



Storm Resilience Partnering Monmouth County And Naval Weapons Station Earle

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- **What and Why**

- **Background**

- **Superstorm Sandy**

- **Joint Land Use Study**

- **Justification**

- **Partnership/Recommendations**

- **Next Steps**



MISSION: Provide ordnance for all Atlantic Fleet Carrier and Expeditionary Strike Groups, and support strategic Department of Defense ordnance requirements

Pier Complex

- **2.9 mile finger pier complex (\$391M replacement value)**
 - **2 active piers, 4 berths, 45' depth of water**
 - **Direct access to the Atlantic Ocean - cross no bridges or tunnels to reach blue water (3 miles distance)**
 - **Ability to accept large rail shipments and conduct load outs in a short time**
- 
- An aerial photograph showing a long, narrow pier complex extending from a shoreline into a large body of water. The pier is a long, straight concrete structure that curves at its end into a U-shape. Several large white cargo ships are docked at the piers. The water is a deep blue-grey color, and the sky is clear and blue. In the background, a coastal town and some greenery are visible on the land.

Superstorm Sandy Damage



Superstorm Sandy Raises Storm Resiliency Issues

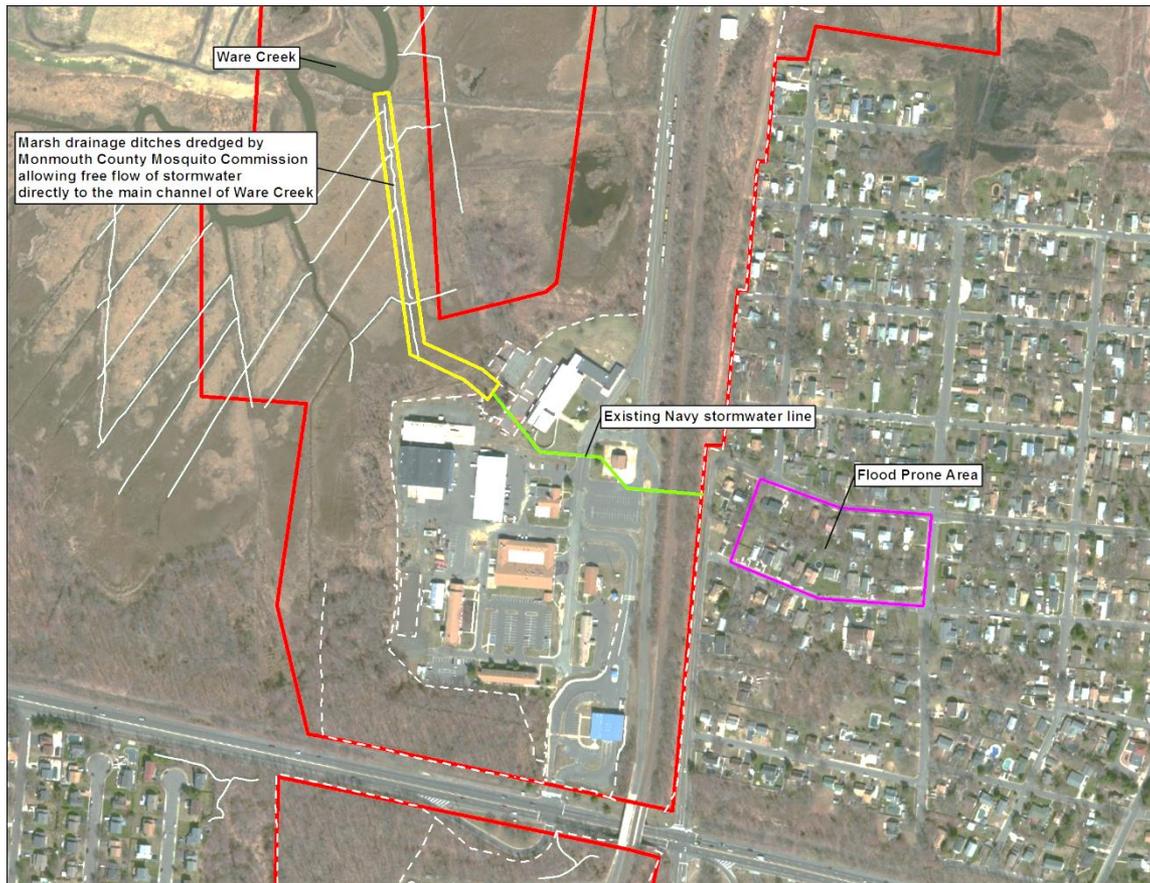


- **Naval Weapons Station Earle**
 - Located on Raritan Bay in Lower New York Harbor, longest ammunition loading piers in the world
- **Superstorm Sandy - Greatest Storm in Living Memory**
 - \$50M in damage at NWS Earle
 - Loss of grid power for 7-14 days
 - Ready for essential operation in five days, but repairs not completed until late 2015
 - Cost of tree clearing alone, \$1M
- **Resilience issue**
 - Recurrent flooding in community adjacent to naval station
 - Salt marshes can absorb stormwater and lessen storm surge
 - Living Shoreline enhances protection

