

*Restoration of Coastal
Dune, Barrier Beach,
and Tidal Inlet System:
Sandwich, MA*



April 3, 2014

History of Erosion

- Construction of Canal
- Lack of Sediment Supply
- Subsequent Alterations



- Approximately $67,000 \text{ yd}^3/\text{yr}$ between MHW and 18 foot depth (1940-1955) - (Giese, 1980)
- Shoreline Change Analysis
-2.0 ft/yr and increasing

Project History

- 1990 Dune Reconstruction
- 2000 Inlet Stabilization Project Initialized
- 2001 Notice of Project Change
- 2004 Dune Reconstruction
- 2004 Draft EIR for Inlet Stabilization Project
- 2013 Dune Breach Restoration



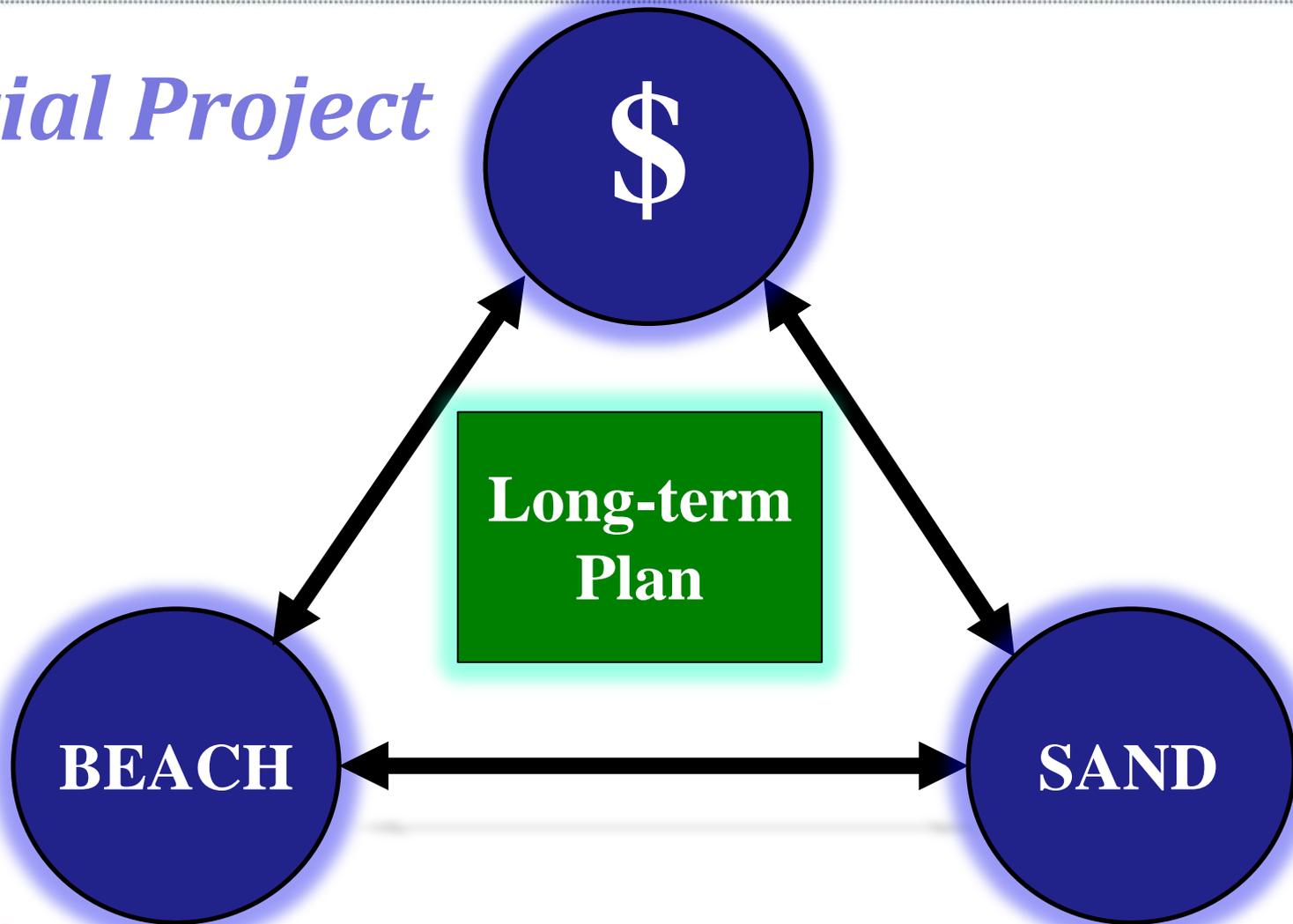
Current and Ongoing Projects

- Topographic Survey/Monitoring
- Stop-Gap Erosion Mitigation Measures
- Formal Beach Management Plan
- **Town Neck Beach Full-Scale Nourishment**
- Restructuring of Sandwich Harbor Inlet Stabilization
- USACE Authority and Study Tracking



Beach Nourishment is Difficult...

