

OUR SHORE Coastal Erosion Assessments and Site Reports: Great Diamond Island



Photo by Madison McClintock, Island Institute.



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The Maine Department of Environmental Protection (DEP) is currently developing OUR SHORE, a program that seeks to support homeowners, contractors, and communities who want to integrate nature-based strategies (NbS) into their plans for coastal resilience. The program provides informational tools in the form of a Quick Assessment to identify erosion hazards and a longer guide on how to apply NbS techniques, as well as outreach and training events for homeowners and shoreline stabilization practitioners.

In partnership with the Maine Conservation Corps, the OUR SHORE Program provides direct technical assistance on NbS to property owners and communities by placing Shore Corps Stewards with nonprofits across the state of Maine. Each Shore Corps Steward receives specialized training from the OUR SHORE program and state partners. From May 2025–May 2026, Island Institute is hosting a Shore Corps Steward, Emma Polhemus, to support the Casco Bay islands as they expand NbS opportunities for public and private properties.

Alongside community partners and Island Institute staff, the Shore Corps Steward visited three coastal sites on Great Diamond Island in April 2026 to complete OUR SHORE Assessments of coastal erosion. The following report documents the results of these assessments along with recommended erosion management actions that align with OUR SHORE guidelines and prioritize nature-based and hybrid strategies.

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Additionally, this report was funded by the Casco Bay Estuary Partnership (CBEP) Resilient Communities Grant administered by the University of Southern Maine and in partnership with the Casco Bay Estuary Partnership.

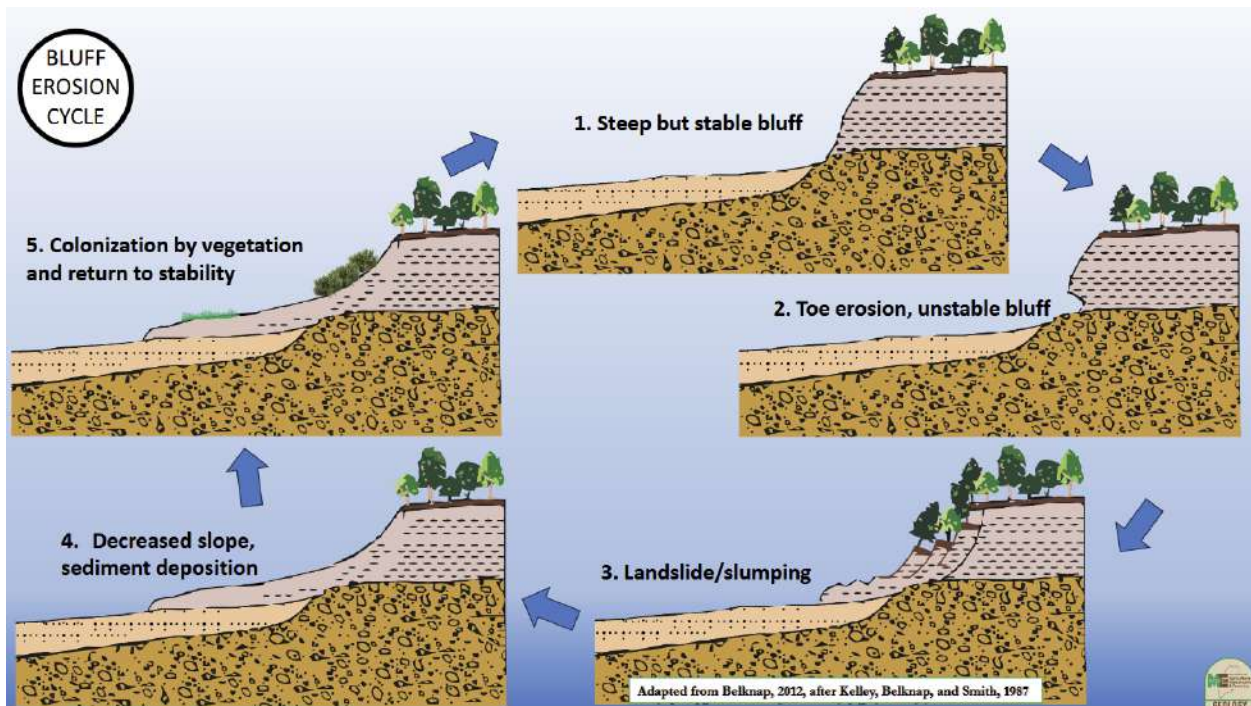
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Key Terms

Coastal bluff: A type of coastal shoreline where unconsolidated sediment (e.g. sand or clay) forms a steep slope 3 feet or taller. Coastal bluffs are located above the high tide line, and can be adjacent to different habitats like salt marshes or mud flats. The top of a bluff where flat land meets the slope is called the crest and the base of the bluff is called the toe. The slope in between the crest and toe is called the bluff face.

Bluff erosion cycle: Coastal bluffs follow a predictable geologic cycle of erosion and stability. In the bluff erosion cycle, the toe of a stable bluff is eroded, creating instability. The unstable bluff slumps, meaning that sediment from higher up the bluff falls or slides to the toe. The fallen sediment creates a more gradual slope and provides habitat for intertidal and upland vegetation, which protects and restabilizes the bluff, returning to the beginning of the cycle. The diagram below, created by the Maine Geological Survey, illustrates this cycle.



(Slovinsky, 2025)

Shoreline stabilization: Often called shoreline hardening or armoring, this typically refers to building hard, manufactured structures (like seawalls, bulkheads, and/or riprap) along a coast or water's edge to attempt to stop erosion and protect private property. Shoreline stabilization can also refer to plants and natural materials used for the same purpose.

Nature-based strategies: Strategies that utilize natural processes and ecosystems to address environmental challenges. For shoreline erosion, several nature-based solutions can be

employed to manage and mitigate erosion while also providing additional benefits to the ecosystem

End-effect erosion: Worsened coastal erosion that happens at the ends of protective structures like seawalls or riprap, causing increased damage to neighboring properties by disrupting natural sediment flow, essentially pushing the erosion problem next door in a domino effect

Scouring: An effect that occurs when waves hit a hard, vertical wall. That wave energy is not absorbed; instead, it is reflected downward and sideways. This redirected, high-energy flow "scoops out" and carries away the sediment (sand, soil, and/or sea bottom) at the base of the structure and in adjacent areas. Consequences of scouring include deepening the water in front of the structure and creating more intense wave energy, degrading habitat, and the undercutting of the foundation of the hardened structure leading to failure of the structure

Fetch: The distance that wind can blow over water towards a shoreline without interruption by a land mass or structure. Shorelines with a high fetch are very exposed to wind, and therefore experience bigger waves, while shorelines with a low fetch are sheltered from wind, storms, and waves. The exposure level of a coastal site is sometimes expressed as *annualized fetch*, which combines the fetch from different directions with how often the wind was blowing in each direction during a year.

