Final Project Recommendations for:
Pleasantville City, Atlantic County
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This project report is a summary of the information provided by the Restoration Explorer and is a complimentary planning tool during the initial steps of developing a living shoreline project. The Restoration Explorer is a first-level screening tool. Therefore, the report is intended to help municipal decision-makers plan a successful project by providing key information necessary to move forward with living shoreline projects. Once a project has been identified, the information in this report can be used in consultation with engineers and ecologists during the initial planning stages of implementing the project.

Please be aware that living shoreline techniques suggested by the Restoration Explorer will require Federal, State, and local regulatory approvals. The Nature Conservancy and its partners make no representation that potential projects will gain all required Federal, State or local approvals. Before engaging in design work, please contact Steve Jacobus at New Jersey's Coastal Land Use Office and local building officials for more specific information and guidance about the permits or other approvals which may be needed.

For additional information on key next steps for implementing living shorelines projects, please refer to NOAA's "Guidance for Considering Living Shorelines 2015" which describes 12 guiding questions and answers for communities that can be used to determine the best approach to stabilize the shoreline and sustain coastal connections between land and water. In addition, for more information on the design process and engineering requirements for living shorelines, refer to Stevens Institute of Technology's (SIT) Guidelines to Living Shorelines.

Municipal Shoreline Summary
The coast of Pleasantville City, NJ is heavily populated by marsh shoreline. Nearly 87% of the 4.5 miles of coastline is marsh habitat. The remaining shoreline is beach, upland or bulkheads. Across the township, approximately 64% of the coastline has been experiencing low to moderate rates of erosion. More information on the miles of shoreline that are suitable for different living shoreline techniques can be found within the Restoration Explorer. It can also be found via the Municipal Summary provided by the Restoration Explorer, which is attached to this report.

This report provides initial information on two potential project locations. Further, as a result of conversations with members of the City of Pleasantville's leadership team, another location is briefly outlined in this report as an additional area to consider nature-based solutions to reduce shoreline erosion.

Project Location #1
The entire project area encompasses approximately 1,000 – 1,300 feet. It will be oriented along the marsh shoreline on the opposing side of Bay Drive (Figures 1, 2, & 3).

Figure 1. Citywide view of project locations.

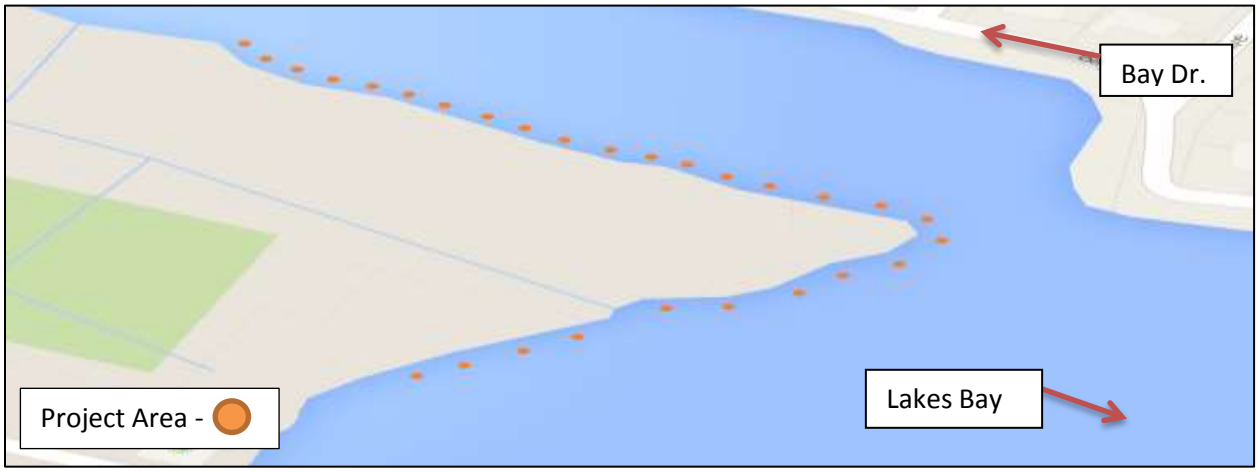


Figure 2. *Street Map*

Figure 3. *3-D Aerial View*

Project(s) Goals:

- Absorb wave energy and reduce shoreline erosion
- Enhance coastal aesthetics
- Reduce risk of nuisance tidal inundation

Project Summary

The project seeks to use a living shoreline in order to stabilize the community's coast on the opposing side of Bay Drive. The proposed living shoreline location (see Figures 1, 2, & 3) is near private boat docks and homes, publically accessible roadways, and undeveloped open space. The proposed project will aid in sheltering the adjacent uplands that abut the area of interest by helping to vertically increase the marsh shoreline edge. Additionally, the proposed project location encompasses a small area (roughly 150 ft.) of beach-front where sand replenishment could allow for improved coastal landscapes and a more natural transition where land meets water.

Nature-based bank stabilization techniques can help to enhance viewsheds by sustaining valuable coastal habitats. In order to maximize the merit of implementing a living shoreline at the proposed location, native vegetation such as Smooth Cordgrass (*Spartina alterniflora)*, can be replanted in order to increase the rate at which natural vegetation can reestablish and create pleasing aesthetics. The project is aimed to be visually pleasing as a result of attracting native wildlife. In addition, because the project will be situated near a previously conceptualized walking trail, additional ecotourism revenue might be sought through birding and boating as a result of the proposed shoreline enhancements. The recommendation presented below highlights a manner by which the shoreline can be stabilized using restoration techniques primarily focused on the installation of segmented marsh sills and beach restoration.

Shoreline Condition

Along the shoreline of the proposed project area the Restoration Explorer shows that erosion rates are between 1ft - 3ft. /year between 1977 and 2012 (Figure 4). Due to the average rate of erosion at the proposed site, the potential project should include strong structural stabilizing features, such as stone, in order to reduce shoreline loss.

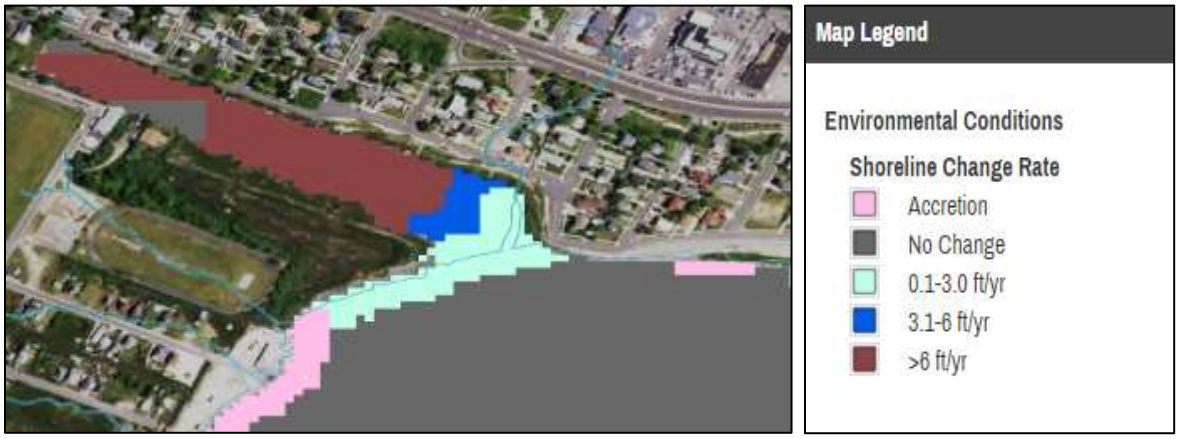


Figure 4. Average erosion rate of project sites (from 1977-2012).