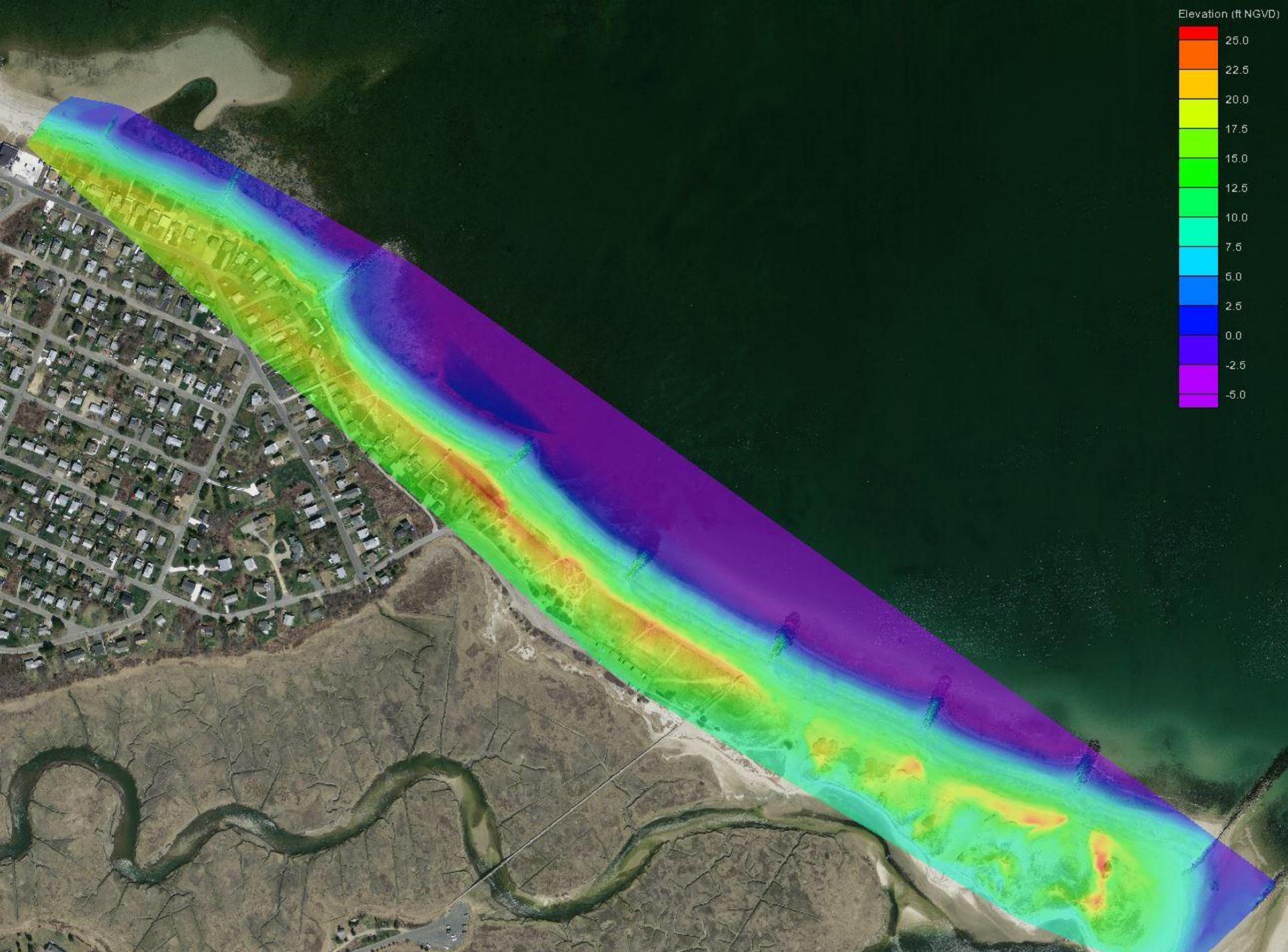
Initial Project

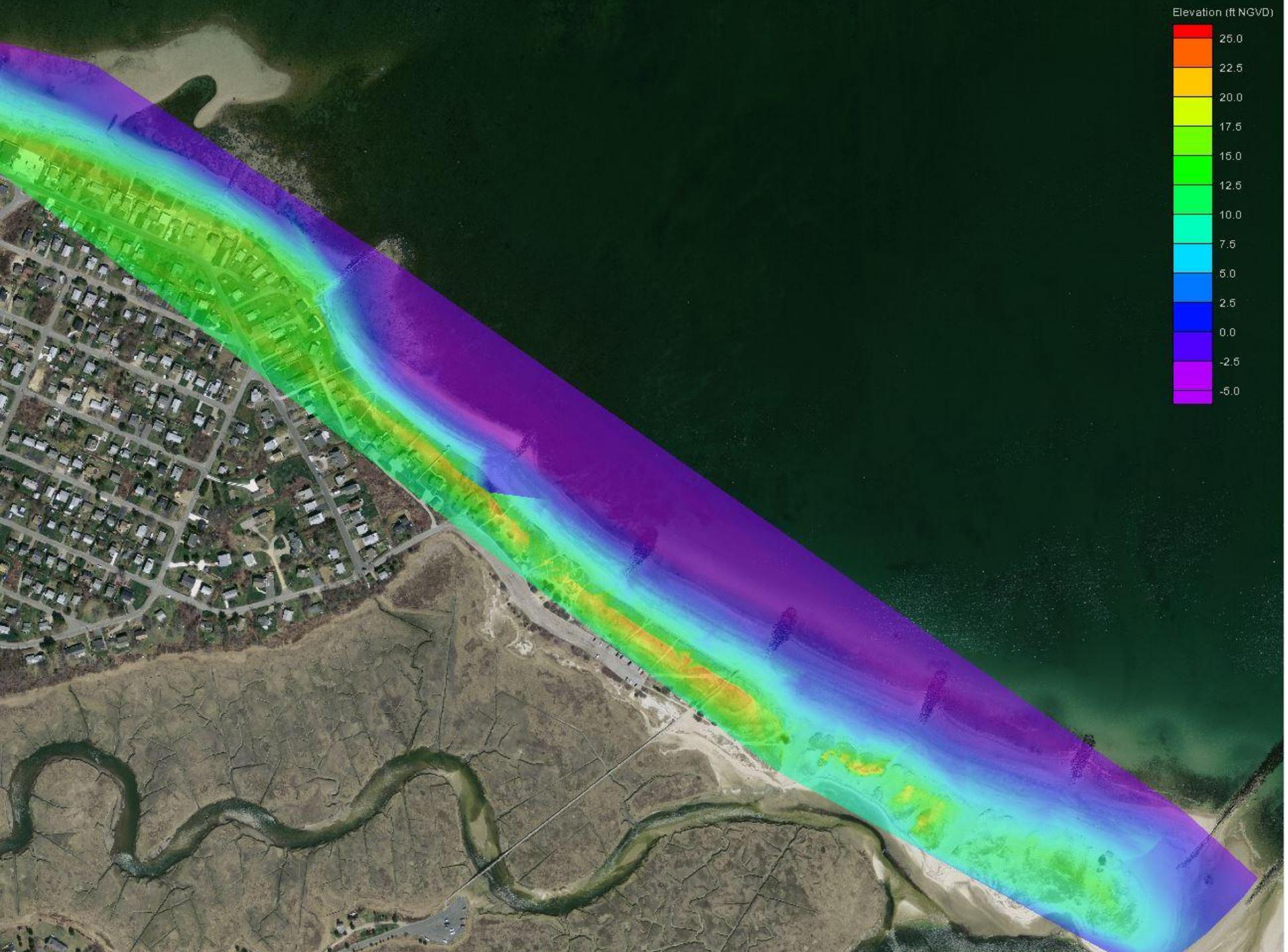


Ultimate Goal

**Return sediment to the system
on a consistent basis
(Beach recovery through beneficial re-use)**

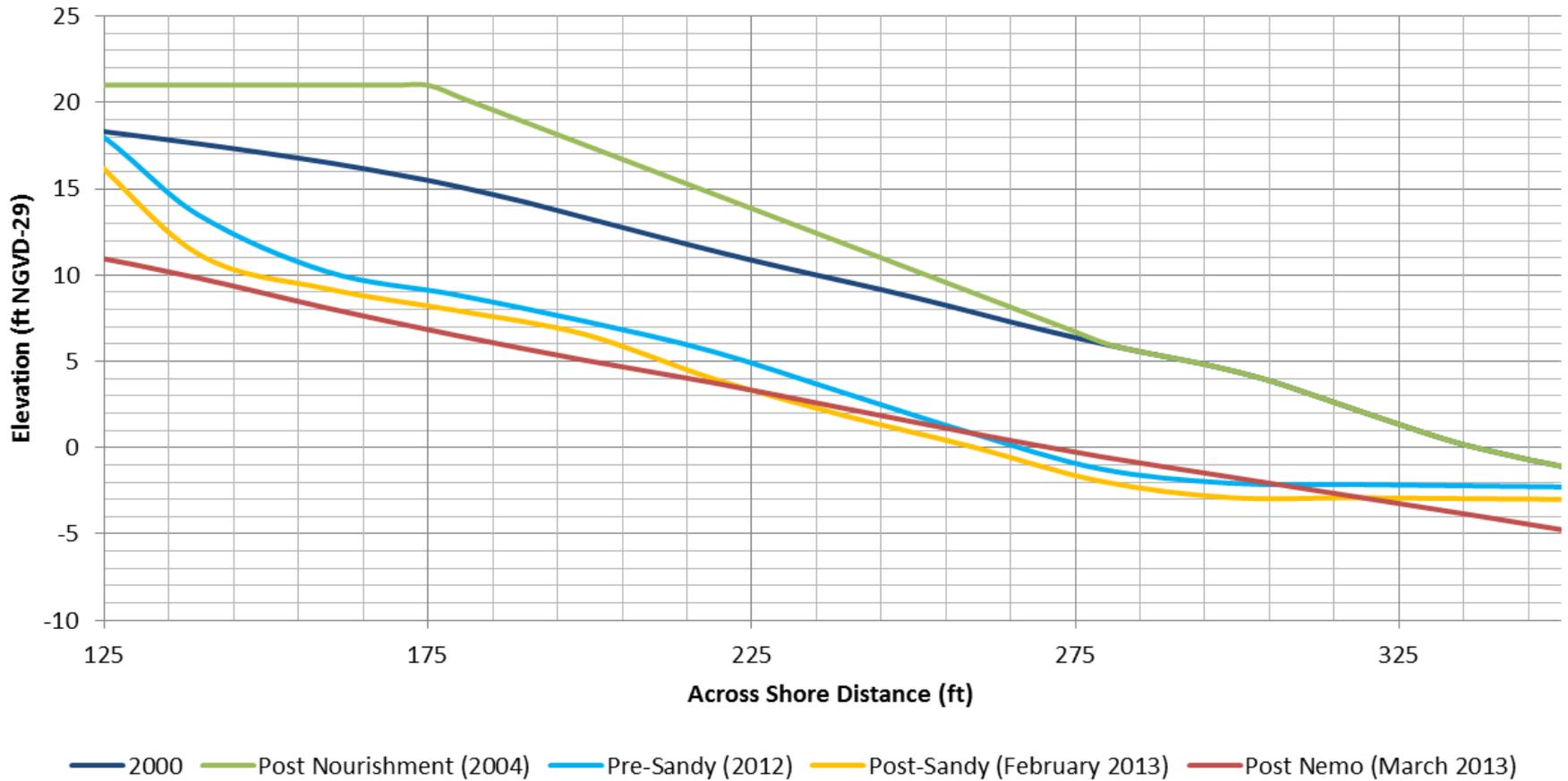






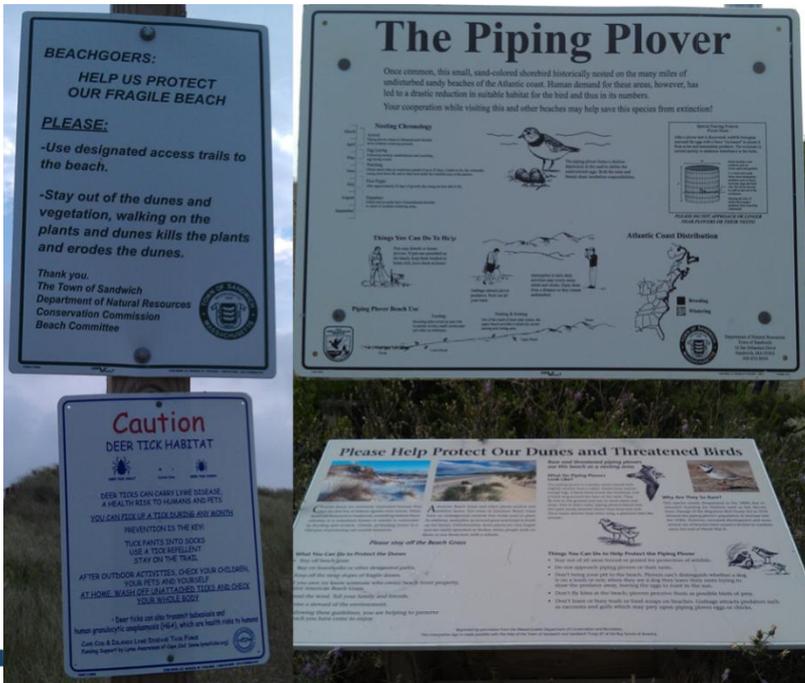
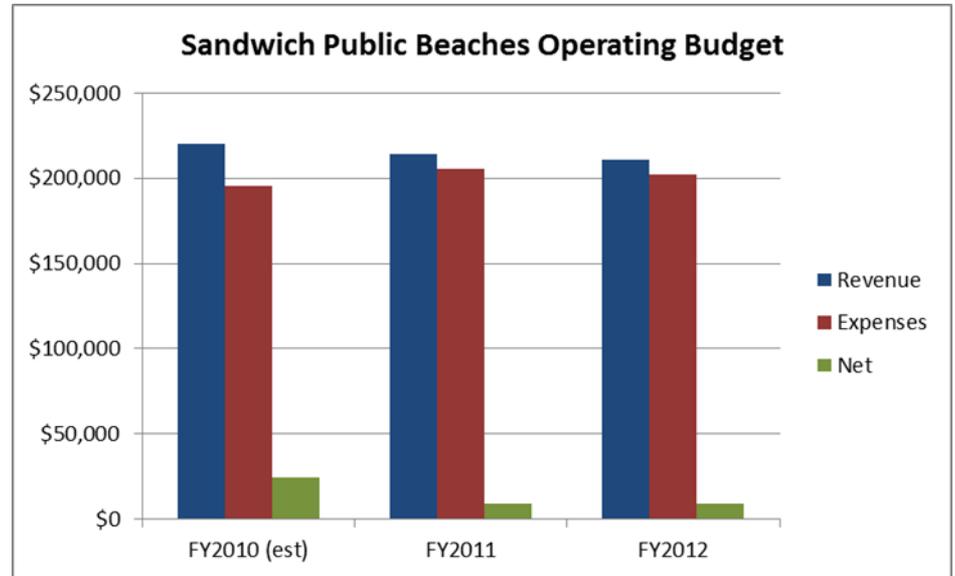
Current Conditions

Representative Cross Section



Beach Management Plan

