



Norfolk District

Craney Island Dredged Material Area



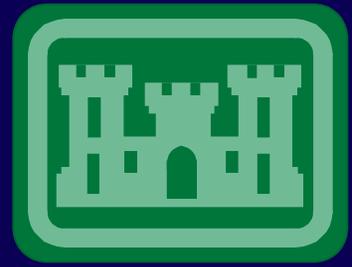
DZL SHERZAR

FACTS

20 Year Design Life Until 1980

100 Million Cubic Yard Design Capacity

Received over 200 Million Cubic Yard



History

- June 1944 Congress: Determine Advisability of Disposal Area

Conferences



ZOHOCHSZO

Construction began in 1956

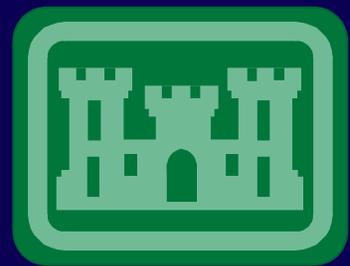


Completed in 1958

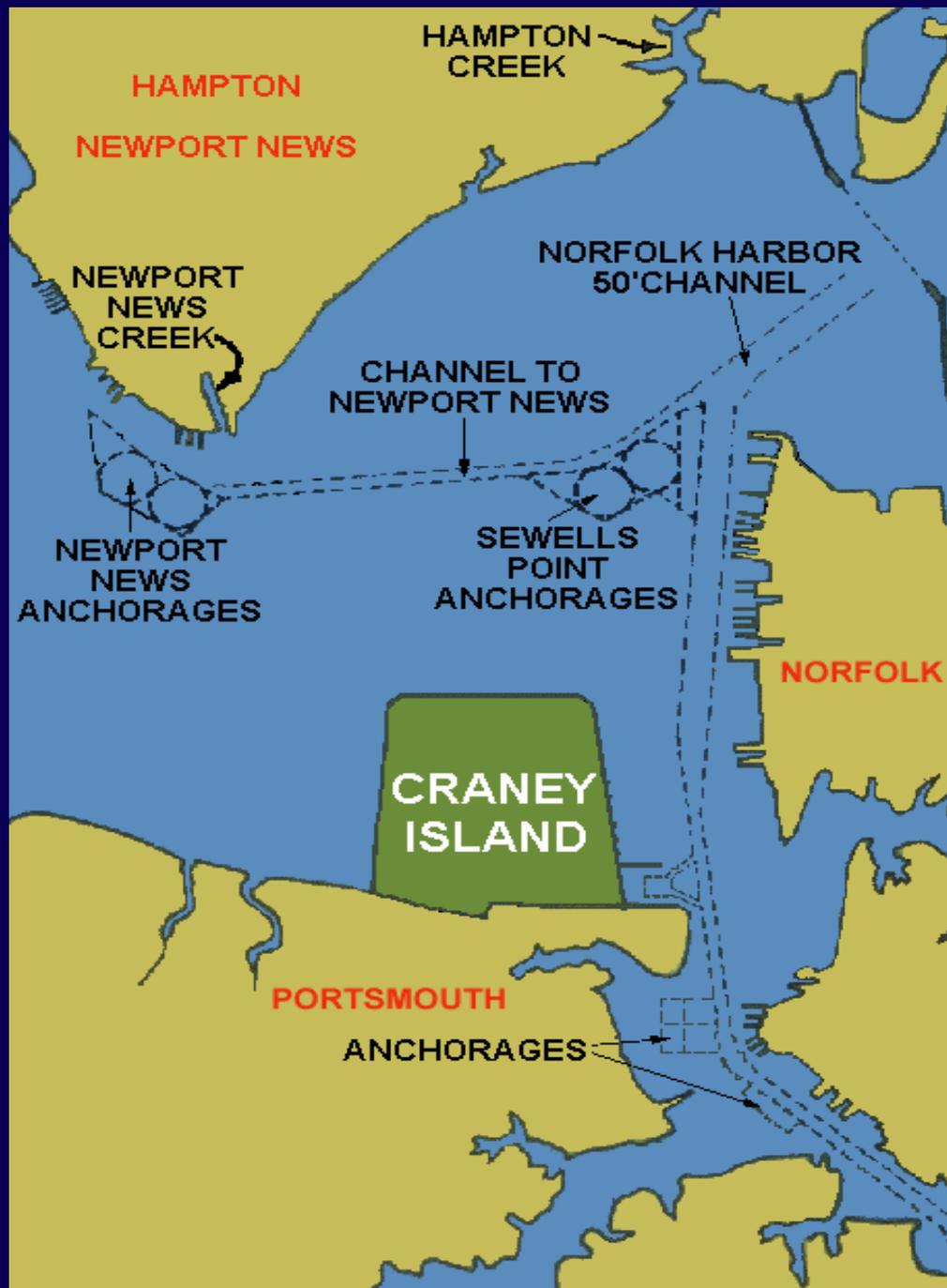


DAVIS BRIDGE



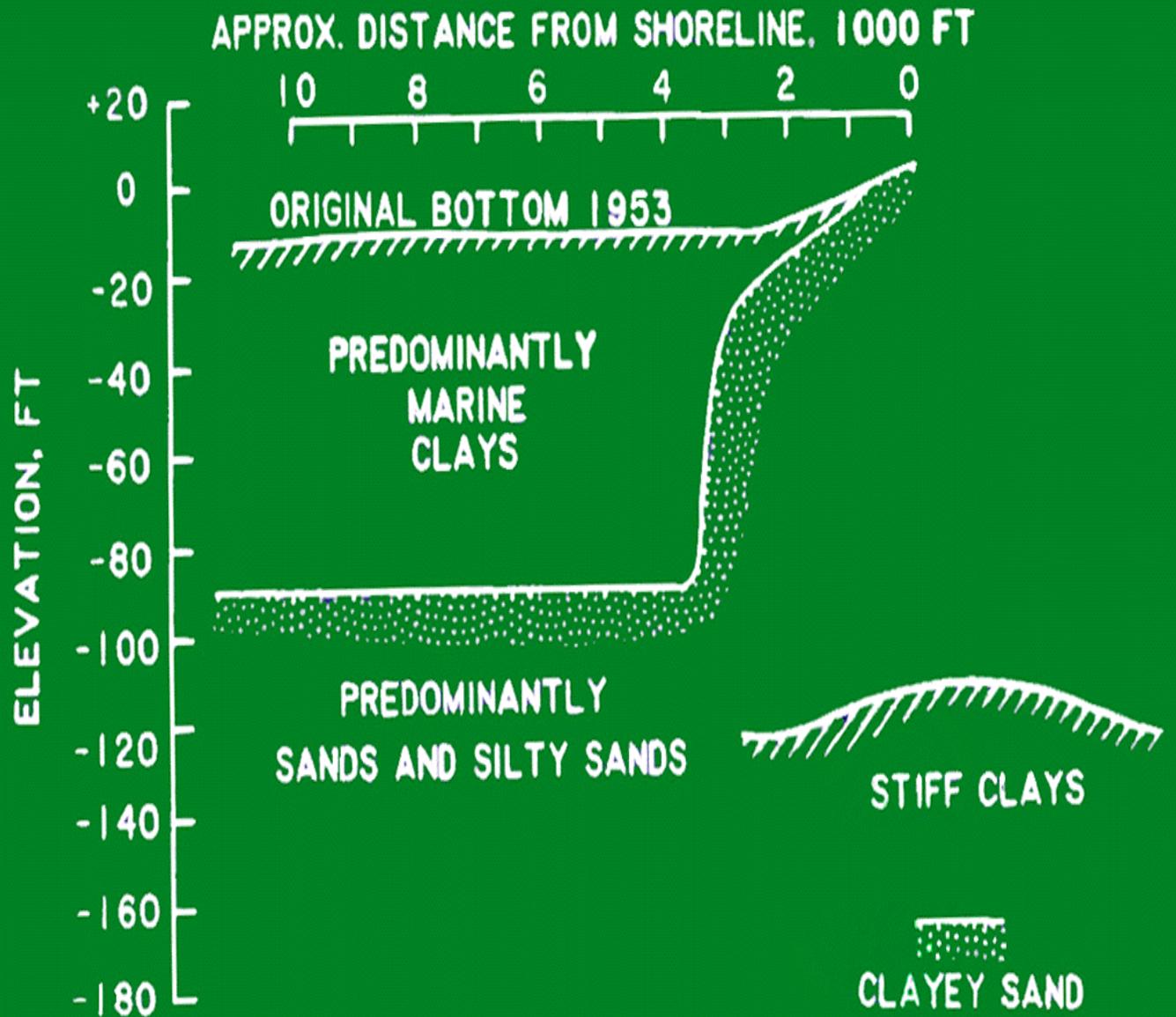


PROXIMITY





ZOHEMWOOD



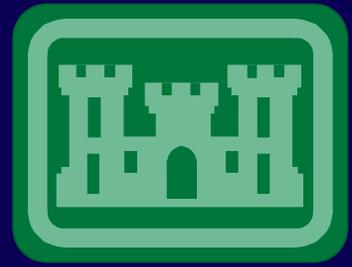


WREKALDZUS





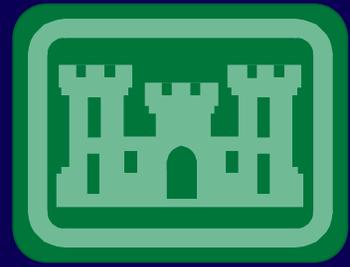
OLD ROAD



Section 148 of PL 94-587: Sec 148.

"Chief of Engineers, shall ... extend the capacity and useful life of dredged material disposal areas such that the need for new dredged material disposal areas is kept to a minimum."

USACE



Engineering Research & Development Center

(Corps of Engineers Research Laboratory, formerly
Waterways Experiment Station)

- Studied Craney Island
- Developed a Management Plan for the Site
- Technical Report EL-81-II

Corps
of
Engineers



5%
WATER



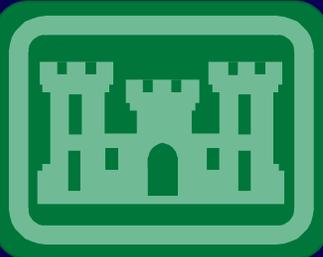


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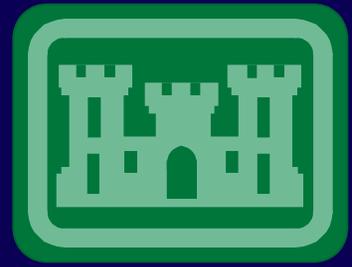
WATER MANAGEMENT



Engineering Research & Development Center Management Plan

M a n a g e m e n t

- "...lift thicknesses in excess of 5 ft begin to significantly affect desiccation and consolidation behavior."
- "The lift thickness applied over any annual period should therefore be limited to approximately 6 ft or less to avoid significant reduction in dewatering benefits"
- NAO limits inflow to approximately 5 mcy/year



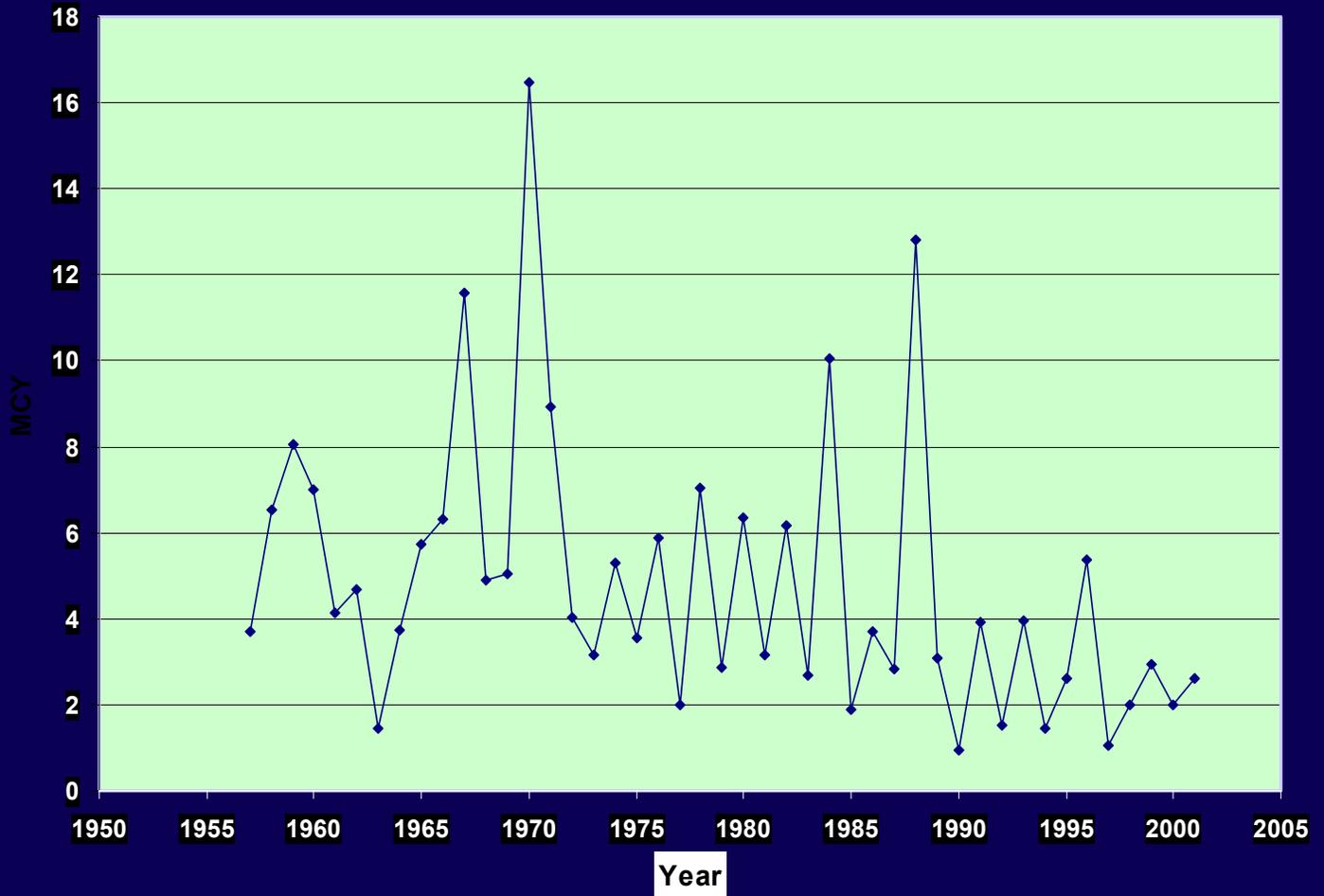
Management Plan

Benefit:

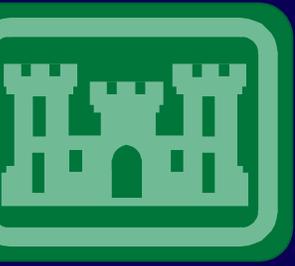
- Creates 25% more storage volume in Craney Island

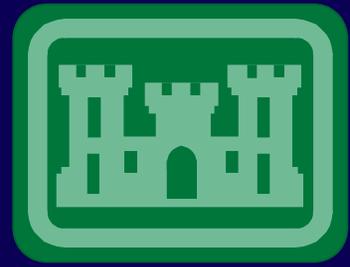
SHIFFER
BENZER

CRANEY ISLAND INFLOW



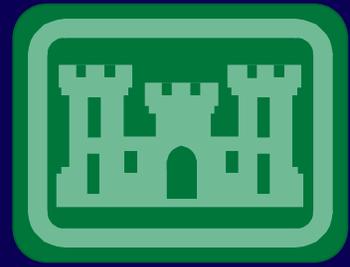
IN
FLOW
RATE





T O L L S

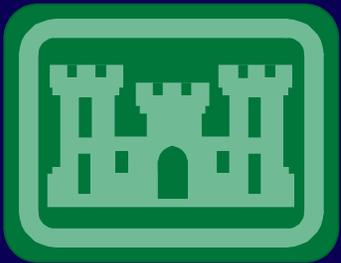
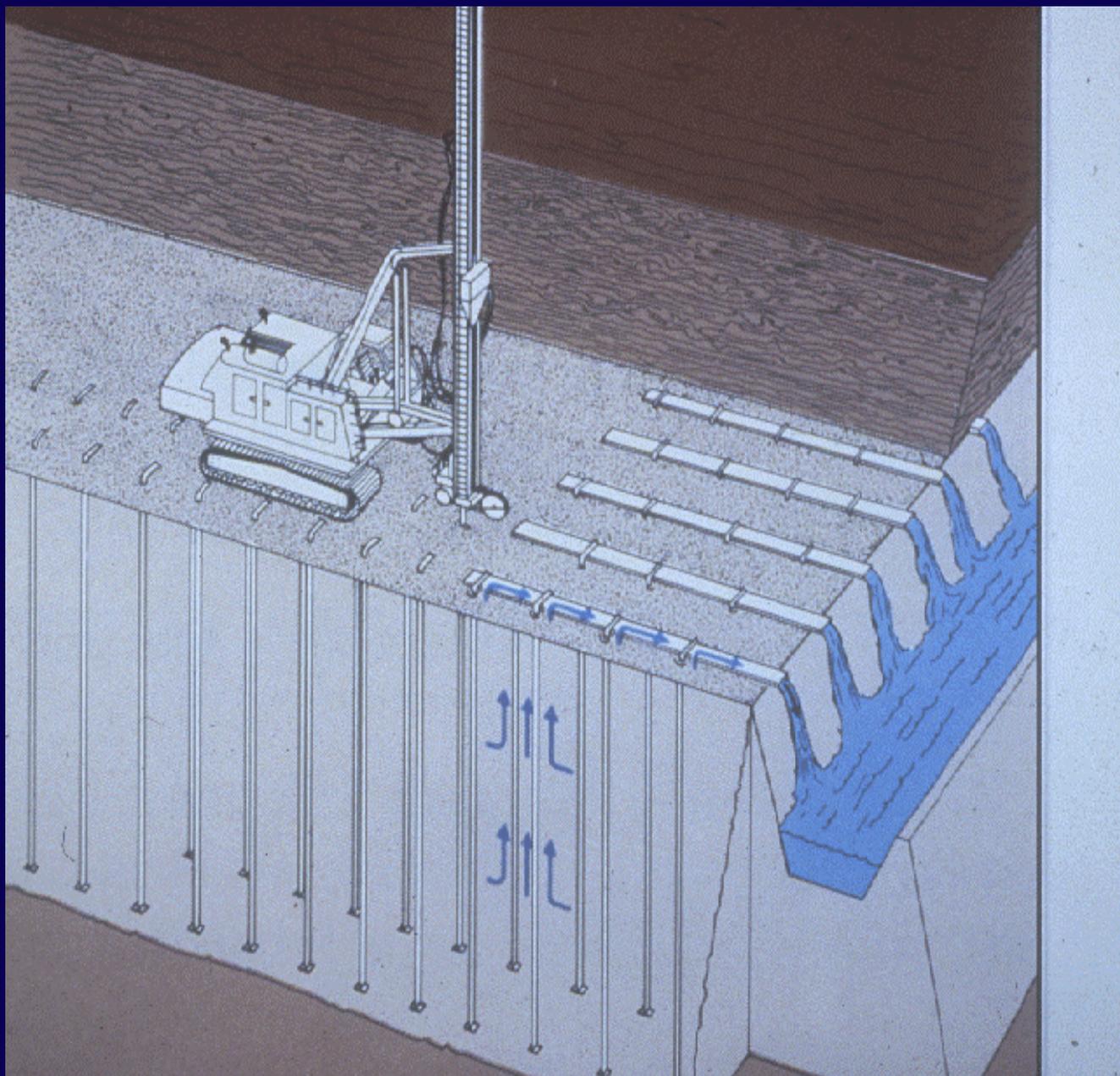
Direct Pump	\$0.86 Per Cubic Yard
Cost to Rehandle	<u>+\$1.44</u> Per Cubic Yard
Rehandling Basin	\$2.30 Per Cubic Yard



