New Jersey Back Bays Coastal Storm Risk Management Interim Report and Environmental Scoping Document

Virtual Meeting

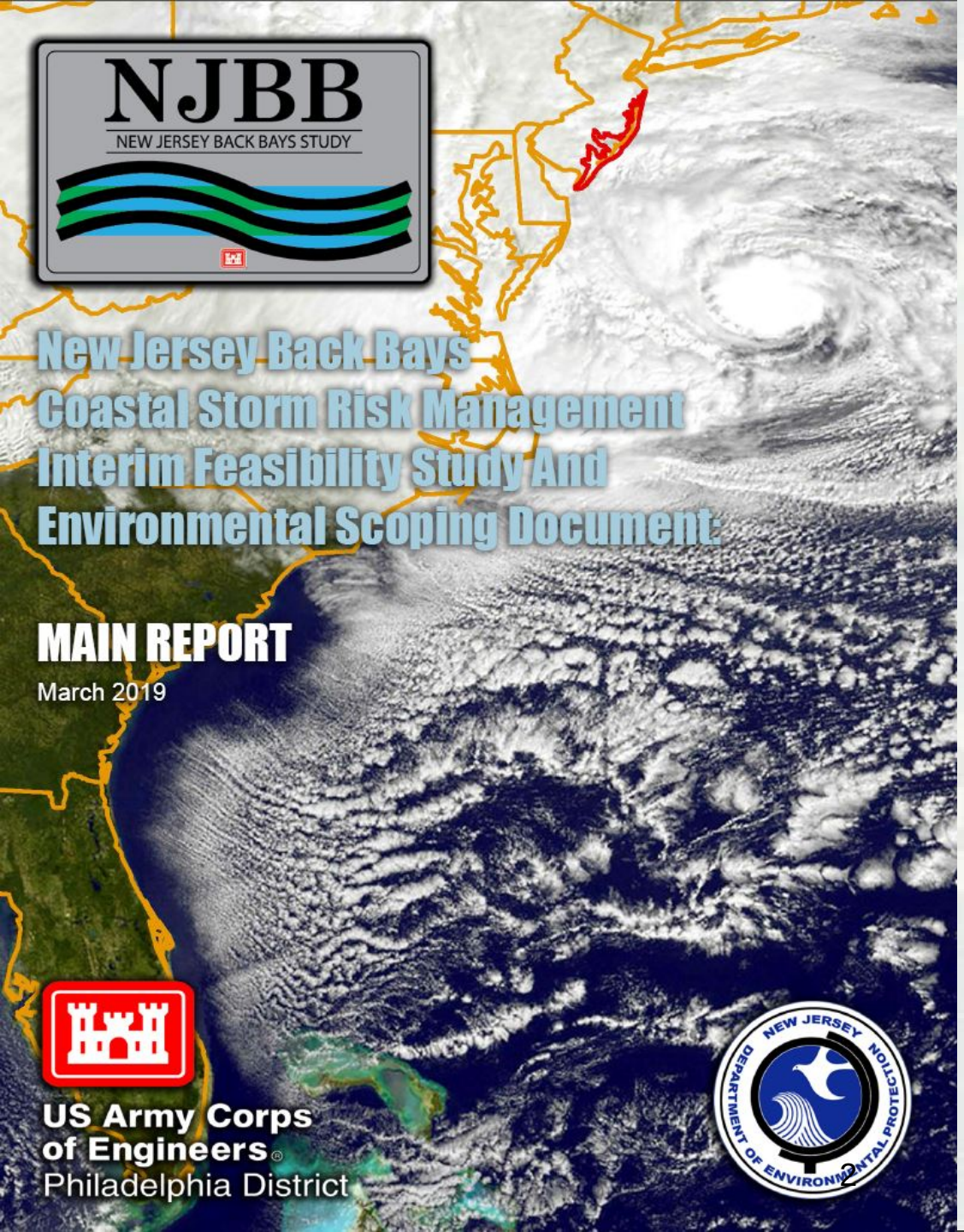
14 March 2019

US Army Corps of Engineers Philadelphia District

NJBB
NEW JERSEY BACK BAYS STUDY

US Army Corps of Engineers

U.S.ARMY



Agenda

- Report Highlights
- Focused Array Overview
- Process Overview
- Questions & Answers
- Closing Comments

New Jersey Back Bays Coastal Storm Risk Management Study

Interim Report

The U.S. Army Corps of Engineers and the New Jersey Department of Environmental Protection announced the release of an Interim Report for the New Jersey Back Bays Coastal Storm Risk Management Study, and a virtual meeting on March 14, 2019 from 9 a.m. to 10 a.m. The Interim Report presents a focused array of alternative plans that manage risk and reduce damages from coastal storms as well as the engineering, economic, social, and environmental analyses that have been conducted to develop the focused array of alternatives outlined in the report. The Army Corps and NJDEP invite the public to comment on the report by April 1, 2019. Comments can be submitted by email or in writing to: U.S. Army Corps of Engineer Planning Division, 100 Penn Square E. Philadelphia PA 19107.

- News Release (with webinar details)
- Executive Summary
- Main Report
- Appendix A - Plan Formulation
- Appendix B - Engineering
- Appendix C - Economics
- Appendix D - Nonstructural Analyses
- Appendix E - Correspondence and Communication
- Appendix F - Environmental and Cultural

Public Meetings

The U.S. Army Corps of Engineers and the New Jersey Department of Environmental Protection hosted public meetings regarding the New Jersey Back Bays Flood Risk Management study on Sept. 12, 2018 in Ventnor City, N.J. and on Sept 13 in Toms River Township, N.J. Some of the measures that were discussed at the public meetings included structural solutions such as storm surge barriers, tide gates, levees, and floodwalls; non-structural solutions such as elevating homes; and nature-based features such as marsh restoration and the creation of living shorelines.

- Presentation for Public Meeting in Toms River, NJ (Sept. 13, 2018)
- Presentation for Public Meeting in Ventnor City, NJ (Sept. 12, 2018)
- New Jersey Back Bays Fact Card (Sept 2018)
- Public Comment Form (Sept 2018)
- Meeting Welcome Form (Sept 2018)

Contact

Philadelphia District
Planning Division
100 Penn Square E.
Philadelphia, PA 19107
215-656-6579
Email

Links

Study Area Map
Public Mtg Presentation (Sept 13, 2018)
Public Mtg Presentation (Sept 12, 2018)
Public Comment Form (Sept. 2018)
Meeting Welcome Form (Sept. 2018)
Public Outreach Summary
Study Fact Card
Study Overview Factsheet

Study Documents

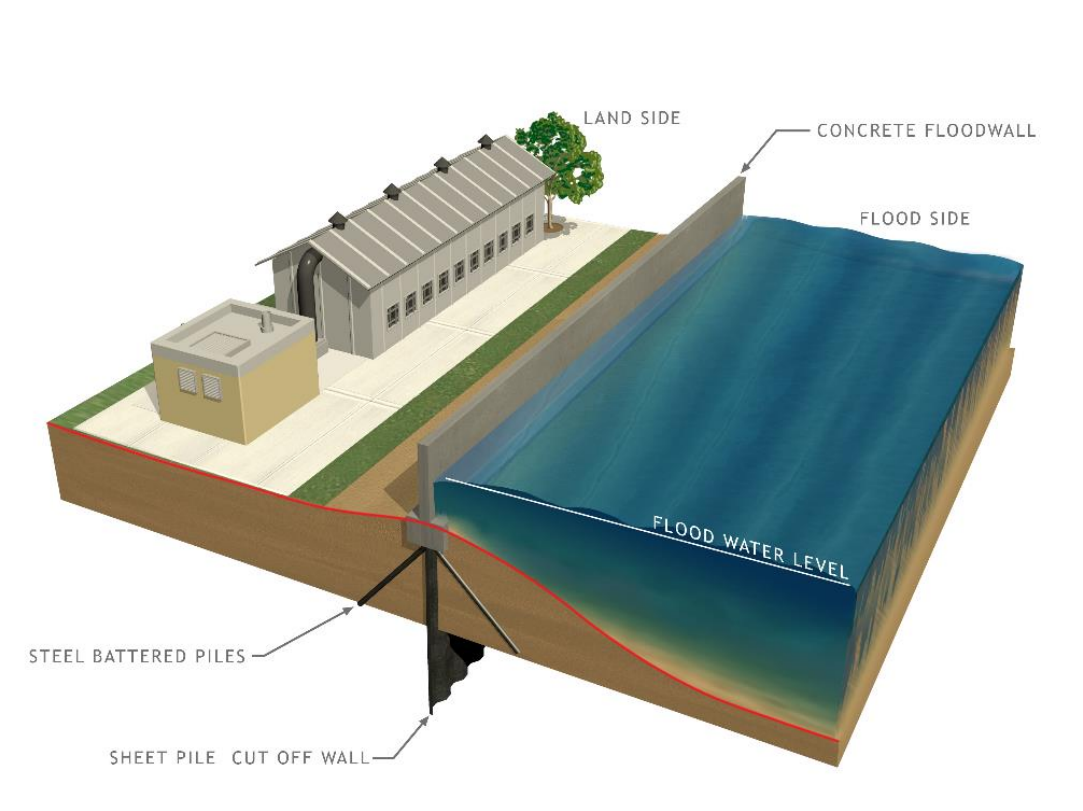
⊞ Study Documents
⊞ Presentations
⊞ Sept 2018 Public Meeting Posters

Interim Report Outline

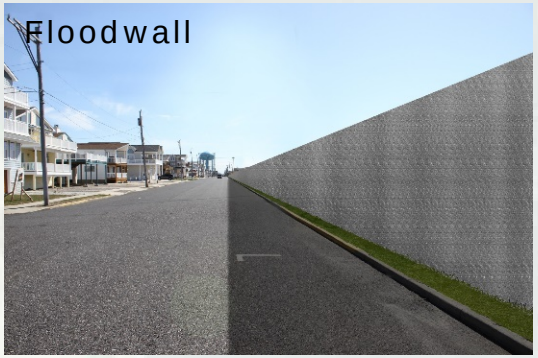
- Executive Summary
- Main Report
- Appendix A - Plan Formulation
- Appendix B - Engineering
- Appendix C - Economics
- Appendix D - Nonstructural Analyses
- Appendix E - Correspondence and Communication
- Appendix F - Environmental and Cultural