Mapping Tools

The following maps and mapping tools are referenced throughout this report:

Living Shorelines Decision Support Tool: Created by the Maine Geological Survey (MGS), this mapping tool rates stretches of shoreline from probably not suitable to highly suitable for a living shoreline design (i.e., using nature-based strategies). Suitability ratings are based on environmental factors like the shoreline geology, annualized fetch, and height and angle of the slope. This tool is a helpful starting point for deciding whether to build a living shoreline, but any site should be assessed on the ground and in detail before choosing a shoreline stabilization strategy.

Coastal Bluff Maps: The MGS Coastal Bluff Maps classify coastal bluffs as stable, unstable, or highly unstable. Stable bluffs have dense vegetation cover, gentler slopes, and no signs of erosion. Unstable and highly unstable bluffs have exposed soil on the bluff face, steeper slopes, and signs of erosion like fallen trees and displaced blocks of soil. Data for the Coastal Bluff Maps was last collected in 2020, so some bluffs mapped as stable might be unstable at present, and some unstable bluffs might have stabilized. New Coastal Bluff Maps of Casco Bay are expected in 2026.

Beginning with Habitat Maps: Beginning with Habitat is a program created by the Maine Department of Inland Fisheries & Wildlife (IF&W) to share information on plant and wildlife habitats and conservation. Since any shoreline stabilization project, whether nature-based or a hardened structure, will impact the surrounding environment, these maps can help decision-makers and project designers understand what habitats and wildlife are in the area and how to minimize negative impacts. Some of the data included in Beginning with Habitat maps also affect the permitting process. For example, shoreline stabilization permits have to undergo additional review by IF&W if the project will occur near protected habitats like high-value waterfowl and wading bird habitat.

The OUR SHORE Quick Assessment

The OUR SHORE Quick Assessment is a tool used to quickly analyze the causes and impacts of erosion at a shoreline site. The assessor ranks the site as lower, moderate, or higher instability risk based on a variety of criteria in the following categories.

Criterion	Characteristics of Lower Instability Risk	Characteristics of Moderate Instability Risk	Characteristics of Higher Instability Risk
Example: Bank Height	Low bank (less than 3 feet)	Moderate bank (3-6 feet)	High bank/bluff (over 6 feet)

Source & Severity of Erosion – Assess the locations & sources of of instability

Height & Slope Risk – Assess contributions of height, slope, and soil to instability risk

Overland Water from Land Use – Assess how property use affects stability through overland flow and groundwater

Revegetate/reconnect shoreline buffer – Assess levels of buffer vegetation for stability and habitat connection

The Quick Assessment then provides a list of possible management options based on the instability risk in each category. A complete erosion management plan is created by combining practices to address each source of instability. The Quick Assessment was designed to provide a starting point from which homeowners, contractors, municipal officials, and others can begin to consider nature-based strategies for managing erosion. It does not represent a complete environmental assessment or provide detailed erosion management plans. The complete OUR SHORE Guide and practitioner trainings provided by DEP are available to supplement the Quick Assessment when more detailed assessment or technical guidance is needed.

**OURSHORE Quick Assessment: Barge Landing & Property X
Great Diamond Island, ME**

Existing Site Conditions:

Location:

The Great Diamond Island barge landing is located on the west shore of the island and provides an important access point to the island for vehicles, deliveries, and services like trash removal. The barge landing and an adjacent private, residential property were included in this site assessment.

Environmental characteristics:

The barge landing is constructed of concrete slabs 18 ft in width and extends into the intertidal zone. The sides of the landing structure and adjacent bank areas have been protected with placed stones. The shoreline of the site transitions from a rocky intertidal flat to a moderate bluff of approximately 6 ft in height. Most of the bluff has been covered with placed stone and concrete debris, but there are areas of vegetation and exposed soil on the upper bluff face.

This area of Great Diamond Island was altered by past military land uses. Impacts to the site environment include the presence of stone and construction debris within and in front of the bank. The outfall of a drainage pipe used to exit the bank on the shoreline of Property X but the pipe failed in 2025 and water now drains directly out of the bluff face.

The shoreline is included in National Wetland Inventory maps and has nearby high value Tidal Waterfowl and Wading Bird habitat.

Erosion:

The aging stone stabilization at the site is degraded, and soil erosion is visible above the current extent of the stabilization. The failed drainage system is contributing to worsened erosion where water now drains from the bank.

The GDI Partnership, Casco Bay Islands Climate Cooperative, and the City of Portland Sustainability Office will use this site to host a workshop demonstrating how upland management, including landscaping and drainage design, can enhance bank stability and reduce erosion risks. This report provides recommendations for integrating OUR SHORE principles into the workshop and future shoreline stabilization efforts at the site.



Figure 1: A section of the shoreline including the barge landing to the left.



Figure 2: The shoreline viewed from the edge of the barge landing.



Figure 3: The private property inland of the bluff crest.



Figure 4: Water now drains from this section of bank after a drainage pipe failed. Bricks and debris are visible in the bank.



Figure 5: Soil erosion is visible above the top of the placed stone in this section of bank adjacent to the barge landing.



Figure 6: Beginning with Habitat map of the site showing National Wetland Inventory areas (white and blue pattern).



Figure 7: Beginning with Habitat map of the site showing high value Tidal Waterfowl and Wading Bird habitat (dark blue).

OUR SHORE Quick Assessment:

Source & Severity of Erosion:

Overland Erosion	Moderate - Bank is eroding with observable change and loss from overland flows
Groundwater	Moderate - Evidence of limited or seasonal groundwater seepage or impacts to slope
Toe Erosion	Toe erosion in limited areas or none
Wave Erosion	Moderate - Site receives some wave action, but only large storms cause erosion. Only toe is affected

Height & Slope Risk:

Bank Height	Moderate Bank (3-6 feet)
Slope Severity	High Slope (> 1L:1V)
Current Slope	High - Less than half of surface has vegetation and duff layer
Soils	Low - Soils contain mix of sediments and stone; fairly stable soil condition

Overland Water from Land Use:

Surface Water Flow to Bank	Moderate - Some concentrated or channelized flow is directed toward the eroding bank resulting in minimal sheet or rill erosion
Lawn or Bare Ground Near Bank	High - Lawn area or bare ground is located within 25 feet of the shoreline
Impervious Surface Near Bank	High - Roads, driveways, houses, or other impervious surfaces are within 25 feet of the shoreline
Overall Impact of Surface Flow	High - Overland flow of water is a significant contributor to instability

Revegetate/Reconnect Shoreline Buffer:

Vegetation Within 250 Feet	Average vegetation (20-70% coverage)
Vegetation Within 25 Feet	Average vegetation (20-70% coverage)
How Natural is the Shoreline Habitat	Moderate - Bank impaired by riprap/hardened structures, but vegetation is present OR is pruned, mowed, or otherwise altered

Proposed Management Actions:

Address groundwater and surface water contributions:

An effective and resilient shoreline stabilization design should incorporate elements that minimize the impacts of groundwater and surface water in addition to wave erosion. At this site, a degraded drainage system is eroding soil and creating a saturated, vulnerable section of the bank. Addressing this source of instability will reduce the amount of intervention needed in other areas of the bank.

