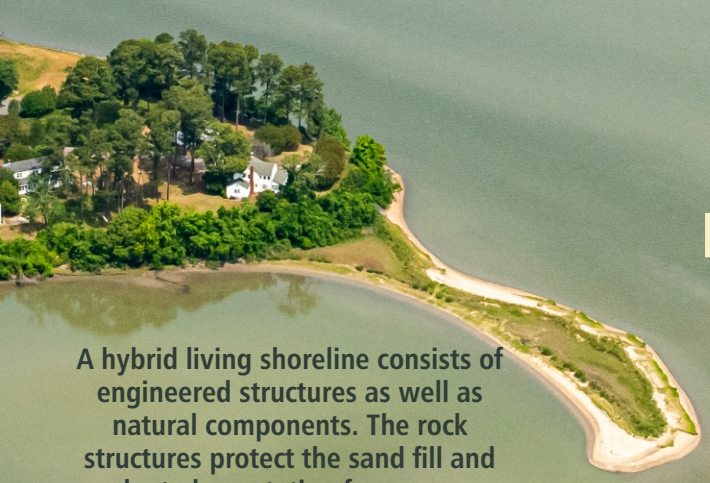
Penniman Spit
Hybrid Living Shoreline Project



A hybrid living shoreline consists of engineered structures as well as natural components. The rock structures protect the sand fill and planted vegetation from wave energy. The planted grasses create/restore marsh habitat, and the rock structures provide habitat for fauna.

37°16'55.50"N
76°35'2.13"W

Partners

Chesapeake Bay Trust
National Fish and Wildlife Foundation (NFWF)
Naval Weapons Station Yorktown
Pew Charitable Trust
Readiness and Environmental Protection Integration (REPI) Program
Virginia Institute of Marine Science, William & Mary

Penniman Spit is located on the southern side of the York River approximately 5 miles north of the Rt. 17, Coleman Bridge in Yorktown. It is attached to the upland at the Naval Weapons Station Yorktown Cheatham Annex and protects the entrances to both King Creek and Felgates Creek. What was once a continuous 14 acre spit in 1937, split into two sections in 2011, and its remnant now only consists of about 4 acres eroding marsh shoreline and sandy washovers. By 2019, the water was 2 ft deep between the two sections allowing tide and wave energy to impact previously-protected habitat in King Creek.

In 2014, Hardaway et al. developed a concept plan for Penniman Spit as part of the York County Management Plan (doi.org/10.21220/V54C72) which included a semi-continuous sill to rebuild sections of the marsh and protect the remaining sections from continued loss. In 2019, the Shoreline Studies Program (SSP) at VIMS received funding from the Chesapeake Bay Trust to further develop the hybrid living shoreline concept project. For this effort, the physical, hydrodynamic, and biologic elements at Penniman were analyzed. At that time, only 1.7 acres of land occurred above mean high water limiting the amount of high marsh present on the Spit. SSP developed a detailed conceptual plan, typical cross-sections, and draft joint permit application for the hybrid living shoreline project that was designed to provide habitat restoration by rebuilding marsh and sandy beach ecosystems and by the installation of rock structures on which shellfish would grow.

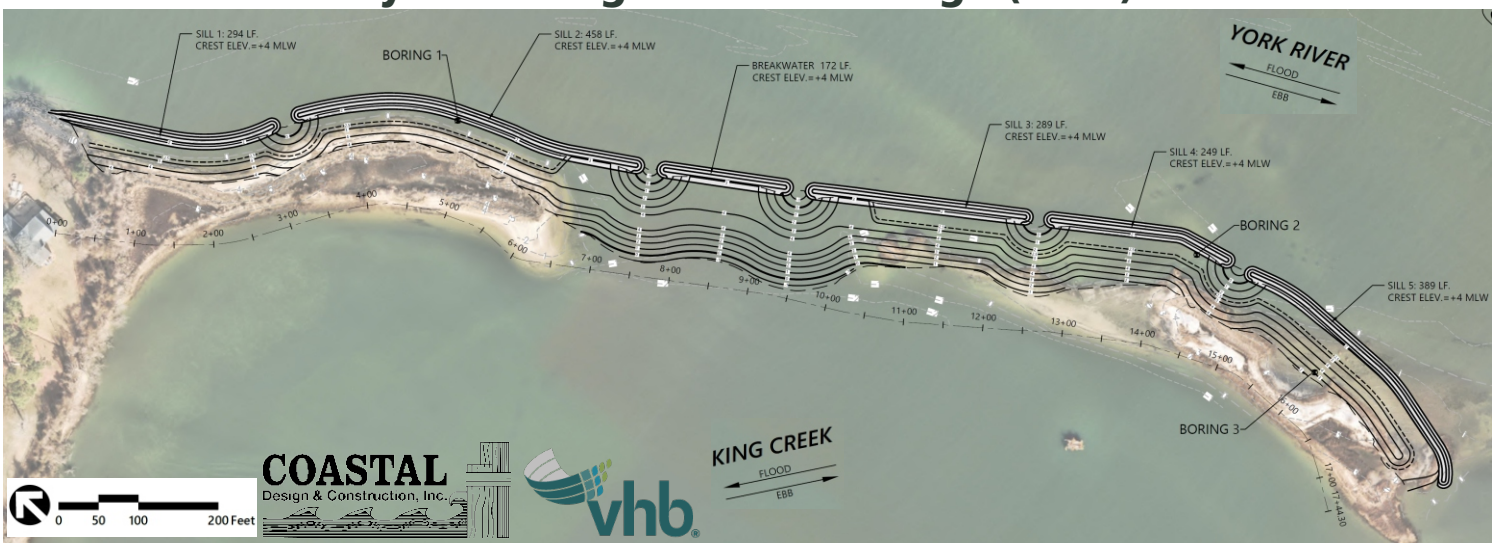
The hybrid living shoreline project consists of 6 rock sills with sand placed between the two spit remnants and behind the sill structures to create a continuous project. The crest elevation of the structures is +4 ft MLW (1983-2001 NTDE), and the rocks provide additional habitat for oysters and other shellfish. Small gaps between sills reduce wave impacts to the marsh while still allowing faunal access. Sand was placed on a 40:1 slope behind the rock sills and on an 8:1 or 10:1 slope further landward to +4 ft MLW. The sand was planted with Spartina alterniflora (0.94 acres) for low marsh and Spartina patens (1.31 acres) for high marsh. The total marsh created is 2.25 acres along 1,950 ft of shoreline and protects nearly 5 acres of existing marsh. The site was accessed by water with materials being delivered by barge.

