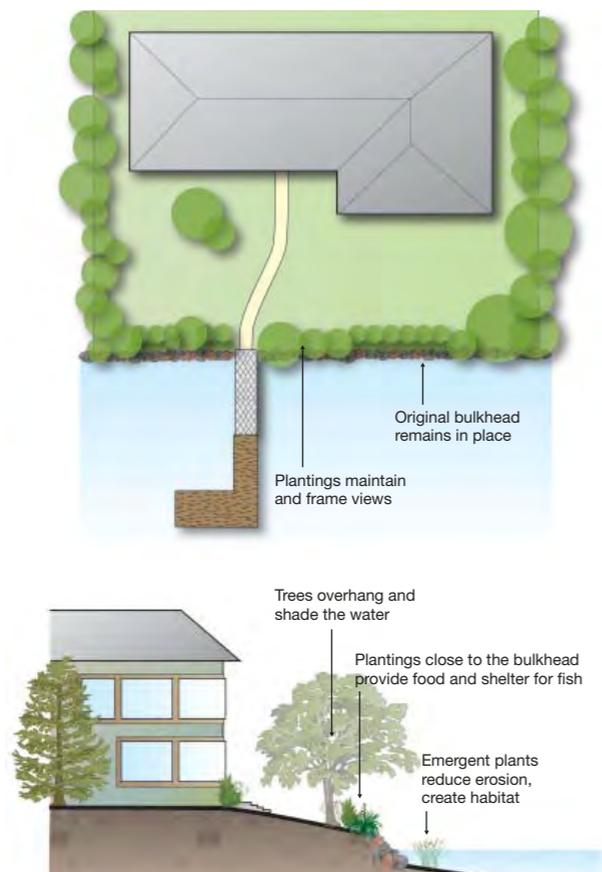
Logs are useful construction materials for green shorelines projects. They can provide strategically placed “hard engineering” structural reinforcement while complementing the aesthetic of a more natural beach project and, in some cases, enhancing ecological function. A few key principles increase the effectiveness of logs.



Shoreline plantings

The use of trees, shrubs, and perennials is a key characteristic that distinguishes green shorelines from conventional shoreline management. When homeowners see examples of green shorelines, the plants are typically what make the biggest impression; instead of a monotonous swath of lawn and bulkhead, these shorelines use a rich variety of plantings to provide visual interest, create and protect habitat, and help stabilize the lakeshore.

In this guidebook, two categories of plantings are discussed: vegetated buffers and slope bioengineering. Vegetated buffers primarily contribute to a shoreline by adding beauty, improving habitat value, and protecting water quality. Slope bioengineering strategically uses plants as an engineering element to hold soil in place.



GREEN SHORELINES:

Vegetated Buffers

Vegetated buffers at the water's edge add visual interest to residential landscapes. A mix of textures, flowers, fruit, and colors brings a dynamic quality to your yard throughout the year. Native plants are ideal, not only because they have lower water and maintenance needs, but also because they help draw birds and beneficial insects to your yard. Vegetated buffers are great options for any lakefront property, whether you have a bulkhead, a beach or a combination of the two.

Diverse shoreline plantings contribute to aquatic habitat in four important ways. First, vegetation provides diffuse shade to the water's edge, creating conditions that help juvenile fish blend in with their surroundings. Second, they restore natural food web processes to the shoreline – plants are home to insects and other small organisms, which become fish food when they fall into the water. Third, they provide twigs, branches and leaves, which create important refuges from birds and bigger fish. Finally, planted strips protect water quality by filtering excess nutrients and other contaminants from stormwater. Rainwater flowing over lawns carries fertilizer, pet feces, gasoline, paint, and pesticides into the lake, but shrubs and perennials can help stop and neutralize these contaminants.

How wide should your buffer be? This depends on what your lot can accommodate. While bigger is better, even a few feet can provide benefits. For most new residences along Lake Washington, Seattle requires at least a 25' building setback. This means a 5-10' vegetated buffer can easily fit on most sites, and 15-20' is often feasible. An additional benefit of vegetated buffers: replacing turf with low-maintenance perennials and shrubs can cut down on yard work by shrinking the area that needs mowing.

Ideally, shrubs and perennials should be directly adjacent to the water's edge, overhanging the lake wherever possible. When a property has a bulkhead, however, trees and large shrubs need to be sited carefully to prevent damage to shoreline armoring. Black cottonwood, for example, is an ideal tree to plant next to beach areas, but its vigorous root system could cause problems for a riprap bulkhead.

Emergent plants provide excellent habitat and erosion control, but they often struggle on Lake Washington due to the lake's unusual hydrological conditions – the lake's water level is managed at the Ballard Locks such that high water occurs in the summer and low water occurs in the winter. Emergent plants may work well in protected parts of Lake Washington, or areas with shallow nearshore slopes.

As long as all plants are placed above the high water mark, no permits are necessary to plant shoreline vegetation.



“Sure, I like plants, but maintaining my view of the water is a higher priority.”

Many homeowners favor large expanses of lawn because they see it as the best way to protect their view. The truth is that diverse plantings can accent and improve views.

Framing views is an important principle of garden and landscape design. Identify which views you want to keep and enhance, and which views would be better screened. Strategic plant placement can help block or soften undesirable views (such as a neighbor's shed or boat house) while maintaining views of the water.

Since houses are always sited above the high water line, it's usually easy to keep views of the water over perennials and low shrubs. Most sites can also accommodate trees without losing views, so long as the trees are maintained properly; limbing them up (trimming out the lower branches to allow views under or through the canopy) may sometimes be desirable. Trees contribute to a sense of privacy, bring birds and other wildlife to your yard, absorb runoff, and can even reduce energy costs by shading your house in the summer.

Looking at the examples throughout this guidebook will give you more specific ideas of how plantings can preserve and enhance views while reducing your impact on the environment.



Photo Above: Joanna A. Buehler
Photo Left: The Berger Partnership



Slope Bioengineering

Slope bioengineering is a term used for an array of different techniques that share an elegant principle. Instead of using concrete or sheetpile, bioengineering uses plant material as a self-renewing, ecologically sustainable way to hold soil and gravel in place. These “soft engineering” techniques are commonly used in parks and natural areas for ecological restoration projects, but they may also be used on residential properties.



Each of the dozens of slope bioengineering techniques has its own advantages specific to different situations. A few examples are listed below:

- 1 Live stakes are a key element of almost all bioengineering projects. These are cuttings from plants that will grow roots when inserted into moist ground. Willows, dogwoods, and other shoreline species adapted to reproduce through cuttings are all viable candidates. Live stakes can be a simple and cost-effective way to bind soil in place and provide plant cover.
- 2 Fascines are long bundles of thin branches, tightly bound with twine. They are partially buried in trenches parallel to incoming waves and “nailed” into place with live stakes. These thick masses of branches provide immediate structural support, catch sediment coming from upslope, and can establish their own roots and new growth. Since they are usually composed of several different species, the resultant growth comes in as a thicket of mixed plants. For this reason, fascines should be placed carefully to avoid blocking views.
- 3 Live revetment is used to stabilize steep banks. Geotextile fabric holds earth-filled terraces in place. Further structural support is provided by live stakes driven through the fabric.

Be sure that cuttings are collected from an approved site – contact your city’s parks department or the Washington Department of Natural Resources to find out where harvesting is allowed (see “Contacts”). Permits are required for any slope bioengineering installations at or below ordinary high water.

“How might climate change affect Lake Washington, and how can plantings help?”

Fortunately for homeowners on Lake Washington, climate change will not cause the lake to rise. Because the lake’s level is managed at the Ballard Locks, the ordinary high water line should stay essentially the same.

The bad news is that a temperature change of just a few degrees can dramatically alter ecological relationships in the lake. University of Washington researchers have measured rising temperatures in the lake over the past 40 years. They suspect that the warmer water is linked to declining numbers of *Daphnia*, a tiny aquatic organism that provides a food source to Chinook, sockeye, and other fish.

As this food source diminishes, native vegetation along the shoreline becomes even more important as a source of insects, insect larvae, and other fish food. By increasing your waterfront vegetation, you are increasing habitat for beneficial insects, thereby providing an alternative food source for salmon.

Trees and shrubs also increase the amount of partial shade on the lake’s surface, helping to moderate temperatures in shallow water.

note



Plant List

Native plants offer many advantages for green shorelines and residential landscaping in general. Because they are adapted to local conditions, they rarely require irrigation. They are surprisingly diverse, offering a wide palette of shapes, textures, and colors to work with. They can be attractively mixed with many nonnative ornamental plants. Also importantly, they offer substantial habitat benefits for birds, beneficial insects, and fish. Finally, native plants do

not need fertilizer and pesticide treatments that can put harmful chemicals in the lake.

Many of the plants on this list, like Oregon grape and mock-orange, can be found at any nursery. Others will only be available through nurseries that specialize in native plants. For an up-to-date list of native plant retailers, please contact the Washington Native Plant Society (www.wnps.org).

Latin name	common name	exposure	moisture	height (ft.)
------------	-------------	----------	----------	--------------

TREES

<i>Abies procera</i>	noble fir	sun/part shade	dry/moist	200
<i>Acer circinatum</i>	vine maple	part shade/shade	dry/moist	25
<i>Acer macrophyllum</i>	bigleaf maple	sun/part shade	dry/moist	105
<i>Alnus rubra</i>	red alder	sun/part shade	moist/wet	70
<i>Betula papyrifera</i>	paper birch	sun	moist	80
<i>Crataegus douglasii</i>	black hawthorn	sun/part shade	dry/moist	25
<i>Crataegus suksdorfii</i>	Suksdorf's hawthorn	sun/part shade	dry/moist	20
<i>Fraxinus latifolia</i>	Oregon ash	sun/part shade	moist/wet	70
<i>Malus fusca</i>	Pacific crabapple	sun/part shade	dry/moist	40
<i>Picea sitchensis</i>	Sitka spruce	sun/part shade	dry/moist	200
<i>Populus balsamifera</i>	black cottonwood	sun	moist	100
<i>Populus tremuloides</i>	trembling aspen	sun	dry/moist	75
<i>Pseudotsuga menziesii</i>	Douglas fir	sun/part shade	dry/moist	200
<i>Rhamnus purshiana</i>	casacara	sun/part shade	dry/moist	30
<i>Salix spp.</i>	willow	sun/part shade	moist/wet	6-40
<i>Thuja plicata</i>	Western redcedar	part shade/shade	moist/wet	200
<i>Tsuga heterophylla</i>	Western hemlock	sun/part shade	dry/moist	180

GROUNDCOVER

<i>Achlys triphylla</i>	vanilla leaf	part shade/shade	moist	1
<i>Allium cernuum</i>	nodding onion	sun	dry/moist	1
<i>Asarum caudatum</i>	wild ginger	part shade/shade	moist	0.5
<i>Camassia quamash</i>	common camas	sun/part shade	dry/moist	1
<i>Cornus canadensis</i>	bunchberry	part shade/shade	moist	0.5
<i>Fragaria chiloensis</i>	beach strawberry	sun/part shade	dry	1
<i>Mahonia nervosa</i>	low Oregon grape	sun/shade	dry/moist	2
<i>Maianthemum dilatatum</i>	false lily-of-the-valley	part shade/shade	dry/moist	1
<i>Vancouveria hexandra</i>	inside-out flower	part shade/shade	moist	1

Latin name	common name	exposure	moisture	height (ft.)
------------	-------------	----------	----------	--------------

SHRUBS

<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	sun/shade	dry/moist	20
<i>Andromeda polifolia</i>	bog rosemary	sun/part shade	wet	1.5
<i>Cornus stolonifera</i>	red-osier dogwood	sun/shade	moist/wet	15
<i>Corylus californica</i>	beaked hazelnut	sun/shade	dry/moist	20
<i>Gaultheria shallon</i>	salal	part shade/shade	dry/moist	5
<i>Holodiscus discolor</i>	oceanspray	sun/shade	dry	15
<i>Lonicera involucrata</i>	black twinberry	sun/part shade	dry/wet	8
<i>Mahonia aquifolium</i>	tall Oregon grape	sun/shade	dry/moist	8
<i>Philadelphus lewisii</i>	mock-orange	sun/part shade	dry/moist	9
<i>Physocarpus capitatus</i>	Pacific ninebark	sun/shade	moist/wet	13
<i>Rhododendron macrophyllum</i>	Pacific rhododendron	part shade/shade	dry/moist	20
<i>Ribes sanguineum</i>	red-flowering currant	sun/part shade	dry/moist	6
<i>Rosa gymnocarpa</i>	bald-hip rose	sun/part shade	dry/moist	5
<i>Rosa pisocarpa</i>	cluster rose	sun/part shade	moist/wet	6
<i>Rosa nutkana</i>	nootka rose	sun/part shade	moist/wet	10
<i>Rubus spectabilis</i>	salmonberry	sun/shade	moist/wet	10
<i>Salix scouleriana</i>	Scouler willow	sun/part shade	moist/wet	25
<i>Sambucus racemosa</i>	red elderberry	sun/part shade	moist/wet	20
<i>Sorbus sitchensis</i>	Sitka mountain-ash	sun/part shade	moist	10
<i>Spiraea douglasii*</i>	spiraea	sun/part shade	moist/wet	12
<i>Symphoricarpos albus</i>	snowberry	sun/shade	dry/moist	5
<i>Vaccinium ovatum</i>	evergreen huckleberry	part shade	dry	12
<i>Viburnum edule</i>	highbush cranberry	sun/part shade	moist/wet	12

PERENNIALS

<i>Aruncus sylvester</i>	goat's beard	sun/part shade	moist/wet	5
<i>Aster subspicatus</i>	Douglas' aster	sun/part shade	moist	2
<i>Athyrium filix-femina</i>	lady fern	sun/shade	moist/wet	4
<i>Aquilegia formosa</i>	Western columbine	sun/part shade	moist	2
<i>Blechnum spicant</i>	deer fern	part shade/shade	moist/wet	3
<i>Carex canescens</i>	grey sedge	sun/part shade	moist/wet	2
<i>Dicentra formosa</i>	Pacific bleeding heart	sun/part shade	moist/wet	1
<i>Iris tenax</i>	Oregon iris	sun/part shade	moist/wet	1
<i>Lupinus polyphyllus</i>	large-leaved lupine	sun	moist/wet	4
<i>Mimulus guttatus</i>	yellow monkey-flower	sun/shade	moist/wet	2
<i>Polystichum munitum</i>	sword fern	part shade/shade	moist	4
<i>Sisyrinchium californicum</i>	golden-eyed-grass	sun/part shade	moist/wet	1
<i>Sisyrinchium idahoense</i>	Idaho blue-eyed-grass	sun/part shade	moist/wet	2
<i>Solidago canadensis</i>	goldenrod	sun/part shade	dry/moist	4
<i>Trillium ovatum</i>	Western trillium	part shade/shade	moist/wet	1.5

EMERGENT AQUATIC PLANTS**

<i>Alisma plantago-aquatica</i>	water-plantain	sun-part shade	wet	3
<i>Carex kelloggii</i>	Kellogg's sedge	sun/part shade	moist/wet	2
<i>Carex obnupta</i>	slough sedge	sun/part shade	moist/wet	3
<i>Carex stipata</i>	sawbeak sedge	sun/part shade	moist/wet	2
<i>Sagittaria latifolia</i>	arrowhead	sun/part shade	wet	3
<i>Scirpus microcarpus</i>	small-fruited bulrush	sun/part shade	wet	3
<i>Scirpus acutus</i>	hardstem bulrush	sun	wet	9
<i>Typha latifolia*</i>	cattail	sun/part shade	wet	8

* Potentially aggressive growth and spreading – not suitable where spreading is undesirable.
 ** See information on emergent plants under "Vegetated Buffers."

Selecting the right approach



Not all of the practices discussed in this guidebook are appropriate for every waterfront parcel. Vegetated buffers and logs can be incorporated into just about any shoreline project, including those that require some form of bulkhead. Slope bioengineering and setting back bulkheads also can be used on most sites. While full beach restoration and beach coves are the most desirable options for shoreline management, they may not be effectively implemented on every site.

In cases where bulkheads serve only to maximize lawn area, they can typically be replaced by a beach with minimal grading and little additional reinforcement. Others cases, such as properties where houses are set back just a few feet from the water or are perched steeply above the shoreline, require some amount of armoring. How can you tell which practices might be the most appropriate for your property?

Your property's potential for green shoreline improvements is determined by a combination of four factors: building setback from the water, nearshore slope moving from your shoreline into the lake, yard slope leading from your house to the shoreline, and the intensity of waves in your area.

"High wave energy" on the decision tree does not include the typical waves experienced along Lake Washington, but rather refers to sites with one or more of the following conditions:

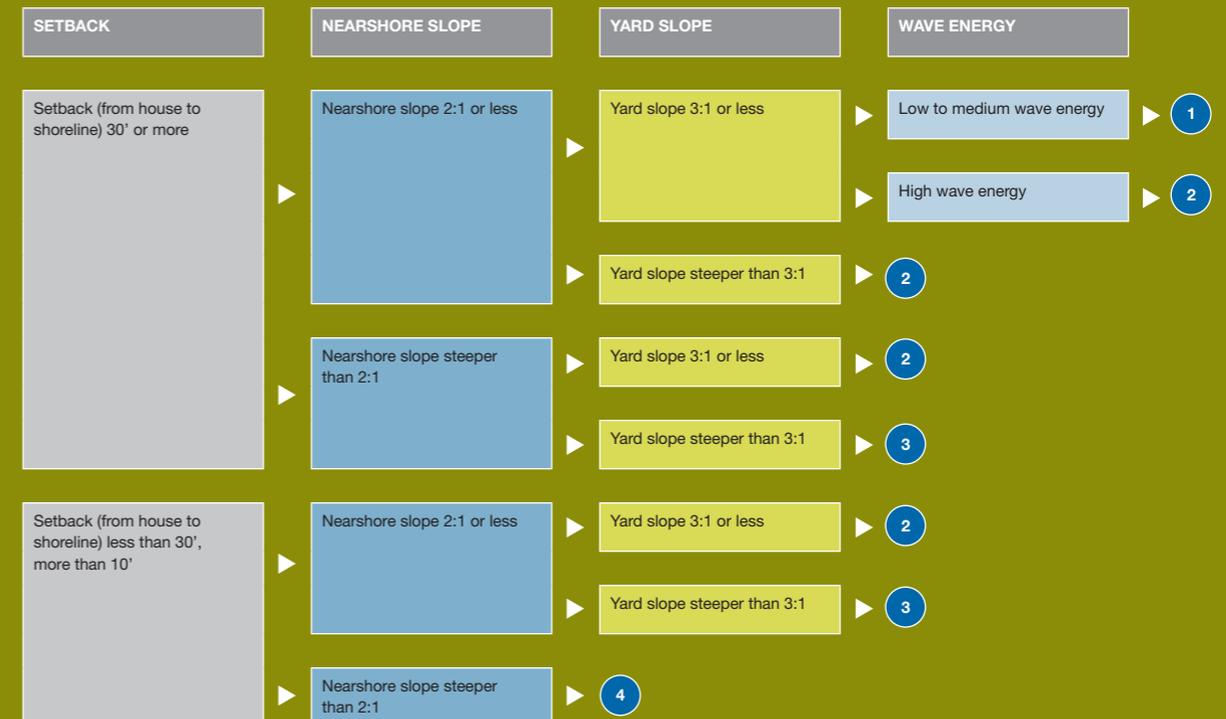
- 1 Site is adjacent to major boat traffic lane, such as the mouth of Union Bay.
- 2 Site receives waves that build up over a particularly long fetch (the distance over which waves pick up wind energy).
- 3 Site receives waves reflected off Highway 520 or Interstate 90.

The decision tree presented here helps evaluate options based on a site's characteristics, but it is not definitive – individual sites may have additional or special characteristics that increase or limit design options.



Green Shorelines Decision Tree

How do I know which options I can consider for my site?



Notes:

The use of plant buffers or logs is a viable option for any site, including those that employ hard engineering such as bulkheads.

Sites with less than a 10' setback are not included on this decision tree, because in most cases they will depend on concrete, sheetpile, or riprap. As noted above, plant buffers still may be appropriate.

- 1 full beach, beach coves, setting back bulkhead, bioengineering
- 2 beach coves, setting back bulkhead, bioengineering
- 3 setting back bulkhead, bioengineering
- 4 bioengineering

Building better docks



“What’s the goal—shade or no shade?”

Permitting agencies encourage plants that hang over the water, but discourage overwater structures because they shade the water. So what’s the difference?

Natural shorelines provide complex habitat: varied sediment sizes, dappled shade, leaves, twigs, branches, logs, and varying depths. All of these factors help juvenile fish by providing shelter and food sources. Shoreline development, especially bulkheads and docks, tend to simplify habitat. It creates large, homogenous swaths, with shallow-water areas alternating between full sun (between docks) and full shade (under docks). Essentially, speckled or patchy shade can be beneficial for salmon, but conventional docks are the equivalent of a dark alley.

More complex landscapes such as those promoted by green shoreline practices provide more habitat diversity, which in turn supports relatively high biological diversity. Simplified built landscapes provides homogenous habitat, and only support a few species.

People are often surprised to learn that docks can have a major impact on fish. While problems sometimes arise from toxic preservatives leaching off older docks, the bigger issue is that overwater structures change underwater light conditions, affecting the behavior of juvenile salmon and their predators. Regulators and the construction industry have worked together to address this problem, and new dock-building practices have dramatically decreased impacts on the nearshore environment.

Since water moves freely underneath docks, it seems logical that they are not barriers for fish. In fact, research shows that migrating smolts tend to swim around docks rather than underneath them. It is thought that this helps juvenile salmon avoid bass and other predators that hide in the dark shade under these structures. Taking this behavior into consideration, it is apparent that the 2,700+ docks around Lake Washington can add up to taxing and potentially dangerous detours for smolts. The docks add distance to a salmon’s migration to the Ship Canal, and they push much of that migration out into deeper water where small fish are more vulnerable to predation.

Research suggests certain modifications to docks that can improve conditions for salmon while maintaining access for people.

Making construction clean and green

Like any construction along the shoreline, building or renovating a dock presents a potential disturbance to sensitive shoreline habitat. However, taking the following steps can decrease the impact:

- 1 Work with a contractor who is conscientious about preventing spills and minimizing disturbance of sediments, following Best Management Practices.
- 2 Carefully select wood preservatives for any lumber that will have contact with the water, or use untreated wood. The worst preservatives, creosote and pentachlorophenol, are now banned, but most of the remaining options contain arsenic or copper, which also pose threats to aquatic organisms. Nontoxic alternatives can be difficult to find and are not yet approved under International Building Code. Fortunately, untreated Douglas fir and galvanized or epoxy-coated steel piles last a long time in freshwater.
- 3 Use decking materials that will not require toxic finishes and cleaning agents. No matter how careful you are in applying these chemicals, they end up in the lake. Metal, fiberglass or plastic grating, recycled plastic lumber, and naturally rot-resistant wood can help avoid the problem. For wood needing finishes, look for the least toxic product for the job. The signal word (“poison,” “warning,” “caution,” etc.) at the top of the label gives a general sense of the potential hazards. Avoid products labeled “poison” or “warning” if possible, as these indicate a relatively high hazard level.
- 4 Schedule construction within approved work windows to minimize disturbance to threatened species. These windows are determined based on the nesting season for bald eagles and the migration patterns of salmon. Work windows vary from one part of the lake to another. You will get information for your area during the application process for Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (see “Getting Permits”).

Let the sun shine in

Juvenile Chinook salmon have a complicated relationship with docks. As fry, Lake Washington salmon tend to congregate under docks during the day. This can protect them from bird predation, but may make it easier for larger fish to get them. Additionally, during their migration as smolts, docks present an obstacle for salmon to swim around. Allowing more light under docks is thought to help salmon during both the fry and smolt life stages. There are several ways to improve the light conditions under a dock:

- 1 Use grated decking with openings that allow light to pass through.
- 2 Make ramps and walkways narrower, ideally 4’ or less for walkways and 3’ or less for ramps.
- 3 Do not use “skirts,” i.e., boards on the sides of the dock that extend down to the water. Multiple agencies prohibit skirts because of their effect on light in the nearshore area.
- 4 Design the dock such that the bottom of the entire structure is at least 18” above ordinary high water.
- 5 Use structural beams such as glu-lams, which allow longer spans between piles.
- 6 Avoid overwater lights that will be on all night. Although salmon need light during the day, artificial light makes them more vulnerable to predation at night.

These guidelines are highlights of a regional general permit for dock construction issued by the Army Corps of Engineers. Complying with these guidelines can substantially speed up the federal review and permitting for your dock (see “Getting Permits”).

Photo and design: Anchor Environmental





Estimated costs & maintenance

A survey conducted by Seattle Public Utilities found that most lakefront homeowners prefer vegetation and beaches over bulkheads, but they assume that green shorelines are more expensive than armoring. So what do these projects really cost? It varies, but in general, green shorelines cost about the same as conventional bulkheads. Up-front design, permitting, and construction costs tend to be slightly lower, but maintenance costs make up the difference.

There is an enormous range of costs for shoreline construction. The price for any given renovation depends on site characteristics, the professionals that design and build your project, and, to a large extent, your preferences. Also, cost estimates presented here are based on 2008 rates – actual costs fluctuate.

Bulkhead removal

If your site has an existing bulkhead, the cost to remove it is the same whether you are replacing it with a new bulkhead or an alternative. Costs typically range from about \$30 to \$125 per linear foot, depending on bulkhead material and site access.

Design and Construction

Green shorelines project tend to cost slightly less for design and permitting, since they tend to require fewer revisions to meet regulatory conditions. “We’ve found that natural shoreline projects sail through the permitting process. We frequently get permits in three months or less, while bulkhead projects can take up to a year,” says one designer who specializes in residential beach restoration. A faster permitting process translates to less money spent sending your designer or contractor to government offices.

Once the old bulkhead has been removed to make way for construction, slope bioengineering or beach construction cost about the same as a new bulkhead, while riprap generally costs somewhat less.

Maintenance

Maintenance and long-term costs represent important differences between conventional approaches and green shorelines. While residential bulkheads typically require no maintenance over the course of their 25-50 year life spans, green shorelines may require periodic beach nourishment (see “Full Beaches”).

Although they require upkeep, beaches and bioengineered shorelines have an important long-term advantage: while bulkheads settle, weaken, and eventually fail, the alternatives can last indefinitely if maintained properly. Aside from supplementary gravel and any replacement plants needed during the establishment period, no large future investments are likely to be needed.

Several factors help determine whether your project is likely to fall at the low end or high end of the possible cost range:

- 1 Grading:** Projects that require large volumes of cut or fill are more expensive than those that do not require major excavation.
- 2 Access:** If your shoreline can be accessed by land, costs will be lower than they would be for sites that require equipment to be brought by water.
- 3 Planting plan:** Planting in the fall and using native plants can bring down costs. Both strategies decrease the need for irrigation and improve plant survival, reducing the need for replacement plantings in the first year.
- 4 Project size:** While larger projects cost more as a whole, they carry lower costs per unit. That is, cost per linear foot of a 70’ long beach will be less than that of a 25’ long beach. Along these lines, working with a neighbor to renovate both shorelines at the same time can substantially lower construction costs for each project.

note



Bulkhead removal costs			
SITE ACCESS	BULKHEAD MATERIAL (REMOVAL)		
	Wood	Riprap	Concrete
Accessible from land and water	\$30-40 per linear foot	\$45-60 per linear foot	\$95-110 per linear foot
Accessible from water only	\$40-55 per linear foot	\$55-80 per linear foot	\$100-125 per linear foot

Shoreline construction costs (as of 2008)					
Cost Category	CONVENTIONAL TREATMENTS		GREEN SHORELINES		
	Solid bulkheads	Riprap	Beach Establishment	Slope bioengineering	Docks
Capital Costs	Average rock or concrete bulkhead is \$350 to \$400 per linear foot, sheetpile is \$800+ per linear foot	Average riprapped bank is \$125 to \$200 feet per linear foot	Average beach establishment is \$200 to \$500 per linear foot	Average bioengineering project is \$200 to \$500	Average new dock costs \$100 to \$130 per square foot
Design and Permitting	10-15% of capital costs for larger projects (greater than \$100K), 20-25% for smaller projects		7-12% of capital costs for larger projects (greater than \$100K), 15-20% for smaller projects		Similar to bulkheads
Maintenance	No maintenance is usually required for 25-50 year life span of projects		Sand replenishment at a 1-5 year frequency, gravel at a 5-10 years, both \$3 to \$6 per square foot of beach – with proper maintenance, project can last indefinitely		Similar to bulkheads

Choosing a shoreline professional



Design: The Watershed Company

Almost all shoreline projects, aside from minor landscaping above the water line, will require some hired help from one or more professionals. These individuals use their training and experience to help you navigate the technical details of designing, permitting, building, and maintaining a durable, attractive shoreline. The professionals that you hire help determine how smoothly your design and permitting processes will go, as well as the final outcome of your project. It is worth taking extra care at the outset to find the right professional for you.

Depending on your time, budget, and the specifics of your site, you may find yourself looking for a landscape architect, landscape designer, engineer, contractor, and/or permit specialist. Some companies do all of these things, and others specialize in one. Start by identifying your priorities for your new waterfront. Make a list of features or qualities that you like, either from this guidebook or from projects that you have seen around the lake.

Talk to friends and neighbors who have undertaken recent shoreline work. Their experiences can give you leads, or can help you cross candidates off your list. After identifying several candidates, ask to see photos of recent work or to visit any of their projects. Be sure to tell them that you are interested in a green shorelines or “soft engineering” approach for your project so they can show you the most relevant examples. Inquire specifically about the practices that each contractor uses to minimize impacts on the shoreline environment. Once you have narrowed the list down to three or four companies, invite representatives to your property to get personalized recommendations and estimates.

As you interview potential designers or contractors, assess their experience as well as their willingness to help you realize your vision for the project. Make sure that you are confident in their abilities and that you will be able to have a collaborative relationship.

note





Getting permits

The permitting process can be daunting for any shoreline project. Agencies at local, state, and federal levels review shoreline plans to ensure that development in and around shorelines will protect safety, the aquatic environment, endangered species, and water quality. The resulting multilayered regulatory process can seem confusing and overwhelming. Fortunately, help is available.

Staff from the agencies listed in “Contacts” can help you navigate through specific requirements. The Governor’s Office of Regulatory Assistance can also provide guidance: Call 1-800-917-0043 or visit www.ora.wa.gov for free support regarding environmental permits and permitting processes.

Additionally, jurisdictions at all levels are working to encourage the kinds of practices highlighted in this guidebook. Many of them already have some regulations that favor green shorelines, and most are working to make the process smoother for shoreline restoration. If you follow the recommendations in this guidebook, the permitting process is likely to be noticeably easier and faster. Good design and thorough documentation are always necessary for obtaining permits, but proposed projects that feature beaches and plantings will tend to be more successful than those that emphasize armoring.

Any project that involves work in, over, under, or adjacent to water requires review from three levels. Each project may be required to obtain the following permits from the following agencies:

1 Local jurisdiction (your city or King County)

- Shoreline substantial development permit or exemption
- Environmentally Critical Area permit
- State Environmental Policy Act (SEPA) permit or exemption
- General construction permits

2 State agencies

- Washington State Department of Fish and Wildlife
 - Hydraulic Project Approval (HPA)
- Washington Department of Ecology
 - Section 401 Water Quality Certification
 - Coastal Zone Management Certification
 - NPDES Stormwater General Permit

3 United States Army Corps of Engineers

- Discharge of Dredge or Fill Material, Section 404 Permit
- Work for Structures in Navigable Waters, Section 10 Permit

Application materials

In most cases, the permitting process will be handled by your project designer or contractor. Information that they will need to provide with the application includes:

- 1 Joint Aquatic Resources Permit Application (JARPA) form. In an effort to streamline permitting, multiple agencies have worked together to develop a single application form. The form is currently used by WDFW, Department of Ecology, and the Corps, and it may be used by some local jurisdictions in the future. Find the form and more information at <http://www.epermitting.org/default.aspx>.
- 2 Plans and, if applicable, surveys of existing conditions.
- 3 Plans for proposed construction, including plan (aerial) view and cross sections. The JARPA specifies an 8½”x 11” copy for fax and public notice purposes, but larger plans are required for most local reviews. Each municipality has its own standards for drawings, so be sure to research these before preparing your application packet.
- 4 Photos or aerial photos of existing conditions may be helpful.
- 5 Any additional studies or specifics you already have for your site—erring on the side of too much information will help your application get through the process faster. For example, if one agency requires you to conduct a geotechnical study or biological evaluation, include the results in all of your permit applications.

Many permit reviews are delayed while agencies wait for additional information from applicants. Remember to review application requirements, use the most current forms, provide all the required information, and obtain all the necessary signatures before attending a permit review meeting.

Permit application timeline

Permitting takes time. It is ideal to start the permit application process a full year before the desired work start date. While green shorelines projects are sometimes permitted in as little as three months, the process can be lengthy since several steps have to occur in a specific sequence.

Before you draw any plans, start by reviewing local permitting rules, Corps and WDFW design guidelines, and information requested on the JARPA form. Find out if there are any examples, conditions, or concerns for your specific type of project. Also understand what work windows are and how they might affect your project timeline (see “Building Better Docks”).

Once you and your designer complete a concept design for your project, meet with your local agency for early design guidance and review of your preliminary plans. Taking this step before completing plans will save time and money.

note

Since Corps permits are the most complex, consider submitting your applications to both the Corps and local jurisdiction at the same time. As part of its review process, the Corps is required to consult with other agencies such as the Washington State Department of Ecology (DOE), tribal agencies, NOAA Fisheries, and the United States Department of Fish and Wildlife. Except for the DOE, you probably will not work directly with these other agencies. DOE will begin formal review of your application once it receives official notification from the Corps.

Tips to facilitate the Army Corps permit process

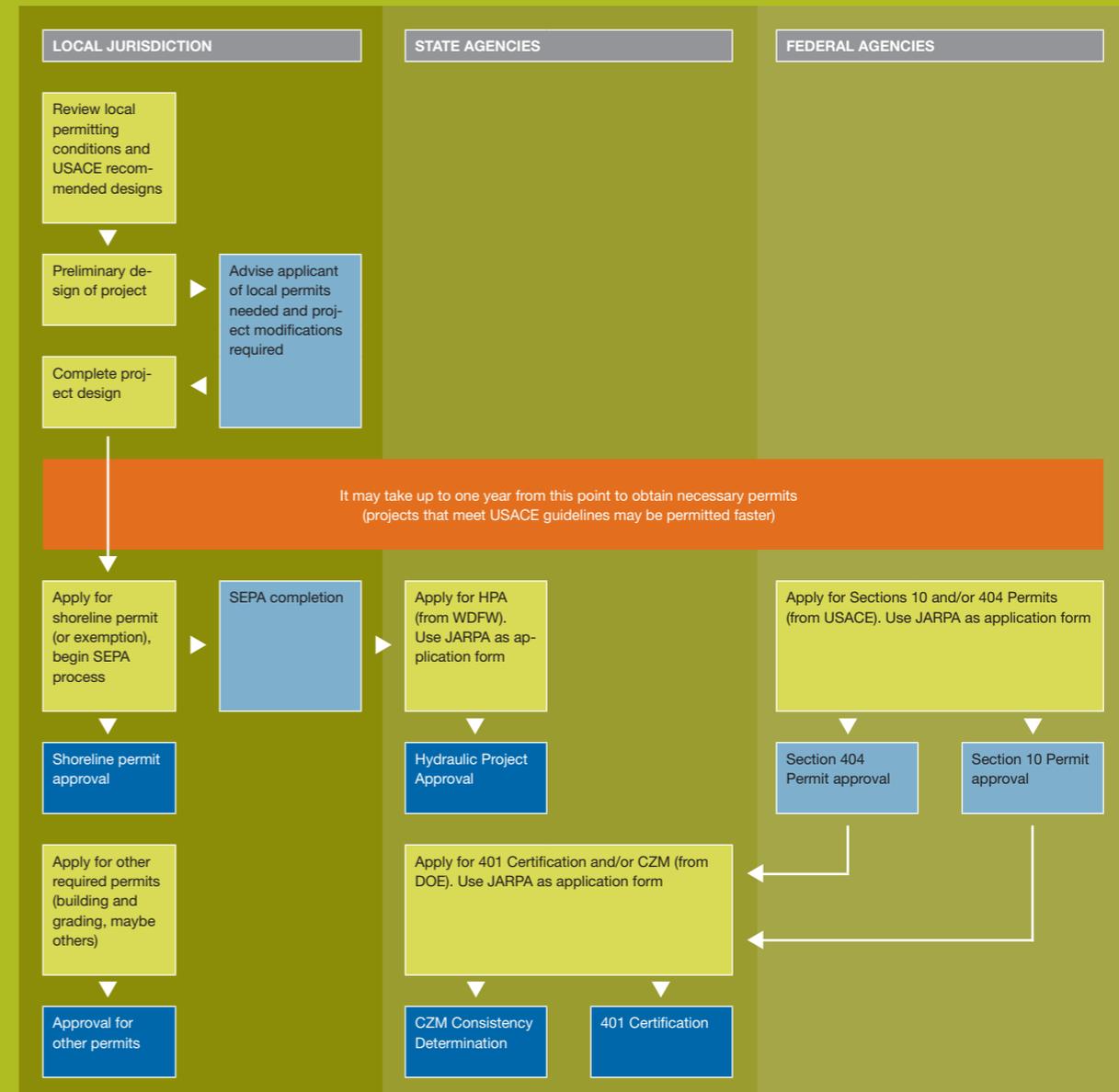
The Corps has written several documents that can accelerate the process of getting federal permits. Most significant for green shoreline projects is a “Programmatic Biological Evaluation” for shoreline restoration that the Army Corps wrote in collaboration with NOAA Fisheries and the U.S. Fish and Wildlife Service. It includes criteria for cut beaches, fill beaches, and bulkhead plantings. If your project meets the conditions listed, you will be able to forgo the site-specific Endangered Species Act analysis, which is typically the most involved part of getting federal permits. To determine whether your project meets the programmatic conditions, visit: <http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=Programmatics>

Also, a Regional General Permit (RGP3) provides clear guidelines for docks on Lake Washington and Lake Sammamish, most of which are outlined in “Building Better Docks.” If you can demonstrate that your proposed project meets the conditions of RGP3, it will greatly simplify the Corps review. To download RGP3, visit: http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=mainpage_RGPs

The Corps has a series of general permits known as Nationwide Permits for activities that have minimal environmental impact. If your project does not meet the criteria of RGP3, Nationwide Permits 3, 13, and 27 may help streamline permitting. For more information, visit: http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=What_is_NWP

The flow chart provided here represents the process for a typical residential shoreline project. It does not cover every possible variation that can arise for specific projects.

Schematic of the permitting process for residential shoreline projects on Lake Washington



Design and Photo: J.A. Brennan Associates



- Applicant's responsibility
 - Permitting agency's responsibility
 - Permitting complete
- CZM - Coastal Zone Management
 - DOE - WA Department of Ecology
 - HPA - Hydraulic Project Approval
 - JARPA - Joint Aquatic Resources Permit Application
 - SEPA - WA State Environmental Policy Act
 - WDFW - WA Department of Fish & Wildlife
 - USACE - US Army Corps of Engineers

Resources

The following publications and websites served as sources for this guidebook. They include additional information based on shoreline restoration efforts around the country. For links to these sites and more, please visit the Green Shorelines website, www.seattle.gov/dpd/GreenShorelines.

Lakeside Living (King County)

www.govlink.org/watersheds/8/action/lakeside-living

Salmon-Friendly Gardening (City of Seattle)

www.seattle.gov/util/Services/Yard/Natural_Lawn_&_Garden_Care/Salmon_Friendly_Gardening/index.asp

Lakescaping for Water Quality and Wildlife (Minnesota Department of Natural Resources),

by Carrol Henderson, Carolyn Dindorf, and Fred Rozumalski. May be purchased online at www.comm.media.state.mn.us/bookstore/bookstore.asp

Slope Stabilization and Erosion Control (Washington State Department of Ecology)

www.ecy.wa.gov/programs/sea/pubs/93-30/index.html

Alternative Bank Protection Methods for Puget Sound Shorelines (Department of Ecology)

www.ecy.wa.gov/biblio/0006012a.html

Native Plant Resources Directory (King County)

green.kingcounty.gov/GoNative

Puget Sound Shoreline Stewardship Guidebook (Puget Sound Action Team)

www.kingcounty.gov/environment/watersheds/central-puget-sound/shoreline-stewardship-guidebook.aspx

The Shoreline Stabilization Handbook: Lake Champlain and Other Inland Lakes (Northwest Regional Planning Commission)

www.nrpcvt.com/nrpcvt/shoreline.html

Green Home Remodel series (City of Seattle)

In particular, see “Landscape Materials” and “Hiring a Pro.” www.seattle.gov/dpd/GreenBuilding/SingleFamilyResidential/Resources/RemodelingGuides/default.asp

The Water’s Edge: Helping fish and wildlife on your waterfront property (Wisconsin Department of Natural Resources)

www.dnr.wi.gov/fish/pubs/thewatersedge.pdf

Governor’s Office of Regulatory Assistance,

including documents such as a Aquatic Permitting Fact Sheet, a Permit Handbook, permit schematics, and an on-line permit questionnaire, www.ora.wa.gov

Army Corps of Engineers permit process overview

www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=mainpage_Permit_Applicant_Info

Contacts

United States Army Corps of Engineers, Seattle District Office

Mailing Address:
P.O. Box 3755
Seattle, WA 98124

Street Address:
4735 E. Marginal Way South
Seattle, WA 98134
(206) 764-3742
www.nws.usace.army.mil

Washington Department of Fish and Wildlife, Region 4

1775 12th Ave NW
Issaquah, WA 98027
(425) 313-5660
www.wdfw.wa.gov/reg/region4.htm

Department of Ecology, Northwest Regional Office

3190 160th Ave SE
Bellevue, WA 98008
(425) 649-7000
www.ecy.wa.gov

Governor’s Office of Regulatory Assistance

1-800-917-0043
www.ora.wa.gov

City of Seattle, Department of Planning and Development

700 5th Ave., Suite 2000
Seattle, WA 98124
(206) 684-8600
www.seattle.gov/dpd/Permits/default.asp

City of Mercer Island, Development Services

9611 SE 36th St.
Mercer Island, WA 98040
(206) 275-7605
www.ci.mercer-island.wa.us/SectionIndex.asp?SectionID=43

City of Bellevue, Development Services

450 110th Ave. NE
P.O. Box 90012
Bellevue, WA 98009
(425) 452-6800
www.ci.bellevue.wa.us/development_services_center_intro.htm

City of Renton, Development Services

Renton City Hall
1055 S. Grady Way
Renton, WA 98057
(425) 430-7200
www.rentonwa.gov/government/default.aspx?id=1112

City of Kirkland, Planning Department

123 5th Ave
Kirkland, WA 98033
(425) 587-2225
www.ci.kirkland.wa.us/depart/Planning.htm

City of Redmond, Department of Planning and Community Development

PO Box 97010
Redmond, WA 98073
(425) 556-2473
www.ci.redmond.wa.us/insidecityhall/planning/planning.asp

City of Sammamish, Community Development Department

801 228th Ave SE
Sammamish, WA 98075
(425) 295-0500
www.ci.sammamish.wa.us/CommunityDevelopment.aspx

City of Lake Forest Park, Planning and Building Department

17425 Ballinger Way NE
Lake Forest Park, WA 98155
(206) 368-5440
<http://www.cityoflfp.com/city/planning.html>

City of Kenmore, Community Development

6700 NE 181st Street
P.O. Box 82607
Kenmore, WA 98028
(425) 398-8900
<http://www.cityofkenmore.com/dept/cd/cdindex.html>

King County, Department of Development and Environmental Services

Black River Corporate Park
900 Oakesdale Avenue SW
Renton, WA 98057
(206) 296-6600
www.kingcounty.gov/permits

Glossary

Armoring: Any hard engineering approach to shoreline protection. This includes structures made of concrete, riprap, and sheetpile. While needed on some properties, armoring is often unnecessary, and causes negative impacts on fish habitat, water quality, and access to the water.

Beach nourishment: Adding appropriate gravel to the shoreline in order to offset gradual erosion. Typically needed every five to ten years for beaches on Lake Washington.

Emergent plants: Plants that thrive while partially submerged. In addition to having striking visual qualities, emergent plantings are an effective way to enhance near-shore habitat and provide reinforcement against erosion. Often difficult to establish in Lake Washington, given the lake's unusual hydrology (see "Plant List").

JARPA: Joint Aquatic Resources Permit Application, a form developed by multiple regulatory agencies to streamline the environmental permitting process (see "Getting Permits").

Nearshore habitat: Shallow areas waterward of the shoreline, which make up the most biologically active part of the lake. Aquatic plants, juvenile salmon, shore birds, and numerous other organisms depend on this habitat. Nearshore slope can be a key factor in determining which kinds of restoration work on a given site (see "Selecting the Right Approach").

Ordinary high water line: The elevation where high water meets the shore. Water level in Lake Washington, which peaks in the summer at 21.85 feet above sea level, is regulated at the Ballard Locks. In most cases, local, state, and federal permitting processes are triggered when development occurs at or below the ordinary high water line.

Riprap: Stone commonly used for bulkheads or other bank stabilization efforts; ranging from about 4" to 2' in diameter. Also known as rip-rap, rubble, revetment, or rock armoring.

SEPA: State Environmental Policy Act, a state process that requires state and local agencies to consider the environmental consequences of a proposal before approving or denying the proposal.

Sheetpile: A type of wall used as a bulkhead on sites with shallow setbacks. Typically made of steel, vinyl, fiberglass, or treated wood, sheetpile walls have all the negative effects of concrete and typically cost more.

Shoreline exemption: A determination that a proposed project does not require a shoreline substantial development permit. Shoreline substantial development permits are required by state law for many development activities in shoreline areas, but most single-family residential projects are exempt (see "Getting Permits").

Acknowledgements

City of Seattle Project Management Team:

Dave LaClergue
Margaret Glowacki
Miles Mayhew
Holly McCracken

Funding:

This publication was funded by a grant from the King Conservation District. It was developed by the Seattle Department of Planning and Development, in collaboration with Seattle Public Utilities, the City of Seattle's Restore Our Waters program, and the Lake Washington/Cedar/Sammamish Watershed Salmon Recovery Council (WRIA 8), with contributions from the following agency personnel and researchers:

Partners:

Jean White – WRIA 8
Jim Muck, Tom Sibley, Kitty Nelson, Polly Hicks – NOAA
Joe Burcar – Washington State Department of Ecology
John Skelton – Seattle Department of Planning and Development
Karen Walter, Glen St. Amant – Muckleshoot Tribe
Kathy Curry, Maren Van Nostrand – City of Sammamish
Lucia Athens, Lynne Barker – Seattle City Green Building
Marcy Reed – Army Corps of Engineers
Roger Tabor – United States Fish and Wildlife Service
Sarah McKernan – Seattle Public Utilities
Sally Abella – King County
Seth Ballhorn, Lindsay Chang, Kelly Stumbaugh, Martin Valeri – University of Washington
Stacy Clauson – City of Kirkland
Stewart Reinbold – Washington Department of Fish and Wildlife
Zelma Zieman – Office of Regulatory Assistance

Numerous designers, engineers, and contractors generously provided advice, photos, and technical review:

Becky Henderson – Marine Restoration
Bill Rissel – Stillwater Marine, Inc.
Dan Nickel – The Watershed Company
Dave Douglas – Waterfront Construction
Dave Wells – Lakeshore Marine Construction
Debbie Natelson – Hendrikus Group
Evan Wehr, Troy Hussing – Ecco Design
Gregory W. Ashley – Ashley Shoreline Design
Jeff Layton – Layton and Sell, Inc.
Jeff Sidebotham, Ted Burns – Seaborn Piledriving
Jim Brennan – J.A. Brennan Associates
John Lally – Lally Consulting
José Carrasquero-Verde – Herrera Environmental Consultants
Peter Hummel, John Small, Tom Schadt – Anchor Environmental
Vladimir Shepsis – Coast & Harbor Engineering

Site photography:

Ben VanHouten

Thank you to the homeowners who invited us to visit their restored shorelines and encouraged us to share pictures.

Editing:

Susie Gallin LaClergue

Graphic design:

Design Hovie Studios



PugetSoundPartnership
our sound, our community, our chance

City of Seattle

Mayor Greg Nickels

Department of Planning and Development

Diane Sugimura, Director

www.seattle.gov/dpd/greenshorelines

in partnership with



LIVING SHORELINES:

A NATURAL APPROACH TO EROSION CONTROL



Introduction, Guidance, and Case Studies



The Galveston Bay Foundation (GBF) is a 501(c)(3) non-profit organization established in 1987 under the laws of the State of Texas. The Foundation's strength is that it involves a true cross-section of Bay interests to address issues and concerns related to Galveston Bay. It is managed by a strong Board of Trustees whose members represent sport and commercial fishing groups, government agencies, recreational users, environmental groups, shipping, development, and business interests. The mission of the Foundation is to preserve, protect, and enhance the natural resources of the Galveston Bay estuarine system and its tributaries for present users and for posterity. Its programs in advocacy, conservation, education, and research strive to ensure that Galveston Bay remains a beautiful and productive place for generations to come.

Galveston Bay Foundation
17330 Highway 3
Webster, TX 77598
Phone: 281-332-3381
Fax: 281-332-3153
www.galvbay.org

OUR SPONSORS

The Galveston Bay Foundation would like to thank the following sponsors for making this Living Shorelines document possible:



Table of Contents

<i>OUR SPONSORS</i>	1
<i>LIVING SHORELINES: A NATURAL APPROACH TO EROSION CONTROL AND PREVENTION</i>	4
Introduction	4
What are Living Shorelines?	5
<i>LIVING SHORELINES DESIGN GUIDELINES</i>	6
Site Assessment	6
Project Design	7
Plant Selection	7
Timing	9
Permitting	10
Costs	12
<i>Example Methods and Case Studies</i>	14
Permanent Installations	14
A. Offshore Rock or Concrete	14
B. Reef Domes	20
C. Vinyl Sheetpile	21
D. Shoreline Grading	23
Temporary Wave breaks	25
A. Erosion Control Fencing	25
B. Coir Logs.....	27
<i>Conclusion</i>	28
<i>STATE AND FEDERAL AGENCIES</i>	29
<i>NOTES AND CALCULATIONS</i>	31

Tables and Figures

Figure 1. Planting diagram showing ideal plant spacing behind a wave break	8
Figure 2. Living Shoreline, Galveston Island	9
Figure 3. Permit Service Center flow chart, Amy Gohres, Weeks Bay Foundation.....	11
Figure 4. Living Shoreline, Galveston Island	13
Figure 5. BEFORE: Heavily eroded bluff shoreline suitable for construction of an offshore wave break.....	14
Figure 6. Pyramid vs. single stacking of sacrete in reference to mean high and mean low tide	15
Figure 7. Gaps in the breakwater allow for flow of nutrients and organics	15
Figure 8. Standard drawing showing a 10:1 slope	16
Figure 9. Dimensions of example 300' breakwater	17
Figure 10. Dimensions of fill material behind example breakwater.....	17
Figure 11. DURING: Planting in constructed fill area behind rock breakwater at Asher site.....	18
Figure 12. AFTER: Asher shoreline six months after planting behind rock breakwater	19
Figure 13. Reef domes installed at Sweetwater (left), encrusted with oysters (right)	20
Figure 14. DURING: Vinyl sheetpile installation	21
Figure 15. AFTER: Canal planting.....	22
Figure 16. BEFORE: Scarborough shoreline before grading and planting	23
Figure 17. AFTER: Scarborough shoreline six months after planting	24
Figure 18. Double-row erosion control fencing	25
Figure 19. Planting behind erosion control fence	26
Figure 20. Staked coir logs.....	27
Figure 21. Sunset on a Living Shoreline property	28
Table 1. Some common beneficial plants for low salinity environments	8
Table 2. Pricing guidelines: Shoreline armoring	12
Table 3. Pricing guidelines: Offshore/nearshore breakwater materials	12
Table 4. Pricing guidelines: Plants	13
Table 5. Estimated material needs for constructing an example breakwater	17
Table 6. Estimated material needs for fill behind example breakwater	17

LIVING SHORELINES: A NATURAL APPROACH TO EROSION CONTROL AND PREVENTION

Introduction

A common concern of many landowners with shoreline property is erosion. A common response to erosion is “armoring”: the installation of bulkheads, rip-rap, or other hard structures directly onshore to stop erosion and protect property. These shoreline protection methods, particularly bulkheads, can actually increase erosion on adjacent properties and in front of the structure itself. Wave energy from wind, boat wakes, and storm events is reflected back from the armored shoreline causing scouring in front of, and increased erosion on each side of, the bulkhead or armored area. Bulkheads are prone to undercutting and structural failure requiring costly periodic maintenance and eventual replacement. Additionally, bulkheads and other hard structures placed directly onshore often eliminate or reduce access to valuable shoreline marsh and other riparian habitats. Shoreline hardening separates uplands from lowlands and causes the loss of important vegetated shallows as the area in front of the armoring is typically converted to open water. These intertidal marshes are important habitat for many wildlife species including birds and economically valuable fisheries species.

Since the 1950s, Texas estuarine (saltwater) wetlands have decreased approximately 9.5 percent, or roughly 59,600 acres. This is an average net loss of 1,600 acres per year.¹ The Galveston Bay system has lost over 20 percent of its tidal marshes since the 1940s.² Some areas, such as the bay side of Galveston Island, have been hit even harder with marsh losses upwards of 80 percent.³ In part, these losses can be attributed to subsidence which drowns the marshes as the water levels become too deep too rapidly for the marsh grasses to survive. The loss of soil-stabilizing vegetation makes the shoreline more vulnerable to erosion. The loss of vegetation exacerbates the negative effects of wind driven waves and boat wakes. In this way, marsh and shoreline are rapidly converted to open water. For these and other reasons, landowners face a constant battle to protect their property from loss due to erosion.

¹ Moulton, D.W. et al, “Texas Coastal Wetlands: Status and Trends, Mid-1950s to Early 1990s” 1997, USFWS, 17 October 2000 < <http://library.fws.gov/Wetlands/TexasWetlands.pdf>>

² The State of the Bay- A Characterization of the Galveston Bay Ecosystem, 2nd Ed. Galveston Bay Estuary Program Publication GBEP T-7. Lester and Gonzalez, Eds., 2002, 162 pages.

³ Galveston Bay Estuary Program Publication GBNEP-49, The Galveston Bay Plan: The Comprehensive Conservation and Management Plan for the Galveston Bay System, 1994, 457 pages

What are Living Shorelines?

Innovative shoreline protection methods have been implemented within the Galveston Bay estuary system in an attempt to deal with shoreline erosion by mimicking natural coastal processes through the strategic placement of plants, stone, fill, and other structural and organic materials. Restoration specialists at some public lands, such as those near Anahuac and Brazoria National Wildlife Refuges, have built wave break structures from shell and/or rip-rap just offshore rather than directly onshore. Not only do these structures act as wave breaks, robbing the waves of their energy, they cause sediment-laden waves to deposit materials landward of the wave break. This process can build up sediment raising the elevation behind the wave break sufficiently to support marsh grasses without the need for extra fill-dirt. Many times, the wave break itself becomes encrusted with oysters and other crustaceans creating an artificial reef.

Local private landowners have incorporated smaller versions of the above projects and other techniques to stabilize their shorelines. Landowners are even creating projects incorporating these principles and techniques along canals or in front of existing armoring. This allows them to design a shoreline that incorporates environmental benefits, prolongs the life of their bulkhead, reduces long term maintenance and replacement costs, and protects their property from erosion. In addition to these important features, the end result is a shoreline that is functional as well as aesthetically appealing, often creating a lush green band of vegetation or a winding reef that follows the shoreline. Birds and fish are attracted to the restored areas, providing recreational opportunities and enjoyment for the landowner.

Living Shorelines are shoreline management options that provide erosion control while working with nature to restore, create or protect valuable habitat. As opposed to bulkheads or armoring, **Living Shorelines** are designed to allow natural coastal processes to take place by allowing the movement of organics in and out of the marsh; absorbing wave energy from wind, boats, and storm events; and filtering pollutants from runoff. In addition, they create and/or maintain vital habitat for economically and ecologically important fish and shellfish, and they provide nesting and foraging areas for resident and migratory birds. They can be built in front of bulkheads or armoring providing additional protection to existing structures while restoring shoreline habitat. **Living Shorelines** help protect landowner investments while enhancing the ecological value of the property. They are often less expensive than traditional shoreline armoring methods, and in some instances, grant funding is available to offset costs to landowners who are willing to protect and create habitat.

This document is intended to provide the reader with general guidelines for starting a **Living Shoreline** project through technical guidance and real examples. At the end of the document is a list of resources and agencies that are available to answer questions and help design a shoreline that meets landowner needs and plays an active role in protecting and restoring bay systems.

LIVING SHORELINES DESIGN GUIDELINES

When considering a **Living Shoreline** project the first question one must ask is, “Do I have an erosion problem?” If there is measurable land loss due to currents or waves and action is needed to stop or slow the loss of property, a **Living Shoreline** might be an option. If the shoreline is stable and stocked with quality, native high and low marsh plants – **STOP!** The first, and best, option in this situation is to do nothing. Local experts can help determine whether the shoreline is experiencing erosion and/or if it is already supporting beneficial plants that could be incorporated into the project design. (Agencies that can provide assistance are listed at the end of this document). If there is property loss or it is felt that action must be taken to prevent future loss, the following steps may be helpful. Depending on the reader’s background or level of knowledge, this document may be all that is needed to get started. However, it is more likely to be a starting place to provide information and to raise questions that will need to be asked when contacting the agencies for assistance.

Site Assessment

In order to determine what sort of shoreline enhancement is right for a property, one must first answer some questions about the particular shoreline and what factors are occurring:

- **Rate of erosion:** Can property loss be measured in inches or feet per year, or is the erosion noticeable over a span of many years? Rapid erosion might indicate the need for a more permanent solution such as a rock or concrete breakwater, whereas a temporary breakwater and dense planting might be enough to protect where erosion is minimal.
- **Type of shoreline:** Is the shoreline severely cut like a bluff? How high is the bluff? Is the bluff undercut? Alternatively, is the shoreline sloped but not supporting plants? The severity of the erosion can help one choose the right protective measures.
- **Erosional forces:** Is the property routinely subjected to waves generated by passing boats and/or jet-skis? If so, how often? Is the property subject to a prevailing wind that keeps relatively strong waves hitting the shore much of the time? Is the property in a protected area that gets occasional boat traffic or storm generated waves? Understanding the factors contributing to the erosion at the property will help determine how strong and/or permanent a wave break will be needed. Additionally, if the property is in an area frequently used by commercial or recreational boat traffic, navigational hazards and signage must be considered.
- **Water depth:** How deep is the water just offshore? Will the area behind the breakwater require filling to raise the elevation to support plants? How quickly does the depth increase? Does the bottom drop off steeply or slope gently

getting gradually deeper? These questions can help determine what steps will be necessary to achieve satisfactory plant growth.

