

Penniman Spit Naval Weapons Station Yorktown

Hybrid Living Shoreline Restoration Project

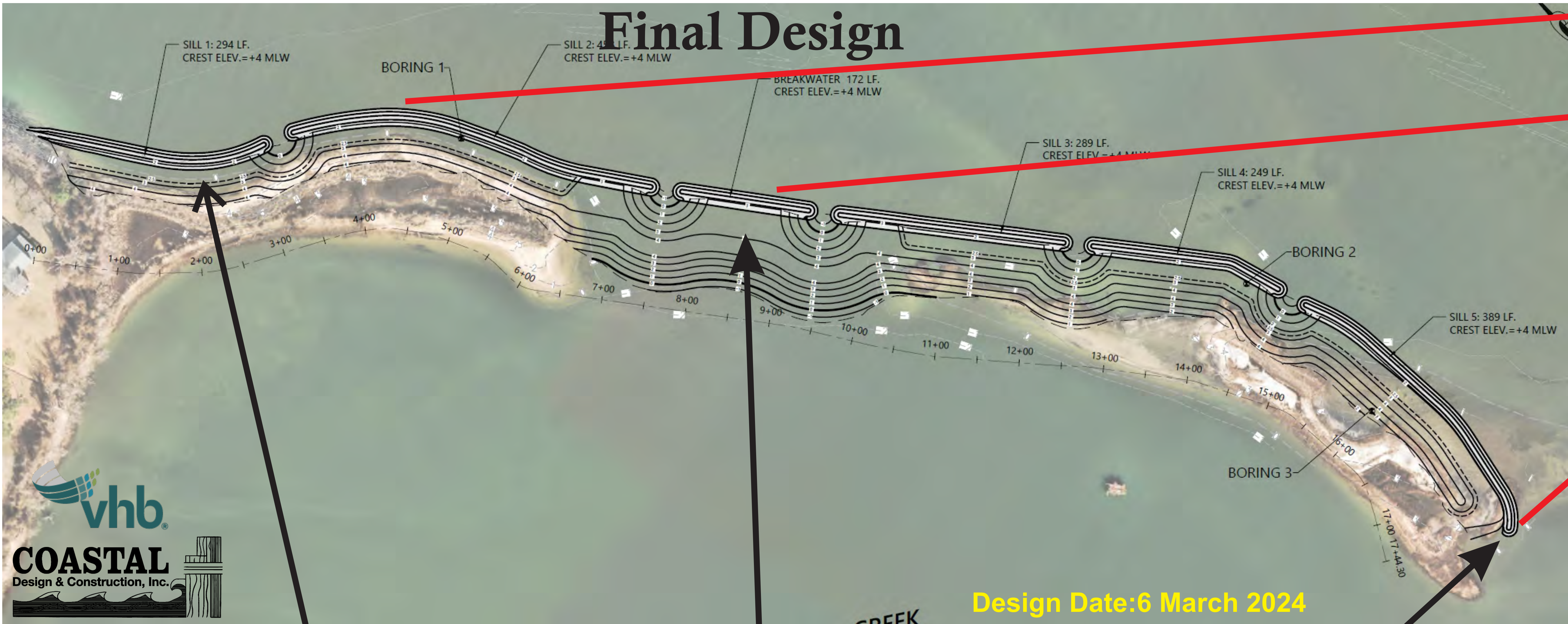
The hybrid living shoreline project consists of 6 rock sills with sand placed between the two spit remnants and behind the sill structures to create a continuous project. The crest elevation of the structures is +4 ft MLW (1983-2001 NTDE), and the rocks provide additional habitat for oysters and other 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 1,700 ft of shoreline. The site was accessed by water with materials being delivered by barge.