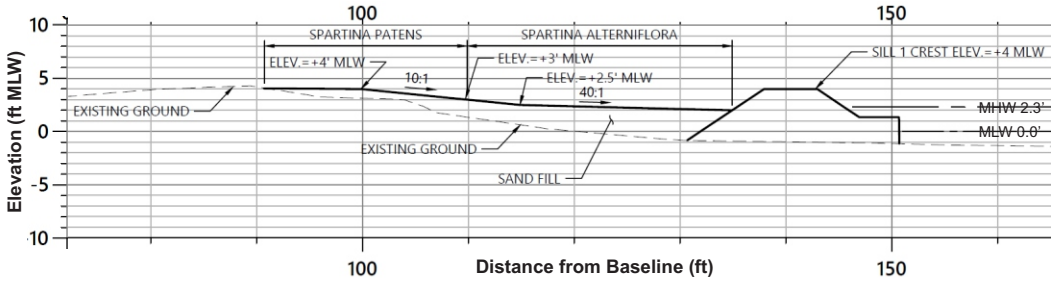
Pre-Construction

Present

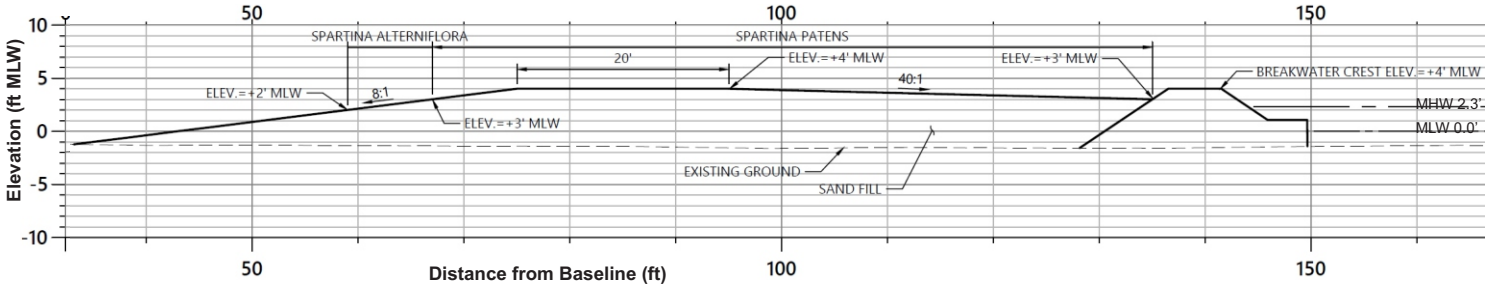
Post Construction Image (Oct 2024)

Hybrid Living Shoreline Design (2024)





Length	1,950 ft
Rock	10,000 tons
Sand	24,000 tons
Plants	40,000 each
S. alterniflora	41,035 ft2
S. patens	57,117 ft2
Design-Construction Services Cost	$3,547,970



Who	
Conceptual Design	Shoreline Studies Program, VIMS
Contract Admin	William & Mary, VIMS
Design-Build Services	VHB and Coastal Design & Construction, Inc
Construction Manager	Bayside Construction Management

VIMS | William & Mary
Virginia Institute of Marine Science

Shoreline Studies Program VIMS

Created by Shoreline Studies Program, VIMS, November 2024; Photo date other side 20 May 2021