- **Substrate:** Is the bottom offshore from the property sand, silt, clay, or shell? Is it hard or soft? Understanding the substrate can help determine what methods will or won't work in an area and how much settling of materials might occur after installation.
- **Salinity:** Is the water body fresh or salty? Salinity will determine what plants are chosen for a **Living Shoreline** installation.

Project Design

Once the questions above have been answered, a project plan can begin to take shape. By looking at the methods available, a landowner can begin to determine what is right for the property. In some instances, a landowner in a high wave energy environment with an eroded, steep, bluff shoreline may have to install a substantial offshore rock or concrete breakwater to trip the waves and calm the waters so that plants can establish and grow in a permanently protected area. In lower energy conditions, shoreline grading and planting might be all that is needed.

This document presents case studies from actual projects and is intended to be a guide to help landowners decide what options are best for their unique situations. The examples presented here are not exhaustive, and there are many combinations of methods that may be implemented to address erosion and habitat loss. The most important thing to remember is that **ONE SIZE DOES NOT FIT ALL.**

Plant Selection

In most areas around Galveston Bay, smooth cordgrass (*Spartina alterniflora*) is an appropriate choice for establishing vegetation along the shoreline. This aquatic plant's elaborate root structure helps hold the substrate intact to reduce erosion and provide habitat for marine organisms. *Spartina alterniflora* is a perennial grass that grows from extensive rhizomes. The plant grows in intermediate to saline marshes, often forming dense stands over broad areas. It is a major contributor of organic material to aquatic food chains. This plant is native to the Gulf coast.

In areas farther up rivers or bayous, lower salinity levels dictate that different plants be selected. There are many species of plants suited to this type of environment that can be selected based on habitat value, aesthetic appeal and availability.

Examples of some of these plants include but are not limited to the plants listed in the table below.

Table 1. Some common beneficial plants for low salinity environments

Common name	Scientific name
Swamp lily	<i>Crinum americanum</i>
Black needle rush	<i>Juncus roemerianus</i>
Palmetto	<i>Sabal minor</i>
Spider lily	<i>Hymenocallis liriosme</i>
Iris	<i>Iris virginica</i>
Cutgrass	<i>Zizaniopsis miliacea</i>
Bulltongue	<i>Sagittaria lancifolia</i>

When planting in intertidal zones subject to changing water levels, sprigs (individual stems) are typically planted approximately three feet apart. To increase the chance of survival, the sprigs should be planted deeply enough that the roots are covered. Also, the stem must be secured by compacting the soil around the base of the stem to prevent the plant from washing out. In higher energy environments, it may be necessary to plant sprigs more densely, perhaps one or two feet apart. When planting behind a wave break, plants can be spaced three feet apart closer to shore decreasing to one foot apart directly behind the wave break. If plants are available and the budget allows, additional plants will increase vegetative cover and will help stabilize the shoreline more quickly.

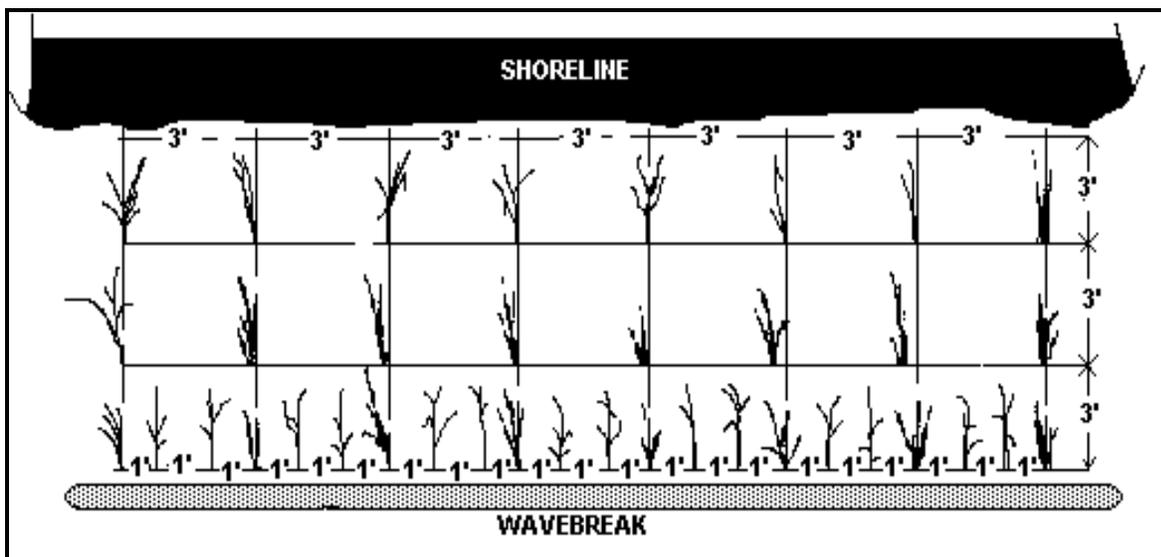


Figure 1. Planting diagram showing ideal plant spacing behind a wave break

Timing

If possible, it is best to begin construction on **Living Shoreline** projects during the winter months -- ideally November through January. Winter usually provides the lowest tides, making offshore construction easier. Also, beginning the project during the winter allows adequate time for any fill materials to settle before planting begins. The ideal months to begin planting are February through May. Planting during these months provides the plants a chance to become established during the growing season and allows the vegetation several months of growth before the following winter arrives. Obtaining the required construction and transplanting permits can take several months, so the application process should ideally be started in early summer; however, this is a guideline and not a rule.



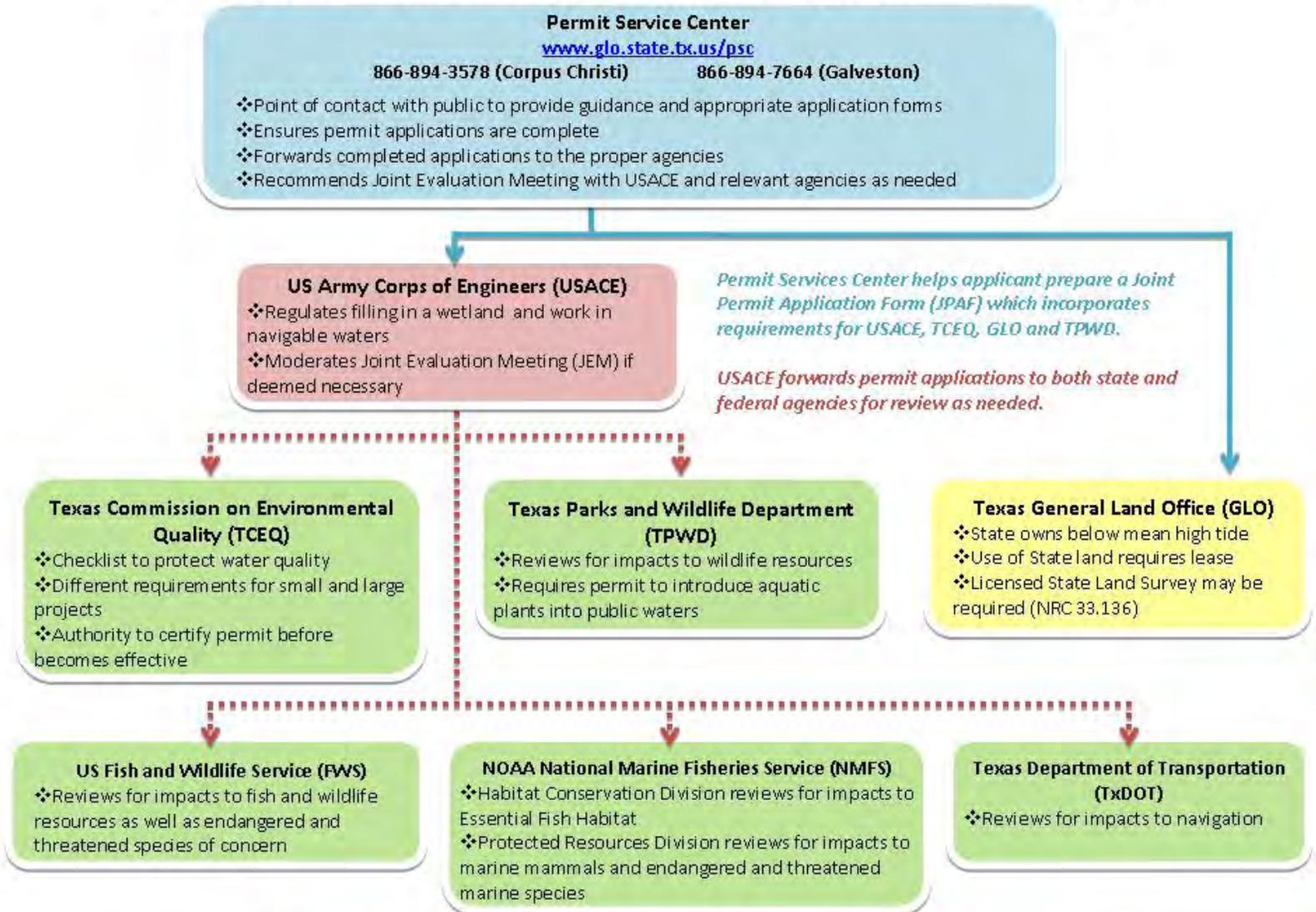
Figure 2. Living Shoreline, Galveston Island

Permitting

Typically, when attempting shoreline work, there are four agencies that are part of the permitting process. These agencies must grant approval before work can commence. The U.S. Army Corps of Engineers (USACE) will determine whether the water body on which you are working is under their jurisdiction. If so, the landowner may be required to apply to the USACE for a permit under provisions of the Clean Water Act and/or the Rivers and Harbors Act. Certification from the Texas Commission on Environmental Quality (TCEQ) may also be required. During processing of the USACE permit application, the TCEQ will review the application to determine if the work will comply with state water quality standards. Since most submerged lands are considered “waters of the state” (i.e. they are the property of the State of Texas), a landowner may also have to apply for a state lease through the Texas General Land Office. An application must also be filed with the Texas Parks and Wildlife Department to gain approval to transplant vegetation into state waters. Finally, other agencies, including the National Ocean and Atmospheric Administration, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service, will also review any proposed USACE applications to ensure environmental safeguards are taken into account during the permit review process.

While this may sound daunting at first, the agencies have worked together to simplify the process for landowners by forming the Permit Service Center (PSC). Established in 1999, the Permit Service Center is available to the public to assist with permitting on the Texas coast by acting as a clearinghouse for all permitting activities and offering information, guidance, and forms to those seeking to get their projects permitted. By consolidating forms and directing the forms to the responsible agencies, the PSC can be of great assistance in the permitting process. Landowners can also ask questions and seek guidance from state and federal agency experts through regular monthly pre-application meeting forums scheduled through the USACE. These meetings provide an informal setting through which applicants can obtain valuable advice prior to or during the formal permit application process.

Homeowner's Guide to Permitting Living Shorelines in Texas



**Additional agencies and the general public may also be notified if deemed necessary by USACE.*

Figure 3. Permit Service Center flow chart, Amy Gohres, Weeks Bay Foundation

Costs

The current estimated pricing given in the tables below has been gathered from a variety of vendors and is presented for use as a comparison tool only. Pricing for individual projects will vary based on location, size, scope, materials and plants selected, and availability of materials.

Table 2. Pricing guidelines: Shoreline armoring

Type	Unit	Installed Cost - \$/Unit (Labor and materials included)
Vinyl bulkhead*	Linear Foot	\$125.00 - \$200.00
Vinyl bulkhead* w/ toe protection	Linear Foot	\$210.00 - \$285.00
Wooden bulkhead	Linear Foot	\$115.00 - \$180.00
Wooden bulkhead w/ toe protection	Linear Foot	\$200.00 - \$265.00
Concrete bulkhead	Linear Foot	\$100.00 - \$200.00
Revetment	Cubic yard (yd ³)	\$25.00 - \$45.00 base cost \$120.00 - \$180.00 installed

*(based on 4-8' height)

Miscellaneous Costs: Possible need for earthwork or backfill

Maintenance: Additional fill and vegetation over time, structural repair due to scour or storm damage

Table 3. Pricing guidelines: Offshore/nearshore breakwater materials

Material	Unit	Base Cost \$/Unit	Installed Cost \$/Unit
Oyster shell	Yd ³ (loose shell)	\$50.00 - \$60.00/yd ³	Varies
	Bag	\$5.00 without spat \$30.00 with spat	
Concrete bags	Bag	\$4.00 - \$6.00/bag	\$12.00 - \$16.00/LF
Limestone rock	Linear Foot	Varies	~\$125.00 - \$200.00
Reef domes	Linear foot	--	\$44.00 (incl. delivery)*
Erosion control ("snow") fence	100 feet	\$45.00	Varies
Coir logs	10' lengths	\$57.25 (incl. delivery)	Varies

*Delivery charges can be impacted by number of domes ordered, distance driven, fuel prices and other factors and can vary greatly.

Maintenance: Possible need for additional shell or rock over time, possible repair after storms, removal of fencing

Table 4. Pricing guidelines: Plants

Plant	Unit	Base Cost \$/Unit	Installed Cost \$/Unit
Smooth cordgrass <i>(Spartina alterniflora)</i>	Plug	\$1.25	\$2.00 - \$3.00
Marshhay cordgrass <i>(Spartina patens)</i>	Plug	\$1.25	\$2.00 - \$3.00
Mangrove	Gallon pot	\$5.00	\$10.00
Salt grass <i>(Distichlis spicata)</i>	2" Plug 4" Plug	\$0.60 \$1.00	\$2.00 \$3.00
Bitter Panicum <i>(Panicum vaginatum)</i>	Node	\$1.00	\$2.00 - \$3.00
Freshwater species	Gallon pot	\$5.00 - \$6.00	Varies

Maintenance: Cost of additional plants/labor to replant any areas that don't take in the first planting



Figure 4. Living Shoreline, Galveston Island

EXAMPLE METHODS AND CASE STUDIES

The Galveston Bay Foundation and its agency partners have implemented various shoreline protection methods around the bay. These methods are chosen for and tailored to the specific needs of each individual site. Things to consider include but are not limited to: exposure to wave action caused by wind, boat wakes or other factors; water depth; existing shoreline conditions; and salinity. It is important to note that every site is unique and **one size does not fit all**.

Below are some of the methods that have worked at various locations around the Galveston Bay watershed, with example projects given as case studies to illustrate implementation. These methods can be expanded to work on any part of the Texas coast as long as local hydrological processes and native plant selections are taken into consideration.

Permanent Installations

A. Offshore Rock or Concrete

In higher wave energy areas, hard materials such as rock, rip-rap or bags of concrete (sacrete) can be used just offshore to create a wave break in front of an eroded shoreline.



Figure 5. **BEFORE:** Heavily eroded bluff shoreline suitable for construction of an offshore wave break

This method works equally well in front of existing shoreline armoring (e.g. an existing bulkhead) where habitat creation and additional protection are the goals. By installing a wave break and planting behind it, one can provide valuable cover and food for small fish, shrimp, and crabs as well as habitat for birds that are attracted to the food and shelter behind the wave break. The area behind the wave break may fill naturally or may be filled with materials to achieve elevations suitable for planting. In order to create conditions that will encourage natural filling and mimic natural marsh conditions, the breakwater height should fall between mean high and mean low tide. At high tide, waves should wash over the breakwater bringing in fresh nutrients and organics and dropping sediments. At low tide, water should be allowed to run out of the marsh to allow for flushing of the area. Additionally, the breakwater should be planned with gaps (a one foot break for every 50 feet of wave break is typical) to allow ingress and egress of marine resources. The gaps may be staggered or overlapping to slow the flow of water which may carry sediments out of the project area. Maintaining sediment behind the breakwater is key to project success.

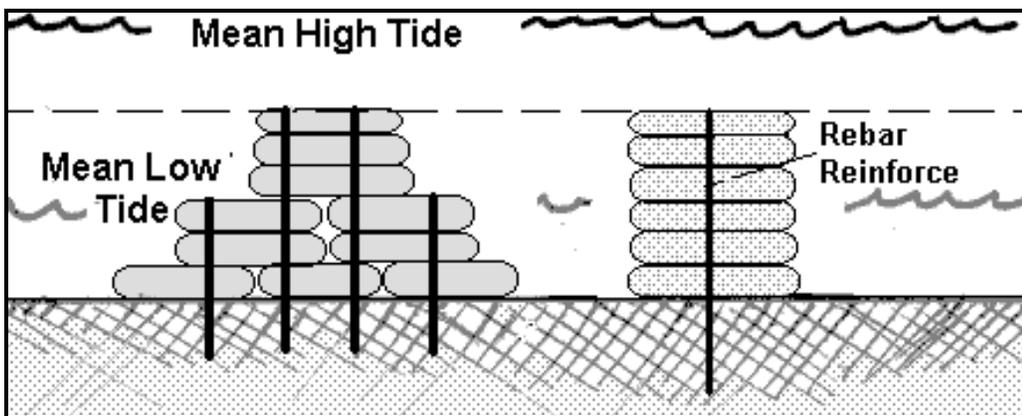


Figure 6. Pyramid vs. single stacking of sacrete in reference to mean high and mean low tide

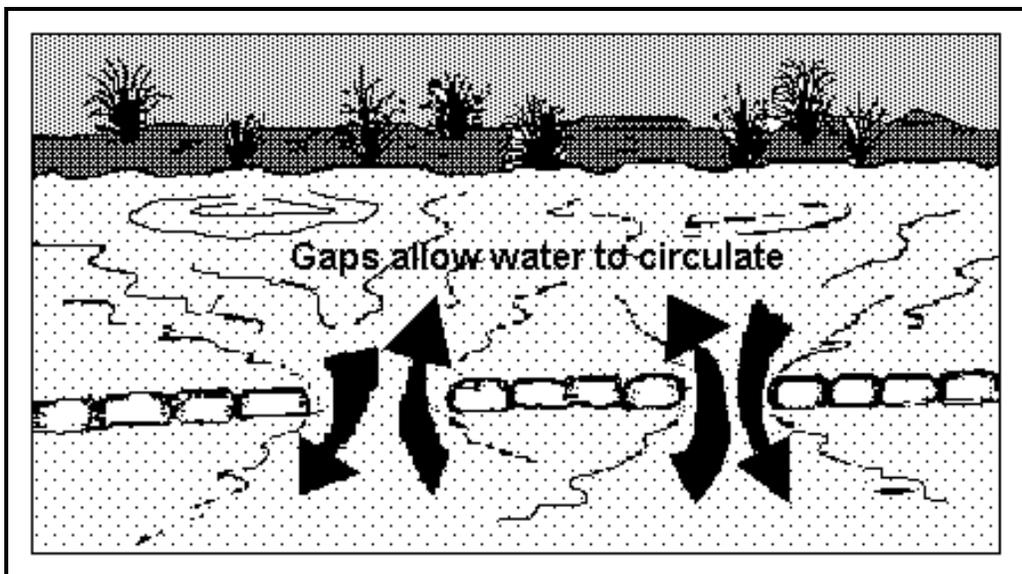


Figure 7. Gaps in the breakwater allow for flow of nutrients and organics

If rip-rap (broken concrete blocks) already exists along the present shoreline, all or part of it can be used to construct the wave break by moving and stacking it a short distance from and parallel to the existing shoreline. If rip-rap is not available, sacrete can be used. Sacrete can be purchased under the brand names QUIKRETE® or Sakrete®. The material is packaged in biodegradable 80-pound paper bags so it can be stacked offshore where it is needed. Salinity can impact the ability of the concrete to set, so one should check with the vendor to determine which product is right for each project. The bags must be abutted against each other to ensure that the fill materials placed behind the wave break do not wash out. The bags may also be stacked in staggered rows to prevent wash-out and further stabilize the wave break. Also, shell hash or oysters placed behind the breakwater can minimize sediment loss.

Three 80-pound sacrete bags stacked vertically provide approximately one foot of elevation, and seven bags laid end-to-end provide about five feet of length. If the height of the wave break is more than a foot or so, stacking the sacrete in a pyramid shape is suggested to ensure that the structure does not fall over. Also, consider stacking the materials with the pyramid method if wave energy is high. Sacrete breakwaters can be reinforced by driving rebar through the bags and into the substrate, strengthening the structure.

Once a breakwater is complete, the elevation of the area behind the breakwater must be raised to a sufficient level to support marsh plants. The filled area should slope from the mean high water mark to the breakwater. A 10:1 slope is generally acceptable, but this will vary from site to site depending on local conditions, e.g. the distance from the mean high water mark to the breakwater.

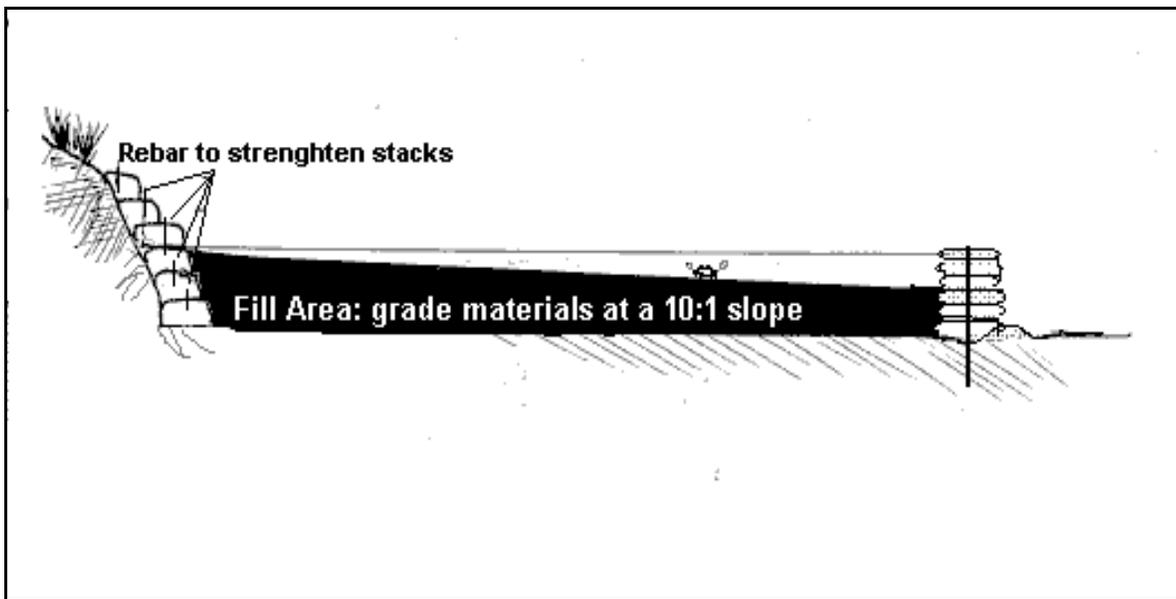


Figure 8. Standard drawing showing a 10:1 slope

Example: Diagrams and calculations for constructing a 300 foot long breakwater, 3 feet wide at the base, 30 feet from shore

Table 5. Estimated material needs for constructing an example breakwater

Calculations for 300' Example Breakwater	
Item	Size
Front Wall	$300' \times 3' = 900$ square feet
Sides	$3' \times 30' = 90$ square feet
Total	990 square feet
Wave break calculations:	
170 bags of material are needed for 100 square feet of barrier	
990 square feet / 100 square feet = 9.9	
9.9×170 bags = $1,683$ bags of material	

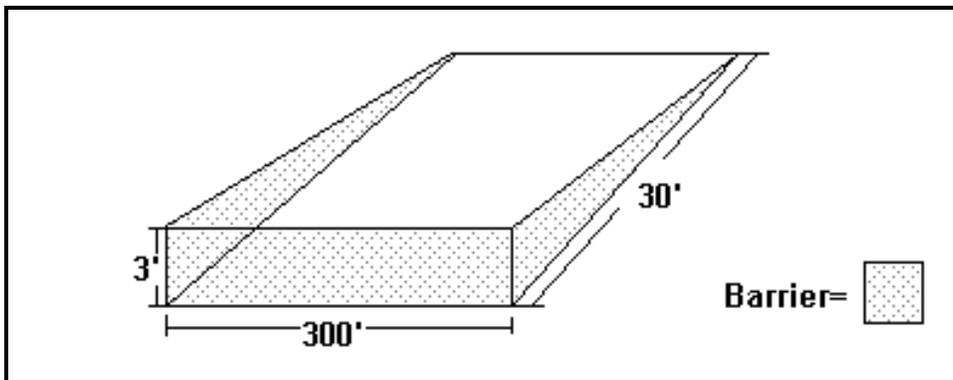


Figure 9. Dimensions of example 300' breakwater

Table 6. Estimated material needs for fill behind example breakwater

Fill Materials for 300' Example Breakwater
Calculations:
$30' \times 2' \times 300' = 18,000$ cubic feet
$18,000$ cubic feet / 2 (half the square) = $9,000$ cubic feet
$9,000$ cubic feet / 27 (convert cubic feet to cubic yards) = 333 cubic yards

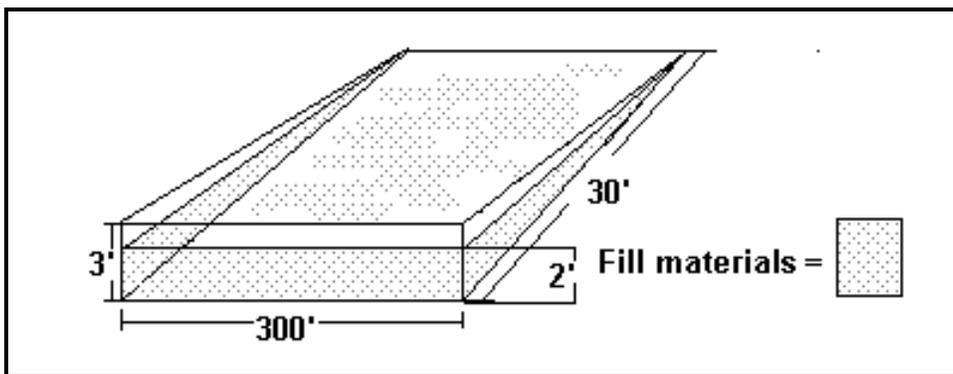


Figure 10. Dimensions of fill material behind example breakwater

Case Study: Asher Project

One of the Galveston Bay Foundation's early **Living Shoreline** projects involved the creation of a 450-foot rip-rap and sacrete breakwater that was constructed and backfilled to create approximately 4,000 square feet of tidal marsh along Dickinson Bayou in Galveston County, Texas. The bluff shoreline shown in Figure 5 above was graded to allow for more plantable area (Figure 11 below). A breakwater was constructed approximately 8-feet offshore, and the area between the breakwater and newly graded shoreline was filled with clean fill. The filled area was planted with *Spartina alterniflora*.

In addition to creating habitat, the project generated interest in the local community, serving as a prime example of an alternative method of shoreline protection that provides aquatic habitat while being significantly less expensive than traditional armoring.



Figure 11. DURING: Planting in constructed fill area behind rock breakwater at Asher site



Figure 12. AFTER: Asher shoreline six months after planting behind rock breakwater

B. Reef Domes

In some instances, landowners wish to specifically create oyster habitat in combination with their shoreline protection project. To achieve this goal, there are several routes that can be taken. In some instances, landowners can place old oyster shell or crushed concrete on open bottom offshore to provide a place for oyster larvae to attach and grow. Alternatively, reef domes can be used to encourage oyster colonization while also acting as a breakwater. Reef domes are patented hollow concrete dome-like structures used for shoreline protection and habitat creation. Reef domes placed offshore act to trip waves and calm waters near shore to allow for planting and shoreline stabilization. Because reef domes are large and heavy, barges or boats are often needed to move them from an onshore staging area to their offshore resting place. Galveston Bay Foundation or the agency resources listed at the end of this document can assist with determining whether reef domes would be suitable for specific projects. Once reef domes are installed, the area behind the domes can be allowed to fill naturally as waves drop sediment behind them or clean fill can be manually placed behind the domes.

Case Study: Sweetwater Property

Galveston Bay Foundation has placed over 1,000 feet of reef domes along the shore of its Sweetwater Property on Galveston Island. The property has approximately 3,500 feet of shoreline affected by severe erosion from wave energy that has resulted in the loss of fringing salt marsh habitat. At this property, reef domes were deployed both in single and double rows to allow for increased erosion control and sediment accretion.



Figure 13. Reef domes installed at Sweetwater (left), encrusted with oysters (right)

C. Vinyl Sheetpile

In areas where space is a concern, such as on a canal, one does not want to take up valuable planting area with rock or sacrete. In these cases, a plantable shelf can be created by driving vinyl sheetpile vertically into the substrate leaving some sticking up from the bottom to form the edge of the shelf. Just as with a rock or sacrete breakwater, the top of the vinyl sheetpile should fall between the mean high and mean low tide marks so that water will overtop the breakwater at high tide and leave it exposed at low tide.

Case Study: Alonso Project

Vinyl sheetpile has been employed successfully in the Lafitte's Cove canal subdivision on West Galveston Island. The property owners wished to create habitat in front of their existing bulkhead on the canal. Existing high marsh found on the property was incorporated into the final project design. In total, the project created approximately 2700 square feet of inter-tidal marsh along 180 feet of waterfront on a 150 foot wide canal. The amount of marsh created would have been significantly diminished had sacrete or rock been used as a breakwater. In this instance, a barge was used to bring in the sheetpile and the machinery used to install it. Fill material was dredged from the canal itself and deposited behind the sheetpile.



Figure 14. DURING: Vinyl sheetpile installation



Figure 15. AFTER: Canal planting

D. Shoreline Grading

In some instances, placing hard material offshore is not practical perhaps because it presents a hazard to navigation, or because the near shore bottom drops off steeply, or because of space limitations. One method that has been successful in such environments is grading the shoreline back from the waterline to maximize the suitable area for planting. By scraping back and gently sloping the shoreline, a larger area is made plantable.

Case Study: Scarborough Property

Located along a diversionary canal near Hitchcock, Texas, the Scarborough property offered a low wave energy environment on a relatively narrow water body. The near shore bottom dropped steeply leaving only a narrow band of ground suitable for planting between the bluff shoreline and the point where the water became too deep to support plants.



Figure 16. BEFORE: Scarborough shoreline before grading and planting

By grading the shoreline back from the waterline, the bluff was leveled out and the plantable area was widened toward the upland area. Pushing fill into the water was not feasible given the steep drop in the bottom just offshore. Smooth cordgrass was planted densely to increase its ability to take root and establish quickly. Because wave energy from boat wakes or wind driven waves is low in this area, no hard structure or even temporary fencing was deemed necessary.



Figure 17. AFTER: Scarborough shoreline six months after planting
Photo: Tom Scarborough

Temporary Wave breaks

A. Erosion Control Fencing

In many areas around Galveston Bay, subsidence due to the pumping out of groundwater is the main culprit in marsh loss. As the ground has sunk, marsh grasses have died. If other erosional forces are minimal, a temporary wave break such as erosion control fencing may be installed to temporarily cut down on wave action until plants installed behind the fence become established. Once the vegetation has taken hold and developed a strong root system, the fencing can be removed leaving behind a natural wave break of plants that will trap and hold additional sediments and filter impurities out of the water.

Case Study: Sullivan Project

The loss of marsh grass contributed to increased erosion and shoreline loss along this Trinity Bay property. To combat this, the property owner installed 955 linear feet of double row erosion control fencing and planted *Spartina alterniflora* behind it creating approximately 13,000 square feet of marsh. The fencing will be removed once the plants have established and grown dense enough to withstand the wind driven waves along his portion of the shore.



Figure 18. Double-row erosion control fencing



Figure 19. Planting behind erosion control fence

B. Coir Logs

Coir logs are constructed of interwoven coconut fibers that are bound together with biodegradable netting. Commercially produced coir logs come in various lengths and diameters. Coir logs are best used in low energy environments, as they are intended to biodegrade over time after plants have had a chance to become established. While the plants are growing and getting established, the coir logs provide a wave break to still the waters behind them. Plants can be planted into the coir logs themselves as well as behind them.

Coir logs will need to be secured to ensure that they are not dislodged by moving water.



Stakes can be driven through the coir log netting and then into the substrate to anchor them. The higher the wave energy, the more stakes are required to hold the coir logs in place. Coir logs should not be used in areas where wave energy is significant. Logs should not be secured in areas where they are submerged most of the time. Excessive wave energy can cause the material to fall and the log to fail. Coir logs are an inexpensive alternative that can easily be deployed by a landowner or small work group. Placing the logs parallel to the shoreline has shown success. However, when wave energy is more significant, it may work better to place the logs perpendicular to the shoreline. This technique has shown success and works similar to a mini-jetty. The logs are biodegradable, and it is anticipated that the vegetation will establish before the logs fail.

Figure 20. Staked coir logs

CONCLUSION

Whatever methods are chosen, a **Living Shoreline** can provide erosion control with the added benefits of water quality improvement, habitat creation or restoration, and increased aesthetic value, often for less than the cost of traditional shoreline armoring. By installing a **Living Shoreline**, property owners are adding to cumulative habitat benefits within a water body. Small incremental landowner projects, when added together and taken into account with larger scale restoration and protection projects in a geographic area, can add up to big watershed level changes. **Living Shorelines** are a viable, beneficial method for controlling shoreline erosion that allows coastal residents to play an important part in saving habitat in their own backyard for the benefit of future generations.

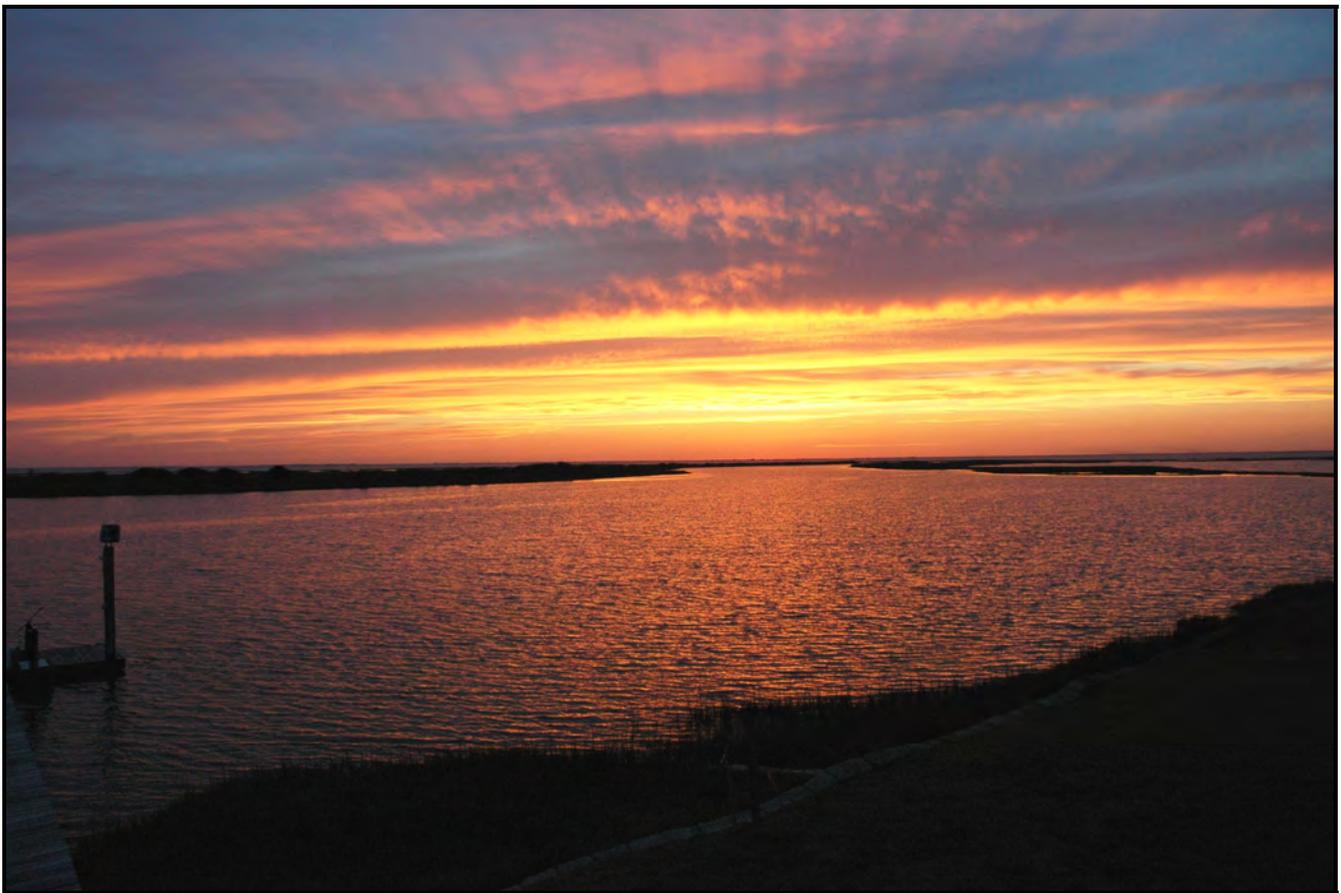


Figure 21. Sunset on a Living Shoreline property
Photo: Bob Moore

STATE AND FEDERAL AGENCIES

U.S. Army Corps of Engineers

Regulatory Branch, CESWG-CO-RE
U.S. Army Engineer District, Galveston
CESWG-PE-R
P.O. Box 1220
Galveston, TX 77551
Phone: 409-766-3930
Fax: 409-766-3931
<http://www.swg.usace.army.mil>

Texas General Land Office: Permit Service Centers

PO Box 1675
Galveston, Texas 77553-1675
Phone: 409-741-4057; 1-866-894-7664 (toll free)
Fax: 409-741-4010
<http://www.glo.state.tx.us/psc>

Texas A&M University-Corpus Christi
6300 Ocean Dr., NRC #2800, Unit 5841
Corpus Christi 78412-5841

Texas General Land Office – Field Office

11811 North D. St.
LaPorte, Texas 77571
Phone: 281-470-1191
Fax: 281-470-8071
<http://www.glo.state.tx.us>

Texas Commission on Environmental Quality

Watershed Management Division
P.O. Box 13087
Capitol Station
Austin, Texas 78711
<http://www.tceq.state.tx.us>

NOAA National Marine Fisheries Service

Habitat Conservation Division

4700 Avenue U

Galveston, TX 77551-5997

Phone: 409-766-3699

Fax: 409-766-3575

<http://sero.nmfs.noaa.gov/hcd/hcd.htm>

U.S. Fish and Wildlife Service

Clear Lake ES Field Office

17629 El Camino Real #211

Houston, TX 77058-3051

Phone: 281-286-8282

Natural Resource Conservation Service

7705 W. Bay Rd.

Baytown, Texas 77520

Phone: 281-383-4285

Fax: 281-383-4286

<http://www.nrcs.usda.gov/>

NOTES AND CALCULATIONS



Living Shorelines

FOR THE CHESAPEAKE BAY WATERSHED



CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

Living Shorelines are a creative and proven approach to protecting tidal shorelines from erosion. The technique consists of planting native wetland plants and grasses, shrubs, and trees at various points along the tidal water line. Plantings are often coordinated with carefully placed bioengineering materials, such as man-made coconut-fiber rolls (or biologs) to protect vegetation and soils. Where viable, oysters can be included as well. Projects may include stone elements, as long as they do not cut off access to the shore.

Living shorelines have many benefits and vary with specific site conditions. They:

- improve water quality by settling sediments and filtering pollution;
- provide shoreline access to wildlife, such as nesting turtles, horseshoe crabs, and shorebirds;
- provide shallow water habitat and a diversity of plant species for aquatic and terrestrial animals;



On College Creek, Annapolis, a natural shoreline showcases an extensive buffer of trees and wetland grasses. Ideal shoreline projects replicate these conditions.

DO YOU HAVE A FAILING BULKHEAD OR EROSION BEHIND A ROCK WALL?

Think about a living shoreline before you replace these structures with similar ones.



Substantial erosion is occurring behind a failing wooden bulkhead, and traditional turfgrass lawns do little to hold soil in place.

- provide shade to keep water temperatures cool, helping to increase oxygen levels for fish and other aquatic species;
- look natural rather than man-made and artificial;
- absorb wave energy so that reflected waves do not scour the shallow sub-tidal zone and hamper the growth of underwater grasses; and
- are often less costly than wooden bulkheads and rock walls (also known as “revetments”).

Erosion: A natural process

Shorelines are continually eroded by the movement of water, waves, and wind. Deposition of sediments and sand along shorelines further downstream helps sustain natural habitats. Human activities like high-speed boating and hardened shorelines on adjacent properties can greatly increase the rates of erosion. Installing living shorelines is a way to work with natural processes while still protecting shorelines.



A newly created marsh island protects the sandy shoreline from waves and wind while allowing for the natural movement of sand and water.

In some instances, such as on steep slopes, regrading of the shoreline’s bank may be necessary to provide a stable slope and allow newly-planted vegetation to become established. Fill material can also be extended out from the existing shoreline and then planted with appropriate vegetation to create a tidal wetland marsh. In mid-to-high wave energy areas, an offshore breakwater may be installed to diminish wave energy.



On the right side of the photo is a living shoreline, on the left a bulkheaded shoreline. The steep slopes of the living shoreline were stabilized by planting warm-season grasses, including switchgrass and little bluestem, and native shrubs.

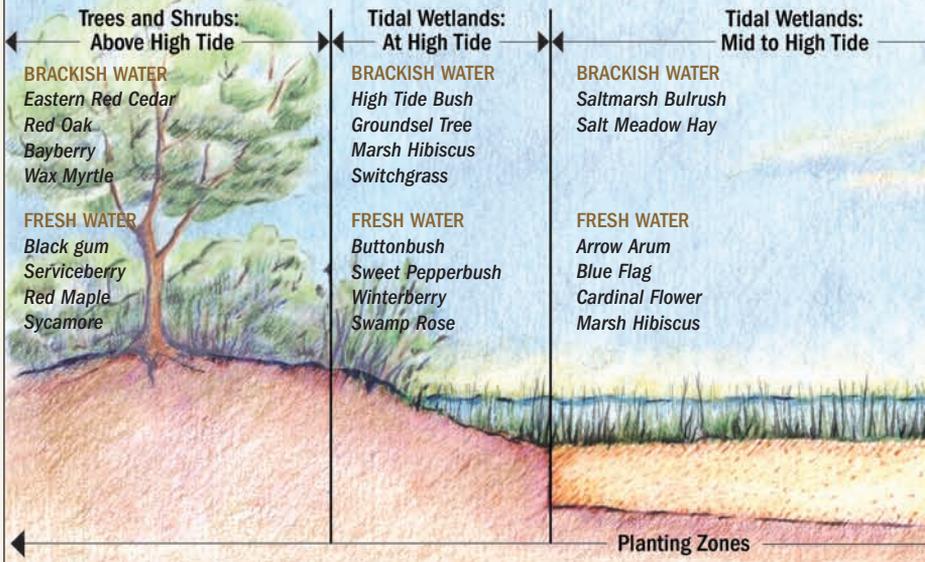
IS “ARMORING” YOUR SHORELINE ALONG TIDAL CREEKS REALLY NECESSARY?

Many waterfront property owners who live on protected creeks and rivers see their neighbors’ wooden bulkheads and rock walls and think that they are the only solution to erosion concerns. However, where there is low-to-moderate wave energy and minimal erosion, it is usually not necessary to install these hard structures. Not only are they more costly, but they can destroy shallow water habitats when wave energy is reflected back.



A contrast in shorelines: The living shoreline on the left provides many water quality and wildlife benefits while blending in with the natural environment. The shoreline on the right is completely covered in stone and has no vegetation behind it to prevent erosion.

THE “IDEAL” LIVING SHORELINE



The “Ideal” Living Shoreline

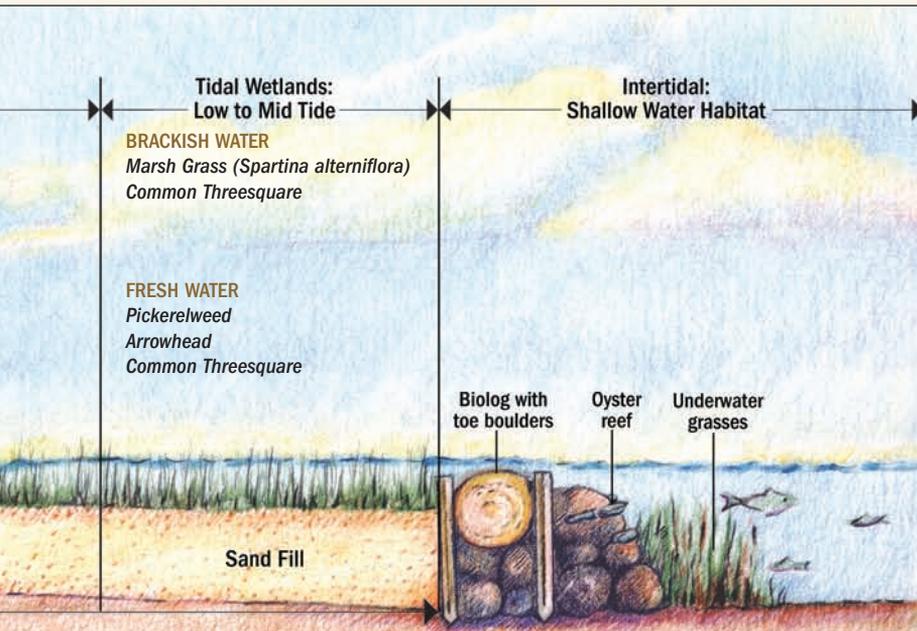
The “ideal” living shoreline in many tidal areas in the Bay watershed contains a succession of natural filters that normally would be found in undisturbed ecosystems. These filters include:

- riparian buffers above the tide line, made up of native trees and shrubs, including a mix of shrubs at high tide elevation;
- tidal wetlands, including grasses, rushes, and sedges at mid-tide elevation, and marsh grasses and common threesquare at low tide;
- oysters and an oyster reef—where appropriate; and
- underwater grasses in shallow water.

Selecting Native Plants

Native trees, shrubs, and grasses have expansive roots that hold soil in place and slow erosion from water and overland runoff. They add critical wildlife habitat and diversity, as well as beauty and value, to your property. Plant selection will depend on your site conditions.

If possible, purchase plants from a local nursery that propagates its own plants from regionally-obtained native stock or seed. (For a list of native plant nurs-



WHAT ARE THE CONDITIONS AT YOUR SITE?

- Salinity:** Is your water fresh or brackish?
- Water depth:** How great is the fluctuation between low and high tide?
- Light:** Does the site receive full sun, partial shade, or full shade?
- Slope of bank:** Are the shoreline's slopes gradual or steep?

eries, contact your state's native plant society or go to cbf.org/landscaping. If biologs are used as part of a living shoreline, herbaceous plants can be planted directly in the biologs. Over five to six years, the biolog will decompose naturally, but the plants' roots will grow throughout the log to hold the bank or shoreline edge in place.

An excellent guide on native plants for restoration in the Bay watershed is the U.S. Fish and Wildlife Service book *Native Plants for Wildlife Habitat and Conservation Landscaping* (www.nps.gov/plants/pubs/chesapeake/toc.htm).

When to Plant

Perennials and grasses should be planted during peak growing season (in mid-to-late summer) to allow enough time for their root systems to become established before they go dormant in the late fall. Trees and shrubs should be planted in spring and fall when there is adequate rainfall to help them develop strong roots and leafy growth.



Showy native wetland plants, like Blue Flag iris (left) and Marsh Hibiscus (right), attract pollinators, provide seasonal color, and have extensive root systems to hold shorelines in place.



Volunteers plant hundreds of marsh grass plugs (*Spartina alterniflora*) at the Back Creek Nature Park waterfront.

Maintenance

Waterfowl, such as ducks and geese, love to feed on newly-planted vegetation. To keep them out of the area for the first full growing season, a three-to-four foot tall mesh enclosure—tied onto wooden stakes—should be erected. Large debris, such as logs, algae mats, and trash, should be periodically cleared from the site to protect wetland plants from smothering. For beach and water access, keep a narrow path to the water unplanted to avoid trampling vegetation. Control non-native invasive plants, such as English ivy and multi-flora rose, and replace them with native wetland plants and shrubs.



Fencing shown on the right keeps ducks and geese from browsing and pulling out recently planted marsh grass plugs (next to the biologist) and warm-season grasses (on the slope.) After the first full growing season, fences can usually be removed.

Expand Your Buffer

If your property is experiencing erosion, it is important to understand where it is coming from; not all erosion is due to waves, wind, and tides. On properties with steep slopes leading to the water, a major source of severe erosion can be runoff from rooftops, downspouts, and paved driveways unless adequate tree and shrub buffers are planted closer to the house.



Well-established shoreline buffers include mature native trees and shrubs to help frame the view. Extensive buffers anchor the soil, provide wildlife habitat, and make the shoreline more aesthetically pleasing.

By planting woody vegetation such as shrubs and smaller trees to create an understory, and large canopy trees as part of the buffer, you can greatly reduce runoff and soil loss coming from the land. The wider the buffer the better, but a width of at least 30 feet is ideal. If you are concerned about maintaining your view, plant larger trees away from sight lines and plant low-growing shrubs instead.

Three Types of Shoreline Projects



NONSTRUCTURAL:
Biologs and vegetation



HYBRID:
Segmented sills,
jetties, or groins
with natural beach
shoreline and/or
marsh plantings



STRUCTURAL:
Offshore breakwater
(openings provide
wildlife access)

WHICH PROJECT IS RIGHT FOR MY SITE?

(source: MD Department of Natural Resources)

Site Conditions	Low Energy (Nonstructural)	Medium Energy (Hybrid)		High Energy (Structural)
Shoreline Location	creek or cove	minor river	major tributary	mainstem Bay
Water Depth (ft/near shore)	-1.0	-1.0 to -2.0	2.0 to -4.0	-4.0 to -15.0
Fetch (mi/distance to nearest opposite shore)	0.5	1.0 to 1.5	2.0 or more	2.0 or more
Erosion Rate (ft/yr)	2 or less	2 to 4	4 to 8	8 to 20
Erosion Control Treatment Options	Nonstructural projects	Hybrid Project		Structural Projects
	beach replenishment	marsh fringe w/groins		bulkheads
	marsh fringe	marsh fringe w/sills		revetments
	marshy islands	marsh fringe w/breakwaters		stone reinforcing
	biologs, groins	beach replenishment w/breakwaters		groins and jetties
Cost per foot	\$50-100	\$150-300	\$350-500	\$500-1,200

Permit Process

Permit requirements for installation of living shorelines vary depending on state and local laws. No permits are required to plant vegetation on existing substrate on tidal or non-tidal shorelines unless fill is introduced or damaging equipment is required. However, permits are required for any alteration of shorelines in tidal areas, as well as wetlands. This includes:

- removal of vegetation;
- grading and introducing fill material;
- installation of nonstructural materials like biologs with toe boulders (narrow bands of rock that hold sand-fill and biologs in place); and
- installation of hard structures like bulkheads, sills, and revetments.

A joint federal/state permit application (JPA) from the U.S. Army Corps of Engineers is now in place to help streamline the process. Go to cbf.org/livingshorelines for appropriate links.

Getting Help: Demonstration Projects and Workshops

Many living shoreline projects have been successfully installed in the Chesapeake Bay watershed. For a list of publicly-accessible projects, go to cbf.org/livingshorelines.

Getting Help: Financial Assistance for Public and Private Living Shoreline Projects

Maryland has a wide range of loan, grant, and cost-share programs available for homeowners, communities, local governments, and non-profit organizations through state agencies and private foundations.

Virginia has grants available for private individuals through the Chesapeake Bay Trust's Living Shorelines Initiative. The Chesapeake Bay Restoration Fund in Virginia only funds projects for public and non-profit organizations.

ORGANIZATION	PROGRAM	PROJECT TYPES	ELIGIBLE	STATE	AMOUNT	DUE DATE	CONTACT INFORMATION
Chesapeake Bay Trust, NOAA-Restoration Center, Campbell Foundation, National Fish and Wildlife Foundation	Living Shorelines Initiative	grant	public and private	VA, MD	up to \$75,000	Sept.	www.cbtrust.org
Chesapeake Bay Trust Program	Stewardship	grant	public and some private	MD	up to \$25,000	July, Dec.	www.cbtrust.org
National Fish and Wildlife Foundation Program	Chesapeake Bay Small Watersheds	grant	public and private	VA, MD	up to \$50,000	Feb.	www.nfwf.org
Maryland Department of the Environment, Water Management Administration	Small Creeks and Estuary Restoration Program	grant	public and private	MD	75% cost share	Feb.	www.mde.state.md.us
Maryland Department of the Environment, Tidal Wetlands Division	Tidal Wetland Compensation Fund	grant	private	MD	generally up to \$50,000	on-going	www.mde.state.md.us
Maryland Department of the Environment, Water Quality Financing Administration	Water Quality Revolving Loan Fund	low interest loan	public and private, applicant must be local gov't.	MD		Feb.	www.mde.state.md.us
Maryland Department of the Environment, Water Quality Financing Administration	Linked Deposit Program	low interest loan	private	MD		Feb.	www.mde.state.md.us
Maryland Department of Natural Resources Shore Erosion Control Program	Nonstructural Erosion Control	no interest loan	public and private	MD	public: no limit; private: up to \$25,000	on-going	www.dnr.state.md.us

(Source: Chesapeake Bay Trust and Maryland Department of Natural Resources)



How to Make Your Living Shoreline Happen:

1. Identify your site conditions and determine suitable types of projects.
2. Contact your local and state agencies to get technical assistance and arrange a site visit.
3. Contact consultants and contractors who specialize in constructing living shorelines for a site visit, information, and financial estimates.
4. Plan ahead!
 - Permits take time (four months or longer depending on the type of work needed) so if you want construction to begin in the spring, you will need to start the permit process in the fall.
 - For grasses and herbaceous perennials, the best time to start construction is in the spring since plants are available from nurseries at the start of the peak summer growing season. (Trees and shrubs can also be ordered for a fall planting.)
5. Take photos before, during, and after your project.
6. Educate your neighbors and community about why you are constructing a living shoreline and what the benefits are to your local watershed and the Bay.
7. Enjoy your beautiful shoreline and the wildlife that you will attract!

Go to cbf.org/livingshorelines for more information.



Living shorelines provide a natural setting for both humans and wildlife. They play an important role in restoring water quality in our rivers and streams, and ensure a future for fishing, crabbing, and boating on the Bay.



CHESAPEAKE BAY FOUNDATION

Saving a National Treasure

Chesapeake Bay Foundation Maryland

Philip Merrill Environmental Center
6 Herndon Avenue
Annapolis, MD 21403
410/268-8816

Pennsylvania

The Old Water Works Building
614 North Front Street, Suite G
Harrisburg, PA 17101
717/234-5550

Virginia

Capitol Place
1108 East Main Street, Suite 1600
Richmond, VA 23219
804/780-1392

Website: cbf.org

E-mail: chesapeake@cbf.org

Membership information: 888/SAVEBAY (728-3229)

ABOUT THE COVER:

Shown one year after planting, this living shoreline project at St. John's College, Annapolis, replaced 800 feet of wooden bulkhead with native plantings, tidal wetlands, oysters, and underwater grasses.

bottom photo: Beth LeFebvre/CBF Staff

Living shorelines offer wildlife vital habitat. Diamond-back Terrapins need access to shorelines to lay their eggs.

inset photo: Willem M. Roosenburg

PHOTO CREDITS:

- page 1: top: Rob Schnabel/CBF Staff;
bottom: Marcy Damon/CBF Staff
- page 2: top: Marcy Damon/CBF Staff;
bottom: Rob Schnabel/CBF Staff
- page 3: top: Rob Schnabel/CBF Staff;
bottom illustration by Terry Coker Peterson
- page 5: Marcy Damon/CBF Staff
- page 6: top: Marcy Damon/CBF Staff;
bottom: Rob Schnabel/CBF Staff
- page 7: top: Rob Schnabel/CBF Staff;
middle: Lynn Ohman; bottom: Maryland
Department of Natural Resources
- page 10: Rob Schnabel/CBF Staff

ACKNOWLEDGMENTS:

Design and publication made possible through a National Fish and Wildlife Foundation (NFWF) Chesapeake Bay Small Watershed Grant with funds from the U.S. Environmental Protection Agency and National Oceanographic and Atmospheric Administration. The views and conclusions contained within this document should not be interpreted as representing the opinions or policies of the U.S. Government or NFWF. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government or NFWF.



cbf.org/livingshorelines

CHESAPEAKE BAY WATERSHED



The Chesapeake Bay's 64,000-square-mile watershed covers parts of six states and is home to more than 17 million people.



Printed on recycled, recyclable paper, 09/07.

C O N S E R V A T I O N

Rebuilt Wetlands Can Protect Shorelines Better Than Walls

Fortified wetlands can protect shorelines better than hard structures

By Rowan Jacobsen on April 1, 2019



Oysters are tested in experimental configurations for shoring up a coastline near Beaufort, N.C. Credit: John Althouse

On August 27, 2011, Hurricane Irene crashed into North Carolina, eviscerating the Outer Banks. The storm dumped rain shin-high and hurled three-meter storm surges against the barrier island shores that faced the mainland, destroying roads and 1,100 homes.

After the storm, a young ecologist then at the University of North Carolina at Chapel Hill named Rachel K. Gittman decided to survey the affected areas. Gittman had worked as an environmental consultant for the U.S. Navy on a shoreline-stabilization project and had been shocked to discover how little information existed on coastal resilience. “The more I researched, the more I realized that we just don’t know very much,” she explains. “So much policy and management is being made without the underlying science.” She decided to make shorelines her specialty.

What Gittman found was eye-opening. Along the hard-hit shorelines, three quarters of the bulkheads were damaged. The walls, typically concrete and about two meters high, are the standard homeowner defense against the sea in many parts of the country. Yet none of the natural marsh shorelines were impaired. The marshes, which extended 10 to 40 meters from the shore, had lost no sediment or elevation from Irene. Although the storm initially reduced the density of their vegetation by more than a third, a year later the greenery had bounced back and was as thick as ever in many cases.

ADVERTISEMENT

Gittman's study confirmed what many experts had begun to suspect. "Armored" shorelines such as bulkheads offer less protection against big storms than people think. By reflecting wave energy instead of dispersing it, they tend to wear away at the base, which causes them to gradually tilt seaward. Although they still function well in typical storms, they often backfire when high storm surges overtop them, causing them to breach or collapse, releasing an entire backyard into the sea.

In a later study, Gittman and other researchers surveyed 689 waterfront owners and found that the 37 percent of properties protected by bulkheads had suffered 93 percent of the damage. And bulkhead owners routinely had four times the annual maintenance costs of residents who relied on nature instead. Salt marshes bent but did not break.