Structural Measure – Floodwalls & Levees

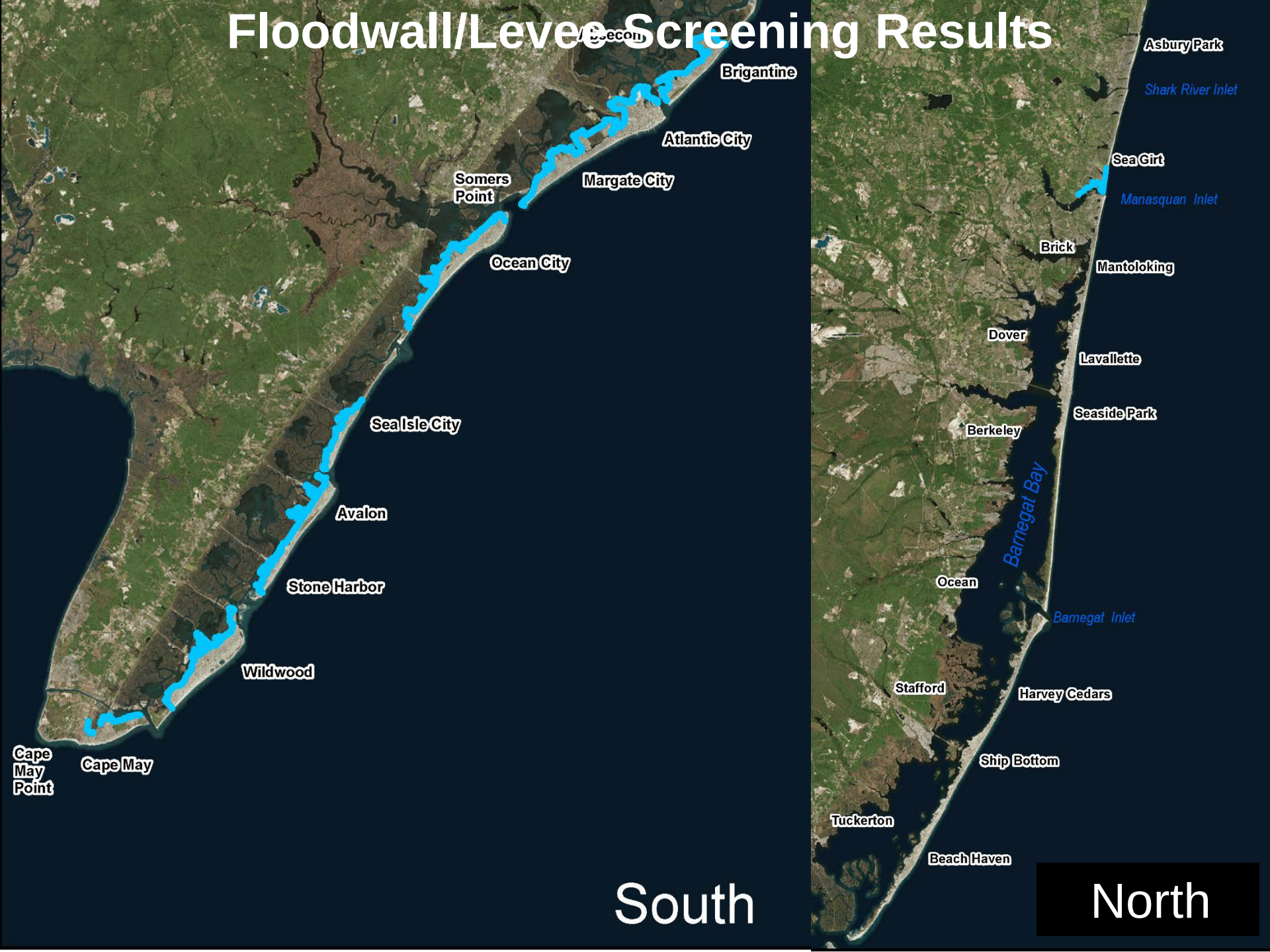
- **Main Report (Ch 9.4, p. 130)**



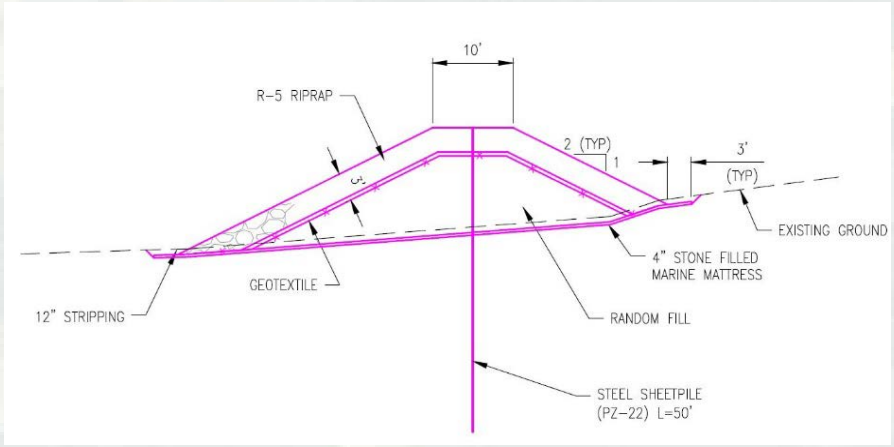
Visual Impacts



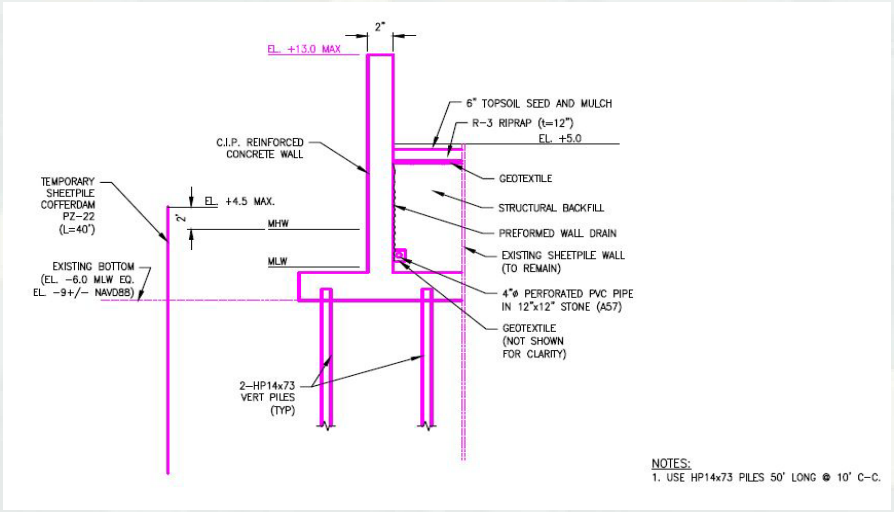
Floodwall/Levee Screening Results



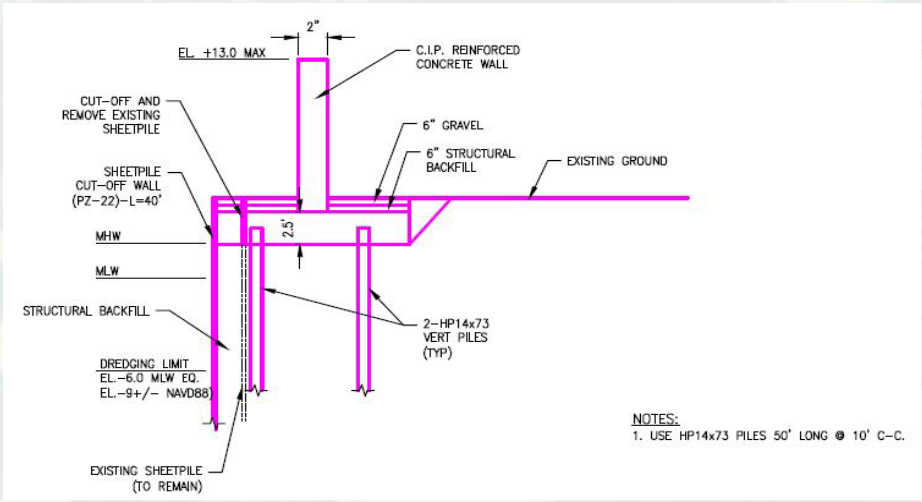
Floodwall/Levee Typical Sections



Levee



Floodwall – water construction

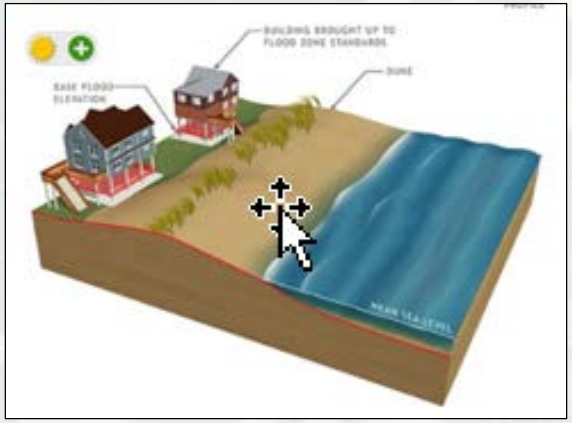


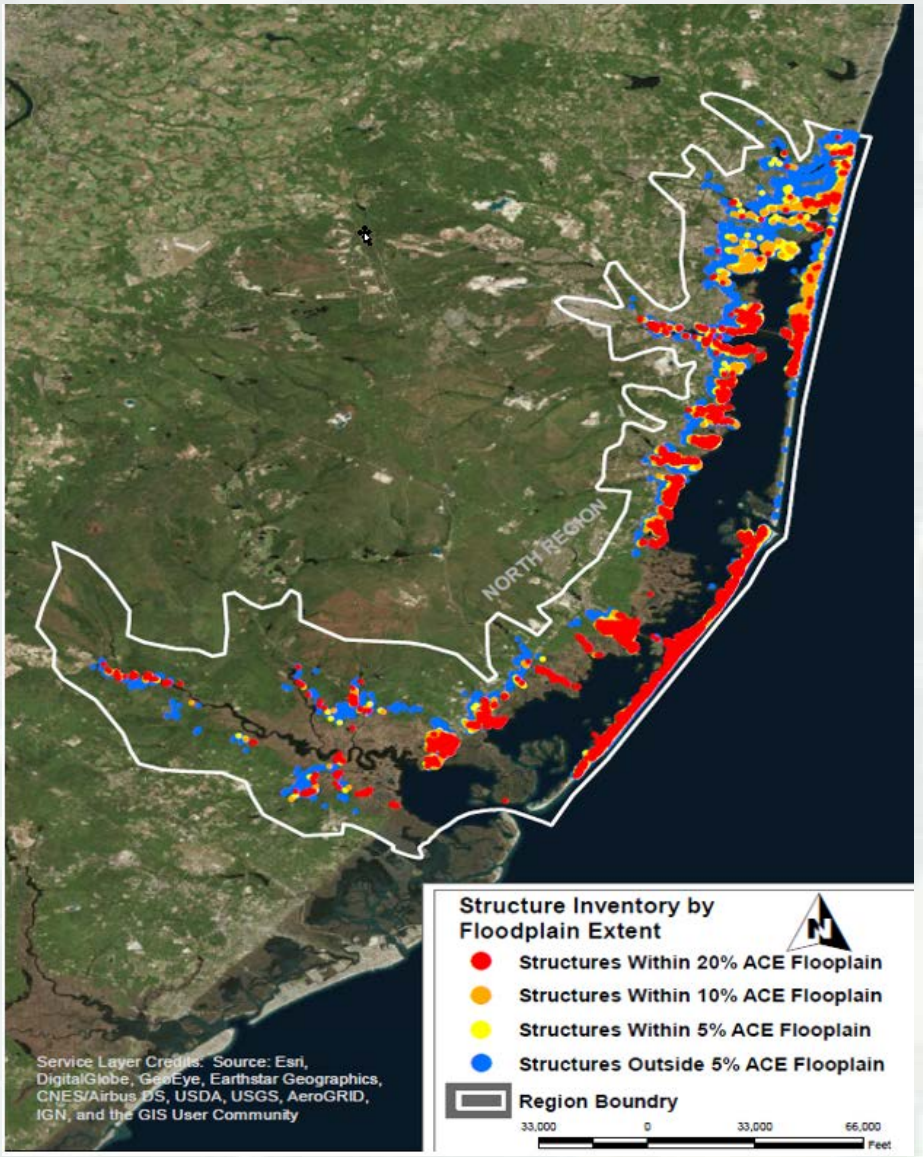
Floodwall – land construction

Nonstructural Measures – Building Elevation

- **Main Report (Ch 9.4, p. 137)**

- **Primary Nonstructural measures**
  - **Building elevation**
  - **Acquisition and relocation later**
- **Recommended in combination with structural measures to formulate economically justified hybrid plans**
- **The process**
  - **Develop structure inventory**
  - **Identify Design Flood Elevation (DFE) = FEMA BFE + 3 feet**
  - **Approximately 30,000 structures in the 20-year floodplain**
  - **Additional floodplains beyond 5-, 10-, and 20-year floodplains**



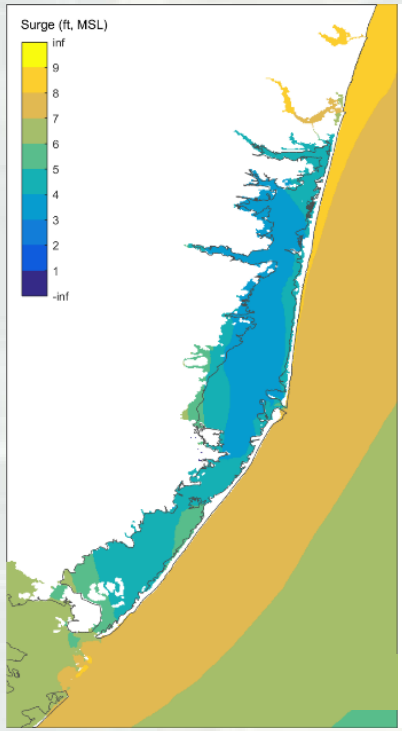


Structural Measure - Storm Surge Barriers

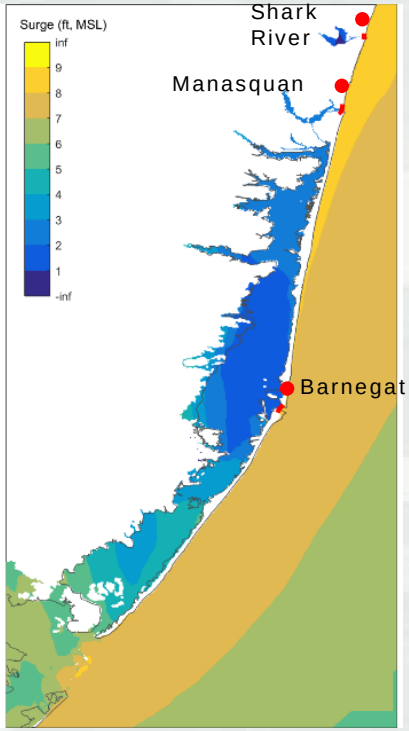
- **Main Report Ch 8, 9**

Seabrook - New Orleans, LA

Example at Barnegat Inlet, NJ



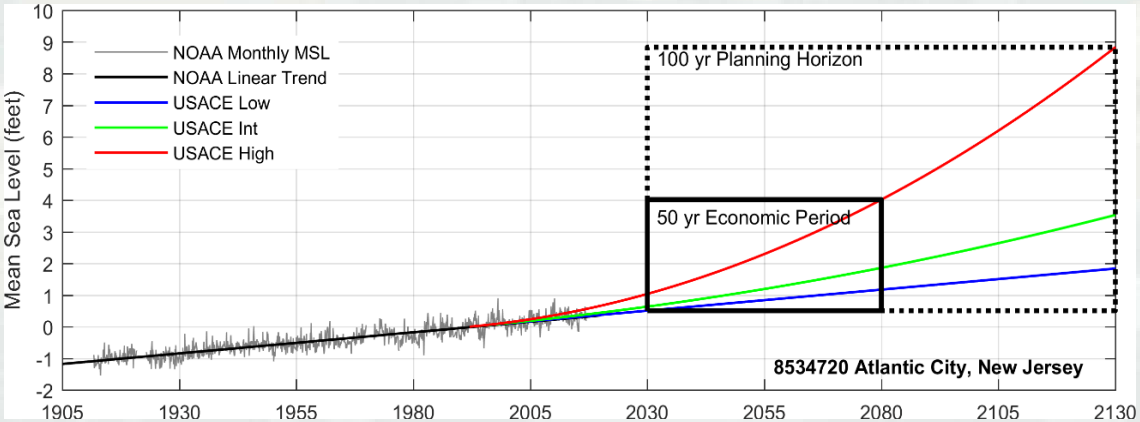
Existing Conditions



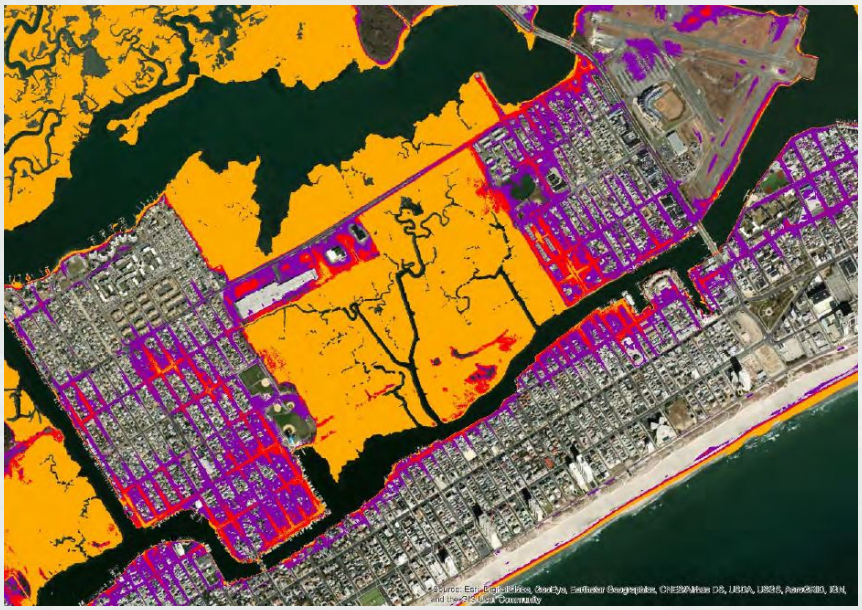
Barrier Alternative

Interim Report Engineering Highlights

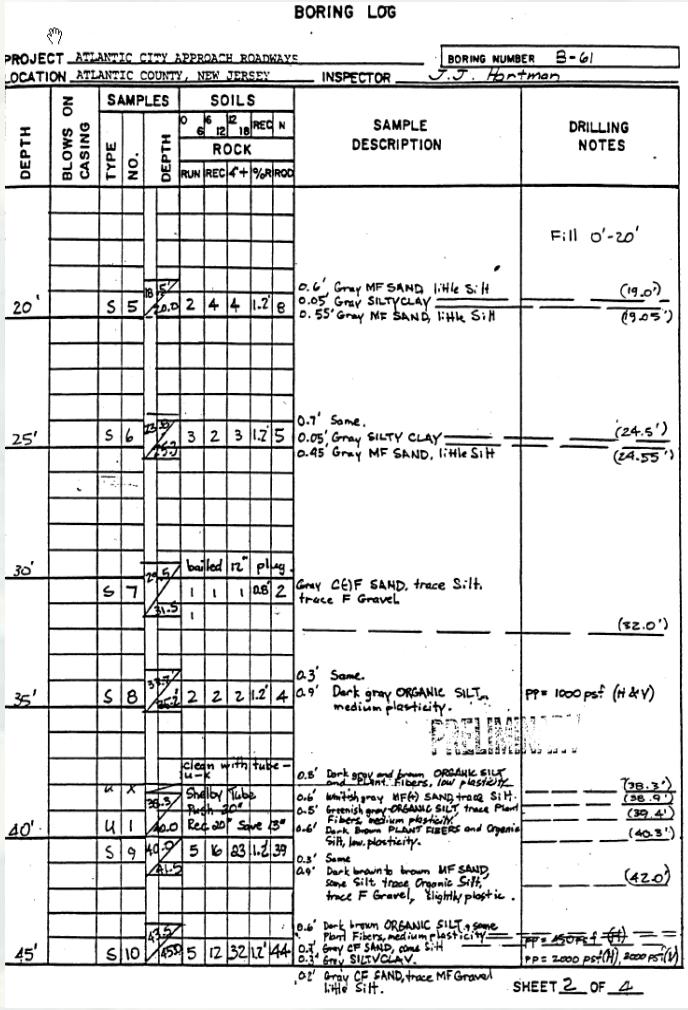
- **Appendix B - Engineering**



Relative sea level changes for the study area



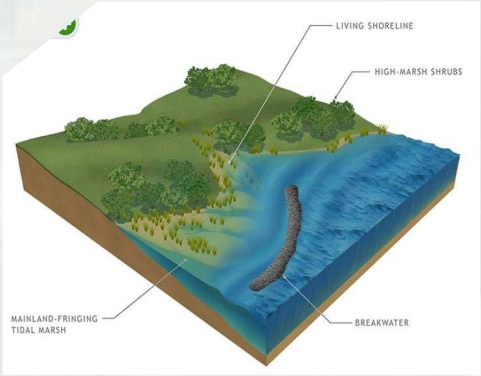
NWS stage floodplains



Geotechnical boring log

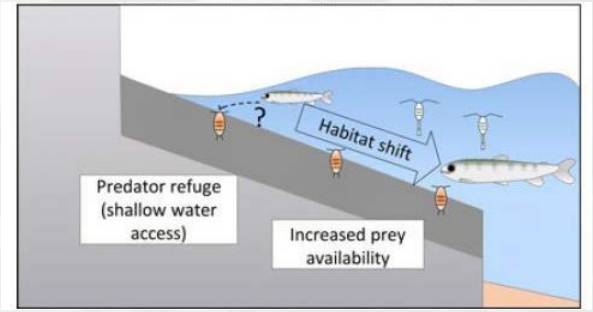
Natural and Nature Based Features (NNBF)

- **Main Report Ch 9.2 and 10.2**



- **Primary NNBF measure under consideration is living shorelines. Current criteria for this measure include:**
  - **Unarmored shorelines adjacent to infrastructure**
  - **Complementary to structural measures such as floodwalls and levees**
- **NJBB study is also considering modifications that can be made to structural measures that can increase their habitat value:**
  - **Habitat benches to restore more natural slope along shorelines**
  - **Textured concrete to support colonization of algae and invertebrates**

Construction of living shoreline in Camp Pecometh, MD

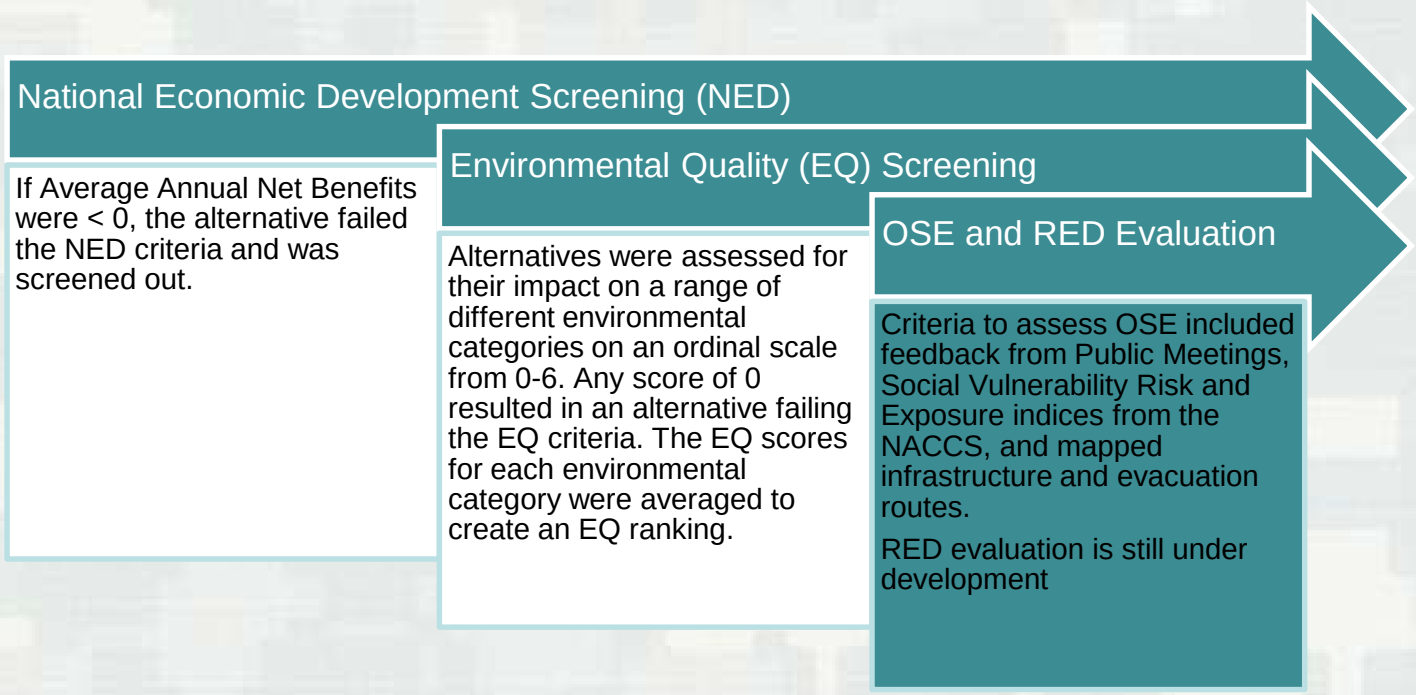


Conceptual diagram of habitat bench

Textured concrete

Alternative Screening, Evaluation, and Comparison using System of Accounts

- **Main Report Ch 9; Appendix A – Plan Formulation**



Remaining alternatives are evaluated as part of the focused array

Environmental Considerations of the Focused Array of Alternatives

- **Main Report Ch 6, 11; Appendix F**

STRUCTURAL MEASURES

Perimeter Plans: Floodwalls/Levees

Temporary Impacts:
- Water Quality/Turbidity
- Habitat disturbance
- Air Quality/Noise
- Community

