Old Saybrook Coastal Resilience Committee

OSCRC Report No. 3

Meeting Summary

May 12, 2022

Old Saybrook, CT

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Introduction

The Old Saybrook Coastal Resilience Committee (OSCRC) was formed in 2021 to assess the needs of the dozen or so local beachfront and riverfront communities as a response to sea level rise. This report is a summary of the OSCRC's third meeting held in the Old Saybrook Town Hall on May 12, 2022.

Each beach community (association, tax district, borough, etc.) sent a representative to the third meeting. The attendee list from the first, second, and third meetings is in Appendix 1. Representatives of town governments were also in attendance. The focus of the third meeting was the investigation of options for each of the problems identified and prioritized by the beach communities in the first and second meetings. Investigate options is the third step in the resilience framework (Figure 1), which was introduced in the first meeting.

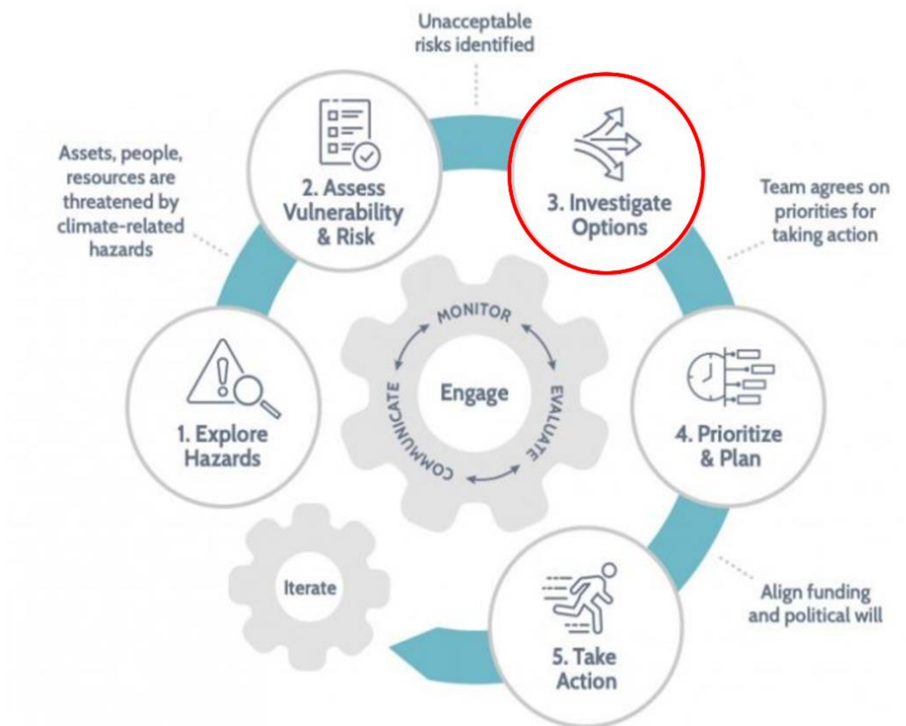


Figure 1. Steps to Resilience. Graphic by Anna Eshelman, NOAA (https://toolkit.climate.gov/image/3354). The Steps to Resilience framework has five steps: 1. Explore Hazards, 2. Assess Vulnerability and Risk, 3. Investigate Options, 4. Prioritize and Plan, and 5. Take Action.

The third meeting agenda called for introductions, a brief presentation outlining possible options to address problems identified by OSCRC beach communities, a brainstorming session during which each attending beach community wrote down their preferred three options for their most important risks, the next step for the OSCRC, and a brief update in the form of list of identified individuals and organizations who could support and/or provide funds for future OSCRC proposals.

The meeting started with introductions. Following introductions, a letter of support requested by Chris Costa for a pending proposal was agreed upon by the attendees. Next on the agenda was brief presentation outlining possible options to address the prioritized problems identified by OSCRC beach communities (Appendix 2). The goal of the presentation was to provide information on the various options for addressing the OSCRC-identified problems and risks.

Brainstorming Session

The brainstorming session addressed step 3, investigate options, in the resilience framework (Figure 1). At the start of the session, index cards were distributed to attendees. Each Attendee was asked to write down his or her preferred options for three of the most important problems impacting their beach. The written responses were then presented by each attendee followed by a roundtable discussion of the results.

Individual responses were tabulated for each beach community in Appendix 3 and summarized in Table 1. Based on the number of responses, most suggested mitigation options were directed at sand deposition and erosion, tidal flooding and encroachment, and protective barriers against storm surge. There was a single response about the need for a public education program in order to engage beach users in doing their part to promote shoreline resiliency.

Two comments need to be made about Table 1. First, there will be additional options from other members of the OSCRC who were not at the third meeting. Second, the options listed in Table 1 need to have more detail and be translated into a plan of action.

Table 1. Summary of Preferred Options Based on Responses from All Beach Communities.

Problem Addressed	Response Number	Preferred Option
Sand erosion Sand deposition	12	Move excessive sand from one local beach to replenish sand (i.e. beach nourishment) for another local beach. Push sand away from shore to promote natural replenishment. Pile sand to side of beach during winter. Install jetties/groins to either deposit or remove sand. Dredge sand at river entrances. Implement living shoreline where applicable. Investigate beach slope for sand retention or loss.
Tidal flooding Tidal encroachment Inadequate drainage Disruption of septic system	10	Raise roads or properties experiencing tidal flooding. Clean drainage ditches, pitch roadways toward marshes. Add embankments along road, properties facing marshes. Add manmade barriers to prevent flooding on roads, properties. Repair tide gate, install larger pipe, regrade area, and remove structures if necessary to prevent septic flooding.
Storm surge Deterioration of sea walls Deterioration of piers and jetties	9	Install coherent seawall/revetment along all properties. Rebuild slopes with appropriate material. Repair and maintain existing retaining walls, sea walls, revetments, piers and jetties.
Education	1	Institute public education to engage beach users to do their part to preserve beaches and natural areas.

Next Steps

The brain storming session discussed some options for the prioritized problems identified by the beach communities. The next step, as outlined in the resilience framework (Figure 1), is to prioritize and plan each option.

There are multiple ways to prioritize mitigation options. One way is to focus on options that address problems that need immediate attention regardless of cost or the number of affected beach communities. Another way is to choose those options that represent an easy, cost-effective fix. A third way is to choose options that address a problem shared by the largest number of beach communities. The OSCRC membership as a whole will decide on the criterion for prioritizing mitigation responses in the next meeting.

For each prioritized option, there must be a plan, including the end goal and metrics to determine its success. The plan must also include objectives and a list of actions to achieve them, a timeline, milestones within the timeline showing progress to the end goal, overall cost, stakeholders, required permits, materials to be purchased, and a flexible work schedule that allows for delays due to weather or community activities in the targeted area(s).

Once the OSCRC commits to a plan, it must secure funding and identify individuals or an organization to oversee the work, report on its progress, and evaluate final results.

Securing Public Funding

As a follow-up to the second meeting, individuals in the OSCRC submitted names of organizations and people that could assist either directly or indirectly in finding potential funding sources for planned projects. Contact information for these names is listed in Appendix 4. The OSCRC membership will next review the list in Appendix 4 and select those individuals and/or organizations that are the best match to support planned work.

An information packet will be prepared that can be delivered to potential funding sources. The packet will include a two-page abstract of OSCRC activities and contact information. In addition, OSCRC membership will explore putting OSCRC reports and other published material on a website.

As a final note on the public funding discussion, all attendees were encouraged to continue to pass along any names and contact information to the report authors below. These names and their contact information will be added to the list in Appendix 4 and shared with the OSCRC membership in the next report.

