

## 5. How will erosion and sea-level rise impact the property and surrounding area?

**EROSION** is the process by which wave action, wind, and storm surges remove sediment from beaches, dunes, bluffs, and headlands. Once removed from the shore, the sediment can be carried away into the coastal lagoons, deposited on the back of coastal barriers, or swept offshore; often, the sediment won't return to the shoreline.



**Extensive erosion in Matunuck, R.I. Tropical Storm Sandy caused severe erosion along the southern Rhode Island coast in 2012.**

Although shorelines go through natural periods of change, there has been a net loss of sediment over the past few decades in Rhode Island and many municipalities have faced, or are currently facing erosion issues on both public and private beaches. Notably, the most eroded portions of state's coastline have lost over 250 feet of beach in just 50 years.

**SEA-LEVEL RISE:** Since 1930, sea-level rise in Rhode Island has increased an average of 1 inch per decade. However, the rate of sea-level rise has quickened and sea level along Rhode Island's coast has risen 6 inches over the last 40 years. Accelerated sea-level rise is projected to continue into the next century.

### What can we expect in the future?

Coastal erosion is primarily influenced by storm events along the shore. In the future, both sea levels and storm intensity are expected to increase as a result of climate change. Therefore, coastal erosion will likely increase, especially along areas of the Rhode Island coastline most exposed to wave action.

The CRMC projects that Rhode Island sea levels will rise between 3 and 5 feet by 2100 (Section 145 of the CRMC Regulations, [www.crmc.ri.gov/regulations/RICRMP.pdf](http://www.crmc.ri.gov/regulations/RICRMP.pdf)). Accelerated sea-level rise creates concern for coastal towns and cities with vulnerable infrastructure such as roads, utility lines, water supplies, sewage treatment facilities, and public property along the shore. In addition, private coastal property will be subjected to increased flooding or permanent inundation.

CRMC recommends that coastal municipalities recognize and plan for sea-level rise, as does the state. By 2016, under the 2012 Comprehensive Planning Act, Rhode Island municipalities will have to address natural hazards, including sea-level rise, where applicable, within their municipal comprehension plans.

**Why it matters:** Shoreline change not only impacts beaches and nearby structures, but also affects vital coastal infrastructure, like the roads leading to shoreline properties. For shorefront real estate, it is important to consider how erosion and sea-level rise currently influence the shoreline, and how long-term changes may affect the specific property in the future, and over the course of the design-life of a coastal structure. When assessing the impacts of erosion and sea-level rise on a property, be sure to look at how sewer lines, water lines, and access to a property may be compromised over the long-term.

**Find out more:** The CRMC has created a series of [shoreline change maps](#)<sup>31</sup> that depict past coastal erosion. These maps can help you gauge how much erosion a property may experience in the future. To get an idea of how sea-level rise will impact the state, your community, and your property, use the [Rhode Island Inundation Surfaces interactive map](#)<sup>32</sup>.

### Is the property in an area that has experienced significant erosion?

You can use the CRMC [Shoreline Change Maps](#) to find out. The maps demonstrate past erosion along Rhode Island's shoreline, and provide rates of erosional change along the coast. For information about how erosion rates influence coastal setbacks, see Question 1: *What kinds of coastal features are on or near the property, and what kinds of setbacks or regulations apply?*

**Please note: Coastal erosion does not occur slowly and steadily over time at a constant rate, but is instead the result of abrupt changes due to storms. For that reason, the rates provided on the CRMC Shoreline Change Maps should be used with caution.**