When stabilizing an area of the bank that drains a high volume of water or concentrated flows, targeted stone stabilization may be necessary. A layer of gravel underneath larger stones will help water drain from the bank while stabilizing the underlying soil. Adding vegetation to the drainage area will create a root network that can filter out soil particles so they do not get washed out through the stone.

The bank also shows signs of groundwater oversaturation in areas where soil is visible. Often, groundwater saturation can be addressed through targeted upland management practices to decrease groundwater inputs or increase uptake by plants before the groundwater reaches the bank. Increasing the amount of deep-rooted vegetation, especially woody plants like shrubs or trees, can significantly increase the amount of water taken up by root systems before it reaches the bank. Monitoring land use contributions to groundwater, like lawn sprinklers and septic systems, can also identify possible management actions. For example, minimizing the use of irrigation and maintaining septic systems following a septic professional's recommended schedule can also reduce groundwater contributions to instability.

Add vegetation to existing stone stabilization:

The stone slope protection that was previously placed has degraded and is no longer functioning as intended. Shifting and slumping of the stones has contributed to this degradation. Adding vegetation throughout the riprap on the bank connects the stones to the underlying soil, holding them in place and creating a more durable design that becomes stronger over time as the plants mature. A "rooted" riprap design also improves the quality of the shoreline habitat for wildlife.

Live staking is an effective method of adding vegetation to existing riprap stabilization on a shoreline that does not have a geotextile filter layer. This technique uses branch cuttings of dormant native shrubs from certain quickly-rooting species. These live stakes are able to produce roots and grow into a new plant when pushed into the soil. Live stakes can easily be planted into existing gaps within the riprap stones so they reach the underlying soil, allowing for revegetation without having to disturb or remove the existing riprap.

Enhance the shoreline buffer:

A vegetated buffer along the shoreline is an important aspect of shoreline stabilization projects to provide root structure to the soil, limit erosion from overland flow, and mitigate groundwater saturation. Increasing the vegetated buffer on the site is a component of upland management that will be considered during the planned workshop. OUR SHORE recommends modeling buffers after natural, undisturbed shorelines for the greatest benefit to erosion control and habitat value. Components of a natural buffer to consider are incorporating a diversity of plant growth forms and root depths; planting in dense, non-linear arrangements; and including elements that support the transfer of woody debris to the nearshore habitat over time, like standing dead trees, root wads, and logs.

Minimize soil disturbance during planting:

While robust vegetation is critical for stabilizing shorelines, the planting process can disturb large amounts of soil. Healthy, undisturbed soils have fungi, microbes, and extensive fine root networks that increase soil cohesion and stability. Soil disturbance from actions like planting can damage this complex soil structure, in addition to leaving areas of unprotected bare soil.

Using planting strategies like slit planting and live staking disturb less soil than planting potted plants that require large planting holes. Additionally, because these planting practices minimize environmental impact, they do not require a state permit to implement.

Regulatory Considerations:

Most projects in the shoreland zone will need to be permitted at the municipal and state level. This includes recommended erosion management actions described above including stabilizing the drainage system and large-scale planting projects. If a planting project to establish a vegetated buffer or improve bank stability uses hand-planting only and overturns less than one cubic yard of soil, the project will not require a state permit. Techniques like live staking which minimize soil disturbance are recommended as they do not require soil disturbance, and therefore do not contribute to the one cubic yard permitting threshold.

OURSHORE Quick Assessment: Private Property A
Great Diamond Island, ME

Existing Site Conditions:

Location:

The site assessed in this report is a private residential property located on the west shore of Great Diamond Island with 275 feet of shoreline. The property includes a seasonal cottage, yard, and set of stairs for shoreline access.

Environmental Characteristics:

The shoreline system of this property is a high bluff, common across the west shore of Great Diamond Island. The bluff is 15-20 ft tall across the width of the property, with a slope ranging from approximately 45° to vertical. Most of the bluff face consists of unvegetated soil, with some patches of shrubs and grasses. Seaward of the bluff is a cobble and sand beach.

The intertidal zone in front of the property is mapped as a coastal wetland within the National Wetland Inventory (Fig. 5). The area is additionally mapped as high value Tidal Waterfowl and Wading Bird habitat (Fig. 6).

Erosion:

The coastal bluff at the site was designated as Highly Unstable by the Maine Geological Survey in 2020 (Fig. 7). The property owners have noticed indicators of significant bluff erosion at the site. Most notably, a large oak tree growing on the top of the bluff fell in recent years, displacing the soil attached to its root system and causing the upper bluff edge to recede by over 10 feet where the tree stood (Figs. 8-9). Additional signs of bluff instability and erosion include areas of bare soil and exposed roots on the bluff face as well as blocks of sediment at the bluff toe that have slumped from higher on the bluff. Indicators of groundwater saturation, which contributes to bluff instability, were also noted at the site, including visibly dark and saturated sediment in the bluff face as well as a localized, active groundwater seep (Fig. 10). During the site visit, groundwater could be seen draining and running out of the seepage area.