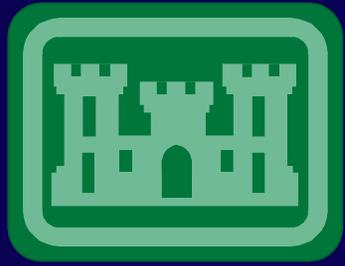
DZL
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C

Foundation Improvements to Raise Craney Island Levees

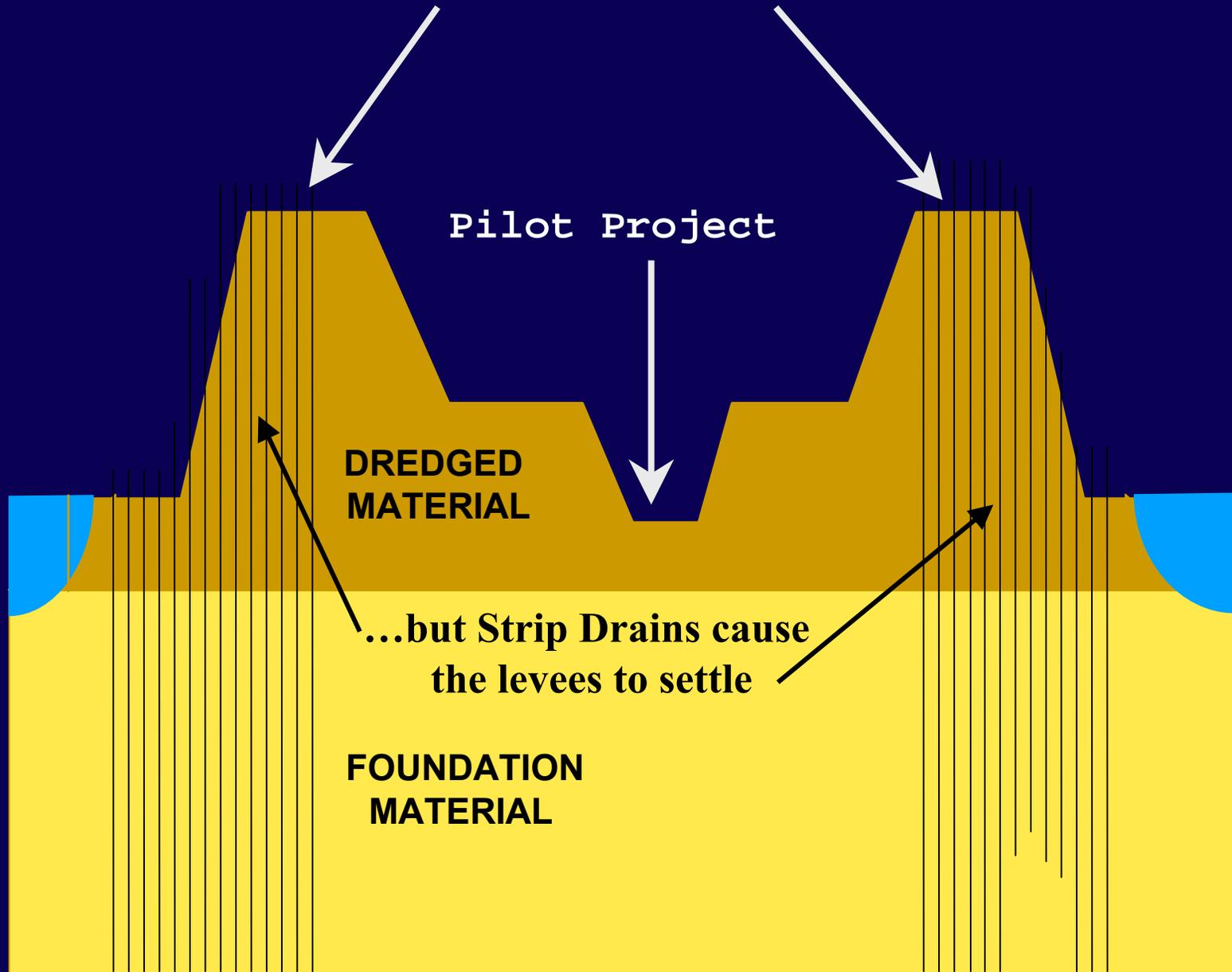
WZARD PITS



PLACE STRIPS IN LEVEES TO
ALLOW RAISING LEVEES...



WARD
RD
PI
R
S
S



Pilot Project

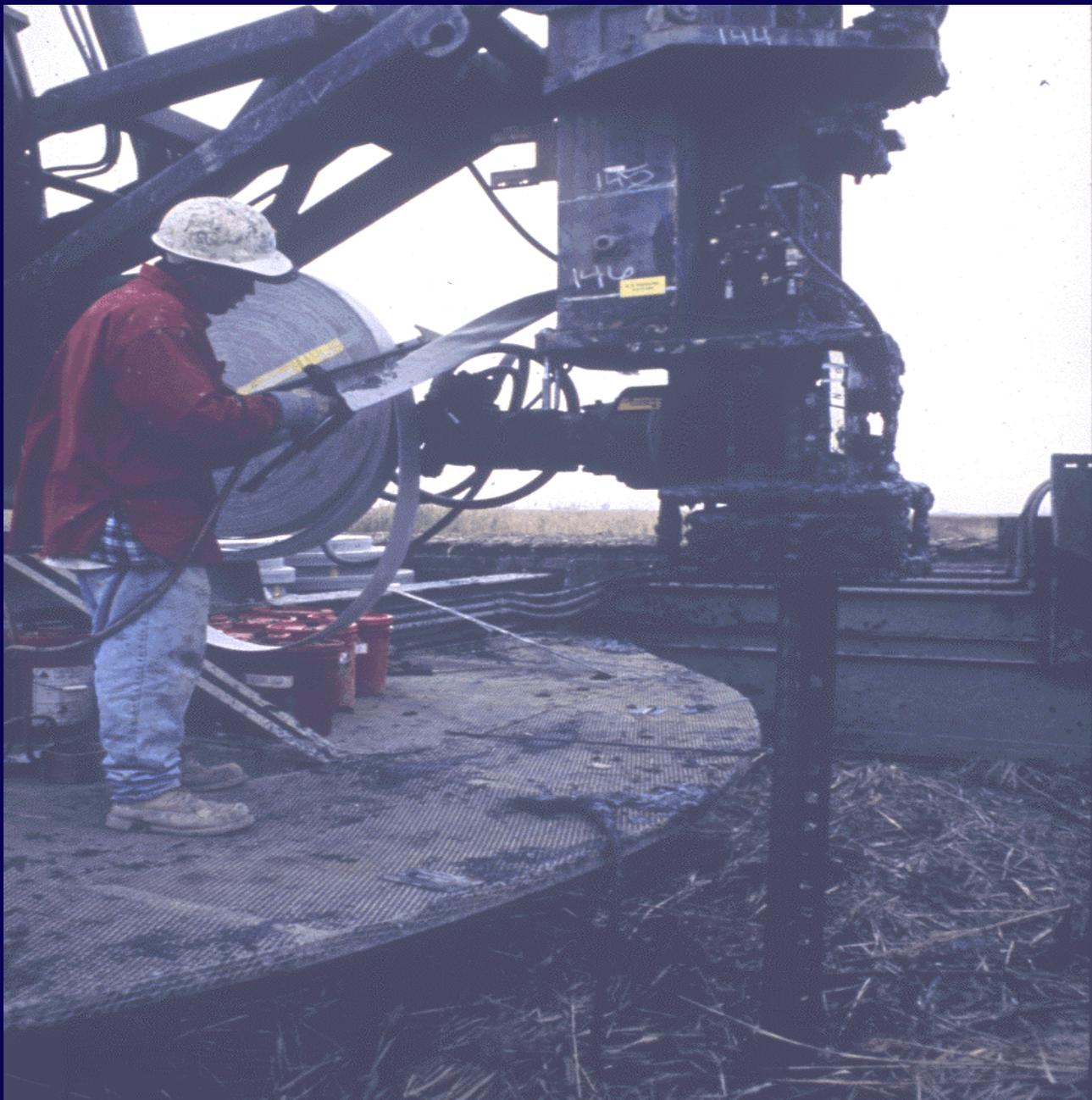
DREDGED
MATERIAL

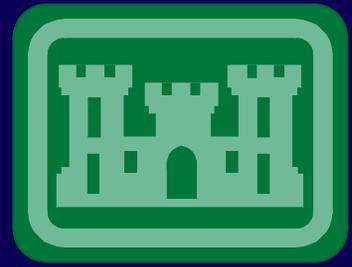
...but Strip Drains cause
the levees to settle

FOUNDATION
MATERIAL

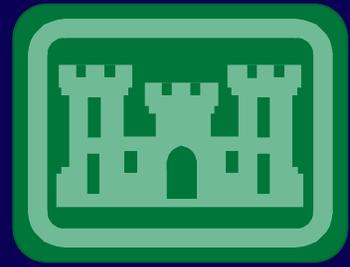


STARDRIPS





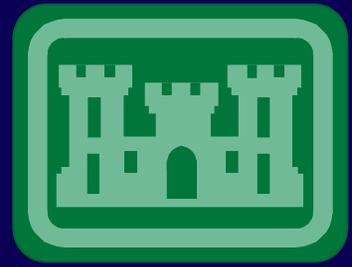
CRANEY ISLAND INFLOW



Methodology for Projecting Deposits:

- Detailed Study
 - design the channels
 - determine what the harbor looks like
- Look at past inflows & make broad assumptions
- Combination

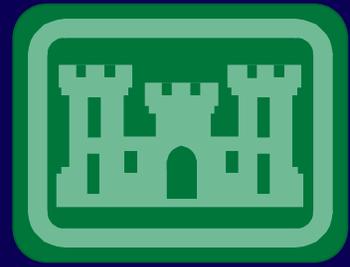
I
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W



Methodology for Projecting Deposits:

- 2000-2020: Educated Estimate
- 2021 and beyond: Look at past inflows & make broad assumptions

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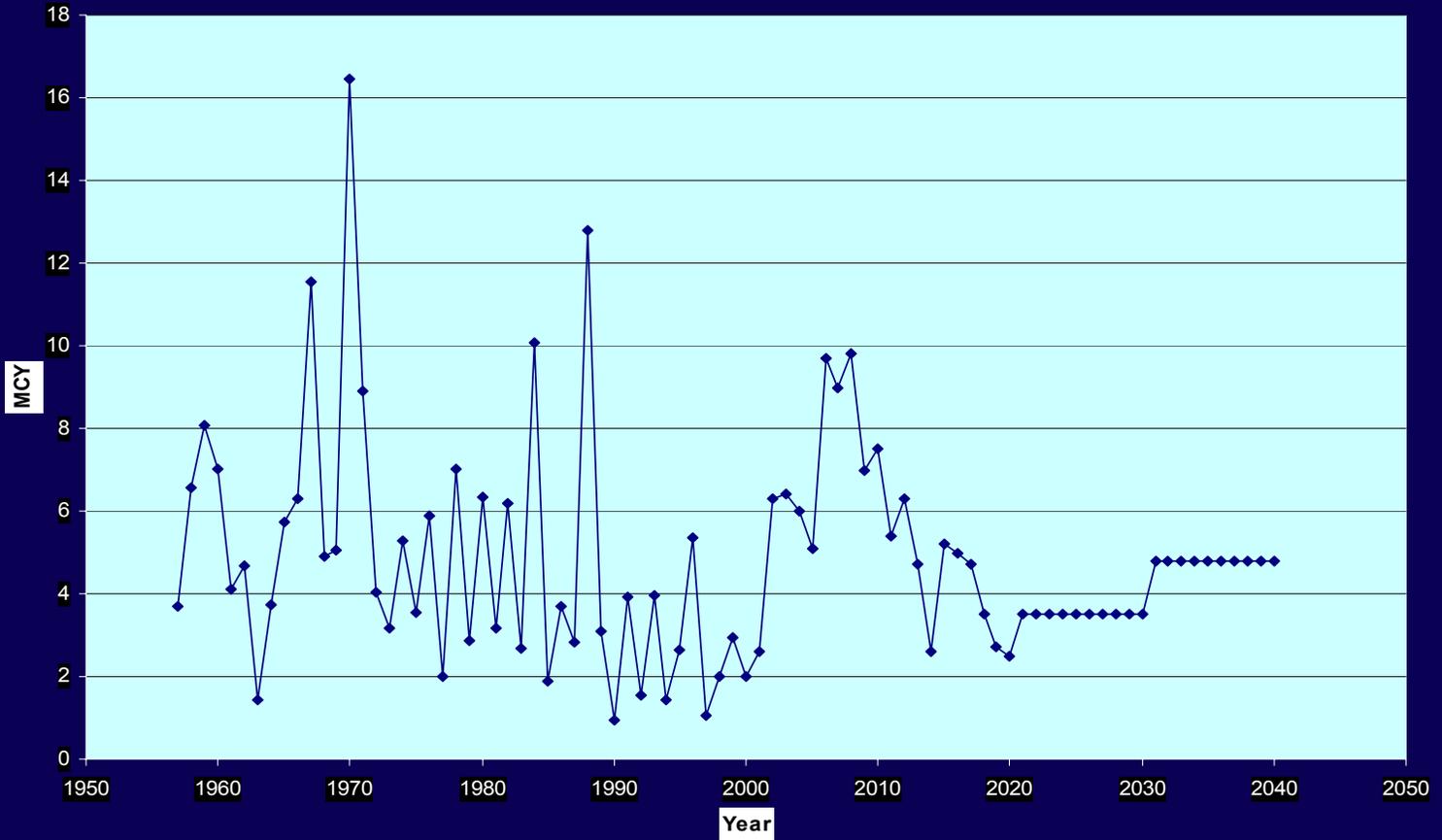
2000-2020 Estimate

– Surveyed Large Users: Navy, VPA, VDOT, USACE

- Determine Significant: New Work Projects
- Timing of New Work
- Annual Maintenance Dredging volume:
2.5 mcy/year

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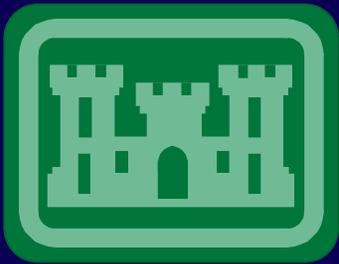
Million Cubic Yards per Year vs. Year