Recurrent Flooding



- County, Municipal, and Naval Station worked together to identify the problem and implement a fix

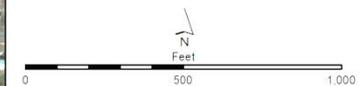


Middletown Stormwater Drainage

NWS Earle Waterfront Area

Legend

- Naval Weapons Station Earle Fenceline (as of 2010)
- Ditch/Aqueduct
- Flood Prone Area
- Roads
 - Major Road
 - Local Road



Source: ESRI 2012, NAVFAC 2012, Microsoft Corporation 2012



Oyster Reef Project



- **NY/NJ Baykeeper (a Non Governmental Organization)**
- **NWS Earle offered a secure test location for restoration of oyster reef habitat within the Hudson Raritan Estuary**
- **Baykeeper and Rutgers (CUES) demonstrated acceptable survival/growth rates in a 0.25 acre test area between the Navy piers**
- **Baykeeper received a “living shorelines” permit from NJ to build an artificial reef**
 - **200 by 200 feet**
 - **Subtidal**
 - **1000 marine concrete “oyster castles”**
 - **Placement began Summer 2016**

Hurricane Sandy Raises Storm Resiliency Issues



Oyster Reef Location

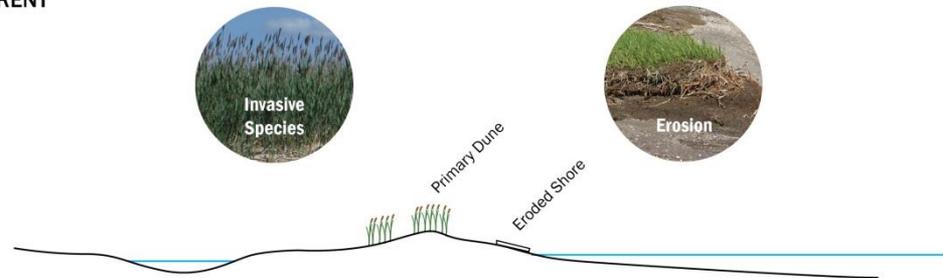


Living Shoreline Concept

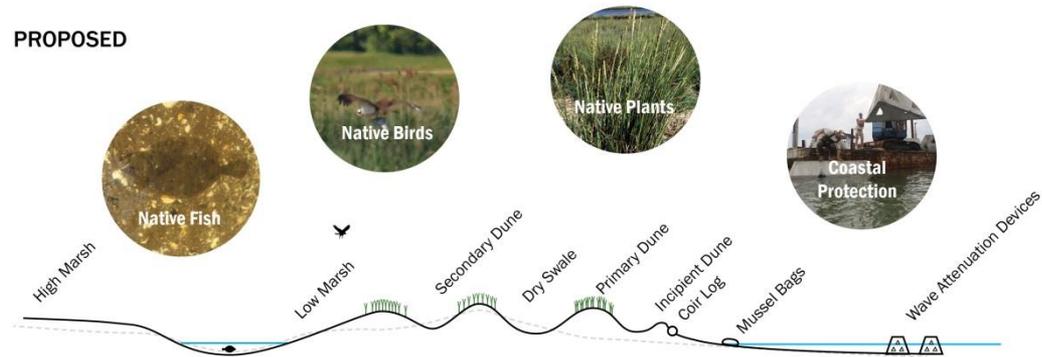


SCHEMATIC CONCEPT SECTION DIAGRAM

CURRENT



PROPOSED



Monmouth County Joint Land Use Study



- **Scope**

- Based on NJ Watershed 12
- 2/3rds of the county
- 32 towns
- 500K people

- **Focus**

- Security on Ammunition Transportation Route
- Security/Safety on Sandy Hook Bay (Pier Complex)
- Climate Adaptation/Storm Resilience

- **Funded in FY16, Final Report Dec17**

- **Public Meeting 7Dec17**

- **Likely Follow On Projects**

- Transportation Improvements
- Stormwater Improvements
- Energy Resiliency

Monmouth County Joint Land Use Study

Select Recommendations



1. Coordinated effort across multiple levels of government to implement a naturalized beach erosion/shoreline protection program along the Monmouth County Bayshore
2. Marsh and dune restoration with beneficial use of Navy dredge material
3. County and Local planning document revision to consider scientific/engineering data and analysis methods for flood hazard planning based on Navy guidance

Takeaways



- **Storm Resiliency is an existential issue along many coastal regions**
- **Green Infrastructure tactics may leverage funds and multiply impacts**
- **Restoring natural systems through partnerships benefits multiple stakeholders and may lower lifecycle as well as initial costs**

Questions?

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