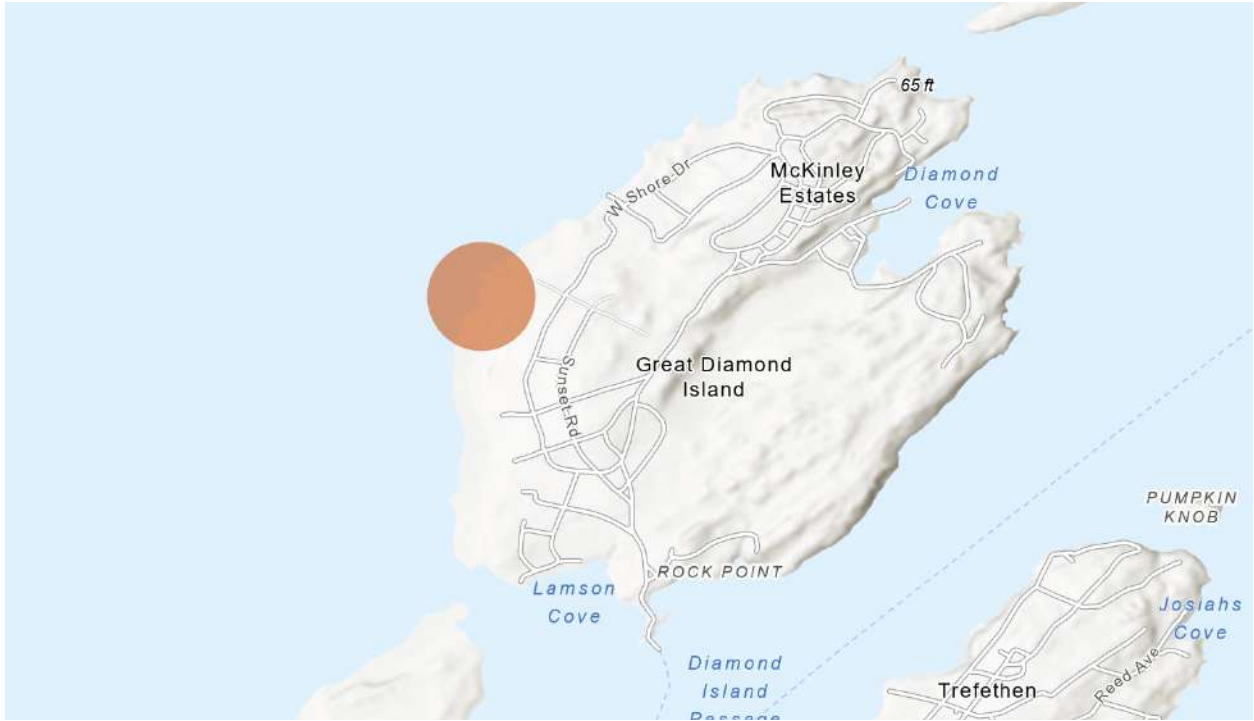


Figure 1: Map indicating the approximate location of the private property assessed.



Figure 2: Photograph of a portion of the bluff face at the site near the north end of the property.



Figure 3: Photograph of a portion of the bluff face at the site near the south end of the property.



Figure 4: Photograph from the top of the bluff at the site showing the bluff edge and sand and cobble beach.



Figure 5: Beginning with Habitat Map of the site indicating National Wetland Inventory wetland locations (white and blue pattern).



Figure 6: Beginning with Habitat map of the site indicating nearby high value Tidal Waterfowl and Wading Bird habitat areas (dark blue).

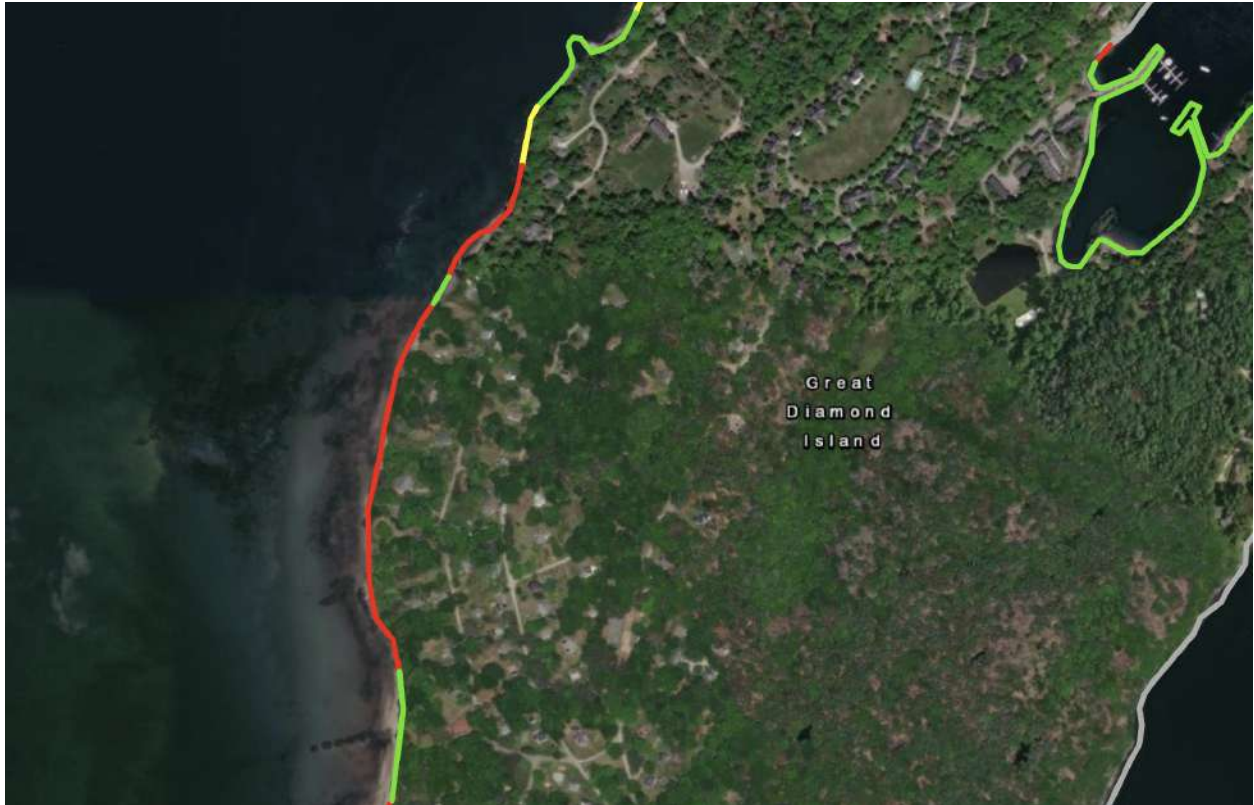


Figure 7: Maine Geological Survey Coastal Bluffs map of the west shore of Great Diamond Island. Red indicates bluffs mapped as Highly Unstable, including the bluff at the assessed site.



Figure 8: This large oak tree fell from the top of the bluff due to toe erosion and slumping.



Figure 9: Photograph showing the root wad of the fallen oak tree and the resulting exposed and displaced soil on the bluff face.



Figure 10: Photograph of the groundwater seep, visible as an area of shimmery, wet soil.