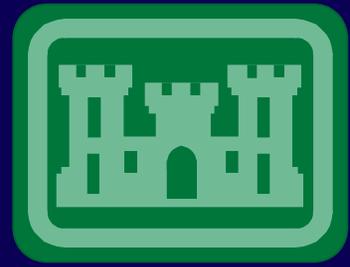


2021-2030: 2.5 mcy maintenance + 1 mcy new work

2031- forward: 4.8 mcy/yr = long term avg. inflow

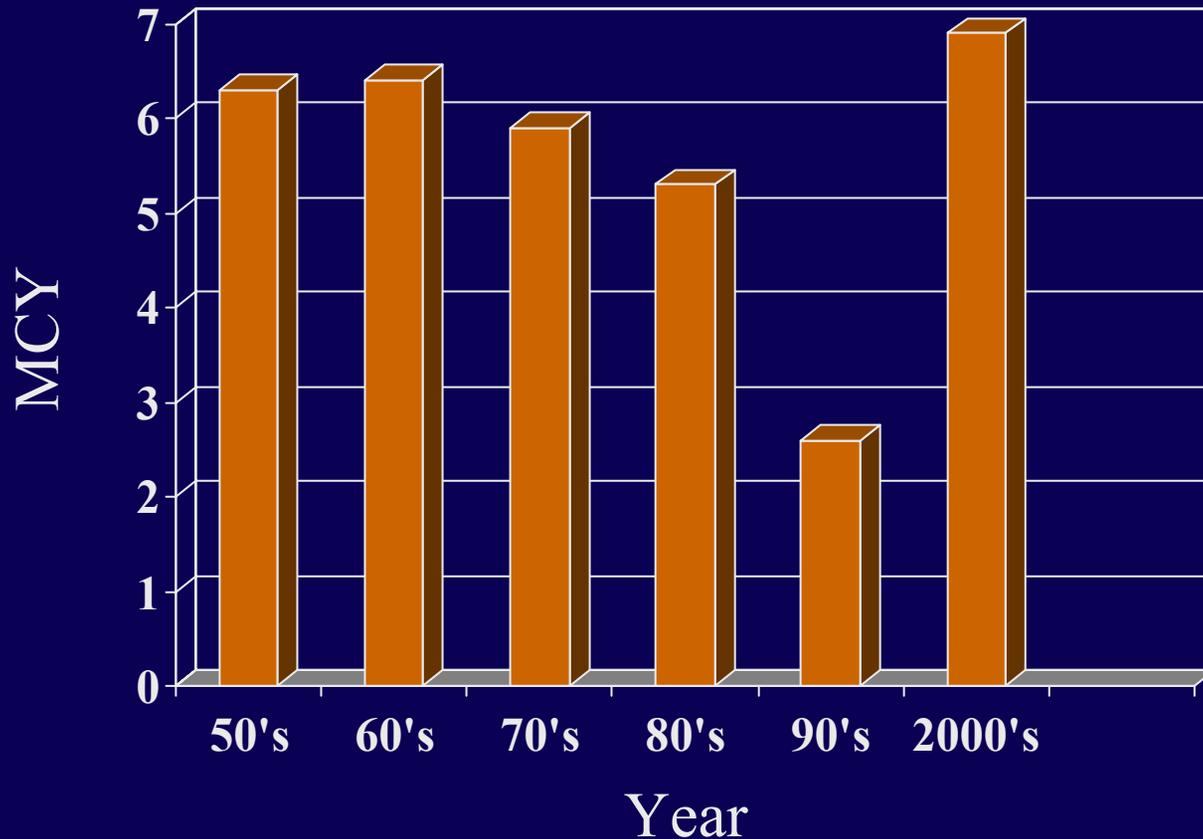
IN
FLOW



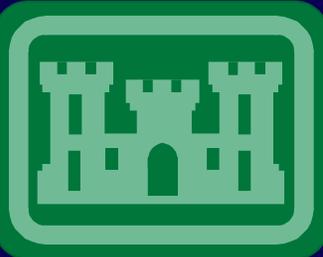


Average Annual Inflows per Decade

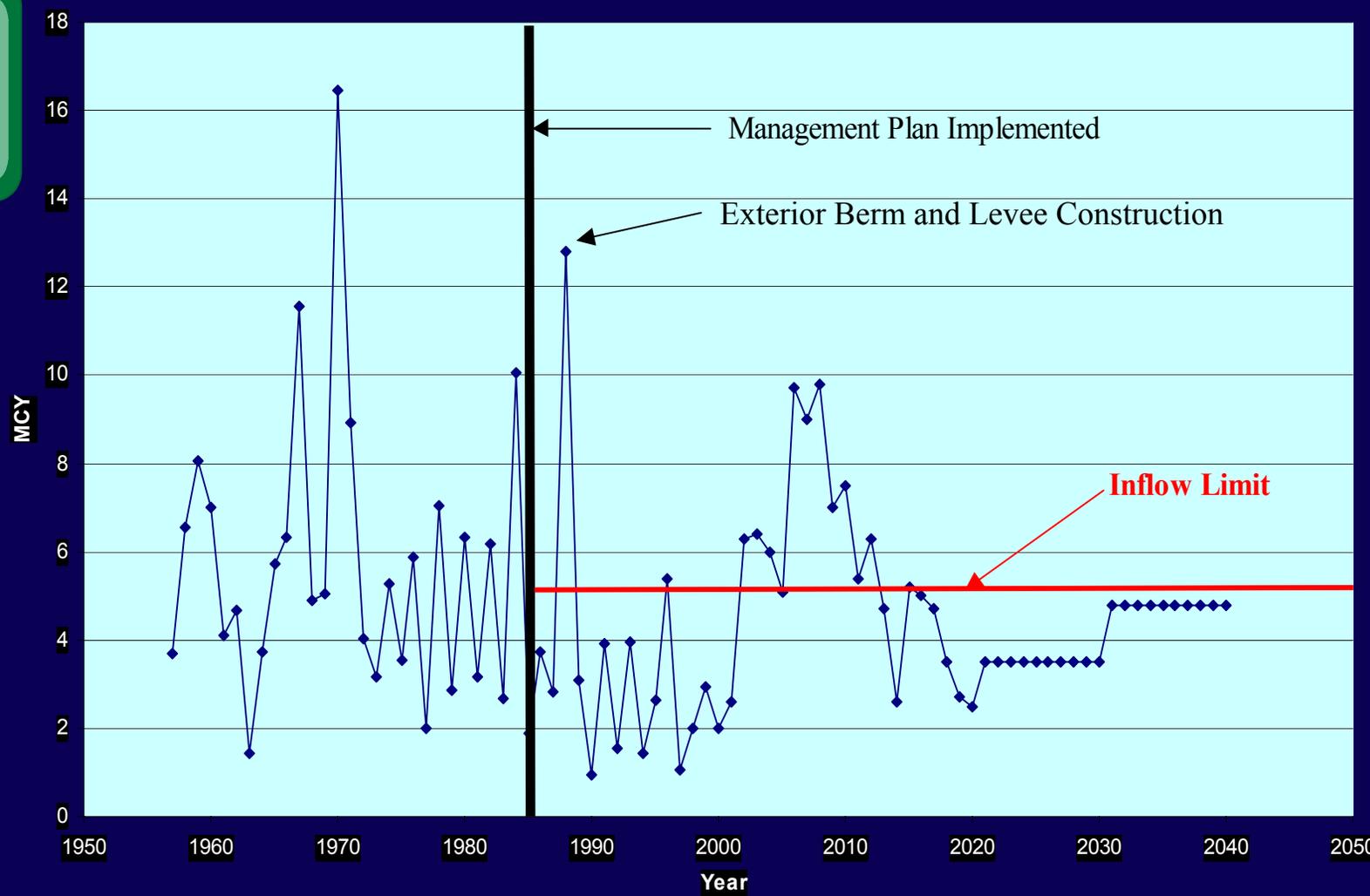
(50's includes 4 yrs of records)



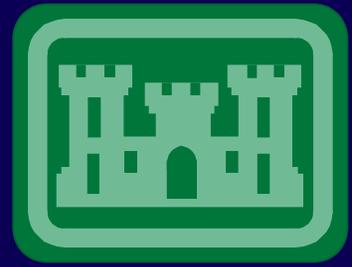
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2002 -2012: 25 mcy of demand in excess of inflow limit



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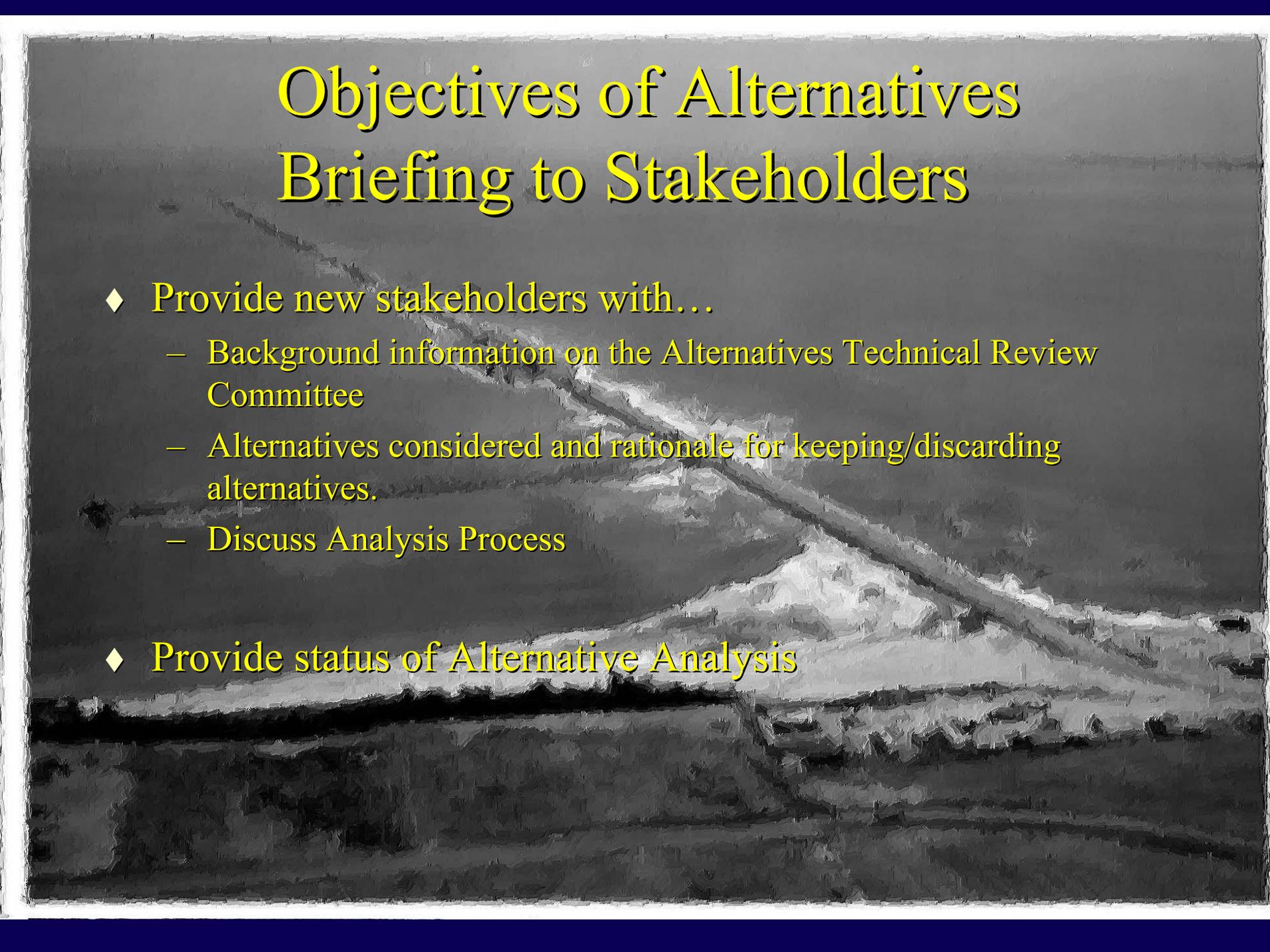
Questions?

An aerial photograph of Craney Island, showing a long pier extending from the mainland into the water. The island is surrounded by water, and there are some buildings and a road visible on the mainland in the foreground. The text is overlaid on the image in a yellow, serif font.

Craney Island Feasibility Study Alternative Analysis

Presented by:
Michelle Banton

Objectives of Alternatives Briefing to Stakeholders



- ◆ Provide new stakeholders with...
 - Background information on the Alternatives Technical Review Committee
 - Alternatives considered and rationale for keeping/discarding alternatives.
 - Discuss Analysis Process
- ◆ Provide status of Alternative Analysis

Hydraulics
&
Hydrology

Geotechnical
Engineering

Environmental

Regulatory

Senior
Technical
Review

Alternatives Technical
Review Committee

GIS

Economics

Craney Island
Operations

Social
&
Cultural

Objectives of Alternatives Briefing to Stakeholders

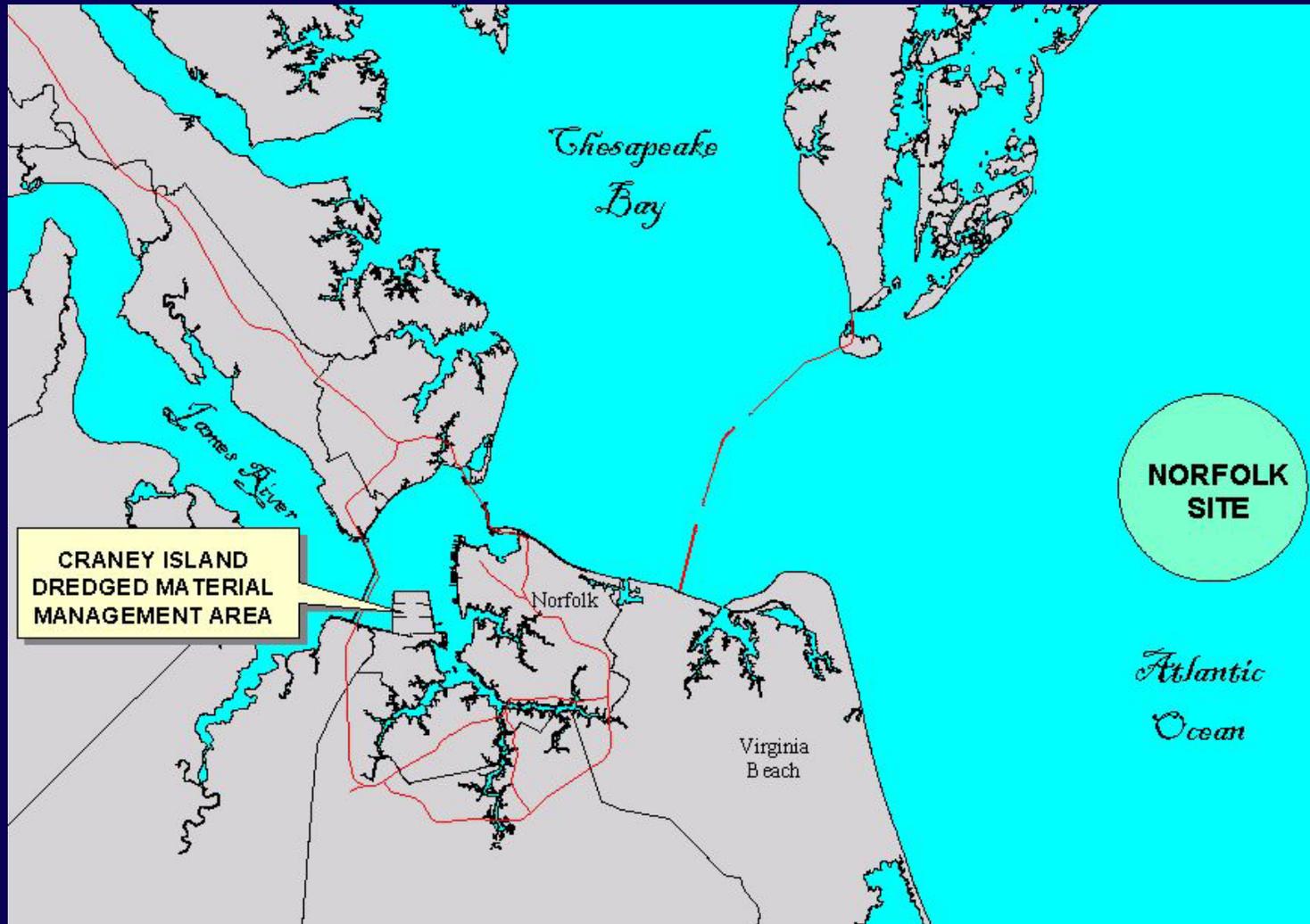
- ◆ Provide new stakeholders with...
 - Background information on the Alternatives Technical Review Committee
 - Alternatives considered and rationale for keeping/discarding alternatives.
 - Discuss Analysis Process and status

Alternatives Considered

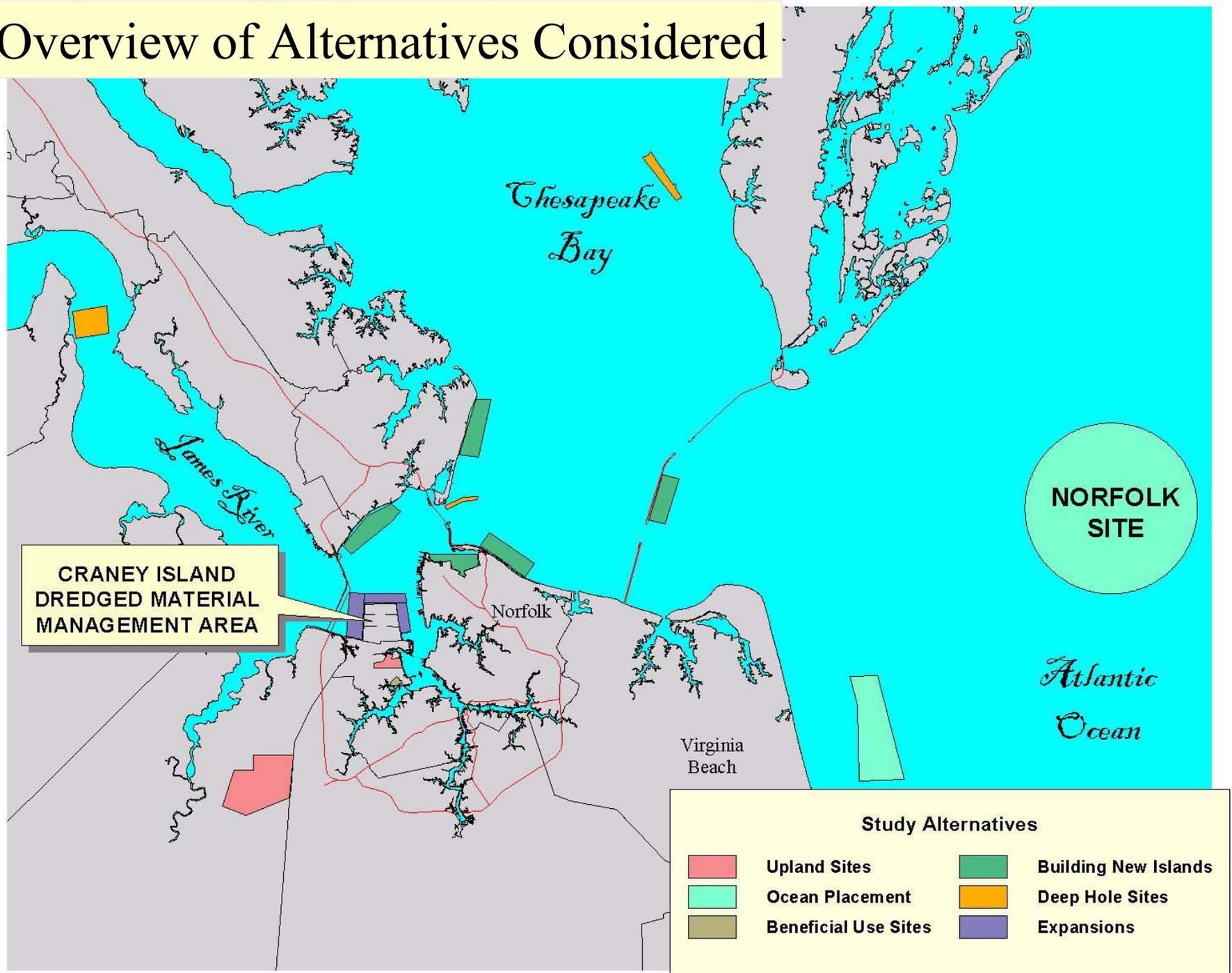
- ◆ 48 alternatives covering a wide spectrum of areas
 - **OFF-SITE**
 - Upland (3)
 - Beneficial Use (2)
 - Islands (5)
 - Combined Aquatic Disposal Facilities (15)
 - Deep Holes (3)
 - Ocean Placement (2)
 - **ON-SITE**
 - Footprint Options (18 plus base condition)

Baseline Condition

Combined Use of Craney Island and Ocean Placement (Norfolk Site)



