

Case Study: Protective Dune

Westport by the Sea Condominiums, Westport, Washington



*An artificial dune defends against erosion while sand fencing collects wind-blown sediment.
(Photo credit: Jackson Blalock, The Nature Conservancy)*

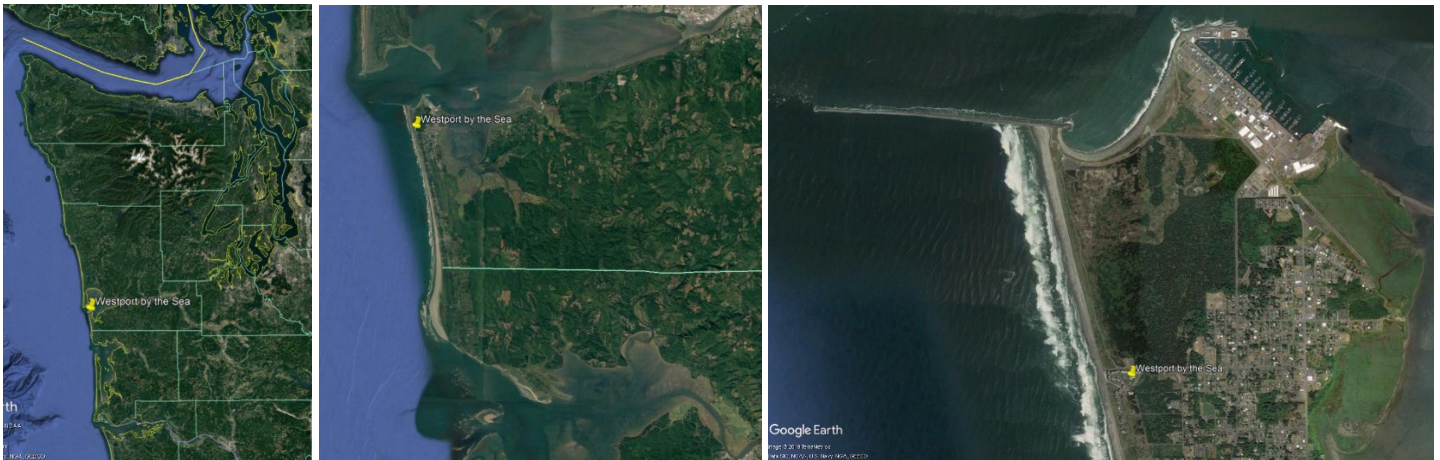
At a Glance

Location	Westport, Washington
Hazard(s) Addressed	Coastal Erosion
Shoreform	Beach/Dune/Developed Shore
Adaptation Strategy	Structural Accommodation
Adaptation Action	Rebuilt dune to limit advancing erosion. Added a sand fence to capture sand, prevent sand loss, and rebuild dune
Lessons Learned	<ul style="list-style-type: none">• At an early stage in the project, contact Washington State Department of Ecology to understand how potential adaptation options are affected by regulations• Contact local, state, and federal agencies who have oversight on the project, and get them all in the same room for conversation• Hire contractors and engineers who have done similar work before• Have contractors and materials on standby for emergency repairs
Project Team	Westport by the Sea homeowners associations
Budget	\$215,000
Time	2016 – present (ongoing)
Contact	George Prigmore, Maintenance for Westport by the Sea george@ismaintllc.com Robert Parnell, Westport City Council Member rparnell@hotmail.com

Context and Motivations

Westport by the Sea is a condominium development in Westport, located to the south of the mouth of Grays Harbor along Washington's Pacific Coast. Originally built between 1999 and 2006, the condos have faced rapid dune erosion, which now threatens the complex's 192 units. The condominiums border the southern edge of Westport Light State Park. While erosion affects the State Park, there are no structures at risk. This presents a challenge for addressing erosion at Westport by the Sea, as the adjacent landowner is minimally affected by the same processes that threaten the very existence of the condominiums.

Two Westport by the Sea homeowner associations came together to create a Dune Committee to conduct research and provide recommendations for addressing the coastal hazards they were facing. These private homeowners have experimented with several dune structures and potential solutions, but every year brings new challenges: storms and extreme tides continue to diminish the dunes while the sea encroaches closer to the condos.



The site's location in Washington (left), as part of the Grayland Plains between Grays Harbor and Willapa Bay (center), and in Westport (right). (Image credit: Google Earth)

August 8, 2009 ↓



↓ August 17, 2016



Rapid coastal erosion at Westport by the Sea can be seen in the pictures above. (Image credit: Westport by the Sea Dune Committee's 2017 Report, Google Earth)

Partners, Permits and Funding

Project Lead: Westport by the Sea homeowners associations

Partners: none

Permits: Grade and Fill Permit (City of Westport), State Environmental Policy Act Review (Washington State Department of Ecology), Shoreline Permit (City of Westport)

Funding: \$215,000 (Westport by the Sea homeowners associations; \$50,000 in 2016, \$80,000 in 2017, \$85,000 in 2018)