Ed Rajotte (Fenwood District) – Email: rajottes@comcast.net
Joe Russo (Knollwood Beach Association) – Email: jmr2649@gmail.com
Tom Tokarz (Fenwood District) – Email: tomtokarz0@gmail.com

Appendix 1. Attendee List in Alphabetical Order

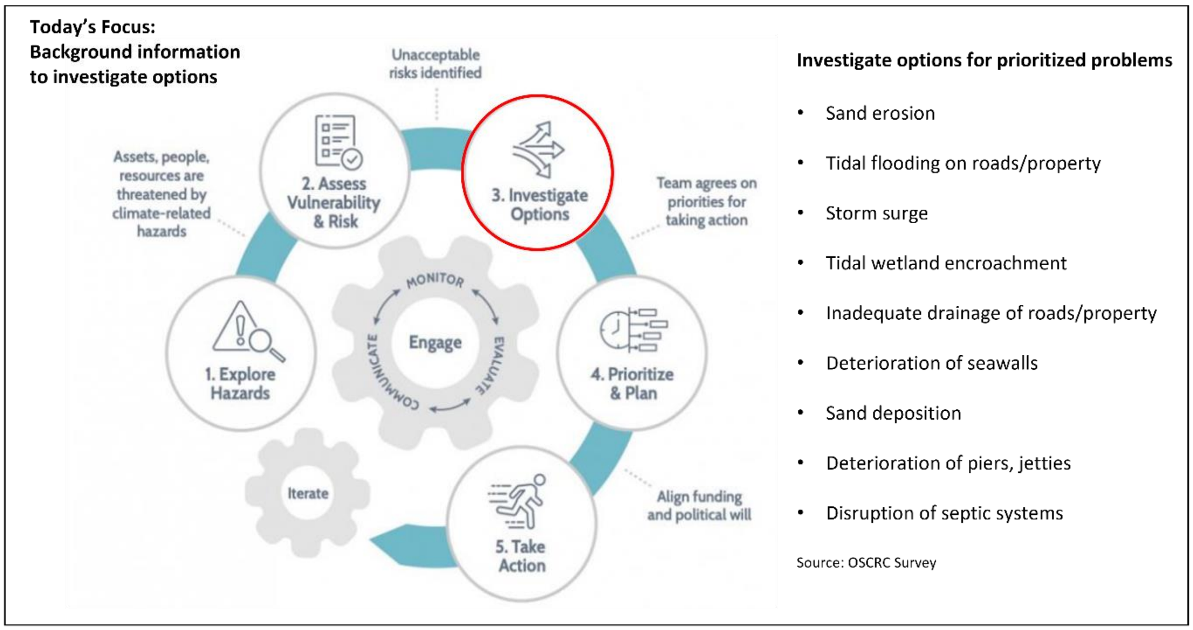
Attendees at the May 12, 2022 meeting are in bold

Name	Association	Email
Gary Albanese	Chalker Beach	gjalbanese@sbcglobal.net
Tom Armstrong	Great Hammock Beach	tarmstrongenv@gmail.com
Joanne Breen	Saybrook Manor Cove	joanne.breen@era.com
Jeffrey Brødersen	Saybrook Manor	Jeffrey.Brodersen@gmail.com
Linda Cannarella	Saybrook Manor Cove	lindacannarella@gmail.com
Marie Cerino	Great Hammock Beach	mariecerino521@gmail.com
Arcangela Claffey	Bel Aire Manor	tnclaffey@gmail.com
Michael Cohen	Chalker Beach	cohenx4@aol.com
Tim Conklin	Cornfield Point	tconklin@magner.com
Christina Costa	Town Planner, CZEO	Chris.costa@oldsaybrookct.gov
Jay Costello	Indian Town	jay.a.costello@comcast.net
Pat DeVito	Knollwood Beach	patdevito@sbcglobal.net
Carl Fortuna	First Selectman	Carl.fortuna@oldsaybrookct.gov
Peter Gillespie	Town of Westbrook	pgillespie@westbrookct.us
John Kennedy	Otter Cove	John.Kennedy@JKennedyTechLaw.com
Marilyn Ozols	Borough of Fenwick	zeo@fenwicknews.com
Lew Perry	Cornfield Point	lperry45@comcast.net
Dave Pettinicchi	Saybrook Manor	neech1214@gmail.com
Robert Pulito	Saybrook Manor Cove	rpulito@slamcoll.com
Edwin Rajotte	Fenwood District	rajottes@comcast.net
Ileen Roth	Indian Town	iroth@travelers.com
Michael Roth	Indian Town	ournextboat@comcast.net
Joseph Russo	Knollwood Beach	jmr2649@gmail.com
Thomas Tokarz	Fenwood District	tomtokarz0@gmail.com
Rose Ziegler	Indian Town	rose.ziegler@sbcglobal.net

Appendix 2. Brief Presentation on **Investigate Options**

A brief presentation on investigate options for the problems identified by the OSCRC beach communities was given by Joe Russo, who is a representative of the Knollwood Beach Association. The goal of the presentation was to provide a common understanding, through descriptions and terminology, of the possible options for mitigating the problems identified in a previous meeting. The presentation, in the form of a PowerPoint slides, has been duplicated in this appendix. Notes are provided to emphasize the main point of each slide.

Slide 1: Resilience Framework Steps



Source: Graph - U.S. Climate Resilience Toolkit. 2022. https://toolkit.climate.gov/steps-to-resilience/steps-resilience-overview

Slide 1 Note: The focus of the third meeting was to deliver background information for Step 3: Investigate Options. The investigation of options was for the nine prioritized problems (listed on the right side of this slide) identified by the OSCRC in a previous meeting.

Slide 2: Sand Erosion Mitigation Options

CONSULT YOUR COMMUNITY
Time: ⌛
Cost: $-
Permit:

Before starting physical solutions, check with your local officials to see if they have mitigation or community plans or suggestions for reducing erosion in your area. Strategic and holistic erosion mitigation projects can protect your home and those of others, too.

HABITAT RESTORATION
Time: ⌛⌛⌛
Cost: $$$
Permit: 🗎🗎🗎

Natural coastal habitats can slow waves, reduce wave height, and reduce erosion. Healthy dunes and wetlands can provide a barrier between the water's edge and your property, creating a first line of defense. The roots of plants help stabilize sand along a beach. Restoring coastal habitats like mangroves and dunes helps build healthy ecosystems which support wildlife populations and provide critical services like filtering and cleaning water. By planting beach-friendly vegetation along your property you can help prevent sand from being carried off by waves.

LIVING SHORELINES
Time: ⌛⌛⌛
Cost: $$
Permit: 🗎🗎

Living shorelines stabilize a shore by combining living components, such as plants, with structural elements, such as seawalls. Living shorelines can slow waves, reduce erosion, and protect coastal property.

BEACH NOURISHMENT
Time: ⌛
Cost: $
Permit: 🗎

Beach nourishment involves replenishing the sand on a beach to widen it. However, it is a temporary solution that will not permanently reduce the risk of erosion.

CONSIDER COASTAL EROSION STRUCTURES
Time: ⌛⌛
Cost: $$$
Permit: 🗎🗎

Seawalls, revetments, bulkheads, groins and breakwaters may reduce erosion in the short-term. They also have very high initial investment costs. However, over time, they can have adverse impacts on the coastline. The cost of maintaining these structures over time is also high and should be accounted for when evaluating potential alternatives.

ANCHOR YOUR HOME
Time: ⌛⌛
Cost: $$
Permit: 🗎

Ensure that your home is sufficiently anchored, especially if it's on sand. Using piles that drive into more secure layers of the ground is highly recommended, especially for homes that are older. A retrofit may be required if a professional architect believes that your structure is at risk.