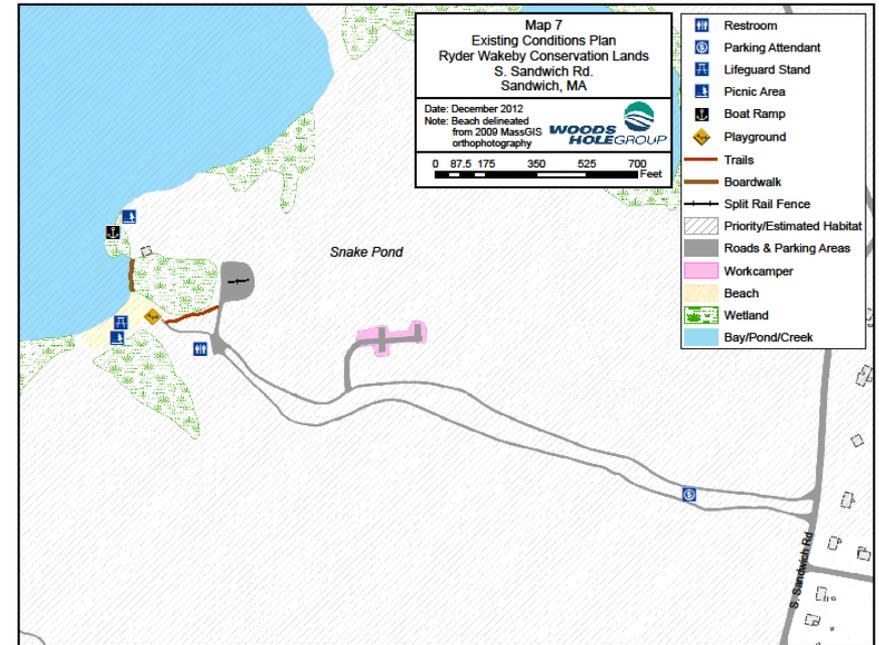
- All Town Beaches (7)
- Addresses Natural and Anthropogenic Features
- Management Structure



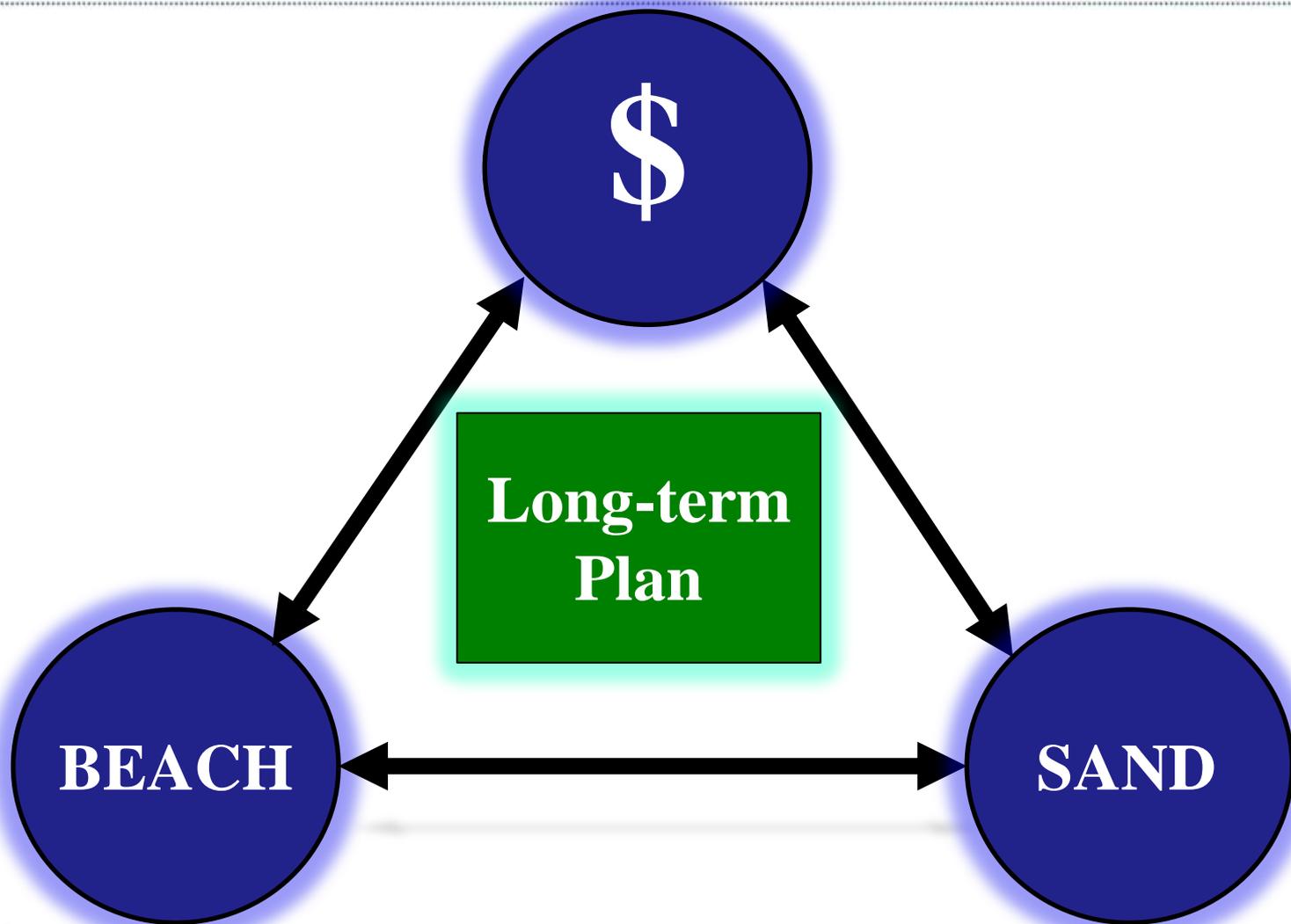
Beach Management Plan

Recommended Management Activities

- Management and Planning Level
- Routine Monitoring
- Endangered Species Management
- Restoration Activities
- Routine Maintenance and Improvement Activities
- Education and Outreach
- Finance Opportunities