In recent years more scientists and policy makers have come to believe that "living shorelines"—natural communities of salt marsh, mangrove, oyster reef, beach and coral reef—can be surprisingly effective in a battle coastal residents have been losing for years. U.S. shores are disintegrating as higher seas, stronger storms and runaway development trigger an epidemic of erosion and flood damage. Every day waves bite off another 89 hectares of the country. Every year another \$500 million of property disappears. Overall, some 40 percent of the U.S. coastline is suffering ongoing erosion. In some places, the rate of loss is breathtaking. Go to Google Earth Engine's Timelapse feature and watch Shackleford Banks melt away like ice cream on a summer sidewalk.

Historically, almost all money spent on coastal defense has gone toward "gray" infrastructure: seawalls, bulkheads, levees and rock revetments. That is beginning to

change as researchers become more sophisticated in measuring the long-term impact of “green” coastal defenses. Insurance companies and governments are finally taking notice and might actually turn the tide toward living defenses.

WETLANDS OUTPERFORM WALLS

Around the time that Hurricane Irene was barreling up the East Coast, Michael W. Beck, a research professor at the University of California, Santa Cruz, and then lead marine scientist for the Nature Conservancy, was initiating a collaboration with the insurance industry that today may begin to change coastal conservation. “A lot of people were saying that ecosystems worked for flood protection, but the evidence was thin,” Beck tells me at his Santa Cruz office. The physical mechanisms were clear: oyster and coral reefs limited erosion and flood damage by acting as natural breakwaters (offshore seawalls), dispersing wave energy with their corrugated surfaces. Salt marshes and mangroves, with their earthen berms and friction-generating forests of stalks, could rake more than 50 percent of the energy out of storm surges in less than 15 meters of territory.

ADVERTISEMENT



Developers survey oysters that have settled onto Oyster Catcher, a jute-and-cement material designed to help babies and adults thrive, protecting marshes between them and solid land. Credit: John Althouse

But although scientists understood the physics, no one had put it into a form that could be used easily by policy makers. Beck set out to rectify that. “If I want to change practices, I can’t bring my ecosystem model to FEMA or the U.S. Army Corps of

Engineers,” he explains. “I have to look at *their* risk model and put ecosystems into *that*.”

Beck and his colleagues began collaborating with Lloyd’s of London, Swiss Re and others in the insurance industry, which have some of the best data and models in the world on assets and risk. When he plugged data on coastal ecosystems into their risk models, it became clear that living shorelines were excellent defenses. And, he notes, “when I tell the Corps, FEMA and the development banks that these are the numbers from the insurance industry, I automatically have a different level of credibility.”

The first study focused on damages from Superstorm Sandy, which clobbered New York and New Jersey in 2012. Working with Risk Management Solutions, a leading risk-modeling firm, the scientists showed that wetlands prevented \$625 million of flood damage from the storm, which was surprising given that the coasts in the region had already lost 60 to 90 percent of their protective wetlands over time. In areas that flooded, the few remaining wetlands lowered flood damage by 11 percent on average. As important was the ability to buffer garden-variety floods: in one local study, properties behind marshes suffered 16 percent less annual flood damage than properties that had lost their marshes. “That’s well within the range for which you could expect [insurance] premium reductions,” Beck points out.



Sign up for *Scientific American's* free newsletters.

[Sign Up](#)

He and his partners then turned their economic and risk-management models on the Gulf Coast from Texas to Florida, which is regularly battered by big storms. They did an exhaustive analysis of the annual expected benefits and costs of all types of infrastructure. The team estimated that the coast would suffer \$134 billion of losses over 20 years if no preventive measures were taken. Elevating homes could prevent \$39.4 billion of those losses, but it is incredibly expensive. At an average of \$83,300 per house, it would cost \$54 billion to prevent that \$39 billion in damages. The six-meter-high dikes being built in Louisiana were a worse option; at \$33,000 per meter, they were an absurdly expensive way to protect a relatively limited amount of property, returning just

\$1 in savings for every \$4 of expense. Smaller levees built on land in front of many low-lying coastal communities prevented much more damage for almost the same cost.

In terms of bang for the buck, sandbags were the best investment, saving \$8.4 billion of damages for a mere \$0.84 billion in expense. Natural defenses ranked high as well. Wetlands restoration, which could prevent \$18.2 billion of losses, would cost just \$2 billion. Oyster-reef restoration could prevent \$9.7 billion in losses for \$1.3 billion. Barrier island restoration offered \$5.9 billion of prevention for \$1.2 billion. And “beach nourishment” (replenishing depleted beaches with sand dredged from the seafloor) in the eastern Gulf could save \$9.3 billion for \$5.5 billion.

ADVERTISEMENT

That last one surprised many people because replacing beach sand year after year is often seen as a fool’s errand. “If the only choices you gave me were beach nourishment versus fully gray infrastructure,” Beck says, “I’d choose the former as the lesser of two evils.”

Overall, the research found that \$57.4 of the \$134 billion could be prevented cost-effectively, almost all of it through green infrastructure.

One type of restoration that was not part of the study is large-scale diversion of the Mississippi River. Diverting sediment-laden water through a gap in the river’s levees and letting that sediment filter into struggling marshes can restore their health and elevation, but the region is subsiding so quickly that not even the famously muddy Mississippi can save it from the encroaching sea. “It is going to be expensive to re-create an entire ecosystem,” Beck says, “and it is better and cheaper to start earlier.”

Cost-effective restoration may be tricky on long, sandy coasts, too. Beaches and barrier islands are by nature transient. Planting grasses to rebuild dunes can help keep beaches in place but only temporarily in many cases. At some point, residents will have to move back from the receding shoreline.

Beck is quick to point out that built infrastructure is still incredibly important and that cost-effectiveness is not the only consideration. “Anywhere you’ve got significant people and property,” he says, natural solutions will “be used together with some form of built infrastructure.” Metropolitan areas, ports and other places where the risk tolerance for a major flood would be extremely low need seawalls, even if such structures are not cost-effective. Still, Beck says, certain populated areas can benefit from a hybrid approach: “Even if you’re building levees, they can be shorter if they have marshes in front.”

ADVERTISEMENT

SHORELINE TRIALS AND ERRORS

.....

One reason living shorelines are becoming an economically viable approach for coastal defense is that researchers and municipalities are getting better at rebuilding them. Early marsh-restoration designs, which followed forestry science and gave each plant plenty of space to avoid competition, were actually counterproductive. It turns out that in bare mudflats, “when marsh plants are together, they share oxygen, so their growth rate is twice as high,” says Brian Silliman, an ecologist at Duke University. Root them in large clumps, and the growth rate of each individual plant can triple. Add blue crabs, which eat the snails that eat the salt-marsh grasses, and the plants do even better.

Scientists are also finding that marshes do best when they have a protective sill—a linear berm that fronts the seaside edge of the grass and stands. Made of hard material such as shell, stone or concrete, its height and position are typically chosen so that water covers it at high tide, but it is exposed during low tide. The sill takes the brunt of wave energy but also traps sediment behind it, allowing the grass to thrive and marsh floor to retain its elevation or even rise.

Almost any hard material can make a successful sill. Large shoreline-stabilization projects use big boulders or stackable concrete blocks, a practice that has been criticized by some experts who say that these structures are living shorelines in name only. But many lower-profile restorations integrate sills more seamlessly into the natural habitat. In the Southeast and Gulf Coast regions, marshes historically possessed a natural sill in

the form of an intertidal oyster reef. Many of those reefs were overharvested long ago, ruining the sill and exposing the marshes to erosion.



Ecologists, including Rachel Gittman (*in white*), measure water levels and grasses at Carrot Island, N.C. Credit: John Althouse

In these warm, oyster-friendly waters, new sills can be formed by placing a hard substrate along the low-tide line at the front edge of the marsh for baby oysters to set on. Some sites with lots of wave action have used small, hollow concrete structures or plastic mesh “onion bags” stuffed with shell and lashed together. When successful, these artificial materials are quickly covered by oysters and disappear into the interstices of the growing reef. But the concrete often remains visible for years, and the bags have been criticized for breaking and scattering plastic through the environment.

Gittman, now at East Carolina University, is testing an alternative material called Oyster Catcher that is made of jute cloth dipped in Portland cement and rolled into various hollow configurations. It hardens with extensive surface area to recruit larval oysters. In addition to being light and flexible, it holds together just long enough to get a reef established, then disintegrates. The product received its first big test when Hurricanes Florence and Michael struck North Carolina last fall. Michael tossed shell bags up into the marshes, but the Oyster Catcher reefs did not budge. The showing was encouraging, but Gittman worries that conservation groups may oversell the potential. “A living shoreline can’t save your house from a Category 5 storm. Although neither can a bulkhead.”

ADVERTISEMENT

Gittman and Beck both stress the need to tailor living shorelines to local conditions. One reason oyster restoration is so cost-effective in the Gulf and the Southeast is because there have been plentiful wild oysters to seed new reefs with babies. That is not the case in most of the country. Chesapeake Bay, for example, was long the poster child for futile oyster restoration. Oyster populations in the bay had fallen to less than 1 percent of historical norms, and decades of effort and tens of millions of dollars barely budged the needle.

“Conceptually, Chesapeake Bay was not our best model,” Beck says. “It put oyster-reef restoration back because it made it look so difficult and expensive. Well, when you’re working in a system where you’ve only got 1 percent left, guess what? It ain’t easy. When you’re in the Gulf of Mexico and you’ve still got 50 percent of your reefs left, it’s a different story. If you build it, the oysters will come.”

Beck extends that lesson to coral reefs, the most underappreciated of natural defenses. “Coral reefs are the single most effective ecosystem for flood-risk reduction,” he says. Corals, which have evolved to take a daily pounding that would destroy most other living things, form natural seawalls exactly where you want them—just offshore, in front of resorts, beach towns, coastal roads and other pricey assets. When healthy, they make remarkably effective breakwaters, reducing wave energy up to 97 percent. They are also affordable: reef restoration averages about \$1,300 per meter versus \$20,000 for artificial breakwater construction. The insurance industry’s assessment for mitigating risk from climate change in the Caribbean found that reviving reefs and mangroves was an order of magnitude more cost-effective than seawalls or breakwaters.

Even though reefs do not line a lot of shorefronts, the annual expected benefits they generate are significant—more than \$100 million a year in the U.S. alone and more than \$400 million a year each in Mexico, Malaysia, Indonesia, the Philippines and Cuba.

Of course, many coral reefs are not healthy, and losing just a single meter of reef height doubles the direct damages from flooding. For that reason alone, Beck believes reef-restoration projects will multiply. Although the science of coral restoration is young, the potential is enormous—so long as a reef has not already collapsed. “Some of these corals actually grow pretty fast,” Beck says. “For example, in places in Indonesia where there’s still good reef habitat and lots of healthy corals around small sites that have been destroyed by blast fishing, reefs can turn around pretty quickly.”

RIISING TIDE OF SUPPORT

Coastal restoration may finally be getting the attention it deserves. “Things are really beginning to change,” Beck says. The Army Corps, which for decades has favored hardscape solutions, has launched an Engineering With Nature initiative—something many planners thought they would never see. The National Oceanic and Atmospheric Administration has made living shorelines a centerpiece of its coastal-resilience blueprint. Hundreds of projects have been completed or are underway around the country, ranging from shoreline stabilizations in Maryland to bulkhead removal in Puget Sound. Most are small, community-based efforts, but larger ventures are becoming more common.

Stimulus funding that flowed after the American Recovery and Reinvestment Act of 2009 increased the size of some projects significantly. Kilometers of oyster-reef projects now line Alabama, Texas and Louisiana. The flagship is Coffee Island, off the Alabama coast. The shoreline had receded up to 100 meters. The Nature Conservancy placed a three-kilometer-long line of shell bags and concrete balls about 30 meters offshore, paralleling the island. The reef immediately blocked wave energy, allowing the marsh to rebuild. Within two years approximately 200 baby oysters per square meter had colonized the structure, covering it and attracting fish, crabs and birds.

Outside the Gulf Coast and the Southeast, restoration projects may be more challenging. California, for example, is a tough undertaking. “In San Francisco Bay,” Beck says, “we’ve lost more than 90 percent of the natural marshes, so you have to go in and re-create an environment wholesale in and around a hell of a lot of people.”

Yet where there is a will—and local money—there is a way. The San Francisco Bay Clean Water, Pollution Prevention, and Habitat Restoration Measure, passed by Bay Area voters in 2016, raises \$25 million a year for 20 years through a parcel tax. That \$500 million will be used to build 40,000 hectares of wetlands—the largest shoreline restoration undertaken in the U.S.—using various techniques. The most novel is horizontal levees. Instead of a high, narrow mound that lines the shore, horizontal levees are broad mudflats, marshes and grasslands that gradually rise from the water’s edge, sometimes for hundreds of meters back onto the land. They are graded with vast amounts of earth (often repurposed from building projects) and planted with starter plugs. They can be lower and 40 percent less costly than a traditional levee because the breadth absorbs floodwater. The configuration also gives marsh communities space to retreat as seas rise.

Another encouraging sign is the Living Shorelines Act, introduced in the U.S. House of Representatives by Frank Pallone, whose New Jersey district was devastated by Superstorm Sandy. The bill would designate \$20 million in grants a year to living-shoreline work. A Senate version was introduced by Chris Murphy of Connecticut and Kamala Harris of California. Their prospects in the current Congress were uncertain at press time, but their existence shows that living shorelines are gaining ground.

North Carolina's Coastal Resources Commission recently approved a new process that will make it as easy to obtain a living-shoreline permit as that for a bulkhead. Maryland has an even stronger law in place, requiring a homeowner to prove why a bulkhead is needed instead of a natural shoreline. Other states may follow these leads.

The most promising indication of all may be the 2018 agreement made by the Nature Conservancy, the reinsurance industry and the Mexican state of Quintana Roo to create a trust fund to protect the Mesoamerican Reef, off the coast of Cancún and Puerto Morelos. The deal will include the first insurance policy ever taken out on a natural ecosystem. If the reef is damaged by a storm, insurance funds are released to rebuild its natural capital.

For living shorelines to become an important part of any long-term coastal defense plan, policy makers in government, insurance and development will have to start improving and installing them before bad storms hit—and funding the next round of projects through postdisaster spending afterward. That requires good science and good economic numbers—which now exist—as well as good proof in the form of demonstration projects, which are increasingly common.

The first significant examples of postdisaster spending on natural infrastructure could occur as FEMA and other agencies look to spend more than \$100 billion in recovery funds from recent hurricanes. Although FEMA's traditional hazard-mitigation investments have focused on tactics such as buying out damaged coastal homes or elevating them, the agency has adjusted its new "benefit-cost analysis" policy to favor investment in natural infrastructure. Beck expects this change in emphasis to result in federally funded projects of unprecedented scope in Florida, Puerto Rico and the Gulf Coast. Other large-scale development may soon follow worldwide as governments, disaster-risk managers, businesses, banks and insurers look to mitigate their risk exposure as cost-effectively as possible. When that happens, it will mark a moment when society realizes nature is not a luxury. It is the future.

This article was produced in collaboration with the Food & Environment Reporting Network, a nonprofit investigative news organization.

ADVERTISEMENT

ABOUT THE AUTHOR(S)



Rowan Jacobsen

Journalist **Rowan Jacobsen** is author of several books, such as *Shadows on the Gulf* (Bloomsbury, 2011) and *The Essential Oyster* (Bloomsbury, 2016), and many magazine articles. He was 2017-18 Knight Science Journalism Fellow at the Massachusetts Institute of Technology.

Credit: Nick Higgins

MORE TO EXPLORE

Marshes with and without Sills Protect Estuarine Shorelines from Erosion Better Than Bulkheads during a Category 1 Hurricane. Rachel K. Gittman et al. in *Ocean & Coastal Management*, Vol. 102, Part A, pages 94–102; December 2014.

Managing Coasts with Natural Solutions: Guidelines for Measuring and Valuing the Coastal Protection Services of Mangroves and Coral Reefs. Edited by M. W. Beck and G.-M. Lange. World Bank, January 2016.

Living Shorelines Academy: www.livingshorelinesacademy.org

FROM OUR ARCHIVES

Architects of the Swamp. John Carey; December 2013.

Scientific American is part of Springer Nature, which owns or has commercial relations with thousands of scientific publications (many of them can be found at www.springernature.com/us). Scientific American maintains a strict policy of editorial independence in reporting developments in science to our readers.

© 2020 SCIENTIFIC AMERICAN, A DIVISION OF SPRINGER NATURE AMERICA, INC.

ALL RIGHTS RESERVED.

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/331389919>

Embracing dynamic design for climate-resilient living shorelines

Article in *Journal of Applied Ecology* · March 2019

DOI: 10.1111/1365-2664.13371

CITATION

1

READS

112

2 authors:



Molly Mitchell

Virginia Institute of Marine Science

28 PUBLICATIONS 329 CITATIONS

[SEE PROFILE](#)



Donna Marie Bilkovic

Virginia Institute of Marine Science

60 PUBLICATIONS 636 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Sea Level Rise: Status, Trends and Forecasts [View project](#)



Living shorelines as restoration strategies [View project](#)

Embracing dynamic design for climate-resilient living shorelines

Molly Mitchell  | Donna Marie Bilkovic 

Virginia Institute of Marine Science, William & Mary, Gloucester Point, Virginia

Correspondence

Molly Mitchell

Email: molly@vims.edu

Handling Editor: Rute Pinto

KEYWORDS

climate change, coastal resilience, defenses, erosion, green infrastructure, marsh, nature-based, sea level rise

1 | INTRODUCTION

As natural marshes are lost to erosion, sea level rise, and human activity, small created marshes, (sometimes with ancillary stabilization structures, and frequently called living shorelines) have gained interest as a replacement habitat; providing both shoreline stabilization and restoration of important ecological functions. These living shorelines enhance ecological function while reducing erosion through the use of marsh plants (Table 1). In all but the lowest energy settings, oyster reefs, low rock structures, or other stabilizing material are frequently used to enhance marsh establishment. Due to their ability to stabilize the shoreline with minimal impact to the ecology, living shorelines are considered a method to increase coastal community resilience to sea level rise (e.g., Sutton-Grier, Wowk, & Bamford, 2015; Van Slobbe et al., 2013) but little consideration is being given to living shoreline resilience under changing climate. Although it has been stated that living shorelines have the capacity to adapt to rising sea levels (e.g., Moosavi, 2017; Sutton-Grier et al., 2015; Toft, Bilkovic, Mitchell, & La Peyre, 2017), their ability to fulfill this potential relies on being designed to incorporate all the processes occurring in natural systems. The extent to which living shorelines can mimic the resiliency of natural marshes and oyster reefs will depend on their setting, design and the type of human maintenance provided. Truly resilient projects will require engineers and ecologists to work together to describe the dynamics of shoreline processes under sea level rise and translate this understanding into living shoreline design.

The potential for living shorelines to self-adapt to rising sea levels comes from their biotic components. When properly constructed, living shorelines provide a plethora of ecological services

through their biotic components, including: nursery, nesting and feeding habitat (Bilkovic & Mitchell, 2017; Davis, Takacs, & Schnabel, 2006; Gittman et al., 2015); filtering of sediments and nutrients from waterways (Beck, Chambers, Mitchell, & Bilkovic, 2017); reduction of wave energy (Gedan, Kirwan, Wolanski, Barbier, & Silliman, 2011; Gittman, Popowich, Bruno, & Peterson, 2014); and carbon storage (Davis, Currin, O'Brien, Raffenburg, & Davis, 2015). In this respect, they have the potential to provide ecological functions that are similar to natural marshes and it is tempting to assume that living shorelines incorporate all the same dynamic processes. However, living shorelines are engineered systems which frequently differ from natural coastal marshes in a few key elements: (a) Plantings are done on a grid, so initial plant density is controlled by design, not inundation; (b) living shorelines typically have a gradual, constant slope while natural shorelines (particularly in erosional areas) often have a scarped edge and complex microtopography; (c) living shorelines frequently have associated engineered structures designed to mitigate wave energy, which can affect sedimentation and faunal settlement patterns. These differences can translate into a system which is stable in the short term, but may have difficulty adapting to a changing environment.

Much of the monitoring or assessment of living shorelines is related to ensuring ecological functions (habitat, nutrient transformations) are equivalent to those of natural marshes; however, assessments of living shoreline sustainability are equally important. Natural coastal marshes are dynamic systems, with some natural adaptation to sea level rise realized through feedback loops (Morris, 2007) involving plant production and sediment capture that result in marsh vertical growth (accretion) and migration into adjacent lands

TABLE 1 Comparison of different shoreline stabilization methods

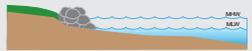
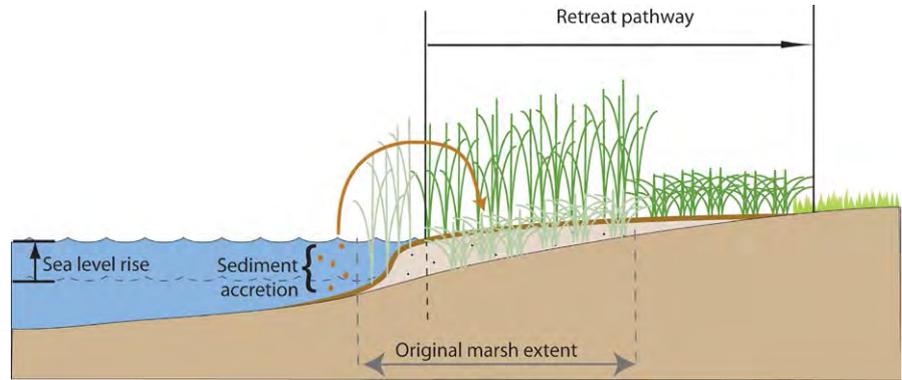
	Potential functions								
	Dissipates wave energy	Prevents flooding	Reduces erosion	Provides native habitat	Supports native populations	Provides foreign habitats, may promote invasion	Prevents faunal access to shoreline	Living organism subject to disease	Potentially self-sustaining under SLR
Living shorelines									
 <p>Marsh</p>	Yes, amount depends on marsh width	No	Depends on setting (Yes in low energy)	Yes	Yes	No (typically)	No	Yes	Yes, with retreat corridor
 <p>Marsh with rock sill</p>	Yes	No	Yes	Depends on setting (Yes on rocky coast)	Yes, although possibly reduced	Depends on setting	Reduces access	Partially	Marsh only, with retreat corridor
 <p>Marsh with oyster sill</p>	Yes, amount depends on marsh width	No	Yes	Yes	Yes	No (typically)	No	Yes	Both, but marsh requires retreat corridor
Traditional hardening									
 <p>Rock Revetment</p>	Yes	No	Yes	Depends on setting (Yes on rocky coast)	Possible	Depends on setting	Replaces shoreline	No	No, and may prevent retreat of other habitats
 <p>Timber/concrete Bulkhead</p>	Reflects energy	Depends on design/height	Yes	No	Possible	Yes	Replaces shoreline	No	No, and may prevent retreat of other habitats

FIGURE 1 Dynamic processes help natural marshes adapt to rising sea level. Tall, dense marsh plants dissipate wave energy and collect sediment, allowing the marsh surface elevation to increase. Their roots also contribute to accretion. Natural, low elevation lands allow marshes to retreat into upland areas as sea level rises. This maintains marsh extent under changing conditions



where possible (Figure 1). In contrast, living shorelines are typically engineered as static systems that reduce erosion and mimic the flora (primarily) and the fauna (secondarily) of natural marshes, but with little emphasis on creating the characteristics of natural marshes that allow for self-evolution under changing water levels. Appropriate design of living shorelines should enhance longevity by embracing the dynamic characteristics of natural marshes and leveraging natural feedback loops to maximize sediment accretion and stabilization (Bilkovic & Mitchell, 2017). In this article, we draw on scientific literature and practical experience with living shoreline design and application to make recommendations for how living shorelines can be sited, built and maintained to be resilient to sea level rise.

2 | LIVING SHORELINE SITING IS CRITICAL FOR ENHANCED LONGEVITY

Longevity of living shorelines under sea level rise is largely dependent on their location in the coastal system. There are three siting factors that affect persistence: (a) wave energy at the site, (b) the potential for upland marsh retreat, and (c) the sediment supply (which is critical for marsh accretion). Ideally, living shorelines should be placed to minimize wave energy and maximize the other two factors (Figure 2). Rock sill or oyster reef structures can be used to mitigate high wave energy and maximize sediment capture, but cannot completely compensate for poor siting.

Living shorelines are most appropriate in low to moderate energy settings since plants have difficulty establishing and thriving in high energy areas (Currin, Davis, & Malhotra, 2017). This means that most estuarine, riverine or creek settings should be appropriate, assuming that the shorelines are not subject to high wave energy. The exception is the outer bends of river meanders, where water flow can be swift and natural processes lead to erosion and migration of the bend. With appropriately-sized structures, living shorelines have been built in open coastal areas. However, their long-term prognosis under sea level rise may be difficult to predict. These areas are subject to high wave energy and although structures placed channelward of the marsh can reduce wave energy somewhat, coastal sediment dynamics can also be very different from the more sheltered coastlines where natural marshes are typically found. Alongshore sand movement and barrier island

migration are both important processes on open coasts that are critical components of coastal resilience but are not compatible with stabilized living shoreline design. The development of dynamic living shoreline designs specifically for high-energy coastal areas, such as barrier islands, would have enormous resilience potential.

Marsh retreat potential is linked to local land use and surrounding elevations (Mitchell, Herman, Bilkovic, & Hershner, 2017). Living shorelines built in low elevation areas will naturally be able to migrate landward, as long as the surrounding land use is compatible. The adjacent upland/riparian area should be preserved as natural lands, ideally populated with native grass or shrubs. Marshes can migrate into forested riparian areas, but shade from the trees can slow migration and competition from invasive species (e.g. Smith, 2013) can alter the floral community. There may be plants that enhance the migration of marsh flora that could be planted in riparian zones and research on this topic would be timely. Steeper elevations or impervious surfaces (roads, driveways, buildings, etc.) interrupt the marsh retreat corridor and should be avoided where possible. In areas where there are sharp inclines, elevation breaks, or retaining walls in the riparian zone, grading of the land may be possible to create a gentle slope and ensure that the marsh isn't compressed during migration. Where living shorelines are backed by bluffs, migration won't be a viable process and significant accretion (equivalent to sea level rise rates) will be crucial to maintain the marsh.

Another important siting factor for living shoreline persistence is local sediment supply. This is particularly critical where marsh retreat is limited. Sediment from both the waterway and the surrounding upland can be captured, contributing to marsh accretion. Accretion slowly raises the surface of the marsh over time, and can keep it in the proper position in the tidal frame. Accretion increases with time of submergence (Temmerman, Govers, Wartel, & Meire, 2004) and with increased plant productivity (Kirwan & Murray, 2007; Morris, Sundareshwar, Nietch, Kjerfve, & Cahoon, 2002), both processes increase with sea level rise. Together these processes can contribute significantly to marsh persistence under moderate sea level rise (Gedan et al., 2011). However, in areas where sea level rise is accelerating (Boon & Mitchell, 2015), high sediment supply will be an important consideration when

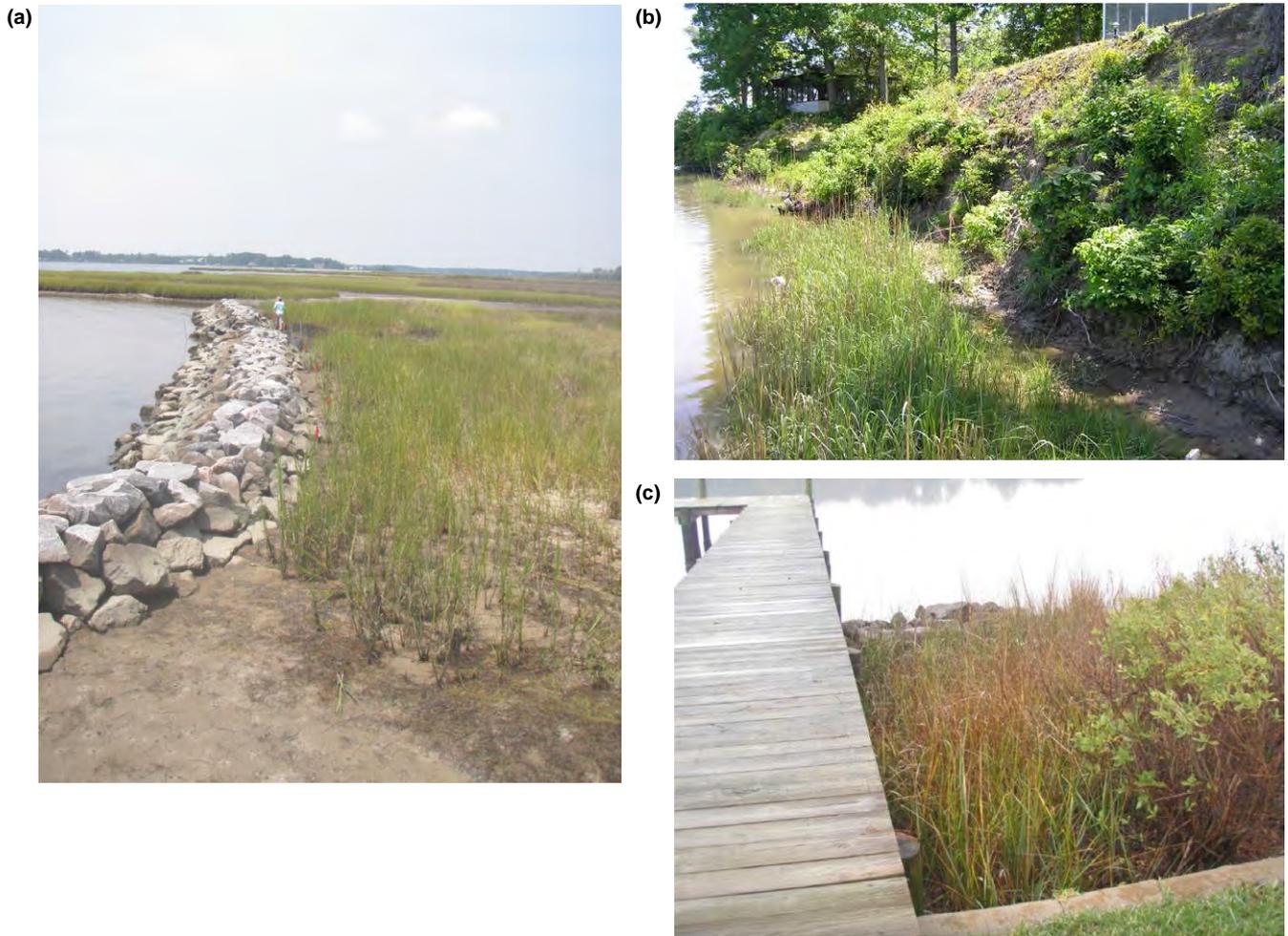


FIGURE 2 Comparison of retreat potential for living shorelines. (a) This living shoreline was constructed adjacent to natural marshes and on a low elevation shoreline with ample opportunity for retreat. However, the somewhat sparse grass may limit its ability to accrete sediment. (b) This marsh is in front of a bluff, which cuts off the retreat pathway but provides sediment for accretion. (c) This living shoreline is built in front of a block retaining wall that cuts off the retreat pathway. Survival under sea level rise will require sufficient sediment accretion to maintain its elevation within the tidal frame

migration potential is limited, so consideration should be given to the surrounding shorelines. Local sediment supply can be greatly reduced by shoreline and bank stabilization, such as retaining walls or bulkheads; therefore, living shorelines in front of or adjacent to unstabilized banks should be more resilient than those where bulkheads and revetments are pervasive. It is also important to consider local conditions that might lead to high subsidence at the marsh location. Marshes persist in areas where the surface accretion is higher than the subsidence rate plus the local sea level rise rate. Some subsidence rates, such as subsidence due to glacial isostatic rebound, are widespread with reliable estimates of magnitude (Piecuch et al., 2018). However, subsidence rates can vary greatly on small scales (20–30 m, Bekaert, Hamlington, Buzzanga, & Jones, 2017) due to local processes such as groundwater withdrawals. In marsh sediments, some subsidence is due to the breakdown of organic material (Morris, 2007); this should be a minor issue for living shorelines since most of them are built on inorganic sediment surfaces and take years (>8 year) to

develop typical marsh sediments (Beck et al., 2017). Locally high subsidence rates result in an increased rate of relative sea level rise in the affected area. Living shorelines in these areas will require higher accretion rates to compensate for the sea level rise and this should be taken into account during project design.

3 | DYNAMIC DESIGN CONSIDERATIONS

Living shorelines can be designed to take advantage of natural processes that enhance sediment accretion, marsh surface elevation, marsh stability and adaptability. Plant growth is an important moderator of all of these characteristics; therefore marsh plantings are integral to living shoreline sustainability. Plant height and density are positively related to the marshes ability to dissipate wave energy (Gedan et al., 2011), which can increase sediment capture (as long as there is sufficient sediment supply) and stimulate accretion. Plants also contribute organic matter to the sediment through root

production, taking up space in the sediment and raising the surface elevation (Baustian, Mendessoeh, & Hester, 2012). Maximizing plant height and root growth requires appropriate nutrient availability. Adding fertilizer to the initial plantings may help maximize plant productivity (Priest, 2017), at least in the early years (2–3 year) after creation. Living shorelines that are partially groundwater-fed may benefit from natural fertilization since they have been shown to remove nitrogen from the groundwater (Beck et al., 2017). Maximizing plant density could be achieved through denser initial planting or encouraging plant spread. Adjusting planting configurations, such as planting marsh vegetation in clumps rather than evenly dispersed, may promote high density plant growth and rapid expansion (Silliman et al., 2015).

Sediment stability is important to prevent marsh erosion and create a stable base for accretion. Edge stabilization is frequently achieved through the use of a rock or oyster sill structures. Sill inclusion in living shorelines can enhance sediment deposition and accretion, given sufficient sediment supply and wave reduction capacity (Currin, Delano, & Valdes-Weaver, 2008), and therefore may help increase their resilience. Marsh-wide, sediment stability can be enhanced by root production which helps to bind the sediment together. In some living shorelines, there may also be fauna that can help bind sediments, such as ribbed mussels (*Geukensia demissa*), which are considered important components of natural marsh stability (Bertness, 1984). Encouraging the settlement of these species may increase marsh stability; however, the construction of ancillary stabilization structures (e.g., rock sills) in living shorelines is likely one contributing factor to observed low recruitment of mussels in living shoreline by reducing larval access to the marsh surface (Bilkovic & Mitchell, 2017). This suggests that using sills to increase edge stability has the potential to affect marsh-wide stability. However, with careful design, impacts from sills can be minimized; enhancing overall marsh resilience. When sills are necessary or desirable to promote sediment accretion and reduce erosion, the use of low elevation sills or low elevation “windows” in the sills should be considered to maximize faunal access to the marsh. Although sills can enhance living shoreline resilience, their effectiveness may decline over time. Rock sills are static structures; as sea level rises, their elevation in the tidal frame and their effectiveness in reducing wave energy will be reduced. Adding biotic components (e.g. oysters) can create a dynamic reef sill (Hall, Beine, & Ortego, 2017) that maintains its elevations under rising sea levels. The oysters also add roughness and complexity to sills, creating natural habitat and dissipating wave energy (Whitman & Reidenbach, 2012).

The slope of the living shoreline marsh and the way in which water enters and leaves the marsh may also affect its resilience. Living shorelines typically have more “perfect” slopes than natural marshes and the high and low marsh widths are controlled by design, not natural feedback loops. Water access may be through more constricted channels than in natural marshes, leading to changes in inundation periods, sedimentation patterns and plant species distributions. All of these factors can affect the living shoreline's response to sea level rise. At this time, there is little

research addressing this issue. One model, which looked at the persistence of a created marsh under sea level rise, suggested that a consistent slope and controlled inundation can lead to a problematic response to sedimentation under accelerated sea level (Vandenbruwaene et al., 2011). As mentioned above, accretion is expected to increase with increasing inundation (under sea level rise); if this is not happening, the living shoreline will eventually drown. More studies of this issue should be done, both models and field tests of different grading plans (e.g. flatter gradients or more microtopography) and water access designs should be studied.

Ultimately, achieving the dynamic design necessary for sea level rise resilience requires a change in attitude by engineers and property owners. Since shoreline stabilization is typically meant to “hold the line” against changing coastal boundaries, there is an expectation that the initial design is also the final design of the project. To truly incorporate sea level rise into a living shoreline requires acceptance and tolerance by the property owners for a dynamic stabilization technique—i.e. their sand and plants may move around over time by design. These shifts are necessary for the living shorelines to be resilient to storms and long-term changes in sea level. Natural succession of plant and animal species and landward retreat of marsh plants should be expected and part of the initial design (Bilkovic, Mitchell, Mason, & Duhring, 2016).

4 | MAINTENANCE

Although the goal is to design living shorelines that naturally accrete and retreat with rising sea levels, it is unrealistic to think this can be achieved in all places and human maintenance of living shorelines may be necessary. Studies of natural marshes show that sea level rise is accelerating at stressful rates in some areas, leading to marsh loss (Mitchell et al., 2017); this is likely also going to be a problem for the living shorelines in the absence of intervention. Long-term augmentation of living shoreline accretion rates may be possible through thin-layer dredge disposal. This is one method that has been used to raise natural marsh elevations (Croft, Leonard, Alphin, Cahoon, & Posey, 2006; Ford, Cahoon, & Lynch, 1999), and may be applicable to living shoreline resilience. In this process, a thin deposit of sediment is sprayed over the marsh surface, with the idea that it will be captured by the vegetation, enhancing marsh accretion. The transferability of this technique to living shorelines needs more research. Even if technically feasible, thin layer dredge disposal may be too expensive and labor intensive for smaller projects. In addition, the depth of the sediment deposit and frequency of application would need to be assessed for each project since local rates of sea level rise and subsidence can vary on small spatial scales.

5 | CONCLUSIONS

Tidal marshes are naturally adaptive systems that alter their location and elevation to fit changing sea levels. Embracing the dynamic characteristics of these systems when designing living shorelines

will result in more resilient shoreline designs. Considering longevity in both project siting and project design is critical to ensuring shoreline protection and the continuation of ecological services from living shorelines. Key considerations include:

- Siting that allows for landward marsh retreat with rising sea levels, wherever possible
- Healthy and appropriate plant communities that can stabilize and accrete sediments with consideration of species diversity and density of plantings to maximize productivity and sediment accretion
- Sill structures designed to enhance sedimentation while not limiting faunal use of the marsh, including the use of “windows” in the sill to promote faunal movement; and which include biotic components, such as oysters, allowing adaptation to rising sea levels
- An improved societal understanding of the benefits of dynamic shoreline protection designs

Living shorelines are rapidly populating our coasts, and are increasingly being considered critical components of flood wave reduction and erosion protection for coastal communities (Sutton-Grier et al., 2015). The resilience of these coastal communities is reliant on the resilience of their living shorelines. A key element mentioned in this paper is the need for the integration of ecologist and engineers in the design of living shorelines. This need has been recognized (e.g. Airoidi et al., 2005; Bilkovic & Mitchell, 2017; Moosavi, 2017) and there are a few examples of it being put into practice (Chapman & Blockley, 2009; Firth et al., 2014). However, there is room for improvement. We recommend three steps towards achieving this goal. First, as mentioned in Toft et al. (2017) the creation of “virtual” forums can help facilitate discussion across disciplines. Second, funding agencies can promote transdisciplinary research through their funding programs. Third, universities can break down barriers between their educational tracks and make cross-disciplinary learning more accessible. These actions could help change the landscape of living shoreline design, resulting in more sustainable coastlines.

ACKNOWLEDGEMENTS

The comments of the editor and two anonymous reviewers helped improve the manuscript. Conclusions in this article were drawn partially from research supported by NSF grant 1600131. This is Contribution No. 3810 of the Virginia Institute of Marine Science, William & Mary.

AUTHORS' CONTRIBUTIONS

M.M. and D.M.B. conceived the ideas for this manuscript. M.M. led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

DATA ACCESSIBILITY

Data have not been archived because this article does not contain data.

BIOSKETCHES

M. Mitchell is an ecologist who researches wetlands, how they change and adapt under sea level rise, and how we can create systems that mimic the important processes of the natural wetland systems, with a particular emphasis on the plant communities.

D.M. Bilkovic is an ecologist and associate professor at Virginia Institute of Marine Science. She has worked on multiple aspects of the ecology of coastal habitats and assemblages. She does research on improving the understanding of social-ecological feedbacks that erode or strengthen coastal resilience, and the role of living shorelines as habitat conservation strategies.

Together they have co-edited a book on living shorelines, authored papers on living shoreline management and both have been lecturers on living shoreline at numerous educational and outreach venues. They also provide advice to state, local and public entities about the impacts of different shoreline solutions on the natural system.

ORCID

Molly Mitchell  <https://orcid.org/0000-0003-4210-285X>

Donna Marie Bilkovic  <https://orcid.org/0000-0003-2002-1901>

REFERENCES

- Airoidi, L., Abbiati, M., Beck, M. W., Hawkins, S. J., Jonsson, P. R., Martin, D., ... Åberg, P. (2005). An ecological perspective on the deployment and design of low-crested and other hard coastal defence structures. *Coastal Engineering*, 52, 1073–1087. <https://doi.org/10.1016/j.coastaleng.2005.09.007>
- Baustian, J. J., Mendessoehn, I. A., & Hester, M. W. (2012). Vegetation's importance in regulating surface elevation in a coastal salt marsh facing elevated rates of sea level rise. *Global Change Biology*, 18(11), 3377–3382. <https://doi.org/10.1111/j.1365-2486.2012.02792.x>
- Beck, A. J., Chambers, R. M., Mitchell, M. M., & Bilkovic, D. M. (2017). Evaluation of Living Shoreline Marshes as a Tool for Reducing Nitrogen Pollution in Coastal Systems. In *Living shorelines: the science and management of nature-based coastal protection*, pp 271-290.
- Bekaert, D. P. S., Hamlington, B. D., Buzzanga, B., & Jones, C. E. (2017). Spaceborne synthetic aperture radar survey of subsidence in Hampton Roads, Virginia (USA). *Scientific Reports*, 7(1), 14752. <https://doi.org/10.1038/s41598-017-15309-5>
- Bertness, M. D. (1984). Ribbed mussels and *Spartina alterniflora* production in a New England salt marsh. *Ecology*, 65(6), 1794–1807. <https://doi.org/10.2307/1937776>
- Bilkovic, D. M., & Mitchell, M. M. (2017). Designing living shoreline salt marsh ecosystems to promote coastal resilience. In D. M. Bilkovic, M. M. Mitchell, M. K. La Peyre, & J. D. Toft (Eds.), *Living shorelines: The science and management of nature-based coastal protection* (pp. 293–316). Boca Raton, FL: CRC Press. <https://doi.org/10.1201/9781315151465>
- Bilkovic, D. M., Mitchell, M., Mason, P., & Duhring, K. (2016). The role of living shorelines as estuarine habitat conservation strategies. *Coastal Management*, 44(3), 161–174. <https://doi.org/10.1080/08920753.2016.1160201>
- Boon, J. D., & Mitchell, M. (2015). Nonlinear change in sea level observed at North American tide stations. *Journal of Coastal Research*, 31(6), 1295–1305. <https://doi.org/10.2112/JCOASTRES-D-15-00041.1>

- Chapman, M. G., & Blockley, D. G. (2009). Engineering novel habitats on urban infrastructure to increase intertidal biodiversity. *Oecologia*, 161, 625–635. <https://doi.org/10.1007/s00442-009-1393-y>
- Croft, A. L., Leonard, L. A., Alphin, T. D., Cahoon, L. B., & Posey, M. H. (2006). The effects of thin layer sand renourishment on tidal marsh processes: Masonboro Island, North Carolina. *Estuaries and Coasts*, 29(5), 737–750. <https://doi.org/10.1007/BF02786525>
- Curran, C. A., Davis, J., & Malhotra, A. (2017). Response of salt marshes to wave energy provides guidance for successful living shoreline implementation. In D. M. Bilkovic, M. M. Mitchell, M. K. La Peyre, & J. D. Toft (Eds.), *Living shorelines: The Science and management of nature-based coastal protection* (pp. 211–234). Boca Raton, FL: CRC Press. <https://doi.org/10.1201/9781315151465>
- Curran, C. A., Delano, P. C., & Valdes-Weaver, L. M. (2008). Utilization of a citizen monitoring protocol to assess the structure and function of natural and stabilized fringing salt marshes in North Carolina. *Wetlands Ecology and Management*, 16(2), 97–118. <https://doi.org/10.1007/s11273-007-9059-1>
- Davis, J. L., Curran, C. A., O'Brien, C., Raffenburg, C., & Davis, A. (2015). Living shorelines: Coastal resilience with a blue carbon benefit. *PLoS ONE*, 10(11), e0142595. <https://doi.org/10.1371/journal.pone.0142595>
- Davis, J. L., Takacs, R. L., & Schnabel, R. (2006). Evaluating ecological impacts of living shorelines and shoreline habitat elements: an example from the upper western Chesapeake Bay. In *Management, policy, science, and engineering of nonstructural erosion control in the Chesapeake Bay* (p. 55).
- Firth, L. B., Thompson, R. C., Bohn, K., Abbiati, M., Airoidi, L., Bouma, T. J., ... Ferrario, F. (2014). Between a rock and a hard place: Environmental and engineering considerations when designing coastal defence structures. *Coastal Engineering*, 87, 122–135. <https://doi.org/10.1016/j.coastaleng.2013.10.015>
- Ford, M. A., Cahoon, D. R., & Lynch, J. C. (1999). Restoring marsh elevation in a rapidly subsiding salt marsh by thin-layer deposition of dredged material. *Ecological Engineering*, 12(3–4), 189–205. [https://doi.org/10.1016/S0925-8574\(98\)00061-5](https://doi.org/10.1016/S0925-8574(98)00061-5)
- Gedan, K. B., Kirwan, M. L., Wolanski, E., Barbier, E. B., & Silliman, B. R. (2011). The present and future role of coastal wetland vegetation in protecting shorelines: Answering recent challenges to the paradigm. *Climatic Change*, 106(1), 7–29. <https://doi.org/10.1007/s10584-010-0003-7>
- Gittman, R. K., Fodrie, F. J., Popowich, A. M., Keller, D. A., Bruno, J. F., Curran, C. A., ... Piehler, M. F. (2015). Engineering away our natural defenses: An analysis of shoreline hardening in the US. *Frontiers in Ecology and the Environment*, 13(6), 301–307. <https://doi.org/10.1890/150065>
- Gittman, R. K., Popowich, A. M., Bruno, J. F., & Peterson, C. H. (2014). Marshes with and without sills protect estuarine shorelines from erosion better than bulkheads during a Category 1 hurricane. *Ocean & Coastal Management*, 102, 94–102. <https://doi.org/10.1016/j.ocecoaman.2014.09.016>
- Hall, S. G., Beine, R., Campbell, M., Ortego, T., & Risinger, J. D. (2017). Growing living shorelines and ecological services via coastal bioengineering. In D. M. Bilkovic, M. M. Mitchell, M. K. La Peyre & J. D. Toft (Eds.), *Living shorelines: The science and management of nature-based coastal protection* (pp. 249–270). Boca Raton, FL: CRC Press. <https://doi.org/10.1201/9781315151465>
- Kirwan, M. L., & Murray, A. B. (2007). A coupled geomorphic and ecological model of tidal marsh evolution. *Proceedings of the National Academy of Sciences of the United States of America*, 104(15), 6118–6122. <https://doi.org/10.1073/pnas.0700958104>
- Mitchell, M., Herman, J., Bilkovic, D. M., & Hershner, C. (2017). Marsh persistence under sea-level rise is controlled by multiple, geologically variable stressors. *Ecosystem Health and Sustainability*, 3(10), 1379888. <https://doi.org/10.1080/20964129.2017.1396009>
- Moosavi, S. (2017). Ecological coastal protection: Pathways to living shorelines. *Procedia Engineering*, 196, 930–938. <https://doi.org/10.1016/j.proeng.2017.08.027>
- Morris, J. T. (2007). Ecological engineering in intertidal saltmarshes. In P. Viaroli, P. Lasserre, & P. Campostrini (Eds.), *Lagoons and coastal wetlands in the global change context: Impacts and management issues* (pp. 161–168). Dordrecht, Netherlands: Springer. <https://doi.org/10.1007/978-1-4020-6008-3>
- Morris, J. T., Sundareshwar, P. V., Nietch, C. T., Kjerfve, B., & Cahoon, D. R. (2002). Responses of coastal wetlands to rising sea level. *Ecology*, 83(10), 2869–2877. [https://doi.org/10.1890/0012-9658\(2002\)083\[2869:ROC WTR\]2.0.CO;2](https://doi.org/10.1890/0012-9658(2002)083[2869:ROC WTR]2.0.CO;2)
- Piecuch, C. G., Huybers, P., Hay, C. C., Kemp, A. C., Little, C. M., Mitrovica, J. X., ... Tingley, M. P. (2018). Origin of spatial variation in US East Coast sea-level trends during 1900–2017. *Nature*, 564(7736), 400. <https://doi.org/10.1038/s41586-018-0787-6>
- Priest III, W. I. (2017). Practical living shorelines. In *Living Shorelines: The Science and Management of Nature-Based Coastal Protection* (pp. 185–210).
- Silliman, B. R., Schrack, E., He, Q., Cope, R., Santoni, A., van der Heide, T., ... van de Koppel, J. (2015). Facilitation shifts paradigms and can amplify coastal restoration efforts. *Proceedings of the National Academy of Sciences of the United States of America*, 112(46), 14295–14300. <https://doi.org/10.1073/pnas.1515297112>
- Smith, J. (2013). The role of *Phragmites australis* in mediating inland salt marsh migration in a mid-Atlantic estuary. *PLoS ONE*, 8(5), e65091. <https://doi.org/10.1371/journal.pone.0065091>
- Sutton-Grier, A. E., Wowk, K., & Bamford, H. (2015). Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems. *Environmental Science & Policy*, 51, 137–148. <https://doi.org/10.1016/j.envsci.2015.04.006>
- Temmerman, S., Govers, G., Wartel, S., & Meire, P. (2004). Modelling estuarine variations in tidal marsh sedimentation: Response to changing sea level and suspended sediment concentrations. *Marine Geology*, 212(1–4), 1–19. <https://doi.org/10.1016/j.margeo.2004.10.021>
- Toft, J. D., Bilkovic, D. M., Mitchell, M. M., & La Peyre, M. K. (2017). A synthesis of living shoreline perspectives. In D. M. Bilkovic, M. M. Mitchell, M. K. La Peyre, & J. D. Toft (Eds.), *Living shorelines: The science and management of nature-based coastal protection* (pp. 481–486). Boca Raton, FL: CRC Press. <https://doi.org/10.1201/9781315151465>
- Van Slobbe, E., de Vriend, H. J., Aarninkhof, S., Lulofs, K., de Vries, M., & Dircke, P. (2013). Building with nature: In search of resilient storm surge protection strategies. *Natural Hazards*, 66(3), 1461–1480. <https://doi.org/10.1007/s11069-013-0612-3>
- Vandenbruwaene, W., Maris, T., Cox, T. J. S., Cahoon, D. R., Meire, P., & Temmerman, S. (2011). Sedimentation and response to sea-level rise of a restored marsh with reduced tidal exchange: Comparison with a natural tidal marsh. *Geomorphology*, 130(3), 115–126. <https://doi.org/10.1016/j.geomorph.2011.03.004>
- Whitman, E. R., & Reidenbach, M. A. (2012). Benthic flow environments affect recruitment of *Crassostrea virginica* larvae to an intertidal oyster reef. *Marine Ecology Progress Series*, 463, 117–191.

How to cite this article: Mitchell M, Bilkovic DM. Embracing dynamic design for climate-resilient living shorelines. *J Appl Ecol*. 2019;00:1–7. <https://doi.org/10.1111/1365-2664.13371>



March 23, 2020

Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

RE: Notice of Intent – SE48-3241
25 Quaise Road

Dear Ms. Erisman:

I am writing to provide information in response to comments at the first public hearing. The existing timber bulkhead has the benefit of appropriate permitting and licenses. Attached is the 1981 Order of Conditions, as well as the 1984 Certificate of Compliance for the structure.

Also attached is the Chapter 91 Waterways License for the existing coastal engineering structure. From Page 3: *“This license is granted upon the further express condition that the authorization contained herein may be modified or may be revoked in whole or in part in the event of the licensee, its successors and assigns, failing to comply with said authorization or any provisions of the license or failing to maintain all authorized structures and installations in good condition, to the satisfaction of the Department of Environmental Quality Engineering or its successors.”*

The purpose of the pending application is to comply with the requirements of the License to maintain the permitted structure. The alternative of installing the exact same configuration as permitted was examined and dismissed on the basis of a greater impact to the interests protected by the Commission. Specifically, the existing bulkhead is supported by steel tie-back rods every eight-feet connected to sheet pile anchors. The replacement of these structural elements would require a much a greater degree of disturbance than the proposed project. The selected alternative of driven steel sheets, which are self-supporting, will not require the excavation and removal of the existing coastal engineering structure, which would destabilize the coastal resource areas.

The proposed return of the bulkhead along the easterly property line has also been selected as the best alternative to maintain the integrity of the licensed structure with minimal impact to the interests protected by the Commission. Also considered were alternatives to install gabions, a stone revetment or coir fiber rolls. All of these alternatives would require excavation and much greater disturbance than the installation of the driven steel sheeting. Without the return, the easterly end of the licensed structure will be subject to erosion behind it, destabilizing both the resource areas and structure.

To the raised question of public access, the proposal does not change the existing condition in terms of access to the intertidal zone. As the tide allows, the public can freely transit the intertidal zone seaward of the bulkhead of the structure in accordance with existing laws and regulations.

I plan to attend the public hearing on this matter to address any questions or concerns.

Sincerely,
Nantucket Engineering & Survey, P.C.
By: Arthur D. Gasbarro, PE, PLS

A handwritten signature in blue ink that reads "Arthur D. Gasbarro". The signature is written in a cursive style and is positioned above a thin horizontal line.

CC: Chuckrow Nominee Trust
Steven L. Cohen
MassDEP - SERO

Nantucket Registry District
NOV 3 1982

RECEIVED FOR REGISTRATION
_____ O'CLOCK _____ m _____ M

Order of Conditions

NCC

to

Adelaide P. Chuckrow

Nantucket Registry District
NOV 3 1982

RECEIVED FOR REGISTRATION
2 O'CLOCK 10 m P. M

NOTED ON CERTIFICATE NO. 4849
IN REGISTRATION BOOK 24 PAGE 114

Attest Josiah S. Bennett
Assistant Recorder

7. No work shall be undertaken until the final order, with respect to the proposed project, has been recorded in the Registry of Deeds for the district in which the land is located within the chain of title of the affected property. The Document number indicating such recording shall be submitted on the form at the end of this order to the issuer of this order prior to commencement of work.
8. A sign shall be displayed at the site not less than two square feet or more than three square feet bearing the words, "Massachusetts Department of Environmental Quality Engineering. Number SE 48-161".
9. Where the Department of Environmental Quality Engineering is requested to make a determination and to issue a superseding order, the Conservation Commission shall be a party to all agency proceedings and hearings before the Department.
10. Upon completion of the work described herein, the applicant shall forthwith request, in writing, that a Certificate of Compliance be issued stating that ~~the work has been satisfactorily completed.~~
11. The work shall conform to the following described plans and additional conditions:
 - a. The proposed project as set forth in the Notice of Intent and the plans attached thereto, dated July 30, 1981, is hereby approved, subject to the following conditions:
 - (1). That members and agents of the Conservation Commission shall have the right to enter and inspect the premises to evaluate compliance with these conditions.
 - (2). That accepted engineering and construction standards and procedures shall be followed in completion of the project.
 - (3). That any changes made or intended to be made in the plans or methods described in the Notice of Intent shall require the applicant to inquire of the Conservation Commission, in writing, whether the change is substantial enough to require a new filing.
 - (4). The new wood bulkhead shall be angled to the northeast corner of the existing concrete seawall at the junction of the bulkhead and the boundary line between the properties. The bulkhead need not extend across the existing stone and concrete revetment but may terminate at its eastern edge.
 - (5). ~~The top of the bulkhead from the point of angle shall taper downwards to the elevation of the seawall or the revetment, whichever is the terminal point.~~
 - (6). The clean fill placed behind the new bulkhead shall be to the top of the bulkhead and up the face of the eroding bank to the angle of repose. The filled area shall be planted with vegetation compatible with existing vegetation along the bank to reduce further erosion.
 - (7). Beach replenishment may be carried out along the existing wood bulkhead using sand compatible in grain size to that existing in the area.

* * * * *

The applicant, any person aggrieved by this order, any owner of land abutting the land upon which the proposed work is to be done, or any ten residents of the city or town in which such land is located, are hereby notified of their right to appeal this order to the Department of Environmental Quality Engineering provided the request is made in writing and by certified mail to the Department within ten (10) days from the issuance of this order.

ISSUED BY: The NANTUCKET CONSERVATION COMMISSION

Benjamin S. Richmond

Paul B. Wani

Carl Burchett

Carl Bennett

Gilbert E. Burchett

On this 28 day of August 1981, before me personally appeared Benjamin S. Richmond to me known to be the person described in and who executed the foregoing instrument and acknowledged that he executed the same as his free act and deed.

Madeline S. Perry
Notary Public

May 6, 1983
My commission expires

DOCUMENT No. 28802

Essex
Essex Registry District
JAN 23 1984

RECEIVED FOR REGISTRATION
1 O'CLOCK 05 m. P. M

NOTED ON CERTIFICATE NO. 4849
IN REGISTRATION BOOK PAGE 114

Attest *Margaret C. Siganto*
Assistant Recorder

DOCUMENT No. 28802

Essex
Essex Registry District
JAN 23 1984

RECEIVED FOR REGISTRATION
O'CLOCK m. M

Cert. of Compliance
NCC

to
Adelaide P. Chukrow

Form 8



Commonwealth
of Massachusetts

DEOE File No. SE 48-161
(To be provided by DEOE)

City/Town Nantucket

Applicant Adelaide P. Chuekrow

Certificate of Compliance Massachusetts Wetlands Protection Act, G.L. c. 131, §40

From NANTUCKET CONSERVATION COMMISSION Issuing Authority

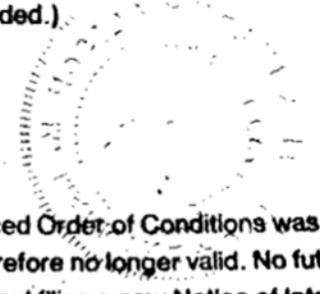
To Ms. Adelaide P. Chuekrow 225 Millwood Rd., Chappaqua, NY 10514
(Name) (Address)

November 17, 1983

Date of Issuance _____

This Certificate is issued for work regulated by an Order of Conditions issued to Adelaide P. Chuekrow dated August 28, 1981 and issued by the Nantucket Conservation Commission.