Recommended Technique #1: Marsh Sills (Figure 5) are low elevation structures (e.g., rocks or bagged oyster shell) that run parallel to the shoreline and are below water at high tide. The area

between the sill and the marsh is often filled and planted with marsh vegetation to speed up shoreline stabilization. Marsh sills provide protection from wave energy and shoreline erosion. This living shoreline technique is utilized in low to moderate energy systems in order to help stabilize marsh vegetation through the accumulation of sediment in the area between the sill and the marsh.

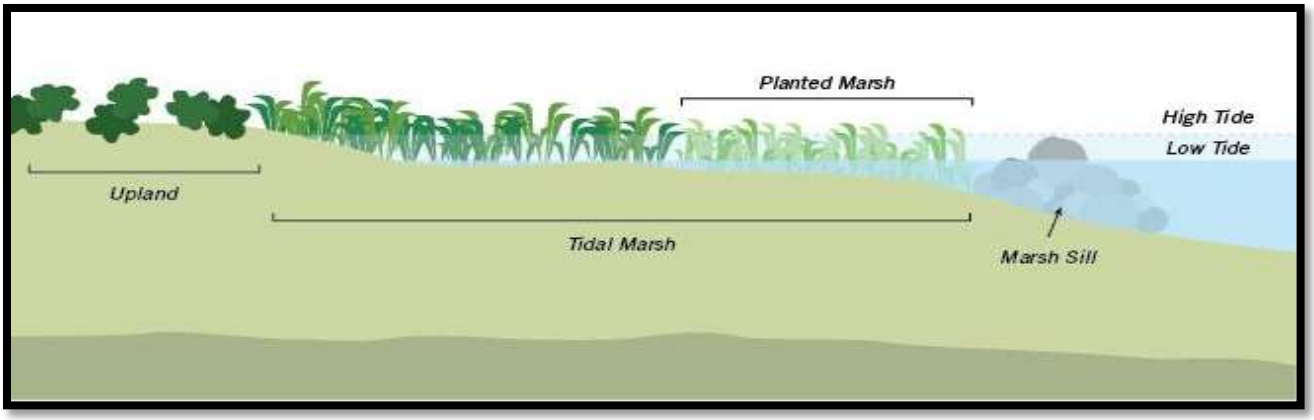


Figure 5. Graphic depiction of a marsh sill living shoreline technique.

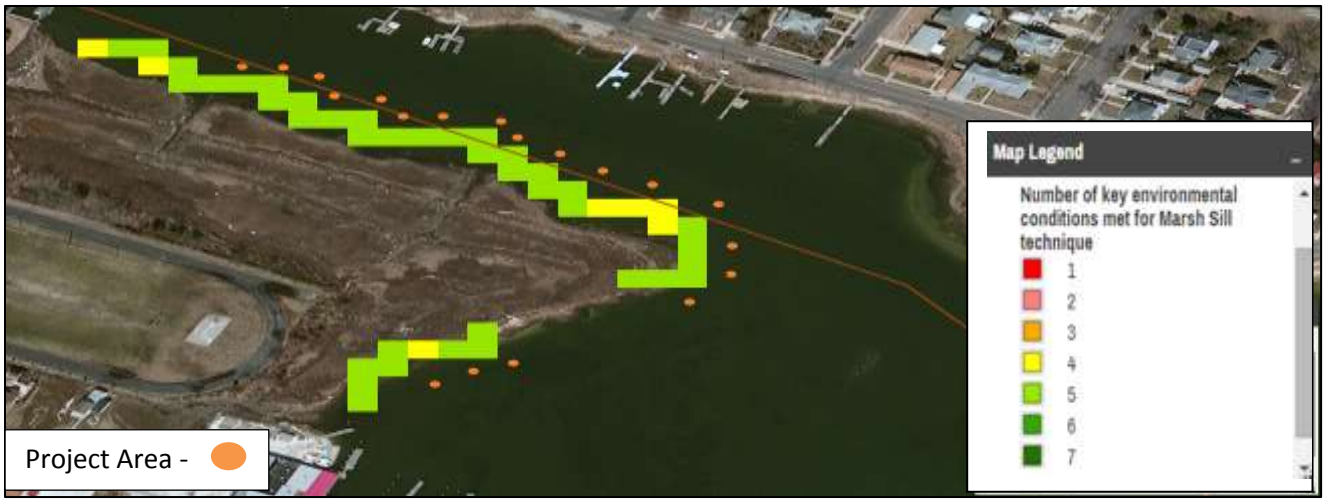


Figure 6. Restoration Explorer information on applicability of a marsh sill at the proposed project location.

Marsh Sill Environmental Conditions:
The implementation of a marsh sill along the selected project area meets key environmental conditions as outlined by the Restoration Explorer. A table describing the ways in which these considerations are met is included below.

Environmental Condition	Environmental Conditions met	Applicable Range for a Marsh Sill	Project location information
Shoreline Change Rate	No	0 – 4ft./yr.	1ft. - 3ft./yr.
Tidal Range	No	0 - 4ft.	4.5ft.
Salinity	Yes	0 – >30 ppt.	28.3 ppt.
Wave Height	Yes	<1ft. - 3ft.	0.8ft.
Ice Cover	Depends on Selected 10x10 Meter Square	Low - Moderate	Low - High
Shoreline Slope	Depends on Selected 10x10 Meter Square	0 - 20%	2% - >20%
Nearshore Slope	Yes	0 - 10%	0%

Rationale for a Marsh Sill
Marsh sills help to create a more natural transition between the tidal marsh edge and open water. This technique will attenuate nearshore wave energy and aim to help reduce erosion impacts on the shoreline. Additionally, marsh sills provide a sheltered environment for the protection of the tidal marsh behind the structure. Therefore, this technique safeguards the existing benefits associated with healthy tidal marshes, such as filtration of nutrient run-off and carbon storage leading to strong resiliency measures for the city. Tidal marshes promote biodiversity and will aim to create pleasing aesthetics resulting in enhanced natural coastlines, improved nearshore habitat, and a sheltered environment for native plants to regrow.

Various small segmented areas (10x10 meter areas) of the approximately 1,000ft. – 1,300 feet of coast that are most suitable for a marsh sill have a tidal range, shoreline slope, and/ or encounter excessive ice cover that fall outside the most applicable range for the implementation of this technique. However, exceeding these thresholds does not completely negate the applicability or effectiveness of this restoration technique throughout most of the area. Addressing these concerns with an engineer is highly recommended in order for the project to function effectively. It's also important to consider that because this technique is constructed near the shoreline, and visible at low tide, it should not impede upon local recreational boating.

Recommended Technique #2: Beach Restoration (Figure 7) requires placing additional sand along a shoreline to help maintain habitat for key species. The natural sloping beach allows waves to break across the sand, minimizing erosion of the shoreline edge.