Pre-Construction



18 Nov 2022

Final Design



Design Date: 6 March 2024

View from Cheatam Annex Overlook



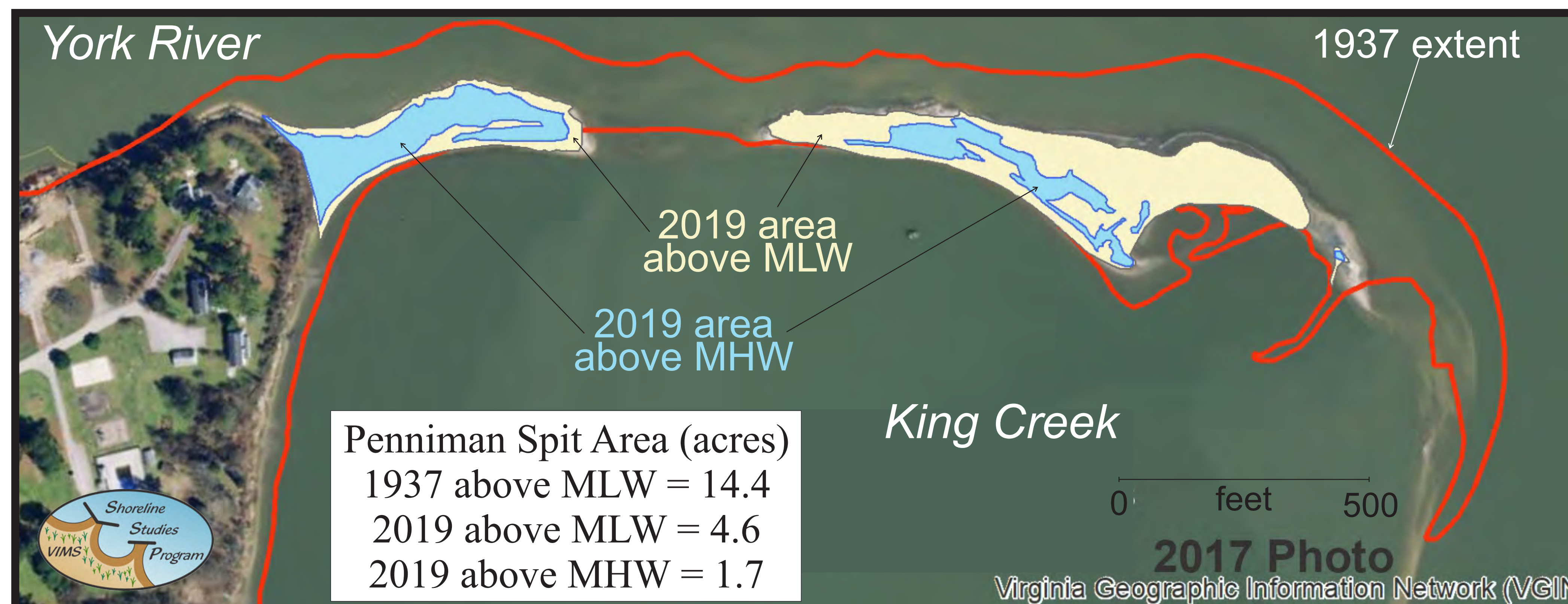
Sand Fill

Intertidal Oyster Castles

21 Oct 2024

Length	1,700 ft
Rock	10,000 tons
Sand	24,000 tons
Plants	40,000 each
S. alterniflora	41,035 ft ²
S. patens	57,117 ft ²
Design-Construction Services Cost	\$3,547,970





Historic Shorelines

In 1937, Penniman Spit was over 3,000 ft long and over 450 ft at its widest part. Comparison of the 1937 shoreline to the 2019 shoreline showed a 68% loss in area above MLW over the last 80 years. The spit separated into two parts in 2011, and 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.

Penniman Spit Construction Summer 2024



Materials were brought in by barge and stockpiled on site.



Stockpiled materials were moved by construction equipment along the shoreline. The large pile of armor rock was placed along the shoreline where sill construction is underway in the nearshore.



Sill construction is complete along this eastern section of the shoreline. Filter cloth was placed under the structures.



Complete sill on the eastern end before sand was planted.



The gap between the existing spit sections was filled with sand and sills and breakwater constructed.



Planting *Spartina alterniflora* and *patens* on the western section of the spit.