1. It is hereby certified that the work regulated by the above-referenced Order of Conditions has been satisfactorily completed.
2. It is hereby certified that only the following portions of the work regulated by the above-referenced Order of Conditions have been satisfactorily completed: (If the Certificate of Compliance does not include the entire project, specify what portions are included.)
3. It is hereby certified that the work regulated by the above-referenced Order of Conditions was never commenced. The Order of Conditions has lapsed and is therefore no longer valid. No future work subject to regulation under the Act may be commenced without filing a new Notice of Intent and receiving a new Order of Conditions.



4. This certificate shall be recorded in the Registry of Deeds or the Land Court for the district in which the land is located. The Order was originally recorded on Nov. 3, 1982 (date) at the Registry of Nantucket County, Book _____, Page _____
Registered Land transaction #26131
5. The following conditions of the Order shall continue: (Set forth any conditions contained in the Final Order, such as maintenance or monitoring, which are to continue for a longer period.)

Issued by NANTUCKET CONSERVATION COMMISSION

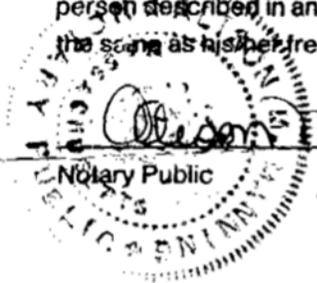
Signature(s) Carl Burchett

Michael J. [Signature] Paul A. Bennett
Charles Pearl
Gilbert E. Burchett

1123
105
6439
105

When issued by the Conservation Commission this Certificate must be signed by a majority of its members.

On this 20th day of January, 19 84, before me personally appeared Carl Burchett, to me known to be the person described in and who executed the foregoing instrument and acknowledged that he/she executed the same as his/her free act and deed.



Oliver J. Manning 10-7-88
 Notary Public My commission expires

Detach on dotted line and submit to the _____

DOCUMENT No. 26239

DOCUMENT No. 26239

License No. 933

Stamphlet Registry District

NOV 30 1982

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

RECEIVED FOR REGISTRATION
11 O'CLOCK 43 m. A.M.

TO

Adelaide P. chuckrow

NOTED ON CERTIFICATE NO. 4849
IN REGISTRATION BOOK 24 PAGE 114

Stamphlet Registry District

NOV 30 1982

RECEIVED FOR REGISTRATION
O'CLOCK m. M

Dated

Attest *Janice S. Bond*
Assistant Recorder

25
11/30
1175

The Commonwealth of Massachusetts

No. 933



Whereas, ADELAIDE P. CHUCKROW-----

of Nantucket-----, in the County of Nantucket----- and Commonwealth aforesaid, has applied to the Department of Environmental Quality Engineering for license to construct and maintain a bulkhead in Nantucket Harbor, in the town of Nantucket-----

and has submitted plans of the same; and whereas due notice of said application, and of the time and place fixed for a hearing thereon, has been given, as required by law, to the Board of Selectmen----- of the Town----- of Nantucket----- :

Now said Department, having heard all parties desiring to be heard, and having fully considered said application, hereby, ~~subject to the approval of the Governor,~~ authorizes and licenses the said

Adelaide P. Chuckrow-----, subject to the provisions of the ninety-first chapter of the General Laws, and of all laws which are or may be in force applicable thereto, to

construct and maintain a bulkhead in Nantucket Harbor, at her property in the Town of Nantucket, in conformity with the accompanying License Plan No. 933, (two sheets).

An existing timber bulkhead may be maintained as constructed along the mean high water line of Nantucket Harbor, described as follows:

Commencing at the licensee's easterly property line said bulkhead may extend in a northwesterly direction a distance of approximately 10 feet, thence turn in a westerly direction along said mean high water for a distance of approximately 120 feet.

A timber bulkhead with a tie-back system may be constructed and maintained, extending from said existing bulkhead in a southwesterly direction a distance of approximately 81 feet where it may meet existing mortared riprap. Said bulkhead may have a top elevation varying from 9.0 to 9.5 feet above the mean low water datum.

Fill may be placed and maintained on the upland side of said bulkhead as indicated of the sectional views of the license plans.

All work authorized hereby shall be in the location shown and in accordance with the details indicated on License Plan No. 933.

Duplicate of said plan, numbered -----933----- is on file in the office of said Department, and original of said plan accompanies this License, and is to be referred to as a part hereof.

~~The amount of tide-water displaced by the work hereby authorized has been ascertained by said Department, and compensation thereof has been made by the said~~

Nothing in this license shall be construed as authorizing encroachment on or over property not owned or controlled by the licensee, except with the consent of the owner or owners thereof.

Acceptance of this license shall constitute an agreement by the licensee, to conform to all terms and conditions herein stated.

This license is granted subject to all applicable Federal, State, County and Municipal laws, ordinances and regulations.

This license is granted upon the express condition that use by boats or otherwise of the structures hereby licensed shall involve no discharge of sewage or other polluting matter into the adjacent tidewaters, except in strict conformity with the requirements of the local and State health departments and the Division of Water Pollution Control.

This license is granted upon the further express condition that any other authorizations necessitated due to the provisions hereof shall be secured prior to the commencement of any work under this license.

This license is granted upon the further express condition that the authorization contained herein may be modified or may be revoked in whole or in part in the event of the licensee, its successors and assigns, failing to comply with said authorization or any provisions of the license or failing to maintain all authorized structures and installations in good condition, to the satisfaction of the Department of Environmental Quality Engineering or its successors. This condition permitting modification or revocation of the license shall also apply in the event of the failure of the licensee, its successors and assigns, to secure approval under all other applicable laws, ordinances or regulations or failure to adhere to the conditions of such approvals upon receipt of such failure provided by an agency having jurisdiction. Revocation or modification of this license as provided herein shall be without liability to the Commonwealth or claim for compensation by the licensee, its successors and assigns.

This license is granted upon the further express condition that the licensee, its successors and assigns, shall upon request in writing by the Department of Environmental Quality Engineering or its successors, change the location of said ~~lower it to such depth, or raise it to such height, as said~~ Department may prescribe or remove it entirely from said waters, and said licensee, by accepting this license shall be deemed to consent and agree to the condition herein set forth, and in case of any refusal or neglect on the part of the licensee, its successors and assigns, to comply with this condition, then this license shall be wholly void and the Commonwealth, by its proper officers, may proceed to remove or to cause the removal of said ~~at the expense of said licensee, its successors and assigns, as an unauthorized and unlawful structure in said waters.~~

by paying into the treasury of the Commonwealth

~~for each cubic yard so displaced, being the amount hereby assessed by said Department.~~

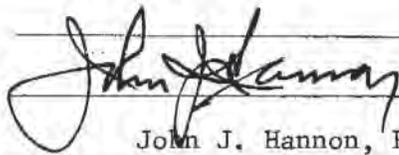
Nothing in this License shall be so construed as to impair the legal rights of any person.

This License shall be void unless the same and the accompanying plans are recorded within one year from the date hereof, in the Registry of Deeds for the _____ District of the County of Nantucket.

In Witness Whereof, said Department of Environmental Quality Engineering have hereunto set their hands this eighteenth _____ day of November _____ in the year nineteen hundred and eighty-two.

Commissioner

Chief Engineer



John J. Hannon, P.E.

Department of
Environmental Quality
Engineering

THE COMMONWEALTH OF MASSACHUSETTS

~~This license is approved in consideration of the payment into the treasury of the Commonwealth by the said _____ of the further sum of _____ the amount determined by the Governor as a just and equitable charge for rights and privileges hereby granted in land of the Commonwealth.~~

BOSTON, _____

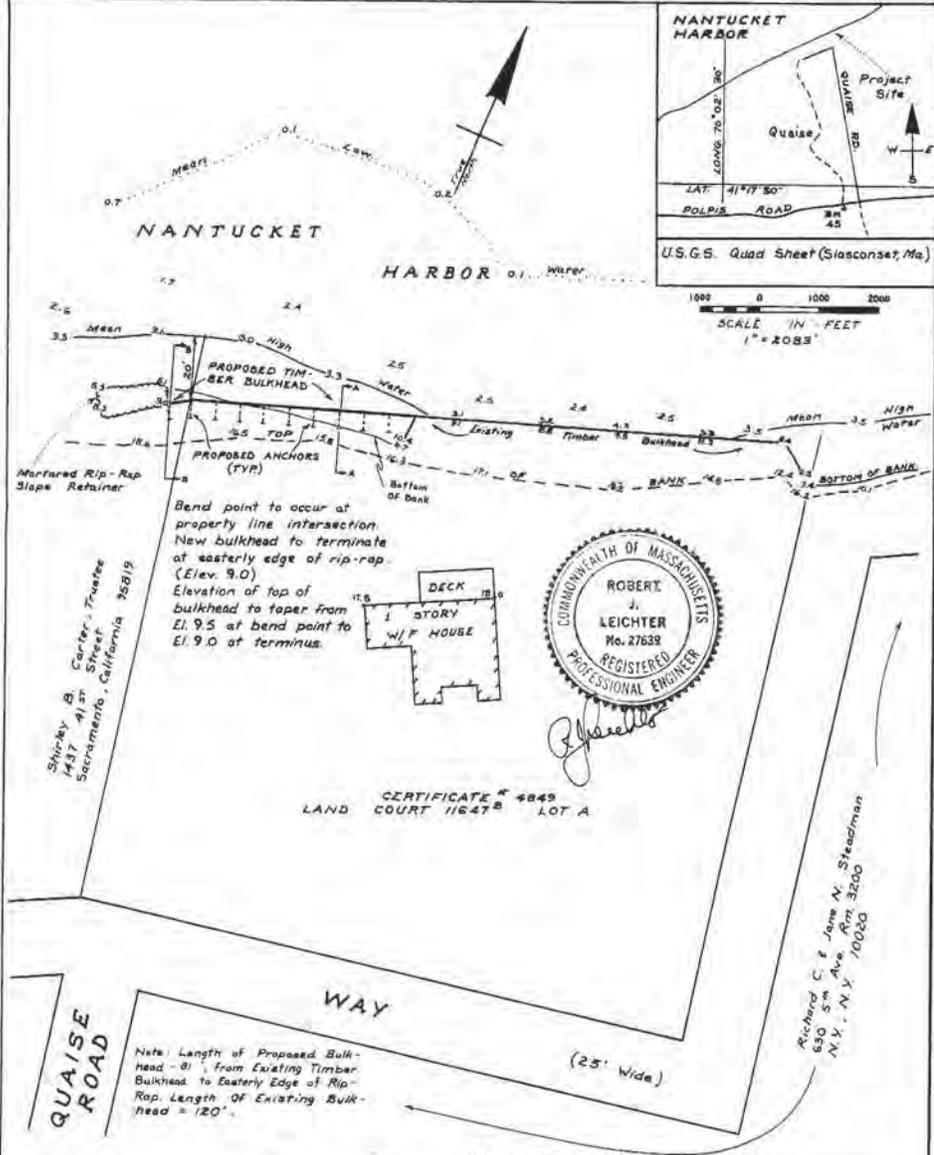
Approved by the Governor.

Governor

GENERAL LAW 36 SECTION 13A
 I CERTIFY THAT THIS PLAN CONFORMS
 WITH THE RULES AND REGULATIONS OF
 THE REGISTERS OF DEEDS.

Michael S. Bachman 5-20-82

REGISTERED LAND SURVEYOR



Shirley B. Carter, Trustee
 1417 Alvar Street
 Sacramento, California 95819

Bend point to occur at
 property line intersection.
 New bulkhead to terminate
 at easterly edge of rip-rap
 (Elev. 9.0)
 Elevation of top of
 bulkhead to taper from
 El. 9.5 at bend point to
 El. 9.0 at terminus.



CERTIFICATE # 4849
 LAND COURT 11647² LOT A

Richard C. & Jane N. Steadman
 590 5th Ave. Apt. 3200
 N.Y., N.Y. 10020

QUAISE ROAD

WAY

(25' Wide)

Note: Length of Proposed Bulkhead - 81' from Existing Timber Bulkhead to Easterly Edge of Rip-Rap. Length of Existing Bulkhead = 120'.

Datum: Mean Low Water - 1934 U.S.C.T.G.S.

PLAN ACCOMPANYING PETITION OF
ADELAIDE P. CHUCKROW
 TO CONSTRUCT AND MAINTAIN A BULKHEAD
 IN NANTUCKET HARBOR, TOWN OF
 NANTUCKET, COUNTY OF NANTUCKET,
 MASSACHUSETTS Date: 5-20-82



LICENSE PLAN NO. 933
 Approved by Department of Environmental Quality Engineering
 of Massachusetts **NOVEMBER 18, 1982**
 COMMISSIONER
 CHIEF ENGINEER

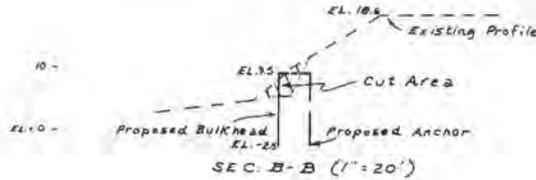
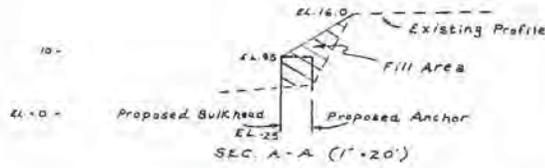
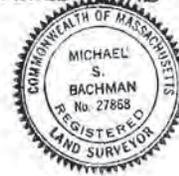
Richard C. Steadman

GENERAL LAW 36 SECTION 13A

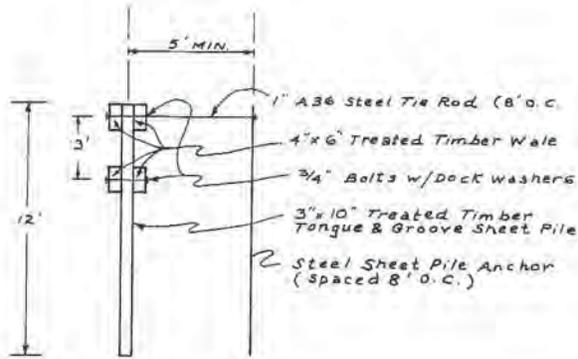
I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

Michael S. Bachman 5-20-82

REGISTERED LAND SURVEYOR



R. J. Leichter



TYPICAL CROSS-SECTION
(NO SCALE)

LICENSE PLAN NO. 933

Approved by Department of Environmental Quality Engineering
NOVEMBER 18, 1982



April 24, 2020

Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

RE: Notice of Intent – SE48-3241
25 Quaise Road

Dear Ms. Erisman:

In response to the discussion at the last public meeting (4/16/20), the Applicant would like to offer a five-foot wide pedestrian easement along the top of the bulkhead, as shown in the attached, revised site plan. The easement would connect from the Land Bank property to the west, to the Town-owned Quaise Road layout on the east. The Applicant is providing this as a substantial benefit to the both the Public, and to further the interests protected by the Commission.

I plan to attend the public hearing on this matter, though please feel free to contact me should you have any questions or concerns with this request in the meantime.

Sincerely,
Nantucket Engineering & Survey, P.C.
By: Arthur D. Gasbarro, PE, PLS

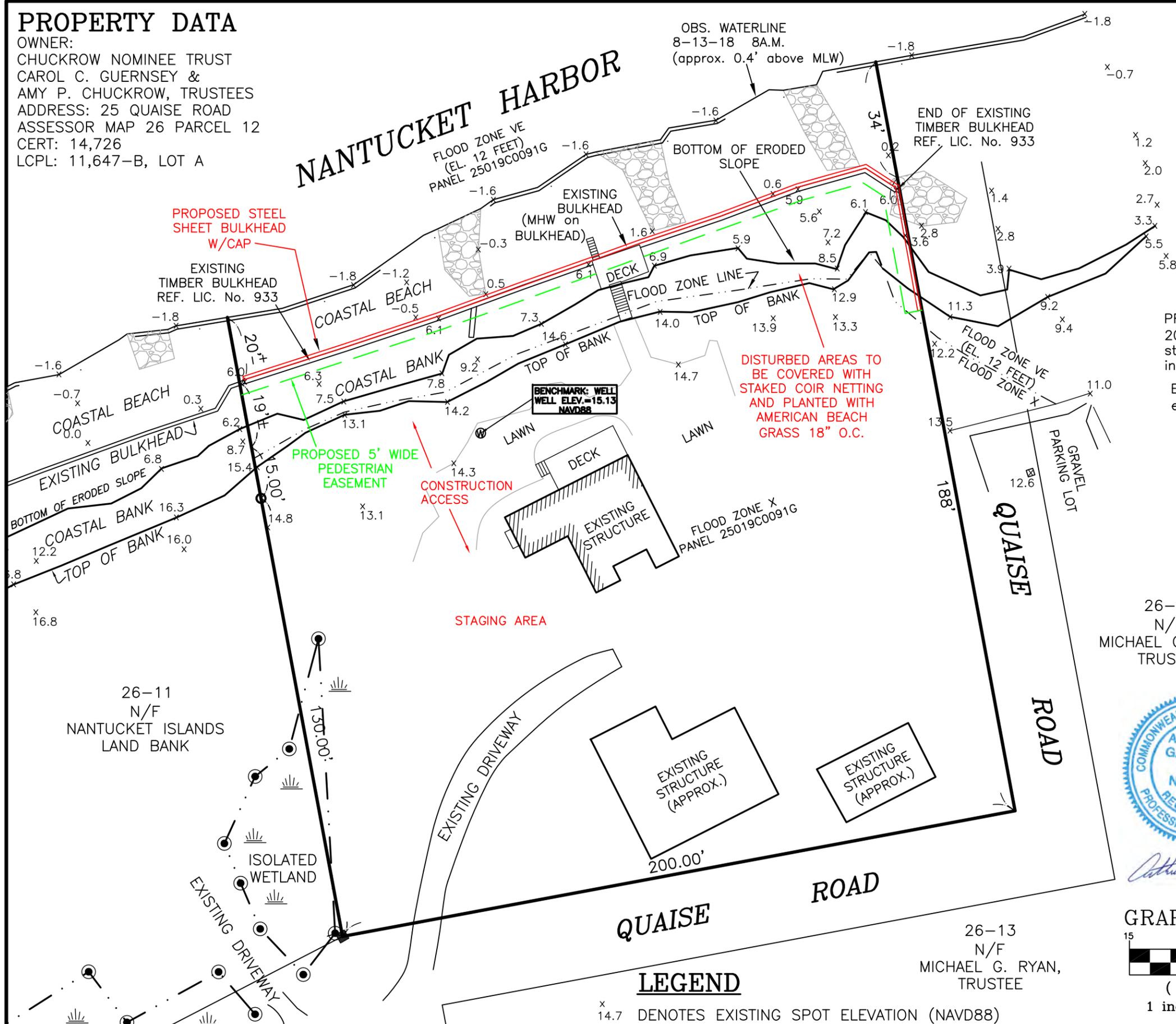
A handwritten signature in blue ink that reads "Arthur D. Gasbarro".

Cc: MassDEP – SERO
Chuckrow Nominee Trust
Steven L. Cohen

PROPERTY DATA

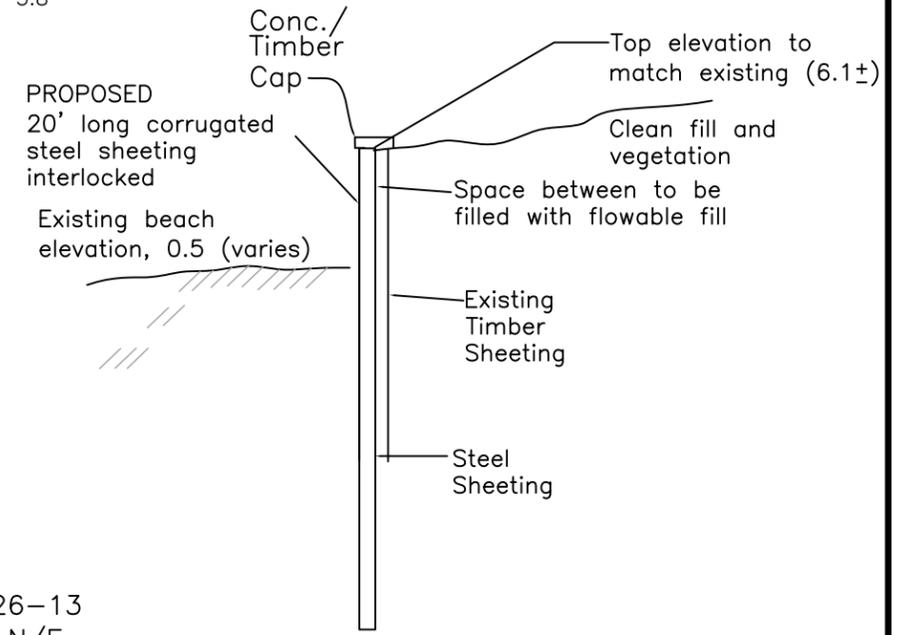
OWNER:
 CHUCKROW NOMINEE TRUST
 CAROL C. GUERNSEY &
 AMY P. CHUCKROW, TRUSTEES
 ADDRESS: 25 QUAISE ROAD
 ASSESSOR MAP 26 PARCEL 12
 CERT: 14,726
 LCPL: 11,647-B, LOT A

NANTUCKET HARBOR



THIS PLOT PLAN WAS PREPARED FOR THE NANTUCKET CONSERVATION COMMISSION ONLY AND SHOULD NOT BE CONSIDERED A PROPERTY LINE SURVEY. THIS PLAN SHOULD NOT BE USED TO ESTABLISH PROPERTY LINES, FENCES, HEDGES OR ANY ANCILLARY STRUCTURES ON THE PREMISES. THE PROPERTY LINES SHOWN RELY ON CURRENT DEEDS AND PLANS OF RECORD. THIS PLOT PLAN IS NOT A CERTIFICATION AS TO TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT ASSESSOR RECORDS.

Bulkhead Cross-Section



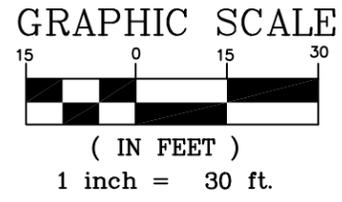
DISTURBED AREAS TO BE COVERED WITH STAKED COIR NETTING AND PLANTED WITH AMERICAN BEACH GRASS 18" O.C.

26-13
 N/F
 MICHAEL G. RYAN,
 TRUSTEE



Arthur D. Gasbarro
 4/21/20

SITE PLAN OF LAND TO ACCOMPANY A NOTICE OF INTENT IN NANTUCKET, MA PREPARED FOR CHUCKROW NOMINEE TRUST 25 QUAISE ROAD MAP 26 PARCEL 12 AUGUST 14, 2019 REV. APRIL 21, 2020 SCALE: 1"=30'



LEGEND

x 14.7 DENOTES EXISTING SPOT ELEVATION (NAVD88)

26-13
 N/F
 MICHAEL G. RYAN,
 TRUSTEE





Nantucket Land Council

Six Ash Lane
Post Office Box 502
Nantucket, Massachusetts 02554

508 228-2818

Fax 508 228-6456

nlc@nantucketlandcouncil.org

www.nantucketlandcouncil.org

Board of Directors

Lucy S. Dillon
President

Paul A. Bennett
Vice President

William Willet
Vice President

Neil Martila
Treasurer

Susan E. Robinson
Clerk

Matt Anderson
Susan Baer
Mary-Randolph Ballinger
Larry Breakiron
William S. Brenizer
Karen K. Clark
Christine Donelan
Josh Eldridge
Thomas V. Farrell
Robert Friedman
Nancy Gillespie
Nathanael Greene
Charles A. Kilvert III
Laurel Ried Langworthy
Lucy Leske
Matthew B. Liddle
Keltie Donelan McDonald
Peter McCausland
Eileen P. McGrath
Carl H. Sjolund
H. Brooks Smith
Lars Soderberg
David Troast
Peter Watrous

Honorary Directors

Howard N. Blitman
William M. Crozier, Jr.

Scientific Advisor

James W. Sutherland, Ph.D.

Staff

Emily Molden
Executive Director

RJ Turcotte
Resource Ecologist

Meg McNeely Browers
Development Director

May 8, 2020

Ms. Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

Re: re: NOI; Chuckrow Nominee Trust, 25 Quaise Road (Map 26, Parcel 12)

Dear Commissioners,

The Nantucket Land Council, Inc. is a 501(c)(3) member supported non-profit organization. We have reviewed the material related to the Notice of Intent filing by Chuckrow Nominee Trust for the installation of a steel sheet bulkhead in front of the existing timber bulkhead, as well as the construction of a steel sheet return bulkhead along the eastern boundary of the property. We would like to make the following comments.

RESOURCE AREA IMPACTS

Installation of a steel sheet bulkhead in front of the failing timber bulkhead: While we acknowledge the applicant's right to maintain this existing structure, the applicant has not demonstrated a detailed alternatives analysis for options suggested by Commissioners such as green shoreline bulkhead alternatives or moving the dwelling away from the eroding coastal bank. The applicant must demonstrate to the Commission why these alternatives are not possible before proceeding with the new steel bulkhead option.



Proposed steel sheet bulkhead return along the eastern property line: This structure must be considered separately by the Commission as a new structure. It is not grandfathered in the manner the rest of the proposed bulkhead structure is. The grandfathering/pre-existing use clause in the Bylaw reads:

“Allows that the use and normal maintenance of any structure or alteration of land, within wetland resource areas and their buffers, existing at the time of enactment of MGLCh131s40 (effective date 1972) or the Town of Nantucket Wetlands Protection Bylaw (effective date 1983), or subsequent revisions, may be continued subject to the following:

- *Existing structures, uses and/or alterations of land may not be extended and/or modified unless such extension or modification is permitted by a finding of the Commission that such alteration or modification shall have no adverse impact to the resource areas and interests protected by the Town of Nantucket Wetlands Protection Bylaw.*
- *Existing structures, uses and/or alterations of land which have been abandoned for five years or more shall not be reestablished, and any future use shall conform with then-current provisions of the Town of Nantucket Wetlands Protection Bylaw, as appropriate.”*

PERFORMANCE STANDARDS

Nantucket Wetland Protection Regulations

Section 2.02, Coastal Beaches, (B) #2 states “No new bulkheads or coastal engineering structures shall be permitted to protect structures constructed, or substantially improved, after 8/78. Bulkheads may be rebuilt only if the Commission determines there is no environmentally better way to control an erosion problem, including in appropriate cases the moving of the threatened building. Other coastal engineering structures may be permitted only upon a clear showing that no other alternative exists to protect a structure built prior to 9/78, and not substantially improved, from imminent danger.”

The applicant has not provided a detailed alternatives analysis for the reasonable alternatives presented by Commissioners and members of the public, such as green shoreline bulkhead alternatives, or moving the dwelling away from the coastal beach. This performance standard has not been met.

Section 2.05, Coastal Banks, (B) #1 states “No new bulkheads, coastal revetments, groins, or other coastal engineering structures shall be permitted to protect structures constructed, or substantially improved, after 8/78 except for public infrastructures. Bulkheads and groins may be rebuilt only if the Commission determines there is no environmentally better way to control an erosion problem, including in appropriate cases the moving of the threatened buildings and/or public infrastructure. Other coastal engineering structures may be permitted only upon a clear showing that no other alternative exists to protect a structure that has not been substantially improved or public infrastructure built prior to 9/78, from imminent danger.”

The applicant has not provided a detailed alternatives analysis for the reasonable alternatives presented by Commissioners and members of the public, such as green shoreline bulkhead alternatives, or moving the dwelling away from the coastal beach. This performance standard has not been met.

Section 2.05, Coastal Banks, (B) #3 states "All projects shall be restricted to activity as determined by the Commission to have no adverse effect on bank height, bank stability, wildlife habitat, vegetation, wetland scenic view, or the use of the bank as a sediment source."

The new steel sheet bulkhead return along the eastern property line will have an adverse impact on bank stability and the use of the bank as a sediment source. Not only will this new structure eliminate the subject parcel as a sediment source for Nantucket Harbor, but it will also accelerate erosion on the adjacent town owned property, hindering public access and creating another "private peninsula" in Nantucket harbor. This performance standard has not been met.

Section 2.05, Coastal Banks, (B) #7 states "In areas of an eroding coastal bank, the distance from all new structures to the coastal bank shall be at least 20 times the average annual erosion rate or 100 feet, whichever is the lesser. The average annual erosion rate shall be determined by averaging the annual erosion rate over a 150-year period ending with the date the NOI was filed, or if no NOI was filed, the date construction began. If erosion data is not available for the 150-year period, the Commission shall determine the average annual erosion rate from such lesser time for which erosion data is available. In cases where documentation can be provided to show that the use of the 150-year period is inappropriate to existing coastal shoreline characteristics and trends, alternate shoreline change rates may be used with the approval of the Commission."

Since the proposed eastern return, a steel sheet bulkhead, is not grandfathered under the Bylaw and thus defined as a new structure, it cannot be constructed in the location proposed under the Nantucket Wetland Protection Bylaw. This performance standard has not been met.

CONCLUSION

The project proposed in this NOI will have adverse impacts to resources protected under the Nantucket Wetlands Protection Bylaw including Coastal Beach and Coastal Bank. The structure as proposed will exacerbate erosion along Nantucket Harbor, hinder public access to the shore, and eliminate the coastal bank and beach on the subject parcel as a sediment source for the littoral system. The return proposed along the easterly property line is not grandfathered under the Bylaw and must be considered a new and separate coastal engineering structure. This return, if permitted, will accelerate erosion on the Town-owned property to the east of 25 Quaise Road, eliminate the coastal bank and coastal beach as sediment sources, and hinder public access along the shore of Nantucket Harbor.

The applicant has not provided a detailed alternatives analysis detailing why the dwelling cannot be moved elsewhere on the property or why the use of green shoreline bulkhead alternatives is not feasible. The applicant has stated that the steel bulkhead proposed will cause less disturbance

to the resource area during installation than the bulkhead alternatives. While this may be true, the long-term benefits of a bulkhead alternative for the resource area have not been addressed by the applicant. As stated above, the project as proposed does not meet the performance standards of the Nantucket Wetland Protection Regulations or the Massachusetts Wetlands Protection Act Regulations.

Thank you for your time.

Sincerely,

A handwritten signature in black ink, appearing to read 'RJ Turcotte', with a large, sweeping flourish at the end.

RJ Turcotte
Resource Ecologist



June 5, 2020

Ms. Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

Re: Notice of Intent
25 Quaise Road
SE48-3241

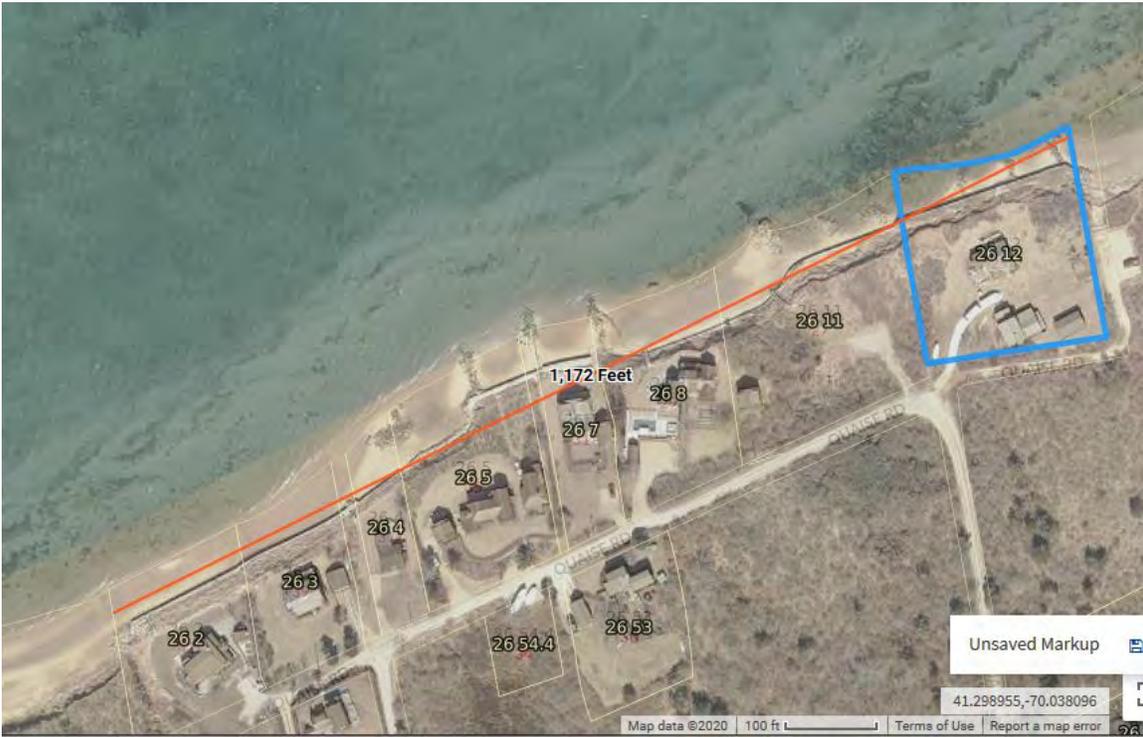
Dear Ms. Erisman:

I am writing to provide additional information related to the pending referenced application. We understand from the comments at the first two public hearings that the Commission is interested in reviewing a more detailed analysis of the alternatives to the project. The analysis below evaluates the merits of 10 alternative approaches, including review of protected interests of the Wetlands Protection Act and Nantucket Wetlands Bylaw and a project-impact analysis on potential effects from the proposed work. Further, the Applicant agrees with a condition that no work will be performed between April 1st and August 31st.

The conclusions of this analysis are:

- The project is being permitted under an existing Chapter91 Waterways License with a right to maintain and repair; this project is proposed as a more environmentally sensitive option than rebuilding the wooden bulkhead per the referenced license. The Applicant prefers not to exercise that right when there are preferred environmental alternatives as demonstrated by the materials provided with this application.
- The impact and alternatives analysis demonstrate that the project is approvable as proposed, and that softer coastal stabilization alternatives are not a viable option to replace the licensed and permitted coastal structure in this location.
- The Living Shoreline alternative was investigated and determined not to be well-suited for this location due to the steep coastal bank in proximity to the water sheet. Further, it is well established by State and Local regulation, as well as long-standing policy of this Commission that one resource area is not destroyed to create another.
- The public access proposed here along the top of the bulkhead is a large benefit that cannot be required beyond the intertidal zone.
- The Commission has approved similar projects recently, including last month and next door.

As an overarching consideration, we wish to emphasize that the proposed project is a small part of an armored shoreline that extends more than 1000-feet to the west (see figure on the following page). Deviation from the current armoring approach at the property could jeopardize the integrity and resiliency of the other protected properties. The proposed extension landward at the eastern end of the property to maintain the structural integrity of the structure represents only 3% (approximately 37 feet) of the overall length of the armored shoreline and is a valuable component to reduce future disturbance to the resource area for further maintenance. The minor extension proposed here is comparable to the extension permitted immediately next door, with no waivers required as a water-dependent use. The difference with this application is that an easement for pedestrian access is being offered along the top of the bulkhead, beyond the limit of intertidal zone. Without the extension to protect the end of the structure, the offered pedestrian easement along the top of the bulkhead is impractical.



Alternatives Analysis

The first alternative requires no action, but is deemed to be non-viable as it does not meet current licensing requirements:

- **No Action** – The Coastal Bank and Permitted/Licensed Coastal Engineering Structure (CES) will continue to be damaged by storm-related erosion if no action is taken. This alternative would not meet the requirements of the current waterways License that the CES is to be maintained in good repair.

Nine alternatives require removal of the existing wood bulkhead prior to installation, a process that will create substantial disturbance to the resource areas. Further, these alternatives could involve construction within the coastal beach area, which at this site is in the inter-tidal zone. Impacts to this area can be avoided by the selected alternative. These alternatives include:

- **Sand Drift Fence with Nourishment** – This option allows for the rapid transport of unconsolidated nourishment material which may have a detrimental effect on nearby eelgrass beds. Further, this alternative does not provide adequate protection for the property and coastal engineering structure on the property. This alternative would not meet the requirements of the current waterways License that the CES is to be maintained in good repair.
- **Living Shoreline** – This alternative would require extensive disturbance to the resource areas and buffer zones. The 15-foot-high coastal bank would need to be substantially destroyed in order to provide beach area for the living shoreline installation above mean high water. This is due to the current location of mean high water on the face of the existing bulkhead. Further, the top of the coastal bank would need to be relocated a substantial distance southerly toward the existing pre-1978 structures. Those structures would then be at greater risk of loss due to erosion. The alternative to relocate the structures on the property is limited by the number of structures, the size of the lot, zoning and setbacks to the septic system. Also, of concern is the impact on the stability of the existing CES on the adjacent property; a living shoreline would put the structural integrity of that structure into jeopardy and substantially increase instability of the coastal bank and increase erosion. Finally, the Living Shoreline concept is not well suited to this location due to the steep coastal bank in proximity to the water sheet.
- **Anchored Coir Fiber Rolls with Reinforced Sand Lifts and Cover Nourishment** – This option would not achieve the goal of the proposed project as it would require extensive disturbance to the resource areas and buffer zones. The coastal bank would need to be altered and partially destroyed in order to provide the area above mean high water for the installation. This alternative would also require considerable maintenance effort and future activity/disturbance.
- **Geotextile Fabric Tubes** – This option would provide good resistance to wave damage however this option is also susceptible to damage from vandalism, debris, and UV degradation. It would also require extensive disturbance of the resource areas.
- **Stone Gabions** – This option would provide good resistance to wave damage. However, it would also require extensive disturbance of the resource areas, as well as consideration of past unfavorable action by the Commission. Disposal of materials could be a concern if removal was required in the future.

- **Marine Mattresses** – This option would provide good resistance to wave damage. However, it would also require extensive disturbance of the resource areas. Other concerns about this option include some on-going maintenance costs and past unfavorable action by the Commission.
- **Stone Revetment** – This option provides a high level of protection but is dismissed due to requiring extensive disturbance of the resource areas and buffer zones, as well as consideration of past unfavorable action by the Commission.
- **Wooden Bulkhead** – This option provides a high level of protection but is dismissed due to concern for extensive disturbance of the resource areas and related impacts. In order to rebuild the existing bulkhead, new tiebacks would be required which would necessitate excavation behind the timber. It would be very difficult to do so at this site in a manner which protects the adjacent coastal beach and land under the ocean from impacts.

The following preferred alternative does not require removal of the existing bulkhead, which substantially reducing impact on the resource area during construction:

- **Steel Bulkhead with Extension (*Most Favorable Alternative*)** This option provides a high level of protection, is consistent with past approvals of the Commission as described below, and minimizes disturbance of the resource areas and related impacts. As previously presented, the steel bulkhead will be self-supporting so that it can be driven in front of the timber bulkhead without the need for removal of that structure or extensive excavation behind it.

Project-Impact Analysis of Protected Interests of Coastal Bank and Coastal Beach Resource Areas

Bank Height – The project will not alter, and therefore have no adverse effect or impact on the height of the bank.

Bank Stability – The project will improve the stability of the bank, without adverse impact on the stability of the bank.

Wildlife Habitat – The project will have no adverse effect or impact on wildlife through the utilization of protective measures including no work on the project between April 1st and August 31st.

Vegetation – The project will have no adverse effect or impact on vegetation on the bank. The project will improve the stability of the bank, thereby providing better conditions for survival of vegetation.

Use of the Bank as a Sediment Source – The project will not alter the rate at which sediment is available to the Beach due to the current bulkhead and existence of boulders and rocks along the proposed extension.

Wetland Scenic Views – The project will have no adverse effect or impact on the wetland scenic views as views will not be altered from a public way to the resource area.

Public or Private Water Supply – The project will not interfere with water supplies in any way, and therefore have no impact on public or private water supplies.

Groundwater – The project will have no impact to groundwater. No dewatering or handling of water is proposed as part of this project.

Flood Control – The project will not alter the flood control function of the Bank.

Erosion Control – The project will not alter the ability of the bank to buffer against erosion.

Storm Damage Prevention – The project will not alter the function of the Bank to prevent storm damage.

Water Pollution – The project will not cause pollution of surface water or groundwater. The proposed project will contain and stabilize materials from the failing bulkhead which could otherwise lead to pollution.

Fisheries – The project will have no adverse impact on fisheries because the work proposed below the mean high-water line is less than two-feet from the existing bulkhead in the intertidal zone where fish could not exist at low-tide.

Shellfish – The project will have no adverse impact on shellfish because the work is proposed below the mean high-water line is less than two-feet from the existing bulkhead in an area devoid of shellfish.

Rare species, including rare, threatened or endangered plant species and animals and habitats – The project will have no adverse impact on rare species as the work will adhere to time of year restrictions.

Recreation – The project will have no adverse impact on recreation because the use of the property is not changing. Access across the beach in the intertidal zone will be maintained at all times during construction.

Near-term resources-area impacts – the ability to construct the proposed structure without removing the old structure will mean substantially reduced disturbance to the protected resource areas and adjacent buffer zones

Long-term resource area impacts – long-term disruption to the resource area will be best avoided by the project's choice of durable materials, which eliminate the need for replacement more often in the future.

Approved Comparison Projects

The Commission has issued Orders of Conditions for very similar projects in nearly identical situations. As just a few examples within Nantucket Harbor -

- Most recently, at 27 Easy Street, the attached Amended Order of Conditions (SE48-3002) was issued on May 1, 2020 to the Nantucket Islands Land Bank for the installation of steel sheet bulkhead seaward of a timber bulkhead, including an additional structural wall return along the abutting property.
- At 28 Easton Street, an Order of Conditions (SE48-2978) was issued for the installation of steel sheet bulkhead seaward of a timber bulkhead, and a Certificate of Compliance for the work issued in October 2019.
- Immediately adjacent to the proposed project, at 27 Quaise Road, an Order of Conditions (SE48-1900) was issued for the installation of steel sheet bulkhead seaward of a timber bulkhead, including an extension. This structure was constructed, including the extension, with an issued Certificate of Compliance.

In closing, the proposed project represents responsible maintenance of a permitted and licensed structure, while minimizing adverse impacts to the interests in the resource areas protected by the Commission. Further, the project is very similar to others for which Orders of Conditions have been approved, and the Applicant agrees to the same set of conditions for the proposed project. I plan to attend your next hearing to review this material and address any questions.

Sincerely,

A handwritten signature in blue ink that reads "Arthur D. Gasbarro". The signature is written in a cursive style and is contained within a light blue rectangular box.

Arthur D. Gasbarro, PE, PLS

Cc: MassDEP – SERO
Chuckrow Nominee Trust
Steven L. Cohen

FINDINGS and ADDITIONAL CONDITIONS
Nantucket Islands Land Bank
DEP FILE NUMBER SE48 – 1900
ASSESSOR'S MAP 26 PARCEL 11
27 Ouaise Road
UNDER THE MASSACHUSETTS WETLANDS PROTECTION ACT
(MGL CHAPTER 131, SECTION 40)
AND THE WETLANDS BYLAW OF THE TOWN OF NANTUCKET
(CHAPTER 136)

This Order permits the repair/reconstruction and extension of a bulkhead with steel sheeting along the base of an eroding coastal bank, reconstruction of beach stairs, repair and planting of portions of the coastal bank and limited beach nourishment within beach and coastal bank resource areas.

FINDINGS

1. Applicant Names Nantucket Islands Land Bank DEP File Number SE48-1900 .
2. This Order of Conditions is being issued based upon strict accordance with the information submitted in the Notice of Intent dated 3/23/06 and the Plans of Record dated 7/7/06 and stamped by Arthur Gasbarro. Also considered was other pertinent supplemental information including but not limited to:
 - Letter from Blackwell & Associates, Inc. dated 7/7/06
 - Letter from the Massachusetts Division of Marine Fisheries dated 5/30/06
 - Letters from Town Biologist dated 4/13/06 & 5/22/06
3. Areas subject to protection/regulation are coastal bank and coastal beach. The Town Biologist examined the site and offered no findings relative to shellfish or shellfish habitat therefore resource areas including land containing shellfish and/or land containing scallops are determined not to be present within the project site.
4. This Order is in accordance with a vote by the Nantucket Conservation Commission to close the public hearing on 7/12/06 and a vote to issue Orders taken by the Commission on 7/12/06.
5. This Order permits the repair/reconstruction and extension of a bulkhead with steel sheeting along the base of an eroding coastal bank, reconstruction of beach stairs, repair and planting of portions of the coastal bank and limited beach nourishment within beach and coastal bank resource areas.
6. The Commission finds the applicant has documented that the construction of the existing and threatened residential structure predates 8/78. Further, the Commission has determined that there is no environmentally better way to control the erosion problem than as proposed (reconfiguration of the existing bulkhead, coastal bank repair and plantings with limited beach nourishment) by the applicant.

7. The Commission finds that the placement of controlled amounts of clean fill on the beach constitutes beach nourishment.
8. The Commission finds that the work proposed and permitted by this Order will serve to protect the interests of MGLCh131s40 and the Nantucket Wetlands Protection Bylaw by minimizing the design of a previously permitted coastal erosion control structure and will serve to enhance the interests of MGLCh131s40 and the Nantucket Wetlands Protection bylaw by repairing the integrity of the coastal bank face and carefully nourishing a sediment depleted coastal beach system.

In addition to the above referenced GENERAL CONDITIONS the Commission has found it necessary to include the following Additional Conditions pursuant to MGLCh131s40 and the Town of Nantucket Wetlands Protection Bylaw, Chapter 136. The above listed General Conditions and Findings are automatically part of this Order of Conditions.

ADDITIONAL CONDITIONS

18. A minimum of three weeks prior to the start of work, the applicant, construction supervisor and Commission staff shall meet on the site to confirm all construction protocols. Within 48 hours of the pre-construction onsite, the applicant shall provide the Commission with construction protocols for final review and approval.
19. No machinery or materials shall be stored within 25 feet of the top of the coastal bank or on the coastal beach.
20. All beach nourishment materials shall consist of medium to coarse grained sands and shall be approved as to source and composition by the Commission staff. The applicant shall provide the Commission with the source of nourishment materials and a sieve analysis or sample a minimum of 48 hours prior to use at the site.
21. Should it be determined that any portion of the existing backfill material behind the timber bulkhead and in front of the proposed steel sheeting is unsuitable for beach nourishment that material shall be removed and disposed of outside the jurisdiction of the Commission.
22. During installation of the steel sheet pilings, the applicant shall provide the Commission office with daily construction reports and photographs.

WAIVERS UNDER THE NANTUCKET WETLANDS BYLAW/REGULATIONS:

No waivers are required based on Findings #6, 7 and 8.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NILB - Quaise
DEP File Number:

WPA Form 8B – Certificate of Compliance

SE48-1900
Provided by DEP

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And-the Town of Nantucket Bylaw Chapter 136

A. Project Information



2009 00002666
Bk: 1200 Pg: 161 Page: 1 of 2
Doc: COC 09/25/2009 11:52 AM

1. This Certificate of Compliance is issued to:

Nantucket Islands Land Bank

Name

22 Broad Street

Mailing Address

Nantucket

City/Town

MA

State

02554

Zip Code

2. This Certificate of Compliance is issued for work regulated by a final Order of Conditions issued to:

Nantucket Islands Land Bank

Name

July 14, 2006

Dated

SE48-1900

DEP File Number

3. The project site is located at:

27 Quaise Road

Street Address

26

Assessors Map/Plat Number

Nantucket

City/Town

11

Parcel/Lot Number

the final Order of Condition was recorded at the Registry of Deeds for:

Nantucket Islands Land Bank

Property Owner (if different)

Nantucket

County

1032

Book

16

Page

Certificate

4. A site inspection was made in the presence of the applicant, or the applicant's agent, on:

Date

B. Certification

Check all that apply:

- Complete Certification:** It is hereby certified that the work regulated by the above-referenced Order of Conditions has been satisfactorily completed.
- Partial Certification:** It is hereby certified that only the following portions of work regulated by the above-referenced Order of Conditions have been satisfactorily completed. The project areas or work subject to this partial certification that have been completed and are released from this Order are:

B. Certification (cont.)

- Invalid Order of Conditions:** It is hereby certified that the work regulated by the above-referenced Order of Conditions never commenced. The Order of Conditions has lapsed and is therefore no longer valid. No future work subject to regulation under the Wetlands Protection Act may commence without filing a new Notice of Intent and receiving a new Order of Conditions.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 8B – Certificate of Compliance
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And-the Town of Nantucket Bylaw Chapter 136

NILB - Quaise
DEP File Number:

SE48-1900
Provided by DEP



Ongoing Conditions: The following conditions of the Order shall continue: (Include any conditions contained in the Final Order, such as maintenance or monitoring, that should continue for a longer period).
Condition Numbers:

C. Authorization

Issued by:

Nantucket
Conservation Commission

September 18, 2009
Date of Issuance

This Certificate must be signed by a majority of the Conservation Commission and a copy sent to the applicant and appropriate DEP Regional Office (See Attachment).

Signatures:

Ernest Steinauer
Ernest Steinauer
Sarah Oktay
Sarah Oktay
Andrew Bennett
Andrew Bennett
Mary Wawro
Mary Wawro

John D. Braginton-Smith
John D. Braginton-Smith
David Gray, Sr.
David Gray, Sr.
John Brescher
John Brescher

Notary Acknowledgement

Commonwealth of Massachusetts County of Nantucket

On this 16th Day of September Month 2009 Year

before me, the undersigned Notary Public, personally appeared

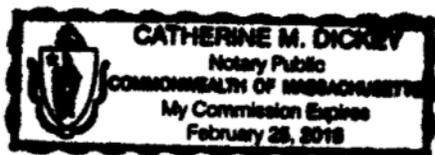
Ernest Steinauer
Name of Document Signer

proved to me through satisfactory evidence of identification, which was/were

Personally Known
Description of evidence of identification

to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose.

As member of Nantucket City/Town Conservation Commission



Catherine M. Dickey
Signature of Notary Public
Catherine M. Dickey
Printed Name of Notary Public
2/25/2018
My Commission Expires

Place notary seal and/or any stamp above

FINDINGS and ADDITIONAL CONDITIONS

Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40)

Town of Nantucket Wetlands Bylaw (Chapter 136)

Address: 28 Easton Street
 Assessor's Map and Parcel: 42.1.4-15
 Property Owner: 28 Easton Street Realty Trust
 Applicant: 28 Easton Street Realty Trust
 DEP File Number: SE48-2978
 Filing Date: June 9, 2017
 Date Hearing Closed: June 21, 2017
 Date Orders Issued: June 21, 2017
 Plan of Record Information: Site Plan of Land, dated June 1, 2017 and stamped by Arthur D. Gasbarro, P.E.

Permit Overview:

This order permits the construction of a new bulkhead in front of an existing failing bulkhead, replacement of the pier and the installation of pilings. Waivers are not required for this project.

Additional Findings:

1. The area falls outside mapped habitat areas and does not require NHESP review.
2. The Commission finds that the existing structure was constructed prior to the enacting of the Wetlands Protection Act and Town of Nantucket Wetlands Bylaw.

In addition to the General Conditions contained elsewhere in this document, the Commission includes the following Special Conditions pursuant to MGLCh131s40 and the Town of Nantucket Wetlands Protection Bylaw, Chapter 136:

18. All work shall be performed in accordance with the Site and Work Description contained within the Notice of Intent and plan notes set out on the plan of record, provided project narratives, and protocols.
19. Excluding the barge and materials on the barge all materials and machinery are to be stored outside of the resource areas.
20. All refueling of land based machinery must be done in excess of fifty feet from the upland side of the timber bulkhead.
21. The barge shall maintain the best possible separation from the bottom of the vessel and Land Under the Ocean at all times.
22. A siltation boom shall be attached to the barge and setup to confine the active work area.
23. Any work beyond May 1st will require authorization from Commission staff.

WAIVERS UNDER THE NANTUCKET WETLANDS BYLAW/REGULATIONS

Waivers are not required for the project as proposed.



2019 00163164

Cert: 26177 Doc: COC
Registered: 10/02/2019 11:00 AM



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 8B – Certificate of Compliance
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

SE48-2978
Provided by DEP

A. Project Information

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



- This Certificate of Compliance is issued to:
 28 Easton Street Realty Trust, Richard J. Glidden, Trustee
 Name
 37 Centre Street
 Mailing Address
 Nantucket MA 02554
 City/Town State Zip Code
- This Certificate of Compliance is issued for work regulated by a final Order of Conditions issued to:
 28 Easton Street Realty Trust, Richard J. Glidden, Trustee
 Name
 06/21/2017 SE48-2978
 Dated DEP File Number
- The project site is located at:
 28 Easton Street Nantucket
 Street Address City/Town
 42.1.4 15
 Assessors Map/Plat Number Parcel/Lot Number
 the final Order of Condition was recorded at the Registry of Deeds for:
 28 Easton Street Realty Trust, Richard J. Glidden, Trustee
 Property Owner (if different)
 Nantucket 155509
 County DOC NO. Book Page
 26177
 Certificate
- A site inspection was made in the presence of the applicant, or the applicant's agent, on:
 09/22/2019
 Date



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 8B – Certificate of Compliance
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

SE48-2978
Provided by DEP

B. Certification

Check all that apply:

- Complete Certification:** It is hereby certified that the work regulated by the above-referenced Order of Conditions has been satisfactorily completed.

- Partial Certification:** It is hereby certified that only the following portions of work regulated by the above-referenced Order of Conditions have been satisfactorily completed. The project areas or work subject to this partial certification that have been completed and are released from this Order are:

- Invalid Order of Conditions:** It is hereby certified that the work regulated by the above-referenced Order of Conditions never commenced. The Order of Conditions has lapsed and is therefore no longer valid. No future work subject to regulation under the Wetlands Protection Act may commence without filing a new Notice of Intent and receiving a new Order of Conditions.

- Ongoing Conditions:** The following conditions of the Order shall continue: (Include any conditions contained in the Final Order, such as maintenance or monitoring, that should continue for a longer period).

Condition Numbers:

C. Authorization

Issued by:

Nantucket
Conservation Commission

09/25/2019
Date of Issuance

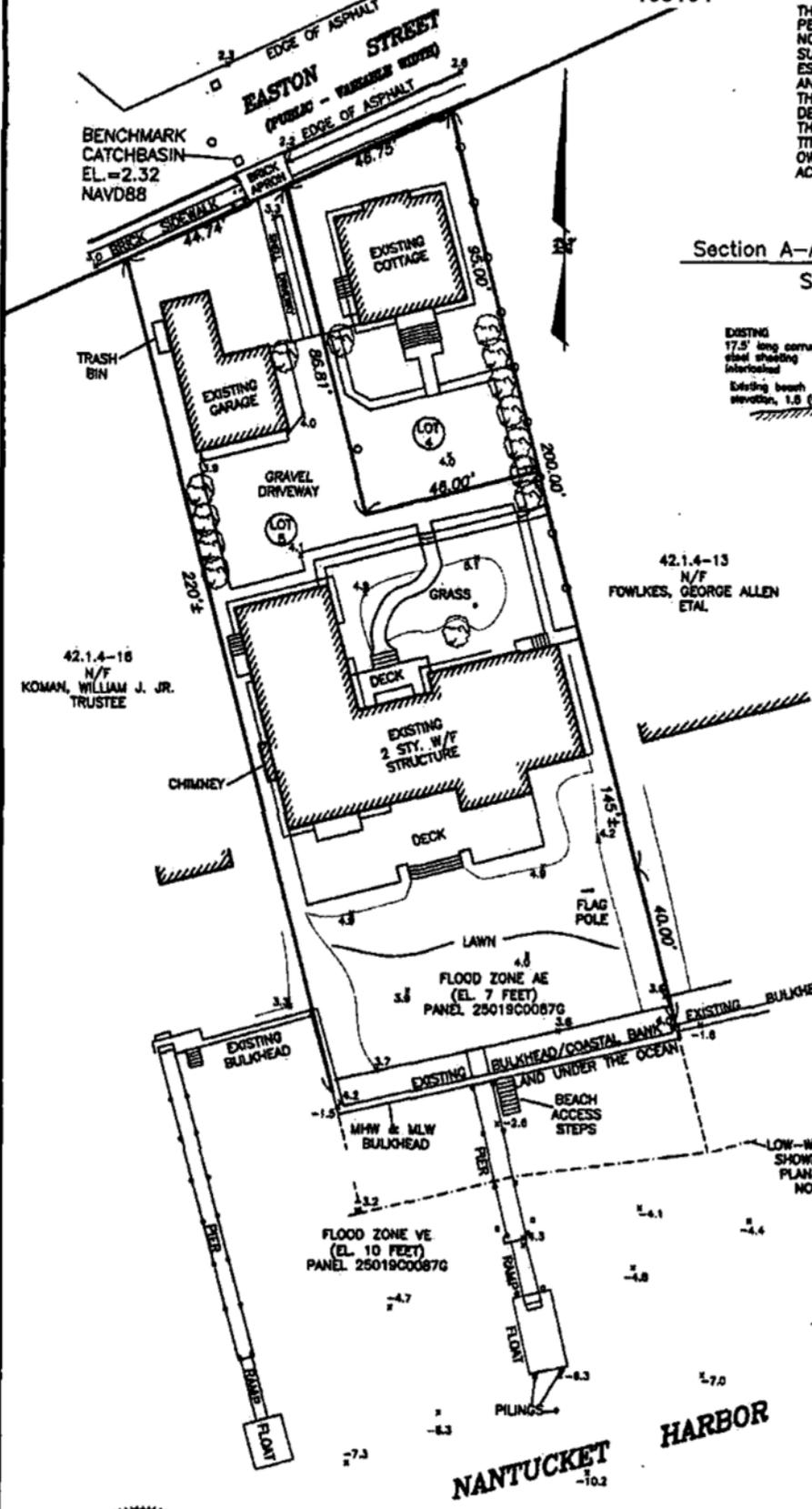
This Certificate must be signed by a majority of the Conservation Commission and a copy sent to the applicant and appropriate DEP Regional Office (See <http://www.mass.gov/dep/about/region/findyour.htm>).

Signatures:

Adrian
de
Ernest Steiner
[Signature]

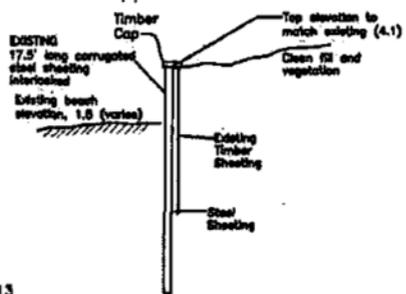
David Lydon
Man O'Key

THIS PLOT PLAN WAS PREPARED FOR PERMITTING PURPOSES ONLY AND SHOULD NOT BE CONSIDERED A PROPERTY LINE SURVEY. THIS PLAN SHOULD NOT BE USED TO ESTABLISH PROPERTY LINES, FENCES, HEDGES OR ANY ANCILLARY STRUCTURES ON THE PREMISES. THE PROPERTY LINES SHOWN RELY ON CURRENT DEEDS AND PLANS OF RECORD. THIS PLOT PLAN IS NOT A CERTIFICATION AS TO TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT ASSESSOR RECORDS.