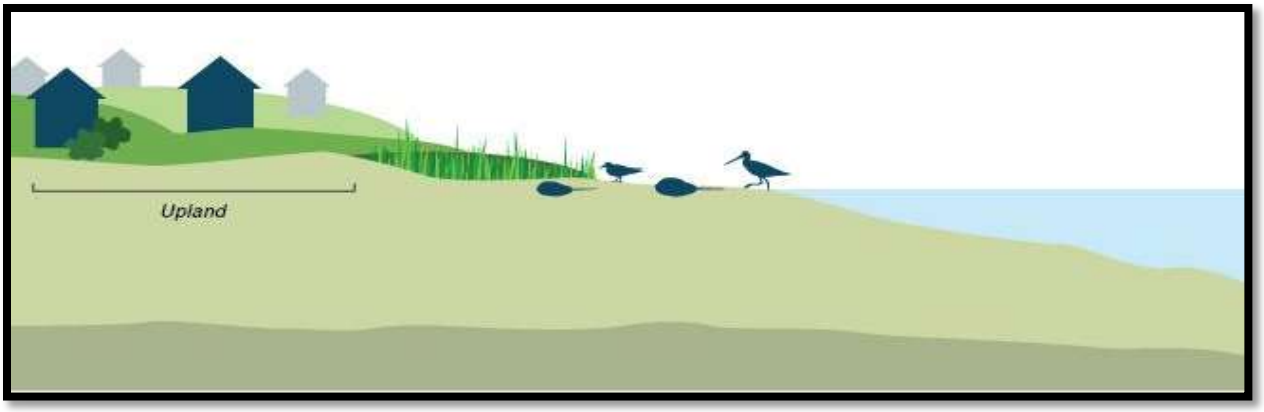


Figure 7. Graphic depiction of a beach restoration living shoreline technique.

Figure 8. Restoration Explorer information on applicability of beach restoration at proposed project location.

Beach Restoration Environmental Conditions:
The implementation of beach restoration along the selected project area meets key environmental conditions as outlined by the Restoration Explorer. A table describing the ways in which these considerations are met is included below.

Environmental Condition	Environmental Conditions met	Applicable Range for Beach Restoration	Project location information
Shoreline Change Rate	Yes	0 – 4ft./yr.	1ft. - 3ft./yr.
Tidal Range	Yes	0 - >6ft.	4.5ft.
Salinity	Yes	0 – >30 ppt.	28.3 ppt.
Wave Height	Yes	<1ft. - >4ft.	0.8ft.
Ice Cover	Yes	Low - Highest	Moderate
Shoreline Slope	Depends on Selected 10x10 Meter Square	0 - 20%	1% - 24%
Nearshore Slope	Yes	0 - 10%	0%

Rationale for Beach Restoration
Beach restoration will recreate a more natural sloping beach seeking to reduce wave energy breaking on the shoreline. Additionally, it will serve to enhance habitat benefits by creating additional nesting areas for native birds. As a result this technique will provide pleasing aesthetics and enhance the natural coastal viewscapes of the city. This technique combined with a marsh sill can serve as a principle example of Pleasantville's ability to consider a range of nature-based solutions as a means for addressing community resilience.

Various small segmented areas (10x10 meter areas) of the approximately 150 feet of coast that is most suitable for a beach restoration project have a shoreline slope that falls outside the most applicable threshold for the implementation of this technique. However, exceeding this threshold in a small area does not completely negate the effectiveness of this restoration technique throughout most of the area. Addressing these concerns with an engineer is highly recommended in order for the project to function effectively.

Project Location #2
The entire project area encompasses approximately 200ft. - 300 ft. It will abut Lakes Bay and be oriented along the marsh shoreline between E. Greenfield Ave. and E. Park Ave. (Figures 9 & 10).

Figure 9. *Street Map*

Figure 10. *3-D Aerial View*

Shoreline Condition

Along the shoreline of the proposed project area the Restoration Explorer shows that erosion rates are between1ft. - 3ft. per year from 1977 to 2012 (Figure 11). Due to the average rate at which the shoreline is eroding, and the strong wave energy along the bayside shoreline, hardened structural components such as segmented stone sills are recommended as bank stabilization techniques for this proposed living shoreline project.

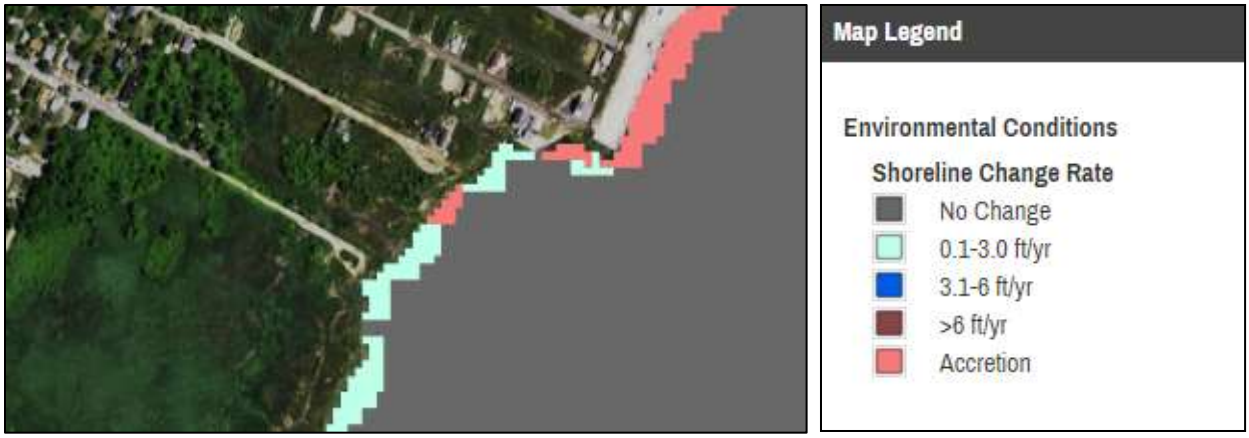


Figure 11. Average erosion rate of project sites (from 1977-2012).

Recommended Technique - Marsh Sills (Figures 5 & 12) are low elevation structures (e.g., rocks or bagged oyster shell) that run parallel to the shoreline and are below water at high tide. The area between the sill and the marsh is often filled and planted with marsh vegetation to speed up shoreline stabilization. Marsh sills provide protection from wave energy and shoreline erosion. This living shoreline technique is utilized in low to moderate energy systems in order to help stabilize marsh vegetation through the accumulation of sediment in the area between the sill and the marsh.