Permanent/Cumulative Impacts:
- High Direct Habitat Losses
- High Mitigation Costs
- Community/Visual Aesthetics

Storm Surge Barriers: Inlet/Bay Closures

Temporary Impacts:
- Water Quality/Turbidity
- Habitat disturbance
- Air Quality/Noise
- Community

Permanent/Cumulative Impacts:
- Lower Direct Habitat Losses
- Potential High Indirect Impacts
- Potential High Mitigation Costs
- Potential T & E species impacts at some locations
- Localized Community/Visual Aesthetics

NON-STRUCTURAL MEASURES

Building Raising

Temporary Impacts:
- Water Quality/Turbidity
- Low or no Habitat disturbance
- Minor Air Quality/Noise
- Community

Permanent/Cumulative Impacts:
- Low or no Direct Habitat Losses
- Potential High Cultural Resources Impacts
- Community

Acquisition

Temporary Impacts:
- Community
- Water Quality/Turbidity if earth disturbance from building razing

Permanent/Cumulative Impacts:
- Community
- Potential High Cultural Resources Impacts
- Potential Beneficial Environmental Effect If Building Razing Removes Impervious Surface

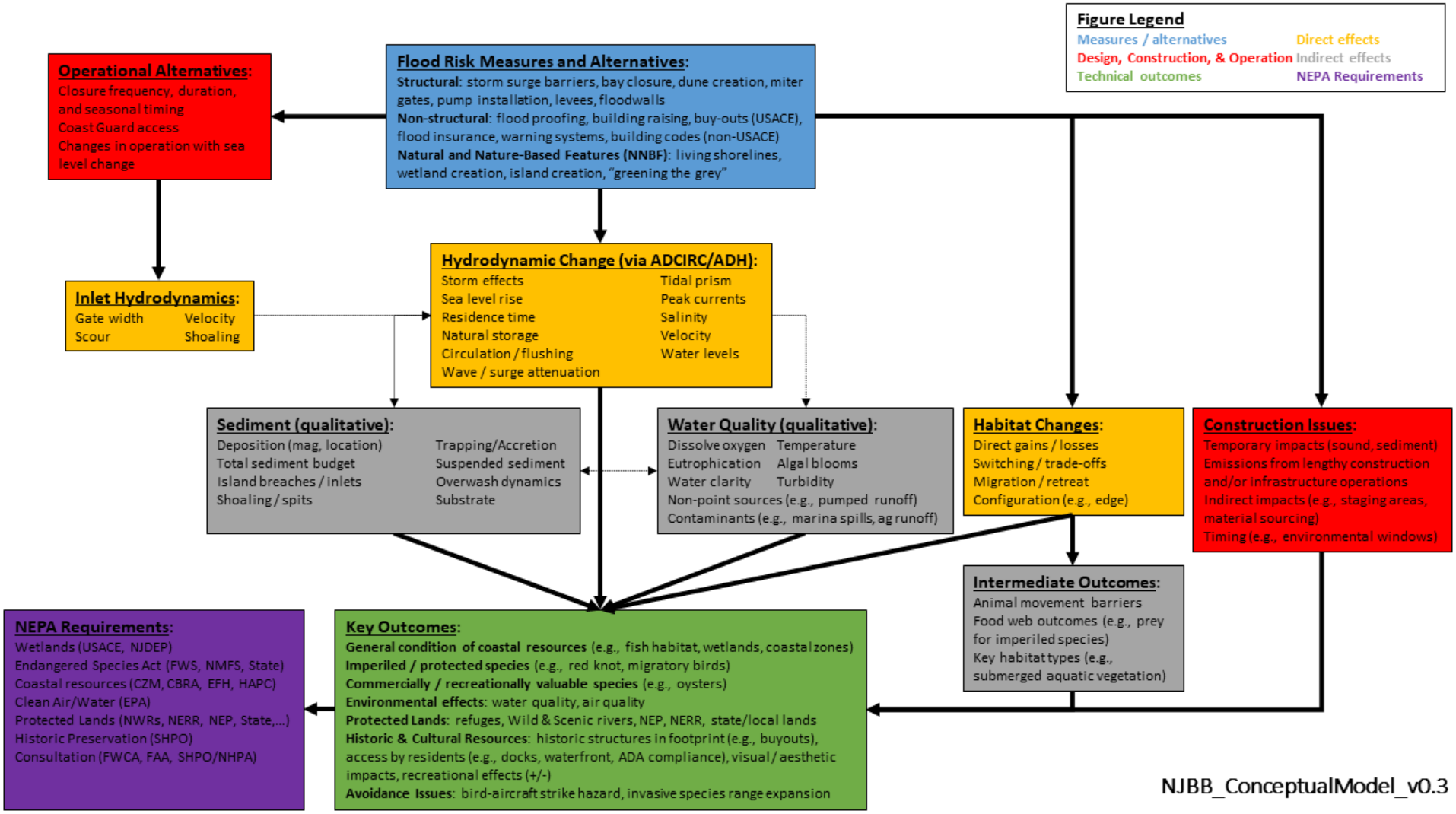
Natural and Nature Based Features (NNBF)

Wetlands/SAVs/ Living Shorelines

Temporary Impacts:
- Water Quality/Turbidity
- Habitat disturbance
- Air Quality/Noise
- Community

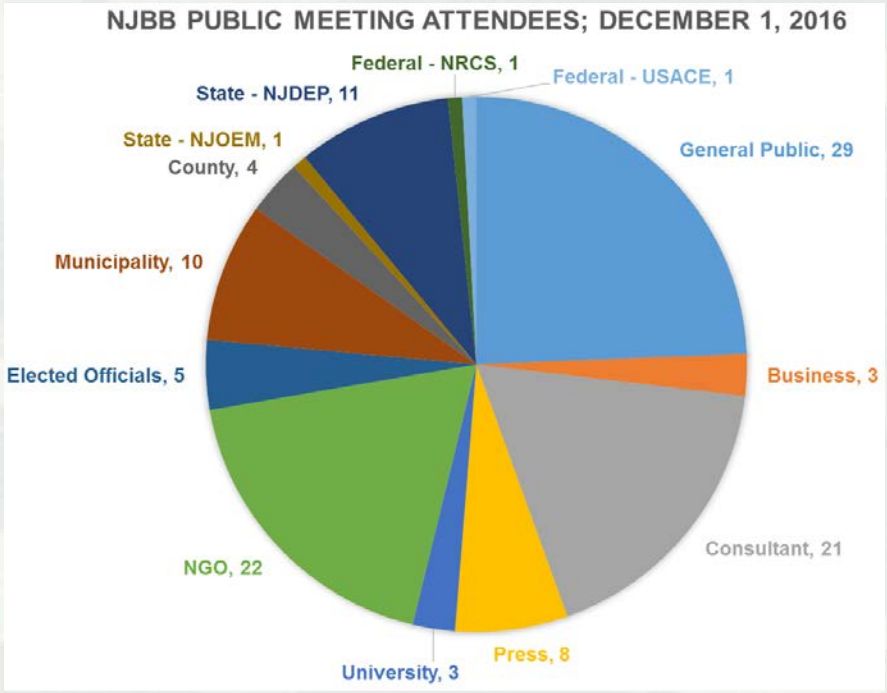
Permanent/Cumulative Impacts:
- Beneficial Ecological Uplift
- Increase in Environmental Services

Preliminary Impact Assessment Conceptual Model



Interim Report Highlights

- **Appendix E - Correspondence and Communication**



Detailed summaries

U.S. Army Corps of Engineers
New Jersey Back Bays
Flood Risk Management Planning Workshop

Coastal Risk Management Strategy Profile

CONTACT INFORMATION (Name, Affiliation, Email, Phone):

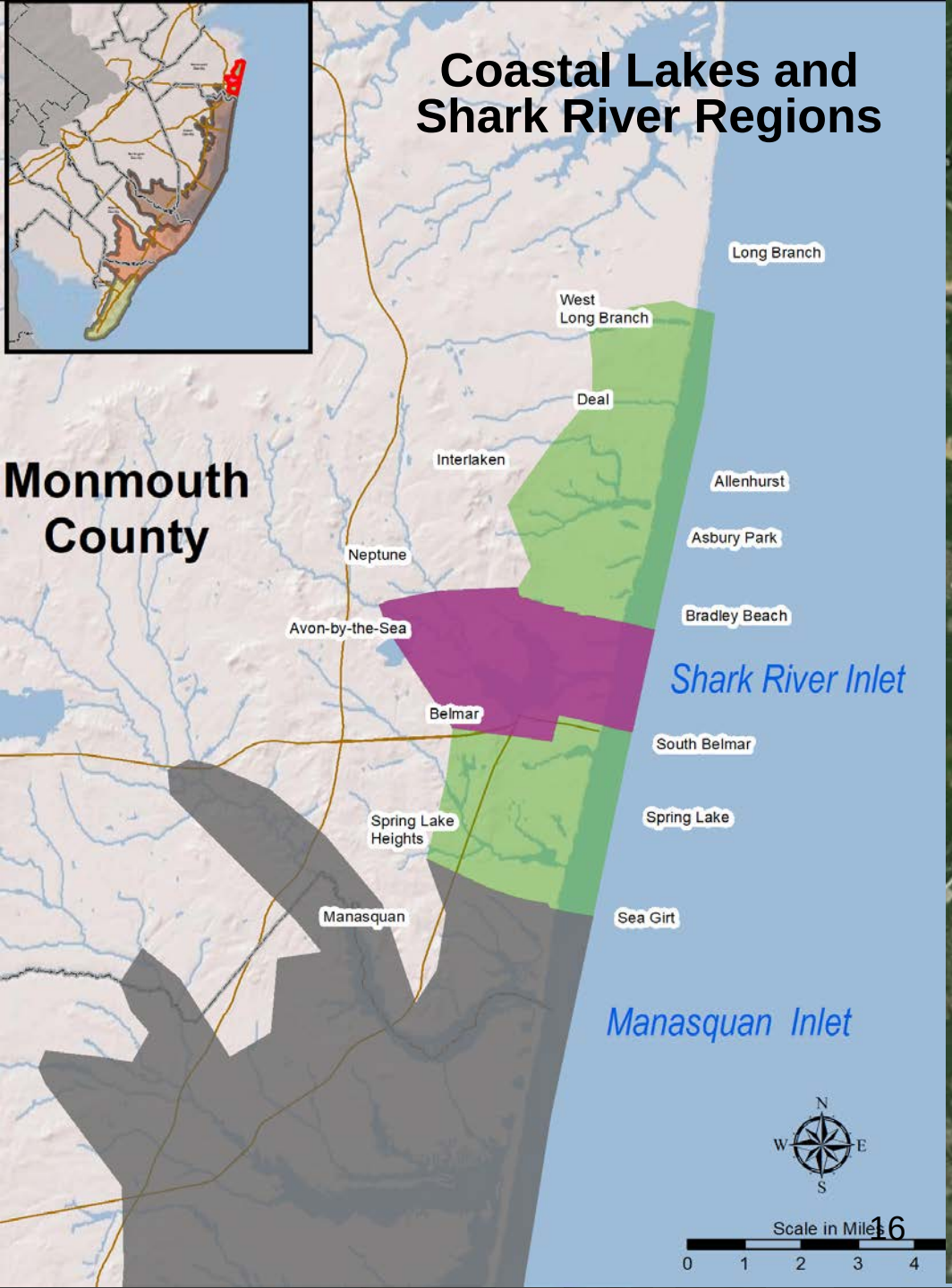
LOCATION (Describe the precise location of the problem; provide a map if possible):

PROBLEM (Define the problem and its general location)

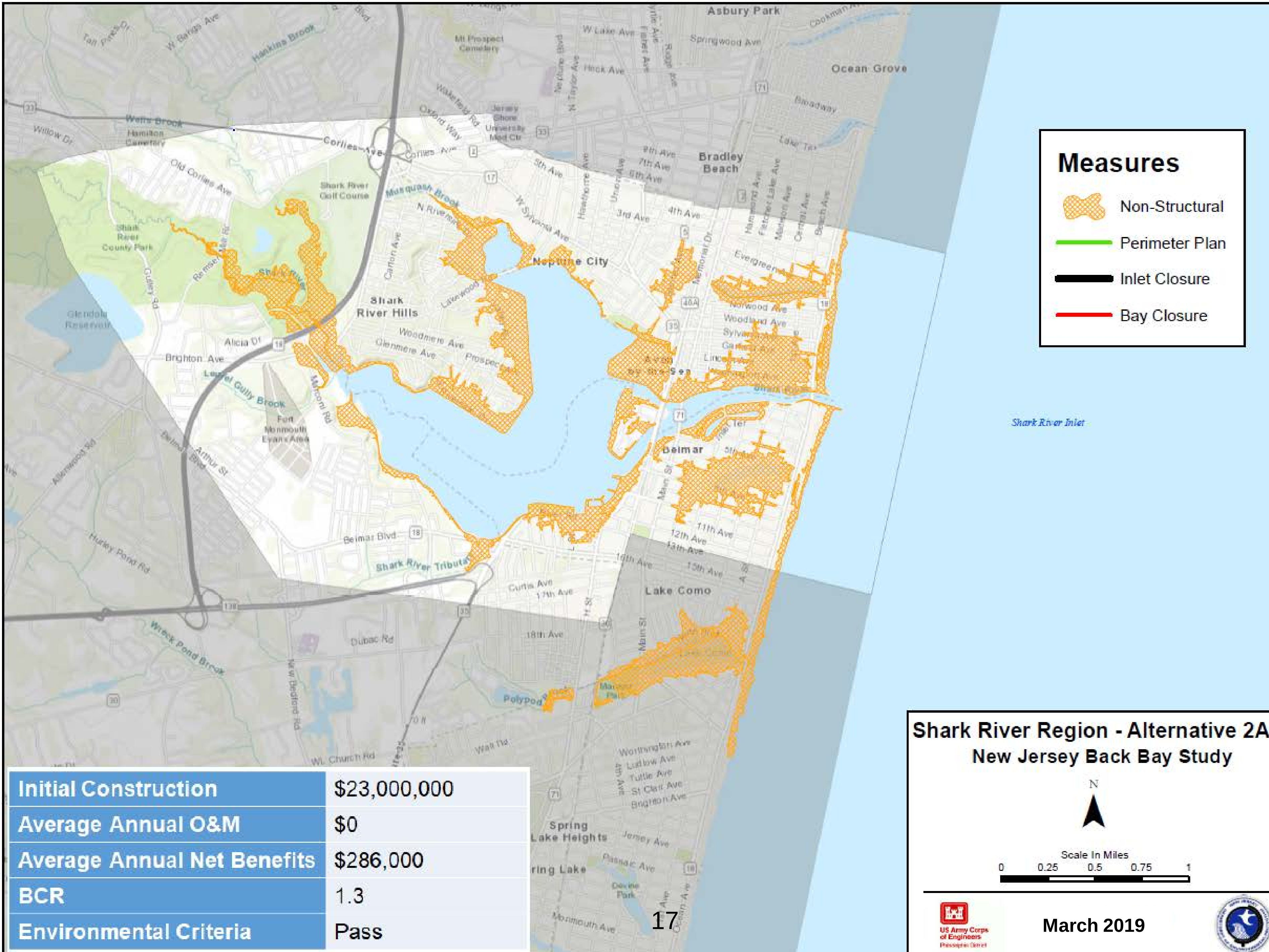
•Discuss if any work has been done on analysis, repairs, advocacy for this problem:

•Provide any specific elevation information of existing management measures:

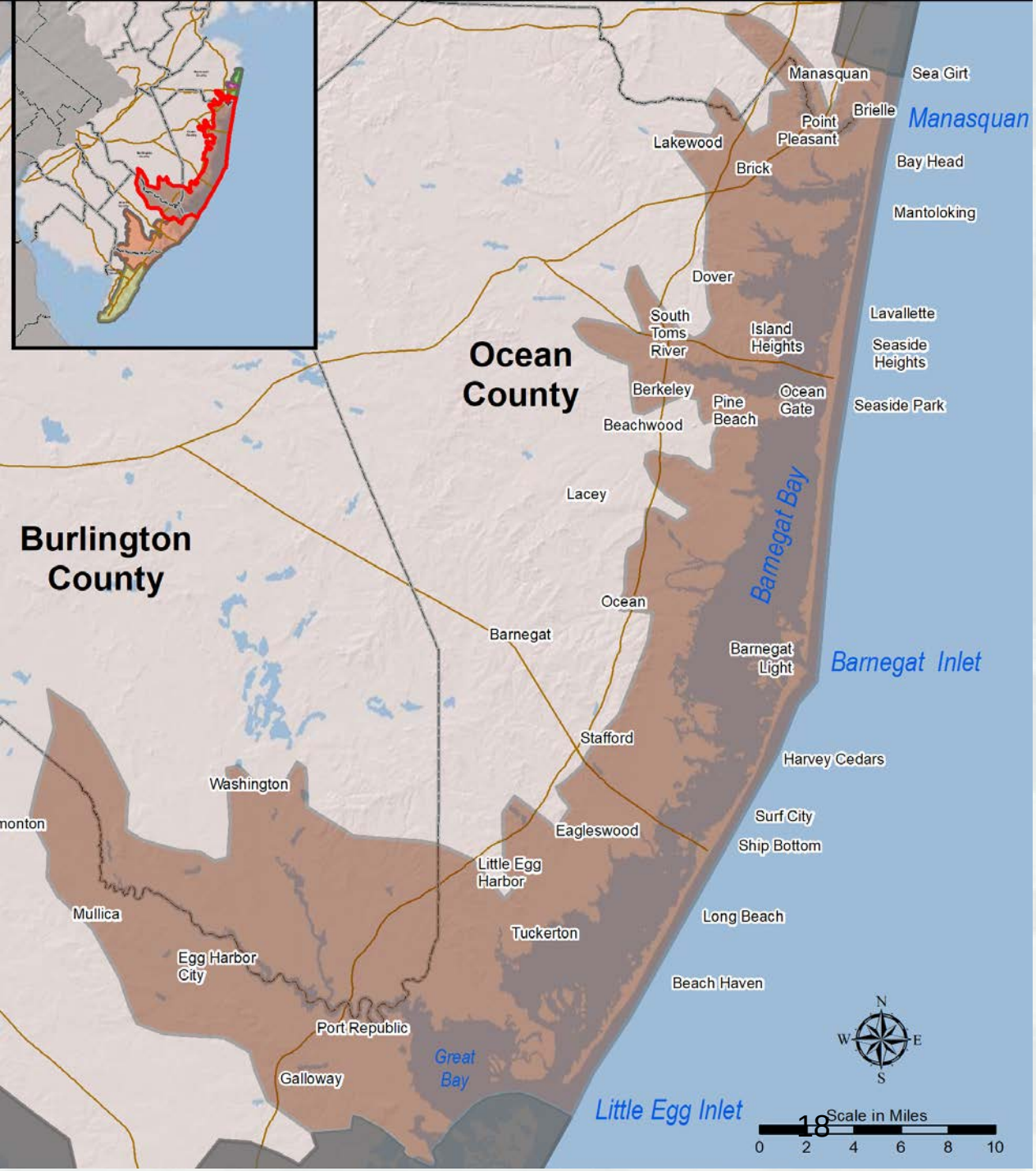
Local flooding profile


Coastal Lakes and
Shark River Regions
Monmouth
County
Long Branch
West
Long Branch
Deal
Interlaken
Allenhurst
Asbury Park
Neptune
Bradley Beach
Avon-by-the-Sea
Shark River Inlet
Belmar
South Belmar
Spring Lake
Heights
Spring Lake
Manasquan
Sea Girt
Manasquan Inlet
N
W
E
S
Scale in Miles
0
1
2
3
4