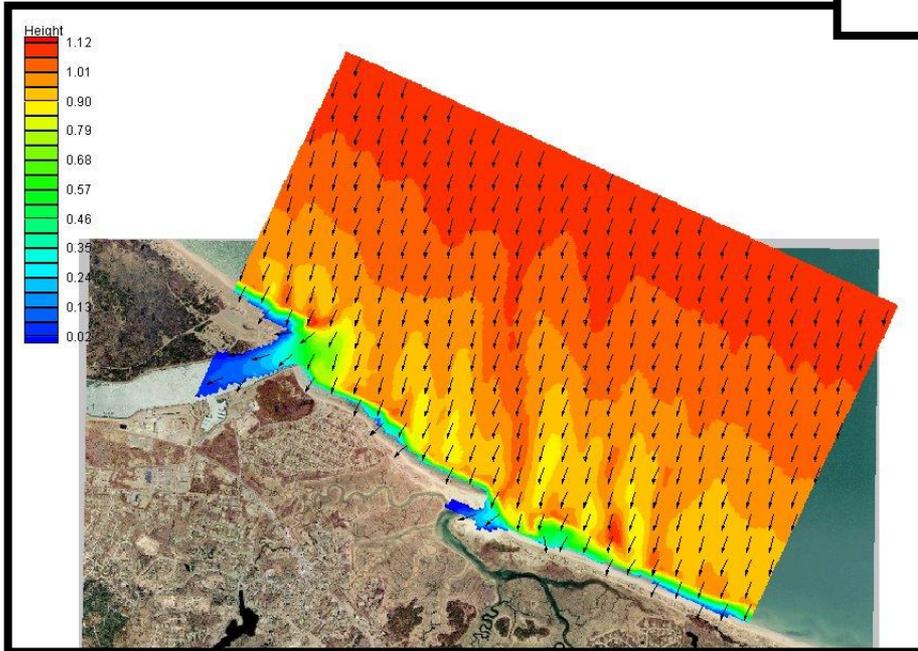
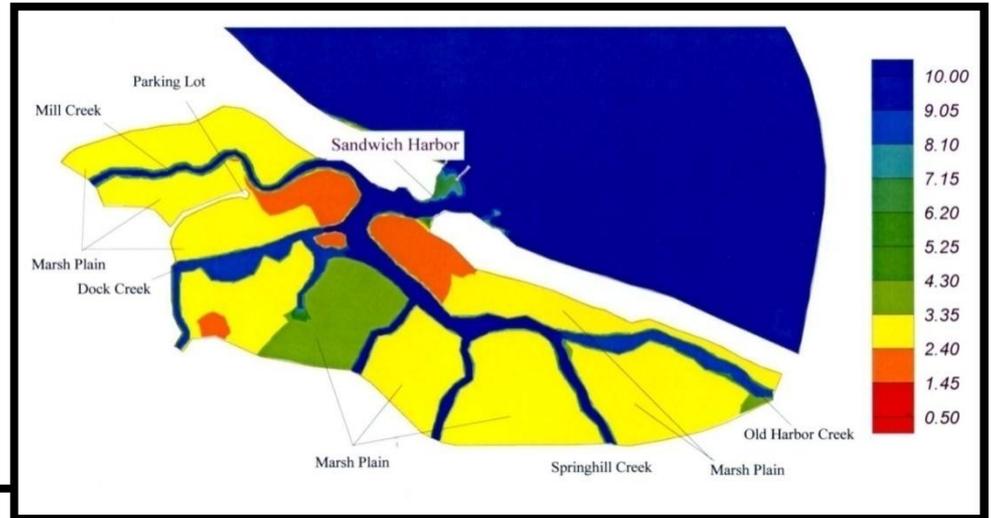


The Beach



Adaption of Old Harbor EIR

- Bathymetry
- Sediments
- Wave Climate
- Sediment Transport
- Ecological Impacts
- Cost Impacts



Hydrodynamics

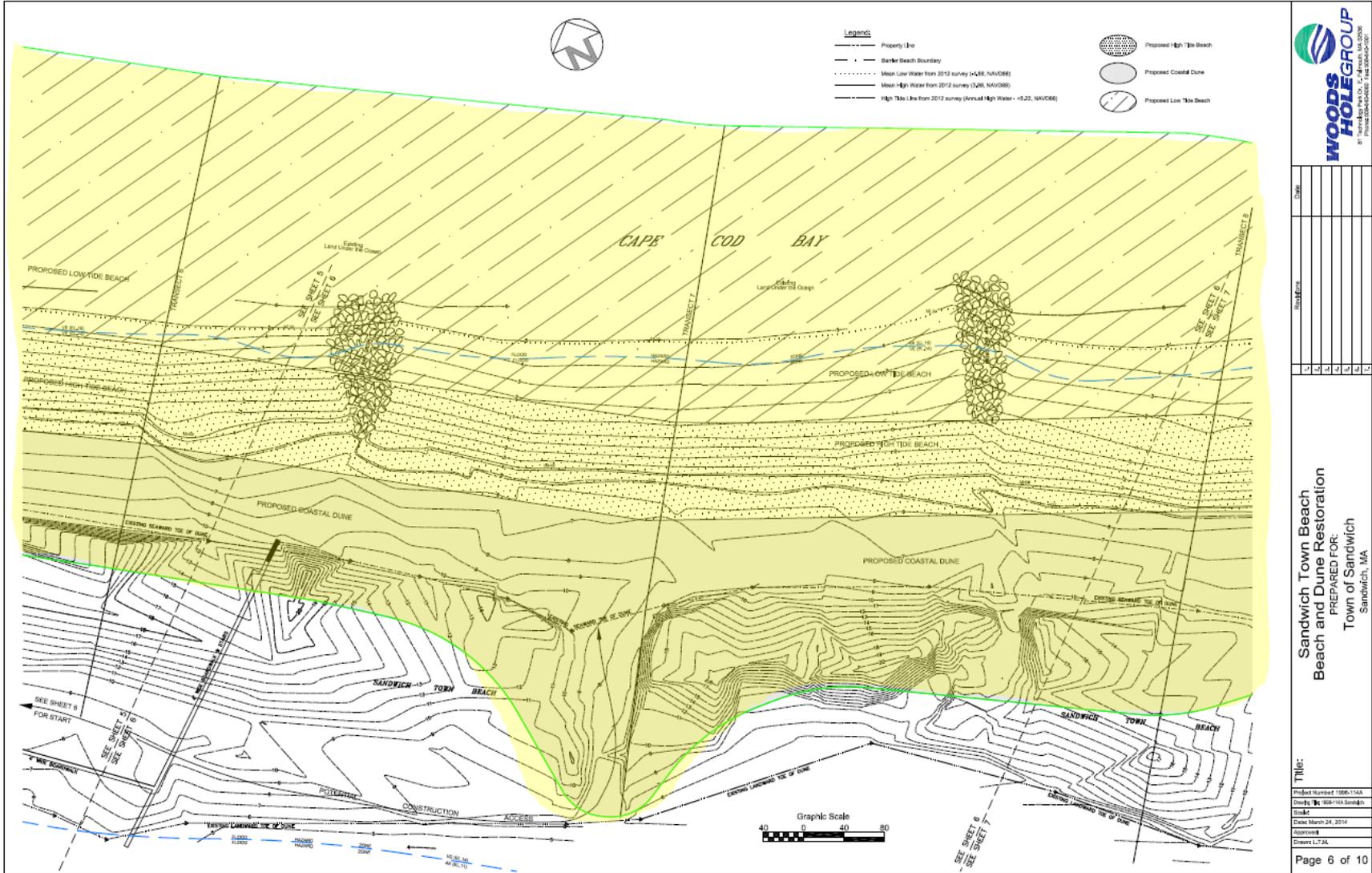
- Tidal Flushing
- Inlet Migration
- Upland Flooding
- Overwash (Habitat Area)
- Velocities and Circulation

Beach Nourishment Alternatives

- No Action
- Inlet Stabilization
- Dune Restoration Only
- Dune/Beach Nourishment – Town Neck Hill only
 - In front of homes only
 - 2,500 linear feet (141,000 cubic yards)
- Dune/Beach Nourishment – All of Town Neck Beach
 - 5,000 linear feet (387,500 cubic yards)
- Dune/Beach Nourishment with Geotubes
- Dune/Beach Nourishment with Groin Repair & Enhancement