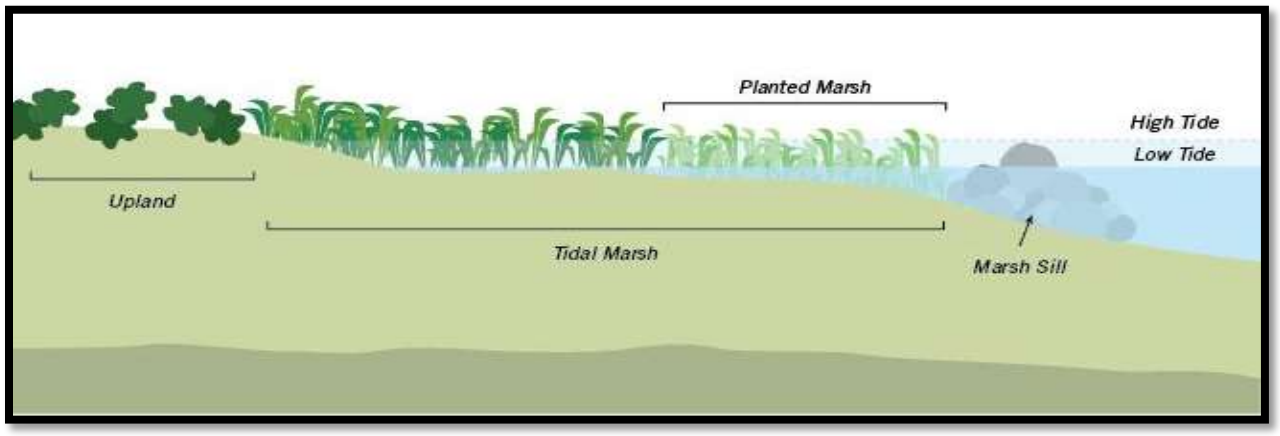


Figure 12. Graphic depiction of a marsh sill technique.

Figure 13. Restoration Explorer information on applicability of a marsh sill at the proposed project location**.**

Marsh Sill Environmental Conditions

The implementation of a marsh sill along the selected project area meets key environmental conditions as outlined by the Restoration Explorer. A table describing the ways in which these considerations are met is included below.

Environmental Condition	Environmental Conditions met	Applicable Range for Marsh Sill	Project location information
Erosion Shoreline Change	Yes	0ft. – 4ft./yr.	1ft. - 3ft./yr.
Tidal Range	No	0 – 4ft.	4.5 ft.
Salinity	Yes	0 – >30ppt.	28.5ppt.
Wave Height	Yes	<1ft. - 3ft.	0.9 ft.
Ice Cover	Yes	Low - Moderate	Moderate
Shoreline Slope	Depends on Selected 10x10 Meter Square	0 - 20%	6% - 26%
Nearshore Slope	Yes	0 - 10%	2% - 6%

Rationale for a Marsh Sill

The implementation of a marsh sill in this location would seek to enhance the means by which wave energy is absorbed before it reaches infrastructure (i.e., homes and roadways) along E. Greenfield Ave. and E. Park Ave. A marsh sill would aid in the structural stabilization of the shoreline, and it would work towards shielding against the tidal energy of Lakes Bay. Additionally, the stone material used to construct the sill can provide a hardened substrate for bivalves and organic material to accumulate. This can lead to an increase in fish foraging and enhanced aquatic habitat. As a result the community of Pleasantville would benefit from utilizing

nature-based solutions as a means for responding to shoreline erosion, increasing coastal ecological connectivity, and supporting community resilience.

Additional location to consider nature-based solutions

- Marsh abutting Lakes Bay (potential location encompasses .5 miles)

Project Goals:

- Reduce shoreline edge erosion
- Enhance habitat benefits

Figure 14. *3-D Ariel view*

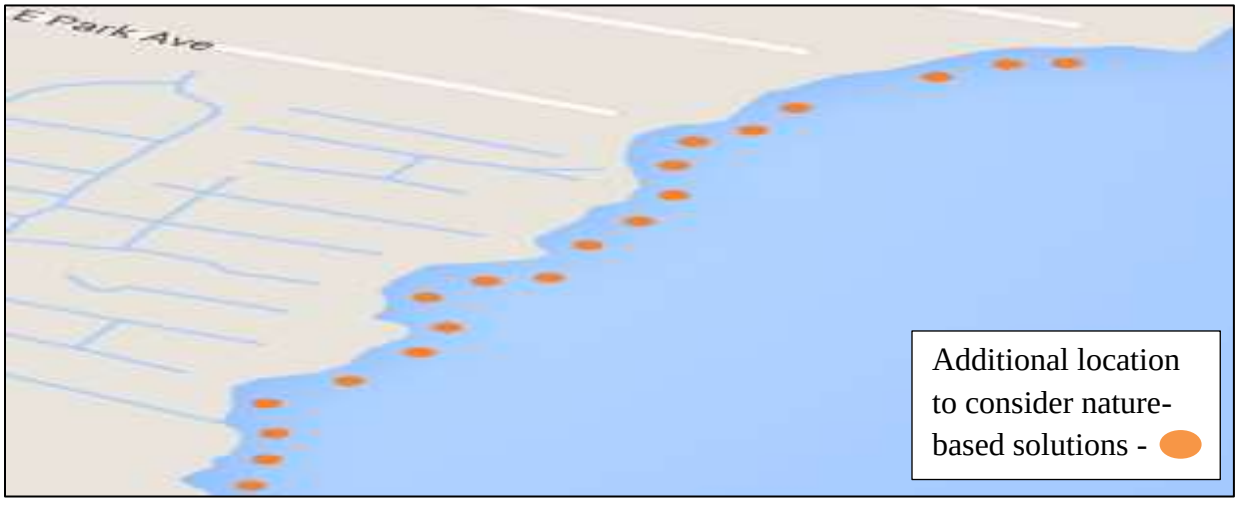


Figure 15. *Street Map*

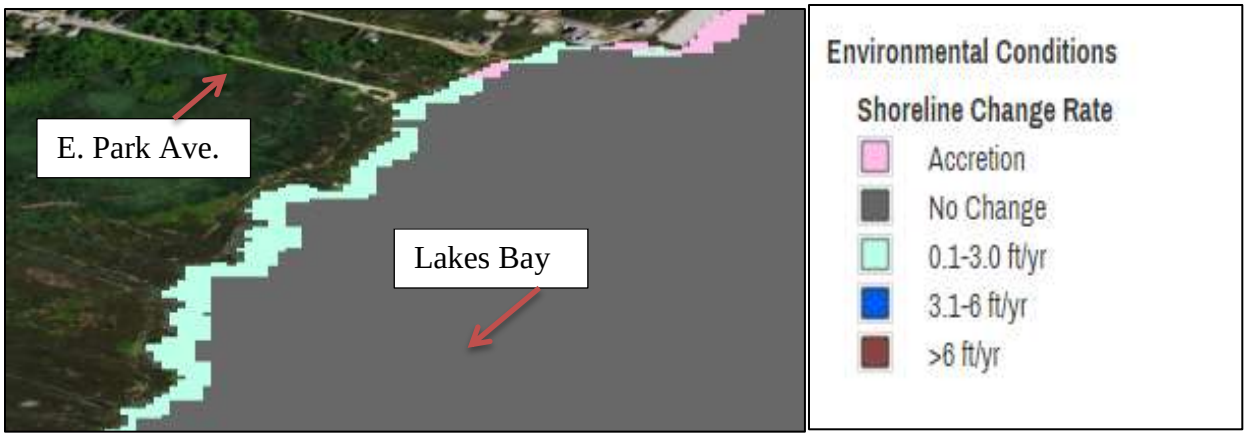


Figure 16. Average erosion rate of project site (from 1977-2012).