TAKANASSE
Oakhurst
DEAL LAKE
Wanamassa
SUNSET LAKE
Asbury Park
LAKE WESLEY
LAKE FLETCHER
Shark
River County Park
Neptune City
SYLVAN LAKE
Belmar
SILVER LAKE
LAKE COMO
Spring Lake
Heights
SPRING LAKE
WRECK POND
Manasquan
River
Manasquan
STOCKTON LAKE
Brielle
GLIMMER GLASS
LAKE LOUISE
LITTLE SILVER LAKE
Point
Pleasant Beach
LAKE OF THE LILLIES
TWILIGHT LAKE
Point
Pleasant

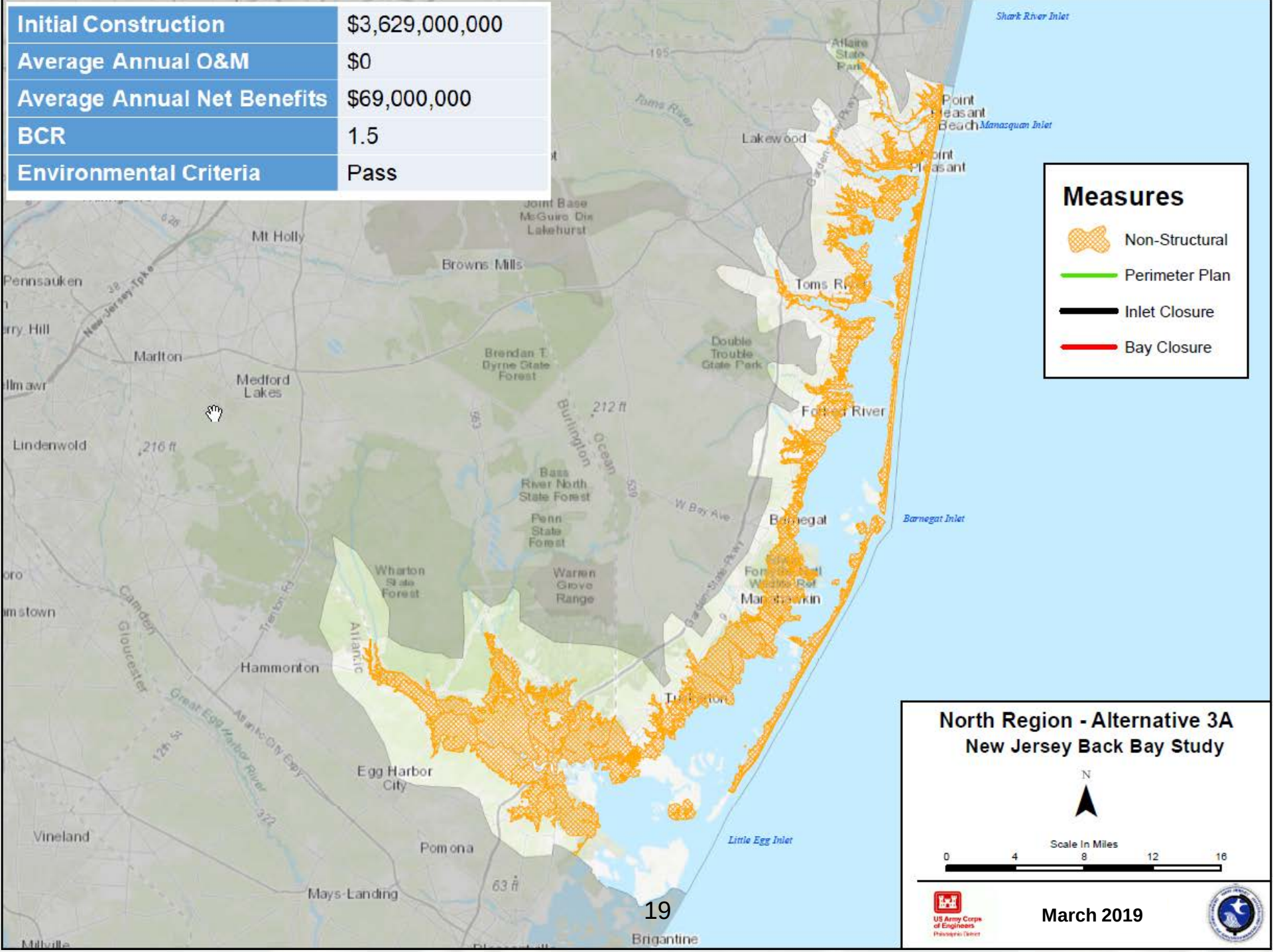


Initial Construction	$23,000,000
Average Annual O&M	$0
Average Annual Net Benefits	$286,000
BCR	1.3
Environmental Criteria	Pass

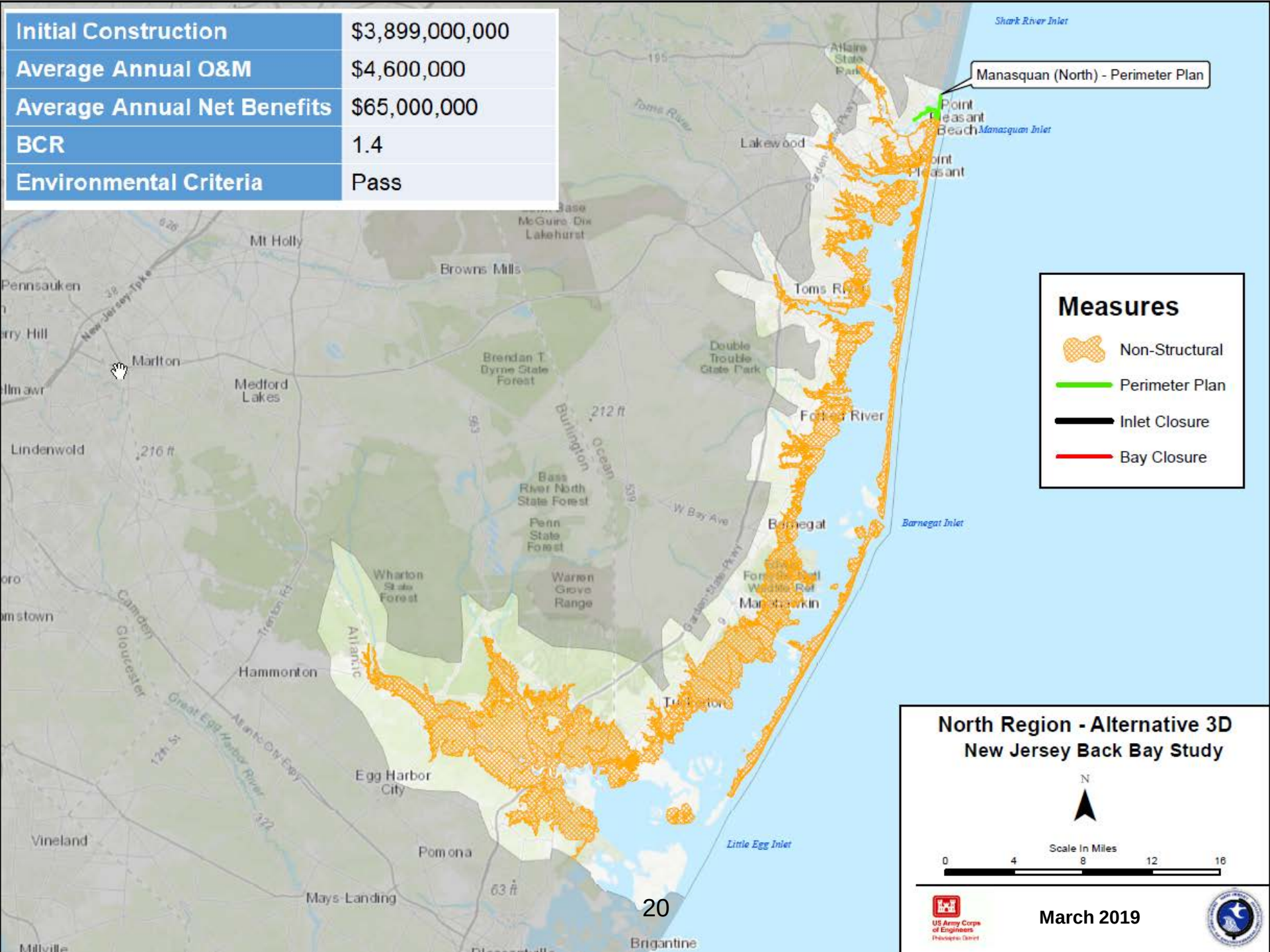


North Region

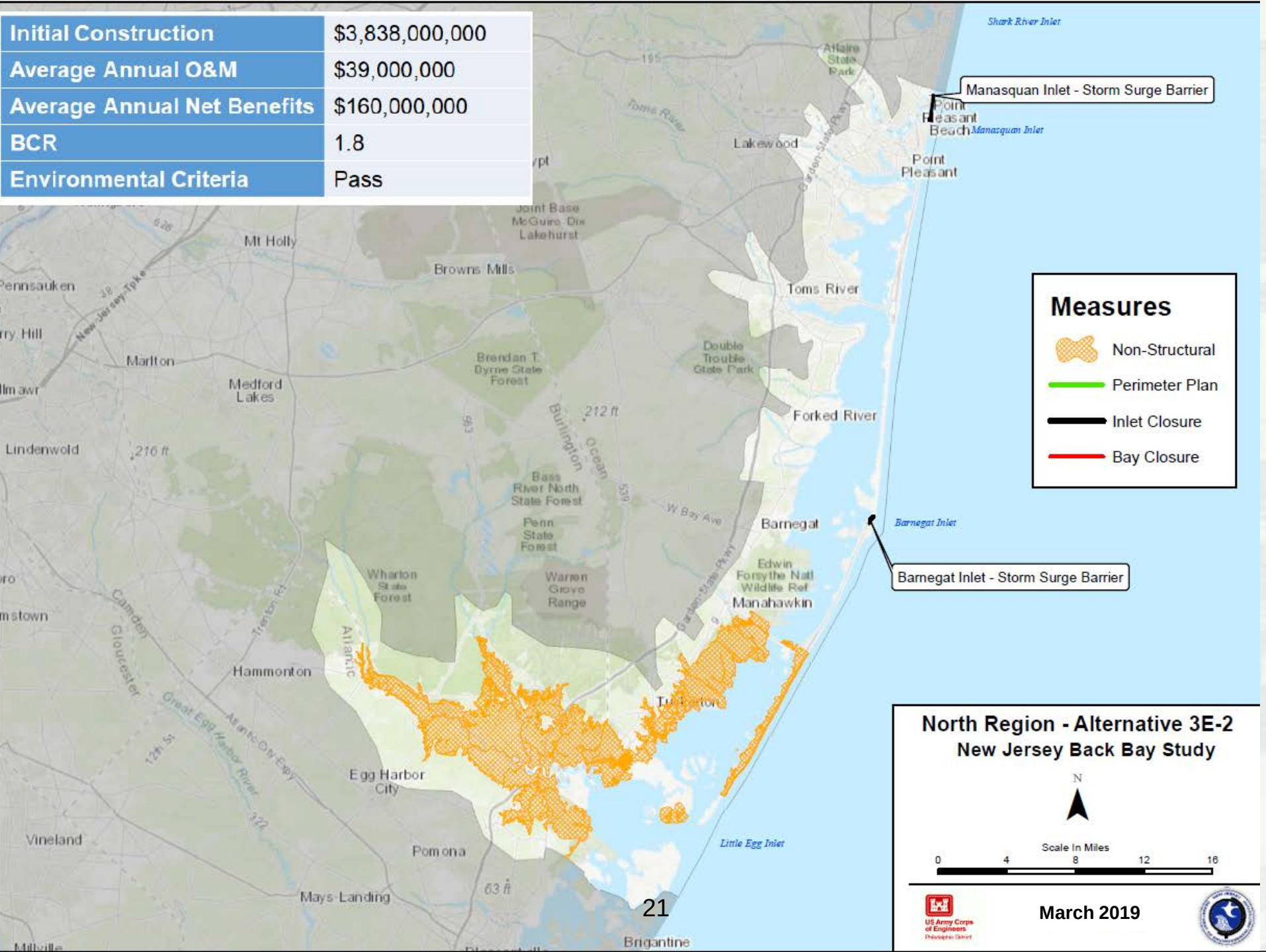
Initial Construction	$3,629,000,000
Average Annual O&M	$0
Average Annual Net Benefits	$69,000,000
BCR	1.5
Environmental Criteria	Pass



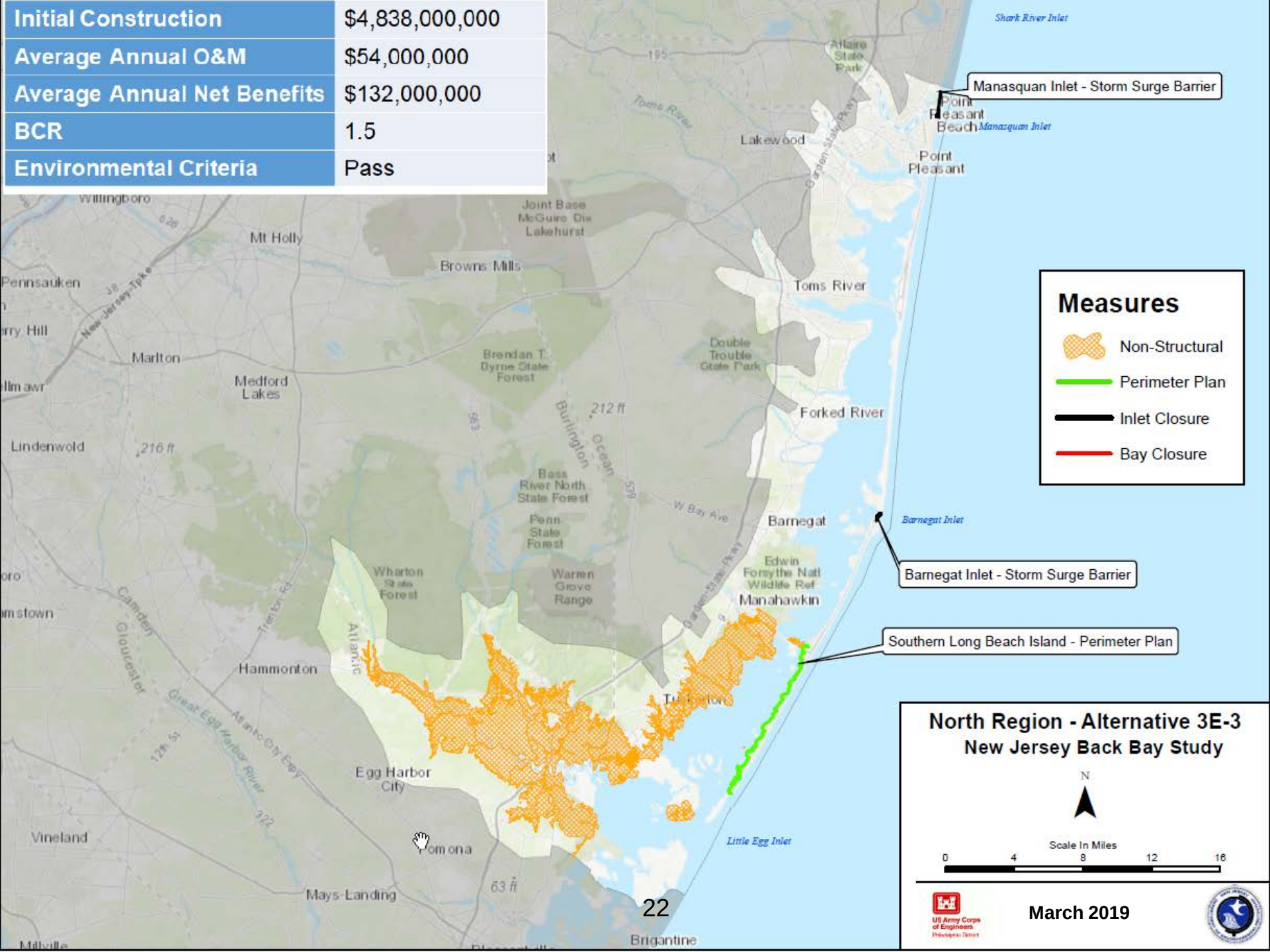
Initial Construction	$3,899,000,000
Average Annual O&M	$4,600,000
Average Annual Net Benefits	$65,000,000
BCR	1.4
Environmental Criteria	Pass