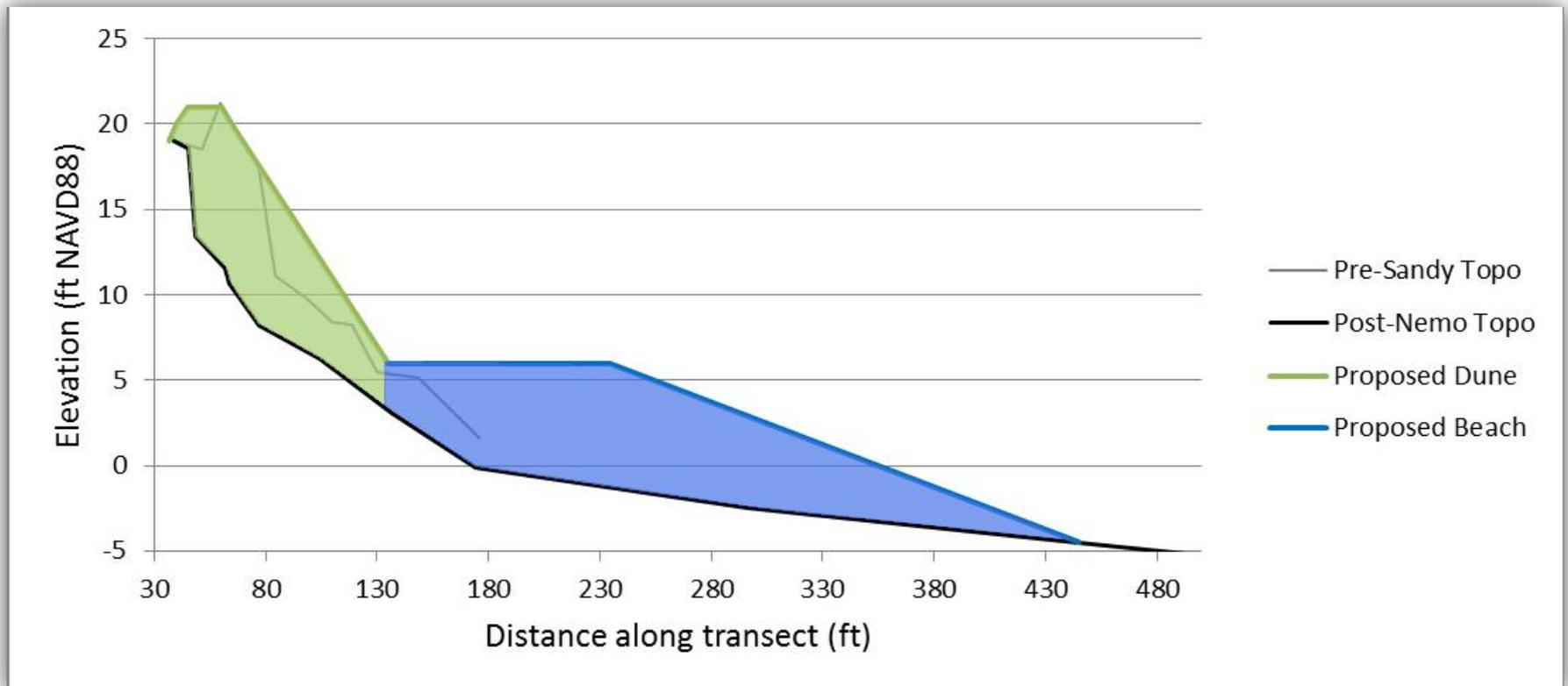
Beach Nourishment Design



Beach Nourishment Design

Typical Profile

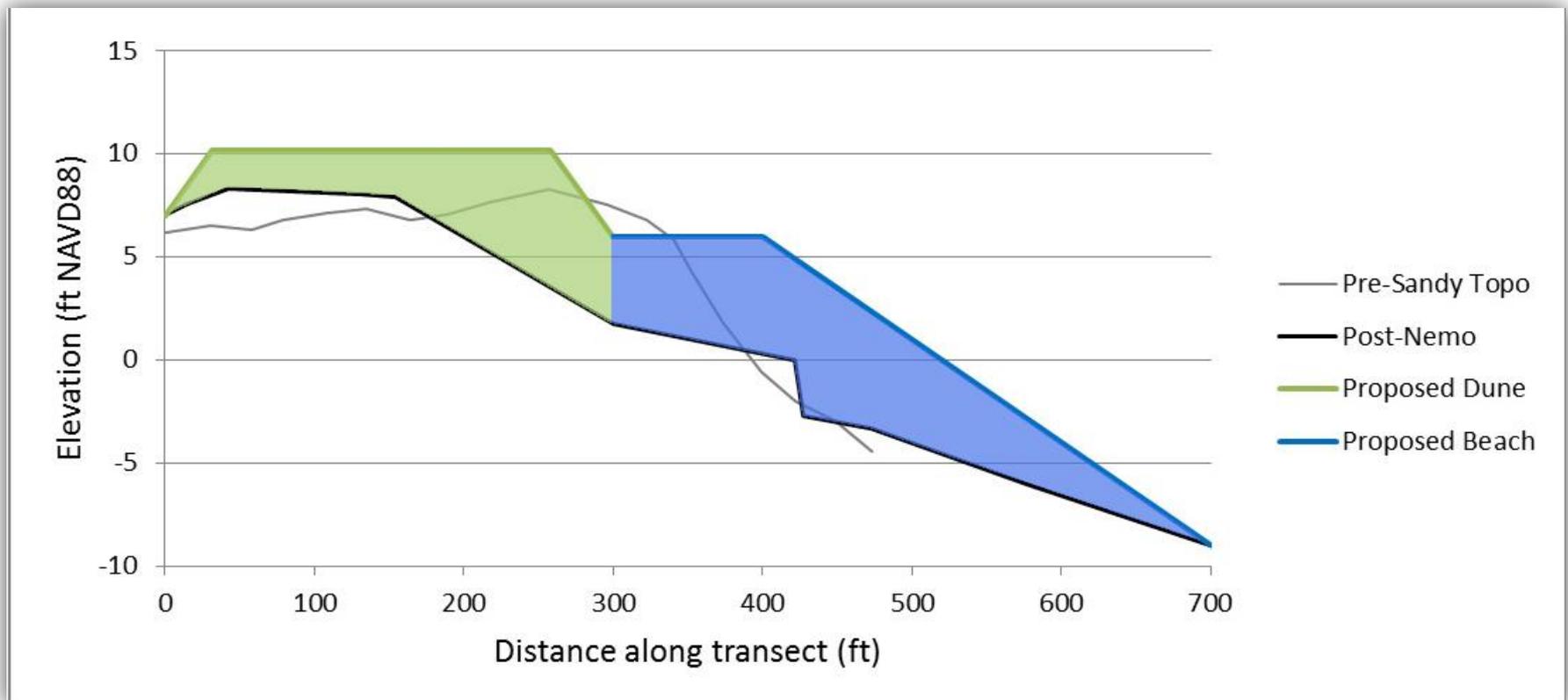
- Beach berm of 100 feet at EL 6' NAVD88
- Increased MHW beach by over 200 feet
- Dune crest restoration of over 20' NAVD88
- Increased dune width of approximately 50 feet
- Need easements for select private properties for placement



Beach Nourishment Design

Town Neck Breach Areas

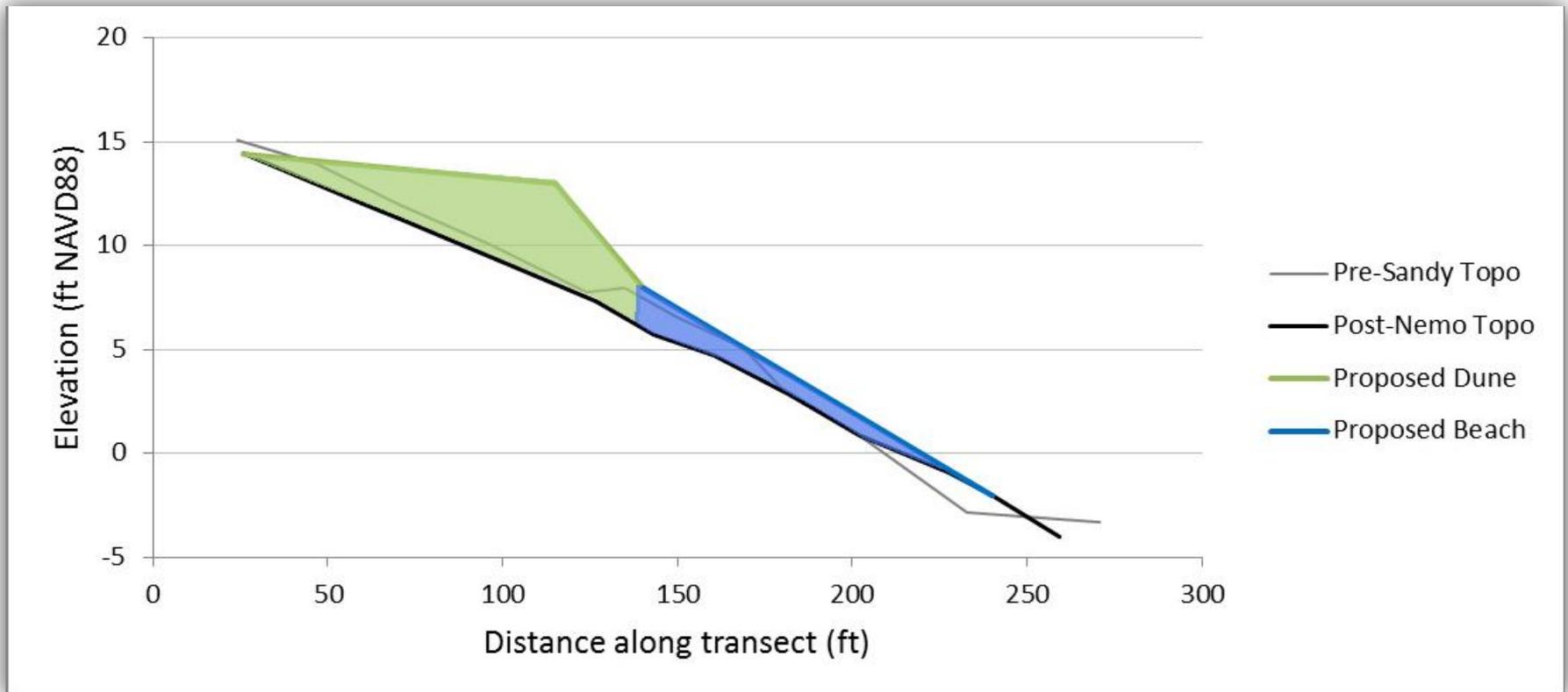
- Breach filled to elevation 10' NAVD88 for endangered species habitat
- Dune slopes 1:10, beach slopes 1:20
- Increased MHW beach by over 200 feet
- Beach berm of approximately 100 feet