Shoreline Condition
The Restoration Explorer shows that the shoreline is eroding at a rate of 1ft. - 3ft. per year from 1977 to 2012 (Figure 16). A marsh sill in this location could help to reduce shoreline loss and increase vertical sediment accretion along the marsh edge assisting to reestablish a more resilient naturally vegetated shoreline.

Recommended Technique: Marsh Sills (Figure 17) are low elevation structures (e.g., rocks or bagged oyster shell) that run parallel to the shoreline and are below water at high tide. The area between the sill and the marsh is often filled and planted with marsh vegetation to speed up shoreline stabilization. Marsh sills provide protection from wave energy and shoreline erosion. This living shoreline technique is utilized in low to moderate energy systems in order to help stabilize marsh vegetation through the accumulation of sediment in the area between the sill and the marsh.

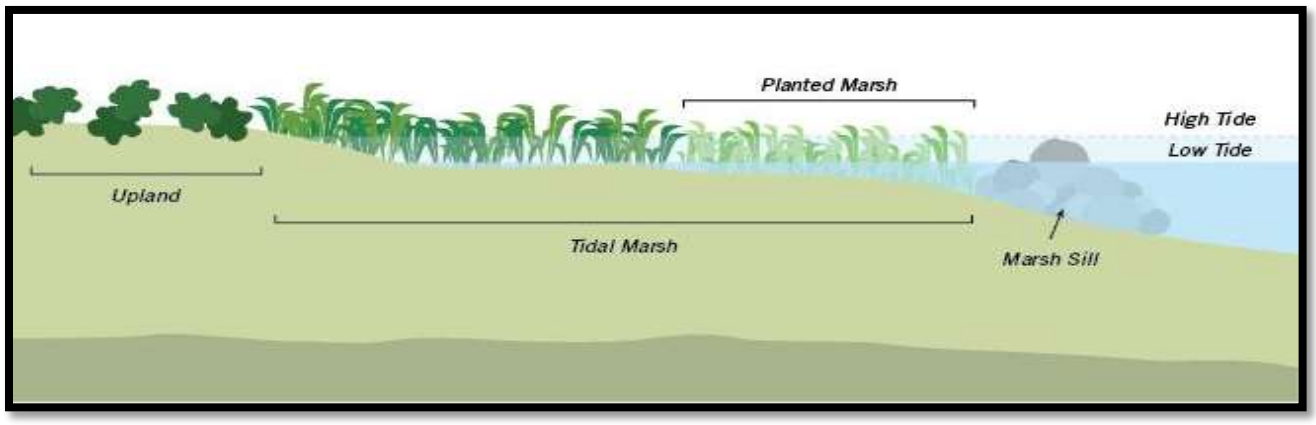


Figure 17. Graphic depiction of a marsh sill living shoreline technique.

Rationale for a Marsh Sill
Marsh sills help to create a more natural transition between the tidal marsh edge and open water. This technique will attenuate nearshore wave energy and aim to help reduce erosion impacts on the shoreline. Additionally, wildlife lookouts and established nature trails have been discussed as potential ways for local residents and tourists to enjoy birding, fishing, kayaking, and nature-walks along Lakes Bay. These circumstances lend to the consideration of implementing a living

shoreline technique that incorporates natural native vegetation, such as Smooth Cordgrass (*Spartina alterniflora)* as well as strong structural components, such as stone sills in order to create pleasing aesthetics and enhanced habitat view-sheds through resiliency tactics.

Figure 18. Restoration Explorer information on the applicability of a marsh sill at the proposed project location.

Marsh Sill Environmental Conditions

The implementation of a marsh sill along the selected project area meets key environmental conditions as outlined by the Restoration Explorer. A table describing the ways in which these considerations are met is included below.

Environmental Condition	Environmental Conditions met	Applicable Range for Marsh Sill	Project location information
Erosion Shoreline Change	Yes	0ft. – 4ft./yr.	1ft. - 3ft./yr.
Tidal Range	No	0 – 4ft.	4.5 ft.
Salinity	Yes	0 – >30ppt.	28.5ppt.
Wave Height	Yes	<1ft. - 3ft.	0.9 ft.
Ice Cover	Depends on Selected 10x10 Meter Square	Low - Moderate	Moderate - High
Shoreline Slope	Depends on Selected 10x10 Meter Square	0 - 20%	5% - >20%
Nearshore Slope	Depends on Selected 10x10 Meter Square	0 - 10%	0% - >20%

Recommendations for additional data collection

Additional data should always be collected to ensure that the Restoration Explorer's results are accurate. As part of the design process, engineers and ecologists will verify the conditions at the project site and provide site-specific design recommendations. Given the results of the Restoration Explorer, project engineers and ecologists should verify the tidal range, slope of the shoreline and wave energy at the site, among other key design criteria. Stevens Institute of Technology has created engineering guidelines that can help to inform your design process.

Beach restoration and marsh sill designs are carefully engineered to take into consideration numerous factors such as, the effects of wave action on adjacent shorelines, fetch, drifting sediments and accessibility to the locations. Additionally, tidal creeks are important ecological corridors that should remain unimpeded.

Municipal Planning

Incorporating living shoreline projects into municipal plans can help to facilitate project implementation by opening up funding opportunities and/or providing a community with the ability to budget for a future project. Updates and revisions to municipal coastal resilience measures, such as shoreline restoration and enhancement strategies, are becoming more easily adapted into local planning efforts. For example, the New Jersey Municipal Land Use Law (MLUL) requires each municipality in the State to review and update its local master plan regularly. This affords an opportunity to include shoreline restoration and enhancement strategies not only in Pleasantville's master plan but also in municipal floodplain management and hazard mitigation plans.

Inclusion of living shoreline strategies into different municipal plans can also benefit Pleasantville's ability to budget and apply for State and Federal funding opportunities including, but not limited to, opportunities from the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance, Pre-Disaster Mitigation, and Flood Mitigation Assistance programs. Communities that participate in FEMA's National Flood Insurance Program's Community Rating System can also receive discounted flood insurance premium rates to reward community actions.

Estimated Costs

The cost of a living shoreline project will vary based on size, location and complexity. The ***average*** cost data included in the table below are sample estimates for the ***materials*** of living shorelines (adapted from Seachange Consulting, 2011, Rella, A., & Miller, J. Ph.D., 2012, and Hafner, S., 2012). The cost information is presented to show how costs for one technique might compare relative to another technique and, therefore, should only be used as a guide. Additional research will be necessary to craft a full project budget.

- Engineering and design of project*
- Labor associated with the construction of the living shoreline;
- Shipping of materials;
- Additional vegetation needed for post-project for replanting,
- Accessibility and procurement of bagged shell, oyster castle material, and stone,
- Annual or bi-annual project maintenance (e.g., additional vegetation plantings, removal of debris at the project site, possible repositioning of structural project components)

*The design cost is also heavily dependent on the amount of site specific information provided to the engineering firm, and the complexity of the proposed project. Please consult engineering and design firms for more accurate estimates.