OUR SHORE Quick Assessment:

Source & Severity of Erosion:

Overland Erosion	Low - No recent bank erosion or loss from overland flows
Groundwater	High - Groundwater is severely impacting the stability of the slope
Toe Erosion	High - Bank is slumping from completely eroded toe
Wave Erosion	Moderate - Site receives some wave action, but only large storms cause erosion. Only toe is affected

Height & Slope Risk:

Bank Height	High Bank/Bluff (over 6 feet)
Slope Severity	High Slope (> 1L:1V)
Current Slope	High - Less than half of surface has vegetation and duff layer
Soils	Moderate - Unstable soil condition or moderate erosion rate

Overland Water from Land Use:

Surface Water Flow to Bank	Low - No concentrated or channelized flow from adjacent land use
Lawn or Bare Ground Near Bank	High - Lawn area or bare ground is located within 25 feet of the shoreline
Impervious Surface Near Bank	Moderate - No roads, driveways, houses, or other impervious surfaces are within 25 feet of shoreline
Overall Impact of Surface Flow	Moderate - Moderate Overland Impact from surface water

Revegetate/Reconnect Shoreline Buffer:

Vegetation Within 250 Feet	Average vegetation (20-70% coverage)
Vegetation Within 25 Feet	Sparse vegetation (less than 20%)
How Natural is the Shoreline Habitat	High - Bank and vegetation are not altered. No riprap or hardened structures installed.

Proposed Management Actions:

Addressing Groundwater Contributions to Instability:

There are indicators that groundwater saturation is significantly impacting slope stability at this site. An oversaturated bank is more vulnerable to erosion from waves and is more likely to slump. Managing groundwater saturation will be an important component of any erosion control plan at the site.

Groundwater saturation may be a result of natural hydrology of the site or caused by land use factors like lawn irrigation or septic systems. The property owners described the approximate location of the property's septic system as directly inland from the position of the groundwater seep on the bluff face, which suggests that contributions from the septic system may be leading to bluff saturation. A septic professional can help identify and manage issues like aging or damaged systems. Following the recommended septic tank pumping schedule is also important to prevent excess groundwater contributions.

Remaining groundwater saturation can be mitigated by installing and maintaining a dense vegetated buffer near the bank. Vegetation draws water into its roots from the bank, and larger, deeper rooted plants remove more water than lawn grass. A minimum buffer width of 10 ft from the edge of the bluff inland is recommended, and further reducing lawn area will continue to increase groundwater uptake and bank stability.

Riprap Stone Toe Protection:

Based on the proximity of the cottage to the bank and the current extent of erosion at the site, a hybrid structural design may be necessary to protect the cottage in its current location. When stone and structural components are used, OUR SHORE principles recommend minimizing the amount of intervention and increasing opportunities for revegetation. Using riprap stones only at the toe of the bluff to provide the bank with a stable foundation is an effective method of minimizing habitat impacts and project costs for many coastal banks. Most bluff erosion occurs following a cycle of erosion and undercutting of the sediment at the toe which causes slumping of the overlying bluff, so protecting the toe is often sufficient to stabilize the entire bluff. Riprap stones for toe protection typically extend 1-2 ft higher than the mapped base flood elevation at the site. Above this elevation, the bank is protected with native vegetation.

The OUR SHORE program also recommends some modifications to standard riprap designs to encourage vegetation of the riprap. Vegetated riprap is more resistant to wave energy than unvegetated riprap, and provides better habitat quality and connectivity. A filter layer is an important component of any riprap design, especially when the slope has high groundwater saturation. However, the plastic geotextile fabrics that are commonly used as filter layers

prevent plants from rooting through the riprap. Recommended alternatives include filter fabrics made of natural materials, like coconut coir or heavy jute, or graded layers of fine gravel and small stones between the soil and large riprap layer. Planting directly into the riprap when it's installed using live stakes, seeds, or mature plants is also recommended to speed up the process of revegetation of the protected area.

Managing Hazard Trees:

The large oak tree that fell from the bank at this site clearly demonstrates how hazard trees can increase bank instability and erosion. When possible, it is best to cut trees that are beginning to lean or fall near the bank to remove weight and reduce the chance of the stump falling. After the tree falls, leaving the trunk and root wad in place, as has been done at this site, is beneficial for shoreline stability. The structure of the branches and roots creates roughness that helps to diffuse energy from oncoming waves.

Regulatory Considerations:

Hand-planting in the shoreland zone can be done without a permit as long as less than one cubic yard of soil is overturned in the process. This is typically equivalent to 25 one-gallon container plants. Seeds and live stakes can be planted without restriction because they do not require soil to be overturned.

The riprap toe protection design described in this report will require both a municipal and state permit for the construction of a new structure in the shoreland zone. At the state level, shoreline stabilization is permitted under the Natural Resources Protection Act as either an Individual Permit or an expedited Permit by Rule (PBR) for projects with minimal environmental impact. Riprap toe protection in a coastal wetland may be permitted under a PBR if the project involves less than 125 linear feet. For this project and property, an Individual Permit would be required for riprap installation unless the design did not extend across the full width of the property.