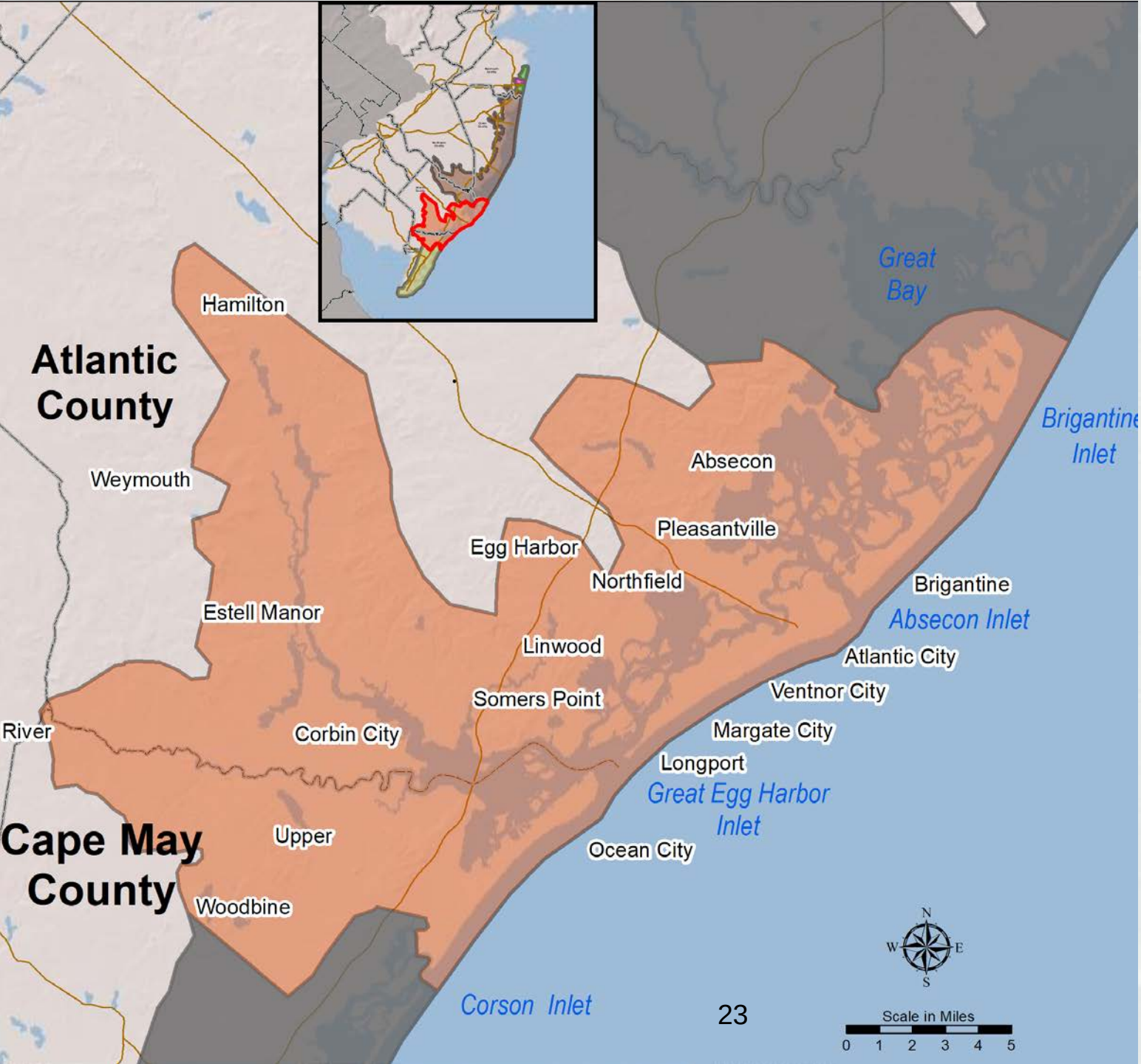


Initial Construction	$3,838,000,000
Average Annual O&M	$39,000,000
Average Annual Net Benefits	$160,000,000
BCR	1.8
Environmental Criteria	Pass

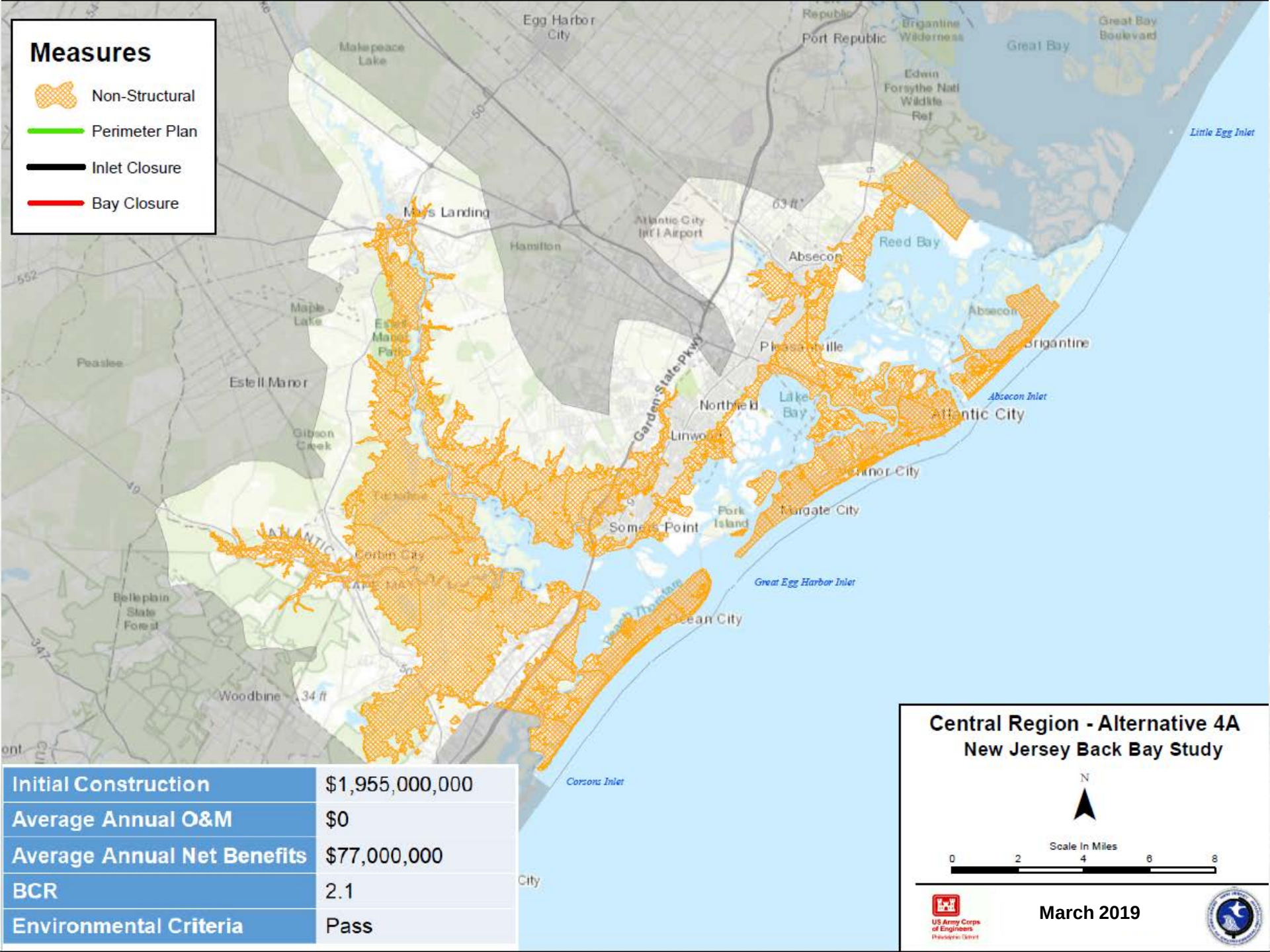


Initial Construction	$4,838,000,000
Average Annual O&M	$54,000,000
Average Annual Net Benefits	$132,000,000
BCR	1.5
Environmental Criteria	Pass