Section A-A' Bulkhead Cross-Section

Scale: 1"=10'

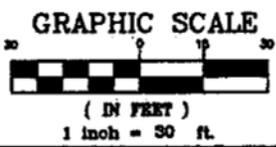


42.1.4-16
N/F
KOMAN, WILLIAM J. JR.
TRUSTEE

42.1.4-15
N/F
FOWLKES, GEORGE ALLEN
ETAL



PROPERTY DATA
OWNER: 28 EASTON STREET REALTY TRUST
RICHARD J. GLIDDEN, TRUSTEE
ADDRESS: 28 EASTON STREET
ASSESSOR MAP 42.1.4 PARCEL 15
CERT: 22985
LCPL 4802-D LOTS 4 & 5



-11.2 **SITE PLAN OF LAND**
IN NANTUCKET, MA
PREPARED FOR:
28 EASTON STREET
REALTY TRUST
RICHARD J. GLIDDEN, TRUSTEE
28 EASTON STREET
MAP 42.1.4 PARCEL 15
SEPTEMBER 20, 2019
SCALE: 1"=30'



FINDINGS and ADDITIONAL CONDITIONS

Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40)

Town of Nantucket Wetlands Bylaw (Chapter 136)

Address: 21 & 27 Easy Street
 Assessor's Map and Parcel: 42.4.2 – 20 & 18
 Property Owner: Nantucket Islands Land Bank
 Applicant: Nantucket Islands Land Bank
 DEP File Number: SE48-3002
 Filing Date: August 18, 2017
 Date Hearing Closed: November 15, 2017
 Date Orders Issued: November 15, 2017
Date Amended: July 31, 2019
Date 2nd Amendment: April 30, 2020
 Plan of Record Information: Existing Conditions Plan (Sheet 1 of 2) and Proposed Site Plan (Sheet 2 of 2), dated 8/17/2007 and stamped by Roger Paul Michniewicz
 Materials and Grading Plan (L1.01), dated 8/18/2017
Amended Plan of Record: 21 & 27 Easy Street (2 sheets) dated 08.17.2017, final revision of 07/10/19, and stamped by Roger Paul Michniewicz
2nd Amended Plan of Record: Proposed Site Plan, dated 08.17.2017, final revision of 04/08/20 and stamped by Roger Paul Michniewicz, P.E.

Permit Overview:

This order permits the removal of an existing dwelling, installation of piles, installation of decking, installation of brick walkways, installation of hardscaping, plantings with associated grading, landscaping and utilities within Land Under the Ocean, Coastal Bank, Land Subject to Coastal Storm Flowage and their accompanying buffer zones. Waivers are not required for this project. **This project is amended to include the repair/ replacement of the existing bulkhead, the installation of a subsurface wall, and sand blasting of the existing bulkhead. This Order is amended to include the installation of fencing, installation of rip-rap, installation at safety ladders, elimination of the mock trolley rail lines in the walkways.**

Additional Findings:

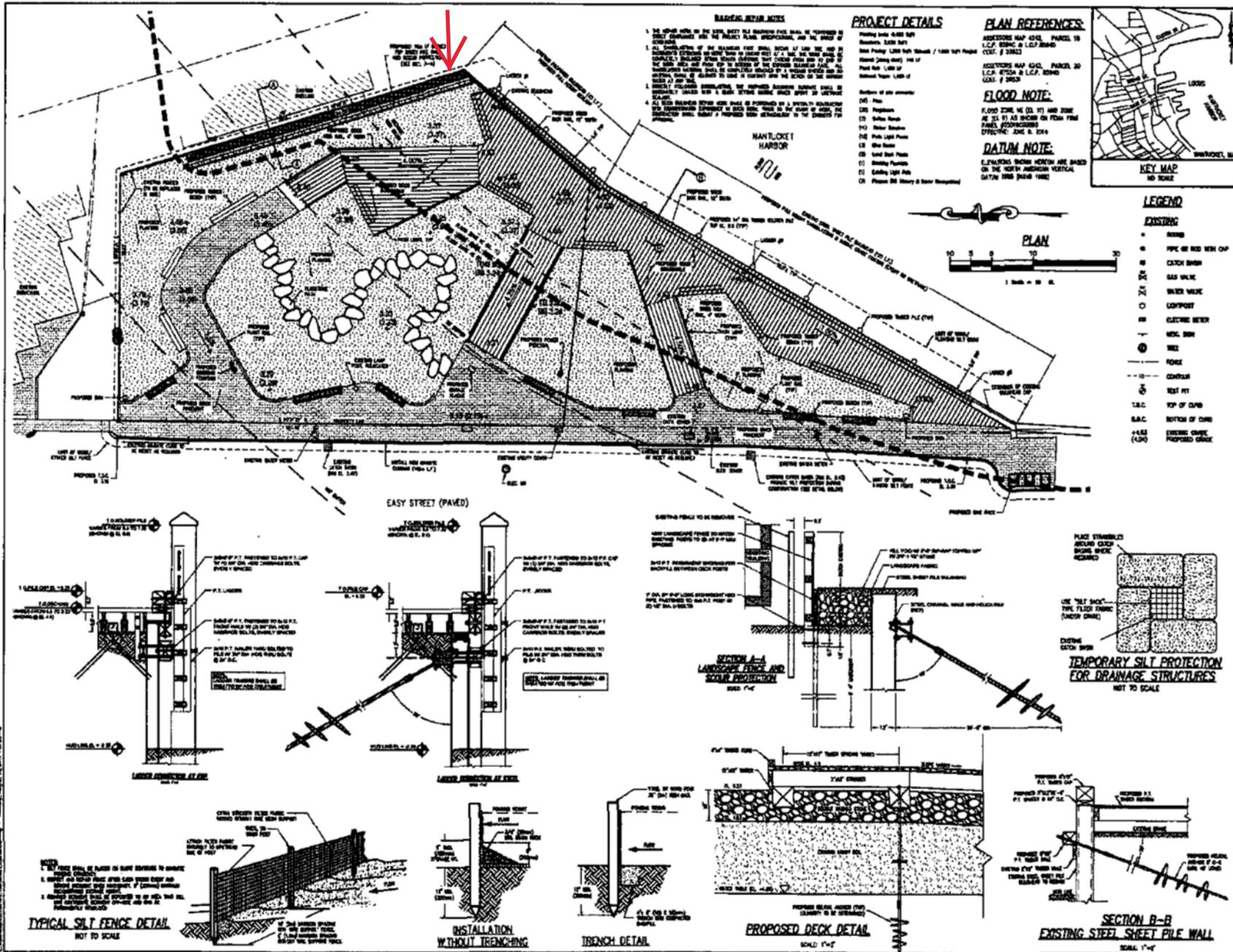
1. The area falls outside mapped habitat areas and required NHESP review.
2. The Commission finds that the public purpose of this project is to provide access to Nantucket Harbor and constitutes a water dependent use.

In addition to the General Conditions contained elsewhere in this document, the Commission includes the following Special Conditions pursuant to MGLCh131s40 and the Town of Nantucket Wetlands Protection Bylaw, Chapter 136:

18. All work shall be performed in accordance with the Site and Work Description contained within the Notice of Intent and plan notes set out on the plan of record, provided project narratives, and protocols.

WAIVERS UNDER THE NANTUCKET WETLANDS BYLAW/REGULATIONS

Waivers are not required for the project as proposed.



21 & 27 EASY STREET

NANTUCKET, MA

Client/Owner
Nantucket Land Bank/Commission
22 Broad Street
Nantucket, MA 02554
Tel: 508.226.7300
Fax: 508.226.4549

Landscaper/Architect
Michael Van Tol/Design/Architecture, Inc.
Landscaper/Architect
66 Chest Street, 11th Floor
Brooklyn, New York 11201
Tel: 718.343.2004
Fax: 718.343.1299

Civil/Structural/Environmental Engineer - Surveyor
Central Engineering
5400 Country Highway
Orlando, MA 02813
Tel: 508.255.6811
Fax: 508.255.6700

Soil Scientist
Pro and Shovel Environmental Services
307 Rouben Road
Orlando, MA 02819
Tel: 508.255.6811
Fax: 508.255.6700

Engineer
WCT Engineer
11A Nantucket Manor Blvd., Etc.
Nantucket, MA 02554
Tel: 508.221.7002

Electrical and Plumbing Engineer
CDO Electricians
125 Avonmore Ave., Suite 4
Parsippany, NJ 07054
Tel: 908.339.5244
Tel: 908.339.5265



Conservation Commission Submission

NO.	DATE	DESCRIPTION
1	05.17.2017	PROPOSED SITE PLAN
2		
3		
4		
5		
6		
7		
8		
9		
10		

PROPOSED SITE PLAN

JOB NUMBER: C18018.00 SHEET NO. 2 OF 2
DATE: 05.17.2017
SCALE: AS NOTED
DRAWN BY: MDJ
CHECKED BY:



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Amended Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
 And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
 SE48-3002
 MassDEP File # _____
 eDEP Transaction # _____
 Nantucket
 City/Town _____

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

05/1/2020

1. Date of Issuance

Please indicate the number of members who will sign this form.

6

This Order must be signed by a majority of the Conservation Commission.

2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

See Vote Recorded in Book 1743 Page 48 Doc #COV

Signatures:

Ashley Erisman

 Ashley Erisman (C)
Jan Golding

 Jan Golding (VC)

 David La Fleur

Joseph Topham

 Joseph Topham
Seth Engelbourg

 Seth Engelbourg
Maureen Phillips

 Maureen Phillips
Mark C. Beale

 Mark C. Beale

by hand delivery on

by certified mail, return receipt requested, on

05/01/2020

Date

Date

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.



NOTICE OF INTENT APPLICATION

**FOR ADDITIONS TO SINGLE-FAMILY DWELLINGS
WITHIN A LANDSCAPED BUFFER ZONE TO
VEGETATED WETLANDS**

At

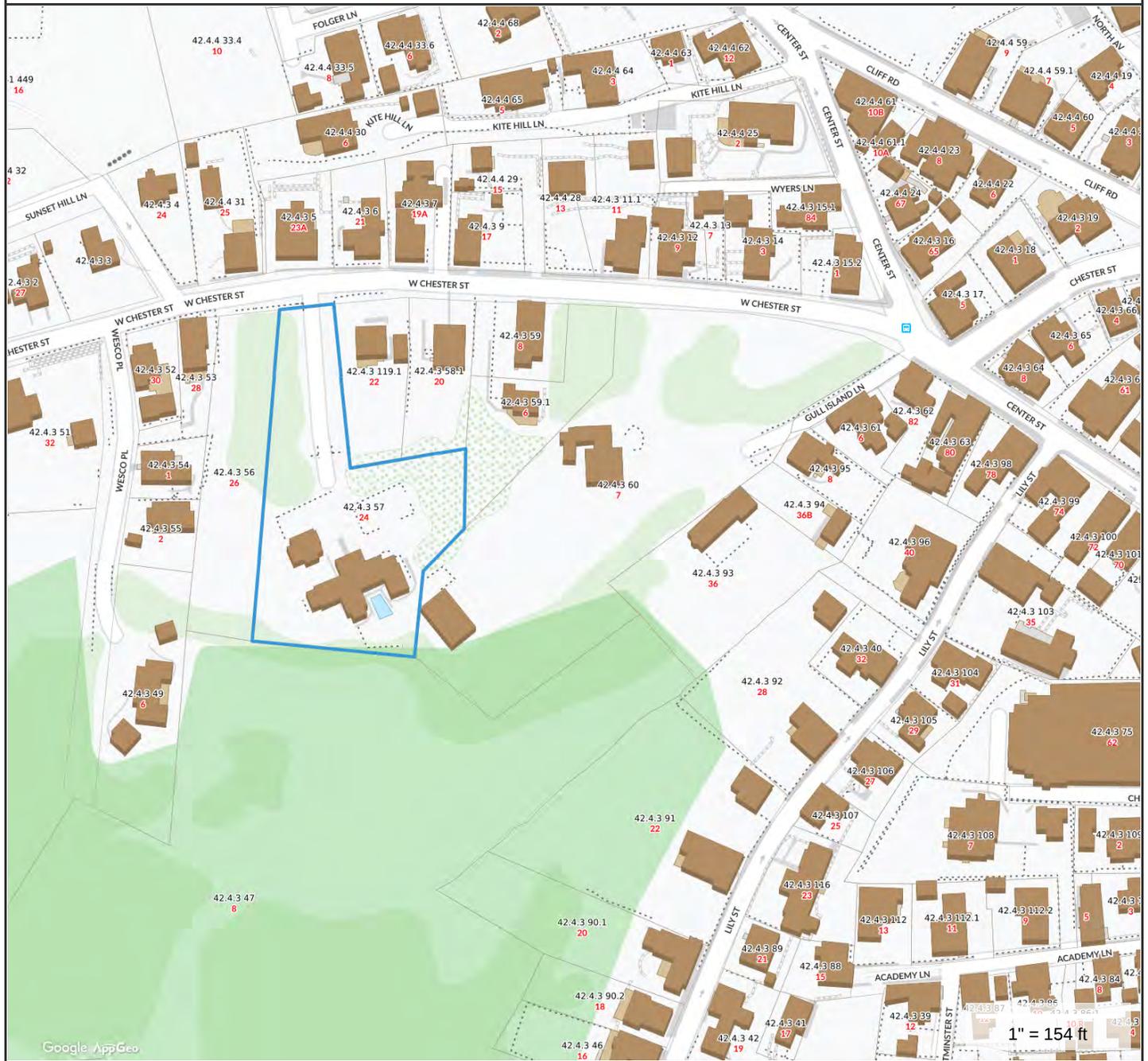
24 WESTCHESTER STREET

MAY 2020

Prepared For

CROQUET PITCH, LLC

Locus Map



Property Information

Property ID 42.4.3.57
Location 24 W CHESTER ST
Owner ZEVIK PAUL A



MAP FOR REFERENCE ONLY NOT A LEGAL DOCUMENT

Town and County of Nantucket, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Geometry updated 11/13/2018
 Data updated 11/19/2018



May 21, 2020

Ms. Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

Re: Notice of Intent
24 Westchester Street
Map 42 .4.3 Parcel 57

Dear Ms. Erisman:

On behalf of the property owner, Croquet Pitch, LLC, Nantucket Engineering & Survey, P.C. is submitting this Notice of Intent (NOI) to the Nantucket Conservation Commission for proposed activities within the Buffer Zone to Vegetated Wetlands at the above referenced property (the "Site") in Nantucket, Massachusetts.

Proposed activities at the Site consist of constructing additions to existing structures within landscaped areas of the Buffer Zones to Vegetated Wetlands, which is located on an adjacent lot. Attached are permit drawings, including plans showing a site locus, existing conditions including resource area locations, and proposed construction areas.

A completed WPA Form 3 – Notice of Intent is attached along with the NOI Wetland Fee Transmittal Form including checks for \$42.50, \$67.50, \$25 and \$200 to cover the WPA filing fee, Nantucket Wetland by-law fee and the Nantucket Expert Review fee. Also included is a check for \$335.10 to the Inquirer & Mirror for publication of the notice of the public hearing. Waivers are required from the Town of Nantucket Bylaw Chapter 136 for the proposed project to allow for the conversion of structure from porch to interior space within the 50-foot buffer zone, and for the bottom of the foundation slab within two-feet of estimated seasonal high groundwater.

Notification of this NOI filing was provided to all abutting property owners by certified mail. This property owner listing was obtained from the Town of Nantucket Assessor's office. Documentation of the notification is provided including a copy of the notification letter, the property owner listing and certified mail receipts.

SITE DESCRIPTION

The subject property is approximately 1.1-acres in size and is located on the edge of the Town Area of Nantucket Island. The property is located on the south side of Westchester Street, surrounded by developed residential-use properties. The lot contains two existing single-family dwellings with appurtenant landscaping/hardscaping, and is served by Town sewer and water service.

The Wetland Resource Areas on-site were delineated by Brian Madden of LEC Environmental. There are three vegetated wetlands which each run off of locus. A soil test was performed in the

buffer zone which established both estimated seasonal high groundwater elevation at 9.4, and observed groundwater at elevation 8.8 (NAVD88).

A review of the August 1, 2017 "Massachusetts Natural Heritage Atlas", prepared by the Massachusetts Natural Heritage and Endangered Species Program (NHESP), indicates that the work area is not within the known range of state listed rare wildlife species defined by the Estimated Habitat mapping.

WORK DESCRIPTION

Prior to commencement of work, a silt fence will be placed at the limit of work as shown on the site plan. This fence will be inspected regularly and kept in good repair until the work has been completed and the site has stabilized. The Applicant proposes to first excavate for the shallow foundations and will truck the material off-site. Temporary dewatering may be required, for which a settling basin will be established as shown on the site plan.

The foundation will then be constructed and soil brought back to restore the areas to match the surrounding grades. The structures will then be built according to the attached architectural plans. Finally, the landscaping will be restored, with all disturbed areas will be covered with a minimum of 6" of topsoil and planted with the specified seed mix and native plants per the landscape design plan.

WAIVER REQUEST

A waiver is required from Section 3.02.B.1 to allow for the bottom of the foundation slab within two-feet of estimated seasonal high groundwater. A waiver is also requested, to the extent required, for the conversion of an existing porch structure into interior space on a slab foundation within the 50-foot buffer zone. No work is proposed outside of areas which are not currently landscaped and maintained. Disturbed areas will be covered with topsoil and then be restored with Cape Cod Special Grass Seed Mix. Waivers from the By-law can be granted for a number of reasons including:

Chapter 1.03 F.3.a *The Commission may grant a waiver from these regulations when the Commission finds that given existing conditions, the proposed project will not adversely impact the interests identified in the Bylaw and there are no reasonable conditions or alternatives that would allow that project to proceed in compliance with the regulations.*

The additions to the existing structures were designed so as to remain outside of the 50-foot buffer zone. However, there is no alternative location for the supporting footings at a greater distance than two-feet from estimated seasonal high groundwater. Alternatives were considered and, the foundation design was modified and engineered so as to be as shallow as possible. The bottom of the structural slab will be above the groundwater level, and as such will not have any adverse impact to the interests protected in the resource areas by the Commission.

CONCLUSION

The proposed project will not result in an adverse impact on the areas or the interests protected by the Commission including public and private water supply, groundwater, flood control, erosion control, storm damage prevention, water pollution, fisheries, shellfish, wildlife, scenic views, and recreation.

I plan to attend the Public Hearings for this application to address any questions, comments or concerns that the Commission may have.

Sincerely,

A handwritten signature in blue ink that reads "Arthur D. Gasbarro". The signature is written in a cursive style with a large initial 'A'.

Arthur D. Gasbarro, PE, PLS

Cc: MassDEP
Croquet Pitch, LLC



WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

NANTUCKET

City/Town

A. General Information (continued)

6. General Project Description:

The Applicant proposes to construct additions to an existing structure within landscaped areas of the buffer zone to a Vegetated Wetland on a developed residential-use lot. Please refer to the Site Plan for additional information.

7a. Project Type Checklist:

- 1. [X] Single Family Home
2. [] Residential Subdivision
3. [] Limited Project Driveway Crossing
4. [] Commercial/Industrial
5. [] Dock/Pier
6. [] Utilities
7. [] Coastal Engineering Structure
8. [] Agriculture (e.g., cranberries, forestry)
9. [] Transportation
10. [] 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 [X] No If yes, describe which limited project applies to this project:

2. Limited Project

8. Property recorded at the Registry of Deeds for:

NANTUCKET

a. County

952

c. Book

b. Certificate # (if registered land)

13

d. Page Number

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

- 1. [X] 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.
2. [] 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.

Table with 3 columns: Resource Area, Size of Proposed Alteration, Proposed Replacement (if any). Rows include Bank, Bordering Vegetated Wetland, and Land Under Waterbodies and Waterways.

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

QUITCLAIM DEED

I, PAUL A. ZEVNIK, of 2930 44th Street, NW, Washington, DC 20016, for non-monetary consideration paid as a transfer in exchange for an interest in the grantee, grant to CROQUET PITCH, L.L.C., a Delaware Limited Liability Company registered with the Commonwealth of Massachusetts, with a mailing address of 2930 44th Street, NW, Washington, DC 20016, with QUITCLAIM COVENANTS,

That certain parcel of land, together with the buildings and improvements erected thereon, situated in the Town and County of Nantucket, Commonwealth of Massachusetts, now known and numbered as 24 West Chester Street, bounded and described as follows:

- | | | |
|---|----|--|
| NORTHERLY | by | West Chester Street, fifty-eight and 34/100 (58.34) feet; |
| EASTERLY | by | Lot 7 on plan hereinafter referred to, one hundred sixty-seven and 91/100 (167.91) feet; |
| NORTHERLY | by | said Lot 7 and by Lot 5 on said plan, and by land now or formerly of Trudy Howard, one hundred nineteen and 83/100 (119.83) feet; |
| EASTERLY
SOUTHEASTERLY
and EASTERLY | by | lands now or formerly of Shaun J. Ruddy and Millicent K. Ruddy, and Jane Magee Murkland, on three corners, two hundred twenty-nine and 69/100 (229.69) feet; |
| SOUTHERLY | by | land now or formerly of Robert B. Blair and Erna Blair, one hundred seventy-one and 44/100 (171.44) feet; |
| WESTERLY | by | land now or formerly of Peter Lowenstein and Susan Lowenstein, three hundred thirty-eight and 92/100 (338.92) feet. |

Said land is shown on Lot 2 on plan dated October 16, 1984, and recorded with the Nantucket Registry of Deeds in Plan File 15-E.

The property is conveyed SUBJECT TO the mortgage from Paul A. Zevnik to Chevy Chase Bank, F.S.B., in the original face amount of \$3,200,000.00, dated March 18, 2005 and recorded with the Nantucket Registry of Deeds at Book 946, Page 76.

For title reference, see deed recorded with the Nantucket Registry of Deeds at Book 946, Page 73.

WITNESS my hand and seal this 11th day of April, 2005..

Paul A. Zevnik
PAUL A. ZEVNIK

STATE OF Washington, D.C.
County of _____, ss.

On this 11th day of April, 2005, before me, the undersigned notary public, personally appeared the above-named Paul A. Zevnik (a) personally known to me or (b) proved to me through satisfactory evidence of identification, which was Paul A. Zevnik, to be the person whose name is signed on the foregoing instrument, and acknowledged to me that he signed it voluntarily, for its stated purpose.

JoAnn Mimms
Notary Public
Printed Name: JoAnn Mimms
My Commission Expires:



JO ANN MIMMS
Notary Public, District Of Columbia
My Commission Expires November 30, 2006

Nantucket County Received & Entered
Date: APR 22 2005 Time: 2:52
Attest: *Jeanne L. Kelley* Register of Deeds

NANTUCKET LAND BANK CERTIFICATE	
<input type="checkbox"/> Paid \$	
<input checked="" type="checkbox"/> Exempt <u>d, i</u>	
<input type="checkbox"/> Non-applicable	
No. <u>25657</u>	Date <u>4/22/05</u>
Authorization <u><i>KH</i></u>	

End of
Instrument

CURRENT ZONING CLASSIFICATION:
RESIDENTIAL OLD HISTORIC (ROH)

MINIMUM LOT SIZE: 5,000 S.F.
MINIMUM FRONTAGE: 50 FT.
FRONT YARD SETBACK: 0 FT.
REAR/SIDE SETBACK: 5 FT.
GROUND COVER % : 50%

LOT AREA=48,557±S.F.

WESTCHESTER STREET
EDGE ASPHALT

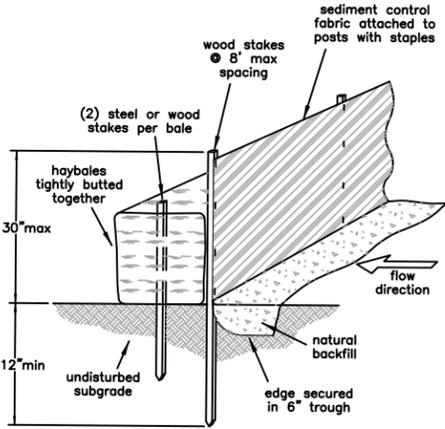
**SITE PLAN
TO ACCOMPANY
NOTICE OF INTENT
IN NANTUCKET, MA
MAY 21, 2020
SCALE: 1"=30'**

PREPARED FOR OWNER:
CROQUET PITCH, LLC
ADDRESS: 24 WEST CHESTER STREET
ASSESSOR MAP 42.4.3 PARCEL 57
DEED BK.946 PG.73
PLAN FILE 15-E, LOT 2

LEGEND

- x 9.9 DENOTES EXISTING SPOT ELEVATION (NAVD88)
- DENOTES EXISTING WETLAND BOUNDARY
- DENOTES PROPOSED SILTATION FENCING

ISOLATED VEGETATED WETLAND (IW)
BOUNDARIES DELINEATED BY: BRIAN MADDEN,
LEC ENVIRONMENTAL CONSULTANTS.
SUBJECT TO REVIEW OF THE NANTUCKET
CONSERVATION COMMISSION



**SILTATION BARRIER
DETAIL**



5/21/20

Arthur D. Gasbarro

42.4.3-119.1
N/F
RALPH & JANICE A.
JAMES, TRUSTEES

RUDDY K. MILLICENT NOMINEE TRUST

42.4.3-56
N/F
BLACKBERRY
PROPERTIES
LLC

42.4.3-60
N/F
ELIZABETH M.
LENCYN, ETAL

42.4.3-47
N/F
NANTUCKET ISLANDS
LAND BANK

CONVERT
PORCH TO
INTERIOR
SPACE

EXISTING
1 1/2 STY.
STRUCTURE
658±S.F.
(FOUNDATION)

PROPOSED
ADDITION

EXISTING 1 1/2 STY.
STRUCTURE
(FOUNDATION)
2992±S.F.

PROPOSED
HAYBALED
SETTLING AREA
FOR TEMPORARY
DEWATERING

THIS PLOT PLAN WAS PREPARED FOR PERMITTING PURPOSES ONLY. IT SHOULD NOT BE CONSIDERED A PROPERTY LINE SURVEY. THIS PLAN SHOULD NOT BE USED TO ESTABLISH PROPERTY LINES, FENCES, HEDGES OR ANY ANCILLARY STRUCTURES ON THE PREMISES. THE PROPERTY LINES SHOWN RELY ON CURRENT DEEDS AND PLANS OF RECORD. THIS PLOT PLAN IS NOT A CERTIFICATION AS TO TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT ASSESSOR RECORDS. LAYOUT SHOWN HEREON FROM PLANS BY EMERITUS, & DOES NOT IMPLY CONFORMANCE WITH ZONING BYLAWS.

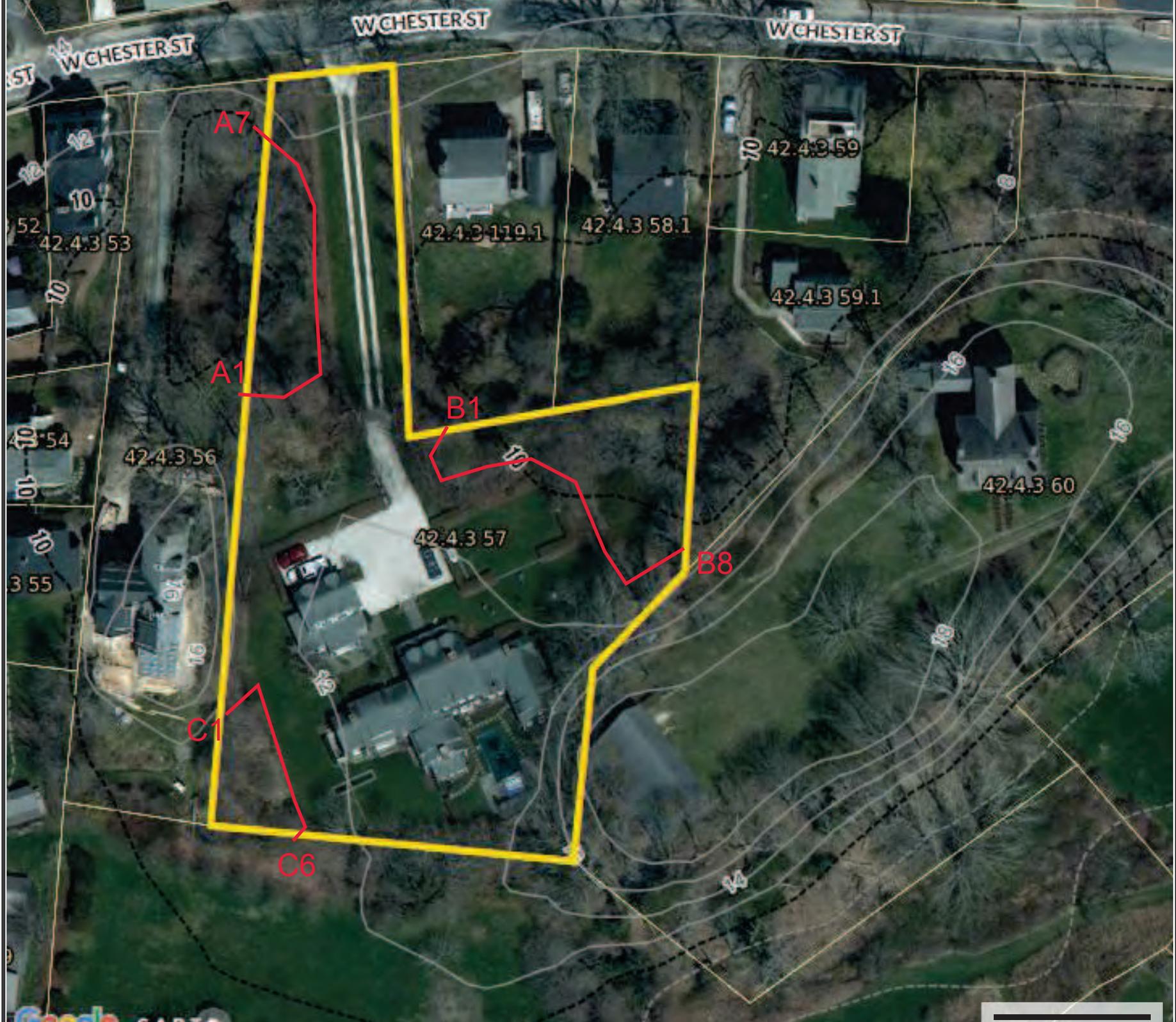
LOCUS PARTIALLY FALLS WITHIN FLOOD HAZARD ZONE "X" (0.2% ANNUAL CHANCE FLOOD) AS SHOWN ON FEMA MAP NO. 25019C0086-G DATED 06/09/14.

GRAPHIC SCALE



(IN FEET)
1 inch = 30 ft.





ST WCHESTER ST

WCHESTER ST

WCHESTER ST

12
10
52
42.4.3 53
10

42.4.3 119.1

42.4.3 58.1

42.4.3 59

42.4.3 59.1

10
54

42.4.3 56

42.4.3 57

42.4.3 60

10
3 55

C1

B8

C6

Guest House

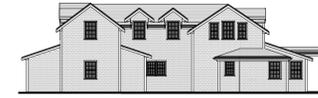
24 West Chester Str
Nantucket, MA 02554



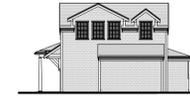
East



South



West



North

2002

Guest House

24 West Chester Str
Nantucket, MA 02554



Cover Sheet

Site Information

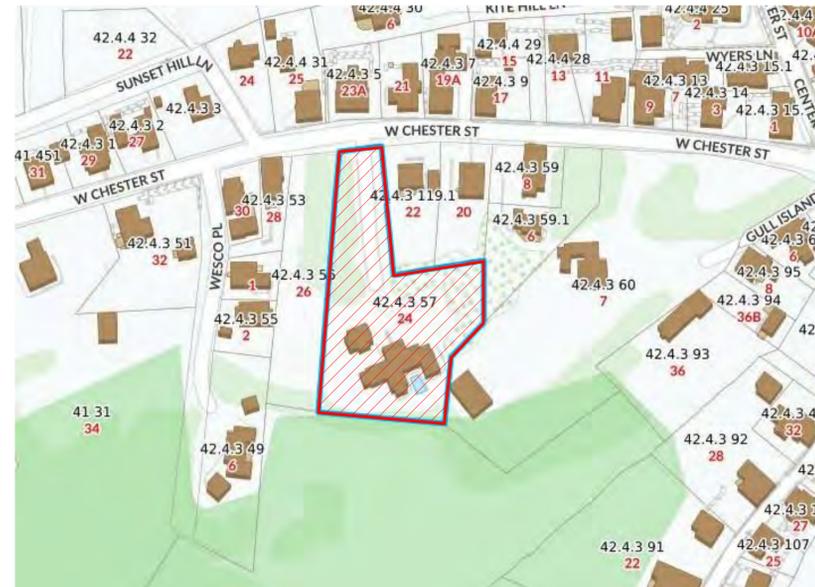
Map & Parcel:	42.4.3 / 57
Current Zoning:	ROH
Minimum Frontage:	50 ft
Front Setback:	0 ft
Side/Rear Setback:	5 ft
Lot Size:	48,557 sq.ft.
Min. Lot Size:	5,000 sq.ft.
Allowable G.C.:	40%
Existing G.C.:	+/- 658 sq.ft.
Proposed G.C.:	_____ sq.ft.
Total Proposed G.C.:	_____ sq.ft.

Information for this site plan was taken from the Nantucket G.I.S. This drawing does not constitute a registered survey. All site work should be verified by a Registered Land Surveyor prior to and during construction.

SHEET INDEX

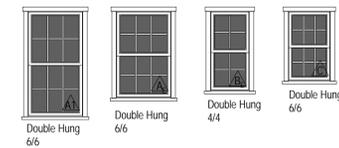
- G.1.1 Cover Sheet
- A.1.1 Floor Plans
- A.2.1 Exterior Elevations
- S.0.1 Foundation & Roof Plan
- S.0.2 Building Sections

04.28.20



1 Locus Map

1/2" = 1'-0"



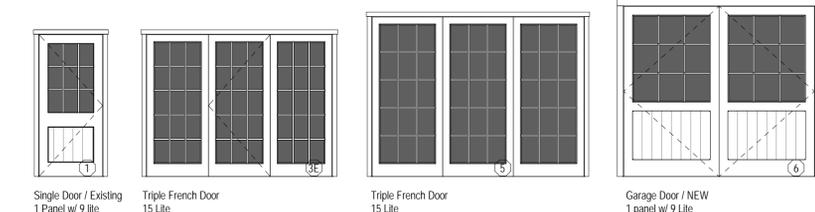
2 Window Legend

1/4" = 1'-0"

WINDOW	QUANTITY	UNIT WIDTH	UNIT HEIGHT	DP RATING
A	16	2'-9 1/4"	4'-1 1/2"	≥ 30
A1	2	2'-9 1/4"	5'-0"	≥ 30
C	3	2'-2"	3'-4"	≥ 30

WINDOW & DOOR NOTES

1. Impact Resistant Glazing Required or Plywood Cutouts Meeting The Requirements Specified in IRC 2015 R301.2.1.2 "Protection of Openings"
2. Windows w/ DP Rating of 30 or Greater Required
3. Contractor to Confirm New Windows & Doors Match Existing Rough Openings Prior to Placing Order
4. Refer To Plan For Tempered Glass Locations; Contractor To Verify Tempered Windows Are Provided Where Required
5. Contractor Shall Install Self Adhesive Flexible Window Flashing by Grace or Equal
6. General Contractor to Verify All Egress Windows Have @ Least 20"x24" Clear Opening & Are In Accordance w/ Massachusetts Minimum Egress Requirements
7. General Contractor to Verify Window & Door Order Matches Or Exceeds Required Energy Ratings Per ResCheck Calculation
8. Contractor Shall Provide Architect w/ Window & Door Quote For Quantity & Type Verification Prior To Order
9. Contractor To Verify All Window & Door Colors As Quoted Match The Latest HDC Approval Prior To Order
10. The Unit Measurements Given In this Document Are For A Guide Only
11. Due To Slight Discrepancies & Changes In Manufacturing, Contractors Must Verify Rough Opening Dimensions Of All Windows & Doors w/ Manufacturer Prior Framing



3 Door Legend

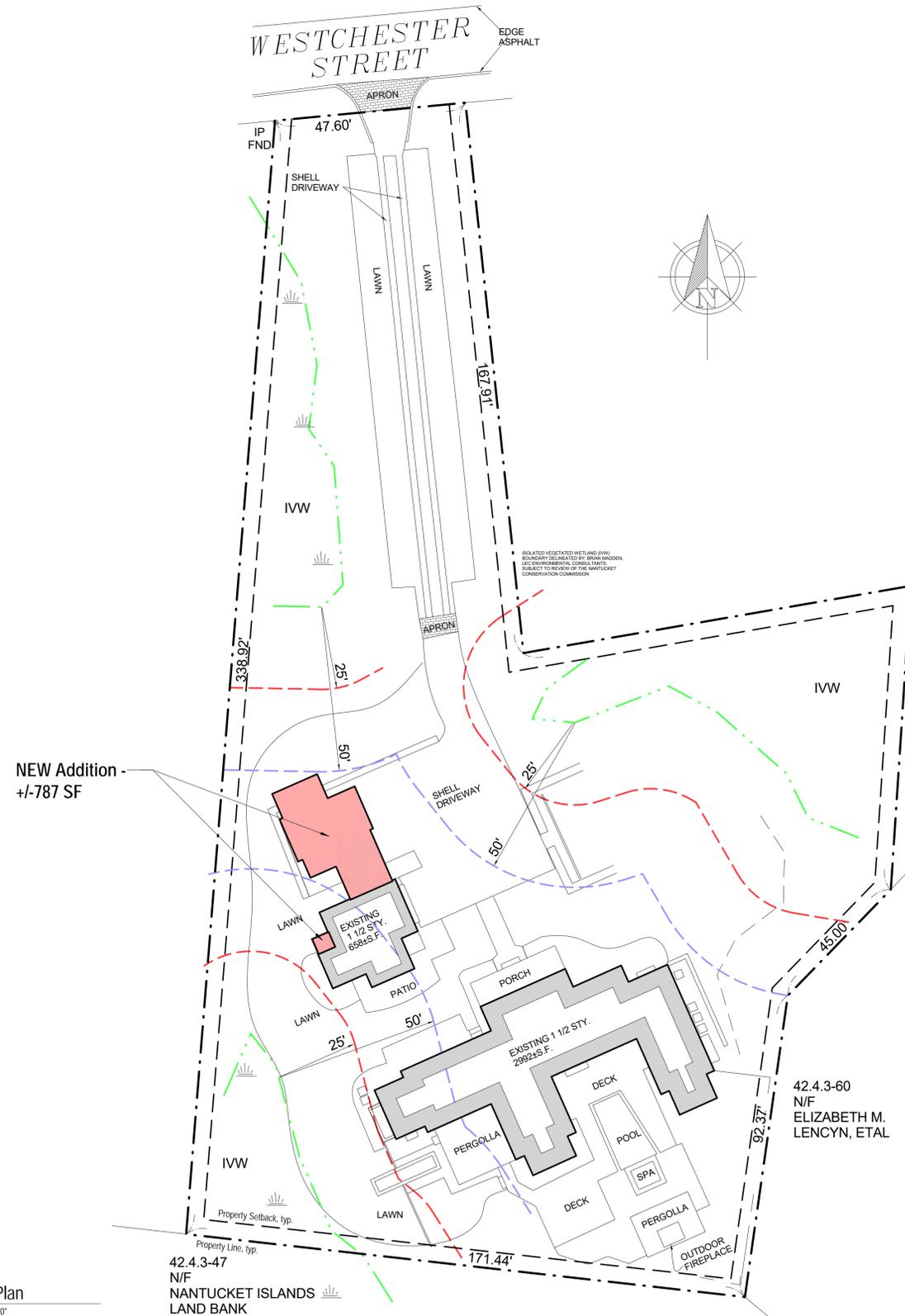
1/4" = 1'-0"

DOOR	QUANTITY	UNIT WIDTH	UNIT HEIGHT	DP RATING
1	1	3'-0"	6'-8"	≥ 30
3E	1	8'-9"	6'-8"	≥ 30
5	1	10'-0"	7'-6"	≥ 30
6	1	9'-0"	8'-0"	≥ 30

4 Site Plan

3/16" = 1'-0"

DESIGN PROGRESS



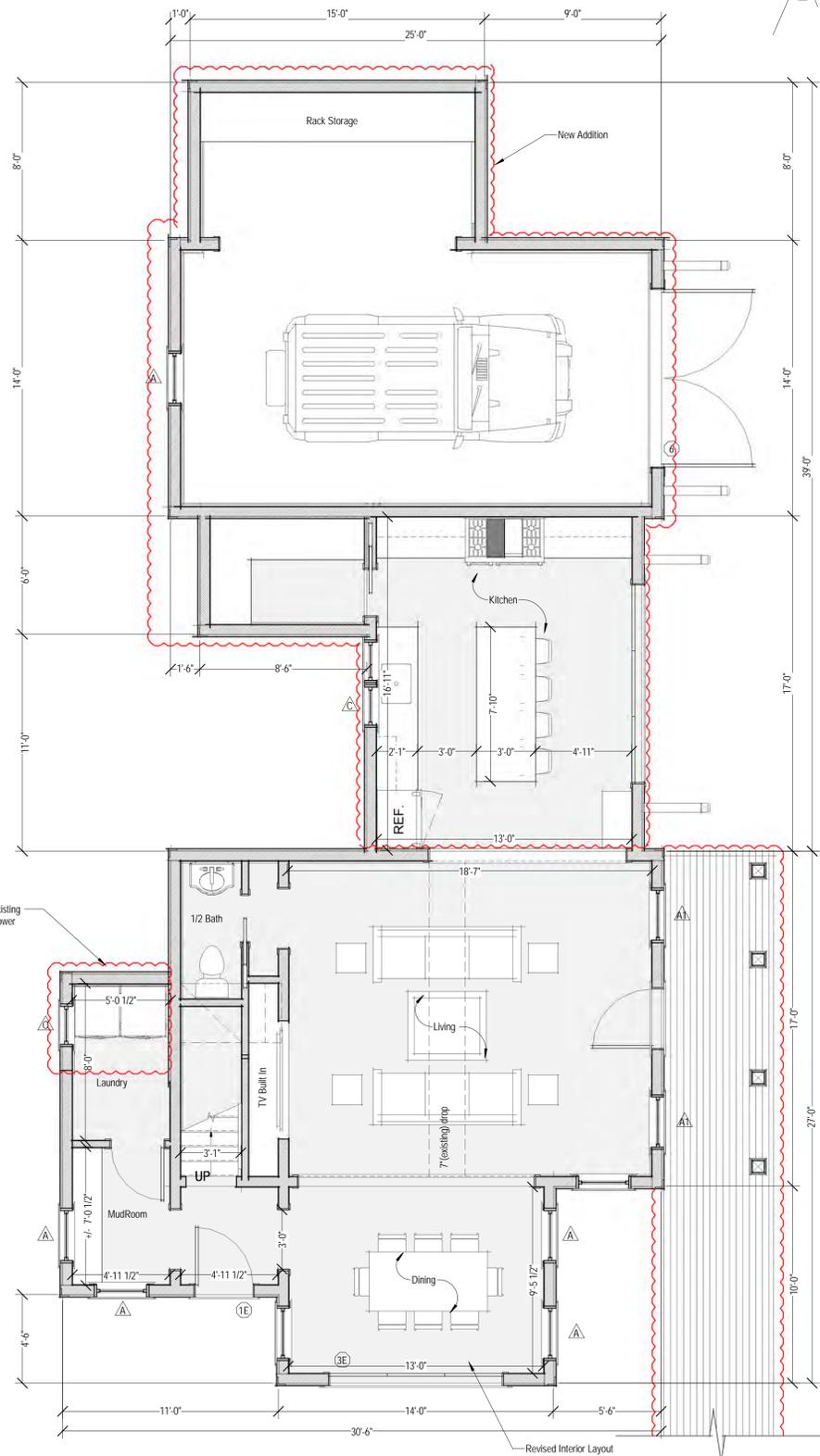
Revisions

THESE DRAWINGS AND THE DESIGNS THEY ILLUSTRATE ARE THE SOLE PROPERTY OF EMERITUS DEVELOPMENT LTD. AND MAY NOT BE USED IN WHOLE OR IN PART WITHOUT WRITTEN AUTHORIZATION OF EMERITUS DEVELOPMENT LTD. DRAWINGS THAT ARE NOT CLEARLY LABELED FOR CONSTRUCTION SHOULD NOT BE USED FOR CONSTRUCTION OR FOR PURCHASING WITHOUT THE EXPRESS WRITTEN CONSENT OF THE PRINCIPAL OR THE DESIGNATED PROJECT MANAGER.

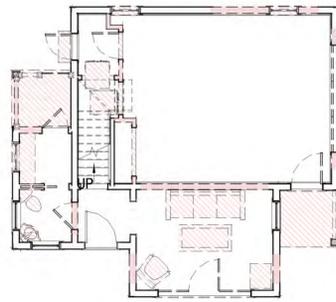
G.1.1
2002

04.28.20

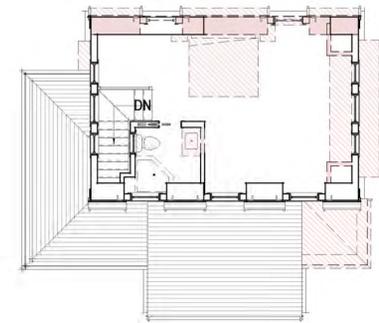
DESIGN PROGRESS



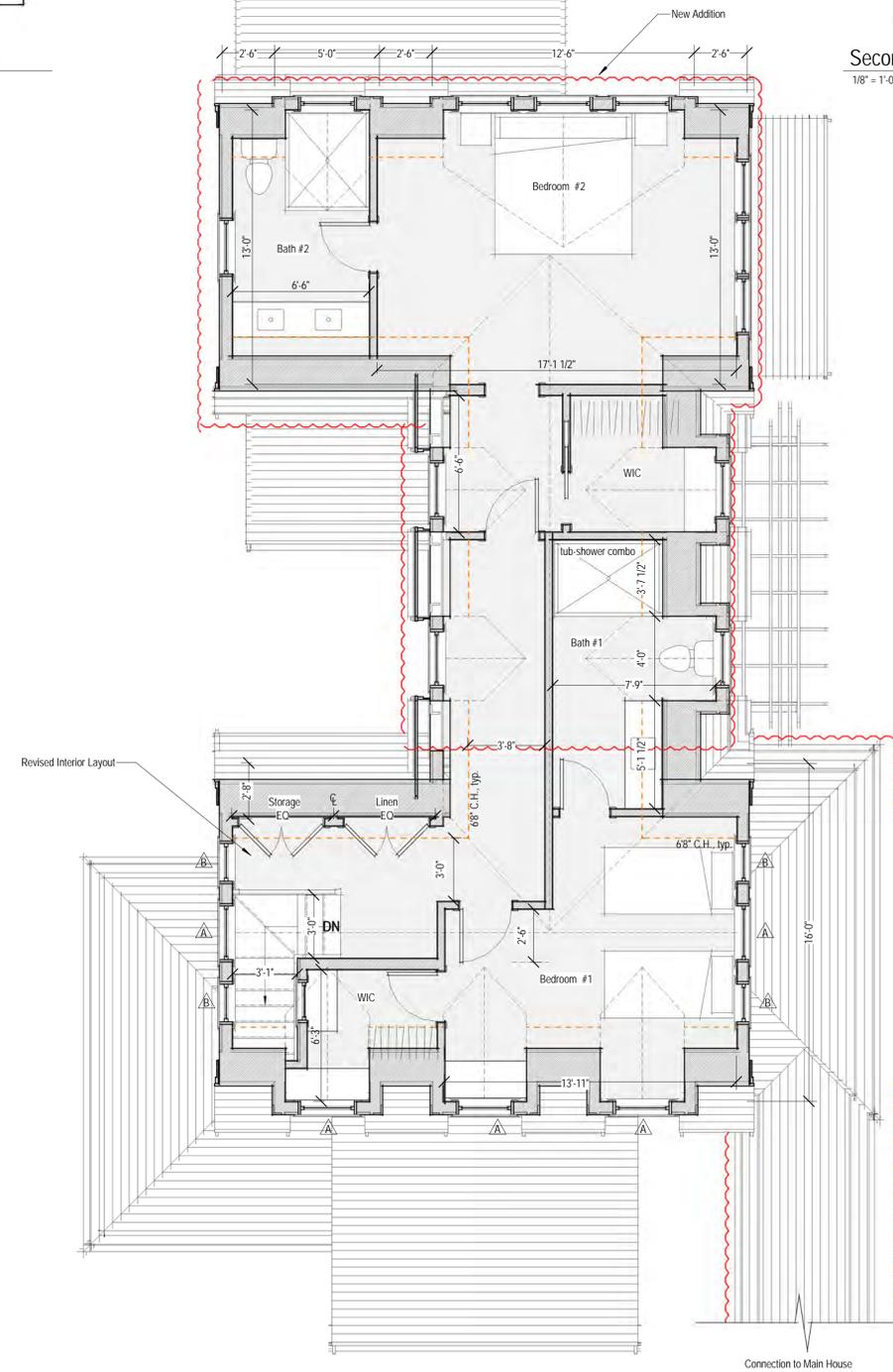
1 First Floor
1/4" = 1'-0"



First Floor - Demo Plan
1/8" = 1'-0"



Second Floor - Demo Plan
1/8" = 1'-0"



2 Second Floor
1/4" = 1'-0"

2002

Guest House

24 West Chester Str
Nantucket, MA 02554



Floor Plans

Site Information

Map & Parcel:	42.4.3 / 57
Current Zoning:	ROH
Minimum Frontage:	50 ft
Front Setback:	0 ft
Side/Rear Setback:	5 ft
Lot Size:	48,557 sq. ft.
Min. Lot Size:	5,000 sq. ft.
Allowable G.C.:	40%
Existing G.C.:	+/- 658 sq. ft.
Proposed G.C.:	_____ sq. ft.
Total Proposed G.C.:	_____ sq. ft.

Information for this site plan was taken from the Nantucket G.I.S. This drawing does not constitute a registered survey. All site work should be verified by a Registered Land Surveyor prior to and during construction.

SHEET INDEX

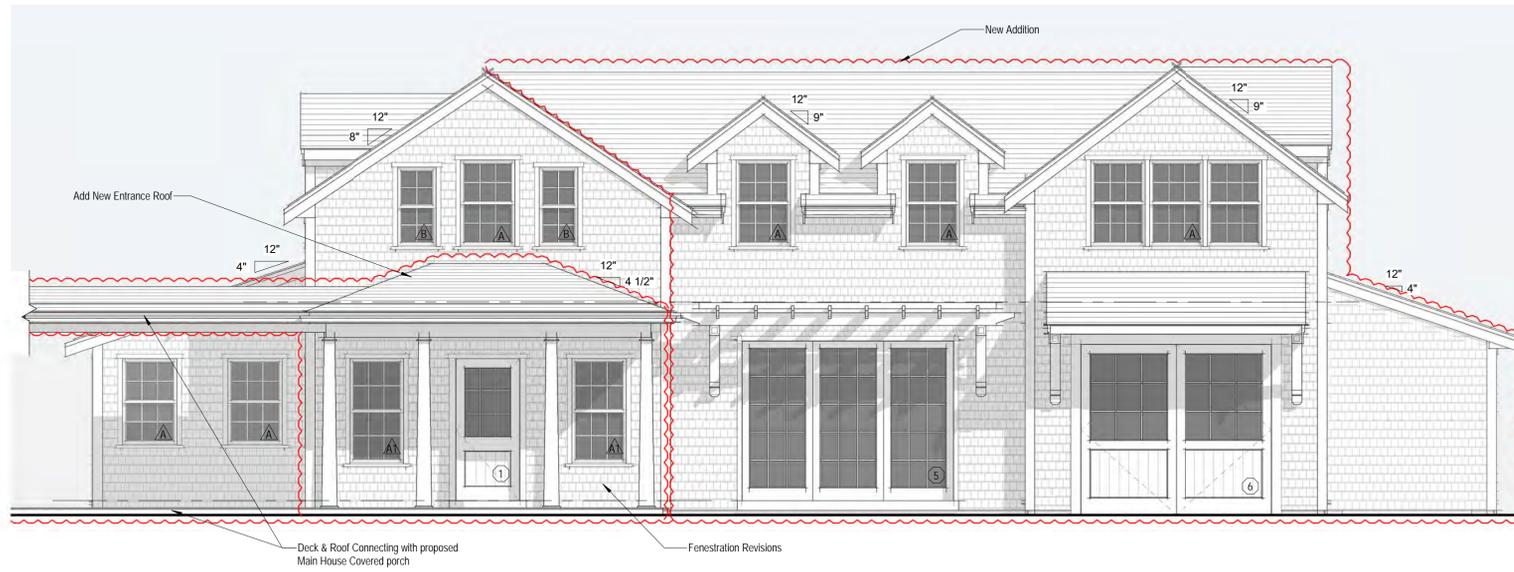
- G.1.1 Cover Sheet
- A.1.1 Floor Plans
- A.2.1 Exterior Elevations
- S.0.1 Foundation & Roof Plan
- S.0.2 Building Sections

Revisions

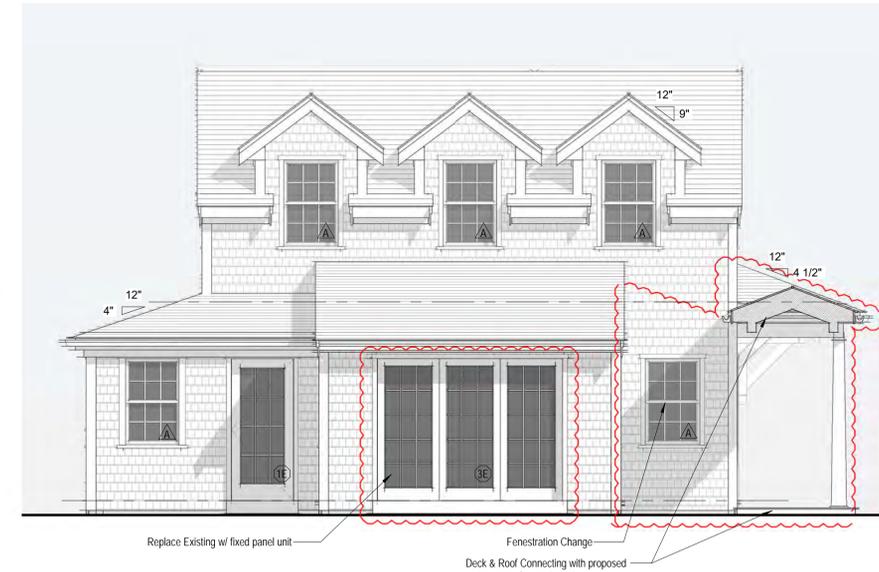
THESE DRAWINGS AND THE DESIGNS THEY ILLUSTRATE ARE THE SOLE PROPERTY OF EMERITUS DEVELOPMENT LTD. AND MAY NOT BE USED IN WHOLE OR IN PART WITHOUT WRITTEN AUTHORIZATION OF EMERITUS DEVELOPMENT LTD. DRAWINGS THAT ARE NOT CLEARLY LABELED FOR CONSTRUCTION SHOULD NOT BE USED FOR CONSTRUCTION OR FOR PURCHASING WITHOUT THE EXPRESS WRITTEN CONSENT OF THE PRINCIPAL OR THE DESIGNATED PROJECT MANAGER.

A.1.1
2002

04.28.20



1 East Elevation
1/4" = 1'-0"



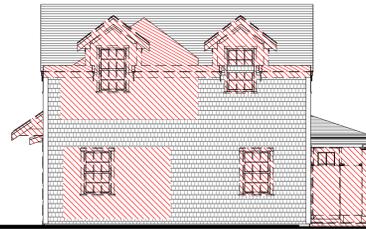
2 South Elevation
1/4" = 1'-0"



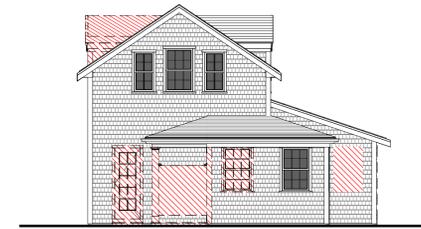
East Elevation - Existing & Demo
1/8" = 1'-0"



South Elevation - Existing & Demo
1/8" = 1'-0"

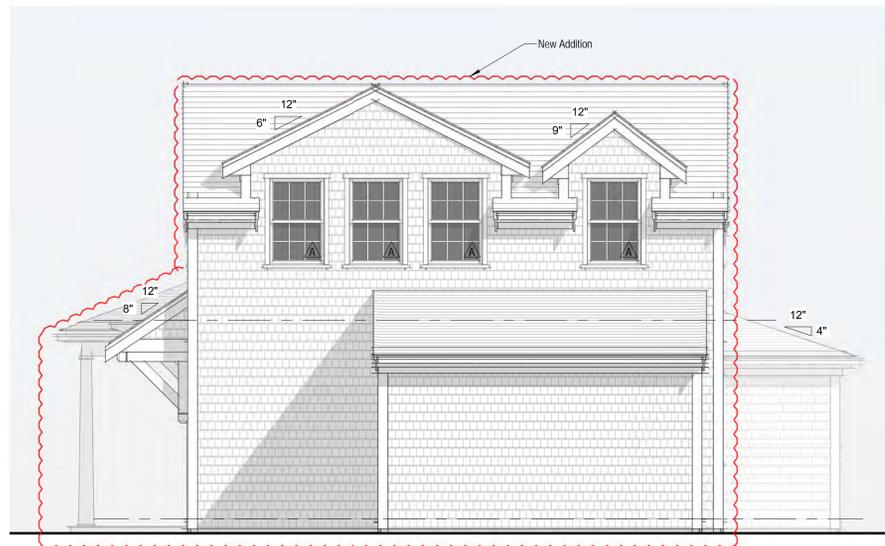


North Elevation - Existing & Demo
1/8" = 1'-0"

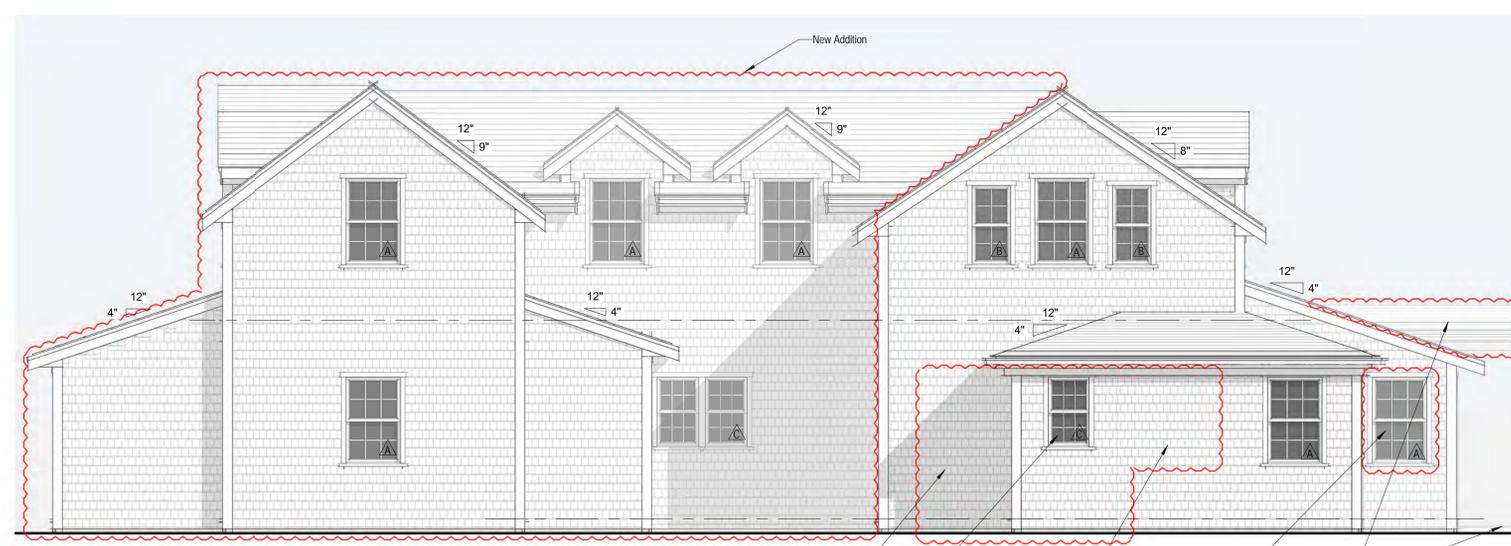


West Elevation - Existing & Demo
1/8" = 1'-0"

DESIGN PROGRESS



3 North Elevation
1/4" = 1'-0"



4 West Elevation
1/4" = 1'-0"

2002

Guest House

24 West Chester Str
Nantucket, MA 02554



Exterior Elevations

Site Information

Map & Parcel:	42.4.3 / 57
Current Zoning:	ROH
Minimum Frontage:	50 ft
Front Setback:	0 ft
Side/Rear Setback:	5 ft
Lot Size:	48,557 sq. ft.
Min. Lot Size:	5,000 sq. ft.
Allowable G.C.:	40%
Existing G.C.:	+/- 658 sq. ft.
Proposed G.C.:	_____ sq. ft.
Total Proposed G.C.:	_____ sq. ft.