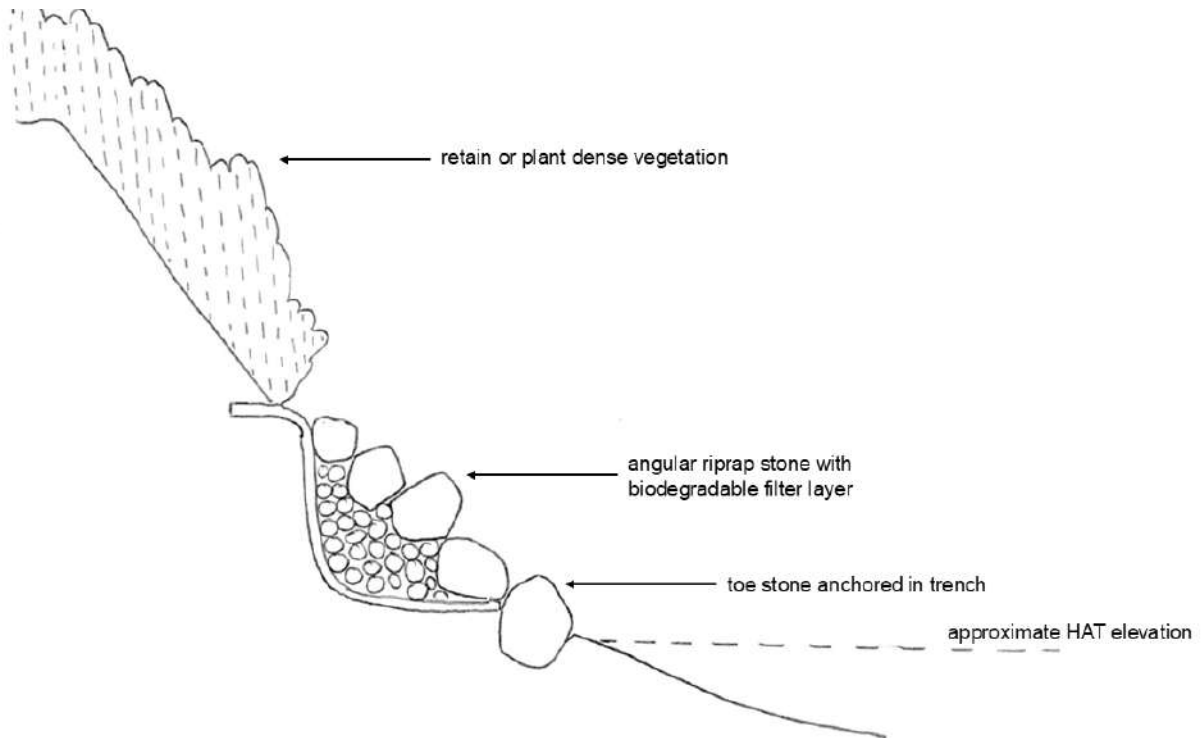


Figure 11: Cross-sectional diagram of the recommended erosion control plan utilizing a riprap stone toe combined with native vegetation for slope protection and groundwater management.

**OURSHORE Quick Assessment: Private Property B
Great Diamond Island, ME**

Existing Site Conditions:

Location:

The site assessed in this report is a private residential property located on the shore of Great Diamond Island near Lamson Cove and the sand bar to Little Diamond Island. The property includes a seasonal cottage, located approximately 60 ft inland from the highest astronomical tide line.

Environmental Characteristics:

Lamson Cove is a shallow, intertidal sand and mud flat. Just above the high tide line, the sand transitions into a gradually sloping grass lawn. The site itself does not contain a mapped sand dune system, but there are identified sand dune systems in nearby areas of Lamson Cove.

Lamson Cove is part of a large coastal wetland included in the National Wetland Inventory. The shallow mudflat is mapped as high value Tidal Waterfowl and Wading Bird Habitat.

Erosion:

The property owners have observed long-term shoreline change and erosion exacerbated by severe winter storms in 2024. Historical photos from the early 1900s show a salt marsh extending along the shoreline of the property which is no longer present. Sea level rise is also impacting the property; the seaward point of the historical tax parcel is now below the highest astronomical tide line.



Figure 1: Photo of the cottage and shoreline in 2026.



Figure 2: Historical photo of the cottage and shoreline taken in the early 1900s. Photo by Paul R. Stevens, provided by the Stevens family.

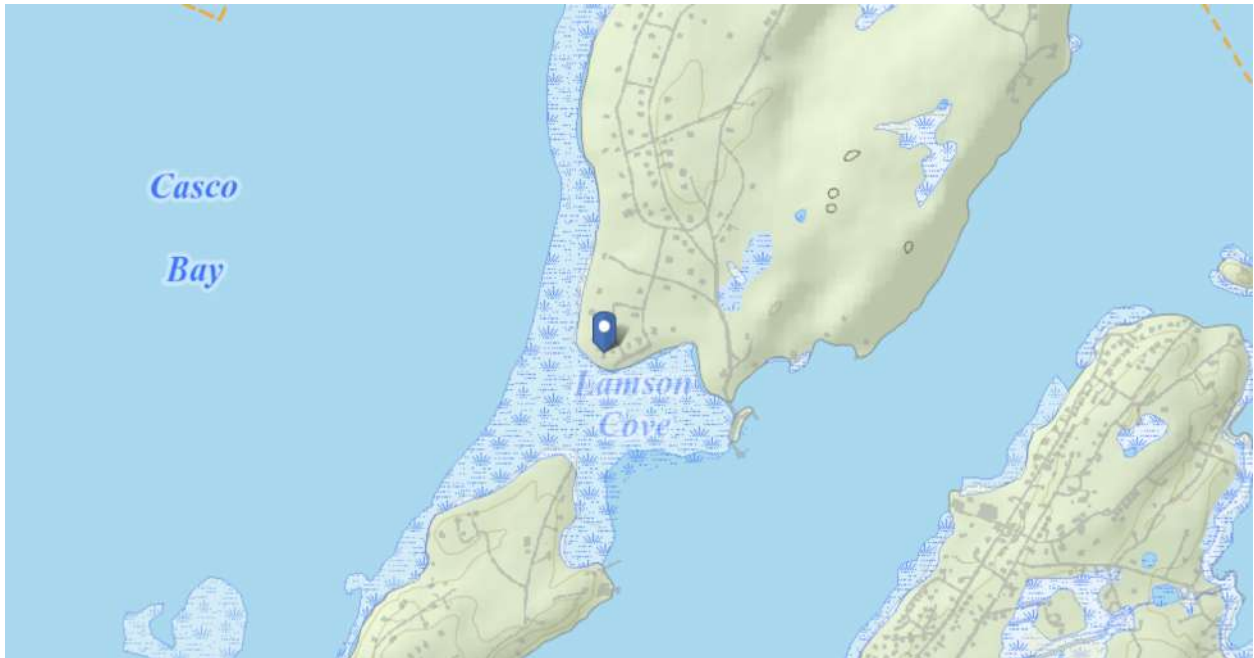


Figure 3: Beginning with Habitat map of the site showing National Wetland Inventory areas (white and blue pattern).



Figure 4: Beginning with Habitat map of the site showing high value Tidal Waterfowl and Wading Bird habitat areas.