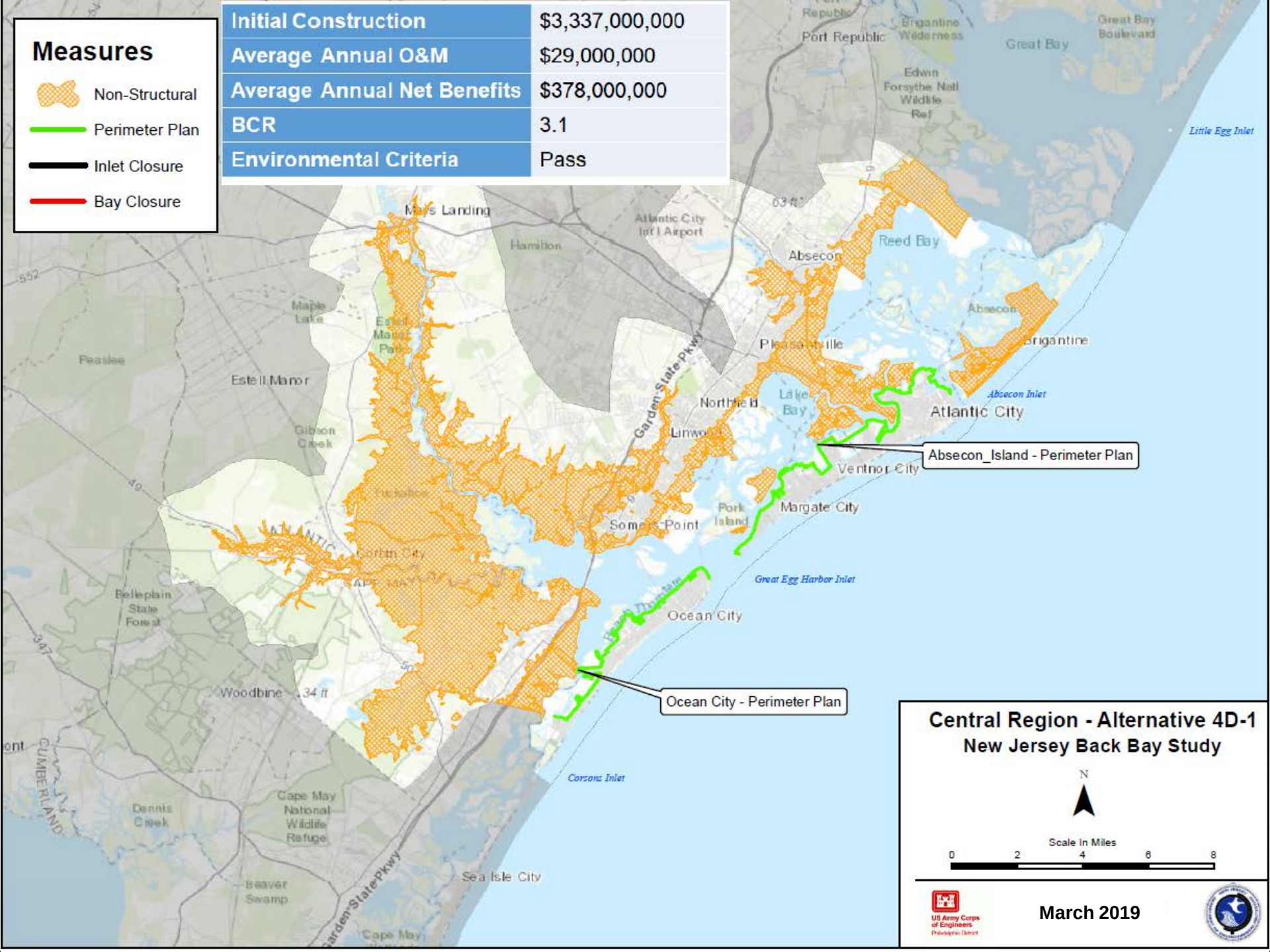


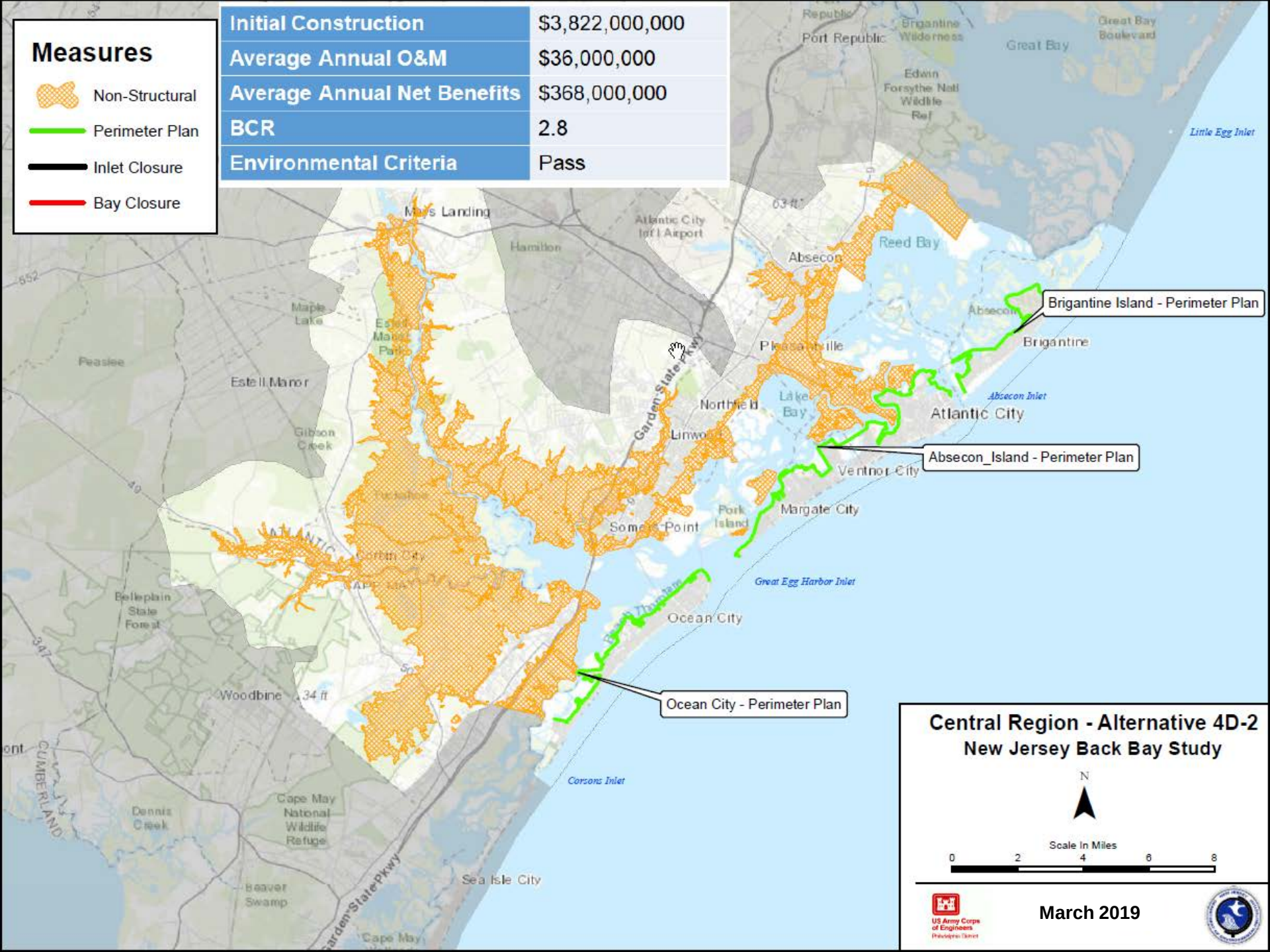


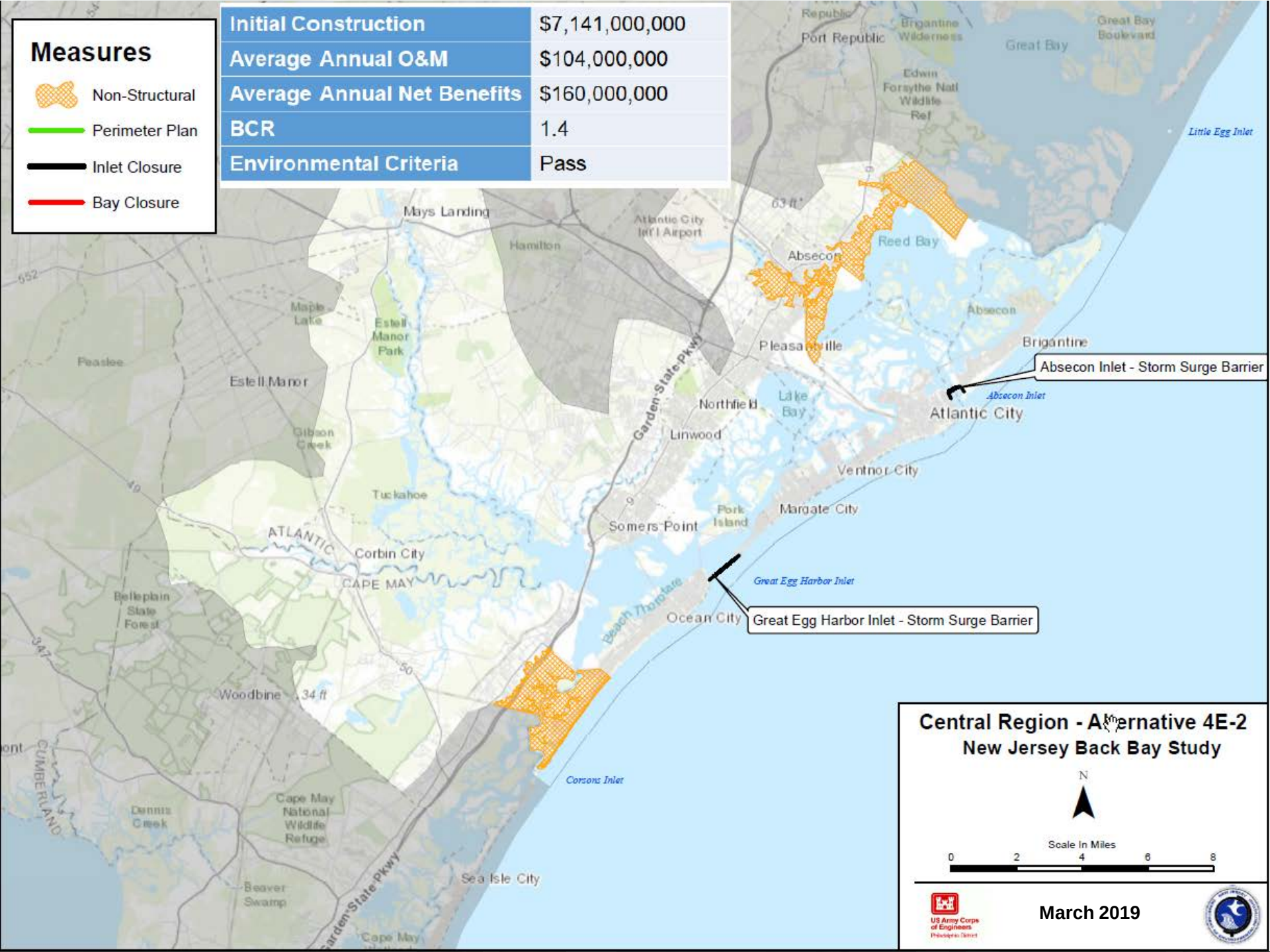
Central Region

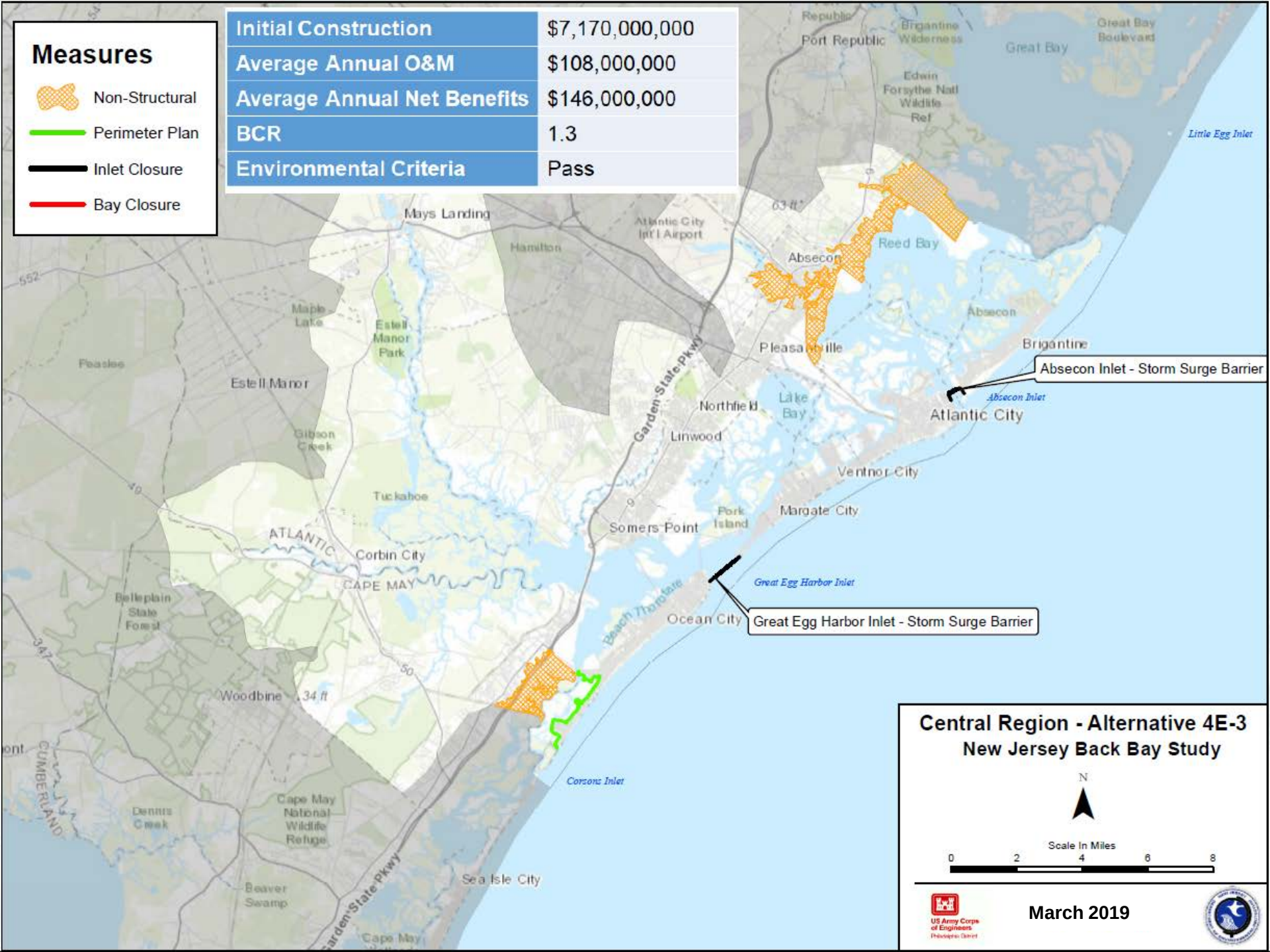


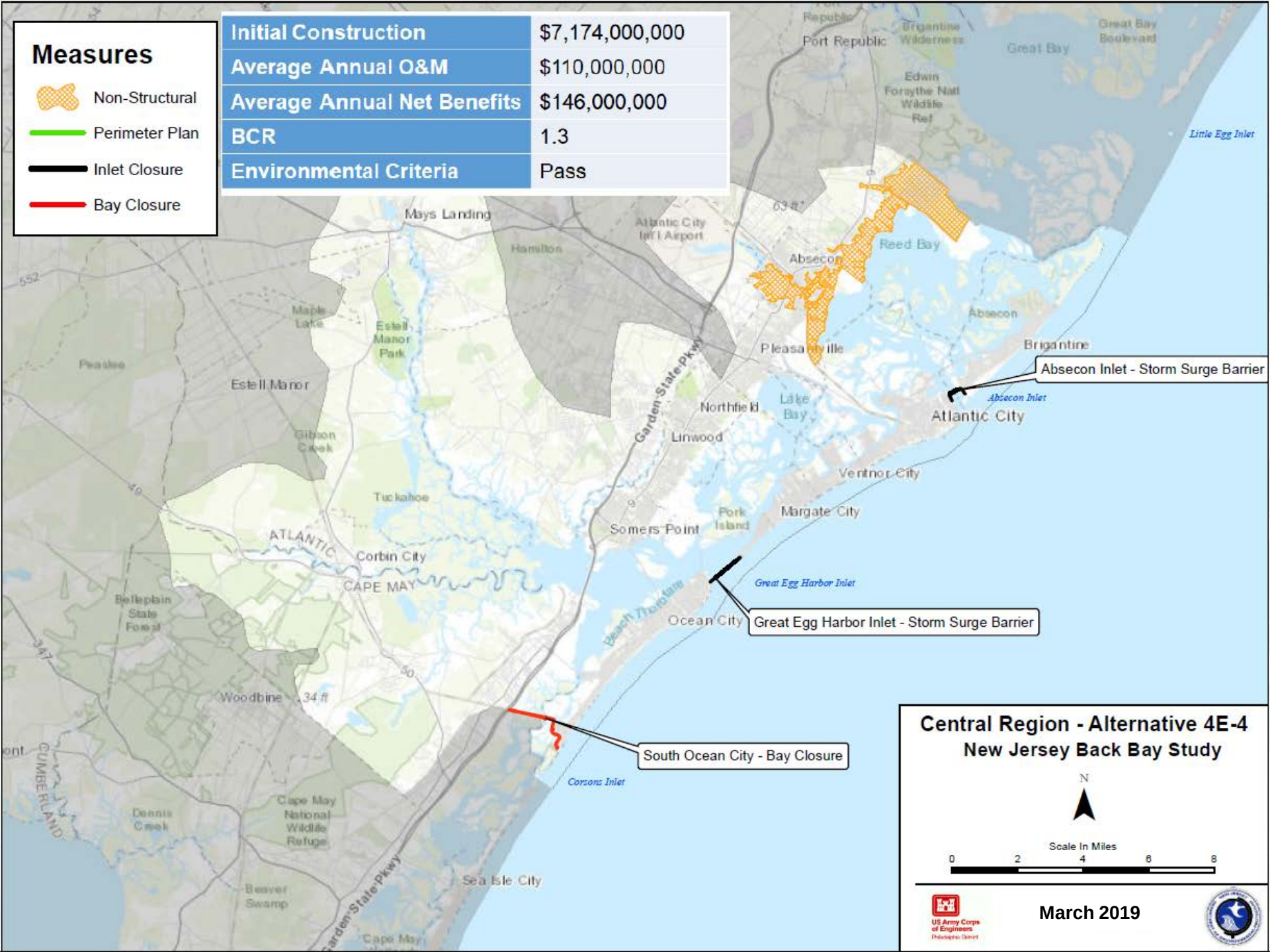
Initial Construction	$1,955,000,000
Average Annual O&M	$0
Average Annual Net Benefits	$77,000,000
BCR	2.1
Environmental Criteria	Pass

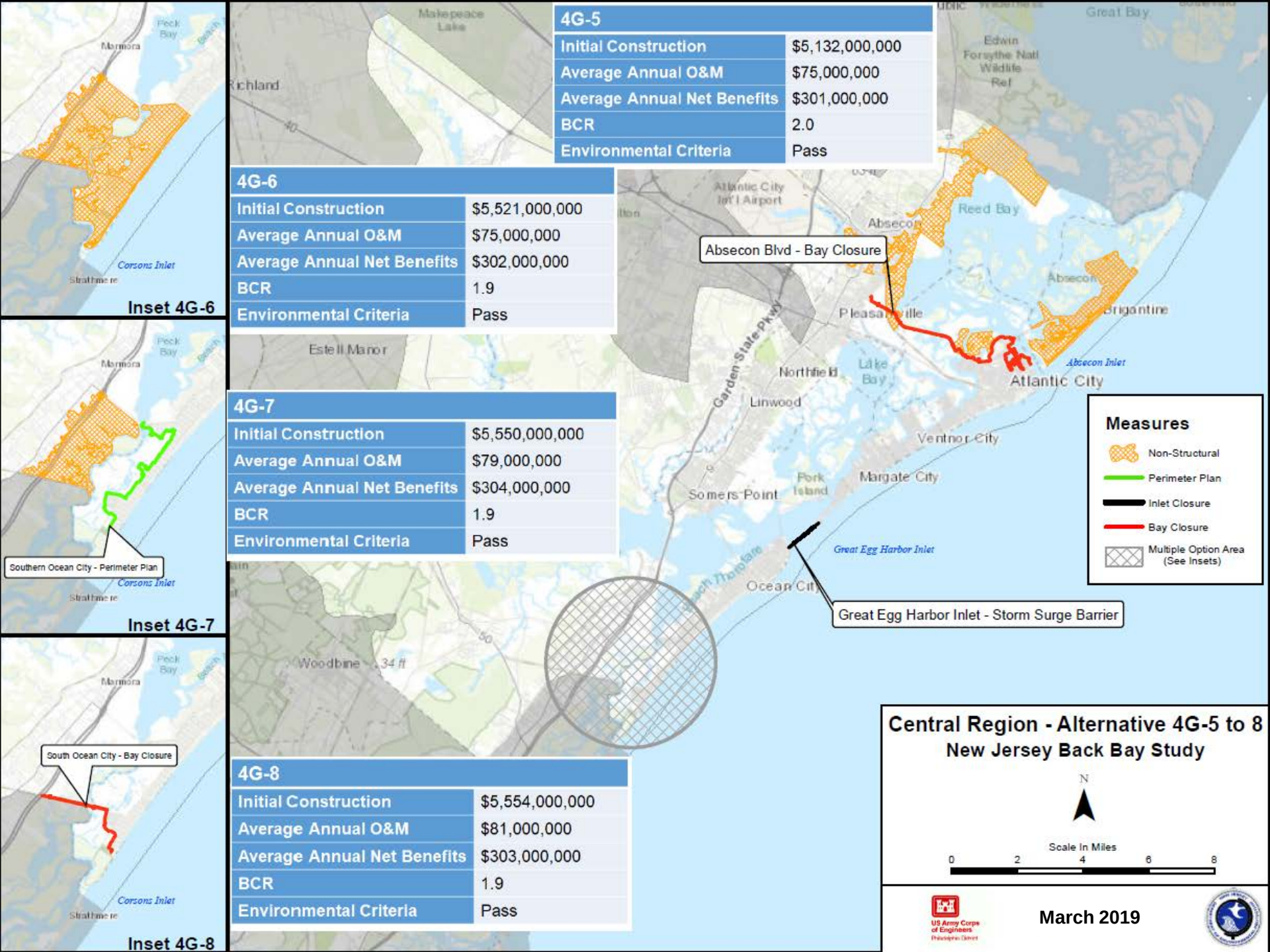

Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $3,337,000,000
Average Annual O&M $29,000,000
Average Annual Net Benefits $378,000,000
BCR 3.1
Environmental Criteria Pass
Absecon_Island - Perimeter Plan
Ocean City - Perimeter Plan
Central Region - Alternative 4D-1
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
March 2019
US Army Corps of Engineers
Port Republic
Brigantine Wilderness
Great Bay
Great Bay Boulevard
Edwin Forsythe Natl Wildlife Ref
Little Egg Inlet
Mays Landing
Hamilton
Atlantic City Intl Airport
Reed Bay
Absecon
Brigantine
Absecon Inlet
Atlantic City
Northfield
Linwood
Garden State Pkwy
Lake Bay
Ventnor City
Margate City
Pork Island
Somers Point
Great Egg Harbor Inlet
Ocean City
Corsons Inlet
Estell Manor
Maple Lake
Peaslee
Gibson Creek
Corbin City
Belleplain State Forest
Woodbine
Dennis Creek
Cape May National Wildlife Refuge
Beaver Swamp
Sea Isle City
Cape May

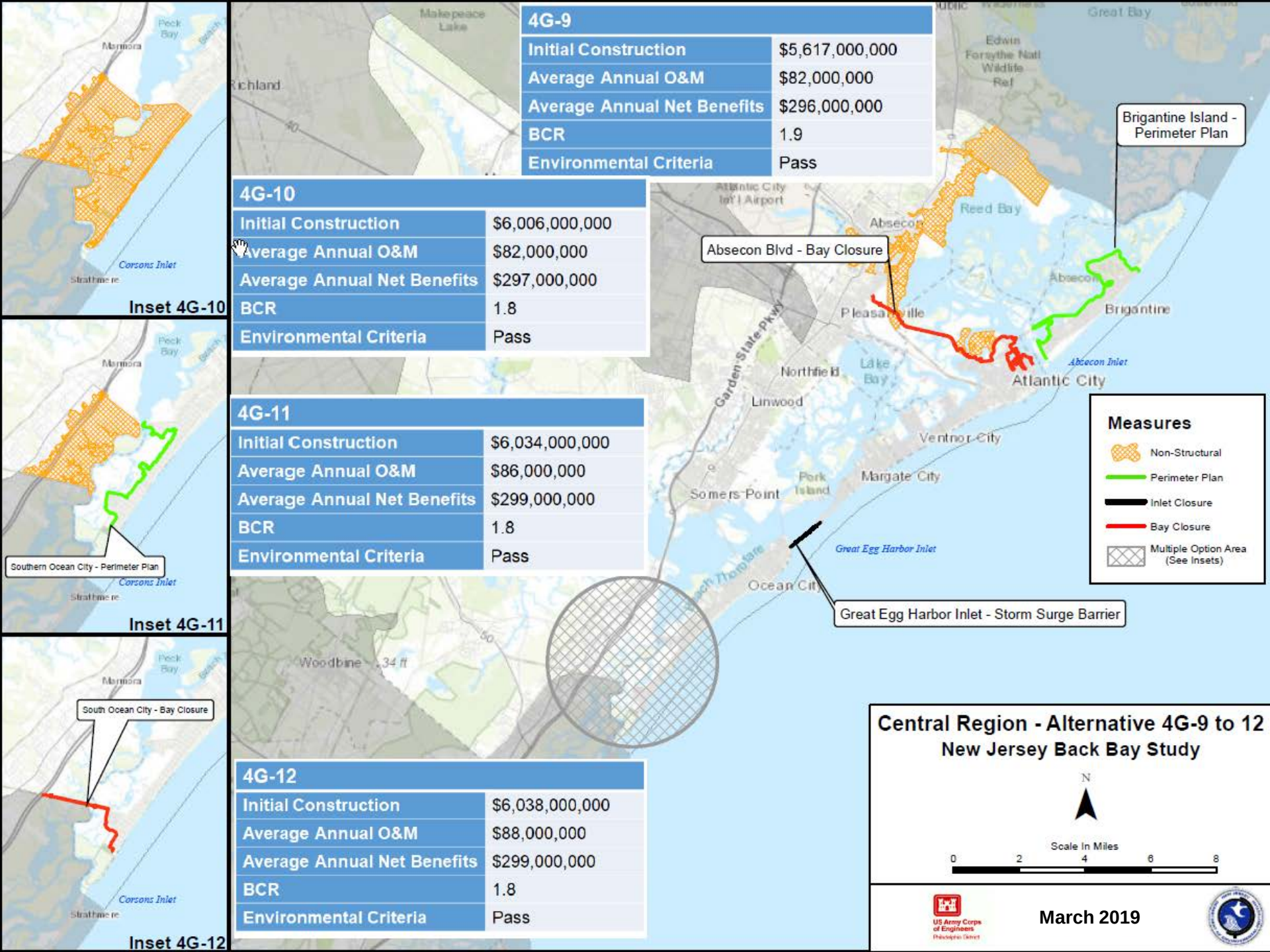

Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $3,822,000,000
Average Annual O&M $36,000,000
Average Annual Net Benefits $368,000,000
BCR 2.8
Environmental Criteria Pass
Brigantine Island - Perimeter Plan
Absecon_Island - Perimeter Plan
Ocean City - Perimeter Plan
Central Region - Alternative 4D-2
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
March 2019
US Army Corps of Engineers
Mays Landing
Hamilton
Atlantic City Intl Airport
Absecon
Reed Bay
Brigantine
Pleasantville
Northfield
Lake Bay
Atlantic City
Ventnor City
Margate City
Somers Point
Ocean City
Woodbine
Estell Manor
Peaslee
Belleplain State Forest
Cape May National Wildlife Refuge
Dennis Creek
Beaver Swamp
Sea Isle City
Cape May
Great Egg Harbor Inlet
Corsons Inlet
Absecon Inlet
Little Egg Inlet
Great Bay
Great Bay Boulevard
Port Republic
Brigantine Wilderness
Edwin Forsythe Natl Wildlife Ref
Garden State Pkwy