Information for this site plan was taken from the Nantucket G.I.S. This drawing does not constitute a registered survey. All site work should be verified by a Registered Land Surveyor prior to and during construction.

SHEET INDEX

- G.1.1 Cover Sheet
- A.1.1 Floor Plans
- A.2.1 Exterior Elevations
- S.0.1 Foundation & Roof Plan
- S.0.2 Building Sections

Revisions

THESE DRAWINGS AND THE DESIGNS THEY ILLUSTRATE ARE THE SOLE PROPERTY OF EMERITUS DEVELOPMENT LTD. AND MAY NOT BE USED IN WHOLE OR IN PART WITHOUT WRITTEN AUTHORIZATION OF EMERITUS DEVELOPMENT LTD. DRAWINGS THAT ARE NOT CLEARLY LABELED FOR CONSTRUCTION SHOULD NOT BE USED FOR CONSTRUCTION OR FOR PURCHASING WITHOUT THE EXPRESS WRITTEN CONSENT OF THE PRINCIPAL OR THE DESIGNATED PROJECT MANAGER.

A.2.1
2002

04.28.20

DESIGN PROGRESS

2002

Guest House

24 West Chester Str
Nantucket, MA 02554



Building Sections

Site Information

Map & Parcel:	42.4.3 / 57
Current Zoning:	ROH
Minimum Frontage:	50 ft
Front Setback:	0 ft
Side/Rear Setback:	5 ft
Lot Size:	48,557 sq. ft.
Min. Lot Size:	5,000 sq. ft.
Allowable G.C.:	40%
Existing G.C.:	+/- 658 sq. ft.
Proposed G.C.:	_____ sq. ft.
Total Proposed G.C.:	_____ sq. ft.

Information for this site plan was taken from the Nantucket G.I.S. This drawing does not constitute a registered survey. All site work should be verified by a Registered Land Surveyor prior to and during construction.

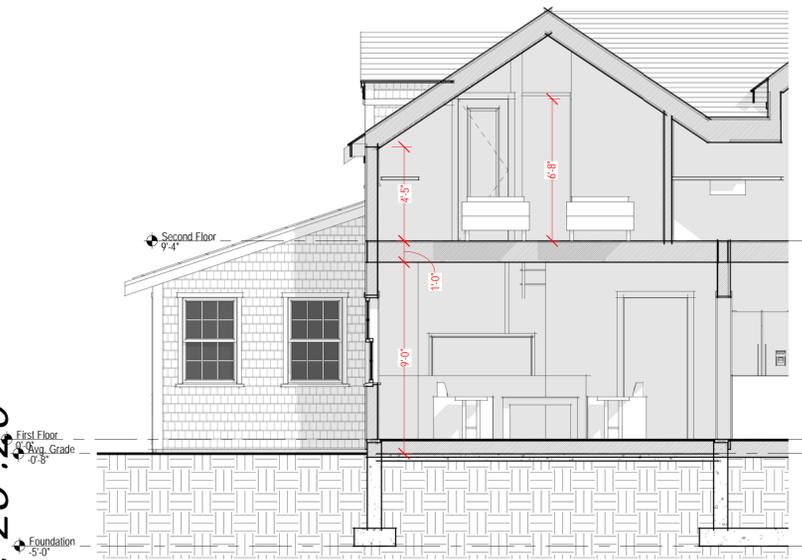
SHEET INDEX

- G.1.1 Cover Sheet
- A.1.1 Floor Plans
- A.2.1 Exterior Elevations
- S.0.1 Foundation & Roof Plan
- S.0.2 Building Sections

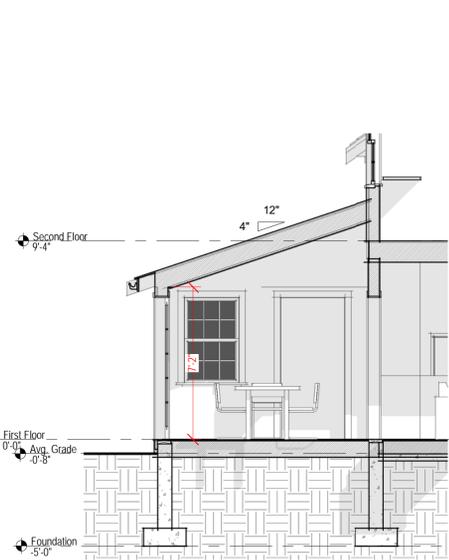
Revisions

THESE DRAWINGS AND THE DESIGNS THEY ILLUSTRATE ARE THE SOLE PROPERTY OF EMERITUS DEVELOPMENT LTD. AND MAY NOT BE USED IN WHOLE OR IN PART WITHOUT WRITTEN AUTHORIZATION OF EMERITUS DEVELOPMENT LTD. DRAWINGS THAT ARE NOT CLEARLY LABELED FOR CONSTRUCTION SHOULD NOT BE USED FOR CONSTRUCTION OR FOR PURCHASING WITHOUT THE EXPRESS WRITTEN CONSENT OF THE PRINCIPAL OR THE DESIGNATED PROJECT MANAGER.

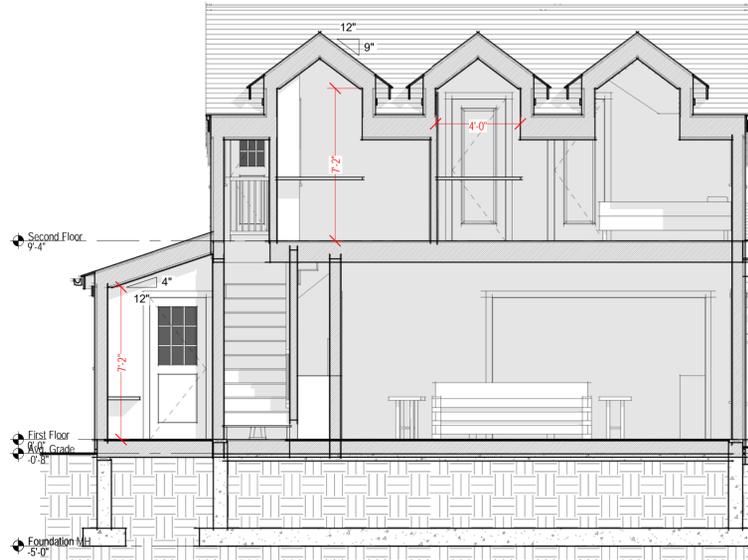
S.0.2
2002



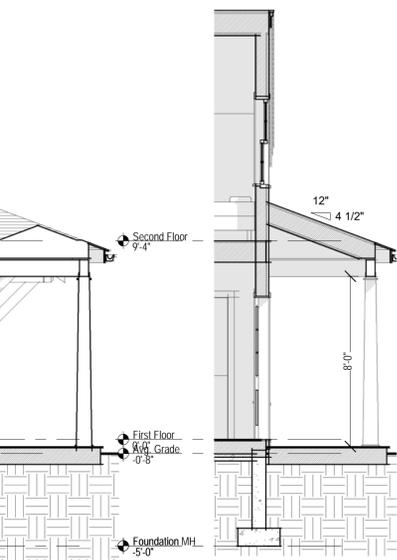
1 Section A
1/4" = 1'-0"



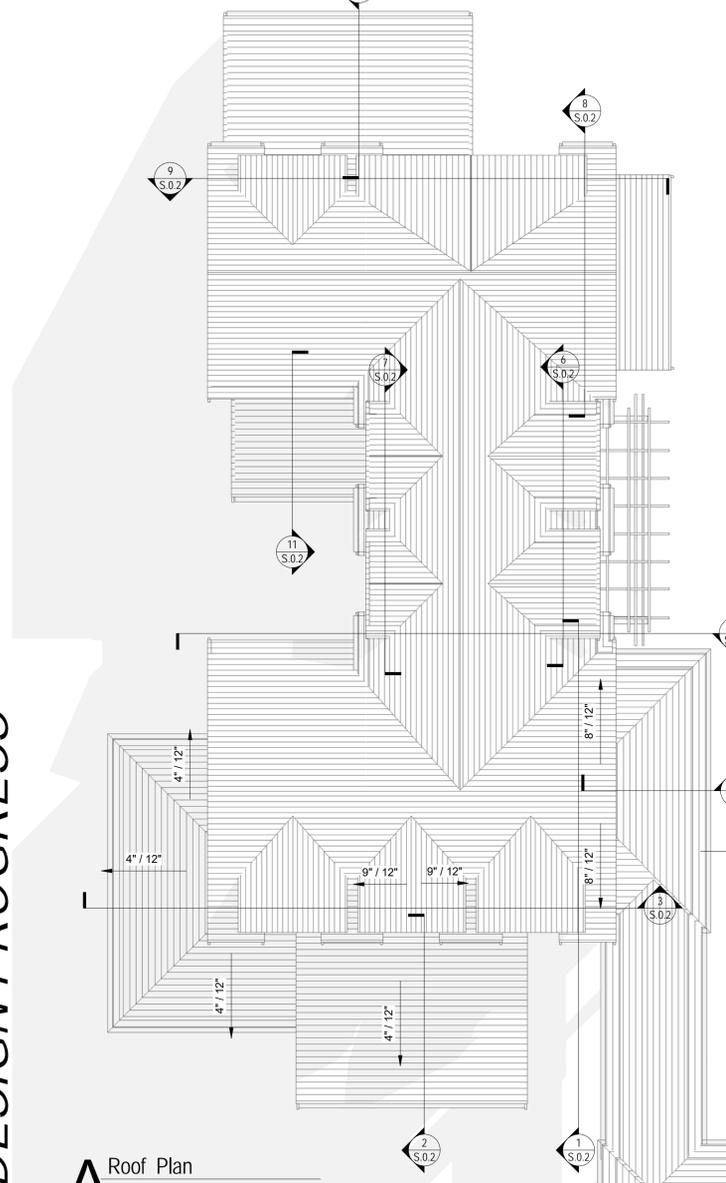
2 Section B
1/4" = 1'-0"



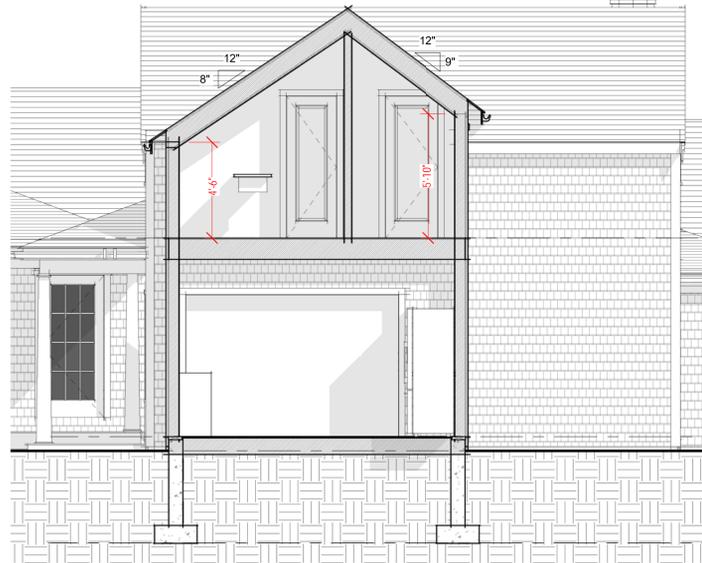
3 Section C
1/4" = 1'-0"



4 Section D
1/4" = 1'-0"

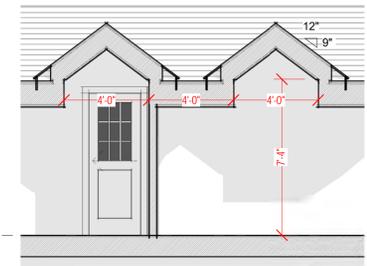
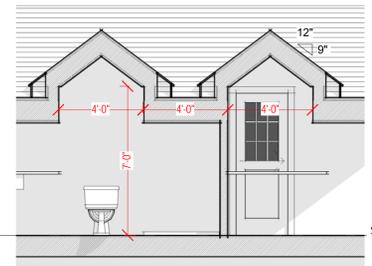


A Roof Plan
3/16" = 1'-0"

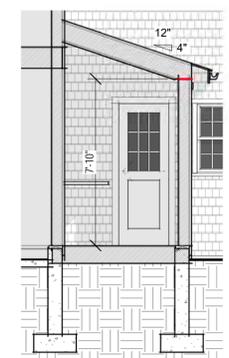


6 Addition Section B
1/4" = 1'-0"

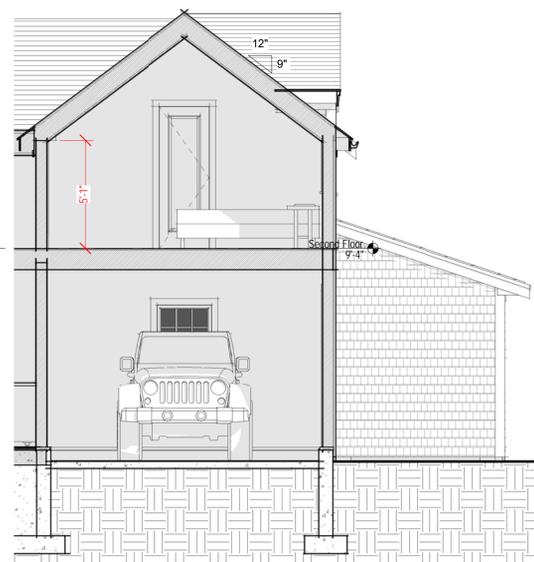
5 Addition Section A
1/4" = 1'-0"



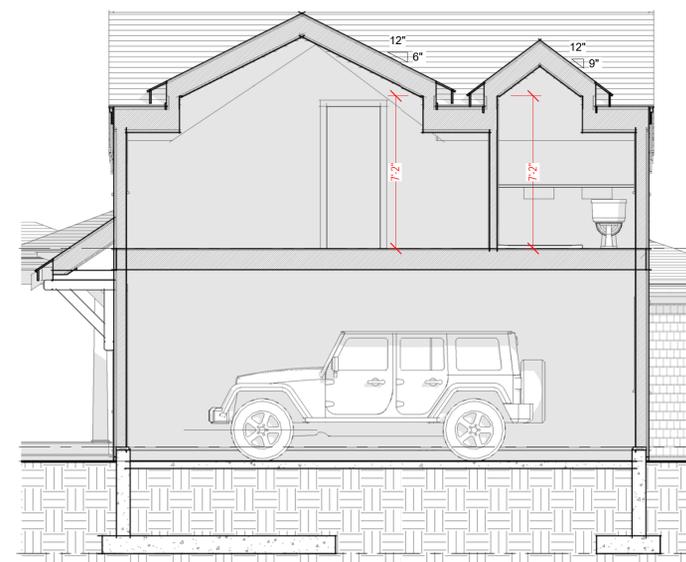
7 Addition Section B2
1/4" = 1'-0"



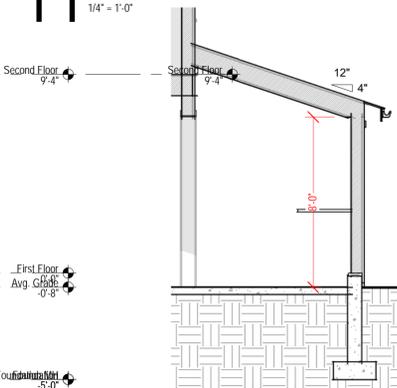
11 Addition Section F
1/4" = 1'-0"



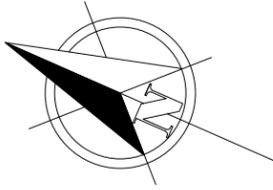
8 Addition Section C
1/4" = 1'-0"



9 Addition Section D
1/4" = 1'-0"



10 Addition Section E
1/4" = 1'-0"



New Addition Main House
+/-305 SF

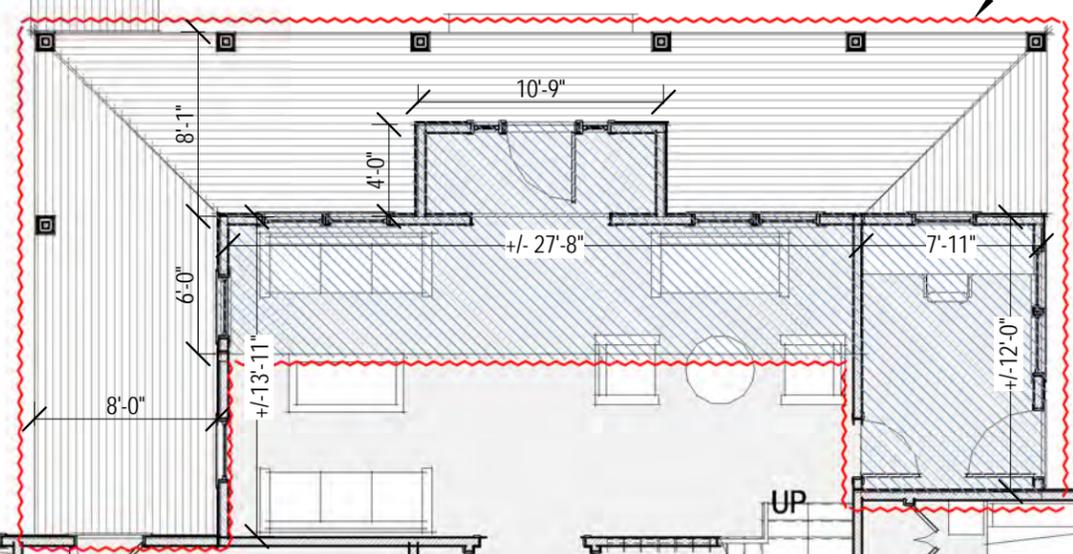
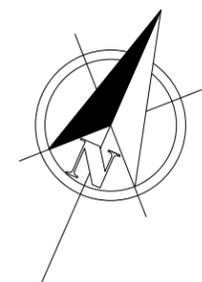
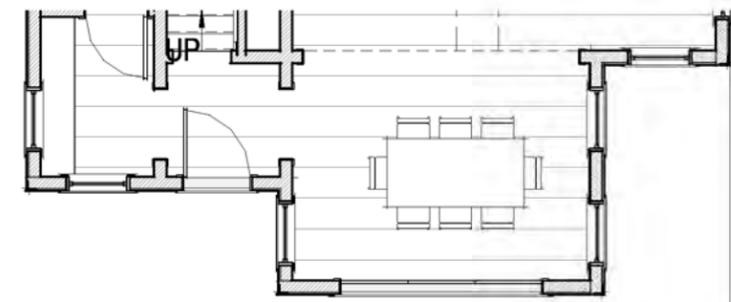
New Addition Guest House
+/-787 SF

Proposed - Site Plan

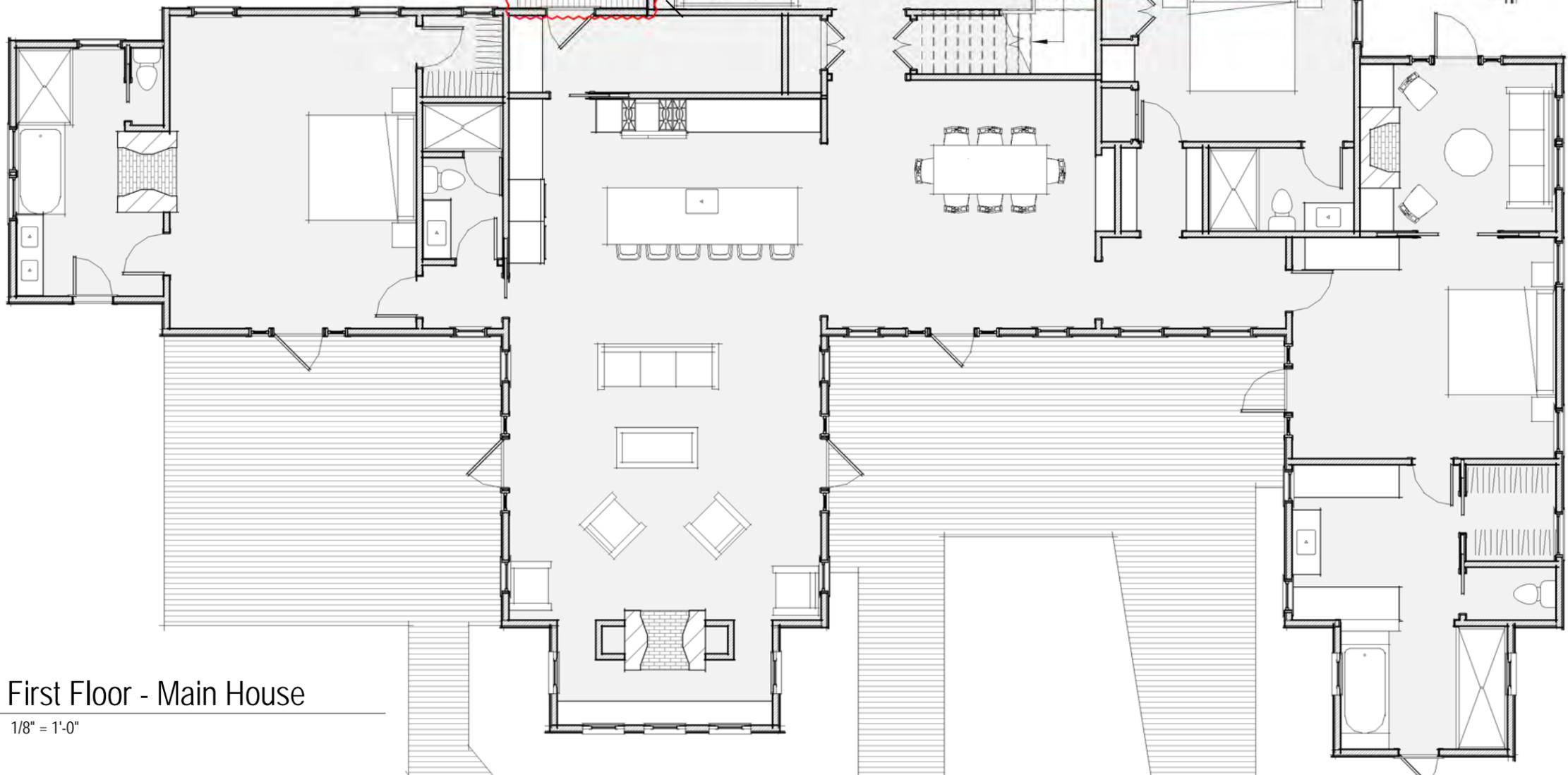
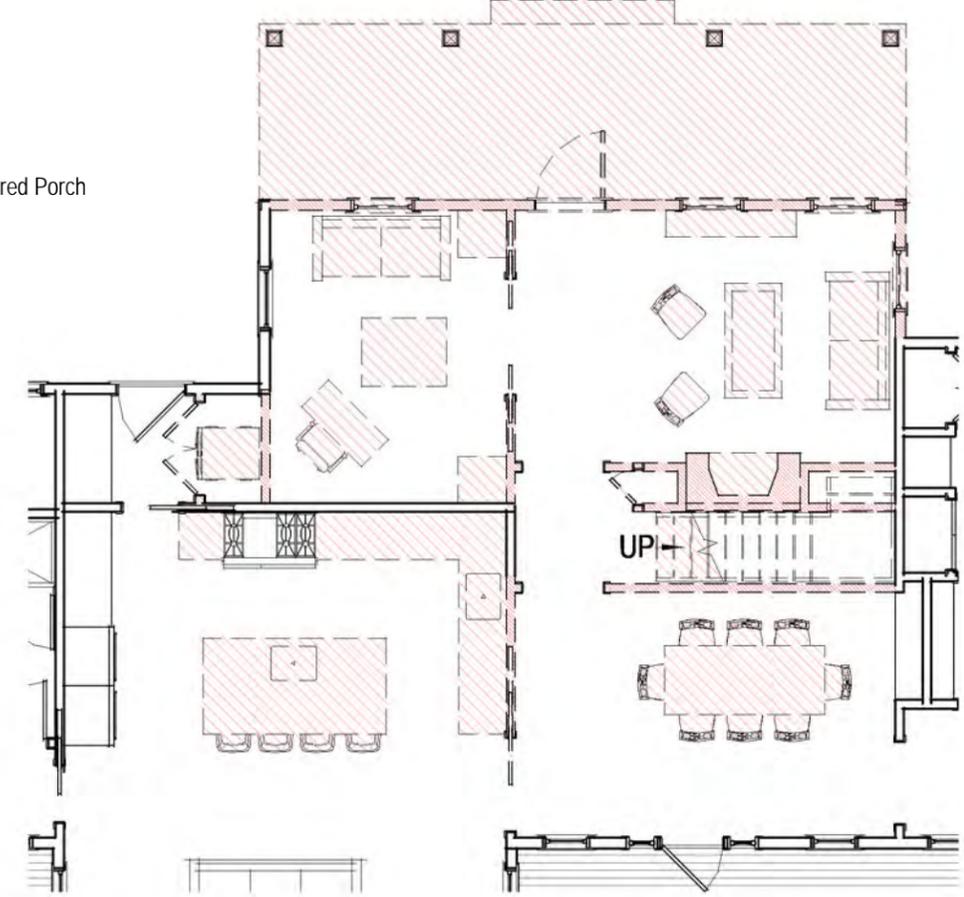
1/16" = 1'-0"



emeritus



New Addition with Covered Porch



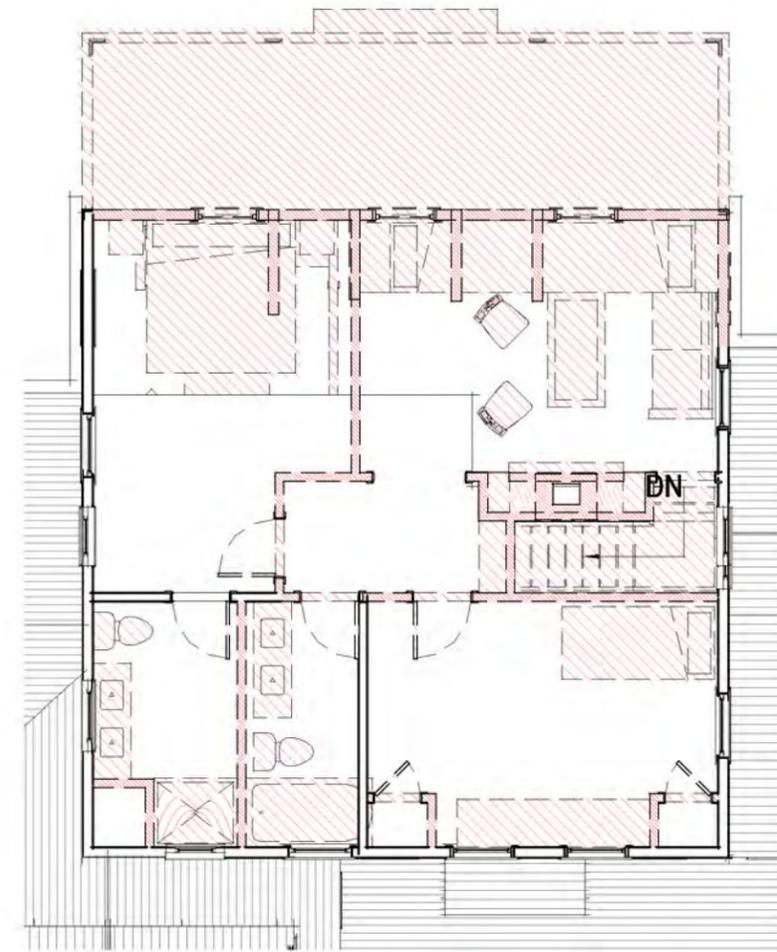
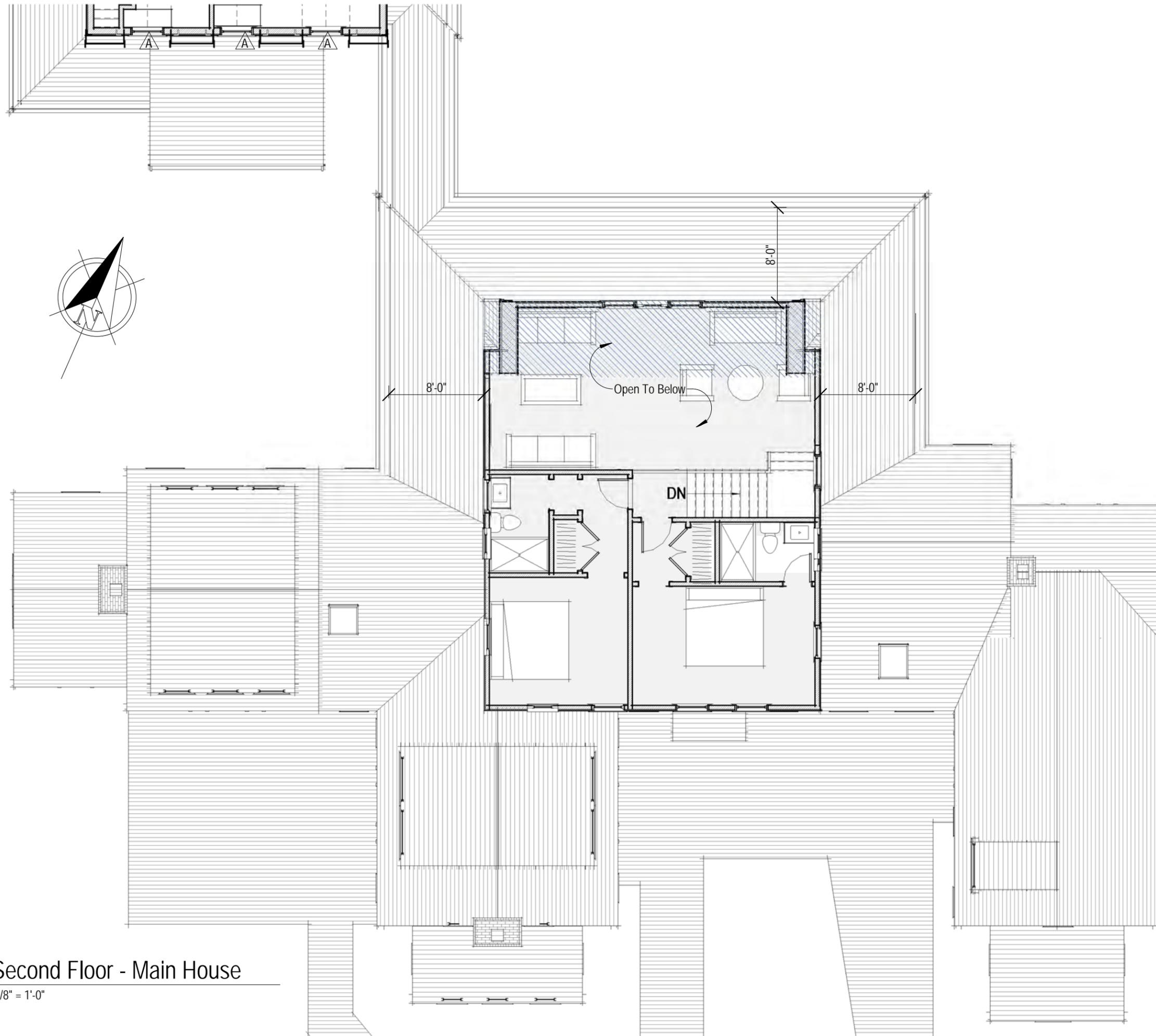
First Floor - Demo Plan - Main House

1/8" = 1'-0"

First Floor - Main House

1/8" = 1'-0"





Second Floor - Demo Plan - Main House
 1/8" = 1'-0"

Second Floor - Main House
 1/8" = 1'-0"





North Elevation - Existing & Demo - Main House

1/8" = 1'-0"



Proposed North Elevation - Main House

1/8" = 1'-0"



North Elevation - Main House

3/16" = 1'-0"



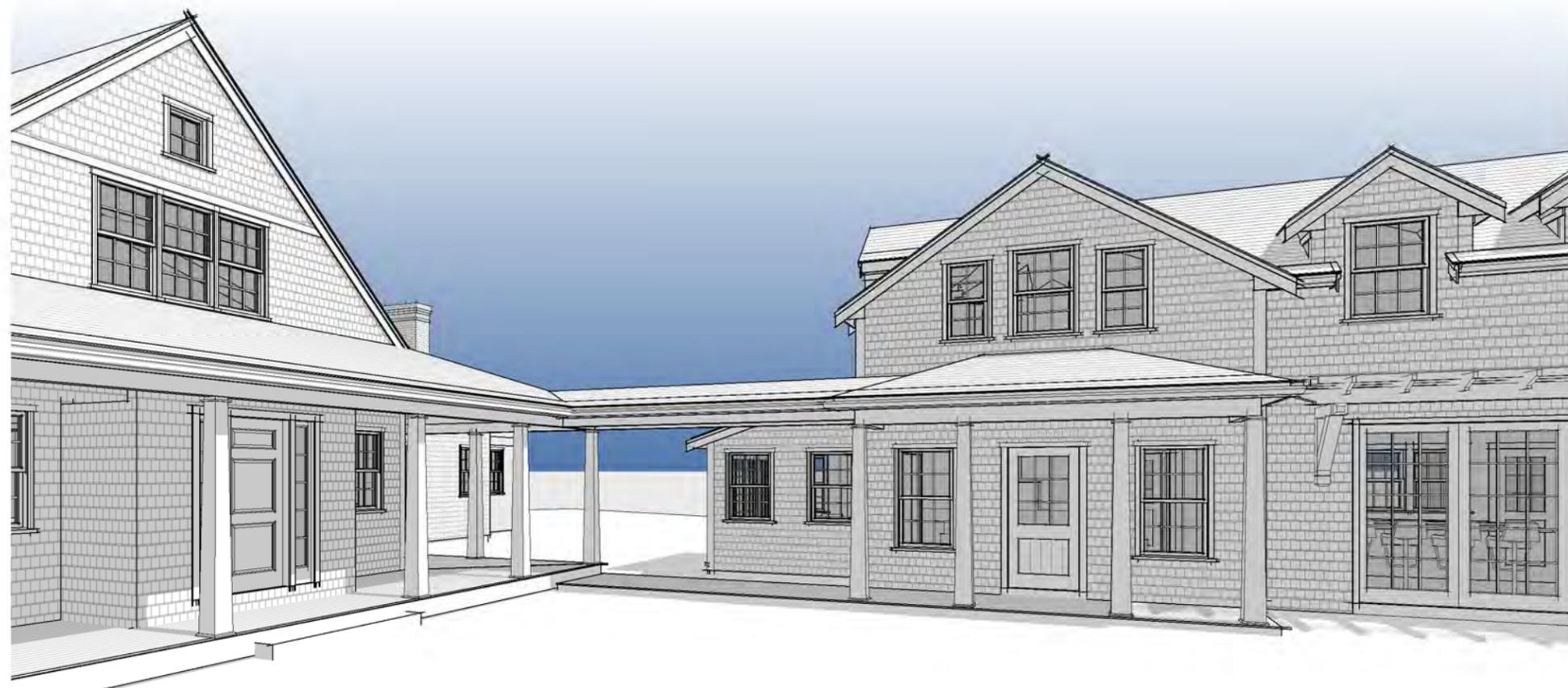
Section Addition & 3D Views

3/16" = 1'-0"



Second Floor MH
9'-9"

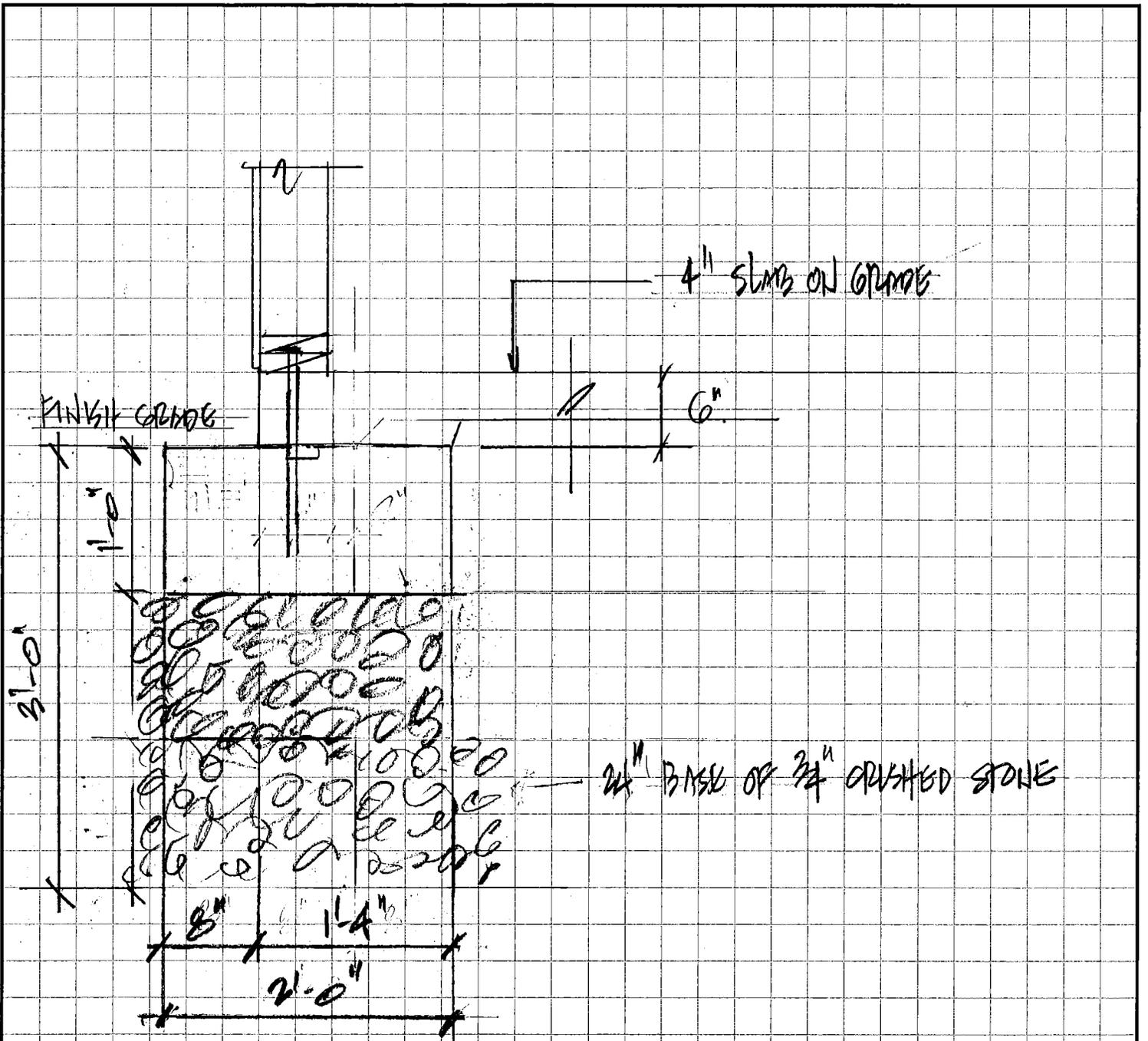
First Floor MH
0'-11"



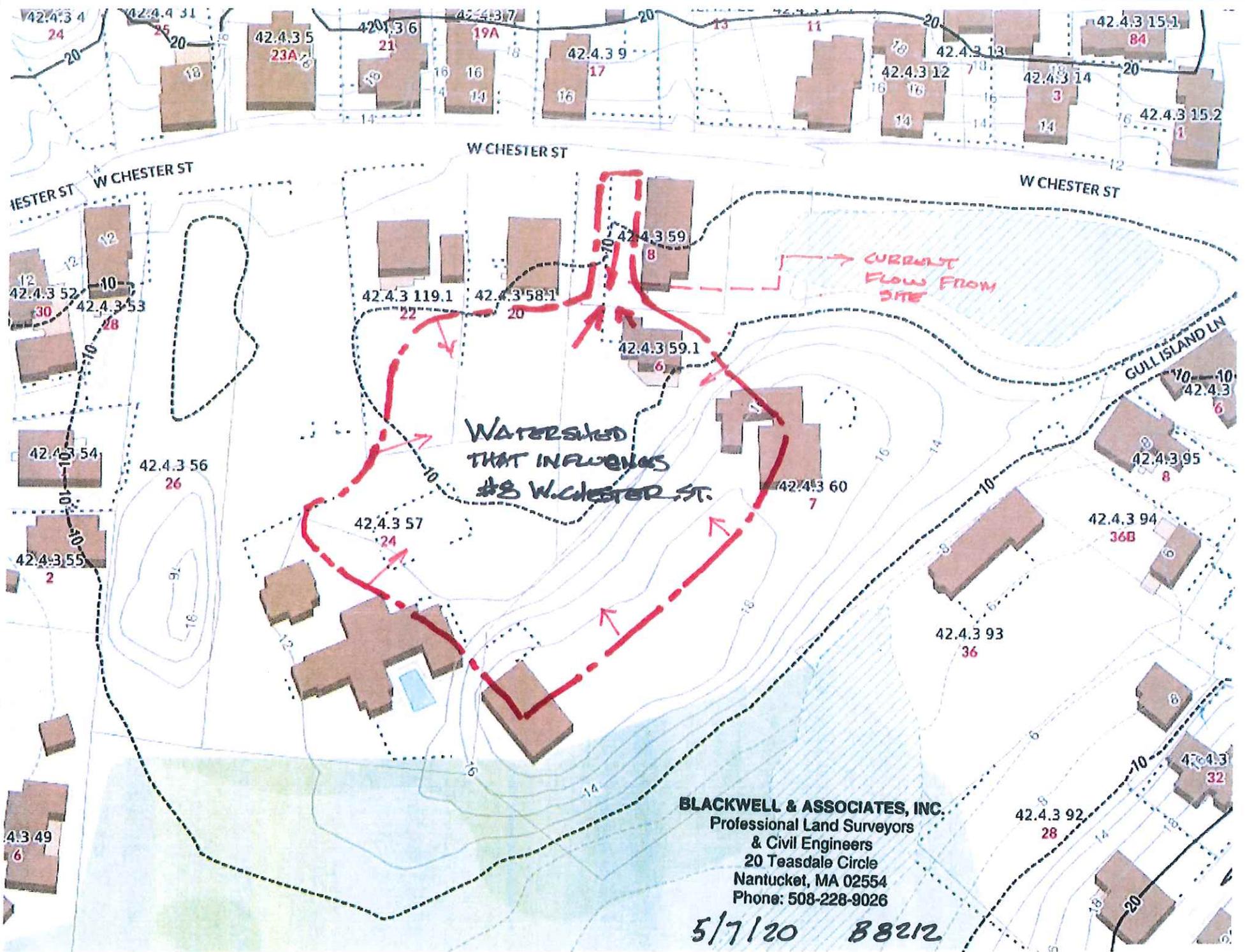
DWD ENGINEERING, INC.

5 Michael Road
East Bridgewater, MA 02333
(508) 378-9602
domdean@aol.com

JOB 24 West Chester Street Northwest, MA
SHEET NO. 945-21-20-1 OF _____
CALCULATED BY DWD DATE 5/24/10
CHECKED BY _____ DATE _____
SCALE _____ 1/2" = 1'-0"



FOUNDATION DETAIL
SCALE: 1/2" = 1'-0"



Watershed
that influences
#8 W. Chester St.

CURRENT
FLOW FROM
SITE

BLACKWELL & ASSOCIATES, INC.
Professional Land Surveyors
& Civil Engineers
20 Teasdale Circle
Nantucket, MA 02554
Phone: 508-228-9026

5/7/20 88212



Notice of Intent Application

May 22, 2020

Subject Property

62 Cliff Road
Map 41, Parcel 20
Nantucket, Massachusetts

Applicant/Property Owner

62 Cliff Road Realty Trust
c/o John J. Tegan, Jr, Trustee
Lorraine A. Tegan, Trustee
62 Cliff Road
Nantucket, MA 02554

LEC Environmental Consultants, Inc.

12 Resnik Road, Suite 1
Plymouth, MA 02360
508-746-9491
508-746-9492 fax

www.lecenvironmental.com



May 22, 2020

Email/FedEx Delivery

Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

**Re: Notice of Intent Application
62 Cliff Road
Map 41, Parcel 20
Nantucket, Massachusetts**

[LEC File #: BrEI\19-405.01]

Dear Members of the Commission:

On behalf of the Applicant, 62 Cliff Road Realty Trust, LEC Environmental Consultants, Inc., (LEC) is submitting this Notice of Intent (NOI) Application for a proposed addition onto the single-family dwelling on the above-referenced subject parcel. Proposed work activities occur within the 100-foot Buffer Zone to Bordering Vegetated Wetlands (BVW)/Vegetated Wetlands protected under the *Massachusetts Wetlands Protection Act* (M.G.L., c. 131, s. 40), its implementing *Regulations* (310 CMR 10.00), and/or the *Town of Nantucket Bylaw* (Chapter 136) and *Wetlands Protection Regulations (Bylaw)*. Details of the proposed project are depicted on the *Proposed Site Plan* prepared by Bracken Engineering, Inc., dated May 19, 2020.

The following checks made payable to the Town of Nantucket will be sent under separate cover: Sixty-Seven Dollars and Fifty Cents (\$67.50) for the town portion of the WPA filing fee; Two Hundred Dollars (\$200.00) for the Town Consultant fee; and Twenty-Five Dollars (\$25.00) for the *Bylaw* fee. A check made payable to *The Inquirer and Mirror* (\$335.10) will also be submitted for the legal advertising fee. The state portion of the WPA filing fee (\$42.50) has been forwarded to the DEP Lockbox.

Thank you for your consideration of this Application. We look forward to the June 11, 2020 Public Hearing to discuss the project further. If you should have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

LEC Environmental Consultants, Inc.

Brian T. Madden
Wildlife Scientist

cc: DEP SERO; 62 Cliff Road Realty Trust; Bracken Engineering, Inc.

LEC Environmental Consultants, Inc.				www.lectenvironmental.com
12 Resnik Road Suite 1 Plymouth, MA 02360 508.746.9491	380 Lowell Street Suite 101 Wakefield, MA 01880 781.245.2500	100 Grove Street Suite 302 Worcester, MA 01605 508.753.3077	P. O. Box 590 Rindge, NH 03461 603.899.6726	680 Warren Avenue Suite 3 East Providence, RI 02914 401.685.3109
PLYMOUTH, MA	WAKEFIELD, MA	WORCESTER, MA	RINDGE, NH	EAST PROVIDENCE, RI

1. Introduction

On behalf of the Applicant, 62 Cliff Road Realty Trust, LEC Environmental Consultants, Inc., (LEC) is submitting this Notice of Intent (NOI) Application for a proposed addition onto the single-family dwelling at 62 Cliff Road. The proposed addition will replace an existing deck. Proposed work activities occur within the 100-foot Buffer Zone to Bordering Vegetated Wetlands (BVW)/Vegetated Wetlands protected under the *Massachusetts Wetlands Protection Act* (M.G.L., c. 131, s. 40), its implementing *Regulations* (310 CMR 10.00), and/or the *Town of Nantucket Bylaw* (Chapter 136) and *Wetlands Protection Regulations (Bylaw)*. A Waiver is concurrently requested for the addition within the 50-foot Buffer Zone and work activities within the existing developed 25-foot Buffer Zone.

The following NOI Application provides a description of the existing site conditions, Wetland Resource Areas, and proposed project designed to protect the interests and values of the Wetland Resource Areas. Details of the proposed project are depicted on the *Proposed Site Plan* prepared by Bracken Engineering, Inc., dated May 19, 2020 (Appendix C).

2. General Site Description

The 21,356± square foot subject parcel affords frontage off Cliff Road to the north, and is surrounded by single-family dwellings (Appendix A, Figures 1 and 2). The subject parcel is currently improved by a single-family dwelling surrounded by lawn/landscaping and accessed via a shell driveway off Cliff Road. Vegetation within the upland consists of ornamental landscaped plants, most notably privet (*Ligustrum* sp.), in addition to an oak (*Quercus* sp.) tree south of the dwelling. Scrub shrub wetland conditions occupy the southerly portion of the site.

2.1 Floodplain Designation

According to the June 9, 2014, Federal Emergency Management Agency Flood Insurance Rate Map for the Town of Nantucket (25019C0086G), the subject parcel is located within Zone X, *Areas determined to be outside the 0.2% annual chance flood* (Appendix A, Figure 3).

2.2 **Natural Heritage and Endangered Species Program Designation**

According to the 14th Edition of the Massachusetts *Natural Heritage Atlas* (effective August 1, 2017) published by the Natural Heritage & Endangered Species Program (NHESP), the subject parcel is not located within an Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Wildlife (Appendix A, Figure 4).

3. **Wetland Boundary Determination Methodology**

LEC determined the on-site BVW/Freshwater Wetland boundaries on November 13, 2019, through observations of the existing plant communities, using the “fifty percent criteria” to determine dominance of wetland/upland vegetation, the interpretation of soil characteristics, and other indicators of hydrology, in accordance with the principals of DEP’s handbook, *Delineating Bordering Vegetated Wetlands under the Massachusetts Wetlands Protection Act* (March 1995), the *Field Indicators for Identifying Hydric Soils in New England-Version 4, May 2017*, and the criteria set forth in 310 CMR 10.55(2) and the *Bylaw*, specifically analyzing the depth of high groundwater within 18 inches of the ground surface.

4. **Wetland Resource Area Descriptions**

On-site Wetland Resource Areas include Bordering Vegetated Wetland (BVW)/Vegetated (Freshwater) Wetlands as described below.

4.1 **Bordering Vegetated Wetland/Vegetated (Freshwater) Wetland**

Bordering Vegetated Wetlands (BVW) are defined in 310 CMR 10.55(2) as *freshwater wetlands which border on creeks, rivers, streams, ponds, and lakes. In these areas soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of BVW is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist.*

A vegetated Freshwater Wetland is defined within Section 1.02 of the Nantucket *Wetlands Protection Regulations* as a *wet meadow, freshwater marsh, swamp, bog, pond, lake, creek, or stream; an area of low topography where ground water, flowing water, standing surface water, or ice provides a significant part of the supporting substrate for a plant community for at least five months a year; characterized by emergent and*

submergent plant communities in inland waters; and/or where depth to high groundwater is within 18 inches of the ground surface, and/or exhibits hydric soil characteristics and includes that portion of any inland bank which touches any inland waters. Freshwater wetlands are not defined to include drainage facilities constructed to include wetland vegetation as treatment for stormwater runoff.

BVW/Vegetated Wetlands occupying the southern portion of the site are dominated by winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), and arrowwood (*Viburnum dentatum*) along with scattered elderberry (*Sambucus canadensis*), bush honeysuckle (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), blackberry (*Rubus allegheniensis*), cattails (*Typha* sp.), soft rush (*Juncus effusus*), sensitive fern (*Onoclea sensibilis*), and goldenrods (*Solidago* sp.).

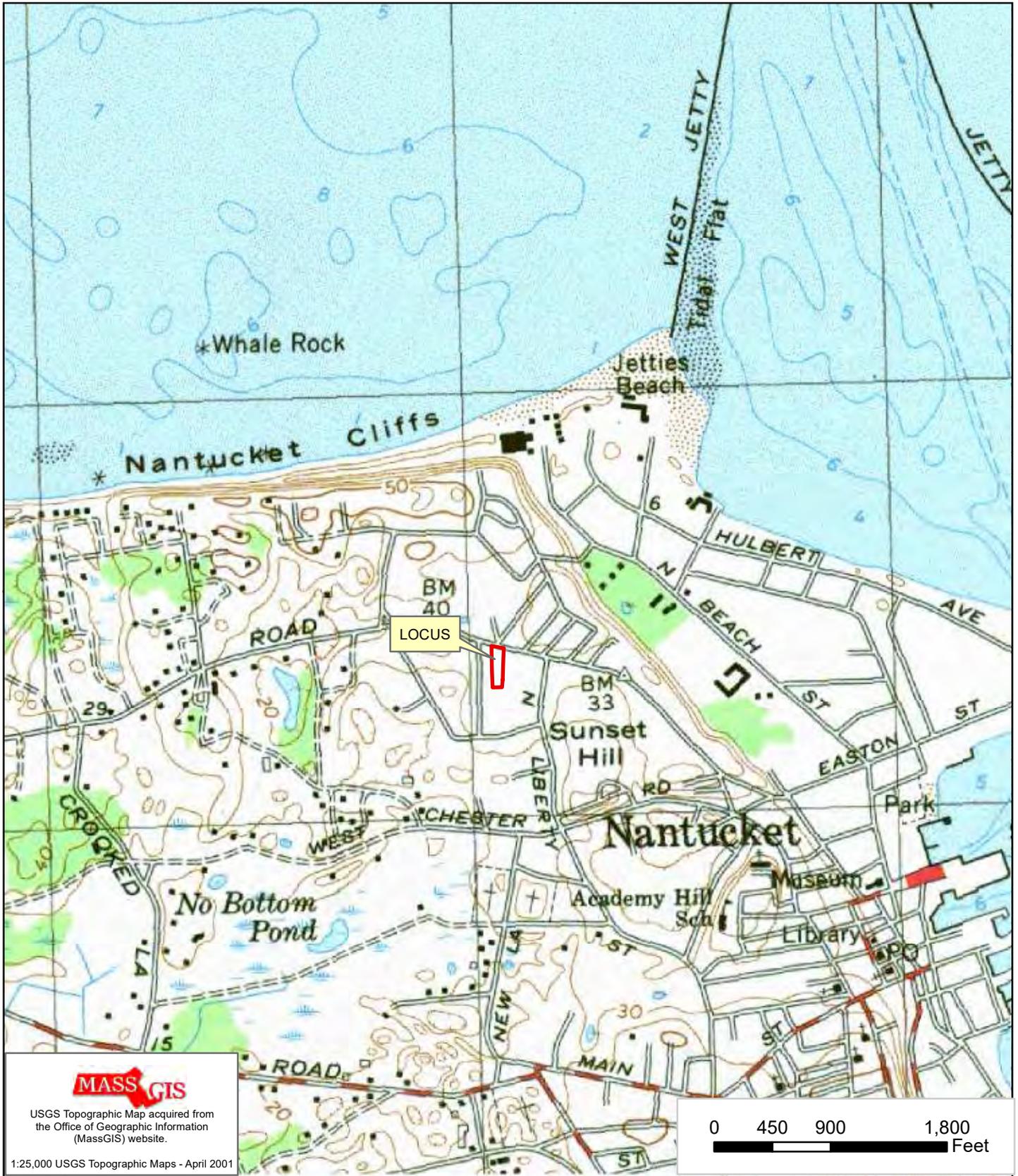
5. Proposed Project

The Applicant is proposing to construct a 233± square foot addition on the southern façade of the dwelling, replacing an existing deck. There is no proposed structural expansion beyond that existing. The addition will be supported by helical piers. The addition occurs within the 50-foot Buffer Zone to the southerly BVW/Vegetated Wetlands and proposed work/access within existing lawn areas within the 25-foot Buffer Zone. Access will be gained via the east side of the dwelling through the existing gate/arbor. The existing gate/arbor and landscaping will be replaced in kind. Erosion control barriers are proposed along the wetland boundary extending through the lawn area to protect the downgradient BVW/Vegetated Wetlands, as depicted on the *Proposed Site Plan*.

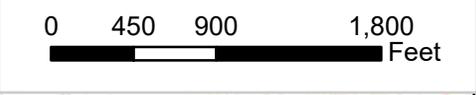
A Waiver is respectfully requested under Section 1.03 F.3. a) of the Nantucket *Wetlands Protection Regulations* for the proposed addition. There are no alternatives to replacing the deck with an addition that avoids the 50-foot Buffer Zone and construction/access within the 25-foot Buffer Zone. Best Management Practices (BMPs) will be implemented during construction to avoid adverse impacts to the on-site BVW/Vegetated Wetlands, including maintenance of the erosion control barriers. The helical pier supports will avoid the need for dewatering and a foundation within high groundwater. To reiterate, the proposed project does not result in any structural expansions and all redevelopment overlaps with the existing deck footprint.

6. Summary

On behalf of the Applicant, 62 Cliff Road, Realty Trust, LEC is submitting this NOI Application for a proposed addition onto the single-family dwelling to replace an existing deck. The project will not result in an adverse impact on the downgradient BVW/Vegetated Wetlands and BMPs will be implemented during construction to protect the on-site Wetland Resource Area.