Living Shoreline Technique	Estimated Cost	Additional factors to consider
Beach Restoration	Sand Replenishment $7.00-17.50/ per cubic yard	Factors to consider include: wave energy, storm frequency, beach density (volume/unit length) and granular fill, transportation of material, and labor.
Marsh Sill	$75.00-$150.00/per linear foot	Factors to consider include: stone work, site preparation, procurement of stone, (potentially marl or lower fill material), and vegetation. Although marsh sills are able to function in a wide array of energy environments it's important to consider site specific conditions which might lend to an even more natural form of restoration technique, such as, nature-based living shorelines.
Bulkhead	$80-$1,200 per linear foot	Hard armoring traditional approach. (Non-nature based technique). Wave energy is reflected and not absorbed, which can result in bottom scour and loss of vegetation. Natural shoreline is eliminated, resulting in a loss of upland and shallow water habitat.

Potential Funding Sources

Although project funding can't be guaranteed, resources are available for communities to explore. An initial list of potential grant opportunities is provided below. Additional information can be found by following the hyperlink for each program.

- NOAA Regional Coastal Resilience Grants Program - The NOAA Regional Coastal Resilience Grants Program is centered on helping communities increase preparedness and improve coastal resiliency measures. This program is applicable to nonprofit organizations, institutions of higher education, regional organizations, private (for profit) entities, and local, State, and tribal governments organizations that work toward resiliency strategies for land and ocean use, disaster preparedness, environmental restoration, and hazard mitigation projects benefiting coastal communities in one or more of the 35 U.S. coastal States or territories. In addition, awards range from $500,000 to $1 million for projects lasting up to 36 months.

- The Department of the Interior Fish and Wildlife Service, Coastal Program – The Department of the Interior Fish and Wildlife Service, Coastal Program utilizes the tax revenue from hunting, boating, and fishing in order to reinvest in conservation and coastal wetland ecosystems. A primary goal of the program is centered on seeking to help mitigate flooding and increase water quality. Most recently this program has helped to provide $21 million dollars in grant funding in order to help improve more than 11,000 acres.

- U.S. Environmental Protection Agency (EPA) Urban Waters Small Grants Program – The U.S. EPA funding opportunity addresses urban runoff pollution to best serve community health benefits, with emphasis on underserved communities with award amounts of up to $60,000. The proposed project must take place entirely within one of the Eligible Geographic Areas. This program helps to influence how healthy and accessible urban waters can help to grow local businesses and enhance educational, recreational, and social and employment opportunities.

- New Jersey State Department of Environmental Protection (NJDEP) - Shore Protection Grants and Loans program - In an effort to protect existing development from sea-level rise, this NJDEP funding opportunity offers a cost share program whereby 25% of the cost is municipally funded & 75% of the cost is State funded. Loans are available from the State for the 25% of the cost owed by the municipality. For additional questions regarding qualification for this program contact the NJDEP-Office of Engineering and Construction,

- The New Jersey Corporate Wetlands Restoration Project -The New Jersey Corporate Wetlands Restoration Project is a public-private partnership that works to help fund a multitude of restoration work including living shorelines. The project must be located in New Jersey, have a Federal partner, and meet a request for funding generally below $25,000.00. Each project will need to include the submittal of the NJCWRP Project Executive Summary Sheet and include a project location map. For examples and templates of submittal forms *click here*.

- Environmental Solutions for Communities Initiative - Wells Fargo and NFWF are providing grants ranging from $25,000 to $100,000 to localities for sustainability projects. Wells Fargo and NFWF are supporting engagement with at least 4-8 neighborhoods with the goal of helping these communities become more sustainable through conserving critical land and water resources, improving local water quality, and restoring and managing natural habitat, species, and ecosystems.

Project Permitting

All living shoreline projects in New Jersey are subject to state and federal permitting requirements. It's recommended to consult with relevant permitting agencies early in your planning process (prior to the completion of formal designs) to ensure that the potential project can be permitted. Should there be any issues with conceptual designs, representatives from the state and federal agencies can provide recommended changes to the project design to help ensure a smooth permitting process.

State Permitting Requirements: N.J.A.C. 7:7 Coastal Zone Management Rules. This regulation enables living shoreline projects to be implemented under the State of New Jersey Department of Environmental Protection Division of Land Use Regulation. Lawfully this provision is recognized as Coastal General Permit 24 (N.J.A.C. 7:7-6.24.) With questions or concerns regarding regulations and permitting contact the NJDEP Coastal Land Use Office.

Federal Army Corps of Engineers (USACE) Permit: Depending on the goals and design of a living shoreline project, it will need either a "nationwide" or "individual" permit before construction can begin. Nationwide Permit 13 (NWP-13) is centered on shoreline bank stabilization. A Pre-Application Meeting Request Form is required to be completed *before* the NWP-13 application. In addition, the Individual Permit Application Submittal Form is a complementary procedure and only should be completed if Nationwide Permit is not applicable for a specific project. For more information on the different permits and necessary forms, visit the USACE webpage.

NJ Bureau of Tidelands Licensing Requirements: The State of New Jersey has ownership of Tidelands public lands. Tidelands are considered to be land currently and previously flowed by the mean high tide of a natural waterway. Written permission from the State and a fee are required in order to use these lands. A Tidelands license or lease is required for submerged structures that are constructed off shore, and are situated anywhere from the tidelines line landward (i.e. Breakwaters, Living Reef Breakwaters).

Additional Considerations

- Additional factors are discussed in the Stevens Institute of Technology (SIT): Guidelines to Living Shorelines.
- Consider the feasibility of public access in relation to developing a project with a goal of enhancing economic development.
- Impacts to adjacent properties should be considered when identifying living shoreline project areas. Shifts in wave energy and bottom scour can result in negative unforeseen consequences to neighboring locations if not examined properly.
- Project planners should engage State officials early in preparatory project stages when considering to plant and/or seed commercial shellfish species.
- All living shoreline projects also require a letter of approval from the land owner or land manager. Make sure to discuss property boundaries and relevant local concerns with local municipal officials.

Next Steps

Local conservation organizations can be helpful advisors to municipalities that are interested in pursuing a living shoreline project. It's most useful to consult with local conservation groups and State permitting officials early in the planning process for a living shoreline project to ensure the highest likelihood of success. An effective planning process should include the steps below. These are not necessarily in order, but each is important to address at some point in your planning process.

Engage property owner. The owner of the property should be included in the planning and implementation of a living shoreline project from the outset to both minimize conflict and maximize project success.

Set project goals. Goal setting should take priority in the planning process, as it informs project design and monitoring. Determine what the project seeks to achieve (e.g., reduce erosion, reduce tidal flooding, etc.) and note the existing environmental conditions

Determine a timeline. Understanding time constraints for permitting and construction will heavily determine the timing of the funding, design, permitting, construction and monitoring. Be sure to note all fixed dates for funding applications and consult with conservation groups or state or federal wildlife management agencies about the best time of year start a project to avoid disrupting migratory birds and fish.

Identify project partners. Project partners can assist with design, implementation, monitoring and maintenance of the site. This can include conservation groups as well as community organizations interested in volunteering time and resources to the project.

Determine permitting requirements. Consult with municipal, state and federal officials to discuss project feasibility and permitting requirements. It is highly recommended to engage the NJDEP Coastal Land Use Office and the U.S. Army Corps of Engineers during the early planning stages of the project.

Develop your project budget and potential funding sources. Budgets for living shoreline projects can vary greatly depending on size and scope. Contact funding sources to determine the most applicable possibilities, timelines for proposal submission, and how the timelines of funding source match up with your project timeline.