RELOCATE YOUR HOME
Time: ⌛⌛
Cost: $$
Permit: 🗎

An expensive option, but one that will significantly reduce your home's risk, is to move your home away from the coastline. Before embarking on this option, speak with professional engineers, architects, and your local officials.

Source: https://www.fema.gov/fema_protect-your-property_coastal-erosion.cleaned.pdf. Time, cost, and permit estimates added by OSCRC.

Slide 2 Note: Sand erosion mitigation options along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 3: Tidal Flooding Mitigation Options

1. Aquifer Storage and Recovery (ASR): ASR involves injecting surface water or groundwater when it is available into an aquifer through a well, to be stored for a period of time until it is needed, and then recovered for use (referred to as a cycle) through the same well. Implementation of ASR increases climate resiliency for periods of low rainfall or extended periods of drought by taking advantage of seasonal variations in surface water runoff or groundwater surpluses. ASR does not typically provide flood hazard reduction independently due to the relatively low injection volumes (compared to flood flows); however, it can be used to "free up" storage in regional stormwater management facilities and reservoirs if pumped at a constant maximum rate.

Time: ⌛⌛
Cost: $$
Permit: 🗎🗎🗎

2. Floodwater Diversion and Storage: This project type includes the transfer of floodwater from a stream, river, or other body of water into a wetland, floodplain, canal/ditch, pipe, or other conduit (e.g., tunnels, wells). Storage of these floodwaters provides for a controlled base flow release and reduces downstream peak flows, stages, and velocities. Water can be impounded in surface reservoirs, floodplains, and wetlands along with retention and detention facilities. By actively managing floodwaters by diversion, storage, and infiltration and allowing for a controlled base flow release, the project would mitigate flooding impacts. In addition, floodwater diversion and storage can replenish water supply aquifers and enhance usable water supply to mitigate the effects of drought. Floodwater diversion can also help maintain healthy ecosystems.

Time: ⌛⌛
Cost: $$$
Permit: 🗎🗎🗎

3. Floodplain and Stream Restoration: Natural events and human activities can change the dynamic equilibrium of stream and floodplain systems. Restoration is the re-establishment of the structure and function of floodplains, stream morphology, and ecosystems. Typical projects include improvements to floodplains and floodways, wetlands, streambeds, flow area, natural channel form, and sinuosity. When healthy, these systems can provide stream flood mitigation, mitigate bank erosion concerns, and provide ecological benefits. Additional benefits include habitat for fish and wildlife, improvement of water quality, water supply benefits, and recreation opportunities.

Time: ⌛⌛⌛
Cost: $$$
Permit: 🗎🗎🗎

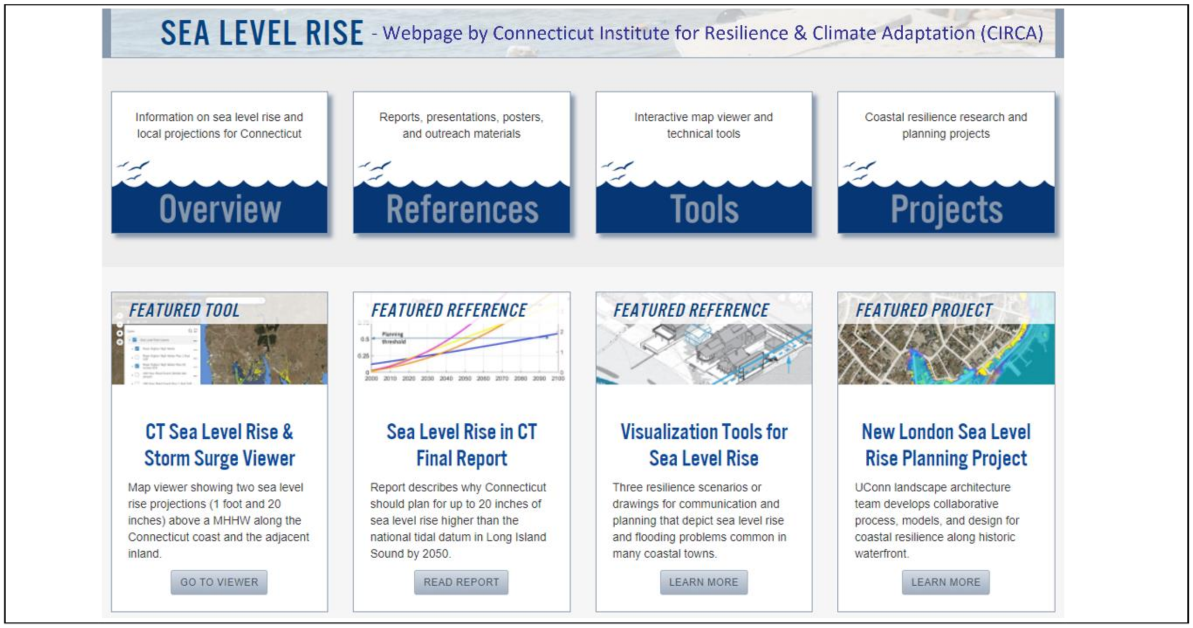
4. Low Impact Development (LID)/Green Infrastructure (GI): LID is a sustainable development and re-development approach to natural landscape preservation and stormwater management. It emphasizes conservation and use of onsite natural features integrated with engineered, hydrologic controls to more closely mimic pre-development hydrologic functions. GI can be used at a wide range of scales in place of, or in addition to, more traditional stormwater control elements to support the principles of LID. These approaches are also termed Best Management Practices (BMPs). Implementation of LID/GI practices can help mitigate flood events by increasing the ability of the landscape to store water on site. Infiltration of these stored waters can also mitigate the effects of drought by replenishing water supply aquifers and enhancing usable water supply.

Time: ⌛⌛
Cost: $$$
Permit: 🗎🗎🗎

Source: FEMA.2017. Innovative Drought and Flood Mitigation Projects. Final Report. CDM Federal Programs Corporation. Contract No.: HSFEHQ-09-D-1128. Time, cost, and permit estimates added by OSCRC.

Slide 3 Note: Tidal flooding mitigation options along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

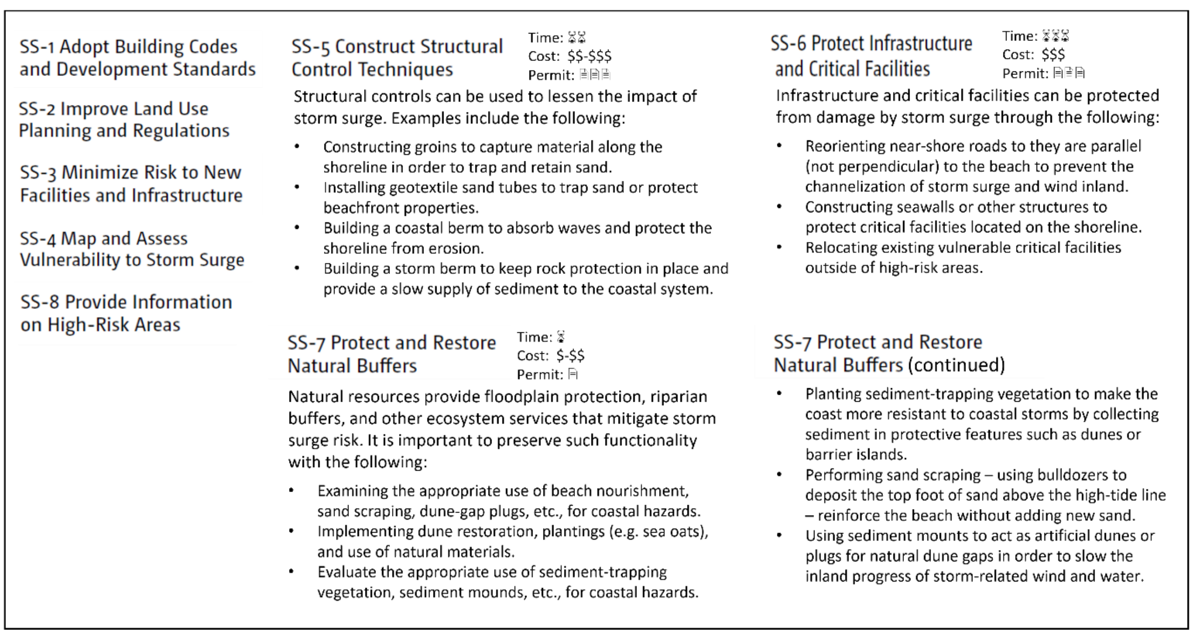
Slide 4: Tidal Flooding UCONN-CIRCA Resources