MASS GIS
 USGS Topographic Map acquired from
 the Office of Geographic Information
 (MassGIS) website.
 1:25,000 USGS Topographic Maps - April 2001



LEC
 LEC Environmental Consultants, Inc.
 Plymouth, MA
 508.746.9491
 www.lecenvironmental.com

Figure 1: USGS Topographic Map

62 Cliff Road
 Nantucket, Massachusetts

N

 April 29, 2020



LEC Environmental Consultants, Inc.

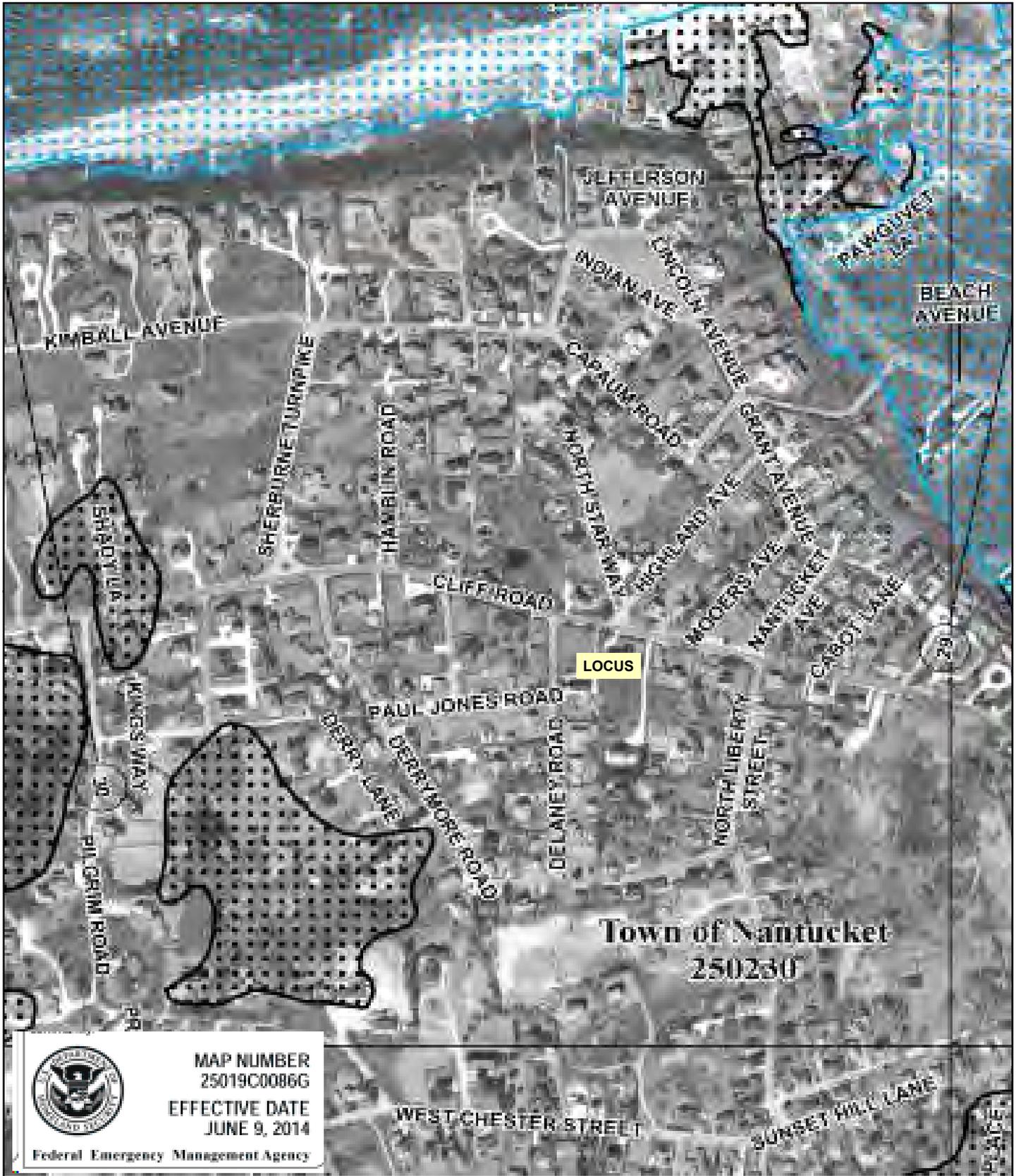
Plymouth, MA
508.746.9491
www.lecenvironmental.com

Figure 2: Aerial Orthophoto Map

62 Cliff Road
Nantucket, Massachusetts



April 29, 2020



MAP NUMBER
25019C0086G
EFFECTIVE DATE
JUNE 9, 2014

Federal Emergency Management Agency



LEC Environmental Consultants, Inc.

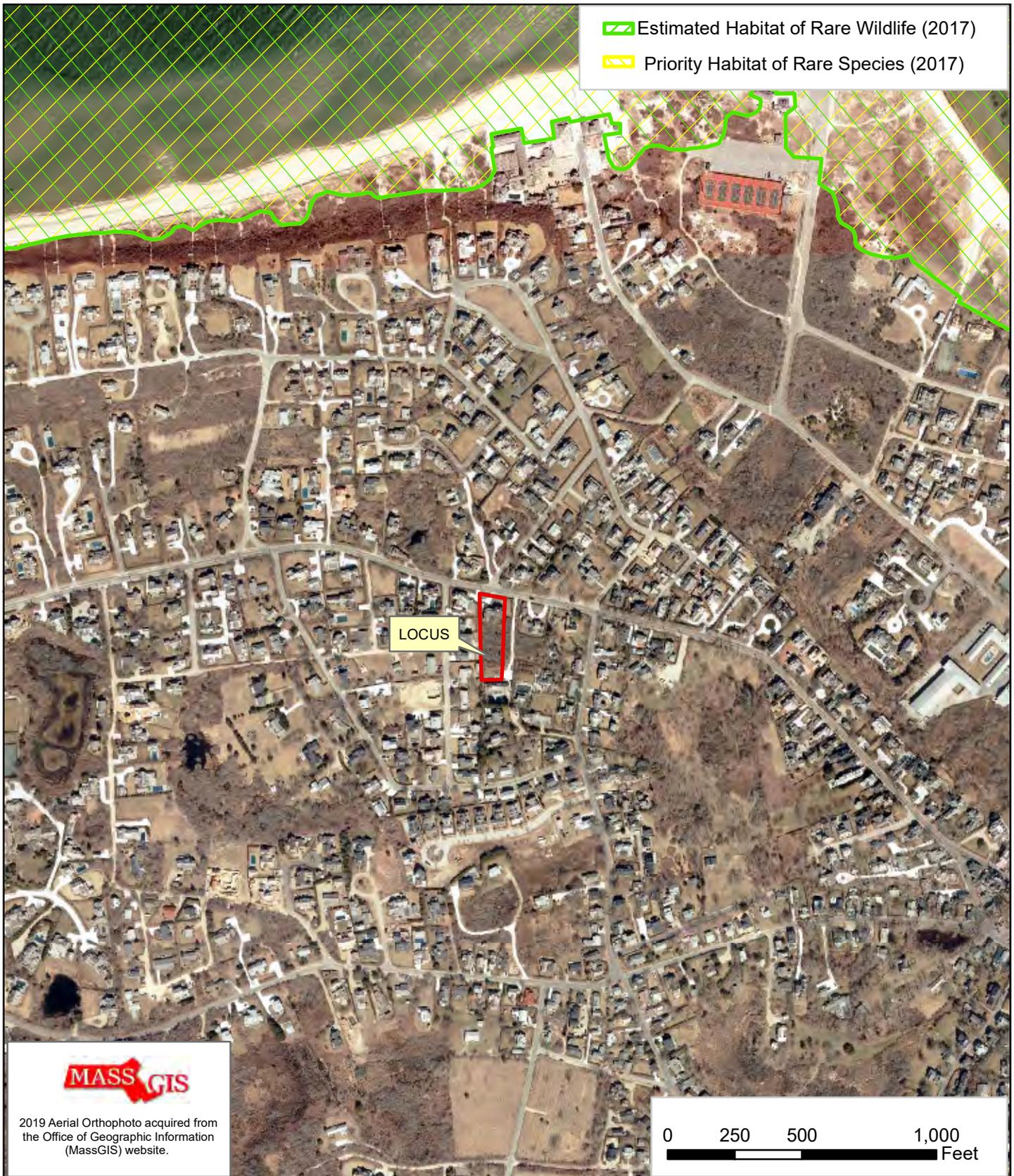
Plymouth, MA
508.746.9491
www.lecenvironmental.com

Figure 3: FEMA Flood Insurance Rate Map

62 Cliff Road
Nantucket, Massachusetts



April 29, 2020



2019 Aerial Orthophoto acquired from the Office of Geographic Information (MassGIS) website.



LEC Environmental Consultants, Inc.

Plymouth, MA
508.746.9491
www.lecenvironmental.com

Figure 4: NHESP Map

62 Cliff Road
Nantucket, Massachusetts



April 29, 2020

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **YES**
 title/date: **NRCS Web Soil Survey**
 map number:
 soil type mapped: **Riverhead-Nantucket complex**
 hydric soil inclusions: **N/A**

Are field observations consistent with soil survey? **NO**
 Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O	1-0"		
A	0-16"	10 YR 4/2	10 YR 3/6, 5/6
B	16-24"	10 YR 6/3	10 YR 3/6, 5/6, 2/1

Remarks:
Plot taken with hand-held auger downgradient of wetland flags 8 & 9

3. Other:

Conclusion: Is soil hydric? **YES**

62 Cliff Road, Nantucket (T1/P1)

Other Indicators of Hydrology: (check all that apply & describe)

- Site Inundated: _____
- Depth to free water in observation hole: **12"**
- Depth to soil saturation in observation hole: **@ surface**
- Water marks: _____
- Drift lines: _____
- Sediment Deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: **Wetland Interior**
- Recorded Data (streams, lake, or tidal gauge; aerial photo; other):

- Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	_____	X
Wetland hydrology present:		
Hydric soil present	X	_____
Other indicators of hydrology present	X	_____
Sample location is in a BVW	X	_____

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: 62 Cliff Road Realty Trust Prepared by: LEC Environmental Project location: 62 Cliff Rd, Nantucket DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 1		Transect Number: 1	Date of Delineation: 11/13/19
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*

Ground

Soft rush (<i>Juncus effuses</i>)	20.5	24.8	Yes	FACW+ *
Orchard grass (<i>Dactylis glomerata</i>)	20.5	24.8	Yes	FACU
Canada goldenrod (<i>Solidago canadensis</i>)	20.5	24.8	Yes	FACU
Grass-leaved goldenrod (<i>Euthamia graminifolia</i>)	10.5	12.7	No	
Multiflora rose (<i>Rosa multiflora</i>)	10.5	12.7	No	

Shrub

Winterberry (<i>Ilex verticillata</i>)	63.0	67.0	Yes	FACW+ *
Multiflora rose	20.5	21.8	Yes	FACU
Bush honeysuckle (<i>Lonicera</i> sp.)	10.5	11.2	No	

* Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

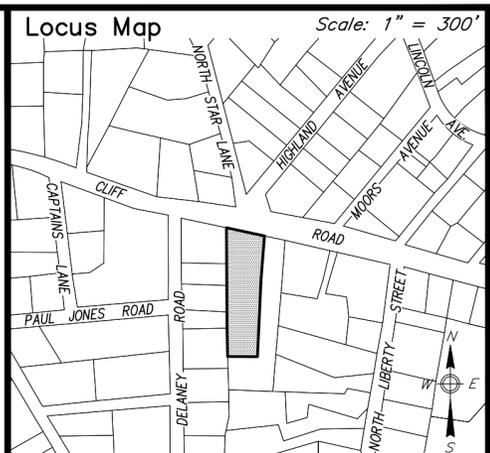
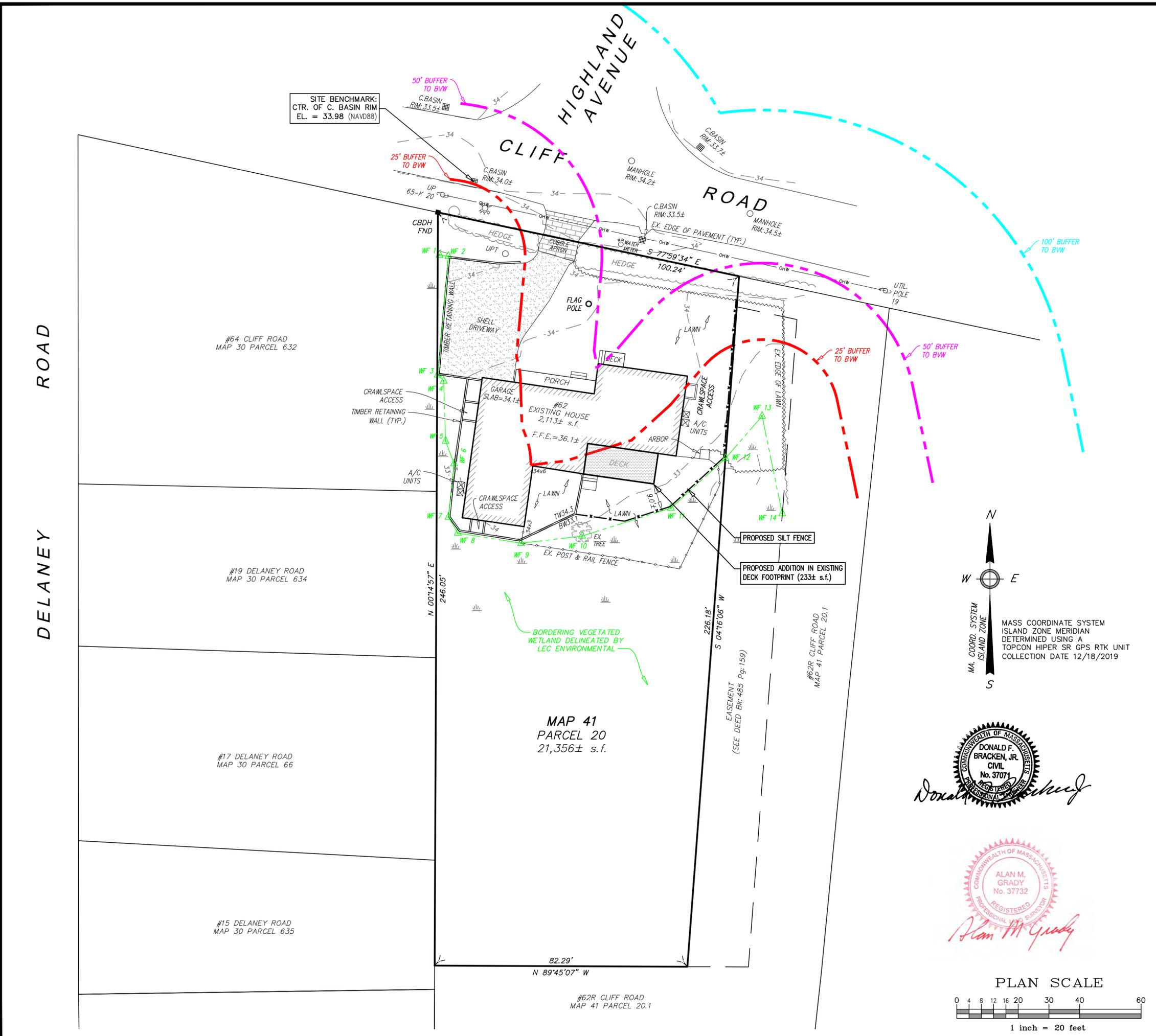
Vegetation conclusion:

Number of dominant wetland indicator plants: **2**

Number of dominant non-wetland indicator plants: **3**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes **NO**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent



- Notes**
- LOCUS: #62 CLIFF ROAD MAP 41 PARCEL 20
 - OWNER: 62 CLIFF ROAD REALTY TRUST
JOHN J. TEGAN, JR., trustee
LORRAINE A. TEGAN, trustee
62 CLIFF ROAD
NANTUCKET, MA 02554
 - DEED REF: Bk: 925 Pg: 40
 - PLAN REF: Plan File 47-J (LOT 4)
 - LOCUS DOES NOT FALL WITHIN A SPECIAL FLOOD HAZARD ZONE AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP No. 25019C-0086-G dated 06/09/2014.
 - LOCUS DOES NOT FALL WITHIN THE NATURAL HERITAGE and ENDANGERED SPECIES PROGRAM (NHESP) AREAS OF ESTIMATED HABITATS OF RARE WILDLIFE and PRIORITY HABITATS OF RARE SPECIES.

ZONE: R-1

REQUIRED

LOT AREA:	5,000 s.f.
FRONTAGE:	50'
FRONT YARD:	10'
SIDE/REAR YARD:	5'
GROUND COVER:	30% (MAX)

Prepared By:

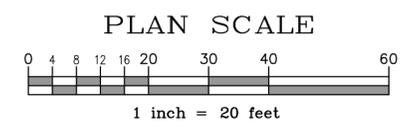
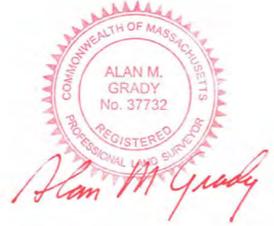
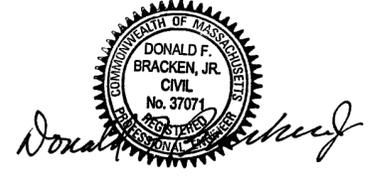
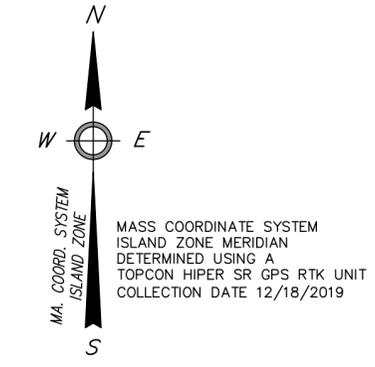
BRACKEN ENGINEERING, INC.

49 HERRING POND ROAD BUZZARDS BAY, MA 02532
 (tel) 508.833.0070 (fax) 508.833.2282

19 OLD SOUTH ROAD NANTUCKET, MA 02554
 (tel) 508.325.0044 (fax) 508.833.2282
 www.brackeneng.com

PROPOSED SITE PLAN IN NANTUCKET, MASSACHUSETTS

Prepared For:
62 CLIFF ROAD REALTY TRUST
 #62 CLIFF ROAD
 MAP 41 PARCEL 20



No.	Date	Revision Description	By

Date: MAY 19, 2020
 Drawn: RMM/ERC/BEI
 Checked: DFB/AMG
 Sheet: 1 of 1



**Nantucket
SURVEYORS**
LLC

One of The  Companies

P.O. Box 3627, Nantucket, Massachusetts 02584-3627

Tel. (508) 228-0240 Fax (508) 228-9856

www.nantucketsurveyors.com

nsllcinfo@nantucketsurveyors.com

N-10933

May 22, 2020

Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

Re: Request for an Amended Order of Conditions
D.E.P. File # SE48-3098
Applicant: 11 Meadow Lane, LLC
11B Meadow Lane, Map: 41 Parcel: 448.1

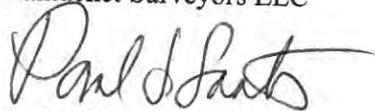
Dear Commissioners:

On behalf of the applicant, Nantucket Surveyors LLC is writing to request an Amendment to the Order of Conditions for the above-mentioned project. The project was issued an Order of Conditions on August 8, 2018 for the construction of a dwelling, and pool with associated grading, landscaping and utilities within the buffer zone to a Bordering Vegetated Wetland.

Within this request the applicant is seeking permission to remove invasive vines between the 25' and the 50' setback of a Bordering Vegetated Wetland.

Thank you for your attention to this matter. If you have any questions, please contact our office.

Respectfully,
Nantucket Surveyors LLC



Paul J. Santos, PLS
Agent for the Applicant

Enclosures

- One (1) check payable to the Town of Nantucket for \$25.00 (Bylaw Fee)
- One (1) check payable to the Town of Nantucket for \$200.00 (Reviewer Fee)
- One (1) check payable to the Inquirer and Mirror for \$335.10 (publishing of public notice)

Cc: DEP Southeast Regional Office
11 Meadow Lane, LLC

Office located at 5 Windy Way • Nantucket, MA 02554

Land Surveying • Topographic Surveys • Civil Engineering • Construction • Marine • Environmental Permitting



2018 00002625

Bk: 1663 Pg: 110 Page: 1 of 17
Doc: OOC 09/18/2018 12:58 PM



**Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands**

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
SE48-3098
MassDEP File #

eDEP Transaction #
Nantucket
City/Town

A. General Information

1. From: Nantucket
Conservation Commission

2. This issuance is for (check one):
a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:

a. First Name 11 Meadow Lane, LLC b. Last Name _____
c. Organization _____
d. Mailing Address 12 Okorwaw Avenue
Nantucket MA 02554
e. City/Town f. State g. Zip Code

4. Property Owner (if different from applicant):

Same As Applicant
a. First Name _____ b. Last Name _____
c. Organization _____
d. Mailing Address _____
e. City/Town _____ f. State _____ g. Zip Code _____

5. Project Location:

a. Street Address 11 Meadow Lane b. City/Town Nantucket
41 c. Assessors Map/Plat Number 448 (Lot 6B)
d. Parcel/Lot Number _____
Latitude and Longitude, if known: 41.283495 -70.111834
d. Latitude e. Longitude

FINDINGS and ADDITIONAL CONDITIONS
Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40)
Town of Nantucket Wetlands Bylaw (Chapter 136)

Address: 11 Meadow Lane
Assessor's Map and Parcel: 41-448 (Lot 6B)
Property Owner: 11 Meadow Lane LLC
Applicant: 11 Meadow Lane LLC
DEP File Number: SE48-3098
Filing Date: July 24, 2018
Date Hearing Closed: August 8, 2018
Date Orders Issued: August 8, 2018
Plan of Record Information: Topographic Plan of Land, dated July 20, 2018 and stamped by Paul J. Santos, P.L.S.
Landscape Plan, dated June 26, 2018 prepared by Atlantic Landscaping, Inc.

Permit Overview:

This order permits the construction of a dwelling, and pool with associated grading, landscaping and utilities within the buffer zone to a Bordering Vegetated Wetland. Waivers are not required for this project.

Additional Findings:

1. The area falls outside mapped habitat areas and does not require NHESP review.
2. Other site work shown on the plans of records are outside of Commission jurisdiction

In addition to the General Conditions contained elsewhere in this document, the Commission includes the following Special Conditions pursuant to MGLCh131s40 and the Town of Nantucket Wetlands Protection Bylaw, Chapter 136:

18. All work shall be performed in accordance with the Site and Work Description contained within the Notice of Intent and plan notes set out on the plan of record, provided project narratives, and protocols.
19. The pool may not be drained or discharged to an area within Commission jurisdiction. Chemical treatment of the pool shall end three weeks prior to any draining.
20. No work or alteration is permitted inside the 50 foot setback.

WAIVERS UNDER THE NANTUCKET WETLANDS BYLAW/REGULATIONS

Waivers are not required for the project as proposed.

11B Meadow Lane, Nantucket, MA
Applicant: 11 Meadow Lane, LLC



View of invasive vines looking west



View of invasive vines looking north

MAIN OFFICE:

49 Herring Pond Road
Buzzards Bay, MA 02532
TEL: (508) 833-0070
FAX: (508) 833-2282



NANTUCKET OFFICE:

19 Old South Road
Nantucket, MA 02554
TEL: (508) 325-0044
www.brackeneng.com

May 12, 2020

EMAIL & USPS

Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

**Re: Certificate of Compliance Request
23 Monomoy Road
Map 54, Parcel 205
SE48-3061**

Dear Commission Members:

On behalf of the Applicants, Constance and David Cheever, Trustees of The Constance K. Cheever Revocable Trust, enclosed with this letter is the WPA Form 8A, recorded OOC pages, site photographs, Conservation Final As-Built plan dated 5/5/2020 and a check for \$25.00 for the Bylaw filing fee.

The Order of Conditions issued on 3/7/2018 allowed for the removal of an existing structure, construction of a new structure, installation of driveways, installation of a pool fence, construction of patios and modification of retaining walls with associated grading, landscaping, and utilities within the buffer zone to a Vegetated Wetland. On 4/6/18 a Minor Modification was filed and approved to raise the top of the proposed foundation from elev. 18.5 to elev. 21.0 and to revise the grading of a retaining wall.

To the best of our knowledge, all work has been completed in substantial conformance with the approved plans with the exception of the following:

1. The porous driveway extended on the north side of the dwelling;
2. Subsurface drainage for the roof was not installed. However, roof runoff dissipates around the structure with no signs of erosion.

If you have any further questions, please do not hesitate to contact me at 508-325-0044 or don@brackeneng.com.

Sincerely,

Bracken Engineering, Inc.

A handwritten signature in black ink, appearing to read 'Donald F. Bracken, Jr.', written in a cursive style.

Donald F. Bracken, Jr., P.E
President

Enclosures



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 8A – Request for Certificate of Compliance
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 &
The Town of Nantucket Wetlands Bylaw Chapter 136

DEP File Number:

SE48-3061
 Provided by
 Nantucket



A. Project Information

1. This request is being made by:(current Title holder):
The Constance K. Cheever Revocable Trust, Constance Cheever & David Cheever, Co-Trustees
 Name
P.O. Box 112
 Mailing Address
Roxbury CT 06783
 City/Town State Zip Code
508-325-0044 (Agent)
 Phone Number

2. This request is in reference to work regulated by a final Order of Conditions issued to:
David and Constance K. Cheever
 Applicant
3/7/2018 SE48-3061
 Dated Nantucket File Number

Upon completion of the work authorized in an Order of Conditions, the property owner must request a Certificate of Compliance from the issuing authority stating that the work or portion of the work has been satisfactorily completed.

3. The project site is located at:
23 Monomoy Road Nantucket
 Street Address City/Town
54 205
 Assessors Map/Plat Number Parcel/Lot Number

4. The final Order of Conditions was recorded at the Registry of Deeds for : (name on Order)
David and Constance K. Cheever
 Property Owner (if different)
Nantucket
 County Book Page
26696 – Doc#157970
 Certificate (if registered land)

5. This request is for certification that (check one):

the work regulated by the above-referenced Order of Conditions has been satisfactorily completed.

the following portions of the work regulated by the above-referenced Order of Conditions have been satisfactorily completed (use additional paper if necessary).

the above-referenced Order of Conditions has lapsed and is therefore no longer valid, and the work regulated by it was never started.



WPA Form 8A – Request for Certificate of Compliance

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 &
The Town of Nantucket Wetlands Bylaw Chapter 136

A. Project Information (cont.)

6. Did the Order of Conditions for this project, or the portion of the project subject to this request, contain an approval of any plans stamped by a registered professional engineer, architect, landscape architect, or land surveyor?

Yes

If yes, attach a written statement by such a professional certifying substantial compliance with the plans and describing what deviation, if any, exists from the plans approved in the Order.

No

B. Submittal Requirements

Requests for Certificates of Compliance should be directed to the issuing authority that issued the final Order of Conditions (OOC). If the project received an OOC from the Conservation Commission, submit this request to that Commission. If the project was issued a Superseding Order of Conditions or was the subject of an Adjudicatory Hearing Final Decision, submit this request to the appropriate DEP Regional Office (see <http://www.mass.gov/eea/agencies/massdep/about/contacts/find-the-massdep-regional-office-for-your-city-or-town.html>).



2018 00157970

Cert: 26696 Doc: OOC

Registered: 03/20/2018 09:31 AM



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:

SE48-3061

MassDEP File #

eDEP Transaction #

Nantucket

City/Town

A. General Information

1. From: Nantucket
Conservation Commission

2. This issuance is for (check one):
a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:

David and Constance K.

a. First Name

Cheever

b. Last Name

c. Organization

Box 112

d. Mailing Address

Roxbury

e. City/Town

CT

f. State

06783-0112

g. Zip Code

4. Property Owner (if different from applicant):

Same as Applicant

a. First Name

b. Last Name

c. Organization

d. Mailing Address

e. City/Town

f. State

g. Zip Code

5. Project Location:

23 Monomoy Road

a. Street Address

Nantucket

b. City/Town

54

c. Assessors Map/Plat Number

205

d. Parcel/Lot Number

Latitude and Longitude, if known:

41°16' 28.578"N

d. Latitude

70° 4'55.1172"W

e. Longitude

FINDINGS and ADDITIONAL CONDITIONS
Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40)
Town of Nantucket Wetlands Bylaw (Chapter 136)

Address: 23 Monomoy Road
Assessor's Map and Parcel: 54-205
Property Owner: Constance K. Cheever
Applicant: David and Constance Cheever
DEP File Number: SE48-3061
Filing Date: February 17, 2018
Date Hearing Closed: March 7, 2018
Date Orders Issued: March 7, 2018
Plan of Record Information: Proposed Site Plan, dated February 15, 2018 and stamped by Donald F. Bracken, Jr. P.E.

Permit Overview:

This order permits the removal of an existing structure, construction of a new structure, installation of driveways, installation of a pool fence, construction of patios and modification of retaining walls with associated grading, landscaping and utilities within the buffer zone to a Vegetated Wetland. Waivers are not required for this project.

Additional Findings:

1. The area falls outside mapped habitat areas and does not require NHESP review.

In addition to the General Conditions contained elsewhere in this document, the Commission includes the following Special Conditions pursuant to MGLCh131s40 and the Town of Nantucket Wetlands Protection Bylaw, Chapter 136:

18. All work shall be performed in accordance with the Site and Work Description contained within the Notice of Intent and plan notes set out on the plan of record, provided project narratives, and protocols.
19. The pool may not be drained to an area within Commission jurisdiction.

WAIVERS UNDER THE NANTUCKET WETLANDS BYLAW/REGULATIONS

Waivers are not required for the project as proposed.



Town of Nantucket Conservation Commission
Minor Modification Request Approval

DEP File Number
 SE48-3061
 Provided by DEP

Town of Nantucket Bylaw Chapter 136
 And Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

A. General Information

From:

Nantucket Conservation Commission

To:

Applicant:

David and Constance Cheever
 Name
Po Box 112
 Mailing Address
Roxbury CT 06783
 City/Town State Zip Code

Property Owner (if different from applicant):

Same As Applicant
 Name

 Mailing Address

 City/Town State Zip Code

Project Location:

23 Monomoy Road Nantucket
 Street Address City/Town
54 205
 Assessors Map/Plat Number Parcel /Lot Number

2. Title and Date (or Revised Date if applicable) of Final Plans and Other Documents:

<u>Proposed Site Plan</u>	<u>4/4/2018</u>
Title	Date
_____	_____
Title	Date
_____	_____
Title	Date

4. Description of Minor Modification:

Raise top of proposed foundation from elev 18.5 to elev 21.0. Revised grading addition of a retaining wall

3. Dates:

<u>0 4/06/18</u>	<u>04/11/2018</u>	<u>03/07/2018</u>
Date Minor Modification Filed	Date of Approval	Order of Conditions Date of

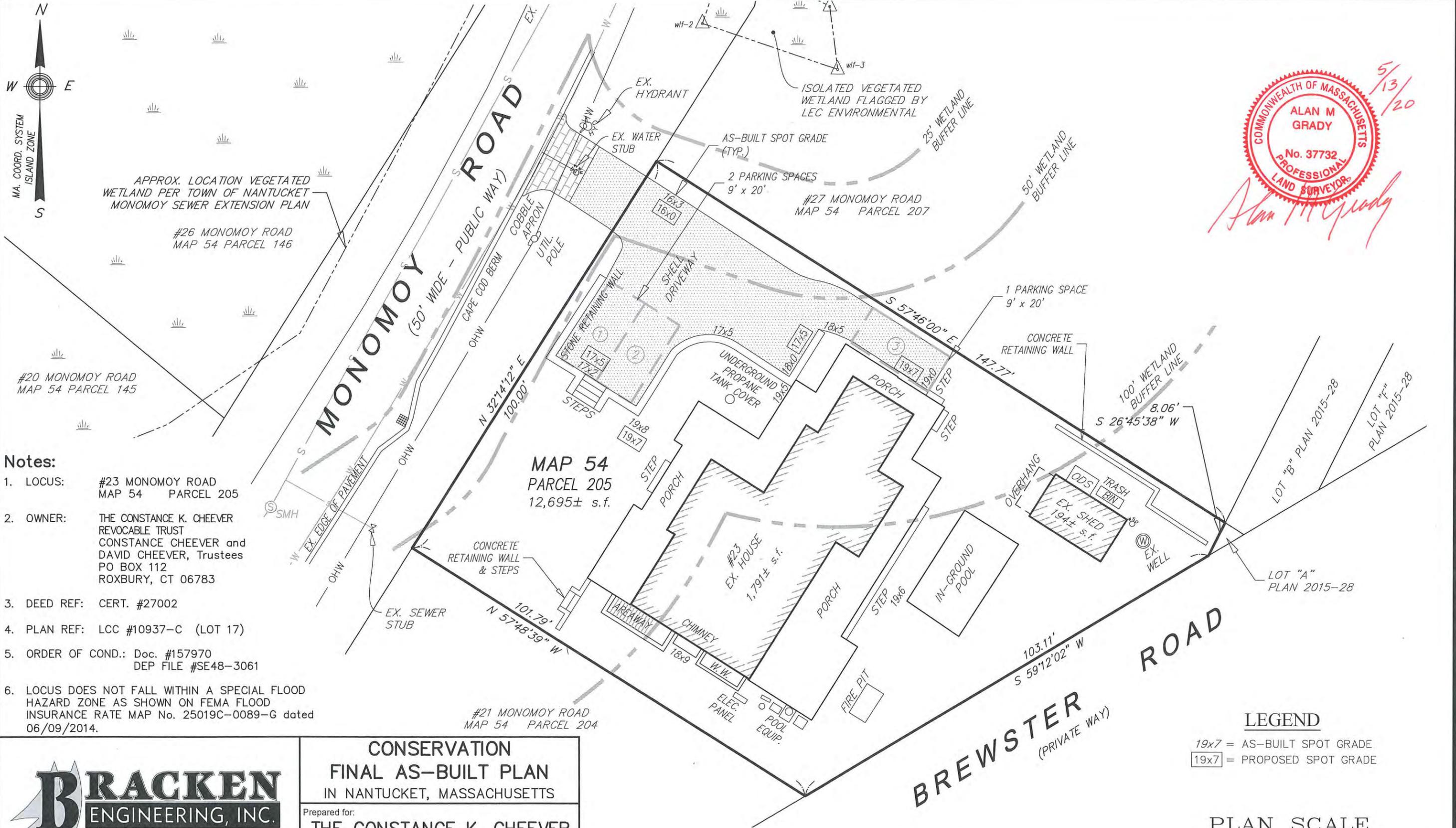
**Note: The date of issuance for the Order of Conditions is 03/07/2018 and is not extended further by this minor modification.*

**23 Monomoy Road (Map 54, Parcel 205)
Certificate of Compliance Request
SE48-3061**



**23 Monomoy Road (Map 54, Parcel 205)
Certificate of Compliance Request
SE48-3061**





5/13/20

ALAN M. GRADY
 No. 37732
 PROFESSIONAL LAND SURVEYOR

Alan M. Grady

- Notes:**
- LOCUS: #23 MONOMOY ROAD MAP 54 PARCEL 205
 - OWNER: THE CONSTANCE K. CHEEVER REVOCABLE TRUST
CONSTANCE CHEEVER and DAVID CHEEVER, Trustees
PO BOX 112
ROXBURY, CT 06783
 - DEED REF: CERT. #27002
 - PLAN REF: LCC #10937-C (LOT 17)
 - ORDER OF COND.: Doc. #157970
DEP FILE #SE48-3061
 - LOCUS DOES NOT FALL WITHIN A SPECIAL FLOOD HAZARD ZONE AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP No. 25019C-0089-G dated 06/09/2014.

BRACKEN ENGINEERING, INC.

49 HERRING POND ROAD BUZZARDS BAY, MA 02532 (tel) 508.833.0070 (fax) 508.833.2282

19 OLD SOUTH ROAD NANTUCKET, MA 02554 (tel) 508.325.0044 www.brackeneng.com

**CONSERVATION
FINAL AS-BUILT PLAN
IN NANTUCKET, MASSACHUSETTS**

Prepared for:
**THE CONSTANCE K. CHEEVER
REVOCABLE TRUST**
#23 MONOMOY ROAD
MAP 54 PARCEL 205

Revised: MAY 13, 2020	Revised: ADD AS-BUILT SPOT GRADES	By: ERC
Date: MAY 5, 2020	Drawn: ERC/BEI	Checked: DFB/AMG

LEGEND

19x7 = AS-BUILT SPOT GRADE
19x7 = PROPOSED SPOT GRADE

PLAN SCALE

0 4 8 12 16 20 30 40 60

1 inch = 20 feet



June 5, 2020

Jeff Carlson, Administrator
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

RE: Certificate of Compliance
46 Shimmo Pond Road
Map 43 Parcel 77
MassDEP File No. SE48-3037

Dear Jeff:

I am writing to request a Certificate of Compliance for the referenced project. The work was completed in substantial compliance with the Order of Conditions, as Amended and Modified. Attached are a Site Plan, WPA Form 8A, \$25 filing fee, front-page copy of the Order recorded at the Nantucket Registry of Deeds and photos of existing conditions.

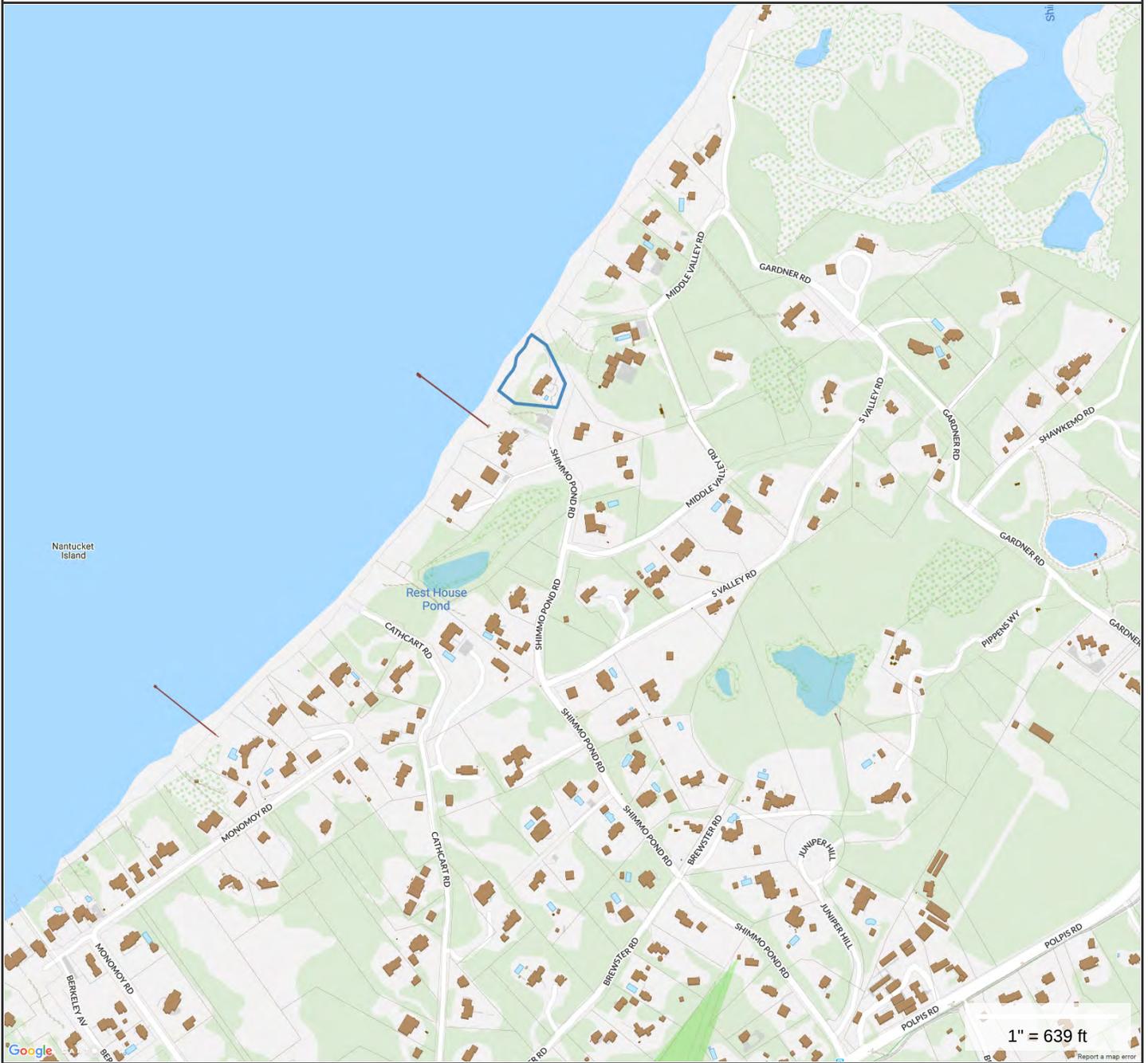
I plan to attend the public hearing on this matter, though please feel free to contact me should you have any questions or concerns with this request in the meantime.

Sincerely,
Nantucket Engineering & Survey, P.C.
By: Arthur D. Gasbarro, PE, PLS

A handwritten signature in blue ink that reads "Arthur D. Gasbarro".

Cc: 46 Shimmo Pond Road Nominee Trust
Arthur I. Reade, Jr.

Locus Map



Property Information

Property ID 43 77
Location 46 SHIMMO POND RD
Owner BASS MICHAEL A TR



**MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT**

Town and County of Nantucket, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated 09/14/2018
 Properties updated 10/06/2018



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 8A – Request for Certificate of Compliance
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

SE48-3037
 Provided by DEP

A. Project Information

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



Upon completion of the work authorized in an Order of Conditions, the property owner must request a Certificate of Compliance from the issuing authority stating that the work or portion of the work has been satisfactorily completed.

1. This request is being made by:

46 Shimmo Pond Road Nominee Trust
 Name

40 Soldiers Field Place
 Mailing Address

Boston MA 02135
 City/Town State Zip Code

 Phone Number

2. This request is in reference to work regulated by a final Order of Conditions issued to:

46 Shimmo Pond Road Nominee Trust
 Applicant

12/20/2017 SE48-3037
 Dated DEP File Number

3. The project site is located at:

46 Shimmo Pond Road Nantucket
 Street Address City/Town

43 77
 Assessors Map/Plat Number Parcel/Lot Number

4. The final Order of Conditions was recorded at the Registry of Deeds for:

 Property Owner (if different)

Nantucket
 County Book Page

26,571
 Certificate (if registered land)

5. This request is for certification that (check one):

the work regulated by the above-referenced Order of Conditions has been satisfactorily completed.

the following portions of the work regulated by the above-referenced Order of Conditions have been satisfactorily completed (use additional paper if necessary).

the above-referenced Order of Conditions has lapsed and is therefore no longer valid, and the work regulated by it was never started.



WPA Form 8A – Request for Certificate of Compliance

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

A. Project Information (cont.)

6. Did the Order of Conditions for this project, or the portion of the project subject to this request, contain an approval of any plans stamped by a registered professional engineer, architect, landscape architect, or land surveyor?

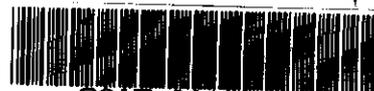
Yes

If yes, attach a written statement by such a professional certifying substantial compliance with the plans and describing what deviation, if any, exists from the plans approved in the Order.

No

B. Submittal Requirements

Requests for Certificates of Compliance should be directed to the issuing authority that issued the final Order of Conditions (OOC). If the project received an OOC from the Conservation Commission, submit this request to that Commission. If the project was issued a Superseding Order of Conditions or was the subject of an Adjudicatory Hearing Final Decision, submit this request to the appropriate DEP Regional Office (see <http://www.mass.gov/eea/agencies/massdep/about/contacts/find-the-massdep-regional-office-for-your-city-or-town.html>).



2017 00157122

 Cert: 26571 Doc: OOC
 Registered: 12/22/2017 02:26 PM

 Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
 And the Town of Nantucket Wetlands Bylaw Chapter 136

 Provided by MassDEP:
 SE48-3037
 MassDEP File #

 eDEP Transaction #
 Nantucket
 City/Town

A. General Information

 1. From: Nantucket
 Conservation Commission

 2. This issuance is for (check one):
 a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:

Michael

a. First Name

A. Bass, Trustee

b. Last Name

46 Shimmo Pond Road Nominee Trust

c. Organization

40 Soldiers Field Road

d. Mailing Address

Boston

e. City/Town

MA

f. State

02135

g. Zip Code

4. Property Owner (if different from applicant):

Same As Applicant

a. First Name

b. Last Name

c. Organization

d. Mailing Address

e. City/Town

f. State

g. Zip Code

5. Project Location:

46 Shimmo Pond Road

a. Street Address

Nantucket

b. City/Town

43

c. Assessors Map/Plat Number

77

d. Parcel/Lot Number

Latitude and Longitude, if known:

41d17'07.36"N

d. Latitude

70d 04'32.31"W

e. Longitude



**Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands**

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:

SE48-3037

MassDEP File #

eDEP Transaction #

Nantucket

City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Nantucket

a. County

Cert # 26,571

b. Certificate Number (if registered land)

c. Book

d. Page

7. Dates: 11/13/2017 12/20/2017 12/20/2017
a. Date Notice of Intent Filed b. Date Public Hearing Closed c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Proposed Conditions Site Plan to Accompany a Notice of Intent

a. Plan Title

Nantucket Engineering & Survey, LLC

b. Prepared By

11/10/2017

d. Final Revision Date

Arthur D. Gasbarro, III

c. Signed and Stamped by

1" = 30'

e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

- a. Public Water Supply b. Land Containing Shellfish c. Prevention of Pollution
d. Private Water Supply e. Fisheries f. Protection of Wildlife Habitat
g. Groundwater Supply h. Storm Damage Prevention i. Flood Control
j. Wetland Scenic Views (bylaw) k. Recreation (Bylaw)

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

- a. the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.



6/5/20

Arthur D. Gasbarro



NANTUCKET HARBOR

EXTREME LOW WATER PER L.C.C. 11461-H

COASTAL BEACH

COASTAL BANK

EXIST. BOTTOM OF BANK

TOP OF BANK

REF. DOC. #61337 EASEMENT

EXIST. ELEVATED TIMBER WALKWAY PIER & STEPS LLC. NO. 14,893

MEAN HIGH WATER EL. 1.0 NAVD88

SHORE ROAD (NOT CONSTRUCTED)

NORTH ROAD (PRIVATE - 33' WIDE) (NOT CONSTRUCTED)

43-79 N/F 48 SPR, LLC CERT. #22341 L.C.C. 11461-H, LOT 70 L.C.C. 11461-E, LOT 38-B

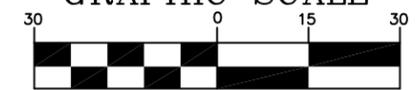
THIS PLOT PLAN WAS PREPARED FOR THE NANTUCKET CONSERVATION COMMISSION ONLY SHOULD NOT BE CONSIDERED A PROPERTY LINE SURVEY. THIS PLAN SHOULD NOT BE USED TO ESTABLISH PROPERTY LINES, FENCES, HEDGES OR ANY ANCILLARY STRUCTURES ON THE PREMISES. THE PROPERTY LINES SHOWN RELY ON CURRENT DEEDS AND PLANS OF RECORD. THIS PLOT PLAN IS NOT A CERTIFICATION AS TO TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT ASSESSOR RECORDS.

REFERENCE MASS D.E.P. FILE NO. SE 48-3037

LEGEND

X 16.7 DENOTES EXISTING SPOT ELEVATION (NAVD88)

SITE PLAN IN NANTUCKET, MA PREPARED FOR 46 SHIMMO POND ROAD NOMINEE TRUST 46 SHIMMO POND ROAD MAP 43 PARCEL 77 CERT.No. 26,571 JUNE 5, 2020 SCALE: 1"=30' GRAPHIC SCALE

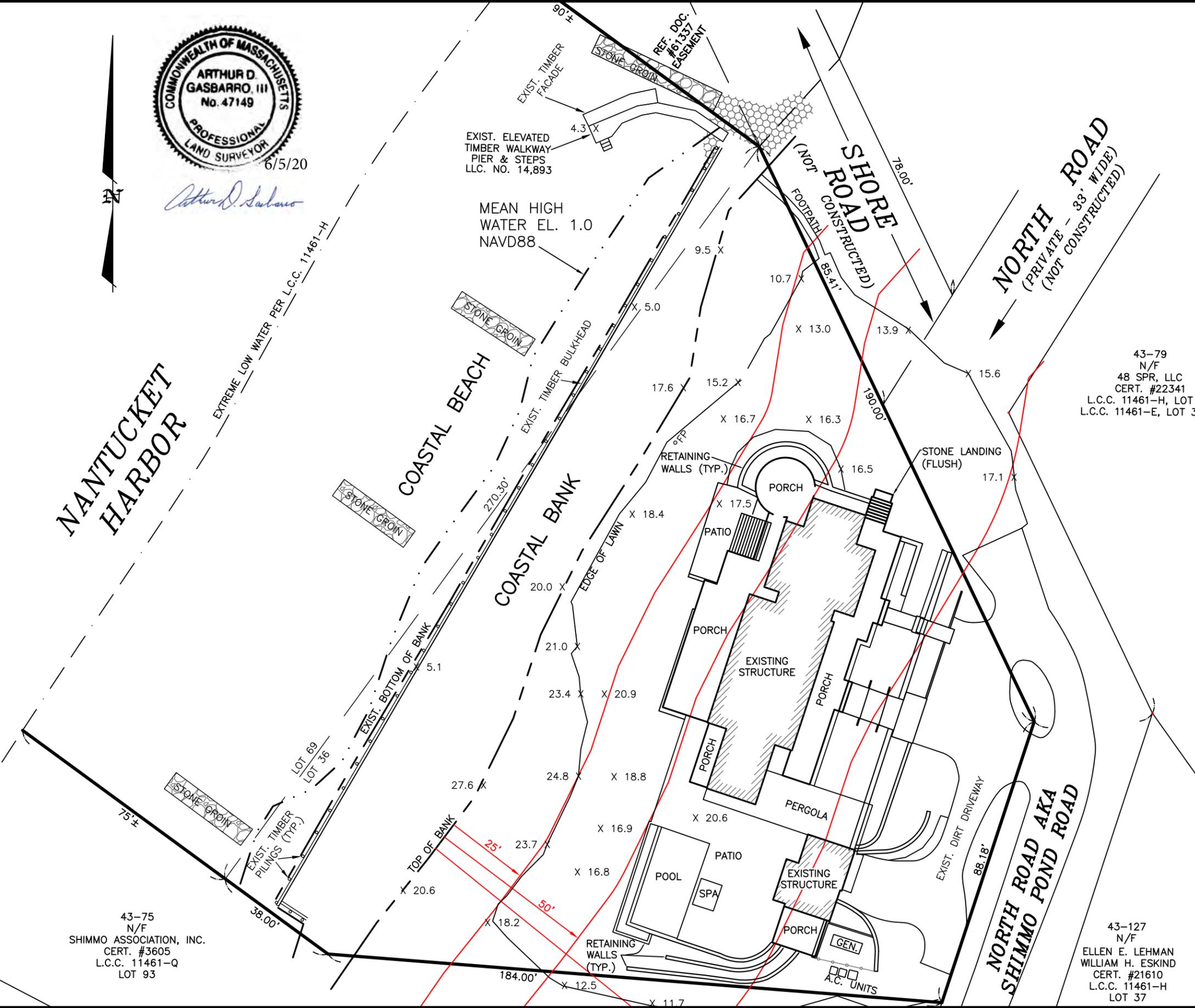


(IN FEET) 1 inch = 30 ft.

NANTUCKET ENGINEERING & SURVEY, PC 20 Mary Ann Drive Nantucket, MA 02554 NantucketEngineer.com 508-825-5053

43-75 N/F SHIMMO ASSOCIATION, INC. CERT. #3605 L.C.C. 11461-Q LOT 93

43-127 N/F ELLEN E. LEHMAN WILLIAM H. ESKIND CERT. #21610 L.C.C. 11461-H LOT 37



6-4-20:







Main Office:

49 Herring Pond Road
Buzzards Bay, MA 02532
Tel (508) 833-0070
Fax (508) 833-2282



Nantucket Office:

19 Old South Road
Nantucket, MA 02554
Tel (508) 325-0044

June 3, 2020

USPS and Emailed

Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

**Re: Order of Conditions Extension Request
File #: SE48-2987
43 West Chester Street (Map 41, Parcel 231)
Nantucket, Massachusetts**

Dear Members of the Commission:

On behalf of the Owner and Applicant, Christine A. Grillo, Bracken Engineering, Inc. is submitting the enclosed request to Extend the Order of Conditions (WPA Form 7) for the above referenced property. The order was issued on July 12, 2017 and work has not yet begun on the project. In accordance MGL Chapter 131 § 40 (310 CMR 10.05 8(a)) and with Bylaw Section 136-4B we are asking to extend the Permit for three years to July 12, 2023. We have also included the proof of recording and a Twenty-Five Dollar (\$25.00) check made payable to the Town of Nantucket for the bylaw filing fee.

If you require anything further, please do not hesitate to contact me at 508-325-0044 or don@brackeneng.com.

Sincerely,

Bracken Engineering, Inc.

A handwritten signature in black ink, appearing to read 'Donald F. Bracken, Jr.', is written over the typed name and title.

Donald F. Bracken, Jr.
President

Enclosures



**WPA Form 7 – Request for Extension Permit for
Orders of Conditions**

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

A. General Information

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



1. Applicant:

43 W Chester ST Realty Trust, Christine A. Grillo, Trustee
Name

725 Harrison Avenue, Apt E502
Mailing Address

Boston MA 02118
City/Town State Zip Code

2. Property Owner (if different):

SAME
Name

Mailing Address

City/Town State Zip Code

B. Authorization

The Order of Conditions (or Extension Permit) issued to the applicant or property owner listed above on:

7/12/2017 Issued by: Nantucket
Date Conservation Commission

for work at: 43 West Chester Street 41 231
Street Address Assessor's Map/Plat Number Parcel/Lot Number

recorded at the Registry of Deeds for:

Nantucket 777 9
County Book Page

Certificate (if registered land)

is hereby extended until: 7/12/2023 n/a
Date Date the Order was last extended (if applicable)

This date can be no more than 3 years from the expiration date of the Order of Conditions or the latest extension. Only unexpired Orders of Conditions or Extension may be extended.



Bk: 1605 Pg: 174 Page: 1 of 16
Doc: OOC 08/23/2017 02:43 PM



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
SE48- 2987
MassDEP File #

eDEP Transaction #
Nantucket
City/Town

A. General Information

1. From: Nantucket
Conservation Commission

2. This issuance is for (check one):
a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:

Christine A. Grillo
a. First Name b. Last Name

43 West Chester Street Realty Trust
c. Organization

725 Harrison Avenue, Apartment E502
d. Mailing Address

Boston MA 02118
e. City/Town f. State g. Zip Code

4. Property Owner (if different from applicant):

Same As Applicant
a. First Name b. Last Name

c. Organization

d. Mailing Address

e. City/Town f. State g. Zip Code

5. Project Location:

43 West Chester Street Nantucket
a. Street Address b. City/Town

41 231
c. Assessors Map/Plat Number d. Parcel/Lot Number

Latitude and Longitude, if known: 41°17'12.8904°N 70°6'29.8836°W
d. Latitude e. Longitude

FINDINGS and ADDITIONAL CONDITIONS
Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40)
Town of Nantucket Wetlands Bylaw (Chapter 136)

Address: 43 West Chester Street
Assessor's Map and 41-231
Property Owner: 43 West Chester Street Realty Trust
Applicant: Christine A. Grillo
DEP File Number: SE48-2987
Filing Date: June 23, 2017
Date Hearing Closed: July 12, 2017
Date Orders Issued: July 12, 2017
Plan of Record Proposed Site Plan, dated June 23, 2017 and stamped
Information: by Alan M. Grady, P.L.S. and Donald F. Bracken, Jr.

Permit Overview:

This order permits the construction of two additions, construction of a patio, an existing deck, reconfiguration of an existing driveway with associated grading, landscaping and utilities within the buffer zone to a Vegetated Wetland. Waivers are required for this project.

Additional Findings:

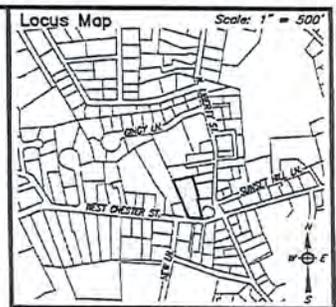
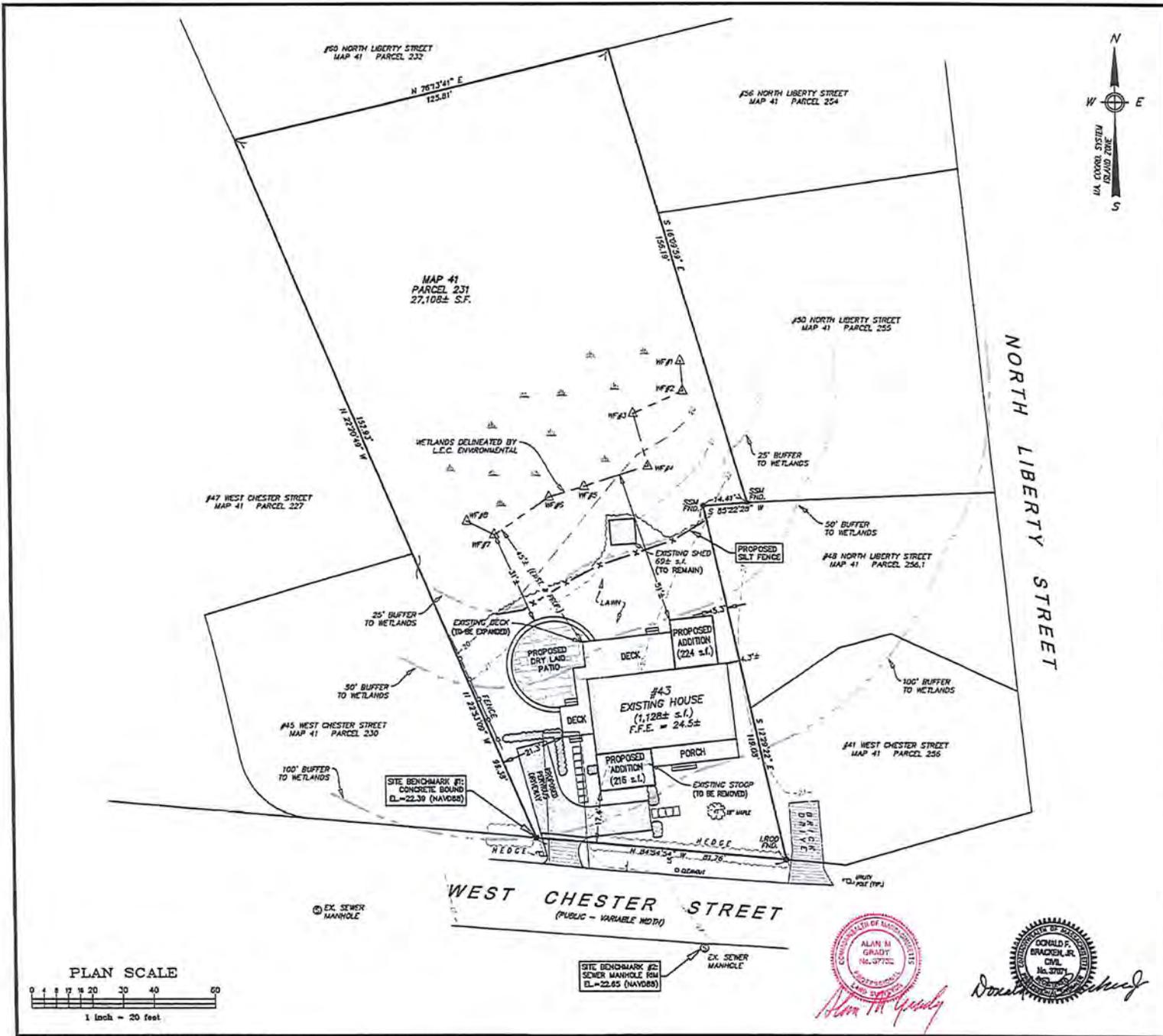
1. The area falls outside mapped habitat areas and does not require NHESP review.