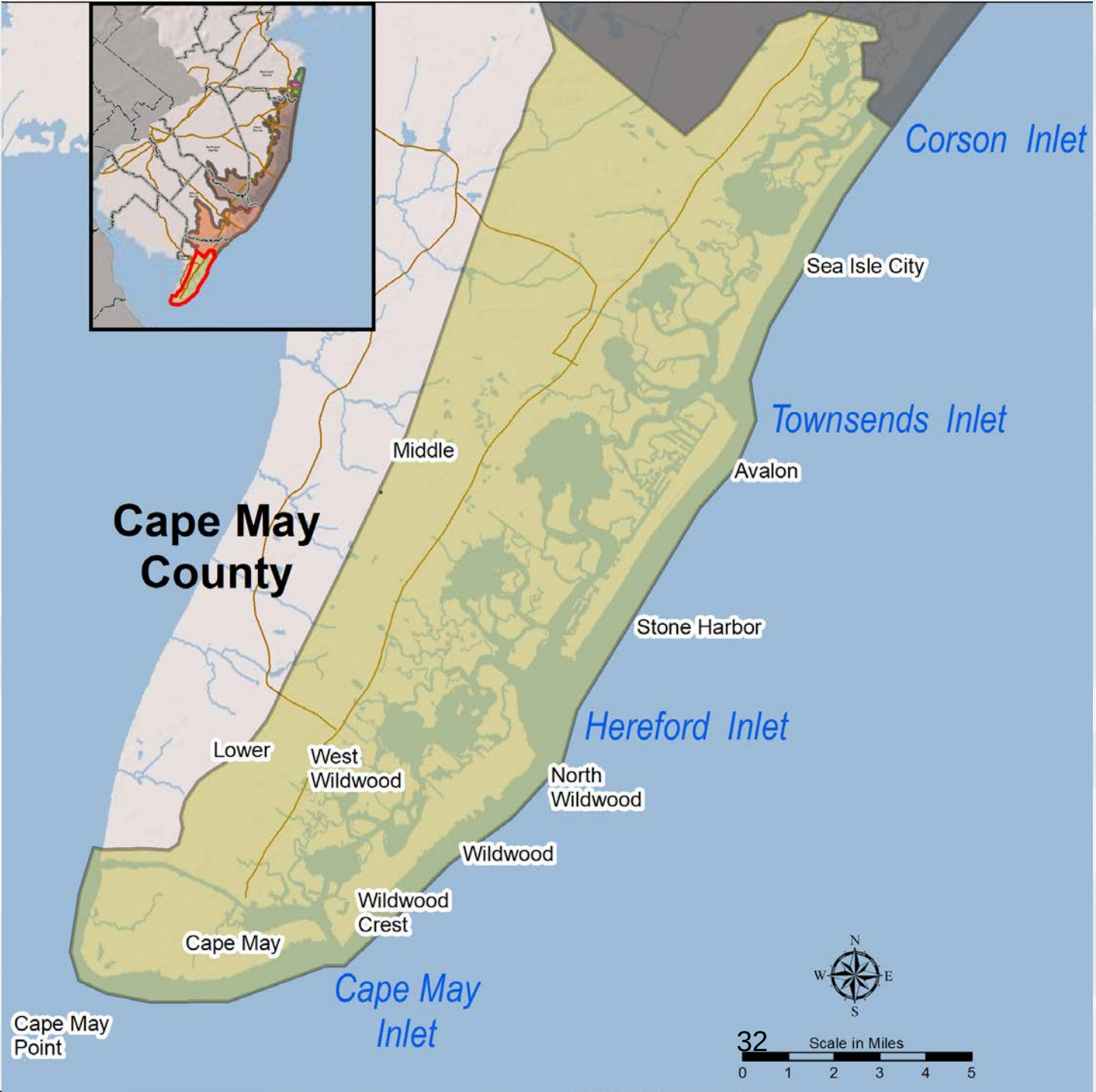

Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $7,141,000,000
Average Annual O&M $104,000,000
Average Annual Net Benefits $160,000,000
BCR 1.4
Environmental Criteria Pass
Absecon Inlet - Storm Surge Barrier
Great Egg Harbor Inlet - Storm Surge Barrier
Central Region - Alternative 4E-2
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019
Mays Landing
Hamilton
Atlantic City Int'l Airport
Absecon
Reed Bay
Pleasantville
Brigantine
Atlantic City
Northfield
Linwood
Lake Bay
Ventnor City
Margate City
Somers Point
Ocean City
Corbin City
Estell Manor
Tuckahoe
Woodbine
Sea Isle City
Cape May
Garden State Pkwy
Great Egg Harbor Inlet
Little Egg Inlet
Corsons Inlet
Absecon Inlet
Port Republic
Great Bay
Edwin Forsythe Natl Wildlife Ref
Great Bay Boulevard
Brigantine Wilderness
Maple Lake
Estell Manor Park
Peaslee
Gibson Creek
Dennis Creek
Cape May National Wildlife Refuge
Beaver Swamp
Belleplain State Forest
Pork Island
Beach Thorofare
ATLANTIC
CAPE MAY
CUMBERLAND
63 ft
34 ft


Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction
$7,170,000,000
Average Annual O&M
$108,000,000
Average Annual Net Benefits
$146,000,000
BCR
1.3
Environmental Criteria
Pass
Absecon Inlet - Storm Surge Barrier
Great Egg Harbor Inlet - Storm Surge Barrier
Central Region - Alternative 4E-3
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019
Port Republic
Brigantine Wilderness
Great Bay
Great Bay Boulevard
Edwin Forsythe Natl Wildlife Ref
Little Egg Inlet
Mays Landing
Hamilton
Atlantic City Int'l Airport
Reed Bay
Absecon
Brigantine
Pleasantville
Maple Lake
Estell Manor Park
Peaslee
Estell Manor
Garden State Pkwy
Northfield
Lake Bay
Linwood
Atlantic City
Absecon Inlet
Gibson Creek
Ventnor City
Tuckahoe
Pork Island
Margate City
Somers Point
ATLANTIC
Corbin City
CAPE MAY
Great Egg Harbor Inlet
Ocean City
Beach Thorofare
Belleplain State Forest
Woodbine
34 ft
63 ft
Corsons Inlet
Cape May National Wildlife Refuge
Dennis Creek
Beaver Swamp
Sea Isle City
Cape May
CUMBERLAND

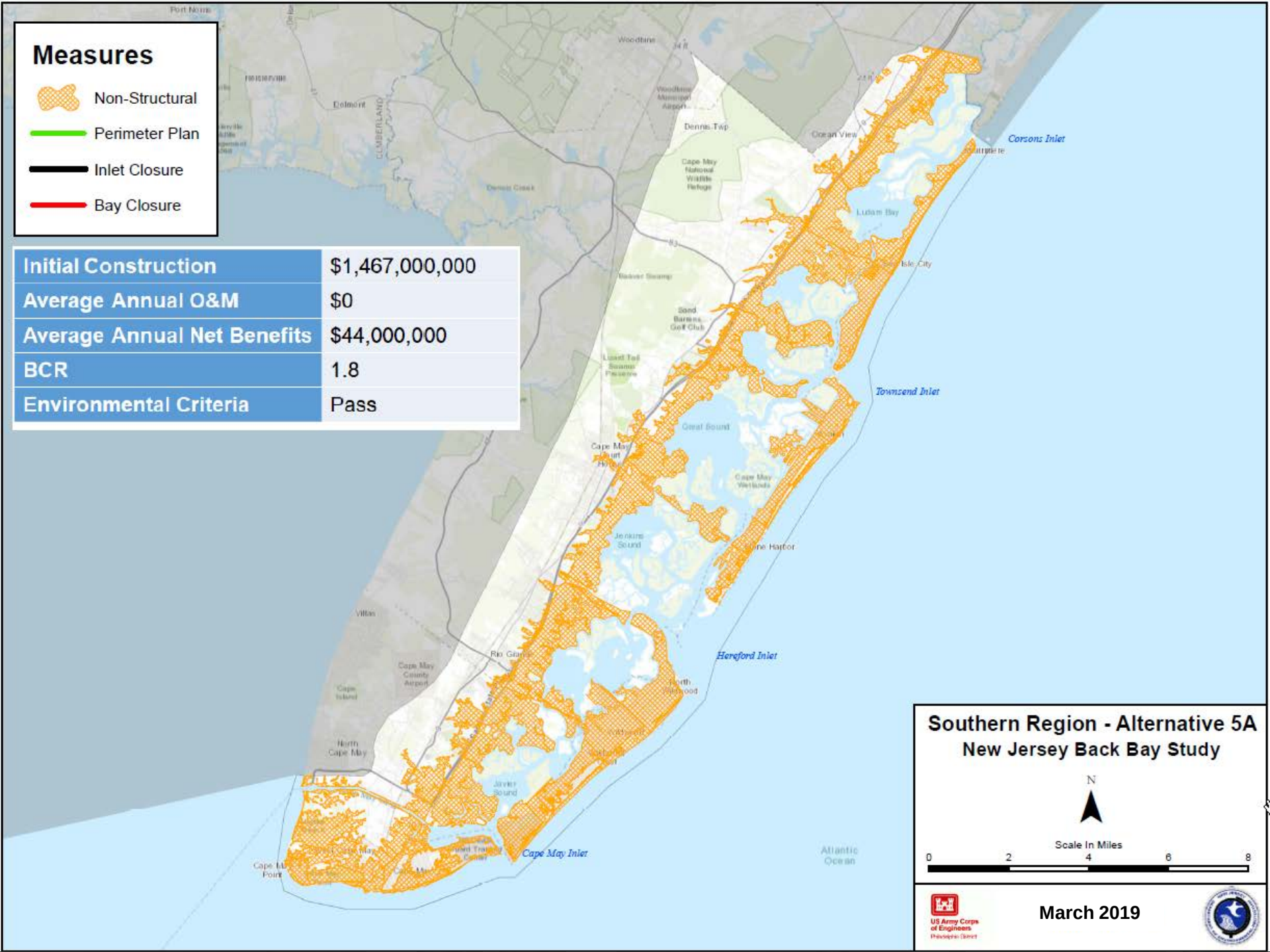

Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $7,174,000,000
Average Annual O&M $110,000,000
Average Annual Net Benefits $146,000,000
BCR 1.3
Environmental Criteria Pass
Absecon Inlet - Storm Surge Barrier
Great Egg Harbor Inlet - Storm Surge Barrier
South Ocean City - Bay Closure
Central Region - Alternative 4E-4
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
March 2019
US Army Corps of Engineers
Mays Landing
Atlantic City Int'l Airport
Absecon
Reed Bay
Pleasantville
Brigantine
Atlantic City
Northfield
Linwood
Lake Bay
Ventnor City
Margate City
Somers Point
Pork Island
Ocean City
Estell Manor
Corbin City
CAPE MAY
Woodbine
Sea Isle City
Cape May
Garden State Pkwy
Little Egg Inlet
Great Egg Harbor Inlet
Corsons Inlet

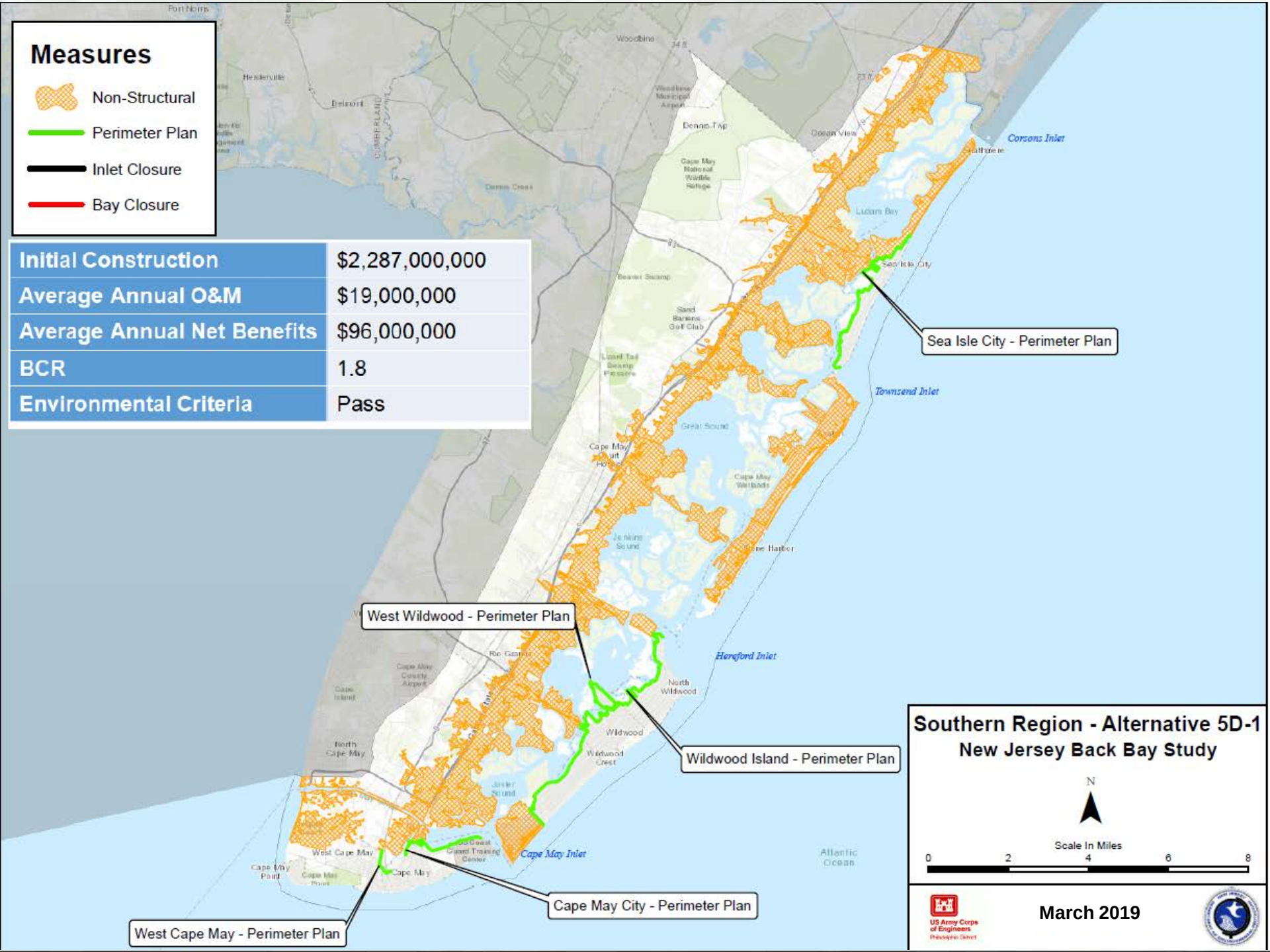

4G-5
Initial Construction $5,132,000,000
Average Annual O&M $75,000,000
Average Annual Net Benefits $301,000,000
BCR 2.0
Environmental Criteria Pass
4G-6
Initial Construction $5,521,000,000
Average Annual O&M $75,000,000
Average Annual Net Benefits $302,000,000
BCR 1.9
Environmental Criteria Pass
4G-7
Initial Construction $5,550,000,000
Average Annual O&M $79,000,000
Average Annual Net Benefits $304,000,000
BCR 1.9
Environmental Criteria Pass
4G-8
Initial Construction $5,554,000,000
Average Annual O&M $81,000,000
Average Annual Net Benefits $303,000,000
BCR 1.9
Environmental Criteria Pass
Absecon Blvd - Bay Closure
Great Egg Harbor Inlet - Storm Surge Barrier
Southern Ocean City - Perimeter Plan
South Ocean City - Bay Closure
Inset 4G-6
Inset 4G-7
Inset 4G-8
Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Multiple Option Area (See Insets)
Central Region - Alternative 4G-5 to 8
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019
Great Bay
Edwin Forsythe Natl Wildlife Ref
Reed Bay
Absecon
Brigantine
Atlantic City
Absecon Inlet
Great Egg Harbor Inlet
Garden State Pkwy
Northfield
Lake Bay
Linwood
Ventnor City
Margate City
Somers Point
Pork Island
Ocean City
Estell Manor
Woodbine
Richland
Makepeace Lake
Atlantic City Int'l Airport
Peck Bay
Marmora
Corsons Inlet
Strathmere