Overview of Alternatives Considered



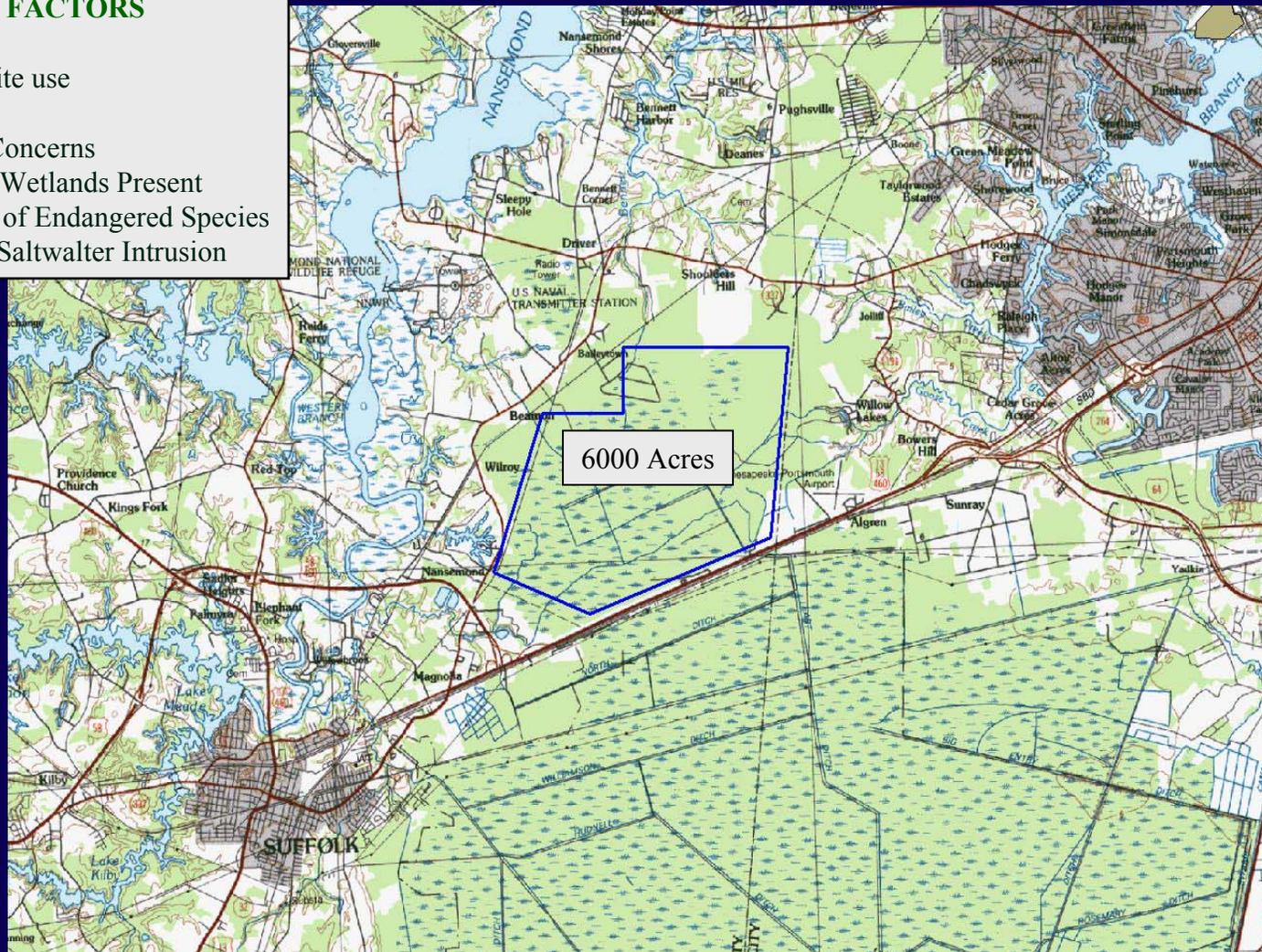
OFF-SITE Alternatives



Upland Sites – Suffolk SPSA Site

ELIMINATION FACTORS

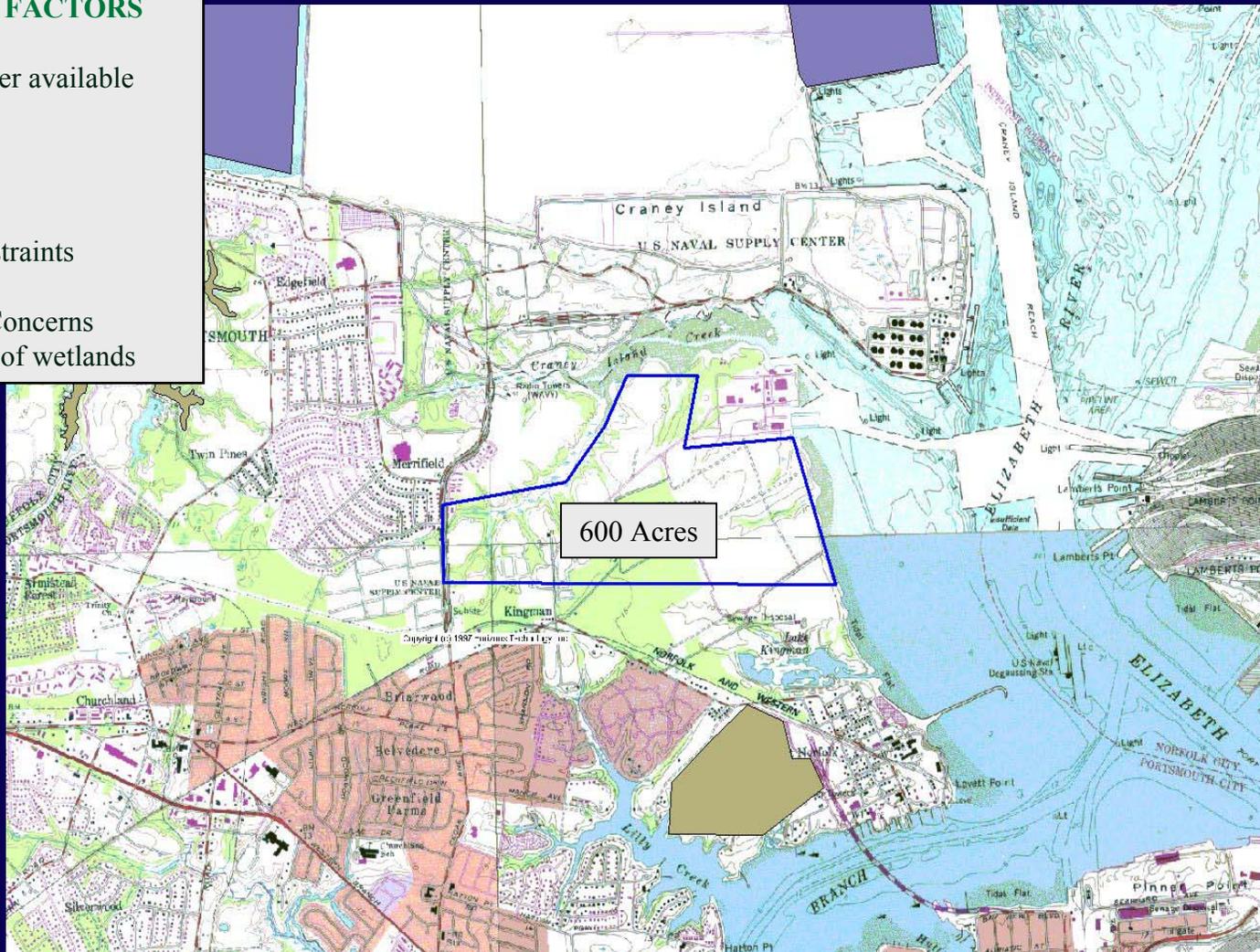
- Conflicting on-site use
- Environmental Concerns
 - Forested Wetlands Present
 - Presence of Endangered Species
 - Possible Saltwater Intrusion



Upland Sites – Portsmouth Sites

ELIMINATION FACTORS

- Property no longer available sold to Maersk
- Capacity Issues
- Operational constraints
- Environmental Concerns
 - Presence of wetlands



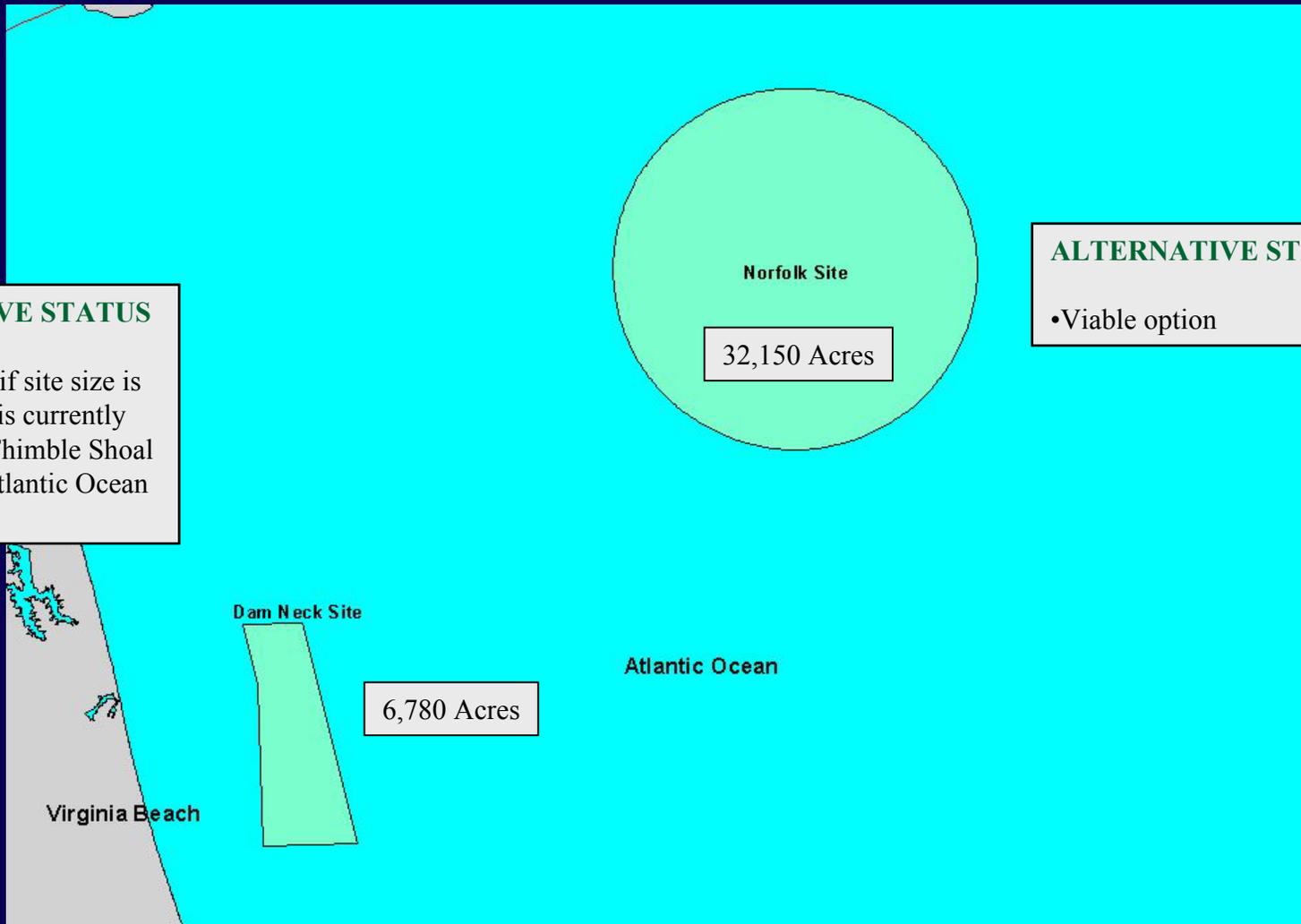
Upland Sites – Lilly Creek

ELIMINATION FACTORS

- Site Constraints
 - Commercial Development
 - Residential Development
- Capacity Issues



Ocean Placement – Norfolk Site & Dam Neck



ALTERNATIVE STATUS
•Viable option

ALTERNATIVE STATUS
•Viable option if site size is expanded; site is currently committed to Thimble Shoal Channel and Atlantic Ocean Channel.

32,150 Acres

6,780 Acres

Virginia Beach

Atlantic Ocean

Dam Neck Site

Norfolk Site

Beneficial Use – Hoffler Creek

ELIMINATION FACTORS

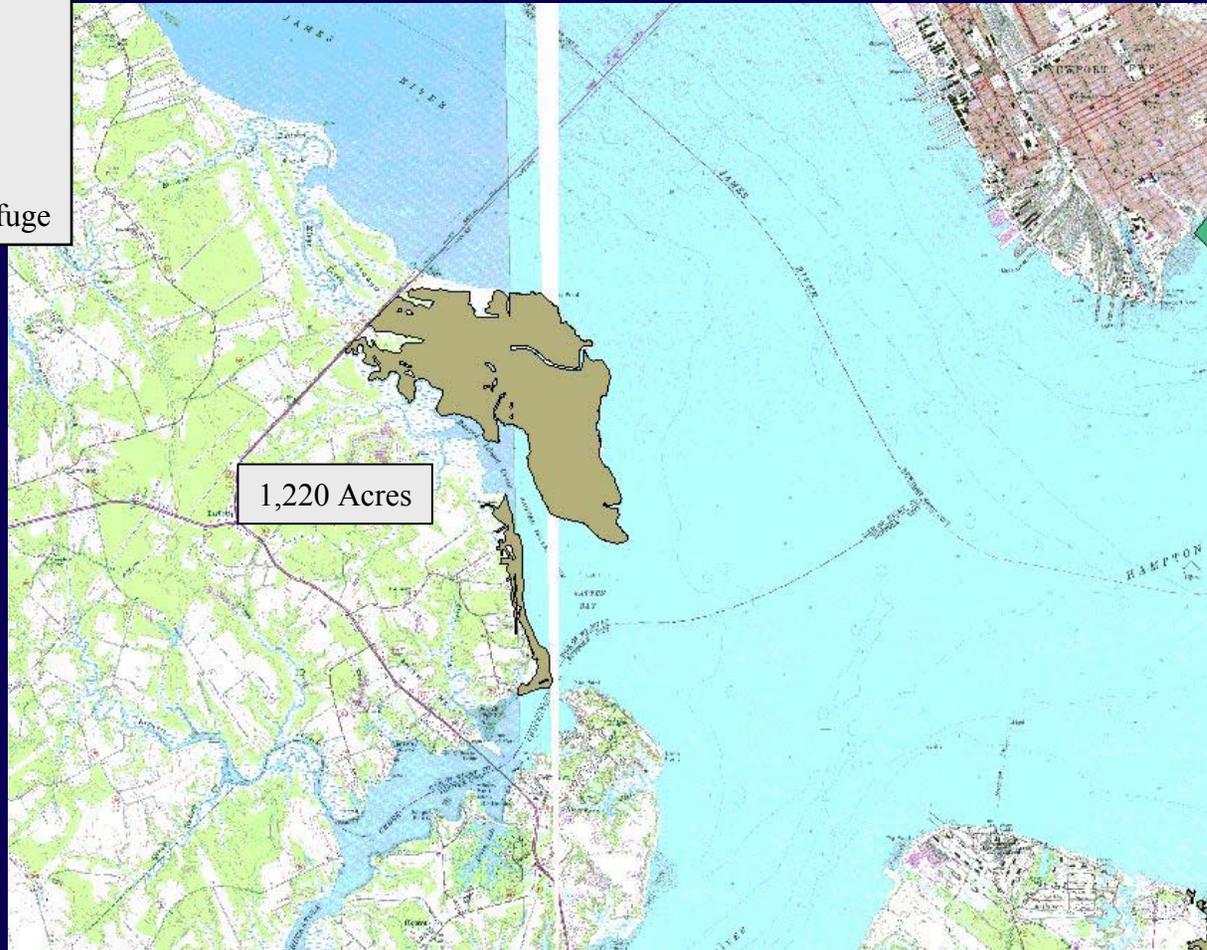
- Site Constraints
- Capacity Issues
- Designated as Wildlife Refuge



Beneficial Use – Ragged Island

ELIMINATION FACTORS

- Site Constraints
- Capacity Issues
- Designated as Wildlife Refuge



Building New Islands – Hampton Flats

ELIMINATION FACTORS

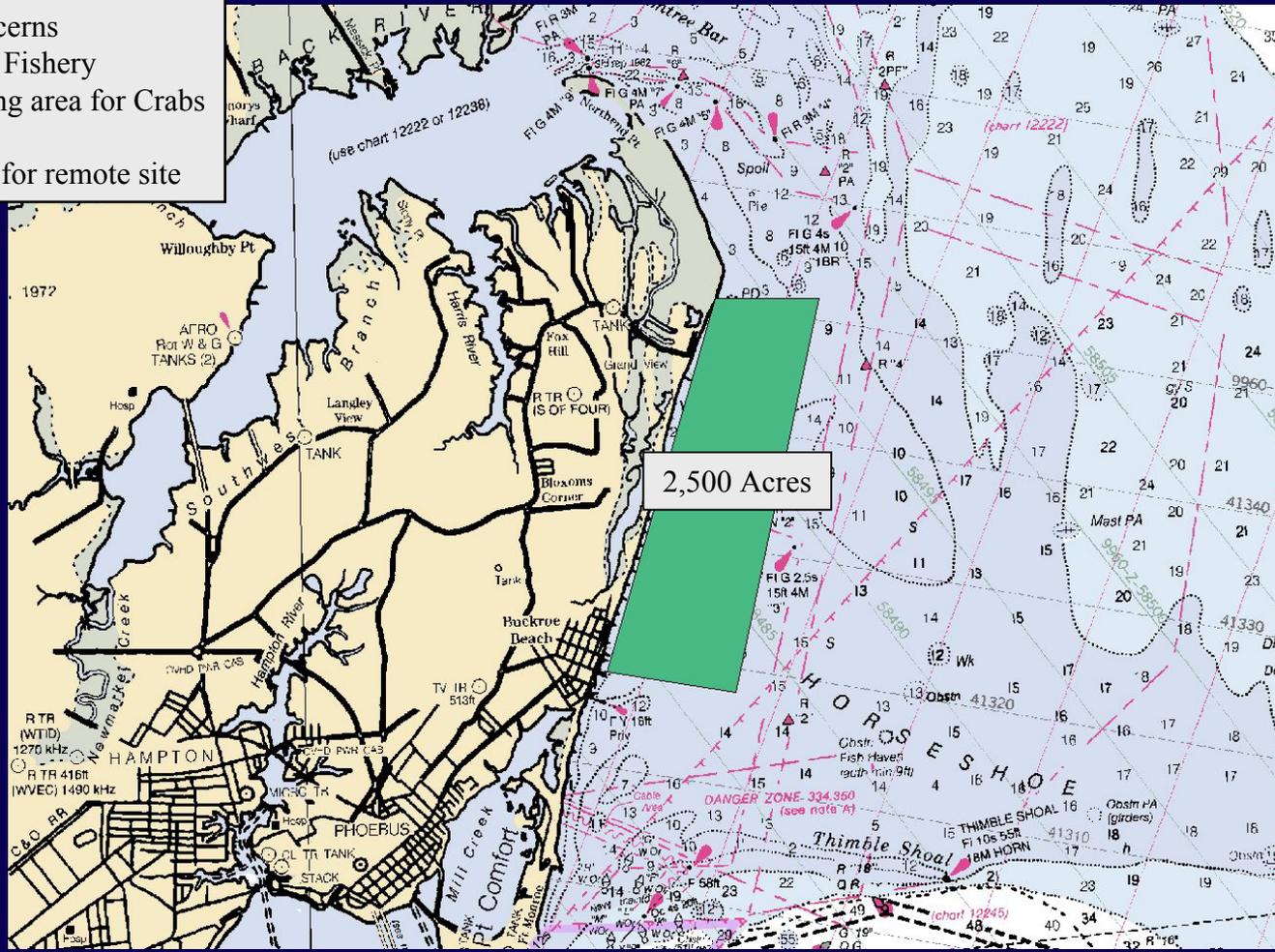
- Environmental Concerns
 - Plunging Front
 - Commercial Fishery



Building New Islands – Buckroe Beach Offshore / Horseshoe

ELIMINATION FACTORS

- Environmental Concerns
 - Commercial Fishery
 - Overwintering area for Crabs
- Operations difficult for remote site