Source: https://circa.uconn.edu/sea-level-rise/

Slide 4 Note: University of Connecticut (UCONN)-Connecticut Institute for Resilience & Climate Adaptation (CIRCA) online resources for tidal flooding information.

Slide 5: Storm Surge Mitigation Options



Source: FEMA.2017. Innovative Drought and Flood Mitigation Projects. Final Report. CDM Federal Programs Corporation. Contract No.: HSFEHQ-09-D-1128. 163 p. Time, cost, and permit estimates added by OSCRC.

Slide 5 Note: Storm surge mitigation options along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 6: Tidal Wetland Encroachment Mitigation Options

Manmade Barrier
Temporary or permanent metal, stone, concrete or wood barrier to block the movement of tidal wetland on properties.

Raised Embankment
A raised structure made of earth or gravel to hold back tidal wetland encroachment.

Diversion Ditch
A shallow ditch, swale, or other excavation to divert surface water away from a water source.

Runoff Area
An area where surface flows could drain into the storm drainage facility or adjacent area away from protected property.

Dredging
Removal of material either at the edge or just behind an encroaching tidal wetland in order to lower the water level relative to adjacent property.

Structure Elevation
Physically raising an existing structure using piers, columns or piles to make an open foundation for water to pass under.

Structure Relocation
The process of moving a structure, either by transporting as a whole or disassembling and reassembling, from one location to another.

Time: ⌛-⌛⌛
Cost: $-$$
Permit: 🗎-🗎🗎

Rolling Easement Regulation

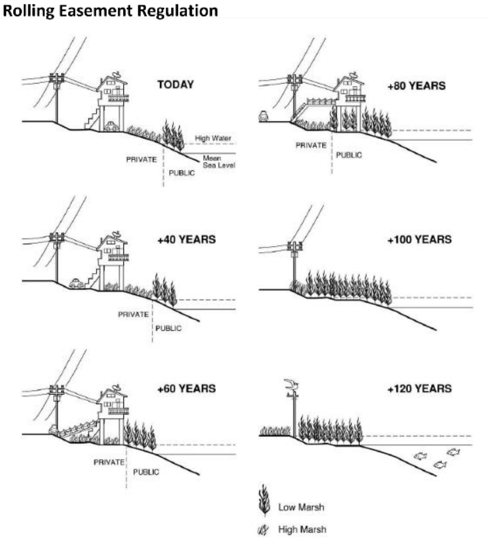


Figure 6. Migration of Wetlands and Boundary between Public and Private Land, with a Property Subject to a Rolling Easement. Source: MARYLAND LAW REVIEW. *See* note 7.

Figure source: Titus, J.G. 2011. Rolling Easements. EPA Report 430R11001.

Source: https://www.bbc.com/news/uk-25929644. Time, cost, and permit estimates added by OSCRC.

Slide 6 Note: Tidal wetland encroachment mitigation options along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most). Image showing how future sea rise may result in the public overtaking private land.

Slide 7: Inadequate Drainage of Roads Mitigation Options for Erosion

Roadway Side Slopes
Steeper slopes pose greater safety risk to motor vehicles traveling across or down them. These steeper slopes are also more difficult to maintain. Side slopes of 1V:4H or flatter are commonly accepted as safe side slopes. These slopes are traversable and recoverable. Drivers of errant vehicles can steer, brake, and recover from a run-off-the-road mistake. Eroded slopes should be graded and seeded. When rip rap is used to control and spread the flow of water, it should have shallow inverts and be placed flush with the existing ground. Additionally, the roadside conditions should be checked to determine why erosion is taking place and the problems resolved.

Roadway Hardware
Soil erosion can have a detrimental effect on safety appurtenances, such as guardrail, sign supports, and highway light supports. The deposit of several inches of eroded soil or the erosion of several inches can significantly reduce crashworthy characteristics.

Culvert and Pipe Ends
Storm flow from the pipe or culvert can cause erosion gullies to develop and erode the sides of a paved channel or the bottom of a graded channel. If these water channels erode, they can create gullies on the side slopes that can trip the wheels of an errant vehicle or bicycle causing instability, loss of control or initiating a vehicle rollover. Pipe and culvert ends should be checked annually or after major storms. Debris that can divert water flow should be removed and eroded areas reestablished with soil/aggregate mixtures and reseeded.

Ditches
A design should ensure ditch traversability, meaning a vehicle or bicycle can pass over the ditch or channel at the travel way speed without abruptly stopping, losing control or being rolled over. Choice of a traversable ditch section depends on the amount of run-off, the grade of the roadway, slope and soil conditions and speed of vehicles on the highway. It is important when repairing eroded earth ditches and shoulders to restore them to their original safety shapes.

Inlets
Inlets are designed to carry surface run-off from the road and roadside away from the roadway. Inlets can be of varying design, including curb openings, grates, or a combination of these. Raised inlets located in areas where an errant vehicle or bicycle can drive into or over them should be no higher than 4 inches above the surrounding ground.

Headwalls
Headwalls are rigid structures used to support the shoulder and maintain the roadway edge, prevent the end of the pipe from being crushed or broken when overridden, collect and disperse water flows and occasionally delineate the ditch or channel. Headwalls, should not extend more than 4 inches above the surrounding ground and should be delineated with a retroreflective object.

Access Points
Access points, such as road intersections, driveways, pedestrian and bicycle crossings are important areas where drainage features should be reviewed and, where appropriate, improvements made. At access points the grade of the highway and the access point have to meet. Consequently, the free flow of run-off is restricted and some drainage feature is usually built to move the water away. Local jurisdictions have established laws requiring access points to be free of hazards and obstacles that could affect the safety of the traveling public.

Time: ⌛-⌛⌛
Cost: $-$$$
Permit: 🗎🗎-🗎🗎🗎

Time, cost, and permit estimates added by OSCRC.

Source: McGee, H.W., D. Nabors, and T. Baughman. 2009. Maintenance of Drainage Features for Safety. Federal Highway Administration. U.S. Department of Transportation. Final Report FHWA-SA-09-024. 33 p.

Slide 7 Note: Mitigation options for erosion resulting from inadequate drainage of roads along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 8: Inadequate Drainage of Properties Mitigation Options for Erosion

Main Principle for Preventing Erosion
The most important principle of preventing erosion is to have the ground as completely covered as possible with growing vegetation, or some substitute cover, such as mulch, burlap, flagstone, or gravel. The type of surface cover must be suited to the ground surface conditions.