In addition to the General Conditions contained elsewhere in this document, the Commission includes the following Special Conditions pursuant to MGLCh131s40 and the Town of Nantucket Wetlands Protection Bylaw, Chapter 136:

18. All work shall be performed in accordance with the Site and Work Description contained within the Notice of Intent and plan notes set out on the plan of record, provided project narratives, and protocols.
19. All construction materials are to be stored outside of the fifty foot setback.

WAIVERS UNDER THE NANTUCKET WETLANDS BYLAW/REGULATIONS

Waivers are required to Section 3.02(B)(1) that all structures are to maintain a two foot separation to groundwater. The Commission finds that the project as proposed will not have an adverse impact to the interests protected and that there are not alternatives that allow that portion of the project to proceed. Therefore the Commission grants a waiver under Section 1.03(F)(3)(a) of the Town of Nantucket Wetland Protection Regulations.



- Notes**
1. LOCUS: #43 WEST CHESTER STREET MAP 41 PARCEL 231
 2. OWNER: 43 WEST CHESTER STREET REALTY TRUST c/o CHRISTINE A. GRILLO, trustee 47 RUTLAND STREET, UNIT 4 BOSTON, MA 02118
 3. DEED REF: Bk: 777 Pg: 9
 4. PLAN REF: Bk: 17 Pg: 127 (Lot 5)
 5. LOCUS DOES NOT FALL WITHIN A SPECIAL FLOOD HAZARD ZONE AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP No. 25019C-0086-G dated 06/09/2014.
 6. LOCUS DOES NOT FALL WITHIN THE NATURAL HERITAGE and ENDANGERED SPECIES PROGRAM (NHESP) AREAS OF ESTIMATED HABITATS OF RARE WILDLIFE and PRIORITY HABITATS OF RARE SPECIES.

ZONE: R-1

	REQUIRED	EXISTING	PROPOSED
LOT AREA:	5,000 s.f.	27,108± s.f.	27,108± s.f.
FRONTAGE:	50'	81.76'	81.76'
FRONT YARD:	10'	26.7±'	17.4'
SIDE/REAR YARD:	5'	4.3±'	4.3'
CRDING COVER:	30% (MAX)	4.2% (1,128 ± l.)	5.8% (1,588 ± l.)

Prepared By:

BRACKEN ENGINEERING INC.

48 HERRING POND ROAD BUZZARDS BAY, MA 02532 13 OLD SOUTH ROAD NANTUCKET, MA 02554

(tel) 608.833.9970 (tel) 608.325.0944
 (fax) 608.833.2282 www.brackeneng.com

PROPOSED SITE PLAN IN NANTUCKET, MASSACHUSETTS

Prepared For:

43 WEST CHESTER STREET REALTY TRUST

#43 WEST CHESTER STREET MAP 41 PARCEL 231

No.	Date	Revision Description	By
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Date: JUNE 23, 2017 Drawn: RJA/PCM/BD Checked: DFB/AMC Sheet: 1 of 1



Professional Engineer Seal for Alan M. Grady, No. 97702, State of Massachusetts.

Professional Engineer Seal for Donald P. Bracken, Jr., No. 3707, State of Massachusetts.

Handwritten signatures: Alan M. Grady and Donald P. Bracken, Jr.

© 2017 Bracken Engineering, Inc. All Rights Reserved. This drawing is the property of Bracken Engineering, Inc. and is not to be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of Bracken Engineering, Inc.



**WPA Form 7 – Request for Extension Permit for
Orders of Conditions**

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

A. General Information

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



- Applicant:

Town of Nantucket
Name

16 Broad Street
Mailing Address

Nantucket
City/Town

Massachusetts
State

02554
Zip Code
- Property Owner (if different):

Same as applicant.
Name

Mailing Address

City/Town

State

Zip Code

B. Authorization

The Order of Conditions (or Extension Permit) issued to the applicant or property owner listed above on:

May 24, 2017
Date

Issued by: Nantucket
Conservation Commission

for work at: 8 Sesachacha Road
Street Address

21
Assessor's Map/Plat Number

20
Parcel/Lot Number

recorded at the Registry of Deeds for:

Nantucket
County

Document 155197
Book

Page

4272
Certificate (if registered land)

is hereby extended until: _____
Date Date the Order was last extended (if applicable)

This date can be no more than 3 years from the expiration date of the Order of Conditions or the latest extension. Only unexpired Orders of Conditions or Extension may be extended.



June 5, 2020

Ms. Ashley Erisman, Chair
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

Re: Extension Request– SE48-2961
135 Wauwinet Road - Map 11 Parcel 12

Dear Ms. Erisman:

I am writing to request a one-year extension to the approved Order of Conditions in accordance with the *Wetland Protection Act (M.G.L. c. 131, § 40) implementing regulations 310CMR10.05(8) and Section 1.03.D of the Wetland Protection Regulations for Administering the Town of Nantucket Bylaw Chapter 136*. Attached is the required form, front-page of the recorded Order and filing fee. A one-year extension is requested at this time to allow for the completion of the project.

I plan to attend your next meeting should you have any questions, comments or concerns regarding this request.

Sincerely,

A handwritten signature in blue ink that reads "Arthur D. Gasbarro".

Nantucket Engineering & Survey, P.C.
By: Arthur D. Gasbarro, PE, PLS

Cc: Lisa & Simon Van Den Born

Locus Map



Property Information

Property ID 11 12
Location 135 WAUWINET RD
Owner VAN DEN BORN LISA & SIMON



**MAP FOR REFERENCE ONLY
 NOT A LEGAL DOCUMENT**

Town and County of Nantucket, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated December, 2014
 Properties updated 02/02/2017



**WPA Form 7 – Request for Extension Permit for
Orders of Conditions**

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

A. General Information

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



1. Applicant:

Lisa & Simon J. Van Den Born

Name

312 Old Church Road

Mailing Address

Greenwich

City/Town

CT

State

06830

Zip Code

2. Property Owner (if different):

Name

Mailing Address

City/Town

State

Zip Code

B. Authorization

The Order of Conditions (or Extension Permit) issued to the applicant or property owner listed above on:

7/12/17

Date

Issued by:

Nantucket

Conservation Commission

for work at:

135 Wauwinet Rd

Street Address

11

Assessor's Map/Plat

12

Parcel/Lot Number

recorded at the Registry of Deeds for:

Nantucket

County

Book

Page

22,727

Certificate (if registered land)

is hereby extended until:

7/12/21

Date

Date the Order was last extended (if applicable)

This date can be no more than 3 years from the expiration date of the Order of Conditions or the latest extension. Only unexpired Orders of Conditions or Extension may be extended.



2018 00158283
 Cert: 22727 Doc: OOC
 Registered: 04/23/2018 10:22 AM



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
 And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
 SE48- 2961
 MassDEP File #

eDEP Transaction #
 Nantucket
 City/Town

A. General Information

1. From: Nantucket
 Conservation Commission

2. This issuance is for (check one):
 a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:

Lisa & Simon J.

a. First Name

Van Den Born

b. Last Name

c. Organization

312 Old Church Road

d. Mailing Address

Greenwich

e. City/Town

CT

f. State

06830

g. Zip Code

4. Property Owner (if different from applicant):

Same As Applicant

a. First Name

b. Last Name

c. Organization

d. Mailing Address

e. City/Town

f. State

g. Zip Code

5. Project Location:

135 Wauwinet Road

a. Street Address

Nantucket

b. City/Town

11

c. Assessors Map/Plat Number

12

d. Parcel/Lot Number

Latitude and Longitude, if known:

41d 19'51.N"

d. Latitude

69d 59'49"W"

e. Longitude



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the Town of Nantucket Wetlands Bylaw Chapter 136

Provided by MassDEP:
SE48- 2961
MassDEP File #

eDEP Transaction #
Nantucket
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Nantucket 22727
a. County b. Certificate Number (if registered land)

c. Book d. Page

7. Dates: 03/10/2017 06/21/2017 07/12/2017
a. Date Notice of Intent Filed b. Date Public Hearing Closed c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Site Plan of Land

a. Plan Title

Nantuckeet Engineering & Survey, PC Arthur D. Gasbarro

b. Prepared By c. Signed and Stamped by

06/14/2017 1" = 30"

d. Final Revision Date e. Scale

f. Additional Plan or Document Title g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

- a. Public Water Supply b. Land Containing Shellfish c. Prevention of Pollution
d. Private Water Supply e. Fisheries f. Protection of Wildlife Habitat
g. Groundwater Supply h. Storm Damage Prevention i. Flood Control
j. Wetland Scenic Views (bylaw) k. Recreation (Bylaw)

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

- a. the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.



CONSERVATION COMMISSION

PUBLIC MEETING

2 Bathing Beach Road
Nantucket, Massachusetts 02554
www.nantucket-ma.gov
Thursday, May 28, 2020 – 5:00 p.m.

*This meeting was held via remote participation using ZOOM and YouTube,
Pursuant to Governor Baker’s March 12, 2020 Order Regarding Open Meeting Law*

Commissioners: Ashley Erisman (Chair), Ian Golding (Vice Chair), David LaFleur, Joe Topham,
Seth Engelbourg, Maureen Phillips, and Mark Beale

Called to order at 5:00 p.m. by Ms. Erisman

Staff in attendance: Jeff Carlson, Natural Resources Director; Joanne Dodd, Natural Resources Coordinator

Attending Members: Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale

Agenda adopted by unanimous consent

*Matter has not been heard

I. PUBLIC MEETING

A. Announcements

B. Public Comment – None

II. PUBLIC HEARING

A. Notice of Intent

1. Chuckrow Nominee Trust – 25 Quaise Road (26-12) SE48-3241 **(Cont. 06/11/2020)**
2. Cindy & John J. Galihier – 34 Washing Pond Road (31-13.3) SE48-3302

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Site and topographical plans, photos, requisite departmental reports and correspondence.
 Representative Art Gasbarro, Nantucket Engineering & Survey
 Public None
 Discussion (5:07) **Gasbarro** – Asked to withdraw the application.
 Staff None
 Motion **Motion to Accept the withdrawal.** (made by: Golding) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

3. 46 Shimmo Pond Road N.T – 46 Shimmo Pond Road (43-77) SE48-3264 **(Cont. 06/25/2020)**
4. Nantucket Point of View, LLC – 9 Lincoln Avenue (30-137) SE48-3278 **(Cont. 06/11/2020)**
5. *On the Pond, LLC – 96 Miacomet Avenue (81-5.1) SE48-3303

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Site and topographical plans, photos, requisite departmental reports and correspondence.
 Representative Brian Madden, LEC Environmental
 Public None
 Discussion (5:09) **Madden** – This proposal is for a new dwelling outside the 50-foot buffer to Miacomet Pond; driveway, water, and sewer. The foundation will meet groundwater requirements. Proposing to revegetate cleared areas and lawn that encroached into the 25-foot buffer and requesting a waiver for that work.
Phillips – Given the problems with flooding, asked why they didn’t place it farther from the pond.
Madden – The bordering vegetated wetland is 50-foot wide; pond elevation is elevation 6.6 and the house location is around elevation 14; also, they are reserving an area to the northeast for a future structure.
 Staff Have everything needed to close.
 Motion **Motion to Close.** (made by: Topham) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

6. Kim Glowacki – 46 Easton Street (42.4.1-22) SE48-3285 **(Cont. 06/11/2020)**
7. 300 Polpis Road, LLC – 300 Polpis Road (88-20 & 11) SE48-3295

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Site and topographical plans, photos, requisite departmental reports and correspondence.
 Representative Jeff Blackwell, Blackwell & Assoc.
 Public None
 Discussion (5:14) **Blackwell** – Recapped the project and reviewed information provided since the last hearing. The dumpster will be removed and does not impact areas of jurisdiction. Lawn and structure are circa 1982, therefore it has grandfathered use. Proposing a split-rail fence to delineate the 25-foot buffer.
Engelbourg – Believes a waiver is required for planting highbrush blueberry in the wetland.

Phillips – She respects the 1982 date but wants documentation on contracts or purchasers that would substantiate that.

Golding – He takes the owners word for the age of the structure.

Erisman – Asked if Caleb Cressman, the owner, provided a timeframe for removal of debris within the 25-foot buffer.

Blackwell – He didn’t provide a date, but the truck will be removed within the week. He offers a month to six weeks due to the COVID restriction on the number of workers at a worksite.

Erisman – The application said the owner was willing to plant 6 highbrush blueberries; you said 10. She prefers 10 because she would like the vegetation in the wetland to be made more robust.

Beale – He’s happy to see the property being cleaned up. It’s good news if the work is environmentally sensitive.

Staff Have everything needed to close.

Motion **Motion to Close.** (made by: Engelbourg) (seconded)

Roll-call Vote Carried 5-0//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-abstain; Topham-aye; Phillips-no vote lost connection

8. The Town of Nantucket – 34 Washington Street (42.2.3-2) SE48-3300 **(Cont. 06/25/2020)**

9. Trust for Richard Phillips – 19 East Tristram Avenue (31-4.1) SE48-3304

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale

Documentation Site and topographical plans, photos, requisite departmental reports and correspondence.

Representative Paul Santos, Nantucket Surveyors

Public None

Discussion (5:31) **Santos** – This is for the reconfiguration of existing driveway within the buffer to a bordering vegetated wetland, which is located across the street and associated with a drainage ditch. All work is within the 100-foot setback; the house and septic are outside the 100-foot buffer. Have a Natural Heritage Endangered Species Program permit for work on the property; their determination is no adverse impact/no take.

Beale – Asked if the beach access is new or existing – existing.

Staff Have everything needed to close.

Motion **Motion to Close.** (made by: Phillips) (seconded)

Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

III. PUBLIC MEETING

C. Requests for Determination of Applicability

1. The Karin Alper Revocable Trust of 2005 – 1 Wamasquid Place & 49 Meadow View Drive (56-113; 390)

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale

Documentation Site and topographical plans, photos, requisite departmental reports and correspondence.

Representative Brian Madden, LEC Environmental

Public None

Discussion (5:36) **Madden** – This is to confirm the wetland resource area boundaries for a sewer connection.

Beale – Asked if there is a trail on the property.

Madden – There is a vegetative buffer around the pond, but the lawn comes close.

Staff We can confirm the resource area boundaries. Recommend Positive 2A and Negative 3.

There is a path from the Nantucket Island Land Bank property to the pond.

Motion **Motion to Approve as recommended.** (made by: Topham) (seconded)

Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

D. Certificates of Compliance

1. Norman M. and Susan I. Fidel – 3 Cudweed Road (82-143) SE48-3106

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale

Staff The site is in compliance.

Discussion (5:41) **Paul Santos**, Nantucket Surveyors – This was for an addition within the buffer to a bordering vegetated wetland. Work was done in compliance.

Motion **Motion to Issue.** (made by: Engelbourg) (seconded)

Roll-call Vote Carried Unanimously//Beale; Engelbourg; Erisman; Golding; LaFleur; Phillips; Topham-aye

2. The Constance K. Cheever Revocable Trust – 23 Monomoy Road (54-205) SE48-3061

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale

Staff This was for residential development. Everything is in compliance. There have been past issues with this site; we talked to the contractor and Town about sediment in a catchbasin. That has been cleaned out.

Discussion (5:43) **Erisman** – Our packet indicates roof drainage wasn’t installed; asked why.

Carlson – We can ask for more information. It was explained that they weren’t seeing runoff in the amount which the site could not naturally infiltrate. We can hold this over.

Golding – He agrees; there was a reason for requesting the drainage and that is how the order was drafted.

Engelbourg – He agrees. It has not been long enough to determine that there will not be issues in the future.

Motion Continued for 2 weeks.

Roll-call Vote N/A

E. Orders of Condition

1. On the Pond, LLC – 96 Miacomet Avenue (81-5.1) SE48-3303

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Draft Order of Conditions
 Staff He'll add Condition 21 requiring native species. He'll add a request for photos to survival rate is met.
 Discussion (5:48) **Erisman** – The plantings should be specified as native with no cultivars.
Engelbourg – Since this is a restoration area, we should add the plant survivability rate.
 Motion **Motion to Approve as amended.** (made by: Golding) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

2. 300 Polpis Road, LLC – 300 Polpis Road (88-20 & 11) SE48-3295

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Draft Order of Conditions
 Staff Condition 19 will add the requirement for photos and survival rate and no cultivars within 25 feet. In the permit overview, asked if they want to include the waiver for plantings – yes. We call out the removal activity.
 Discussion (5:52) **Beale** – Asked if highbrush blueberries should be added.
Erisman – Those are native species.
Engelbourg – Under the waiver, we should call out the plantings.
Erisman – We should be notified before heavy equipment is used to remove debris from within the 25-foot buffer.
Phillips – Regarding the future of the property, asked what “pre-existing” refers to.
Carlson – Grandfathering allows maintaining and renovating the existing structure.
 Motion **Motion to Approve as amended.** (made by: Beale) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

3. Trust for Richard Phillips – 19 East Tristram Avenue (31-4.1) SE48-3304

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Draft Order of Conditions
 Staff Didn't have a lot of conditions for this; it's pretty straight forward.
 Discussion (5:58) None
 Motion **Motion to Approve as drafted.** (made by: Topham) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

F. Extension Requests

1. Kathleen Sayle – 103 Washington Street (55.1.4-37) SE48-2995

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 Documentation Draft Order of Conditions
 Staff None
 Discussion (6:00) **Paul Santos**, Nantucket Surveyors – Asking for one 1-year extension. A majority of the work is in compliance. But they are looking to apply for work on the building which he wants to incorporate on this order.
 Motion **Motion to Approve the 1-year extension.** (made by: Topham) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

G. Other Business

1. Approval of Minutes 5/14/2020:

Motion **Motion to Approve.** (made by: LaFleur) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

2. Discussion of SBPF – 87-105 Baxter Road (48-Variou) SE48-2824 - Template Maintenance

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 SBPF Reps Dwight Dunk, Epsilon
 Steven Cohen, Cohen & Cohen Law P.C.
 Discussion (6:02) **Dunk** – Following the sequence agreed upon, the contractor started removing the debris at Lot 85 Baxter Road; that should be completed by the end of next week. The report submitted last week indicated no debris detected and sand delivered last autumn has been skimmed and used to maintain the template. Asked that they be allowed to return to the weekly and post storm inspections.
Engelbourg – In the 5/11-5/16 log, it seems the dates were incorrectly submitted. Asked those be checked and corrected. Asked if the staff agrees all the sand placed in August has been removed.
Carlson – We've been inspecting the template weekly, and he's not seeing a lot of the problem material or discolored sand.
Phillips – If we get a storm that uncovers the template, asked if the Commission has to specify inspections until the template is recovered. She thinks it should be inspected more than weekly.
Carlson – Inspections are required after any storm until the tubes are recovered.

Motion **Motion to Allow SBPF to go back to weekly inspections.** (made by: Topham) (seconded)
 Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

3. Discussion of SBPF – 77-122 Baxter Road SE 48-1659; SBPF - 65-67 Baxter Road SE48-1602

Sitting Erisman, Golding, LaFleur, Topham, Engelbourg, Phillips, Beale
 SBPF Reps Dwight Dunk, Epsilon
 Steven Cohen, Cohen & Cohen Law P.C.

Public Rick Atherton, Nantucket Coastal Conservancy
 Burton Balkind

Discussion (6:12) **Balkind** – About a year ago, he brought to the board’s attention sand with debris at these locations. We still haven’t gotten to the bottom of who is responsible for that.
Atherton – Referred to a memorandum to the Select Board dated 7/5/2019. He doesn’t know if a report was generated as a result of the information referred to. Further conversation should refer to the permit holder; the references are to other contractors. The second item is in the Order of Conditions issued for the coir log installations regarding Condition 6 requiring clean fill. He thinks it’s appropriate for the permit holder to say they understand what happened and agree it was a mistake, which will not be repeated.
Carlson – He agrees with a few of Mr. Atherton’s points. We lost track of the areas to the south; those permits are held by SBPF, but the easiest way to move forward is to schedule more regular contact meetings. We need to have a 6-month personal check-in on the site and source of material provided to the Commission. Inspections should document what’s coming out of the bank, especially on abandoned sites. We have a maintenance request from NETCO for the area to the south.
Erisman – She was surprised to learn SBPF was the permit hold on these. Asked if NETCO has contacted staff.
Carlson – They want to do the maintenance to recover those sand tubes and the nourishment required.
Engelbourg – Asked if the two Orders of Conditions are still active.
Carlson – Yes; on-going conditions must continue to be complied with.
Engelbourg – He wants to lay out the timeline. He’s hearing that when this matter came up there was a question about sand having debris and SBPF said areas to the south were delivered by a separate contractor. The responsibility to ensure the material is clear falls upon SBPF; there is potentially an enforcement issue on those two orders.
Carlson – If you don’t carry conditions forward, they don’t have to follow them any longer. If you want monitoring and maintenance to continue, the Commission must require it. These two orders don’t have Certificates of Compliance.
Golding – He feels we were deceived; he agrees with Mr. Engelbourg. We’ve been skirting the issue of ensuring future deliveries adhere to protocols. He wants that protocol approved before we allow further deliveries.
Topham – This is twice we’ve had NETCO come into our crosshairs; they don’t seem to understand what is going on her on Nantucket and are constantly making mistakes.
Erisman – Asked if NETCO provided delivery tickets – no. She feels they should have a representative at the meeting.
Balkind – Asked about a sample sent to the Department of Environmental Protection (DEP).
Carlson – They didn’t do chemical testing but found the sand was within the medium requirement
Phillips – Asked about the relationship between NETCO and SBPF.
Cohen – These permits are from 2007, before he was involved in the project. They are not SBPF’s permits; they were issued to the property owners, who are the responsible entities. SBPF facilitated applying for permits for these sites to do terracing; however, SBPF never did any of the work. Conversely, the geo-tube project is an SBPF project on Town property. NETCO has contracted with these homeowners and works with them individually. The responsible parties have been made aware and actions will be taken to ensure proper sand is provided.
Erisman – Using Mr. Cohen’s logic, we should have a member of the Select Board present during any discussion regarding SBPF, since the Town is the property owner. She finds this troubling; SBPF is big enough an organization to keep track of all permits under their name. We need to clean up the confusion.
Golding – Suggests we start an Enforcement Action against NETCO and get Town Counsel’s opinion on Mr. Cohen’s take on this. He respectfully disagrees with the way Mr. Cohen presented the situation. It’s essential to have a legal opinion. He’s very dissatisfied that SBPF feels they can “go sideways” on this.
Engelbourg – He understands what Mr. Cohen is saying about the individual property owners; however, SBPF had a role in enabling the projects. Their 990 form says that they are supporting engineering and other professional fees for permitting, design, and implementation of a beach terracing system to reduce beach erosion on Nantucket. He feels that goes beyond the individual property owners; they helped the properties with the permitting process
Cohen – SBPF facilitated obtaining the permits but hasn’t been involved for 13 years. If the Commission wants to reach out to the contractor, that’s okay. If you want to bring an Enforcement Action, that needs to be investigated.

Topham – Agrees with Mr. Engelbourg, NETCO is really at fault. We’ve asked SBPF to be the watchdog. No one has come forward to say what happened. He also agrees Town Counsel should weigh in. An Enforcement Order should be sent to NETCO.

Phillips – SBPF’s involvement means it does have responsibility, even if it isn’t a legal responsibility. Agrees with Mr. Engelbourg, Mr. Topham, and Mr. Golding and the need for legal counsel. Going forward, she hopes we can work together so that a bad actor doesn’t continue.

Cohen – Bringing NETCO in is the right thing to do.

Carlson – A direct enforcement on the properties would be problematic; a better tack is to bring NETCO in, given that they’ve requested to do maintenance.

Topham – We should write a letter and tell them they can’t begin work until they come before the Commission and correct the mistakes.

Golding – Feels we can hit NETCO with an Enforcement Order. Asked Mr. Carlson if he can do that.

Carlson – He’d rather not comment now; he rather Town Counsel provide advice.

Beale – Thinks a letter to NETCO would make a lot of sense.

Atherton – He thinks it would be advisable that the letter to NETCO be cc’d to all the permit holders.

Carlson – When we send out potential violation letters, we always send copies to any involved property owner, the name on the original order, DEP, and the contractor.

Phillips – The property owners should be awakened to the fact that they are part of this project.

Cohen – The owners have the most direct, tactile connection with NETCO.

Topham – He’s surprised the Commission has dragged SBPF through the mud; however, NETCO has never faced the music and never come forward. He’d like the public to know about the egregious damage they’ve caused to Nantucket. A letter should go forward and Town Counsel weigh in regarding going after them.

Carlson – The Commission can direct action; he’ll have Town Counsel at the next meeting.

Continued for two weeks.

Motion

Roll-call Vote N/A

4. Reports:

a. CPC, Topham

b. NP&EDC, Phillips: discussion about ConCom weighing in on creating subdivisions within areas of jurisdiction.

5. Commissioners Comment

a. **Golding** – Thanked Mr. Engelbourg for digging out the Form 990. Sent glyphosate information to Ms. Phillips. Would like about the Florida State protocol on matching sand sampling be put on the agenda for discussion.

b. **Erisman** – Wants Fining and Enforcement put on the agenda for discussion; wetland boundaries are being pushed all over the Island and there is almost no backing at this time and creation of check list.

Carlson – Office staff keeps a list of running Enforcement Orders. He has drafted new enforcement fines that base penalties on the square-footage of a violation as well as allowing the company that did the work to be fined in addition to the homeowner. He will send it around and to Town Counsel then put it on the June 11 agenda. He can enter a property if there is a “known” wetland violation; otherwise he needs permission to enter the site.

Golding – Thinks it’s time to go into the criminal aspect of these violations. He’d also like to approach the Select Board to explain that if we have the right level of fines, Natural Resources should hire someone to track the violations. Feels a \$5000 fine is insufficient; for some homeowners it is a drop in the bucket.

Topham – Agrees with Mr. Golding. Some heavy-handed reactions will get people talking about avoiding violations. Discussion about past violations and when enforcement actions were affective.

Discussion about possible use of drones to inspect “suspected” violation, in lieu of being able to enter a property.

6. Administrator/Staff Reports

a. Two opportunities: 1) Town was contacted by Martha’s Vineyard Conservation Commission and State agency about applying for a net grant from Southeast New England Estuaries Program to look at how pond openings work and what the benefits are; 2) the other is to partner with MPF and Land Bank to do a complete wetland assessment related to Monomoy.

H. Adjournment

Motion **Motion to Adjourn at 7:34 p.m.** (made by: Golding) (seconded)

Roll-call Vote Carried unanimously//Beale-aye; Engelbourg-aye; Erisman-aye; Golding-aye; LaFleur-aye; Phillips-aye; Topham-aye

Submitted by:

Terry L. Norton

2020

SBPF Site Inspection Report/Log

Inspector: Ali Tepsurkayev

Date: 05/25/20 Time: 8:06 am Weather: Cloudy 54°F

General Site Conditions:

Site was in good condition.

Length of Exposed Geotube:

No exposed GEO tubes.



Type & Quantity of Debris Removed/Action Taken:

Fully inspected the structure from North to South. Drove and walked along the template and the ramps.

No debris was collected during this inspection.

2020

SBPF Site Inspection Report/Log

Inspector: Ali Tepsurkayev

Date: 05/26/20 Time: 6:43 am Weather: Cloudy 56°F

General Site Conditions:

Site was in good condition.

Length of Exposed Geotube:

No exposed GEO tubes.



Type & Quantity of Debris Removed/Action Taken:

Fully inspected the structure from North to South. Drove and walked along the template and the ramps.

No debris was collected during this inspection.

2020

SBPF Site Inspection Report/Log

Inspector: Ali Tepsurkayev

Date: 05/27/20 Time: 7:34 am Weather: Sunny 55°F

General Site Conditions:

Site was in good condition.

Length of Exposed Geotube:

No exposed GEO tubes.



Type & Quantity of Debris Removed/Action Taken:

Fully inspected the structure from North to South. Drove and walked along the template and the ramps.

No debris was collected during this inspection.

2020

SBPF Site Inspection Report/Log

Inspector: Ali Tepsurkayev

Date: 05/28/20 Time: 8:46 am Weather: Sunny 67°F

General Site Conditions:

Site was in good condition.

Length of Exposed Geotube:

No exposed GEO tubes.



Type & Quantity of Debris Removed/Action Taken:

Fully inspected the structure from North to South. Drove and walked along the template and the ramps.

No debris was collected during this inspection.

2020

SBPF Site Inspection Report/Log

Inspector: Ali Tepsurkayev

Date: 05/29/20 Time: 8:11 am Weather: Rain 62°F

General Site Conditions:

Site was in good condition.

Length of Exposed Geotube:

No exposed GEO tubes.



Type & Quantity of Debris Removed/Action Taken:

Fully inspected the structure from North to South. Drove and walked along the template and the ramps.

No debris was collected during this inspection.

Joanne Dodd

From: danneatherton@comcast.net
Sent: Tuesday, June 2, 2020 8:28 AM
To: Joanne Dodd; Jeff Carlson
Subject: COMMENTS RE ORDERS OF CONDITIONS SE48-1659 AND SE48-1602
Attachments: Response to ConCom 5.28.20 Meeting w-attachments.pdf

TO: MEMBERS OF THE CONSERVATION COMMISSION, ADMINISTRATOR CARLSON

FROM: D. ANNE ATHERTON/NCC COORDINATING COMMITTEE

RE: COMMENTS RE ORDERS OF CONDITIONS SE48-1659 AND SE48-1602 (PERMITS FOR SOFT INSTALLATIONS ON PUBLIC BEACH BELOW THE BLUFF)

RESPONSE RE ASSERTIONS MADE BY SBPF ATTORNEY AT MAY 28, 2020 MEETING

Please see attached letter with attachments.

We would like to submit this document (14 pages) as part of the official record.

We respectfully request that this communication and attachment be forwarded to members of the Commission right away, as it contains information that may be helpful for consultation with Town Counsel.

We also ask that it be made part of the submission regarding this matter that has been continued until the June 11 regular meeting.

We would appreciate receiving an acknowledgement that this message and attachment have been received and forwarded directly to members of the Commission.

Thank you, Jo and Jeff.

D. Anne
for the
NCC Team

ATTACHMENT: PDF DOCUMENT/14 PP

June 1, 2020

Dear Chair Erisman, Members of the Commission, and Administrator Carlson:

We thank you for addressing matters related to the Orders of Conditions SE48-1659 and SE48-1602 issued to The Siasconset Beach Preservation Fund (SBPF) originally in 2004 and 2007 respectively. By our rough calculations, the erosion projects (terracing comprised of sand-filled fabric bags and vegetation) permitted by these Orders are currently installed on about 1500 linear feet of the public beach below the bluff in Sconset (south of the geotubes). **The June 2019 delivery of unclean sediment to the beach for these projects is, and continues to be, of great concern to many citizens.**

Of even greater concern are the statements made during the meeting on May 28 by attorney Steven Cohen for SBPF in regard to his client's responsibility as the holders of these permits. As even a cursory review of contemporary press accounts and the record indicate, Mr. Cohen's assertions were **factually incorrect. They cannot be allowed to stand.**

Despite the fact that the orders and all subsequent amended orders and extensions were issued to SBPF, Mr. Cohen claimed that "these are not SBPF permits." He stated that his client's role was simply one of an "organizing tool" for the individual property owners. His statements that, "None of this work has ever been done by SBPF. SBPF has never contracted with, and doesn't currently contract with NETCO, or it doesn't supervise any of it," were flat-out wrong.

We support your consulting with Town Counsel, as you intend to do. Perhaps the following information will be helpful to him as well as to you.

• **SBPF TOOK PUBLIC RESPONSIBILITY FOR TERRACING PROJECTS AS EARLY AS 2006**

There is evidence in the record as early as 2006 that SBPF took full responsibility for the terracing installations and in fact directly contracted with NETCO for services. [See attached, "Tougher conditions set for Sconset bluff work," The Nantucket Inquirer and Mirror, April 27, 2006.] To quote from the letter sent to the Commission by then SBPF Executive Director Cheryl Bartlett in response to an apparent violation (as reported in the paper):

Once notified of this situation [illegal work being performed on the terracing project] SBPF did an internal evaluation of the situation and discovered that our independent contractor [NETCO] for these activities was operating outside the directions from the organization [SBPF] to ensure compliance with all permitting requirements. It appears workers were left unsupervised and continued to work with out an adequate supply of sand for nourishment and terrace work, she wrote. **"On behalf of the [SBPF] board, please accept my sincere regrets for this violation,"** Bartlett concluded. [Emphasis added.]

The article went on to list new conditions for which SBPF was to be responsible.

· CONCOM IMPOSED MORE STRINGENT CONDITIONS ON THE TERRACING PROJECTS FOLLOWING STORM EVENTS IN SPRING OF 2007, PROVIDING FURTHER EVIDENCE OF SBPF'S TAKING RESPONSIBILITY FOR THE INSTALLATIONS

Following a series of severe weather events in the spring of 2007, including the infamous "Patriots Day Storm," the **terracing projects in Sconset collapsed**, causing 4x4 posts and jute bags to wash up on beaches around the island and thus creating public-safety issues and marine hazards. There was a huge public outcry.

The ConCom, questioning the "safety and effectiveness of [the] bluff terracing," imposed a number of more stringent conditions on the project. [See attached article, "ConCom questions safety and effectiveness of bluff terracing," The Nantucket Inquirer and Mirror, June 14, 2007.] To quote the article: "As part of the Order of Conditions for the extended permit, SBPF will be **heat-branding the initials 'SBPF' on all pieces of wood and branding all the jute fabric with orange stitching running through it as it can be easily identified.**"

In addition, SBPF representatives attorney Bill Hunter and Epsilon Associates consultant Mark Rits appeared before the Commission and reported that to avoid having such a collapse happen in the future the project had been modified in a number of ways.

· LICENSE NEGOTIATED BETWEEN THE TOWN AND SBPF IN DECEMBER, 2008 FULLY DOCUMENTS SBPF RESPONSIBILITIES FOR THE TERRACING PROJECTS

Apparently, the Town and SBPF negotiated a new (or revised) license for the use of the Town-owned beach land below the bluff for the terracing projects. **The terms of the license (dated December 30, 2008) clearly stated the expectations of the licensor (the Town, the property owner) and the extent of the obligations the licensee (SBPF) agreed to in exchange for the use of the Town property.** [See attached for copy of the license relating property "seaward" from 77 to 122 Baxter Road. There is a second license pertaining to property "seaward" from 65 to 75 Baxter Road that is essentially the same.]

Note that the first provision of the license agreement states: The Licensor hereby grants to the Licensee a non-exclusive license to enter upon the Land and **to erect, install and maintain the herein described Work/Construction Activities upon the Land**, subject to the following specified terms and conditions. [Emphasis added.] This document makes clear the expectation that SBPF would be responsible for all "Work/Construction Activities" associated with the projects. (The Amended Order of Conditions 1659 and 1602 are attached to the license, providing additional detail of the "Work/Construction Activities.")

In provision #4, SBPF also agreed to accept "complete liability for the actions or omissions of [the] Licensee [SBPF], its contractors, agents, representatives, employees and assignees while present on the Land in connection with the license granted hereby." In addition, SBPF agreed to maintain public liability insurance with comprehensive coverage during the installation and maintenance of the Work/Construction.

And finally, a letter dated December 12, 2008 from Attorney Hunter to the then Board of Selectmen further outlined the “tasks and obligations” SBPF agreed to undertake in entering into the license agreement. Those tasks and obligations include: revisions to the terracing projects, most notably limitations on the use of wood that caused such danger when the project collapsed; the removal of the defunct beach de-watering project; securing an easement from the owner of 65 Baxter Road to formalize public access and egress from the Bluff Walk to Baxter Road; and, finally, the payment of \$7500. to the Town to defray the legal costs of reviewing “the License matters.”

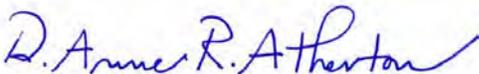
IN CLOSING

Attorney Cohen’s statements to the Commission that “these [Orders of Conditions 1659 and 1602] are not SBPF permits” and that his client’s role in the terracing projects was simply one of an “organizing tool” are blatantly contradicted by the facts. Such assertions should be unacceptable to the Commission and should be noted as such in the record of these proceedings.

We agree that the contractor (NETCO) should be held accountable for the delivery (and use) of unclean material in violation of the Orders of Conditions that require that only clean fill be used. However, as the holder of the permits, SBPF should also be held responsible for any and all actions that are in violation of these Orders of Conditions (including the use of unclean fill).¹ **SBPF has clear primary responsibility.**

Further, we believe that the **Commission should inform the Town**, as the main property owner and licensor, of what has transpired in this matter: namely, that SBPF, through its attorney, has claimed it has no responsibility for these terracing projects, in apparent violation not only of the Orders of Conditions, but also of the License Agreements, which, it should be noted, expired on December 22, 2010, ten years ago.

Sincerely,



D. Anne R. Atherton
for the
NCC Coordinating Team

ATTACHMENTS (4)

I&M Article, “Tougher conditions set for Sconset bluff work,” April 27, 2006.

I&M Article, “ConCom questions safety and effectiveness of bluff terracing,” June 14, 2007, 2pp.

License Agreement, Town of Nantucket and SBPF, 77 to 122 Baxter Road, December 30, 2008.

Letter from William F. Hunter, Esq. to the Board of Selectmen, December 12, 2008, 2 pp.

¹ A close review of the conditions contained in the Orders of Condition may reveal that there are additional violations (non-compliance with reporting requirements, non-compliance with stipulating a responsible party, etc.) that should also be addressed by the Commission.

Tougher conditions set for Sconset bluff work

BY JOSHUA BALLING AND
JOEL SILVERSTEIN
I&M Staff Writers

Citing activities outside the approved scope of its project, Nantucket Conservation Commission administrator Dirk Roggeveen earlier this month ordered the Sconset Beach Preservation Fund to stop anti-erosion work on the bluff in Sconset.

On April 5, the ConCom allowed the project to move forward, but only if the SBPF agreed to even stricter conditions than were previously set.

"They came into the commission meeting on Wednesday. They apologized, explained what had happened, the commission discussed it, and put a whole bunch of conditions on the project so it could move for-

ward. The agreement now represents what the commission ordered them to do," Roggeveen said after the meeting. "It's operational again, but with new conditions."

According to ConCom technical consultant Peggy Fantozzi, she, Roggeveen and a commission member recently observed workers stockpiling beach sand and using it to fill bags they were using to build a terrace to buttress the bluff below Baxter Road on the east end of the island.

"Of course," Fantozzi said, "that violates their order (of conditions). It was supposed to be sand that was brought in from an approved off-site source."

Roggeveen agreed.

"It's really more supervi-

sion than anything. I'm not sure the workers were being properly communicated to. Many of them don't speak English. They have to understand they are not allowed to take sand from the beach."

The ConCom approved the project in February 2004.

In a letter to Roggeveen dated March 30, SBPF executive director Cheryl Bartlett attributed the illegal work to workers being left unsupervised.

"Once notified of this situation, SBPF did an internal evaluation of the situation and discovered that our independent contractor for these activities was operating outside the directions from the organization to ensure compliance with all permitting requirements. It appears workers were left

unsupervised and continued to work without an adequate supply of sand for nourishment and terrace work," she wrote.

"On behalf of the board, please accept my sincere regrets for this violation," Bartlett concluded.

SBPF has communicated with David Lager, president of NETCo, the company responsible for the violation, and expressed its concern, Bartlett said.

Among other things, the new conditions stipulate that:

- The SBPF must open 90 bags filled with beach sand used to buttress the base of the coastal bank and replace the sand on the beach below.

- SBPF "shall create a document drafted in both Spanish and English that recites the various rules,

regulations and obligations under which employees of SBPF, or its agents and/or contractors, must conduct themselves when performing work allowed under the Orders."

- SPBF "shall ensure that a bilingual foreman is on the beach, or close by at the top of the coastal bank, at all times employees are performing work allowed under the orders. Work shall cease if the foreman is not available and shall not commence until such time as the foreman is present to oversee the work."

- "In an effort to guarantee a sufficient supply of contributed sand to the beach, SBPF shall increase its standing order for delivery of sand from a frequency of every two weeks to every 10 days."

ConCom questions safety and effectiveness of bluff terracing

BY MARGARET
CARROLL-BERGMAN
I&M Staff Writer

With more than 30 percent of the anti-erosion wood terracing along the face of Sconset Bluff washed away during the April 16 "Patriot's Day" storm, Nantucket Conservation Commission members are questioning the safety and the effectiveness of the beach preservation project in the wake of not one, but two nor'easters since March.

"Wouldn't this be called a failure where 30 percent was removed?" asked commissioner Sarah Oktay.

The permits for the bluff-terracing project, which is a crude forerunner to the larger Sconset Beach Preservation Fund (SBPF) plan to

"Wouldn't this be called a failure when 30 percent was removed?"

*Sarah Oktay
ConCom*

mine 2.6 million cubic yards of sand off Sankaty Head and dump it along a three-mile stretch of beach, were extended for another 18 months in February with the caveat that as the sandbags made out of coir fiber — the husks of coconut shells — give out, that they be replaced by larger jute bags which are stitched together and anchored by steel cables and posts in the sand.

"One of my concerns is that we've put a lot of material into the near-shore envi-

ronment and it is not sufficient in protecting the homes," said Oktay, the director of the UMass Boston Nantucket Field Station in Ojai.

Oktay also questioned that the data provided by SBPF engineers was insufficient to determine whether the terracing had protected the bluff and beach against storm events.

Mark Ritz, SBPF project scientist from Episilon Associates, said 863 (50) linear feet of coir fabric and 250 to 325 wooden posts were washed out to sea.

"That amount is quite significant," said Oktay. "How much of that did you physically recover?"

Ritz was unable to give a linear amount of fabric and

Erosion (Continued from page 1A)

the number of posts, saying that he could give the amount of the debris in truckloads or weight.

As part of the Order of Conditions for the extended permit, SBPF will be heat-branding the initials "SBPF" on all pieces of wood and branding all the jute fabric with orange stitching running through it so it can be easily identified.

Ritz said the engineers are implementing a new reporting system to recover what had been lost, including measuring pieces of fabric as the jute is recovered.

Sconset Beach Preservation Fund officials submitted a post-storm report on

May 17, 2007, as required, and filed a second report addressing Conservation Commission questions.

ConCom chair woman Virginia Andrews expressed concern that large chunks of the bluff fell off during the April storm and questioned if that was due to water collecting within the terracing.

"We don't think the rainfall in the April storm caused the slumping. The sand in the terraces is beach sand and water percolates through it," said Ritz. "Prior to the March storm, the wooden boards on the side of the terracing were removed, leaving only the front boards."

William Hunter, attorney for SBPF, said the new design, which was permitted in February, has 25 to 30 percent less wood and 50 percent less fabric.

"We are hoping, based on the new design, less material will be broadcast into the system," said Hunter.

The wood and the jute from the April 16 storm traveled around the island with debris being reported on Coatic, Hummock Pond, Great Point, and the bulk of it washing up in Sconset and Codfish Park.

Edith Ray, an island bird expert, said that as the rice bags unraveled in the ocean, they wrapped around other

marine debris, such as roping, fishing lines and deck chairs, creating big balls of material which either floated around in the water or washed up on the beach.

"One of my concerns is often if the debris gets buried before it can be found and is uncovered during another storm," said Andrews.

Conservation Commission Administrator Dirk Roggeveen reminded commissioners that their enforcement powers did not extend into public safety.

"Conservation commissions are not public-safety agencies," said Roggeveen.

"We are focused on protecting the natural environment."

Oktay said, "We can't permit a project that is harmful to human life. We would not voluntarily permit something that could be dangerous."

The SBPF will be coming before the Conservation Commission in the next couple of weeks to discuss the amended Order of Conditions for the extended permit and was asked to provide more detailed information about the terracing project and how it has stemmed or contributed to the erosion along the beach.

LICENSE AGREEMENT

THIS LICENSE AGREEMENT, dated the ^{20th} day of December, 2008, by and between TOWN AND COUNTY OF NANTUCKET, a political subdivision of The Commonwealth of Massachusetts, having its principal office at 16 Broad Street, Nantucket, Massachusetts 02554 (the "Licensor") and the SIASCONSET BEACH PRESERVATION FUND, INC., a duly organized Massachusetts not-for-profit corporation with a mailing address of Post Office Box 966, Siasconset, Massachusetts 02564 (the "Licensee").

WITNESSETH

WHEREAS, the Licensor is the owner of record of a certain parcels of land located seaward of Baxter Road, Siasconset, Nantucket Town and County, Massachusetts ("Sankaty Beach") between 77 Baxter Road and 122 Baxter Road and more particularly described on Exhibit "A" attached hereto (hereafter referred to as the "Land");

WHEREAS, the Licensee has constructed and desires to maintain coastal bank toe protection on Sankaty Beach, requiring landscaping activities that include filling and placing of jute bags against the toe of a coastal bank and beach/bank sand nourishment and associated Beach/Bank nourishment activities upon the Land ("Work/Construction Activities"), such activities conducted pursuant to the provisions of WPA Form 5-Amended Order of Conditions SE 48-1659 issued by the Nantucket Conservation Commission, as amended and extended as more particularly described in Paragraph 6(e), below;

WHEREAS, the general location of the herein described Work/Construction Activities is depicted on Exhibit "B" attached hereto (the "Land"); and

WHEREAS, the Licensor desires to grant to the Licensee a revocable license in accordance with the terms hereof.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and the payment of other consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby enter into a license agreement upon the terms and conditions set forth herein.

1. **Grant of License.** The Licensor hereby grants to the Licensee a non-exclusive license to enter upon the Land and to erect, install and maintain the herein described Work/Construction Activities upon the Land, subject to the following specified terms and conditions. The parties expressly agree that this License granted to the Licensee shall be revocable by the Licensor at will; provided, however, that in any event this License shall terminate no later than February 13, 2010.

2. Permitted Use. The rights of this License shall be exercised by the **Licensee** or its designee solely for the erection, installation, maintenance, repair and reconstruction of the herein described Work/Construction Activities (the "Purpose") upon the Land, subject to the terms and conditions hereof.

3. License Fees. In consideration for the use of this License, the **Licensee** agrees to pay the Licensor a one-time License Fee of One Dollar (\$1.00).

4. Indemnification; Bond. The exercise of this License shall constitute the **Licensee's** acceptance of complete liability for the actions or omissions of **Licensee**, its contractors, agents, representatives, employees and assignees while present on the Land in connection with the license granted hereby.

SBPF shall maintain public liability insurance with coverage for bodily injury, wrongful death and property damage during the installation and maintenance of the Work/Construction Activities as described herein in the amount of one million (\$1,000,000.00) dollars per occurrence and two million (\$2,000,000.00) dollars cumulative and shall deposit a certificate of insurance with the Town of Nantucket prior to the exercise of this License by the **Licensee**.

5. The **Licensee** shall defend, indemnify and hold harmless the Licensor and its officers, employees and agents from and against any and all claims or costs whatsoever arising from or related to exercise by **Licensee** of its rights under the License granted hereby including, without limitation, any damage caused by, or related to, the products of the Work/Construction Activities, whether on not related to the **Licensee's** negligence in the construction, maintenance or repair thereof.

6. The **Licensee** further expressly agrees not to make any claims against the Licensor and its officers, employees and agents for any injury, loss or damage to person (including bodily injury and death) or property arising out of or in connection with the activities undertaken or omissions to act by the **Licensee**, its contractors, agents, representatives, employees, assignees and invitees, as hereby licensed.

7. The Licensor acknowledges that the **Licensee** has previously established an escrow deposit in the amount of at least \$40,000.00 accessible by the Nantucket Conservation Commission and/or the Licensor as security for the **Licensee's** obligations hereunder and to further guarantee all of the Licensee's performance and obligations, including removal of the **licensee's** property as provided in Paragraph 9.

8. Conduct

a. Entry and use under this License by the **Licensee** and its contractors, agents, representatives, employees and assignees, shall, at all times, be subject to review and control by the Licensor and its duly designated agents and representatives.

b. During the exercise of rights hereby granted, **Licensee** shall at all times conduct itself so as not to interfere with activities of the Licensor within or upon the Land.

c. The Licensor shall have the right, at all reasonable times, to enter onto and inspect the Land.

d. The **Licensee** shall observe and obey all applicable laws, statutes, ordinances, regulations and permitting or license requirements and comply with all the conditions of the underlying Order of Conditions.

e. The **Licensee** shall not undertake any construction, reconstruction, rehabilitation or refurbishment upon the Land without first having received the written approval of the Licensor or its authorized representative; provided, however, that, by executing this License Agreement, the Licensor hereby consents to the hereinabove described Work/Construction Activities as more particularly described in WPA Form 5-Amended Order of Conditions SE 48-1659, issued by the Nantucket Conservation Commission on February 13, 2004, as amended, and reissued January 12, 2007 and further Extended by Extension Permit for Order of Conditions signed January 24, 2007, copies of which are attached hereto as Exhibits "C".

f. The **Licensee** shall provide the Nantucket Town Manager with copies of any and all reports that may required to be submitted by the **Licensee** to the Nantucket Conservation Commission pursuant to the terms and conditions of the Orders, Permits and Extensions hereto attached as Exhibits "C".

g. The **Licensee** shall have right of access and egress to the Land from Hoicks Hollow Road.

h. The Licensor and **Licensee** agree to hold a review of this License Agreement in May, 2009 to confirm that the Work/Construction Activities and conduct of the Licensee are in compliance with the requirements of this License Agreement and the underlying Order of Conditions.

i. The Licensor and **Licensee** agree that the issuance of this License is further predicated upon the Licensee's diligent and good faith attempts at implementing the tasks and obligations outlined in the letter attached hereto as Exhibit "D".

9. Termination; Ownership of Improvements. Upon any termination of this License Agreement, the improvements made by the **Licensee** to the Land shall, at the option of the Licensor, either (i) become and remain the property of the Licensor and the **Licensee** shall not be obligated to return the Land to its original condition or (ii) shall be promptly removed by the **Licensee** with the approval of and pursuant to an appropriate Order of the Nantucket

Conservation Commission. If improvements are so removed by the Licensee, the Licensee shall be entitled to the return of the funds maintained in escrow pursuant to Paragraph 7, above. If the Licensee fails to remove the improvements as contemplated herein within forty-five (45) days of the Licensor's request, Licensor shall have the right, but not the obligation, to cause such improvements to be removed and the Land to be restored at the Licensee's expense and shall have the right to draw against the escrowed funds therefore and to make claims against the Licensee in the amount of any shortfall.

10. Modification; Assignment. Any modification or amendment to this License must be in writing. This License is not transferable and no privilege contained herein may be sublet or assigned to any other person or organization without the express written consent of the Licensor.

11. Licensor's Right to Enter and Maintain. Notwithstanding any provisions or agreement to the contrary, the Licensor maintains its right to enter the Land at any time and from time to time to perform any maintenance or repair work that the Licensor, in its sole judgment, shall deem necessary.

12. No Warranty or Representation. The Licensee accepts the Land "as is" and the Licensor makes no warranty or representation, expressed or implied, related to said Land.

13. Successors in Interest and Assignment. The terms and conditions of this instrument shall be binding upon and inure to the benefit of the respective heirs, successors and assigns of the parties hereto. Notwithstanding the foregoing, the Licensee agrees that any right and license granted to the Licensee by this License Agreement may not be assigned or transferred without the prior written consent of the Licensor.

14. Notice. All notices, demands, requests, consents, approvals and other instruments required or permitted to be given pursuant to the terms hereof, shall be in writing and shall be deemed to have been properly given when addressed to the addresses listed above and deposited in registered or certified mail, postage prepaid, return receipt requested. The Licensee and the Licensor may at any time and from time to time, specify as its proper address for purposes of this License Agreement any other address(es) pursuant to the terms of this section.

15. Waiver. Notwithstanding anything herein to the contrary, no provision of this License, no entry upon, travel over or other use of the affected Land by the Licensor, nor the Licensor's granting of any rights or assumption of any obligations hereunder shall not waive, bar, diminish or in any way affect: (i) any legal or equitable right of the Licensor to regulate or issue any order with respect to the affected premises; (ii) waive any limitations on liability afforded a body politic of the Commonwealth of Massachusetts; or (iii) pursue any other claim, action, suit, damages or demand related thereto.

16. Severability. If any court determines any provision of this License to be invalid or unenforceable, the remainder of this instrument shall not be affected and each provision of this License Agreement shall be valid and enforceable to the fullest extent permitted by law.

17. Miscellaneous. This License Agreement: (i) may be signed in multiple counterparts; (ii) shall become effective only when fully signed by the Licensee and duly authorized representatives of the Licensor; and (iii) shall be governed by the laws of the Commonwealth of Massachusetts.

18. Merger. It is understood and agreed that (i) all contemporaneous or prior representations, statements, understandings and agreements, oral or written, between the parties are merged in this License Agreement, which alone fully and completely expresses the agreement of the parties, and (ii) that neither party is relying on any statement or representation made by the other which is not embodied in the Agreement. Further, all previous license agreements or leases between the parties are hereby terminated and superseded by this License Agreement.

19. Survival of Terms and Provisions. All appropriate terms and provisions hereof shall survive the termination or revocation of this License.

[SIGNATURES FOLLOW ON NEXT PAGE]

IN WITNESS HEREOF, the parties hereto have caused this License Agreement to be executed as a sealed instrument the day and year first written above.

TOWN AND COUNTY OF NANTUCKET,
LICENSOR

C. Elizabeth Gibson
C. Elizabeth Gibson
Town Administrator, duly authorized

Date: 12/30/08

**SIASCONSET BEACH PRESERVATION FUND, INC.,
LICENSEE**

By: Kermit Roosevelt
Kermit Roosevelt, duly authorized
Its President

Date: 12/21/08

EXHIBIT "D"

VAUGHAN, DALE, HUNTER, STETINA AND BEAUDETTE

PROFESSIONAL CORPORATION

ATTORNEYS AT LAW

WHALER'S LANE

P.O. BOX 659

NANTUCKET, MASSACHUSETTS 02554

TEL: (508) 228-4455

FAX: (508) 228-3070

EDWARD FOLEY VAUGHAN

KEVIN F. DALE

WILLIAM F. HUNTER

MARTIN JEFFREY STETINA

RICHARD P. BEAUDETTE

December 12, 2008

BY HAND DELIVERY

Michael Kopko, Chairman

Nantucket Board of Selectmen

Broad Street, 1st Floor

Nantucket, Massachusetts 02554

*RE: Baxter Road Toe Protection Licenses;
Orders of Conditions SE48-1659 and 1602;
77-122 Baxter Road, 65-75 Baxter Road*

Dear Michael:

Further to last night's meeting of the Nantucket Board of Selectmen and its deliberations in the captioned matter, **Siasconset Beach Preservation Fund (SBPF)** agrees to undertake the following tasks and obligations:

1. **SBPF** agrees that it shall not undertake so-called coastal bank terracing above the jute bag coastal bank toe protection as was previously permitted in the above captioned Orders of Conditions; to be clear, no wooden terracing shall be constructed along the project length described in the Orders and proposed Licenses, it being **SBPF's** intention to eliminate all wooden elements from its construction methodology under said Orders of Conditions;

2. In this regard, **SBPF** shall immediately remove the wooden "vertical fence post line", weather permitting, currently existing seaward of the installed jute bag coastal bank toe protection along the project length;

Page 2

December 12, 2008

Michael Kopko, Chairman

RE: *Baxter Road Toe Protection Licenses;
Orders of Conditions SE48-1659 and 1602;
77-122 Baxter Road, 65-75 Baxter Road*

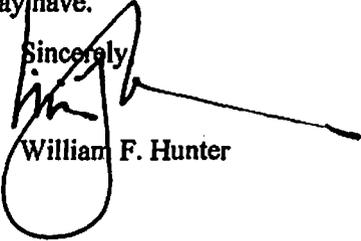
3. **SBPF** shall work to remove the remaining elements of the dewatering system currently installed at "Light House Beach South" and "Light House Beach South, South"; it being the intention of **SBPF** to submit a Notice of Intent to the Nantucket Conservation Commission on or before December 31, 2008 for an Order of Conditions permitting said beach work. The Board of Selectmen, acknowledging that an Order of Conditions from the Nantucket Conservation Commission is required to accomplish this task, shall cooperate with **SBPF** in the filing of said Notice of Intent to the extent reasonably necessary. Should the Conservation Commission issue an Order of Conditions permitting the removal of the dewatering system elements the Board of Selectmen shall cooperate with **SBPF** to the extent reasonably necessary in allowing it to carry out the work permitted under said Order. In order to accomplish this work, **SBPF** plans to draw on the escrow account set up with the Town of Nantucket through its Conservation Commission for this purpose.

4. **SBPF** shall work diligently and in good faith with the property owner of 67 Baxter Road, Siasconset, and Nantucket Town Council to formalize an access and egress path through landscaping and appropriate signage, providing egress from the 'Sconset Bluff Walk to Baxter Road;

5. **SBPF**, acknowledging that the Board of Selectmen has incurred legal fees in having Town Counsel review these License matters, shall contribute \$7500.00 to the Town to defray said costs.

Thank you for your ongoing attention to this matter. I look forward to appearing before the Board of Selectmen next **Wednesday, December 10, 2008** and, hopefully, having the License requests acted favorably upon by the Board. Please feel free to call me with any questions or comments that either you or Board members may have.

Sincerely


William F. Hunter

WFH/