Beach Nourishment Design

Rocky Intertidal Profile

- Avoids direct placement on rocky intertidal resource
- Increased low tide beach
- Increased dune width by approximately 100 feet
- Nourishment will naturally spread into area



Beach Nourishment Design



Beach Nourishment Design



Beach Nourishment Design Features

DESIGN FEATURES

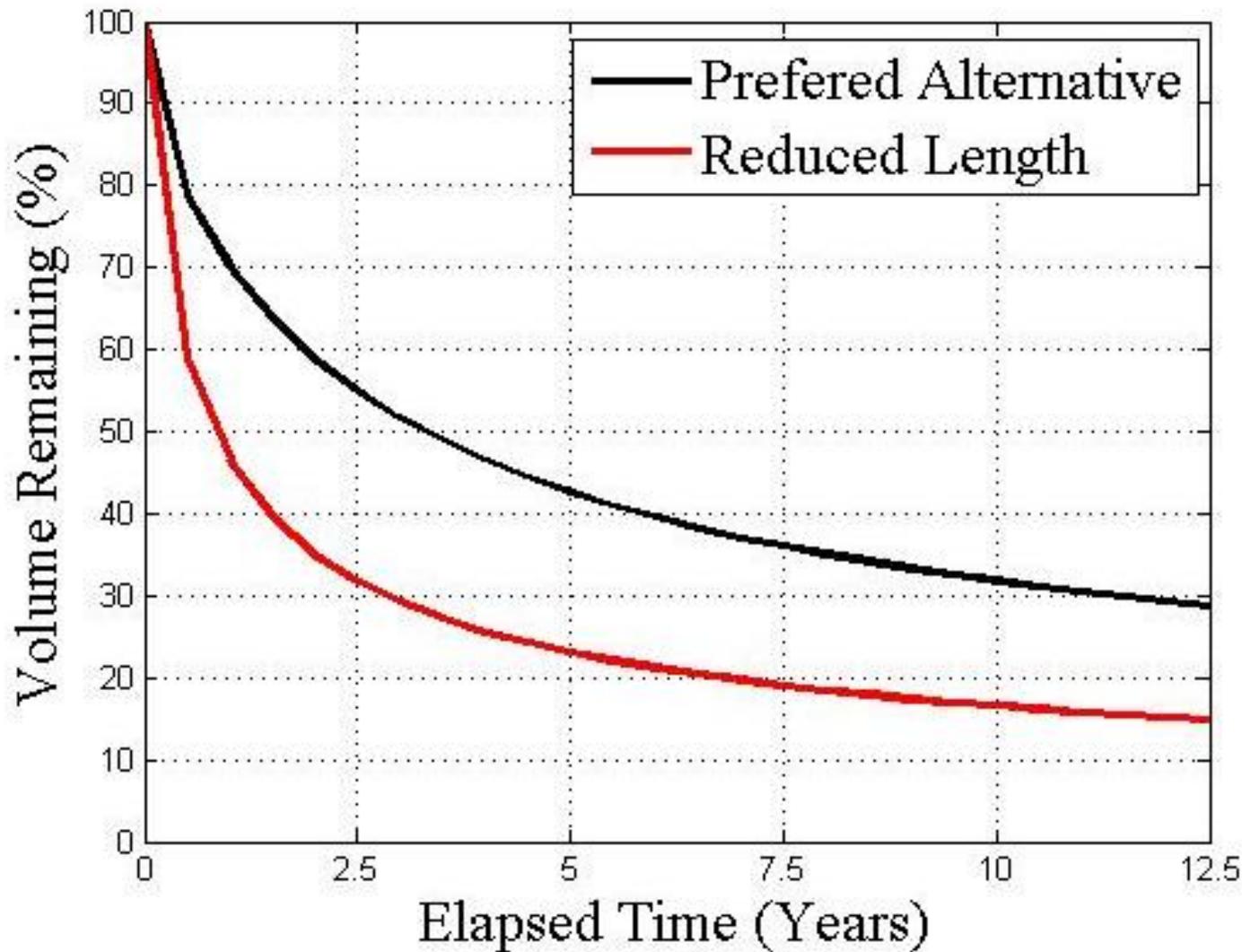
- Nourishment Length = 5,000 feet
- Volume = 387,500 cubic yards
- Beach Berm elevation = 6 feet
- Berm Width = 100 feet
- Dune Width = 100 feet
- Dune Crest = 10-20 feet NAVD88
- Dune Slopes = 1:10
- Beach Slopes = 1:10 to 1:20
- Increased MHW beach by over 200'

RESOURCE AREAS

- Total Project Area = **1.8 million ft²**
- Coastal Dune = **+145,000 ft²**
- Coastal Beach = **+335,000 ft²**
- Land Under the Ocean = **-349,500 ft²**