Building New Islands – Ocean View Offshore Island & Willoughby Bay Island

ELIMINATION FACTORS

- Environmental Concerns
 - Loss of bottom habitat
- Socially unacceptable



Building New Islands – Island East of Chesapeake Bay Bridge Tunnel

ELIMINATION FACTORS

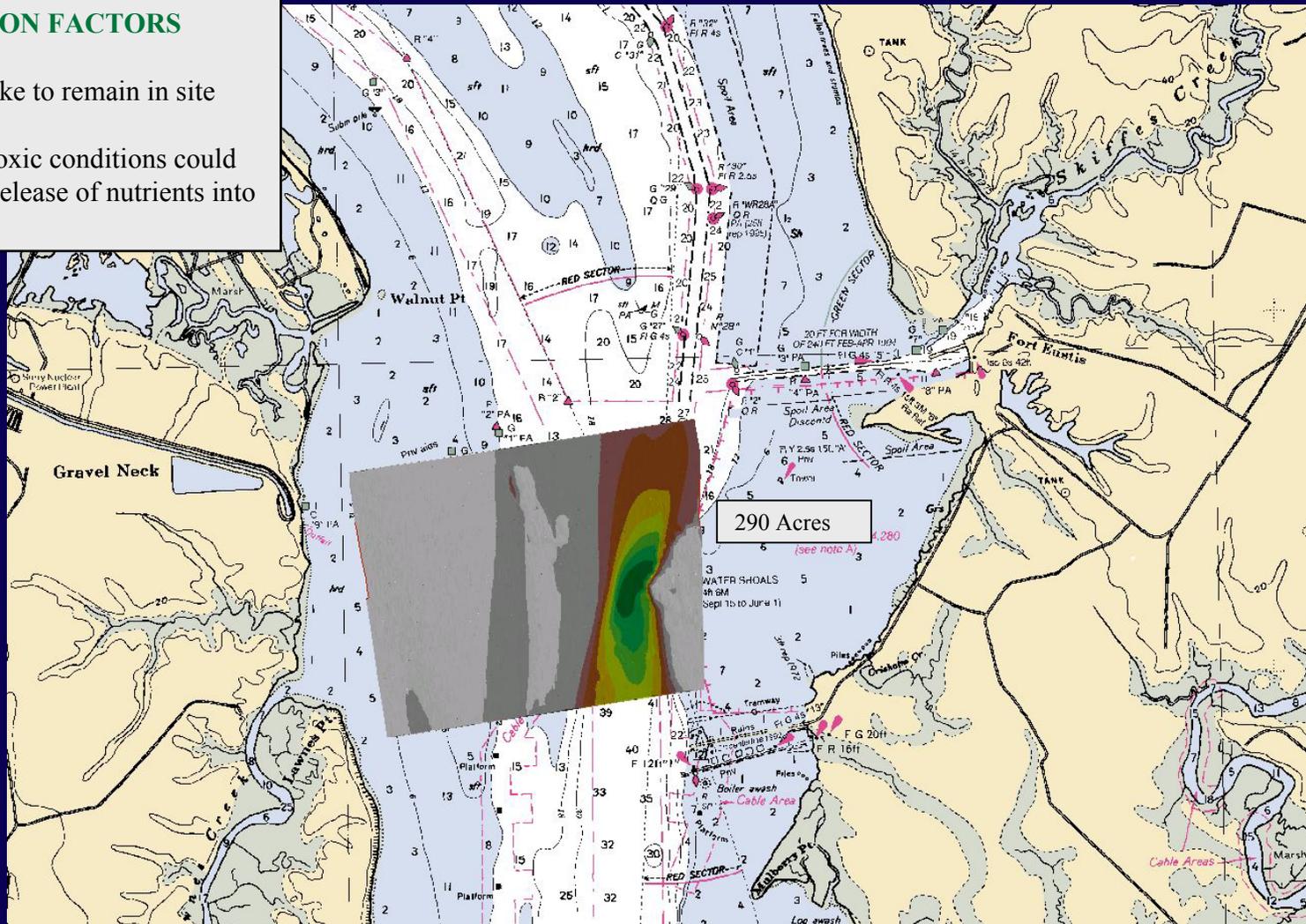
- Environmental Concerns
 - Loss of bottom habitat
- May adversely impact adjacent structures
- Operations difficult for remote site



Deep Hole Sites- James River

ELIMINATION FACTORS

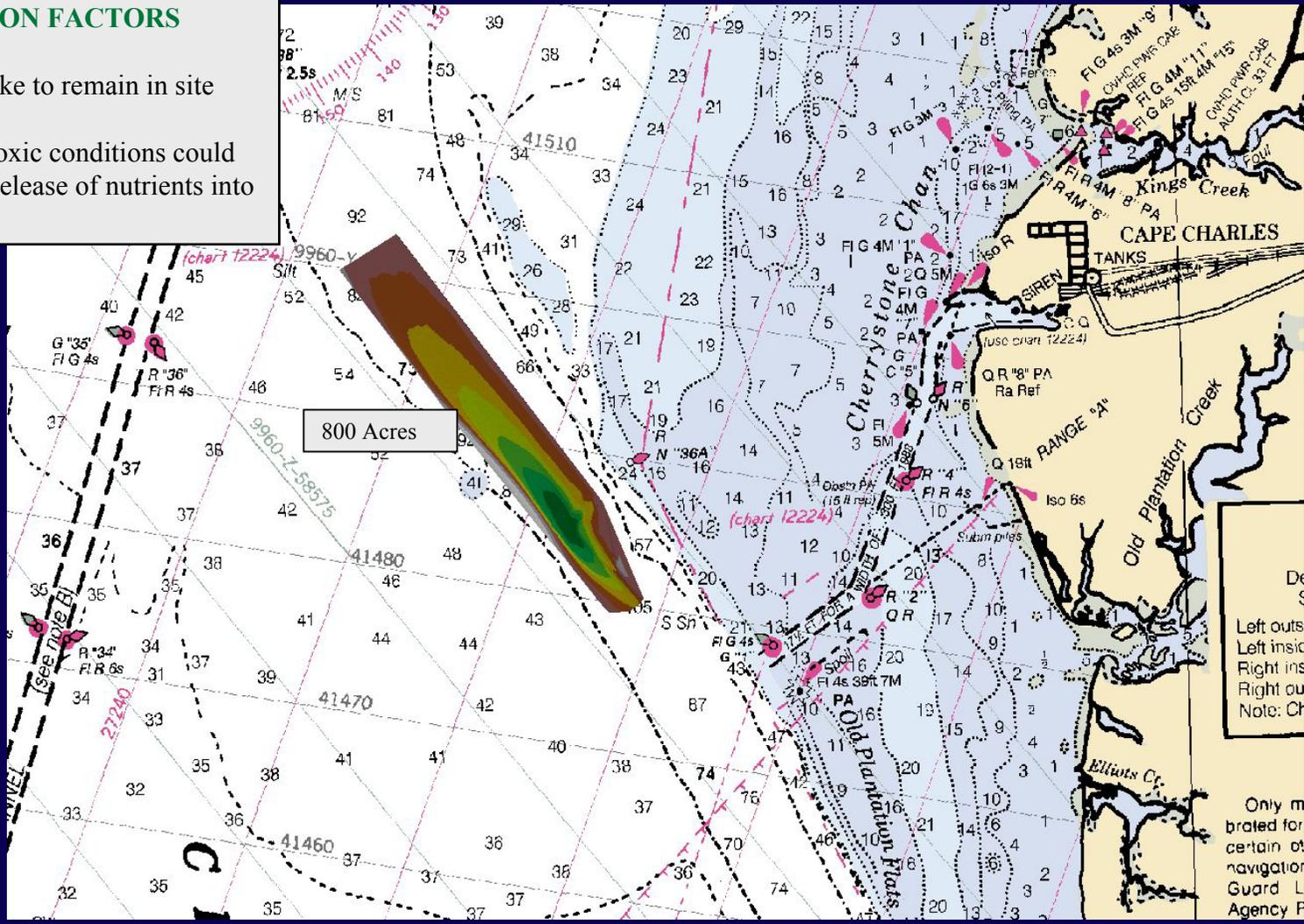
- Material unlikely to remain in site
- Seasonal Anoxic conditions could facilitate the release of nutrients into water column



Deep Hole Sites - Chesapeake Bay Offshore Site

ELIMINATION FACTORS

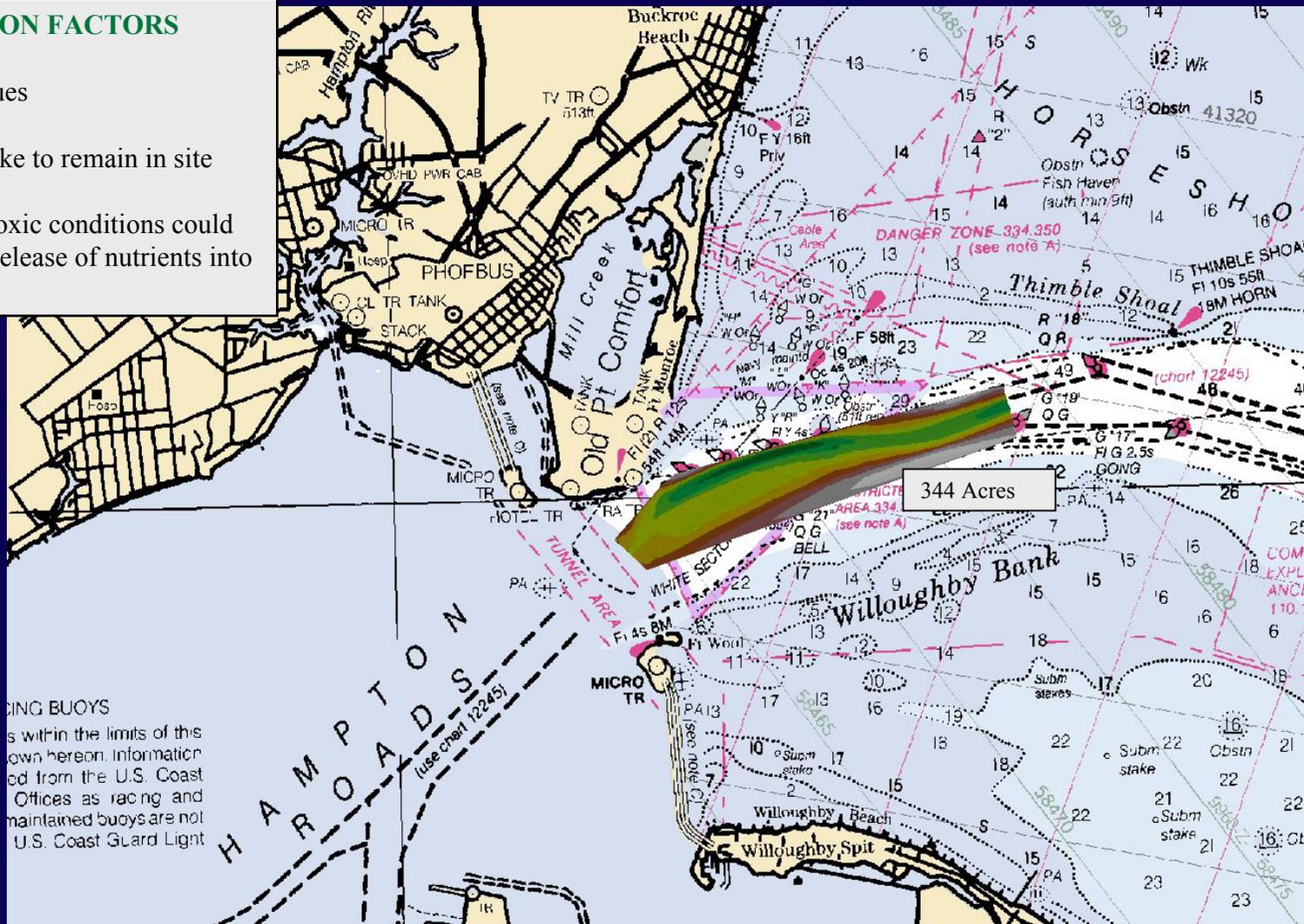
- Material unlikely to remain in site
- Seasonal Anoxic conditions could facilitate the release of nutrients into water column



Deep Hole Sites – Hampton Roads Bridge Tunnel

ELIMINATION FACTORS

- Capacity Issues
- Material unlike to remain in site
- Seasonal Anoxic conditions could facilitate the release of nutrients into water column



ANCHORING BUOYS
within the limits of this
chart hereon. Information
obtained from the U.S. Coast
Guard Offices as to racing and
maintained buoys are not
U.S. Coast Guard Light

COMBINED AQUATIC DISPOSAL FACILITIES

1. Offshore of River Shore
2. Offshore of TCC - Portsmouth
3. Mouth of Nansemond River
4. Offshore of Pike Point
5. West of I-664, Monitor-Merrimac Bridge Tunnel
6. Middle Ground Site
7. Newport News Bar Site
8. Channel to Newport News Site
9. Hampton Flats West
10. Hampton Flats East
11. Sewells Point Spit
12. Norfolk Navy Base near Carrier Pier
13. Norfolk Harbor Channel
14. Norfolk International Terminal Sites
15. Eastside of Craney Island

0 7000 Feet

Scale is approximate



Combined Aquatic Disposal Facilities (CADFs)

- | | | |
|-----|---|---|
| 1. | Offshore of River Shore Neighborhood | Capacity issues/ environmental concerns |
| 2. | Offshore TCC-Portsmouth | Capacity issues/ environmental concerns |
| 3. | South of Entrance of Nansemond River | Capacity issues/ environmental concerns |
| 4. | Offshore of Pike Point | High Commercial Value Fishery |
| 5. | West of I-664 | High Commercial Value Fishery |
| 6. | Middle Ground Site | Environmental issues |
| 7. | Adjacent to Hampton Creek Entrance | Capacity issues, proximity to Channel and Hampton Flats |
| 8. | Channel of Newport News Site | Co-existence of Federal Channel |
| 9. | Hampton Flats West Site | High Commercial Value / Proximity to Hampton Flats |
| 10. | Hampton Flats East Site | High Commercial Value / Proximity to Hampton Flats |
| 11. | Adjacent to Willoughby Federal Navigation Channel | High Commercial Value / Proximity to Federal Channel |
| 12. | Navy Base North of Carrier Docks | Capacity issues, Navy berthing area |
| 13. | Adjacent to NIT North | Capacity issues, port operation issues |
| 14. | Adjacent to NIT South | Capacity issues, port operation issues, |
| 15. | East side of Craney Island Facility | Disruptions of Craney Island Operations |

On-site Alternatives Footprint Options



Option 1 Eliminated

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

Revised Third Crossing
(Shifted West & 1200' South)

VDOT's Proposed
Third Crossing

1770 Acres

Proposed
Placement
Area

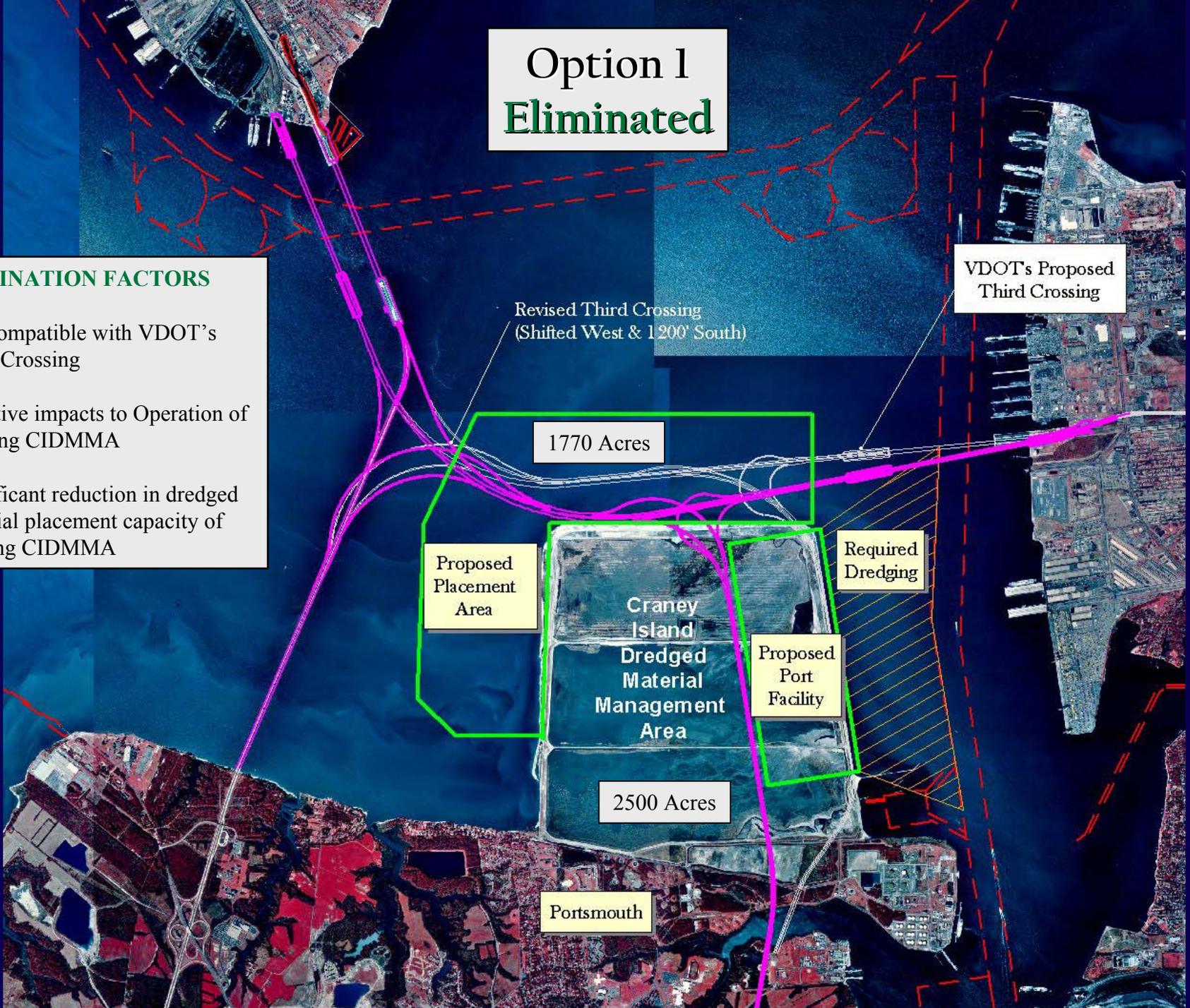
Craney
Island
Dredged
Material
Management
Area

Required
Dredging

Proposed
Port
Facility

2500 Acres

Portsmouth



Option 2 Eliminated

ELIMINATION FACTORS

- Significant Environmental / Social Concerns
- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

Revised Third Crossing
(Shifted West & 1200' South)