Sod
When placed perpendicular to the direction of water flow, sod provides an extremely effective and readily-available source of protection for shallow intermittent drainages.

New Vegetation
Seeding new vegetation, once established, can control soil erosion. However, a soil must be tested for fertility and a cover must be placed over the ground after seeding in order to prevent erosion before there is established vegetation. Decomposable straw, burlap mats, woven jute mats, and paper mats are examples of soil covers after seeding.

Checks
In areas where extensive erosion or gulling has occurred, it may be necessary to install simple timber or rock erosion checks. These measures will serve to trap eroding soils before they can wash downgrade.

Stream Banks - General
Stream bank erosion is a natural process, which can be expected to occur along all streams. Factors which affect the rate of stream bank erosion include: soil types in stream bank, the effectiveness of stream bank vegetation in retaining soils, stream flow velocities, and the frequency of small flood events. It is important to understand that even though stream bank erosion is often a gradual process, major storms can result in rapid loss of large ground areas. Improvements should be placed at least twice as far from a stream bank as the width between the banks whenever possible.

Stream Banks – Rip-Rap
Stone material used to protect stream banks is called rip-rap. Rip-rap protection can be achieved by dumping or placing stone over a prepared surface. A porous filter fabric should be placed between the stone and underlying surface to prevent fine soil particles from washing out from under the stone.

Stream Banks – Gabions
Gabions are compartmentalized rectangular cages made of heavy galvanized steel wire mesh which, when filled with stone, become a flexible and permeable building block. Individual gabions are wired together and filled with stone of an appropriate size to form a continuous stone-filled mat or retaining wall. Water will seep through from behind the wall preventing a buildup of hydrostatic pressure.

Stream Banks – Small Retaining Walls
Small retaining structures, three feet or less, placed at the base of eroding slopes will aid in stabilizing the slope material and help prevent the continuation of erosion. Stream bank retaining walls should be firmly anchored in the stream bottom and the upstream wall should extend into the stable stream bank. Wall material include pre-packaged concrete, rot-resistant timber, and cinder or masonry block. Steel pipes or reinforcing rods serve as anchors for some of the material choices.

Final Note
When natural stream meandering and adjacent floodplain areas are disturbed by removing native vegetation in favor of a lawn or by surface activities, such as worn paths from people walking, erosion problems should be expected to increase dramatically.

Time: ⌛-⌛⌛
Cost: $-$$
Permit: 🗎

Time, cost, and permit estimates added by OSCRC.

Source: Department of Environmental Resources. 1998. Residential Drainage. A Homeowner's Guide to Drainage Problems and Solutions. Prince George County Government, MD. 34 p.

Slide 8 Note: Mitigation options for erosion resulting from inadequate drainage of properties along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 9: Seawall and Revetment Deterioration Mitigation Options

Seawalls and Revetments
Seawalls and revetments are types of coastal engineering structures that run parallel to the shoreline. Also known as "armoring" or "hard structures," coastal engineering structures provide a physical barrier that directly protects inland areas. Seawalls are vertical walls that are typically constructed of concrete or stone, while revetments are sloping structures typically composed of rock (also called "rip rap").

Placement
To minimize interaction with waves and tides and therefore reduce erosion to the fronting beach and adjacent areas, seawalls and revetments should be located as far landward as possible.

Slope
Sloping structures dissipate wave energy (i.e., reduce wave strength) more effectively than vertical structures. Therefore, when seawalls need significant repairs or reconstruction, replacing them with sloping rock revetments that do not extend farther seaward should be considered.

Curved Face
Vertical seawalls reflect water straight down and straight up. The wave energy that is reflected downward erodes the beach, while the wave energy that goes up into the air can overtop the structure and cause erosion behind the wall, potentially damaging the development or infrastructure being protected. If the seawall cannot be replaced with a revetment, a curved face can be added to the top of a vertical concrete seawall to help direct some of the reflected water and waves out and away from the wall.

Beach and Dune Nourishment
Beaches and dunes naturally dissipate energy associated with waves, tides, and currents. Therefore, the best way to reduce the wave energy that hits seawalls and revetments is to maintain the beach in front of these structures. In areas where there is a wide enough beach, dunes can provide additional protection.

Surface Pressure and Chinking
Rough surfaces dissipate more wave energy than smooth surfaces. Therefore, when individual rocks in revetments are replaced or repositioned, or when the structure is reconstructed, the seaward face should be rough instead of flat and smooth.

Structure Height
The higher the seawall or revetment, the more surface area there is to reflect wave energy. Therefore, projects that raise the height of an existing seawall or revetment must be considered carefully in light of the additional erosion that may be caused by wave energy reflected downward.

Transition to Adjacent Property
During repair and reconstruction, it may be necessary to consider changes to reduce "end effects"—the increased erosion and storm damage to adjacent properties caused by the seawall or revetment. Unless the structure connects to an existing structure on an adjacent property, it should be shortened so that it ends approximately 15 to 20 feet from the property line (where feasible and where adequately protective of the building on the site). The ends of the structure should also be tapered so that both its elevation and slope are gradually reduced to further minimize end effects.

Overland Runoff and Other Sources
To help ensure the success and longevity of a repaired or reconstructed structure, all sources of erosion on the site—including upland runoff and waves—should be identified and addressed as part of the site evaluation and design process.

Time: ⌛⌛
Cost: $$-$$$
Permit: 🗎-🗎🗎

Time, cost, and permit estimates added by OSCRC.

Source: Stormsmart Coast Programs. 2018. StormSmart Properties Fact Sheet 7: Repair and Reconstruction of Seawalls and Revetments . Commonwealth of Massachusetts. 12 p.

Slide 9 Note: Seawall and revetment deterioration mitigation options along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 10: Sand Deposition Mitigation Options

Groins
Sand deposition by groins is only effective when there is a net alongshore transport of sand in one direction. The evolution of the shoreline in response to the construction of a groin is dependent on the predominant wave direction. Once constructed, the predominant waves begin to deposit sand along the updrift side of the groin. As the shoreline continues to evolve, the fillet reaches its capacity and sand begins to pass around and over the groin to the downdrift beach.

Jetties
Jetties are designed to interrupt the alongshore transport of sand and stabilize the random transgressions of a coastal inlet. This interruption in sediment transport generates a sand deficit along the shoreline downdrift of the inlet. In order to mitigate negative impacts, inlet stabilized structures are implemented, including the use of weir sections – lowered portions of the structure that allow sand to cross the jetty and deposit in a deposition area – and bypassing of sand across the inlet by pumping, trucking or dredging.

Emerged Breakwaters
Emerged Breakwaters are constructed to provide maximum shelter from approaching waves. They reduce the incident wave energy through reflection or wave breaking along the seaward side of the structure, creating a low energy environment on the lee side. Along open coasts, emerged breakwaters are used to stabilize eroding shores as the reduction in wave energy reduces the transport of sand in the lee of the structure, creating areas of localized deposition. The amount of sediment deposited is a function of the length and height of the breakwater.

Dewatering Systems
Dewatering refers to the drawdown of the water table under the beach foreshore by a system of perforated pipes and pumps. By lowering the natural water table, the porosity of the beach is increased allowing water that would normally run up and down the foreshore slope to percolate down through the sand. Any sediment being carried by the water is deposited on the beach creating a zone of sand deposition.

Hardened Dunes
Dune hardening refers to the process of constructing a solid core in the center of a man-made dune system to act as a shore-parallel barrier to wave attack during severe storms. The core is designed to promote the development of a natural dune on top of, and around the structure and can include appropriate drainage and soil conditions for the establishment of dune grasses and other plants. Some pre-cast concrete units include hollow interiors to promote sand deposition and plant establishment.