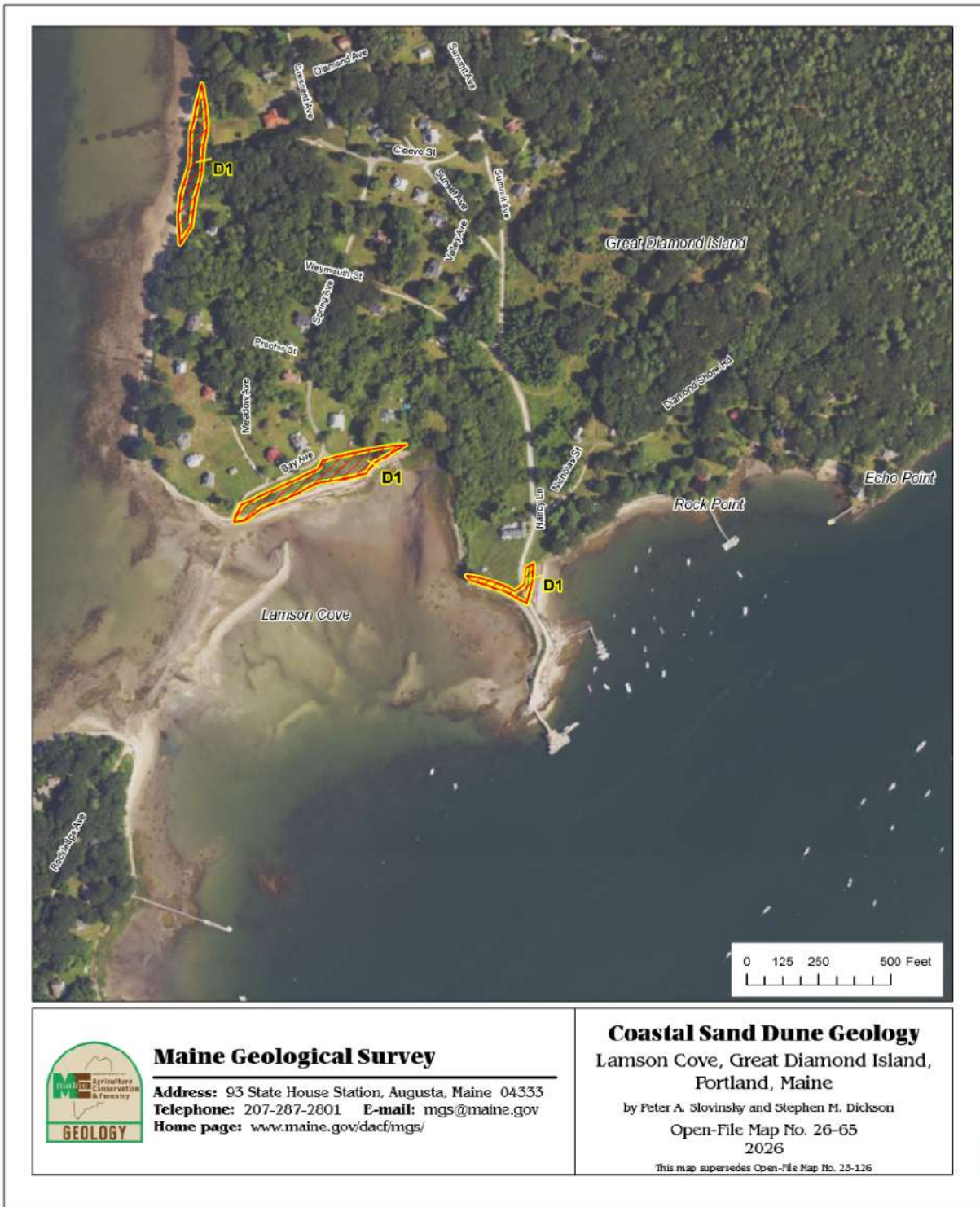


Figure 5: Coastal Sand Dune Geology map of Lamson Cove.

OUR SHORE Quick Assessment:

Source & Severity of Erosion:

Overland Erosion	Low - No recent bank erosion or loss from overland flows
Groundwater	Low - No evidence of groundwater seepage
Toe Erosion	Moderate - Moderate toe erosion, beginning to slump
Wave Erosion	Moderate - Site receives some wave action, but only large storms cause erosion. Only toe is affected

Height & Slope Risk:

Bank Height	Low Bank (less than 3 feet)
Slope Severity	Low Slope (less than 3L:1V)
Current Slope	Moderate - More than half of surface has vegetation and duff layer
Soils	Low - Soils contain mix of sediments and stone; fairly stable soil condition

Overland Water from Land Use:

Surface Water Flow to Bank	Low - No concentrated or channelized flow from adjacent land use
Lawn or Bare Ground Near Bank	High - Lawn area or bare ground is located within 25 feet of the shoreline
Impervious Surface Near Bank	High - Roads, driveways, houses, or other impervious surfaces are within 25 feet of the shoreline
Overall Impact of Surface Flow	Moderate - Moderate Overland Impact from surface water

Revegetate/Reconnect Shoreline Buffer:

Vegetation Within 250 Feet	Average vegetation (20-70% coverage)
Vegetation Within 25 Feet	Sparse vegetation (less than 20%)
How Natural is the Shoreline Habitat	Moderate - Bank impaired by riprap/hardened structures, but vegetation is present OR is pruned, mowed, or otherwise altered

Proposed Management Actions:

Living Shoreline Toe Protection:

Maine Geological Survey's Living Shoreline Decision Support Tool ranks the site as Highly Suitable for living shoreline approaches (Fig. 6). Environmental factors like the shallow intertidal zone, low bank height, and low annualized fetch provide beneficial conditions to establish plantings in combination with bioengineering approaches.

Because the toe of the bank has eroded, a biodegradable stabilization material such as coconut coir logs are recommended to provide additional support while plantings establish. The coir log should be placed directly along the eroding edge of the bank and staked in place (Fig. 7). Vegetation is added for long-term stability and slope protection. Vegetation can be seeded or planted directly into the coir log, or into the soil behind the log.

Marsh Restoration with Sills:

Salt marsh vegetation helps dissipate wave energy and buffer shorelines from erosion. The presence of salt marsh in historical photos suggests that this site may be a good candidate for marsh restoration as a nature-based erosion control strategy. Some marsh restoration sites benefit from the addition of a protective sill, which is usually constructed from logs anchored into the intertidal zone parallel to the shoreline (Fig. 8). A sill helps to reduce the energy of waves reaching the area of marsh restoration as well as allowing for adjustments to the elevation of the marsh to create suitable growing conditions for plantings. The Home Place Team has installed several successful examples of this technique along the coast of Maine; more information can be found in their presentation at the 2025 OUR SHORE conference.¹ Due to the location of the site near the Lamson Cove sandbar, transportation and infrastructure would have to be considered in the siting of a sill structure in the intertidal.

Enhance Vegetated Buffers:

Vegetated buffers are an important component of any shoreline stabilization project. Aboveground plant material prevents erosion from surface water runoff and helps to dissipate wave energy when storms hit, and the network of roots created by a buffer holds soil together and in place on the bank. Lawn grass provides some surface protection, but has a shallow root system that doesn't effectively stabilize soil. Replacing areas of lawn near the shoreline with dense plantings of native shrubs, grasses, and groundcovers can significantly increase shoreline stability and resilience.

For shoreline stabilization benefits, the recommended vegetated buffer depth is at least 10-15 ft. Since the current lawn area is near the high tide line and is occasionally flooded during

¹ <https://youtu.be/lqGsgzsRAgw?t=8982> or <https://www.maine.gov/dep/land/ourshore/>

storms, plants used for the buffer should be salt tolerant. Planting guides like the Cumberland County Soil and Water Conservation District's Coastal Planting Guide can help with selecting plants that are best suited to the sun, water, and soil conditions of the site.