VDOT's Proposed
Third Crossing

2500 Acres

Proposed
Placement
Area

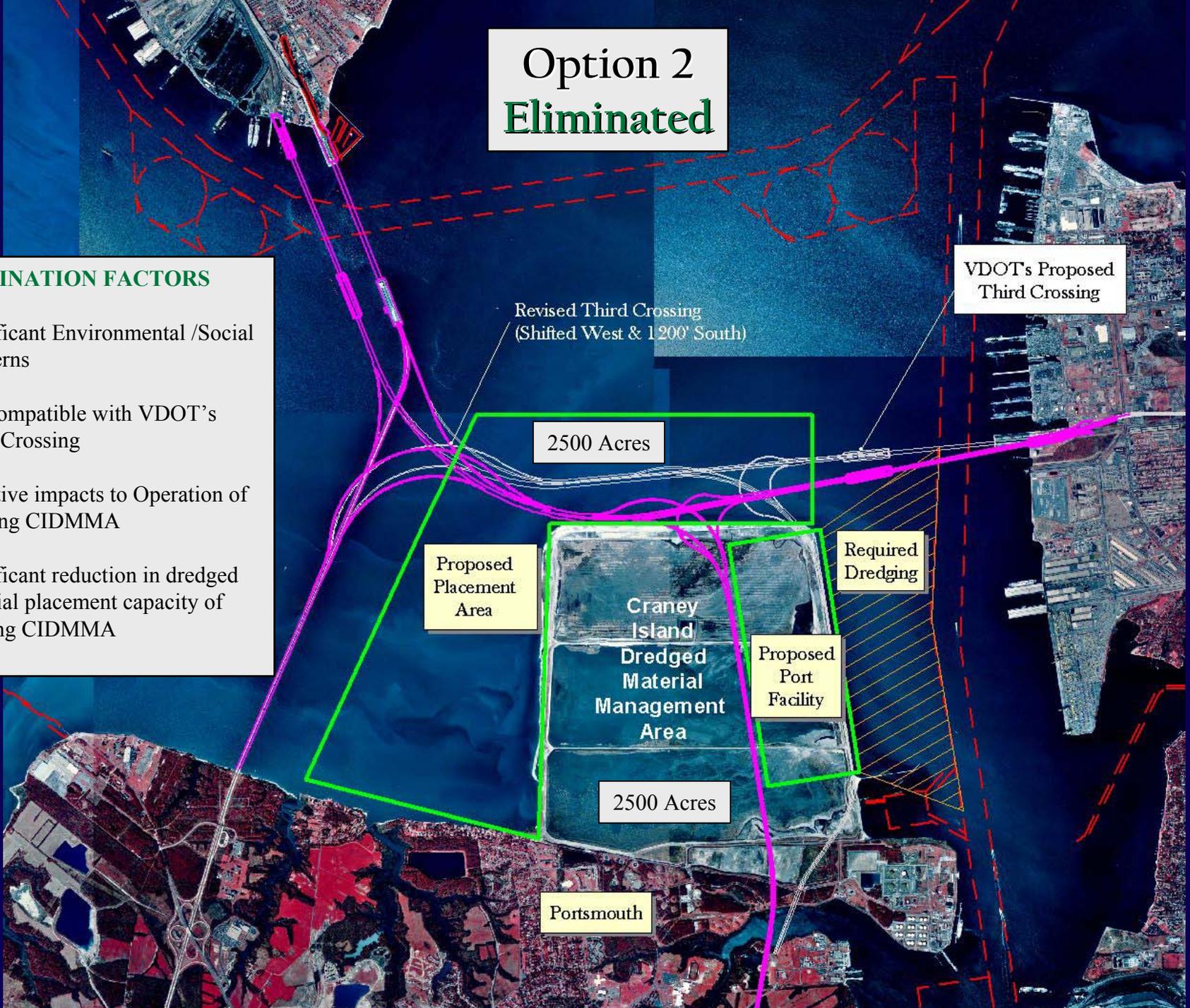
Craney
Island
Dredged
Material
Management
Area

Required
Dredging

Proposed
Port
Facility

2500 Acres

Portsmouth



Option 3 Eliminated

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

VDOT's Proposed Third Crossing

Revised Third Crossing (Shifted West)

Proposed Placement Area

700 Acres

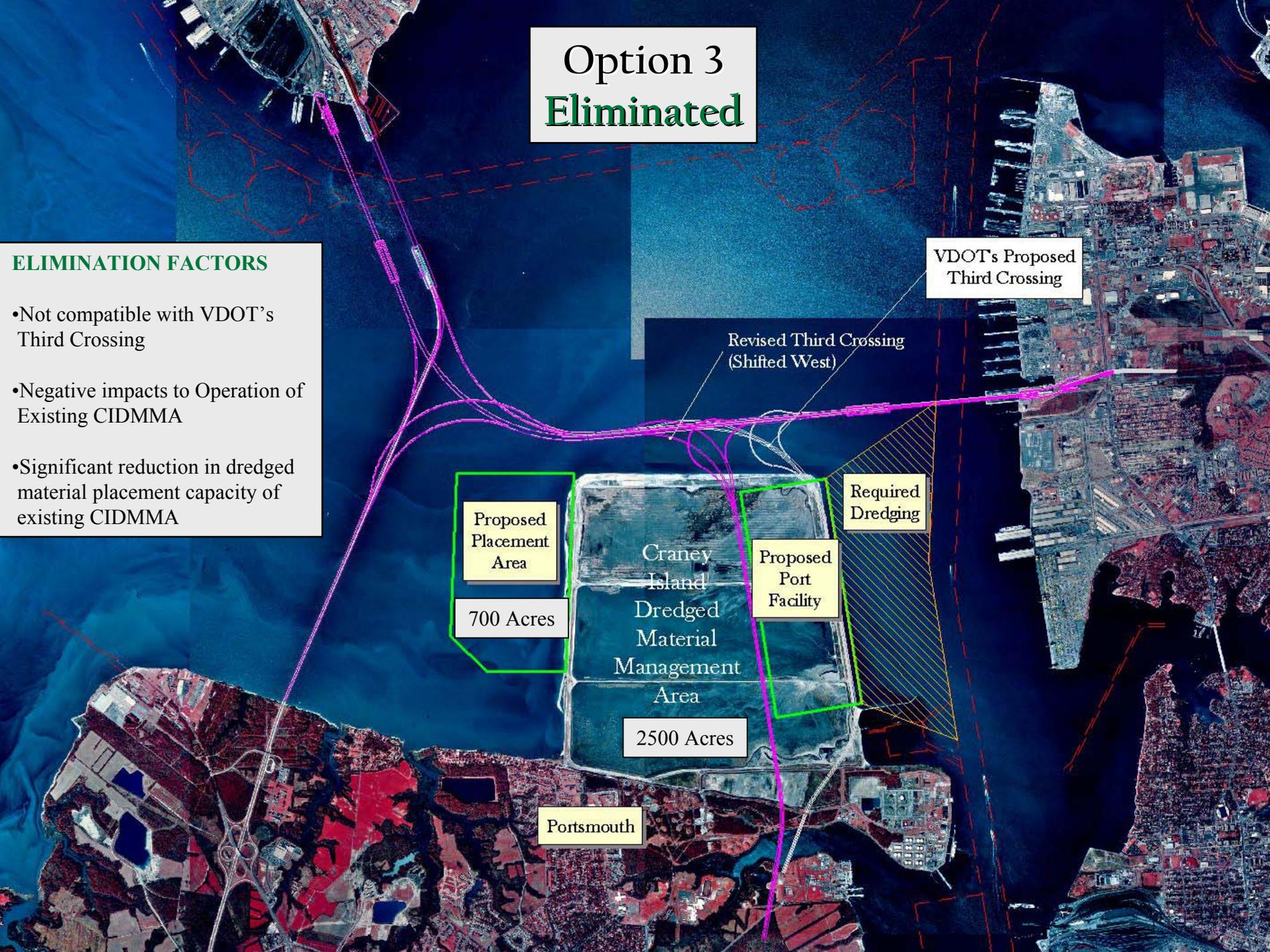
Craney Island Dredged Material Management Area

2500 Acres

Proposed Port Facility

Required Dredging

Portsmouth



Option 4 Eliminated

Hampton Roads Crossing Study
Alternate 9 (Shifted West)

ELIMINATION FACTORS

- Significant Environmental / Social Concerns
- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

Proposed
Placement
Area

1430 Acres

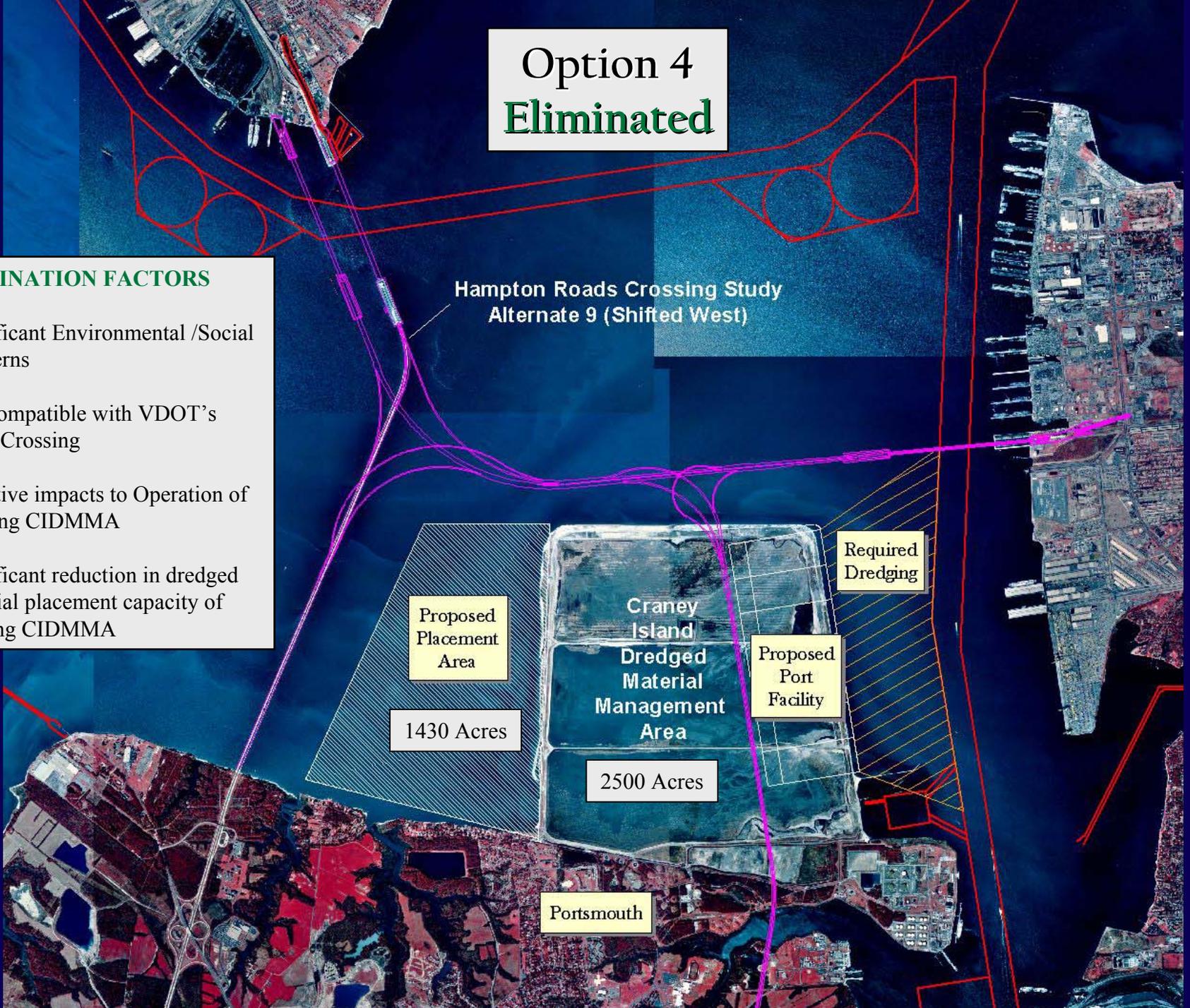
Craney
Island
Dredged
Material
Management
Area

2500 Acres

Required
Dredging

Proposed
Port
Facility

Portsmouth



Option 5 Eliminated

Hampton Roads Crossing Study
Alternate 9 (Shifted West)

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

1013 Acres

Proposed
Placement
Area

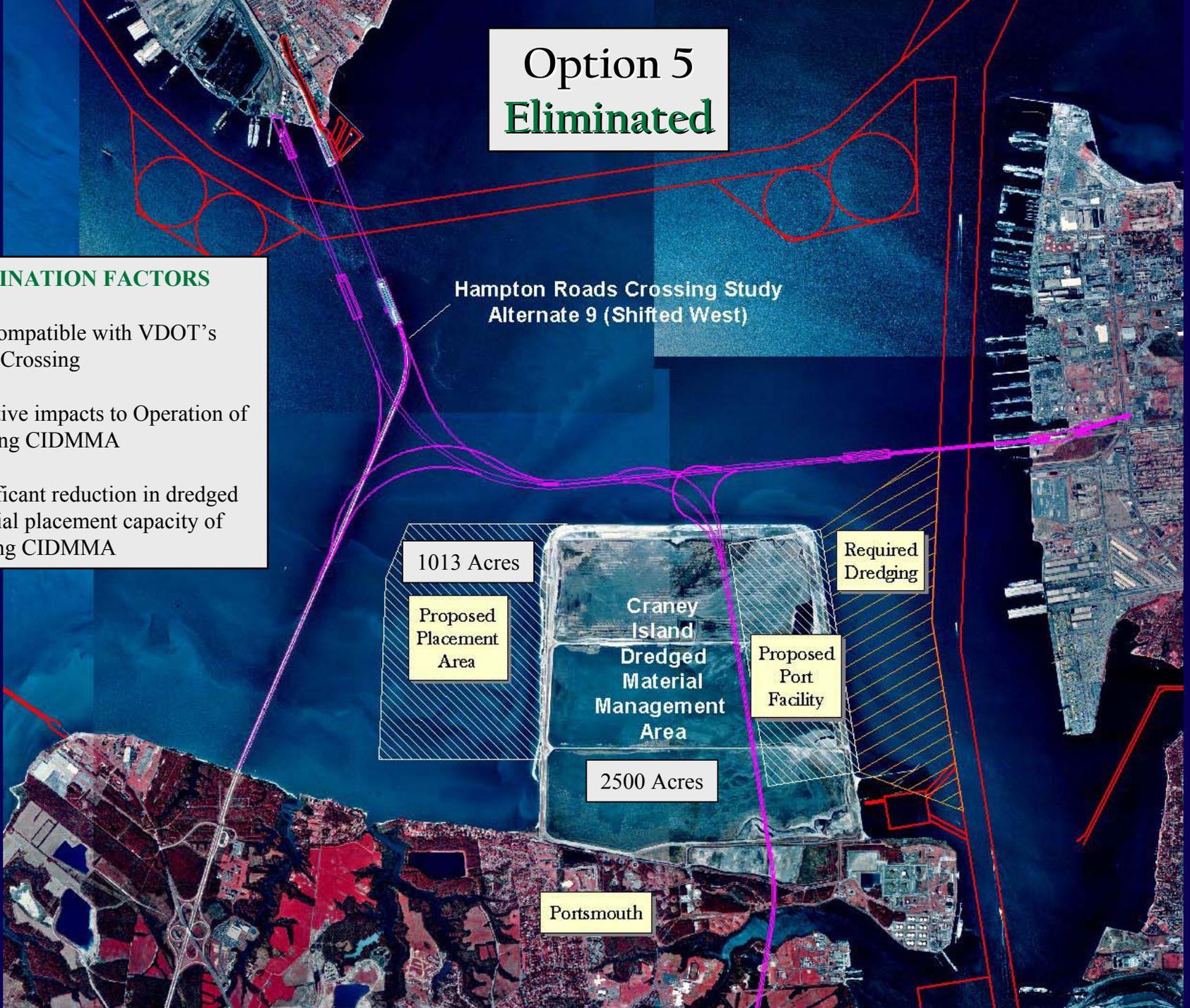
Craney
Island
Dredged
Material
Management
Area

2500 Acres

Required
Dredging

Proposed
Port
Facility

Portsmouth



Modified Option 5

Modeled in VIMS Single Variable Run

SELECTION FACTORS

- Modeling results showed that footprint presented the second least amount of change on the surrounding environment.
- Selected by Stakeholders for additional modeling.