Viscous Drag Mats
Viscous drag mats, sometimes referred to as artificial seaweed, are comprised of buoyant, high-strength plastic fronds woven into a weighted or anchored mat that is placed on the seabed. The fronds create a high-density, vertical lattice that interrupts fluid flow and decreases the velocity of near bottom currents. By interrupting currents, the mat promotes the deposition of sand thereby reducing erosion.

Sand Bypassing
Where a natural coastal feature or structure completely blocks the transport of sand, several techniques can be used to transfer (bypass) the sediment around the obstruction. Natural sand bypassing can be used to divert sand from the updrift shoreline out onto a natural bar or ebb shoal feature that extends around coastal headlands or inlets. This allows natural transport mechanisms to continue the motion of the sand down the coast. Forced sand bypassing employs mechanical methods such as mining and hauling to move sand around a barrier or pump sand across it. The volume, rate and frequency of sand bypassing are determined by the natural net sediment transport rate along the coast.

Sand Mining
Sand mining is the extraction of sand from a beach.
Time: ⧗-⧗⧗⧗
Cost: $-$$$
Permit: 🗎-🗎🗎🗎

Source: Herrington, T.O. 2003. Manual for Coastal Hazard Mitigation. New Jersey Sea Grant College Program. 108 p. Time, cost, and permit estimates added by OSCRC.

Slide 10 Note: Sand deposition mitigation options along with OSCRC estimates of time (⧗ is least, ⧗⧗⧗ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 11: Pier and Jetty Deterioration Mitigation Options

Piers and Jetties
Mitigation options for piers and jetties depend on their design and the materials used in their construction. Periodic inspections are necessary to discover minor problems that could grow over time. Additional inspections may be necessary after severe coastal storms with high waves and wind.

Concrete Structure Repair
The following methods and materials are available for specific types of concrete structures.
- Beam corner
- Beam full soffit
- Pile grouted sleeve
- Pile epoxy injection
- Sacrificial anode protection
- Concrete pile galvanic protection

Concrete Structure Repair Requirements
- Use of heavy marine equipment
- Skilled and experienced labor
- Debris containment
- Strict security and safety measures
- High repair quantities depending on condition of structure
- Standby time due to weather

Source: Waisman, B. 2018. Concrete Damage Repairs of Existing Marine Terminals. Prevention First. Long Beach, California. 27 p.

Time: ⧗⧗-⧗⧗⧗
Cost: $$-$$$
Permit: 🗎🗎-🗎🗎🗎

Steel Structure Repair
Each repair decision must carefully weigh the long-term operational requirements and existing environmental factors (tides and currents) that can help accelerate corrosion before evaluating initial and life cycle costs. In many cases, combining cathodic protection and protective coating in the repair decision may be the most cost effective in the long term. Damaged steel hardware such as cleats and bollards in general should be replaced in kind. An experienced engineer should determine the cause of failure and that the replacement item conforms to current engineered specifications.

Steel Structure Repair Requirements
Repairing the pier decking and curbs, pile caps, fender system, and deck hardware involves having skills and equipment common to in-house shop forces. Underwater repairs require special equipment and skill levels, includeing general diving capability plus knowledge of:
- Removing marine growth
- Retting or air lifting procedures
- Underwater cutting, welding and drilling techniques
- Underwater lifting procedures
- Application techniques for underwater protection coatings
- Wrapping materials used in underwater construction

Source: Marine Construction Magazine. 2021. Repair of Steel Structures. https://marineconstructionmagazine.com/news/repair-of-steel-structures/

Time: ⧗⧗-⧗⧗⧗
Cost: $$-$$$
Permit: 🗎🗎-🗎🗎🗎

Time, cost, and permit estimates added by OSCRC.

Slide 11 Note: Pier and Jetty Deterioration mitigation options along with OSCRC estimates of time (⧗ is least, ⧗⧗⧗ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 12: Pier and Jetty Deterioration Mitigation Options (Continued)

Piers and Jetties
Mitigation options for piers and jetties depend on their design and the materials used in their construction. Periodic inspections are necessary to discover minor problems that could grow over time. Additional inspections may be necessary after severe coastal storms with high waves and wind.

Wooden Structure Repair
Wood structures can deteriorate from a number of physical, chemical, and biological causes. It is therefore necessary to do a thorough inspection to identify the type of repair. The following are methods for detecting decay.
Scraping devices

- Pick test
- Pilodyn test
- Sonic inspection and testing
- Increment borer
- Brace and bit
- Shell-thickness indicator
- Power auger
- Shigometer
- Moisture meter
- Culturing
- X-rays
- Intertidal inspection
- Sacrificial test blocks

Source: Morrel, J.J., G.G. Helsing, and R.D. Graham. 1989. Marine Wood Maintenance Manual: A guide for use of douglas-fir in marine exposures. Forest Research Lab. Oregon State University, Corvallis. Research Bulletin 48. 62 p.

Wooden Structure Repair Options
Repairs should be done as part of frequent maintenance to restore structure to its original capacity and condition. The following are methods for preventing and repairing decay.
Wood should have a preservative treatment for long life prior to construction.
Moisture control to reduce decay in waterfront timbers.
In-place surface preservative treatment.
Treat around curbs, chocks, and wales.
Preservative treatment for internal structure of piles.
Fungicide treatment with an intact cap for pile tops.
Reinforcement with new wood next to an old member.
Replacement of new wood for an old member.

Source: Highley, T. L. and T. Schaeffer. 1989. Controlling decay in waterfront structures: evaluation, prevention, and remedial treatments. Res. Pap. FPL-RP-494. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 26 p.

Time: ⌛
Cost: $-$$
Permit: 🗎

Time, cost, and permit estimates added by OSCRC.

Slide 12 Note: Pier and Jetty Deterioration mitigation options (continued from previous slide) along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Slide 13: Septic Systems Mitigation Options

Inspect and Pump Frequently
The average household septic system should be inspected at least every three years by a septic service professional. Household septic tanks are typically pumped every three to five years. Alternative systems with electrical float switches, pumps, or mechanical components should be inspected more often, generally once a year.

Use Water Efficiently
All of the water a household sends down its pipes winds up in its septic system. The more water a household conserves (e.g. high-efficiency toilets and showerheads, faucet aerators, and energy-efficient washing machines), the less water enters the septic system. Efficient water use improves the operation of a septic system and reduces the risk of failure.

Properly Dispose of Waste
Whether you flush it down the toilet, grind it in the garbage disposal, or pour it down the sink, shower, or bath, everything that goes down your drains ends up in your septic system. What goes down the drain affects how well your septic system works.

Avoid Chemicals
Your septic system contains a collection of living organisms that digest and treat household waste. Pouring toxins down your drain can kill these organisms and harm your septic system.

Maintain Drain field
A drain field is an important component of your septic system that removes contaminants from the liquid that emerges from your septic tank. Never park on a drain field. Plant trees the appropriate distance from your drain field to keep roots from growing into your septic system. Keep roof drains, sump pumps, and other rainwater drainage systems away from your drain field area. Excess water slows down or stops the wastewater treatment process.