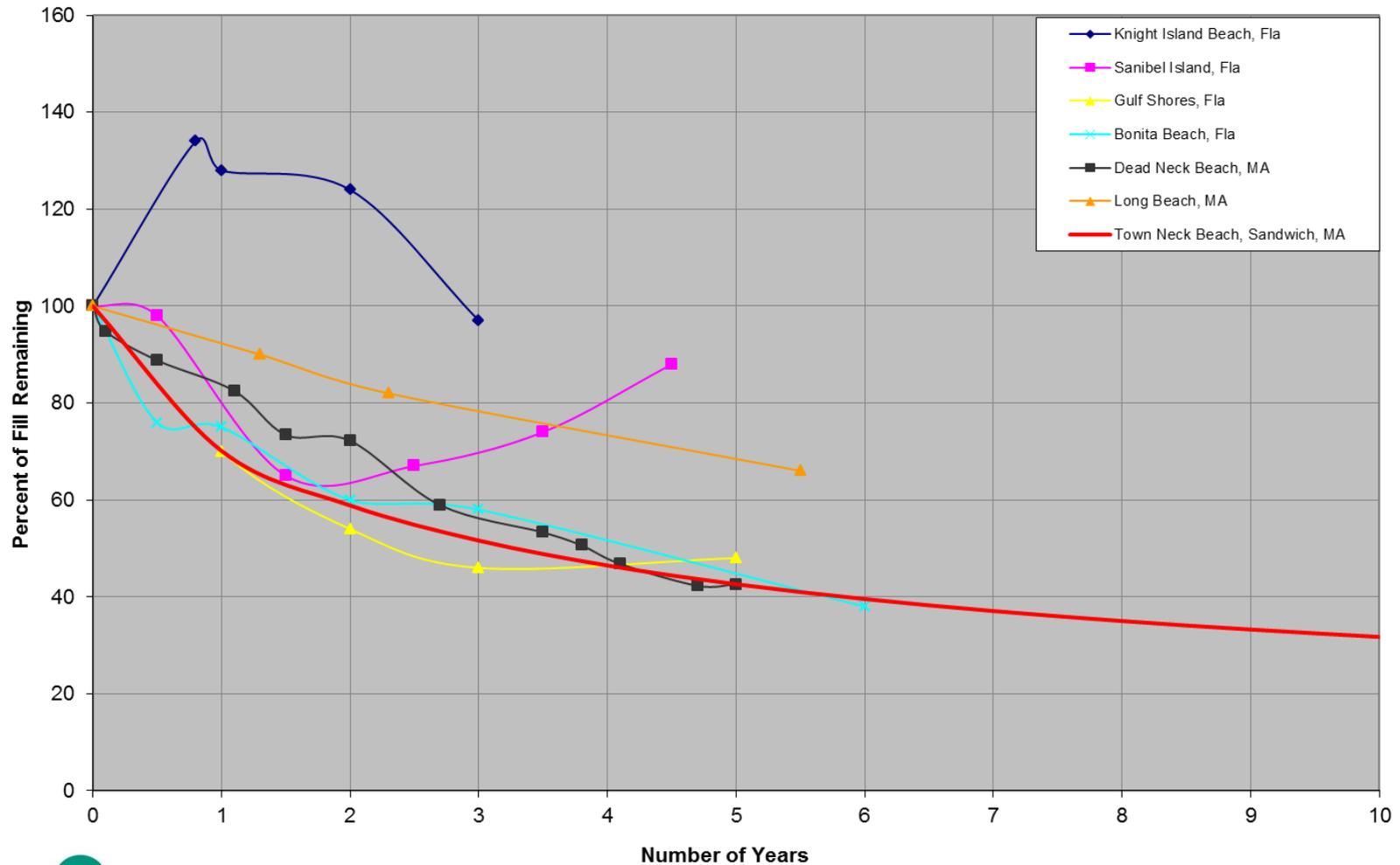


Beach Nourishment Performance



Beach Nourishment Performance

Beach Nourishment Fill Performance

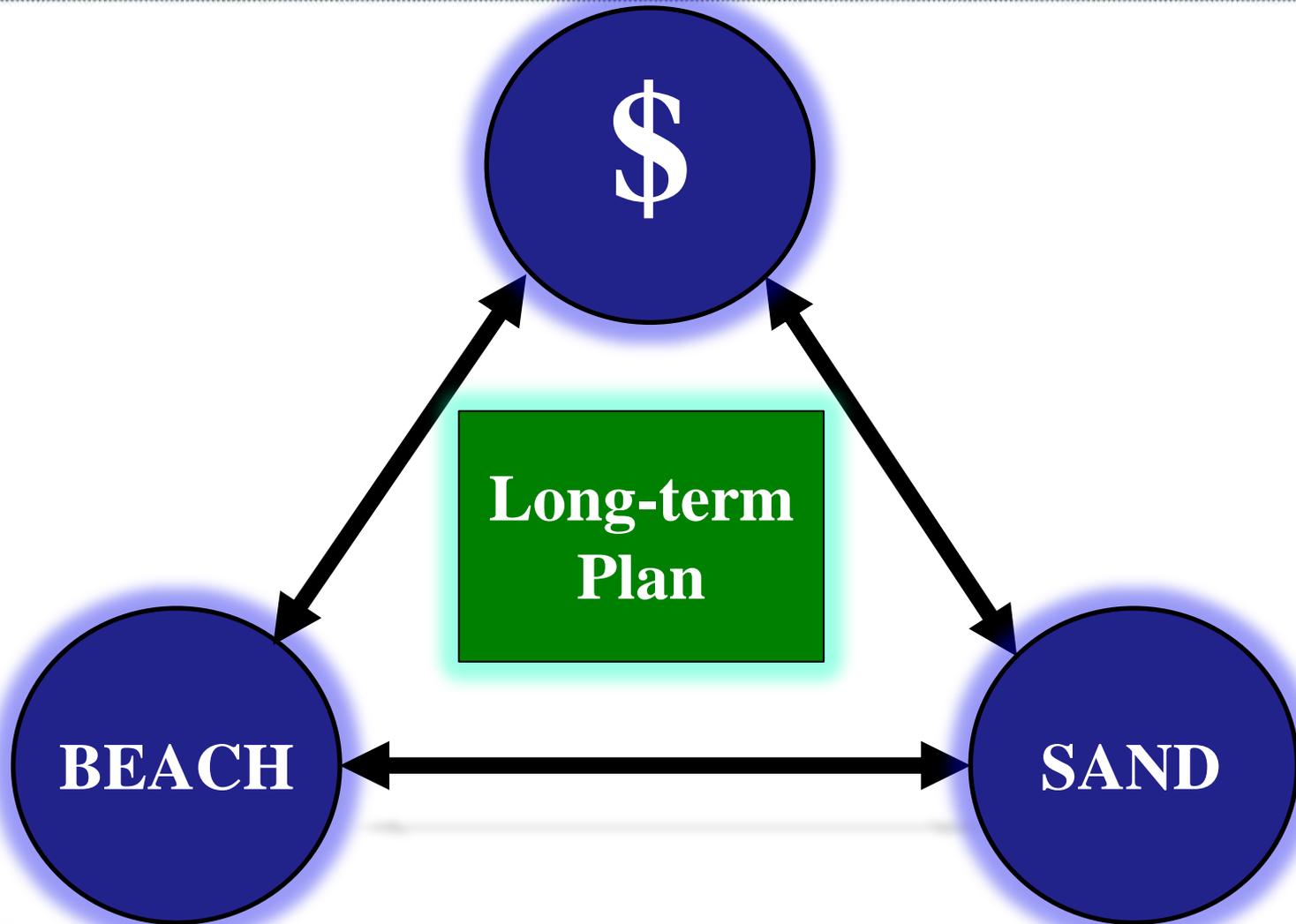


Permits and Timeline

Agency	Permit	File Date	Expected Permit Date
EOEA - MEPA	Secretary Certificate on Expanded ENF	April 15, 2014	May 13, 2014
Conservation Commission	Order of Conditions	May 23, 2014	July 21, 2014
DEP - Waterways	Chapter 91 Permit	May 30, 2014	Sept. 5, 2014
DEP - Wetlands	Water Quality Certification	May 30, 2014	Aug. 15, 2014
MA CZM	CZM Consistency Statement	May 30, 2014	Sept. 26, 2014
USACE	Individual Permit	May 30, 2014	Oct. 10, 2014

Support and approval from MA CZM and EOEA

The Money



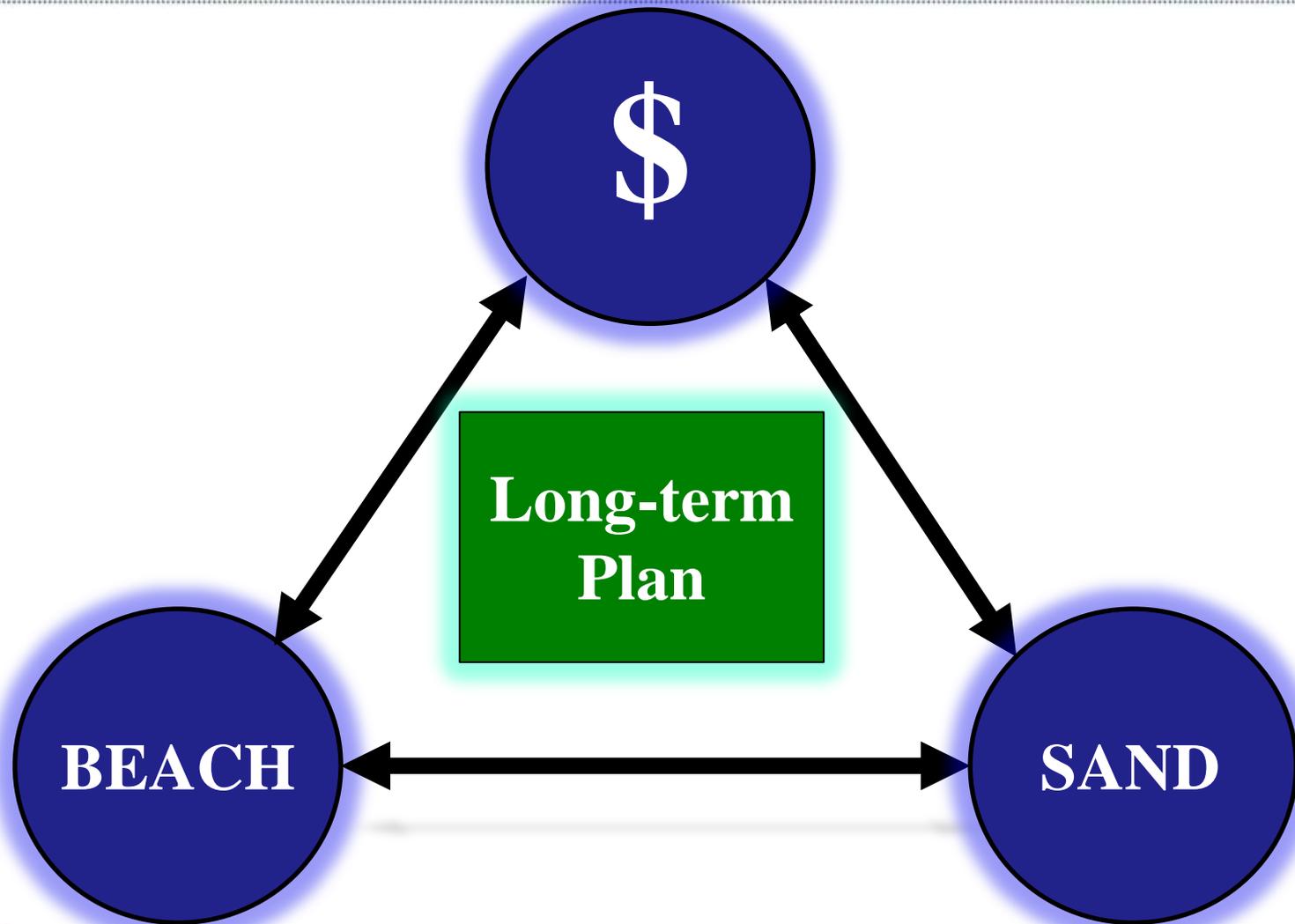
The Money

- Hurricane Sandy Coastal Resilience Grant
 - \$5 million
 - \$1.26 million from CPA funds and town match
 - Grants selected and notified by mid-April
- FEMA Reimbursement from Sandy and Nemo
 - \$4.8 million
 - 6 months to a year
- USACE Section 204 Study
 - Cost share with USACE for disposal cost of nourishment placement
 - 6 months