Hampton Roads Crossing Study
Alternate 9

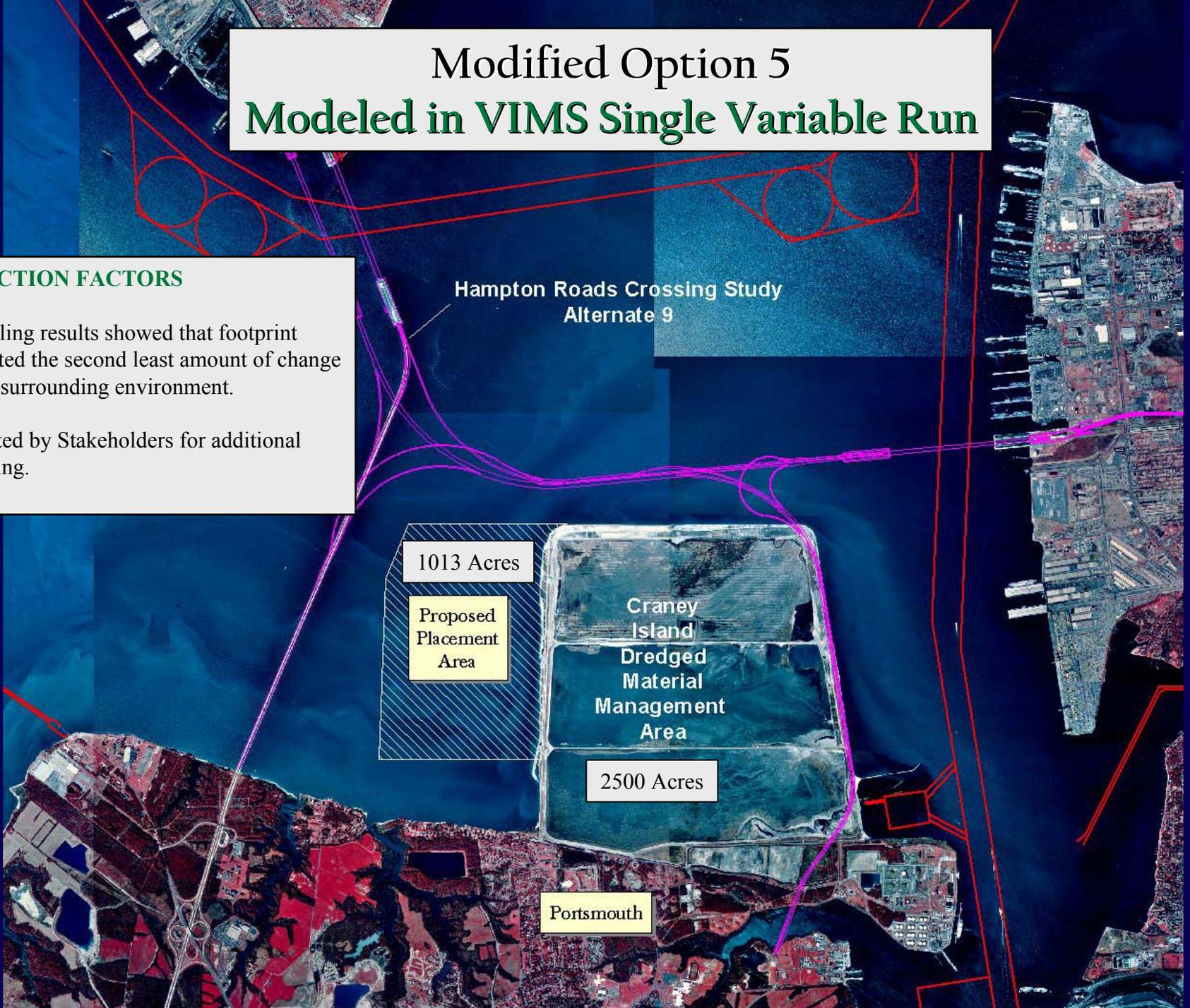
1013 Acres

Proposed
Placement
Area

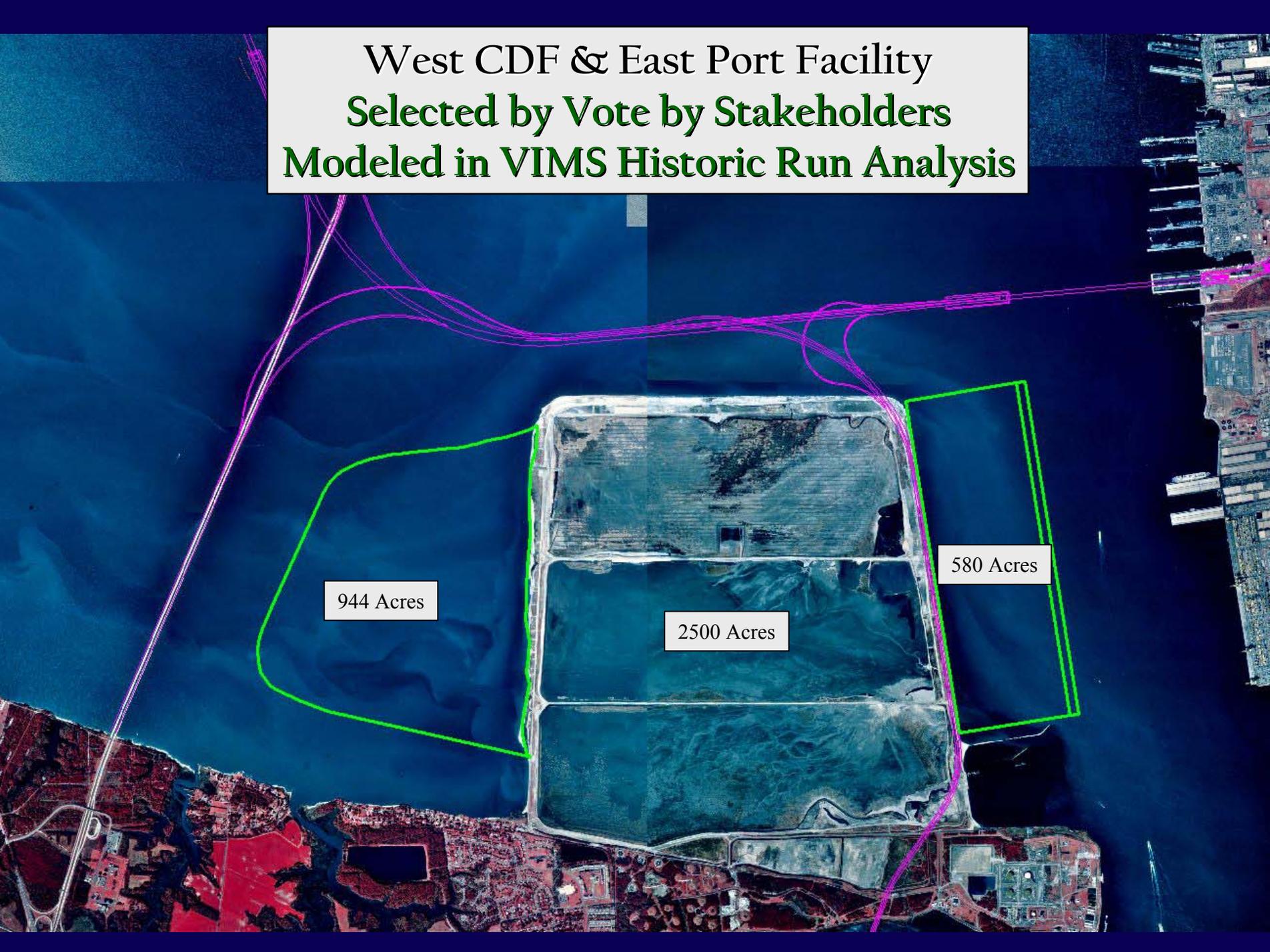
Craney
Island
Dredged
Material
Management
Area

2500 Acres

Portsmouth



**West CDF & East Port Facility
Selected by Vote by Stakeholders
Modeled in VIMS Historic Run Analysis**



944 Acres

2500 Acres

580 Acres

Option 6 Modeled and Eliminated

SELECTION FACTORS

- Modeling results showed greater change with northward expansion.

Hampton Roads Crossing Study
Alternate 9 (shifted 1200' South)

Required Dredging

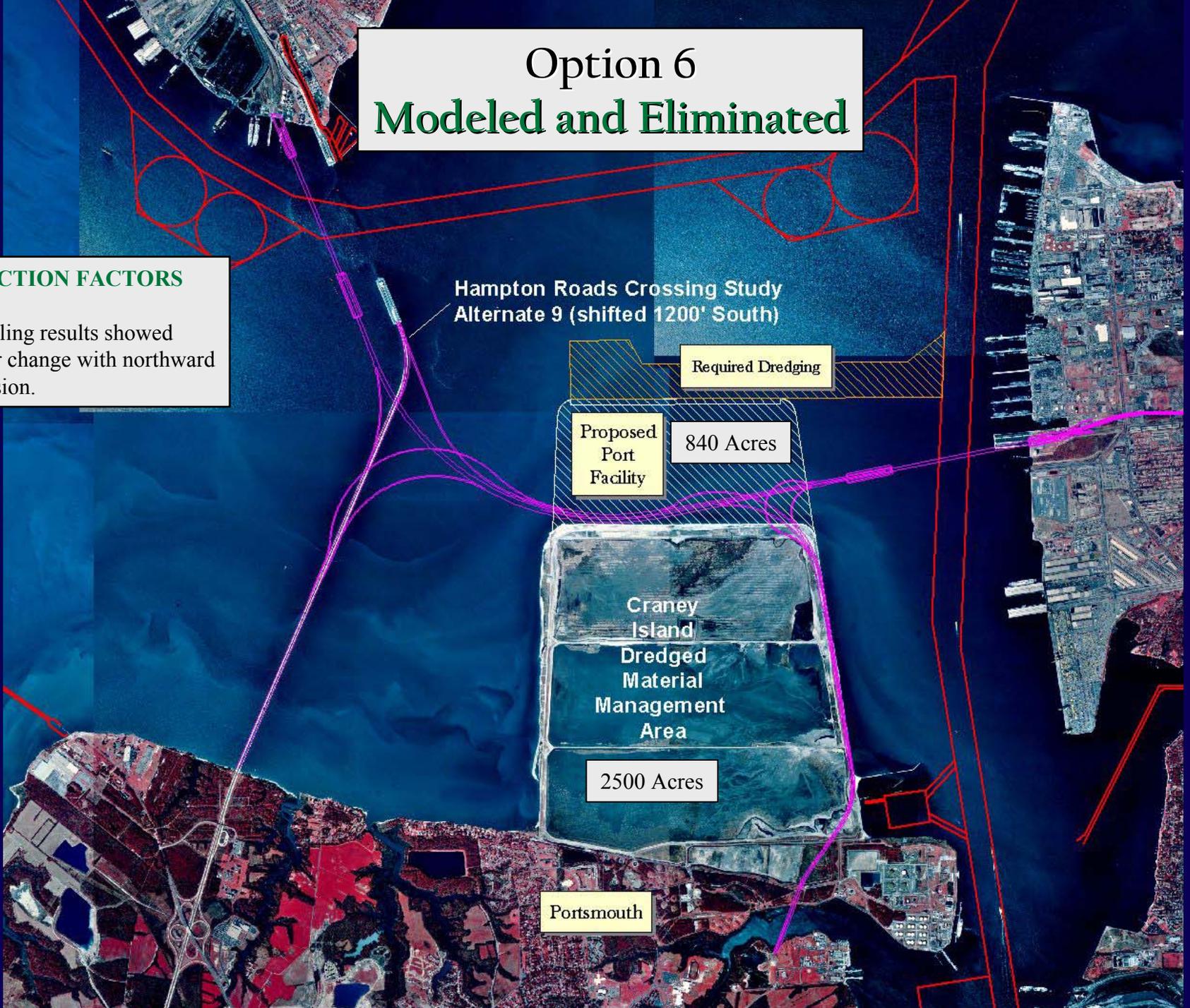
Proposed
Port
Facility

840 Acres

Craney
Island
Dredged
Material
Management
Area

2500 Acres

Portsmouth



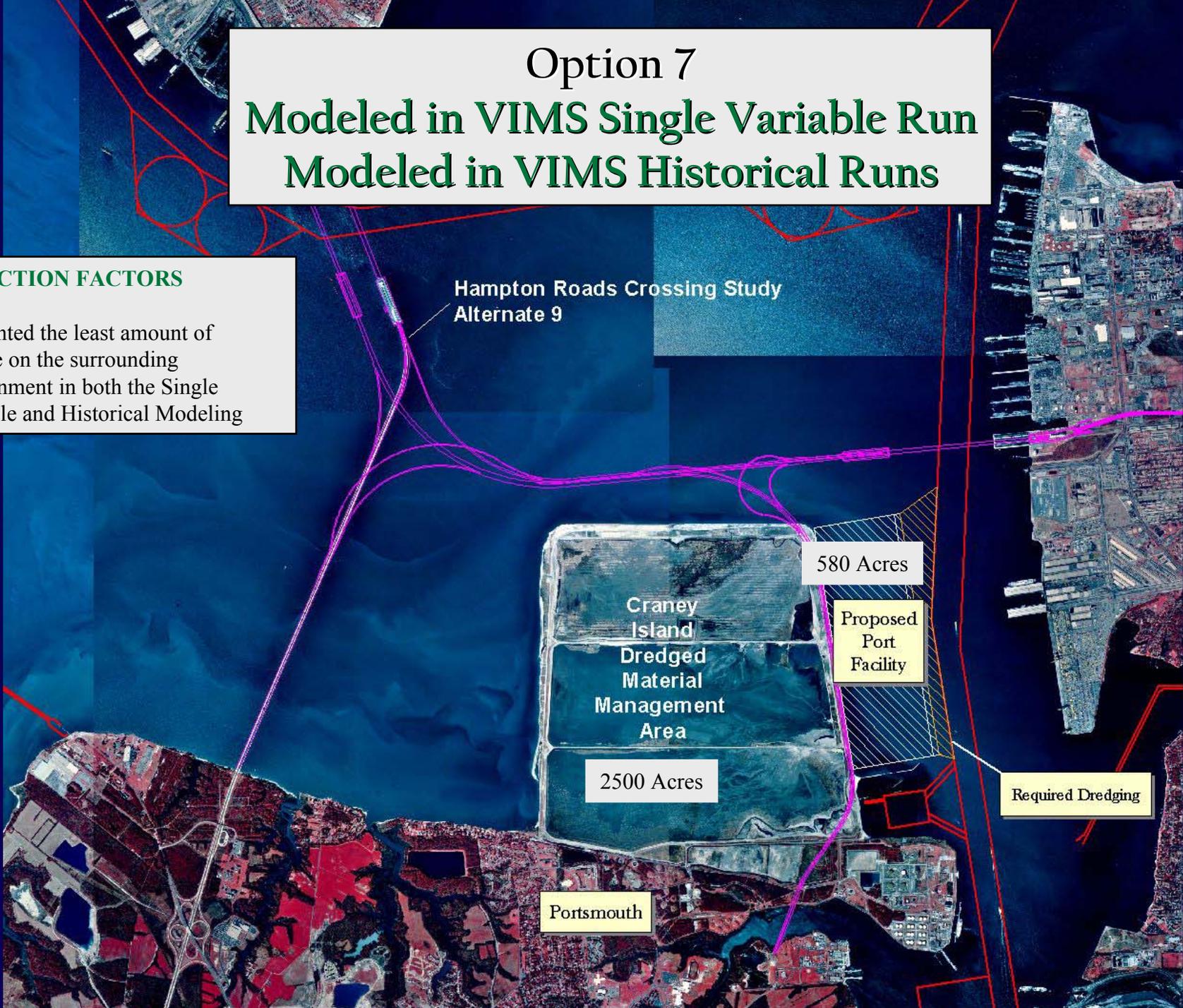
Option 7

Modeled in VIMS Single Variable Run

Modeled in VIMS Historical Runs

SELECTION FACTORS

- Presented the least amount of change on the surrounding environment in both the Single Variable and Historical Modeling



Option 8 Eliminated

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

Hampton Roads Crossing Study
Alternate 9 (shifted 1400' North)

Proposed
Placement
Area

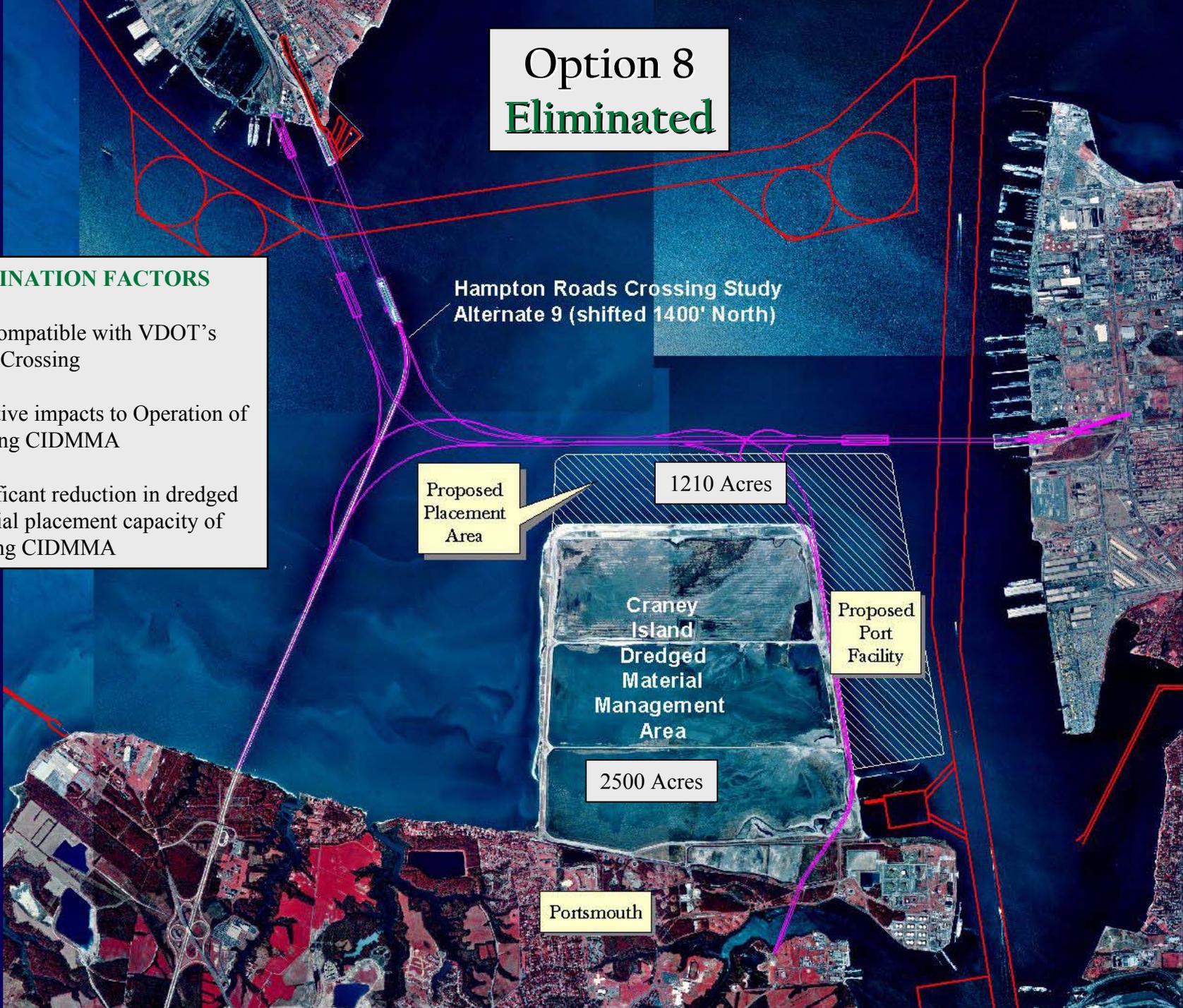
1210 Acres

Craney
Island
Dredged
Material
Management
Area

Proposed
Port
Facility

2500 Acres

Portsmouth



Option 9 Eliminated

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

Revised Third Crossing
(Shifted 1200' South)