After a Septic System is Flooded
Once floodwaters have receded, there are several things homeowners should remember:

- Do not drink well water until it is tested. Contact your local health department.
- Do not use the sewage system until water in the soil absorption field is lower than the water level around the house.
- Have your septic tank professionally inspected and serviced if you suspect damage. Signs of damage include settling or an inability to accept water. Only trained specialists should clean or repair septic tanks because tanks may contain dangerous gases.
- If sewage has backed up into the basement, clean the area and disinfect the floor. Use a chlorine solution of a half cup of chlorine bleach to each gallon of water to disinfect the area thoroughly.
- Pump the septic system as soon as possible after the flood. Be sure to pump both the tank and lift station. This will remove silt and debris that may have washed into the system. Do not pump the tank during flooded or saturated drain field conditions. Under worst conditions, pumping it out could cause the tank to try to float out of the ground and may damage the inlet and outlet pipes.
- Do not compact the soil over the soil absorption field by driving or operating equipment in the area. Saturated soil is especially susceptible to compaction, which can reduce the soil absorption field's ability to treat wastewater and lead to system failure.
- Examine all electrical connections for damage before restoring electricity.
- Be sure the septic tank's manhole cover is secure and that inspection ports have not been blocked or damaged.
- Check the vegetation over your septic tank and soil absorption field. Repair erosion damage and sod or reseed areas as necessary to provide turf grass cover.

Time: ⌛
Cost: $-$$
Permit: 🗎

Sources: https://www.epa.gov/septic/how-care-your-septic-system. https://www.epa.gov/ground-water-and-drinking-water/septic-systems-what-do-after-flood. Time, cost, and permit estimates added by OSCRC.

Slide 13 Note: Septic systems mitigation options along with OSCRC estimates of time (⌛ is least, ⌛⌛⌛ is most), cost ($ is least, $$$ is most), and permits (🗎 is least, 🗎🗎🗎 is most).

Appendix 3. Each Beach Community Preferred Mitigation Options

On distributed index cards, each attendee was asked to write down his or her preferred options for three of the most important problems impacting their beach. The following table are the individual responses for each beach community. Where more than one individual represented a beach community, there are two sets of responses in Appendix Table 3.1.

Appendix Table 3.1. Preferred options for three of the most important problems by individual.

Beach Community	**Preferred Mitigation Options for Three Most Important Problems**
Bel Aire Manor No attendee	
Borough of Fenwick No attendee	
Chalker Beach 1 attendee	Option 1: To prevent septic flooding repair tide gate, install larger pipe and regrade area, or remove entire structure. Option 2: To prevent road flooding, clean drainage ditches, pitch roadways toward marshes, raise roadways that have sunken. This is an old problem that has never been addressed. Option 3: Install living shoreline, perform beach nourishment and annually perform maintenance work to prevent erosion.
Cornfield Point 1 attendee	Option 1: Mitigate tidal flooding of roads and wetland encroachment. Option 2: Reverse shrinking of beach area possibly by beach nourishment. Option 3: Mitigate beach sand disappearing during winter to eliminate bringing in new sand every spring. Include reversing buildup of sand just off shore to prevent 'mud flat' growth.
Fenwood District 1 attendee	Option 1: Continue revetment reconstruction beginning where Knollwood Beach reconstruction ended through Fenwood Beach parcel B. Option 2: Mitigate sand erosion by reorienting rock jetty and piling sand in protect area over the winter. Option 3: Rebuild slope from eastern end of parcel B to beach level. Option 4: Mitigate marsh encroachment using living shoreline techniques Option 5: Relocate rocks from swimming area to parcel B to prevent injuries to swimmers.
Great Hammock Beach 1 attendee	Option 1: Install coherent seawall/revetment along all properties to mitigate storm surge. Option 2: To mitigate road flooding, raise and slope affected roads, or apply other methods.
Indian Town 1 attendee	Option 1: Repair/replace retaining wall behind clubhouse on east side of creek. Consider concrete instead of metal. Option 2: Raise height of Nehantic Trail after bridge through beach road. Same for Mohegan Drive. Option 3: Create alternative to marina dredging, which is required every 4 to 5 years. May involve repositioning jetty. Present jetty redirects sand from eastern beach and creek into marina.

Knollwood Beach 2 attendees	Option 1: Mitigate sand erosion by adding sand after surging water events. Option 2: Inspect deteriorating piers and jetties and make strategic, long-lasting repairs. Option 3: To mitigate tidal wetland encroachment/tidal flooding, install raised embankment with vegetation barrier. Option 1: Remove rocks in pier area and replenish sand then move available sand higher on beach. Option 2: Bring sand from neighboring beaches that have an overabundance (short term solution). Option 3: Provide regular maintenance to prevent pier deterioration. Replace or shore up badly deteriorated sections.
Otter Cove No attendee	Option 1: Mitigate situation where private beaches and yards are flooding along CT River. Option 2: Mitigate tidal marsh flooding.
Saybrook Manor 1 attendee	Option 1: Mitigate seawall deterioration. Hartford Ave Beach seawall needs to be 'shored up.' Wall separates at seam parallel to shoreline. Consider sloping seawall face or other measures. Middletown beach seawall is sloped and fares better although erosion on part of wall perpendicular to beach. Option 2: Mitigate sand erosion. Option 3: Both beaches need jetty repairs and component replacement, improving weather resistance. Part of regular maintenance.
Saybrook Manor Cove 1 attendee	Option 1: Replace eroded sand especially at south end of beach. Option 2: Fix situation where high tides and rainstorms block access across that road. Option 3: Sand deposition in channel needs dredging. Channel provides boat access to Oyster River. Option 4: Assess condition of seawall to determine if repairs are needed.
Town of Old Saybrook 1 attendee	Option 1: To prevent loss of public use beach employ methods to retain sand and stop further loss of land including dune creation, living shoreline installation and maintain/enhance structures to accommodate sea level rise.
All beaches	Option 1: Create and institute public education program to engage all beach users in doing their part to preserve beaches and natural areas.

Appendix 4. Names of Organizations and People Who Could Assist in Finding Funding Sources

The following is a list of organizations and people that could assist either directly or indirectly in finding potential funding sources for planned projects.

1. U.S. House Representative – 2nd Congressional District of Connecticut
   Contact: Joe Courtney
   Phone: 860-886-0139
   Email: via website https://courtney.house.gov/contact
   Address: Joe Courtney, Congressman
   55 Main Street
   Suite 250
   Norwich, CT 06360

2. U.S. Senator – State of Connecticut
   Contact: Richard Blumenthal
   Phone: 860-258-6940
   Email: via website https://www.blumenthal.senate.gov/contact
   Address: Richard Blumenthal, Senator
   90 State House Square
   10th Floor
   Hartford, CT 06103

3. U.S. Senator – State of Connecticut
   Contact: Chris Murphy
   Phone: 860-549-8463
   Email: via website https://www.murphy.senate.gov/contact
   Address: Chris Murphy, Senator
   120 Huyshope Avenue
   Colt Gateway
   Suite 401
   Hartford, CT 06106

4. Connecticut State House Representative – 23rd House District of Connecticut
   Contact: Devon Carney
   Phone: 860-240-8700
   Email: devin.carney@housegop.ct.gov
   Address: Devon Carney, Representative
   Legislative Office Building
   300 Capital Avenue
   Room 4200
   Harford, CT 06106

5. Connecticut State Senator – 33rd Senate District of Connecticut
   Contact: Norm Needleman
   Phone: 860-240-0428
   Email: norm.needleman@cga.ct.gov
   Address: Norm Needleman, Senator
   Legislative Office Building
   300 Capital Avenue
   Room 3900
   Harford, CT 06106

6. Connecticut Governor – State of Connecticut
   Contact: Ned Lamont
   Phone: 860-566-4840
   Email: via website https://portal.ct.gov/Office-of-the-Governor/Contact/Email-Governor-Lamont
   Address: Office of Governor Ned Lamont
   State Capitol
   210 Capitol Avenue
   Hartford, CT 06106