Determine site conditions and develop project design. Work with engineers and marine contractors to gather information on the project site and develop specific project designs. The RE data should only be used as a screening tool. Collecting site specific information is critical to engineering and design.

Develop a monitoring plan. For guidance on developing a monitoring plan you can refer to "A Framework for Developing Monitoring Plans for Coastal Wetland Restoration and Living Shoreline Projects in New Jersey," which can be found at the Coastal Resilience Resources webpage.

Plan for project construction. Contact marine contractors to determine a construction schedule, access to materials, and pricing. Also, conduct site visits during preparation stages to monitor conditions. In preparation for the installation of the project, work with local conservation organizations to best coordinate volunteers, the construction schedule, preliminary site work, tools, access to the site and to galvanize media attention.

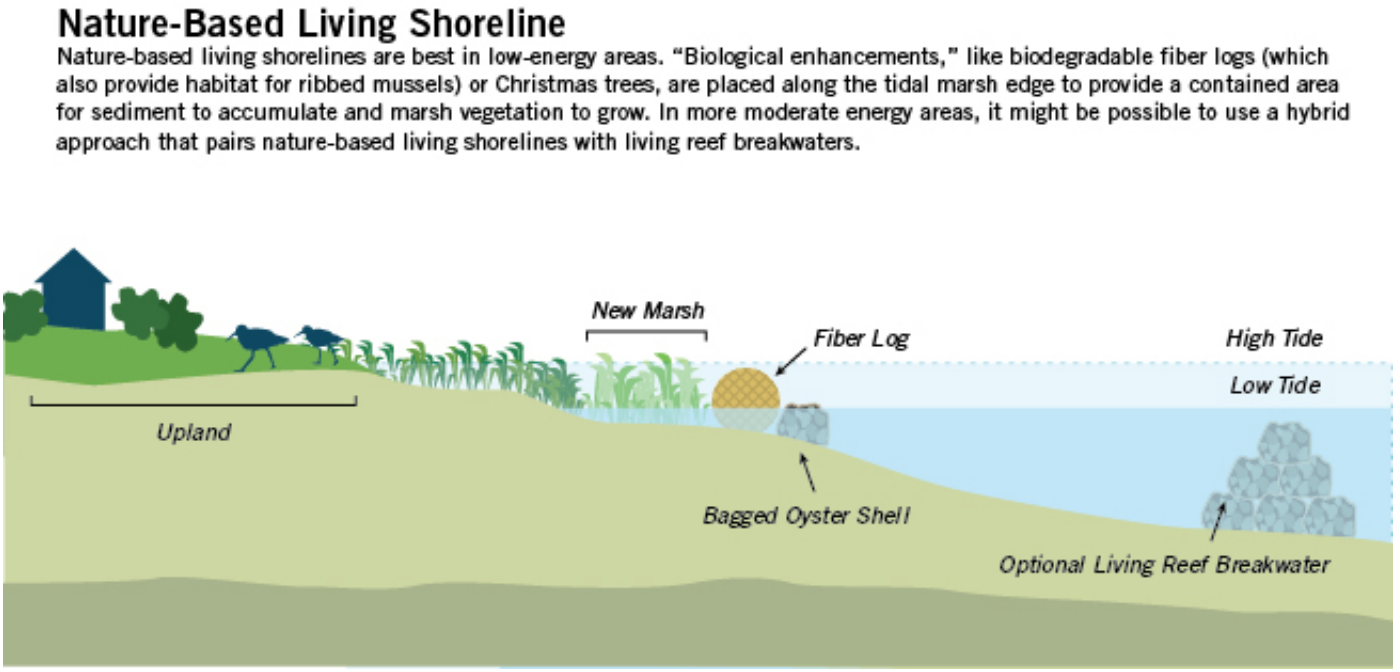
Living Shoreline Snapshot

Pleasantville City, Atlantic County

What is a living shoreline?

A living shoreline is a nature-based alternative to bulkheads to address coastal erosion by providing for the protection, restoration or enhancement of these habitats. As indicated by NJDEP, this is accomplished through the strategic placement of plants, stone, sand, or other structural and organic materials. **Natural living shorelines** include natural vegetation, submerged aquatic vegetation, fill, and biodegradable organic materials (see graphic below). **Hybrid living shorelines** incorporate natural vegetation, submerged aquatic vegetation, fill, biodegradable organic materials, and low-profile rock structures such as segmented sills, stone containment, and living breakwaters seeded with native shellfish. **Structural living shorelines** include, but are not limited to, revetments, break-waters, and groins. Additional information on different types of living shorelines can be found on the NJDEP webpage (PDF). (http://www.nj.gov/dep/cmp/docs/living-shorelines-engineering-guidelines-final.pdf)

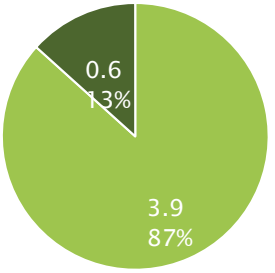
DISCLAIMER: Living shoreline projects have a variety of ecological and engineering requirements and can often be mixed and match to tailor projects designs to local conditions. It is important to consult with ecologists and engineers to determine the specific design requirements for any proposed project. It is also important to consult with federal, state and local officials regarding permitting requirements. Resources are listed below.



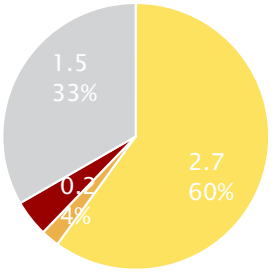
Coastal Shoreline Condition

Identifying how the shoreline is changing and how fast provides important background for a living shoreline project and can help to ensure a living shoreline project's success. Understanding existing shoreline environmental parameters helps to better conceptualize enhancement techniques that can be applied.

Shoreline Length (Miles)
Total: 4.5



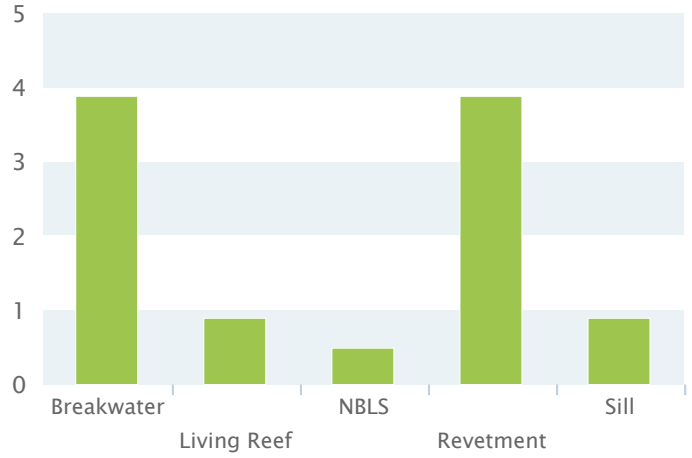
Erosion Rates (Miles)