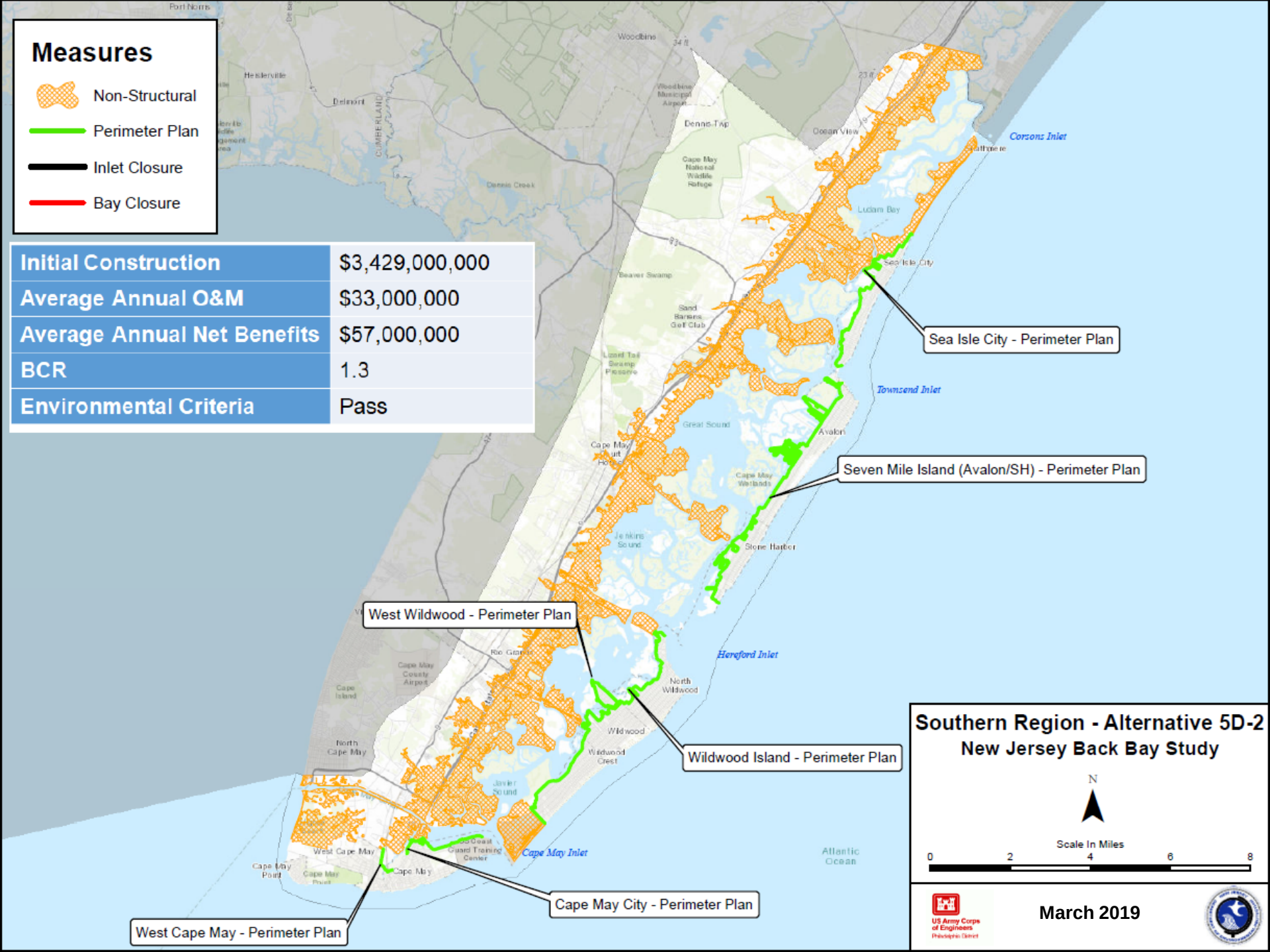

4G-9
Initial Construction $5,617,000,000
Average Annual O&M $82,000,000
Average Annual Net Benefits $296,000,000
BCR 1.9
Environmental Criteria Pass
4G-10
Initial Construction $6,006,000,000
Average Annual O&M $82,000,000
Average Annual Net Benefits $297,000,000
BCR 1.8
Environmental Criteria Pass
4G-11
Initial Construction $6,034,000,000
Average Annual O&M $86,000,000
Average Annual Net Benefits $299,000,000
BCR 1.8
Environmental Criteria Pass
4G-12
Initial Construction $6,038,000,000
Average Annual O&M $88,000,000
Average Annual Net Benefits $299,000,000
BCR 1.8
Environmental Criteria Pass
Brigantine Island - Perimeter Plan
Absecon Blvd - Bay Closure
Southern Ocean City - Perimeter Plan
South Ocean City - Bay Closure
Great Egg Harbor Inlet - Storm Surge Barrier
Inset 4G-10
Inset 4G-11
Inset 4G-12
Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Multiple Option Area (See Insets)
Central Region - Alternative 4G-9 to 12
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019



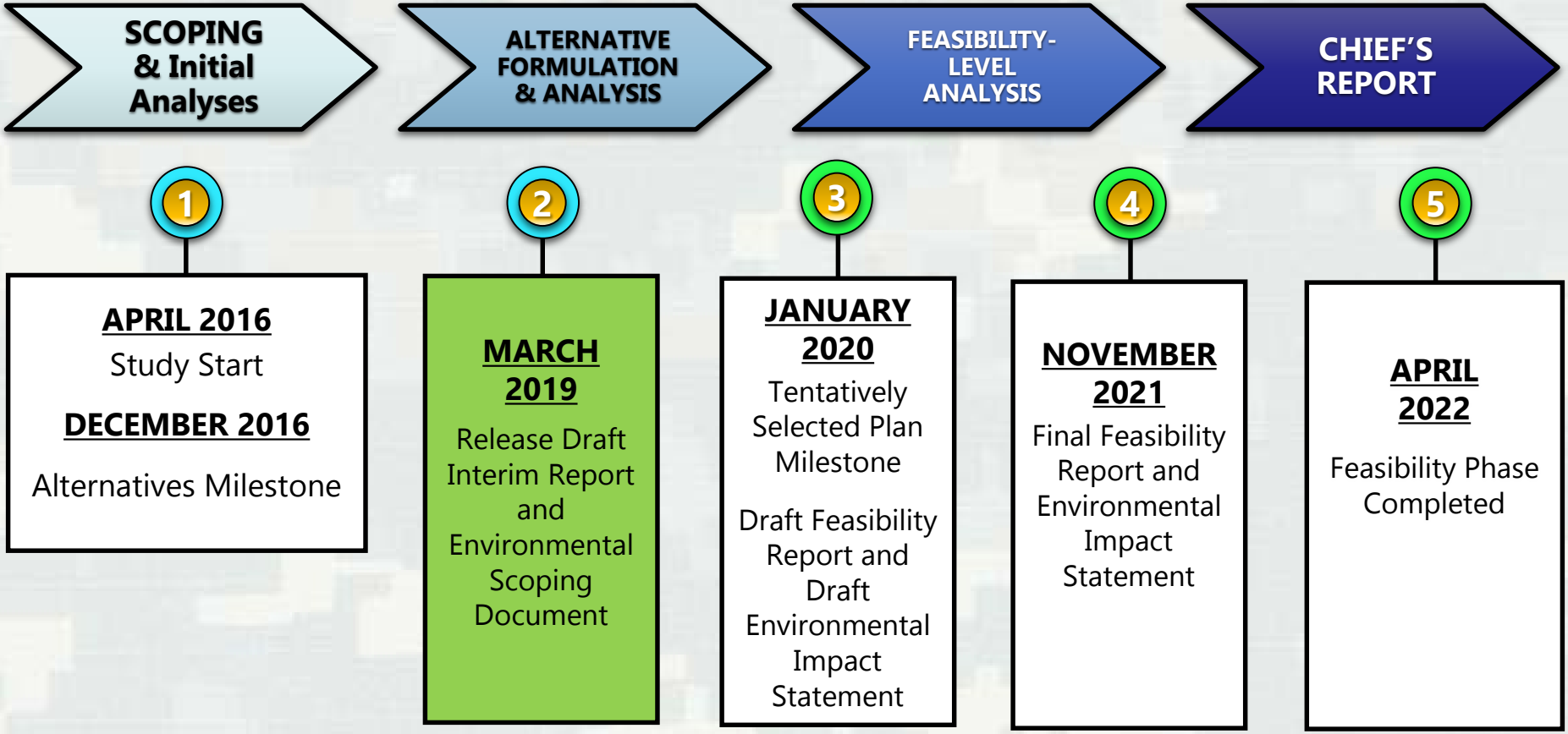
South Region


Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $1,467,000,000
Average Annual O&M $0
Average Annual Net Benefits $44,000,000
BCR 1.8
Environmental Criteria Pass
Corsons Inlet
Townsend Inlet
Hereford Inlet
Cape May Inlet
Atlantic Ocean
Southern Region - Alternative 5A
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019

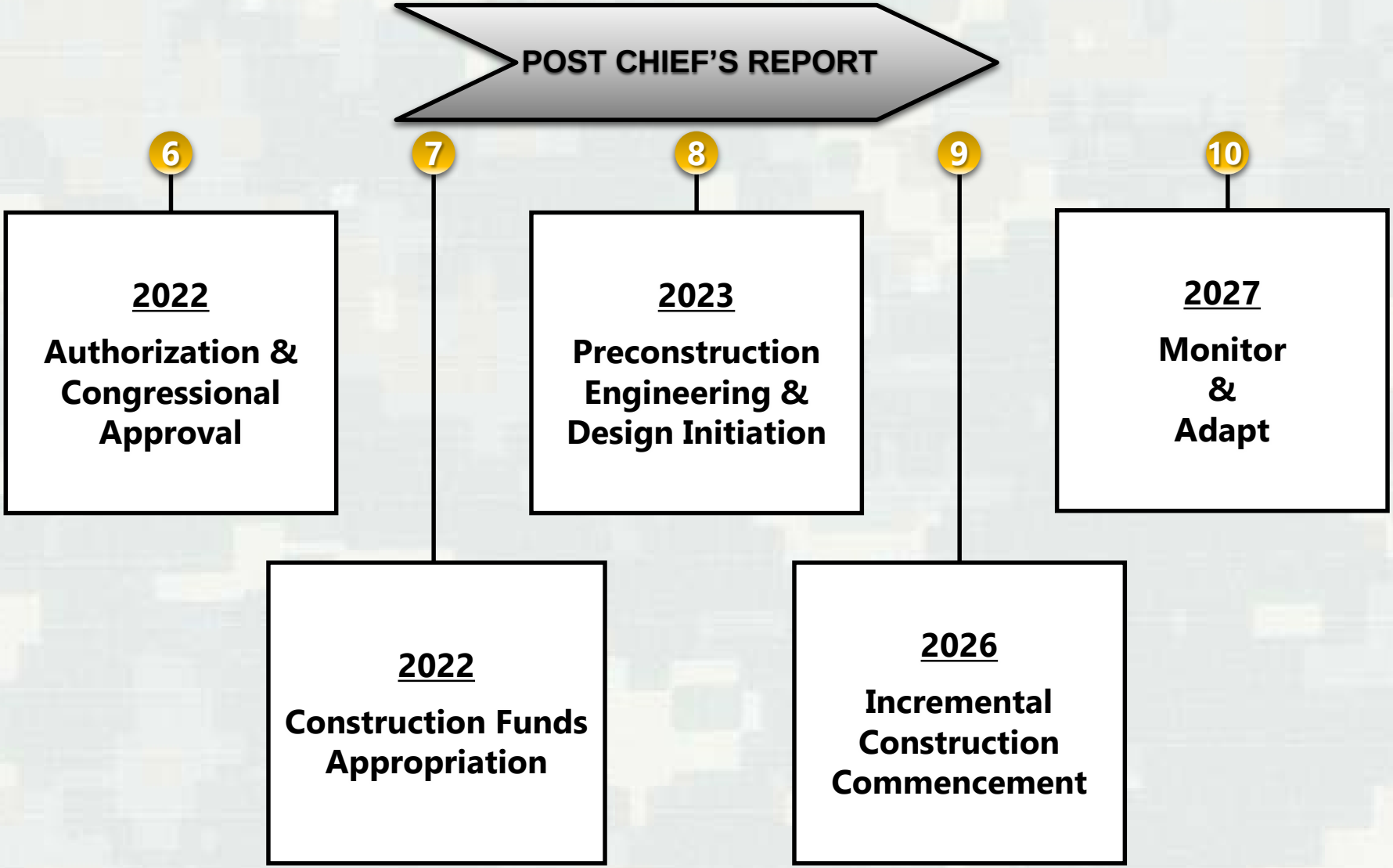

Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $2,287,000,000
Average Annual O&M $19,000,000
Average Annual Net Benefits $96,000,000
BCR 1.8
Environmental Criteria Pass
Sea Isle City - Perimeter Plan
West Wildwood - Perimeter Plan
Wildwood Island - Perimeter Plan
Cape May City - Perimeter Plan
West Cape May - Perimeter Plan
Corsons Inlet
Townsend Inlet
Hereford Inlet
Cape May Inlet
Atlantic Ocean
Southern Region - Alternative 5D-1
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019


Measures
Non-Structural
Perimeter Plan
Inlet Closure
Bay Closure
Initial Construction $3,429,000,000
Average Annual O&M $33,000,000
Average Annual Net Benefits $57,000,000
BCR 1.3
Environmental Criteria Pass
Sea Isle City - Perimeter Plan
Seven Mile Island (Avalon/SH) - Perimeter Plan
West Wildwood - Perimeter Plan
Wildwood Island - Perimeter Plan
Cape May City - Perimeter Plan
West Cape May - Perimeter Plan
Corsons Inlet
Townsend Inlet
Hereford Inlet
Cape May Inlet
Atlantic Ocean
Southern Region - Alternative 5D-2
New Jersey Back Bay Study
N
Scale In Miles
0 2 4 6 8
US Army Corps of Engineers
March 2019

Feasibility Study Process

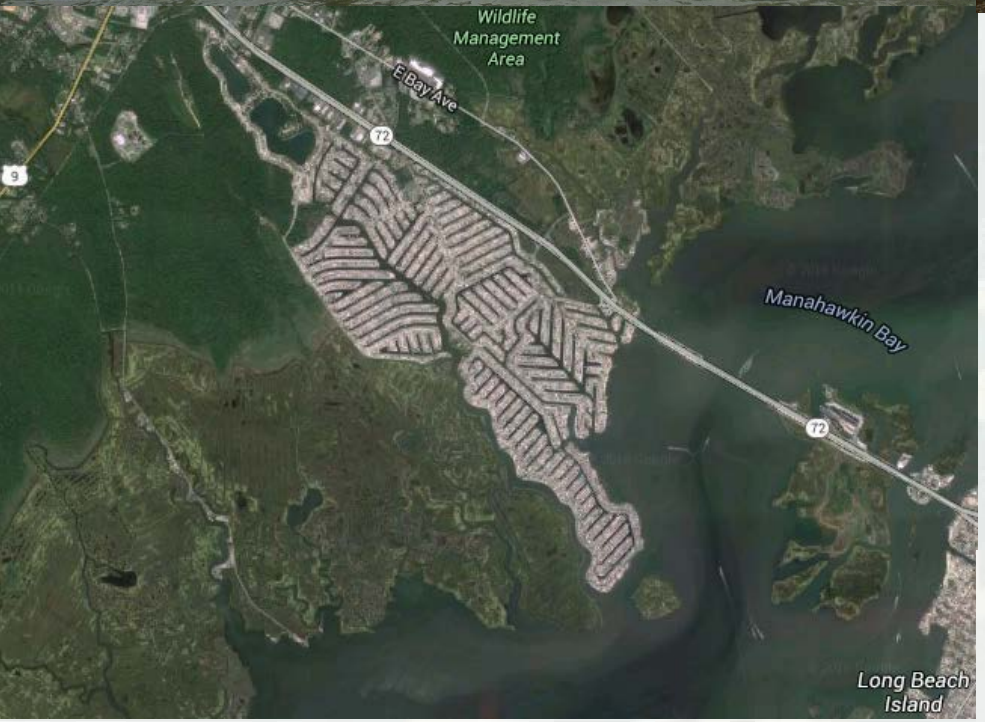


Design & Construction Process

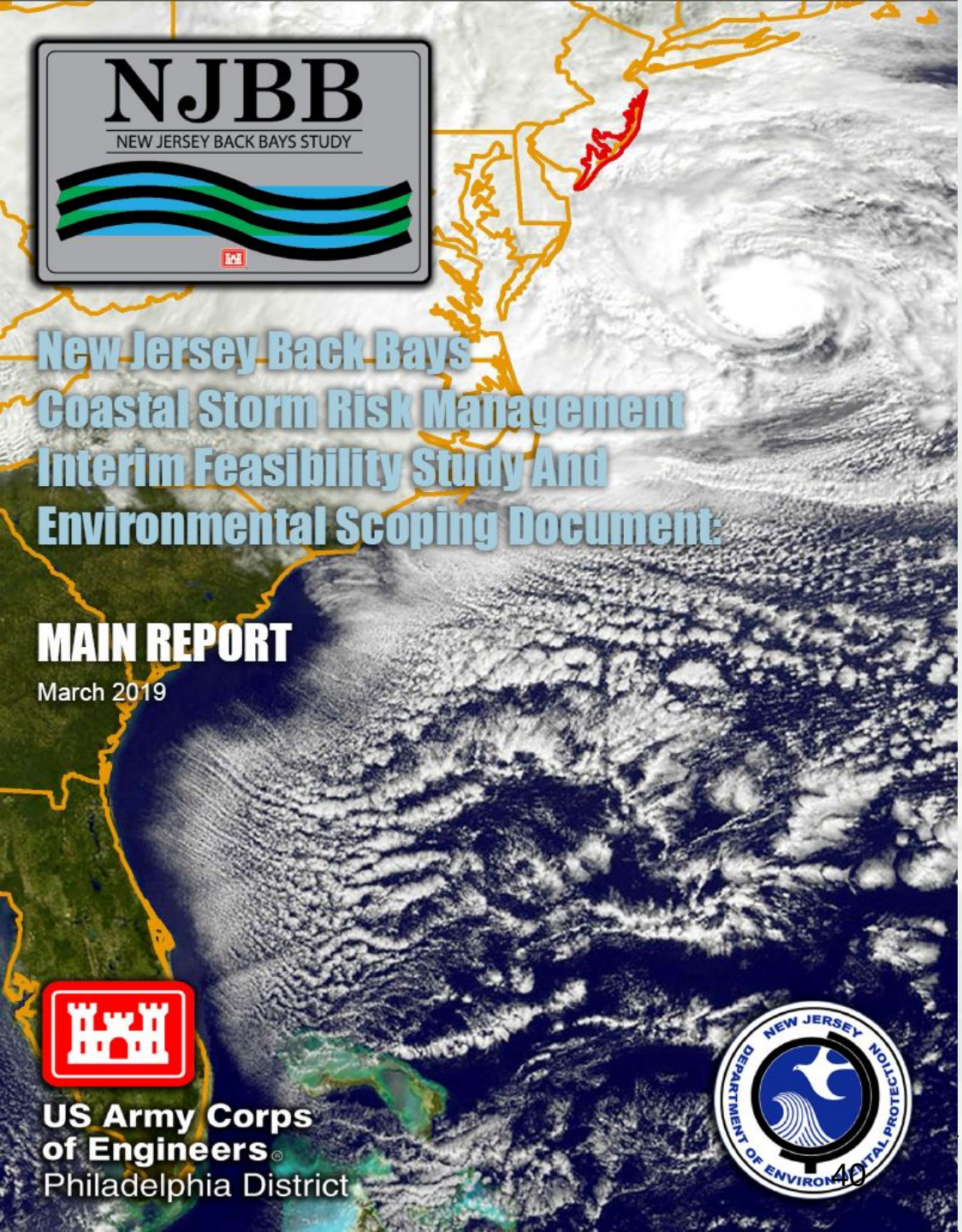


* Dates tentative pending funding

Questions & Answers



Closing Comments



The

New Jersey Back Bays Coastal Storm Risk Management

Virtual Meeting has concluded.

Thank you for your interest!