7. Connecticut State Senator – 13th Senate District of Connecticut
   Contact: Mary Dougherty Abrams
   Phone: 860-240-0584
   Email: via website http://www.senatedems.ct.gov/abrams-contact
   Address: Mary Dougherty Abrams, Senator
   Legislative Office Building
   300 Capital Avenue
   Room 3000
   Harford, CT 06106

8. Connecticut General Assembly (https://www.cga.ct.gov)
   Contact: Office of Legislative Research (No name just call-in number)
   Phone: 860-240-8400 (main office)
   Email: olr@cga.ct.gov
   Address: Office of Legislative Research
   Legislative Office Building
   Suite 5300
   Hartford, CT 06106

9. Connecticut General Assembly (https://www.cga.ct.gov)
   Contact: Environment Committee (No name just call-in number)
   Phone: (860) 240-0440 (main office)
   Email: via website https://www.cga.ct.gov/aspx/CGACommSubscriptions

Address: Environment Committee
Legislative Office Building
Suite 3200
Hartford, CT 06106

10. Connecticut Department of Transportation (https://portal.ct.gov/DOT)
Contact: Kim Lesay, Bureau Chief
Phone: 860-594-2001
Email: kimberly.lesay@ct.gov
Address: CT DOT
2800 Berlin Turnpike
P.O. Box 317546
Newington, CT 06131-7546

11. Connecticut Department of Energy and Environmental Protection (DEEP) (https://portal.ct.gov/DEEP)
Contact: No name just call-in number
Phone: 860-424-3000 (general information)
Email: deep.webmaster@ct.gov
Address: Connecticut Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

12. Connecticut Council on Environmental Quality (CEQ) (https://portal.ct.gov/ceq)
Contact: Peter B. Hearn, Executive Director
Phone: 860-424-4000 (main office)
Email: peter.hearn@ct.gov
Address: Connecticut Council on Environmental Quality
79 Elm Street
Hartford, CT 06106

13. University of Connecticut (UCONN) Connecticut Institute for Resilience & Climate Adaptation (CIRCA) (https://circa.uconn.edu)
Contact: David Murphy, Director of Resilience Engineering
Phone: 860-405-9214 (main office)
Email: david.2.murphy@uconn.edu
Address: UConn Avery Point Campus
CIRCA
1080 Shennecosett Road
Groton, CT 06340

14. University of Connecticut (UCONN) Center for Land Use Education and Research (CLEAR) (https://clear.uconn.edu)
Contact: Juliana Barret, Land & Climate Team (Coastal Resource Management)

Phone: 860-405-9106
Email: Juliana.barret@uconn.edu
Address: Middlesex Cooperative Extension Center
1066 Saybrook Road
Box 70
Haddam, CT 06438

15. Lower Connecticut River Valley Council of Governments (RiverCOG) (https://www.rivercog.org)
Contact: Margot Burns, Senior Environmental Planner
Phone: 860-581-8554 ext. 702
Email: mburns@rivercog.org
Address: RiverCOG
145 Dennison Road
Essex, CT 06426

16. Yale School of the Environment (https://environment.yale.edu)
Contact: Gai Doran, Director of Research
Phone: 203-432-6523
Email: gai.doran@yale.edu
Address: Yale School of the Environment
Room 201
300 Prospect Street
New Haven, CT 06511

17. Coastal Ocean Analytics (https://coastaloa.com)
Contact: Jennifer O'Donnell, Principal Coastal Engineer/CEO
Phone: 860-961-2467
Email: jodonnell@coastaloa.com
Address: Coastal Ocean Analytics LLC
16 Brook Street
Noank, CT 06340

18. Connecticut Water Company (https://www.ctwater.com)
Contact: No name just call-in number
Phone: 800-286-5700
Email: via website https://www.ctwater.com/contact-us
Address: Connecticut Water Service, Inc.
93 West Main Street
Clinton, CT 06413

19. Save the Sound (https://www.savethesound.org)
Contact: Leah Lopez Schmalz, Vice President of Programs
Phone: 203-787-0646 x121

Email: lschmalz@savethesound.org
Address: Save the Sound
900 Chapel Street
Suite 2202
New Haven, CT 06510

20. Rivers Alliance of Connecticut (https://www.riversalliance.org/main.php)
Contact: No name just call-in number
Phone: 860-361-9349
Email: rivers@riversalliance.org
Address: Rivers Alliance
7 West Street
3rd Floor
Litchfield, CT 06759

21. CTrail Shore Line East (https://shorelineeast.com/ p)
Contact: No name just call-in number
Phone: 877-287-4337
Email: info@ctrail.com
Address: CTrail Shore Line East
500 Enterprise Drive
Suite 3B
Rocky Hill, CT 06067

22. The Mashantucket (Western) Pequot Tribal Nation (https://www.mptn-nsn.gov)
Contact: Mashantucket Pequot Tribal Nation
Phone: 860-396-6572 (Tribal Public Affairs)
Email: via website https://www.mptn-nsn.gov/contactus.aspx
Address: Mashantucket Pequot Tribal Nation
Tribal Public Affairs
P.O. Box 3060
Mashantucket, CT 06338

23. The Long Island Sound Conservation Society (https://thelongislandsoundconservationsociety.com)
Contact: No name just call-in number
Phone: 631-470-0572
Email: via website https://longislandsoundconservationsociety.com/partner-with-us/
Address: The Long Island Sound Conservation Society
22 Lynch Street
Huntington Station, NY 11746

24. Long Island Sound Study (https://longislandsoundstudy.net)
Contact: Casey Abel, EPA R1 Program Coordinator

Phone: 203-977-1541 (main office)
Email: abel.casey@epa.gov
Address: EPA Long Island Sound Office
Stamford Government Center
888 Washington Blvd.
Stamford, CT 06904-2152

25. U.S. Army Corps of Engineers – New England District (https://www.nae.usace.army.mil/)
Contact: No name just call-in number
Phone: (203) 758-1723 (Naugatuck River Basin Office)
Email: via website https://www.nae.usace.army.mil/Contact/
Address: U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

26. National Oceanic and Atmospheric Administration (NOAA) National Sea Grant Office (NSGO) (https://seagrant.noaa.gov)
Contact: Jonathan Pennock, Director
Phone: 301-734-1066 (main office)
Email: sgweb@noaa.gov (main office)
Address: NOAA National Sea Grant Office
1315 East-West Highway
Room 11735
Silver Spring, Maryland 20910

27. National Oceanic and Atmospheric Administration (NOAA) Office of Coastal Management (https://coast.noaa.gov)
Contact: No name just call-in number
Phone: 843-740-1200 (main office)
Email: via website https://coast.noaa.gov/contactform
Address: NOAA Office of Coastal Management
2234 South Hobson Avenue
Charleston, South Carolina 29405-2413

28. Connecticut Realtors (https://www.ctrealtors.com)
Contact: Cindy Butts, Chief Executive Officer
Phone: 860-566-8683
Email: cindy@ctrealtors.com
Address: Connecticut Realtors
111 Founders Plaza
Suite 1101
East Hartford, CT 06108

29. National Association of Realtors Grants (https://www.nar.realtor/about-nar/grants-and-funding)
    Contact: No name just call-in number
    Phone: 800-874-6500
    Email: via website https://www.nar.realtor/contact-us
    Address: National Association of Realtors
    430 North Michigan Avenue
    Chicago, IL 60611

30. Long Island Sound Resource Center (LISRC) (https://data.ct.gov/browse?tags=long+island+sound+resource+center)

31. Links to Long Island Sound Related Websites (https://woodshole.er.usgs.gov/openfile/of02-002/htmldocs/links.htm)