Regulatory Considerations:

Shoreline stabilization projects that add fill or structures to the shoreline, including materials like coir logs, require both a municipal and state permit. Projects using biodegradable materials and plantings can be permitted under the state Permit by Rule process, which is a streamlined permit with a 20-day review period. Any project adding structures or fill below the highest astronomical tide line will require additional review by the U.S. Army Corps of Engineers. This would apply to the marsh sill project as described above.

Planting native plants in the shoreland zone to create a vegetated buffer or living shoreline can be done without a permit if the project will overturn less than one cubic yard of soil. Up to 25 one-gallon container plants are considered equivalent to this one cubic yard restriction. Alternative planting methods like live staking or planting seeds are not restricted as they do not cause soil to be overturned.

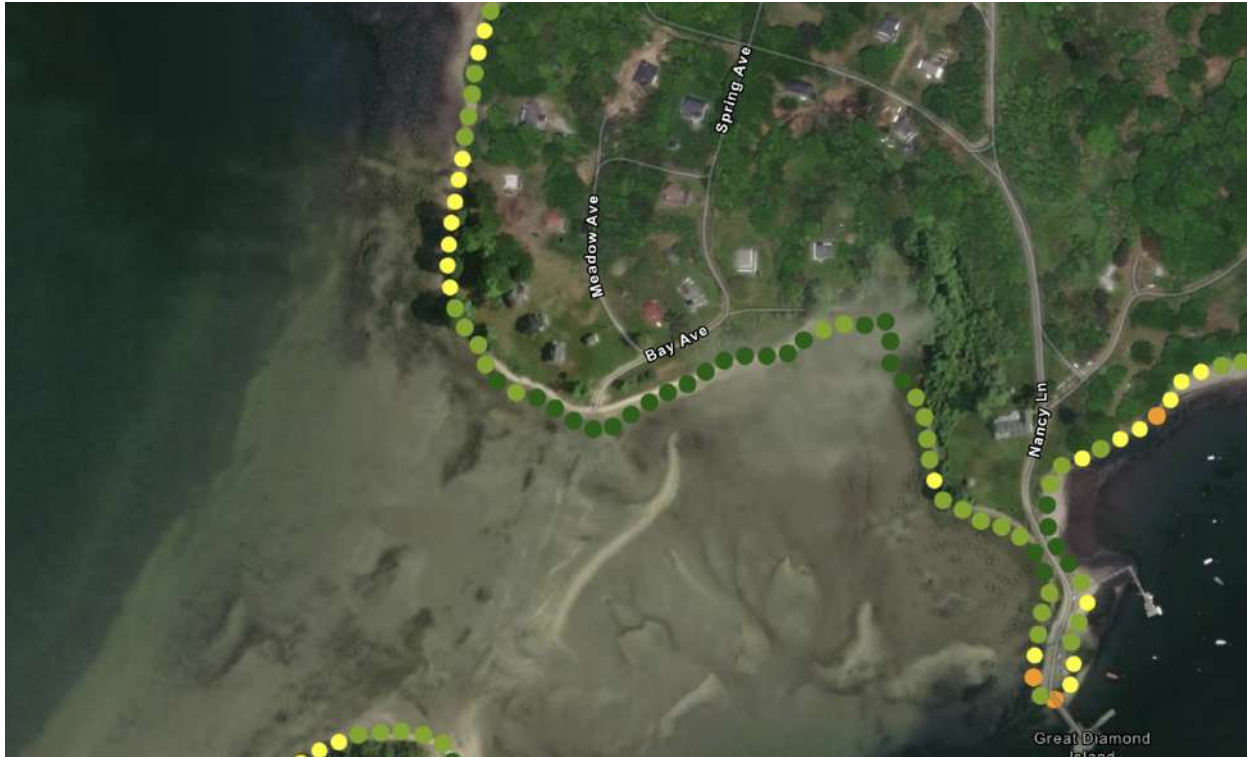


Figure 6: Maine Geological Survey Living Shoreline Decision Support Tool showing the Lamson Cove area. Dark green circles indicate that a site is ranked Highly Suitable for a living shoreline.

FIBER COIR ROLLS

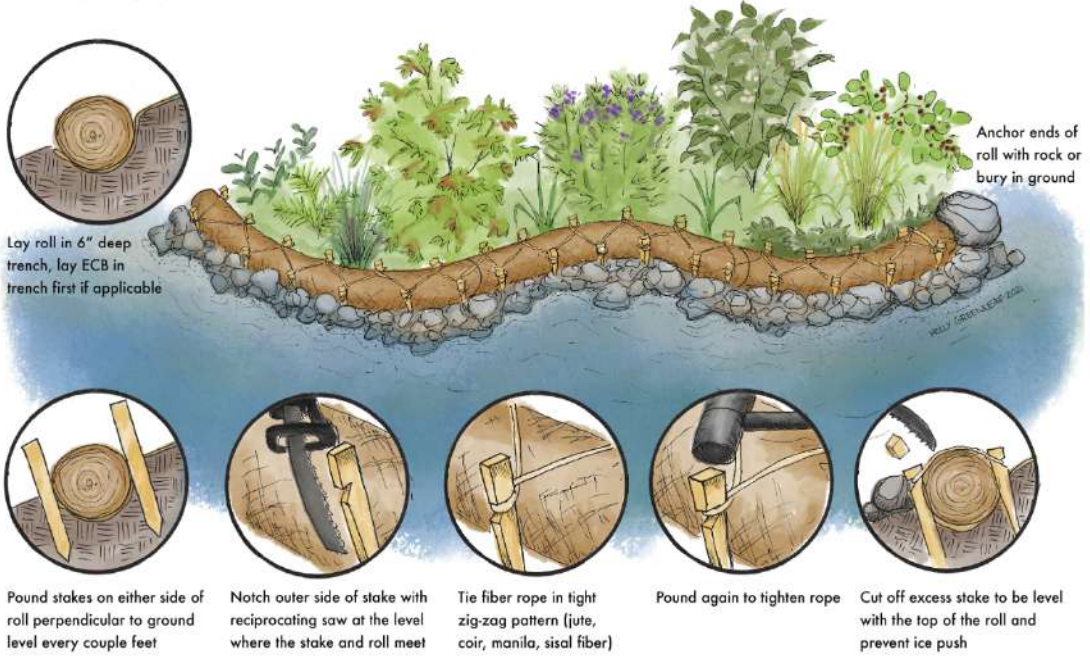


Figure 7: Illustration of coir log installation for toe protection from the Vermont Bioengineering Manual.



Figure 8: Example of a log sill installed for marsh restoration. (Photo from Treyball & Bernacki, 2025).

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