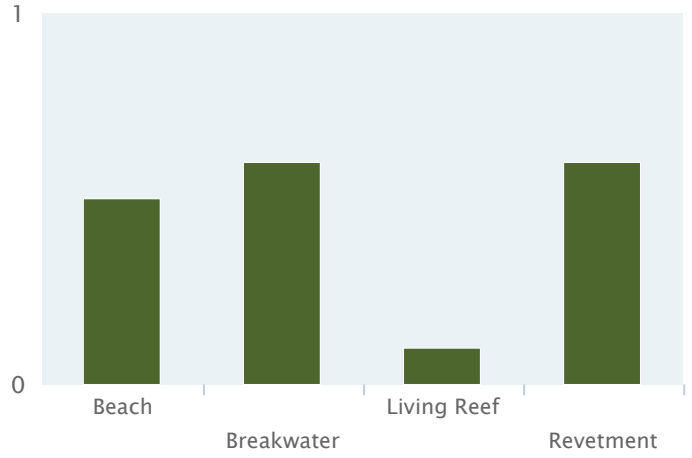
Promoting The Most 'Natural' Solution

Determining which living shoreline techniques are applicable for a given area is based on ecological and engineering requirements. Each technique varies in both design and implementation. The graphs below highlight the applicability of each shoreline enhancement technique per the available miles of coastline. When suitable, the more 'natural' solutions will provide communities with the multiple benefits associated with healthy coastal habitats, including wave attenuation, improved water quality and increased habitat for important fish species. For instance, when applicable, the greatest environmental benefit is achieved through the implementation of a Nature-Based Living Shoreline instead of an Ecologically Enhanced Revetment. Click here (http://coastalresilience.org/) to learn more.

Miles of Marsh Technique (3.9 miles total)



Miles of Upland Technique (0.6 miles total)

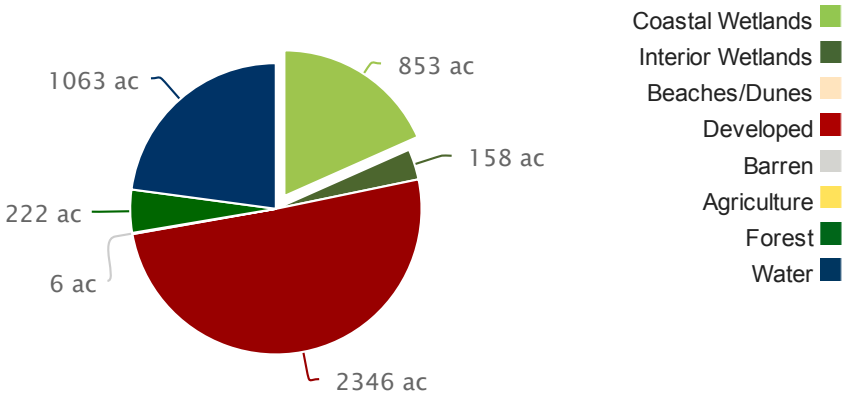


What Habitat Exists?

Coastal habitats provide important storm and flood buffering benefits as well as serve as critical wildlife habitat and public open space

While our tidal marshes have some protection from dredging, filling and development by New Jersey's pioneering Coastal Wetlands Protection law of 1970, some loss still occurs. Between 1986 and 2012, **123** acres of tidal marsh have been lost in **Pleasantville City** due to human development and/or natural processes.

Amount of Land Use/Land Cover (acres) Total: 4648 ac



Implementing Living Shoreline Projects

The Restoration Explorer is an on-line decision support tool designed to help community leaders during the initial steps of planning a living shoreline project. The Restoration Explorer helps users to identify nature-based coastal resilience techniques to stabilize New Jersey's shorelines. Community leaders can utilize the Restoration Explorer and other applications on the Coastal Resilience tool as a platform to discuss the ways in which local concerns can be addressed through the implementation of living shorelines.

However, please be aware that living shoreline techniques suggested by the Restoration Explorer may require Federal, State, and local regulatory approvals and The Nature Conservancy makes no representation that potential projects will gain all required Federal, State or local approvals. Before engaging in design work, please contact New Jersey's Coastal Land Use Office (http://www.nj.gov/dep/lum/lup.htm) and local building officials for more specific information and guidance about the permits or other approvals which may be needed.

Next Steps

Not all restoration techniques are applicable for every community. It is important to recognize that the success of a living shoreline project is contingent upon recognizing relevant ecological and engineering considerations, funding requirements, and municipal planning scenarios.

1. **Contact local conservation groups and engage engineers.** Working closely with conservation organizations is a good way to ensure that all ecological considerations are well addressed. Conservation organizations can help to provide ecological expertise along with advice regarding permitting and construction (Click here (http://delawareestuary.org/living-shorelines) to view the Partnership for the Delaware Estuary's webpage about working with living shorelines). It is also important to consult with engineers to determine specific design requirements for living shoreline techniques recommended by the Restoration Explorer. Click here (PDF document) (http://www.nj.gov/dep/cmp/docs/living-shorelines-engineering-guidelines-final.pdf) to find out more about engineering requirements.
2. **Identify potential funding sources.** State, Federal, or locally sourced funding depends upon the availability of grants and programs centered on coastal restoration and enhancement. Federal opportunities include: NOAA Regional Coastal Resilience Grants Program (http://coast.noaa.gov/resilience-grant/), and Department of the Interior Fish and Wildlife Service - The Coastal Program (http://www.fws.gov/coastal/CoastalGrants/), opportunities from the State of New Jersey include: Shore Protection Grants and Loans – State of N.J. Department of Environmental Protection (http://www.nj.gov/dep/grantandloanprograms/nhr_spgl.htm).
3. **Identify how to incorporate projects into existing municipal plans.** The Restoration Explorer is meant to work with existing municipal plans, and function as a guideline for preparing your own unique project(s). Living shoreline projects can be integrated into existing community plans by noting their ability to enhance natural habitats and strengthen shorelines. Integrating living shorelines into municipal plans offers a governmental means by which projects can be organized and implemented through carefully thought out policies relevant to a localized community.

Addtional Resources

- **The Nature Conservancy (TNC) – New Jersey Chapter** (http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newjersey/) TNC resources can help planners better understand coastal ecological benefits associated with living shoreline projects.
- **American Littoral Society (AmLS)** (http://www.littoralsociety.org/) AmLS provides resources for project planners about habitat restoration and overall environmental health.
- **Barnegat Bay Partnership (BBP)** (http://bbp.ocean.edu/pages/1.asp) BBP can help planners better understand the ways in which community outreach can help projects gain support.
- **Partnership for the Delaware Estuary (PDE)** (http://www.delawareestuary.org/) PDE provides resources for planners centered on project implementation and scientific research.
- **Stevens Institute of Technology (SIT): Guidelines to Living Shorelines (PDF document)** (http://www.nj.gov/dep/cmp/docs/living-shorelines-engineering-guidelines-final.pdf) SIT can help planners to better understand the engineering parameters of living shoreline implementation.
- **Rutgers University Center for Remote Sensing and Spatial Analysis (Rutgers)** (http://crssa.rutgers.edu/) Rutgers CRSSA can be a useful resource to learn about geospatial information sciences and how mapping can be an effective tool for planning a project.
- **NJ Department of Environmental Protection (NJDEP)** (http://www.nj.gov/dep/landuse/activity/livingshore.html) NJDEP can assist planners in better understanding State regulations concerning living shoreline management and permitting.
- **National Oceanic & Atmospheric Administration (NOAA)** (http://www.noaa.gov/) NOAA resources can help planners better understand habitat zones and living shorelines treatments.