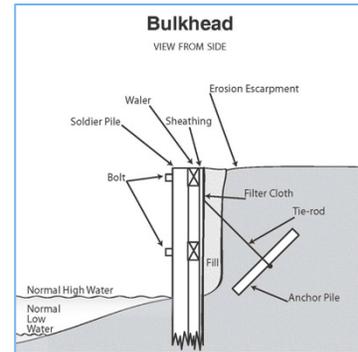
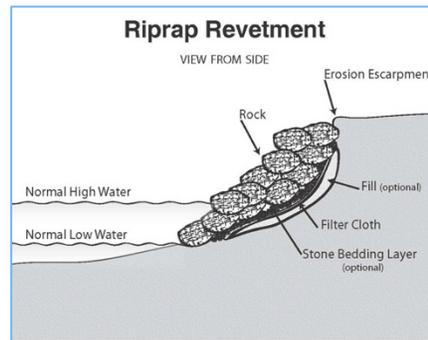
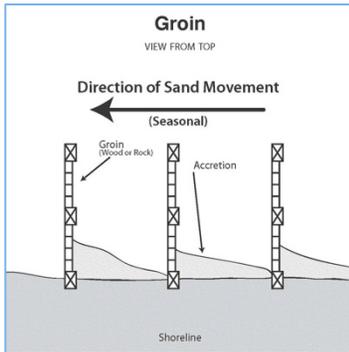
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<sup>31</sup> R.I. CRMC Shoreline Change Maps: [www.crmc.ri.gov/maps/maps\\_shorechange.html](http://www.crmc.ri.gov/maps/maps_shorechange.html)

<sup>32</sup> R.I. Inundation Surfaces (SLR viewer): [www.arcgis.com/home/webmap/viewer.html?webmap=6b97585af3ee4b51af62a10953cd7dc0](http://www.arcgis.com/home/webmap/viewer.html?webmap=6b97585af3ee4b51af62a10953cd7dc0)

## 6. Can I install structures along the shore to protect the property and buildings from erosion or flooding?

Examples of shoreline protection structures. Source: N.C. Division of Coastal Management<sup>33</sup>



Shoreline protection structures are manmade formations like revetments or seawalls designed to protect landforms or structures along the coast. Often, these structures are installed with the intention of preventing shoreline erosion, but shoreline protection structures frequently contribute to increased erosion farther down the coast.

In Rhode Island, the CRMC regulates the installation and maintenance of shoreline protection structures, and differentiates between existing structures and new structures, as well as hardened or natural structures.

Seawalls, groins, jetties, breakwaters, bulkheads, and revetments are examples of hardened shoreline protection structures, meaning they do not utilize natural or “green” infrastructure to protect the shorefront from erosion. Instead, these structures are composed of concrete, quarry stone, wood, or even the remnants of buildings destroyed by extreme coastal weather.



Shoreline protection structures in Rhode Island: a seawall, a riprap revetment, and a bulkhead.

<sup>33</sup> [dcm2.enr.state.nc.us/estuarineshoreline/options.html](http://dcm2.enr.state.nc.us/estuarineshoreline/options.html)

**Why it matters:** Frequently, hardened structures cause increased erosion in areas farther down the coast by retaining erodible sediment behind the structure and sometimes interrupting alongshore transport of sediment to those properties. This means that if an adjacent property owner has a seawall or revetment, the neighboring property's beachfront may be impacted in the future.

If there is an existing shoreline protection structure on the property, be advised that many existing older walls and revetments were not designed to withstand the wave forces and storm surges that are produced by storm events. Many of the revetments on properties in Rhode Island were installed prior to state regulations pertaining to shoreline structures and were built haphazardly or too close to the structures they are intended to protect, which can exacerbate damage to homes during storms. Even a properly designed shoreline protection structure may not protect the property under all circumstances.

#### CRMC Guidelines on Shoreline Protection Structures

*Maintaining structures:* Any alteration or maintenance to an existing shoreline protection structure requires a CRMC permit. Engineers on CRMC's staff will review the proposed structure to ensure that it is designed correctly for its location.

*New structures:* Structural shoreline protection facilities are prohibited when they are implemented to regain property lost through past erosion by storms. In Type 1 waters, and along undeveloped, moderately developed, and developed barriers, CRMC does not permit new shoreline protection structures. Existing structures may be maintained (but not enlarged or enhanced) with a CRMC permit.

*Non-structural methods* for controlling erosion such as planting vegetation or beach nourishment are encouraged by the CRMC. New, hardened shoreline protection structures are only permitted when the property owner has exhausted other, non-hardened methods of shoreline protection.

**Find out more:** For more information about shoreline protection structures, their installation, and maintenance, refer to Section 300.7 of the [CRMC regulations](#).<sup>34</sup>

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<sup>34</sup> R.I. CRMC Regulations: [www.crmc.ri.gov/regulations/RICRMP.pdf](http://www.crmc.ri.gov/regulations/RICRMP.pdf)