Provide adequate funding for project



The Sand



Potential Sediment Sources

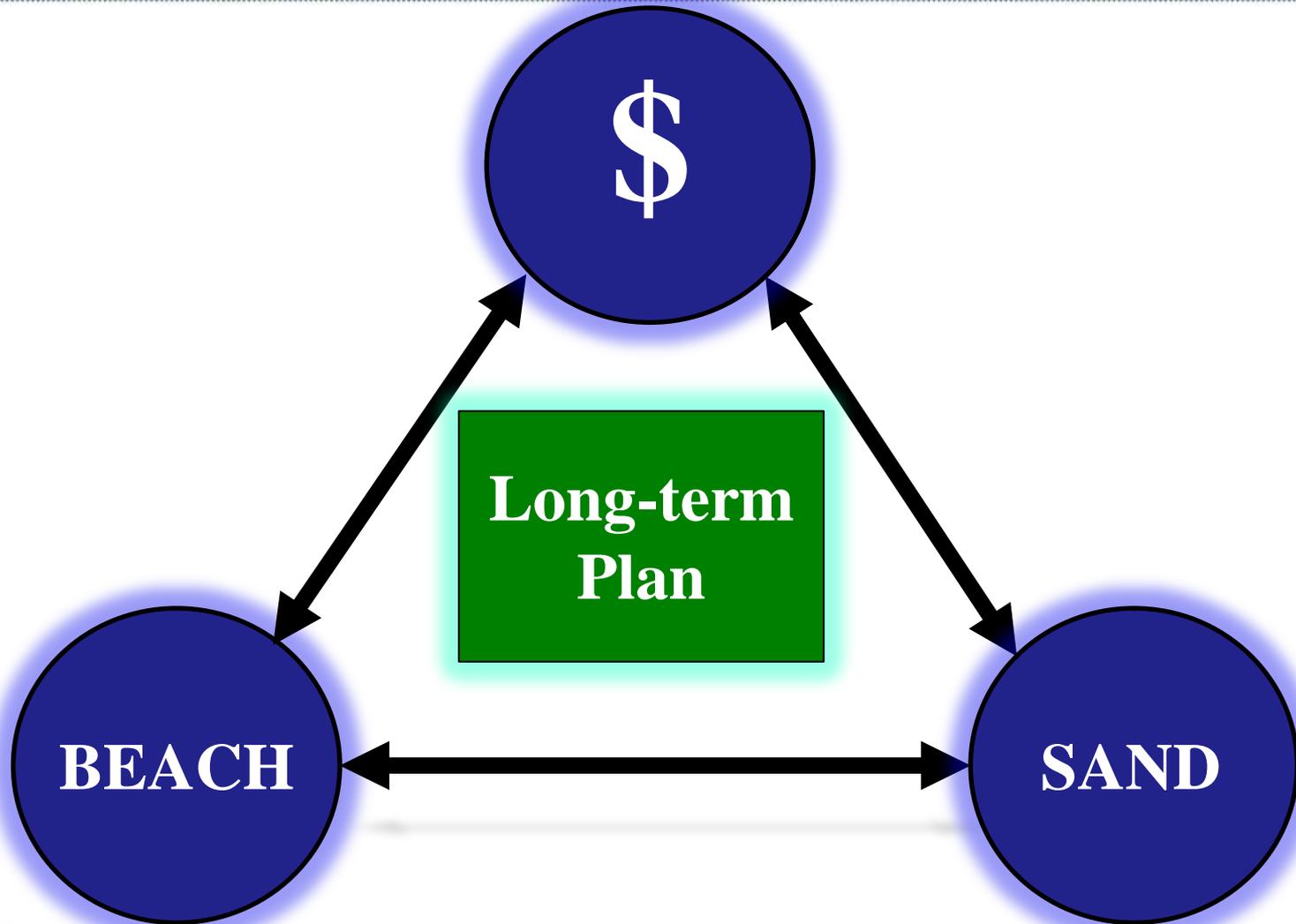


Potential Sand Sources

- Upland
- Cape Cod Canal
- Nearshore area off Scusset Beach
 - Evaluation funded in Sandy grant
- Other offshore sources

Construction in
Winter 2015

Long-term Plan



Long-Term Plan

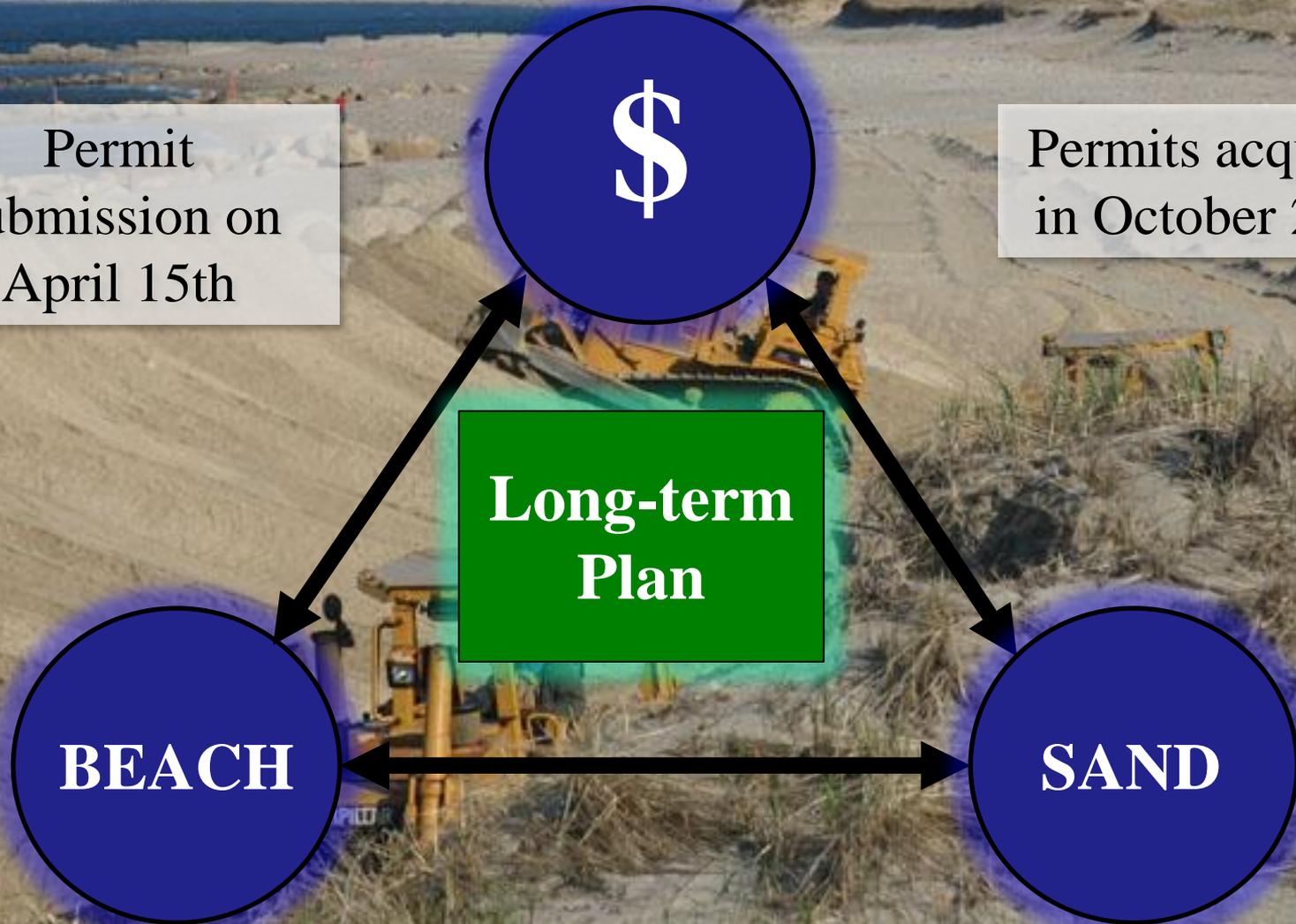
- Periodic dredging of the Cape Cod Canal
 - Approximately every 5-10 years
- **Section 111 Study has been approved!!**
 - Requires mitigation for impacts of federal navigation structure
 - \$5 million cap on mitigation solution
 - > 5 years timeline



Questions?

Permit
submission on
April 15th

Permits acquired
in October 2014



BEACH

SAND

**Long-term
Plan**

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