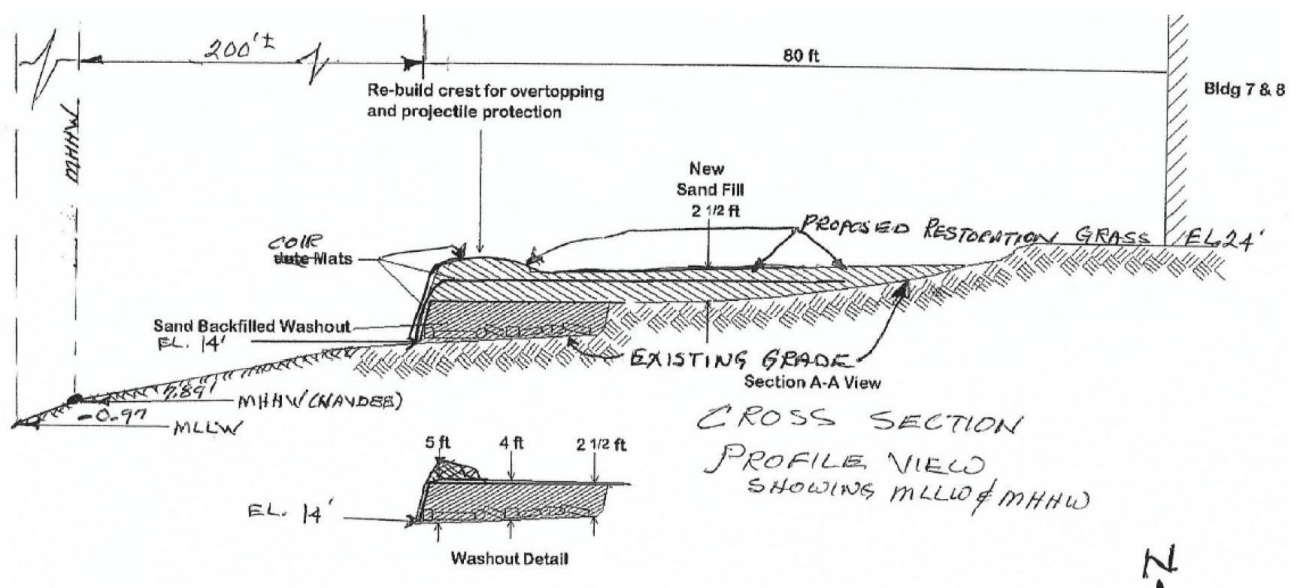
Because this shoreline is privately owned, local and state agencies were only able to provide advice, not funding. During construction, the condominiums were sufficiently set back from the shoreline and were not considered to be within Washington State Department of Ecology's shoreline jurisdiction. Due to erosion, the condominiums are now part of the shoreline jurisdiction, bringing them under the jurisdiction of local Shoreline Master Programs.

Description of Work Completed

This project's strategies are continually being adapted as new ideas form, as the weather and storms change, and as funding allows.

Prior to the implementation of the project, homeowners formed a Dune Committee that researched adaptation options, recorded shoreline changes, and provided recommendations on how to approach the coastal erosion threat. The committee met throughout 2016–2017 and recommended a cobble design (see technical documents). However, differences in opinions between Westport by the Sea's two homeowner associations and the dune committee led to a revised approach. After a new engineer was hired, the Westport by the Sea homeowners associations implemented an artificial dune and a sand fence to address erosion. The dune and sand fence are the latest effort in a series of shoreline stabilization experiments, which have involved anchoring wood, adding local sand to replenish the lost sand, adding hay bales, and other soft shoreline armoring techniques.

The current dune consists of local sand and root-wad logs from Brumfield (local construction company), coir matting (biodegradable coconut fiber) from Ferguson Supply, and cabled logs. American dune grass (*Leymus mollis*) has been planted on top of the dune for stabilization, while American searocket (*Cakile edentula*) has voluntarily taken root and also helped stabilize the dune. The sand fence resides behind the dunes in a zig-zag format to collect windblown sand from the dunes.



Conceptual sketch of emergency protection measures in place in 2016–2017, in response to severe dune erosion in 2015 and 2016. (Image credit: Golder Associates 2017 Conceptual Mitigation Options report)



Emergency protection measures with coir mat on the seaward face of the eroding dune, 2017. Sand had been placed atop coir mat and straw bales in 2016. (Image credit: 2018 Homeowners Associations presentation to Washington State Department of Ecology)



After years of back-and-forth erosion and emergency repairs, Westport by the Sea’s artificial dune is covered with sand (some mechanically deposited, some deposited by wind). Note exposed coir matting (right). (Photot credit: Jackson Blalock, The Nature Conservancy)

Lessons Learned

Homeowners found logistical support after contacting Washington State Department of Ecology and the other local, state and federal agencies. While these agencies were unable to provide funding, they were able to assist homeowners in understanding regulatory maps and jurisdictions. Homeowners also contributed personal expertise in order to monitor shoreline conditions and better understand how permitting guidelines applied to their site.

This was the first erosion control project undertaken by the homeowners. The homeowners recommend that private property owners facing similar issues hire a consultant/designer who has completed similar projects before. A large amount of money and time was spent to find relevant contacts, create designs and implement potential solutions.

As this project is regularly adapted to changing conditions, the homeowners and their contractor have maintained a vehicle access route to the dune in order to make swift repairs. Materials, such as coir matting, are kept on-site to aid with quick adjustments and fixes to breaches in the dune.

Designing a project with numerous homeowners with a shared shoreline proved a challenge. Varying recommendations for combatting coastal erosion were suggested at different stages of the project by the Dune Committee, engineers and others.

Westport by the Sea homeowners benefitted from being proactive and self-reliant. This ensured that actions were completed in a timely fashion, while erosion control strategies evolved in direct response to homeowner needs.



Access route for repairs and continued erosion management is visible as a sandy line between the parking lot and artificial dune. This road has been relocated, but remains in use for adaptation activity. (Photo credit: Washington State Department of Ecology's Coastal Atlas)

This document was produced as part of the Washington Coastal Resilience Project, working to increase the state's capacity to prepare for coastal hazards related to sea level rise. The project was led by the Washington State Department of Ecology and Washington Sea Grant, with funding provided by NOAA Regional Coastal Resilience Grants Program (grant #NA16NOS4730015)