Required Dredging

Proposed Port Facility

1710 Acres

Craney Island
Dredged Material Management Area

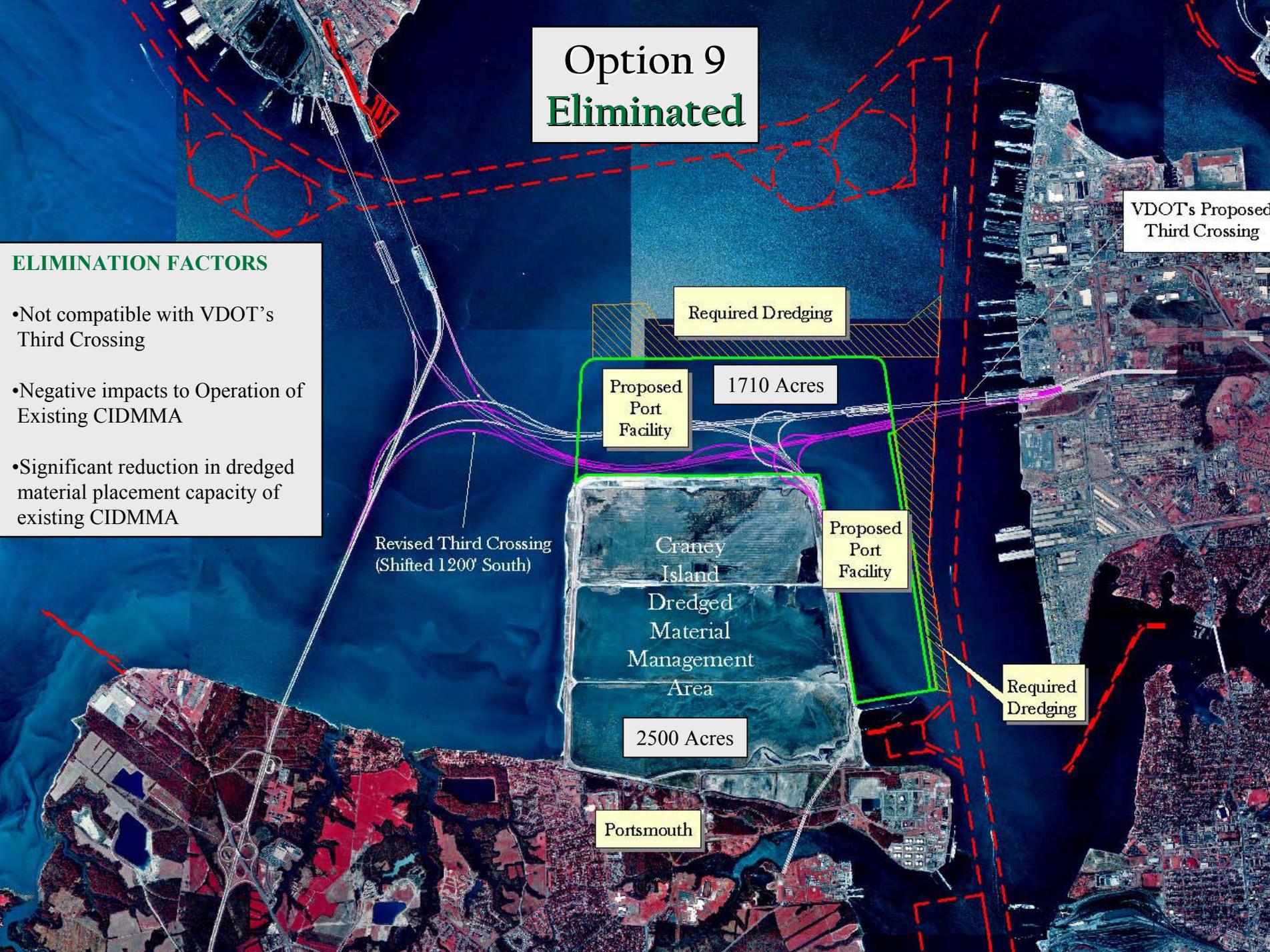
Proposed Port Facility

2500 Acres

Portsmouth

Required Dredging

VDOT's Proposed Third Crossing



Option 10 Eliminated

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

VDOT's Proposed Third Crossing

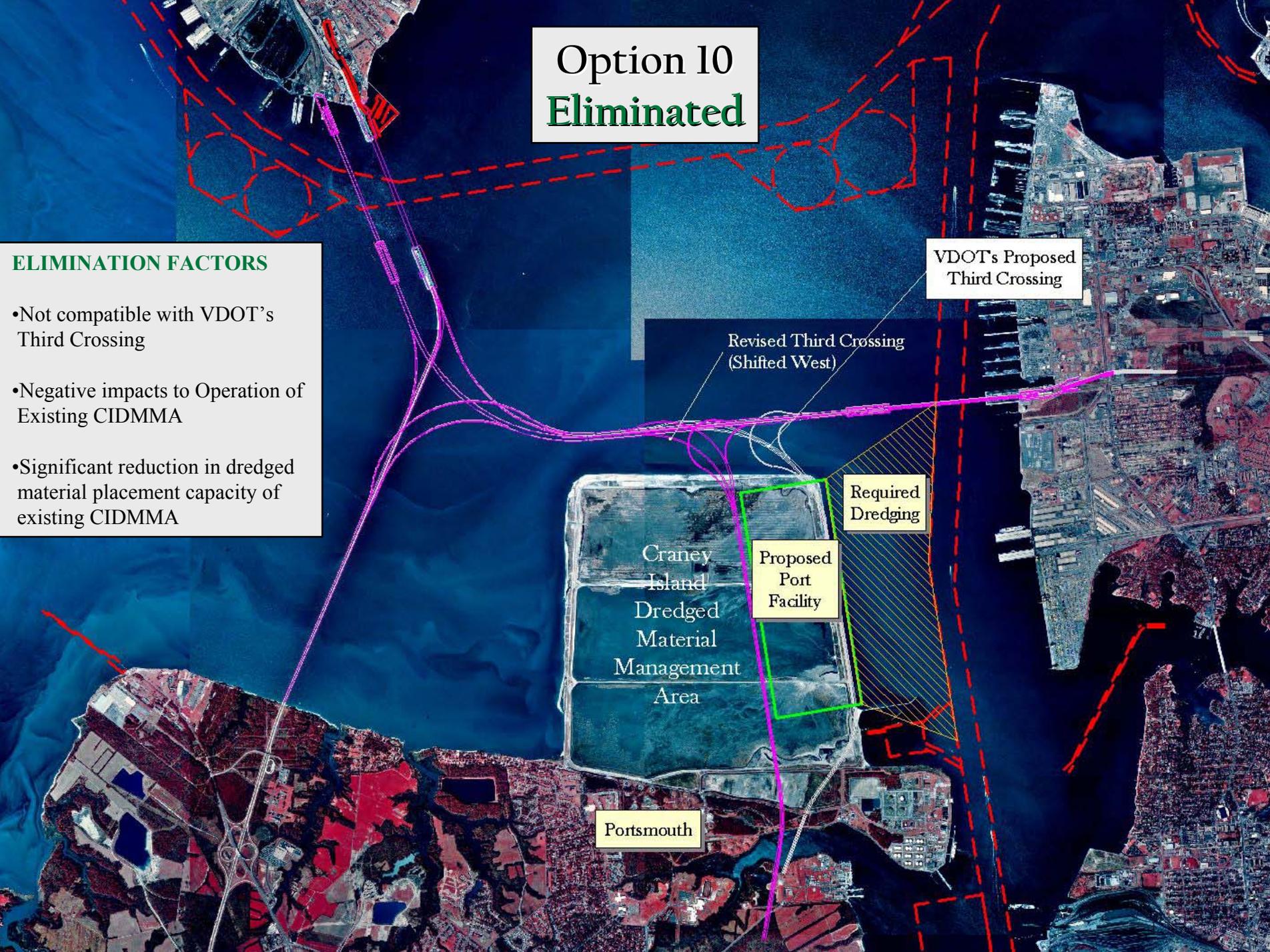
Revised Third Crossing (Shifted West)

Required Dredging

Craney Island Dredged Material Management Area

Proposed Port Facility

Portsmouth



Option 11 Eliminated

VDOT's Proposed
Third Crossing

Proposed Placement
Area

Revised Third Crossing
(Shifted West & 1200' South)

Required
Dredging

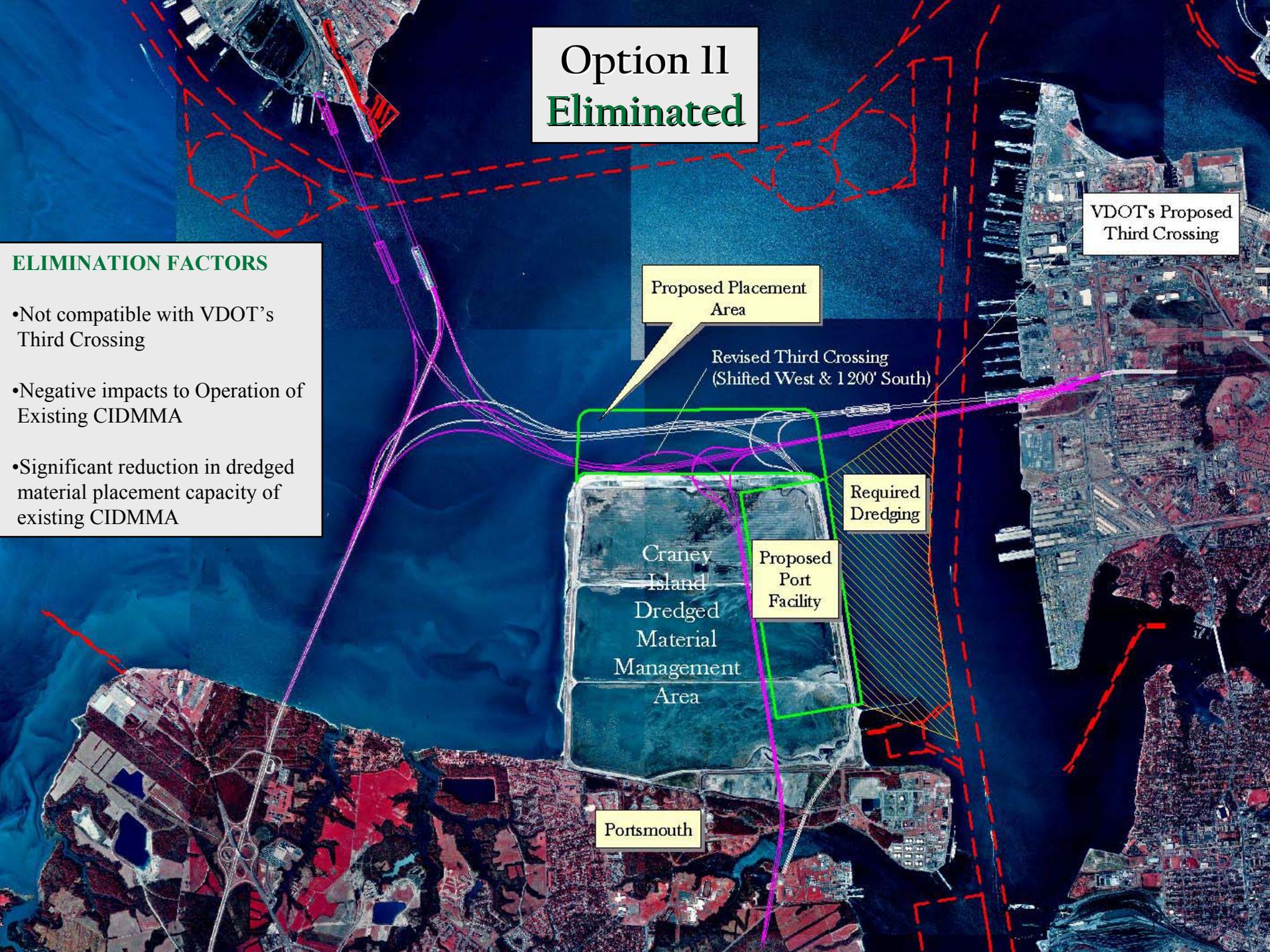
Craney
Island
Dredged
Material
Management
Area

Proposed
Port
Facility

Portsmouth

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA



Option 12 Eliminated

ELIMINATION FACTORS

- Not compatible with VDOT's Third Crossing
- Negative impacts to Operation of Existing CIDMMA
- Significant reduction in dredged material placement capacity of existing CIDMMA

Revised Third Crossing
(Shifted West & 1200' South)

VDOT's Proposed
Third Crossing

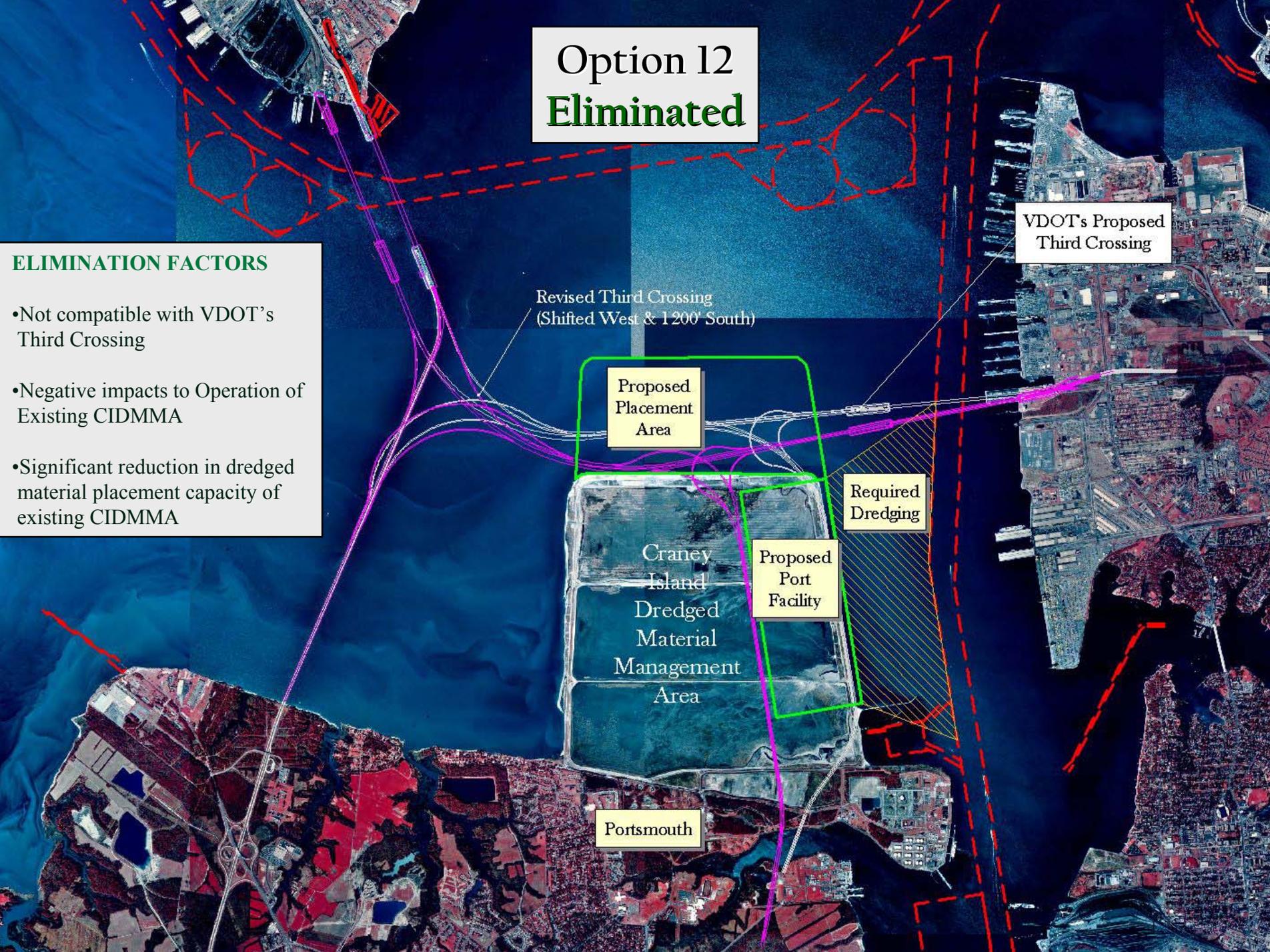
Proposed
Placement
Area

Required
Dredging

Craney
Island
Dredged
Material
Management
Area

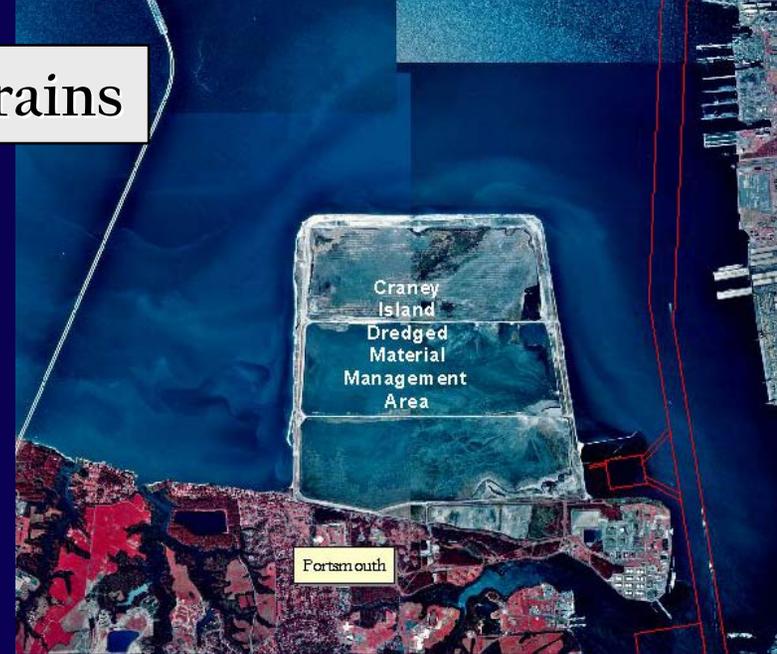
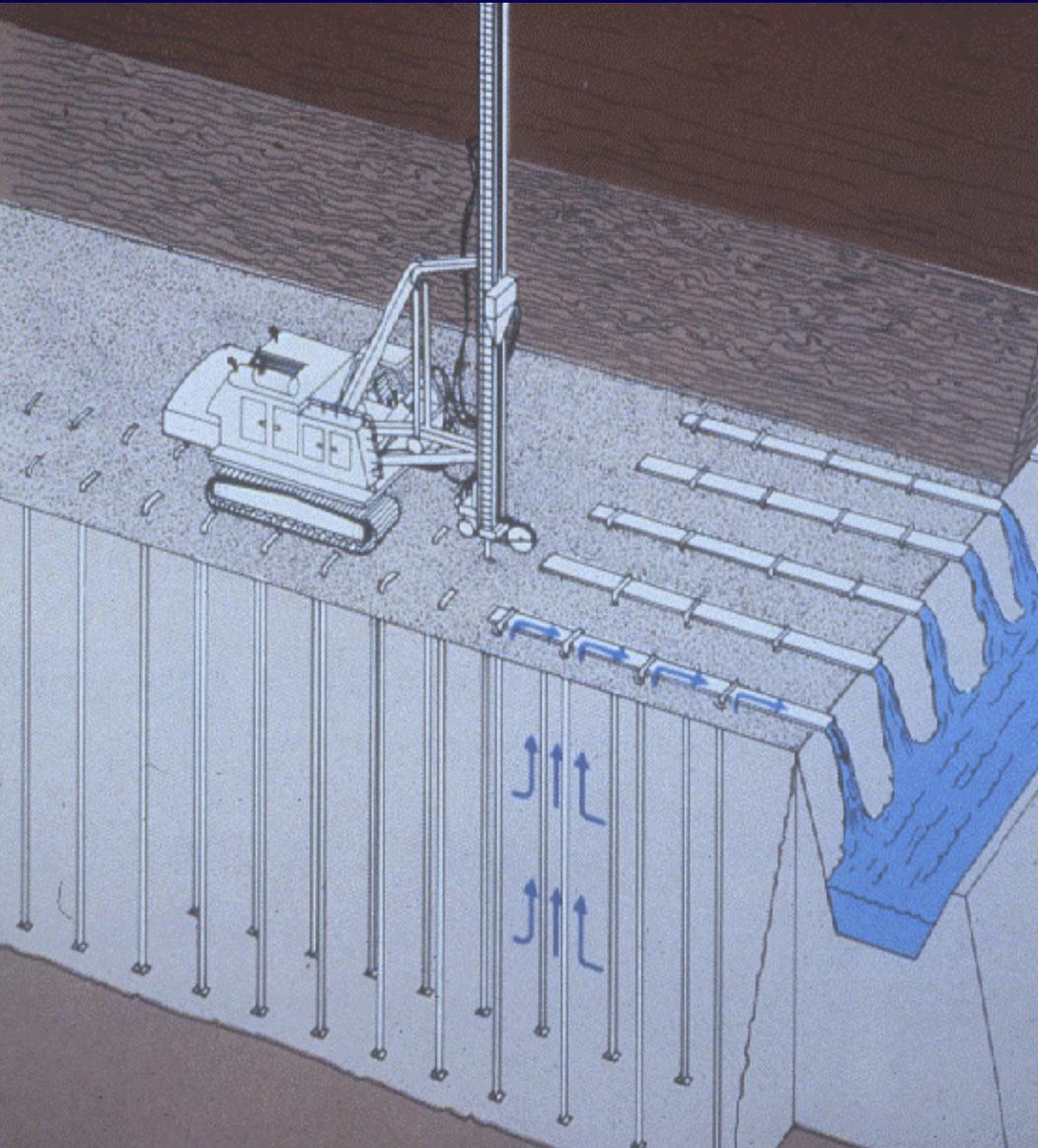
Proposed
Port
Facility

Portsmouth

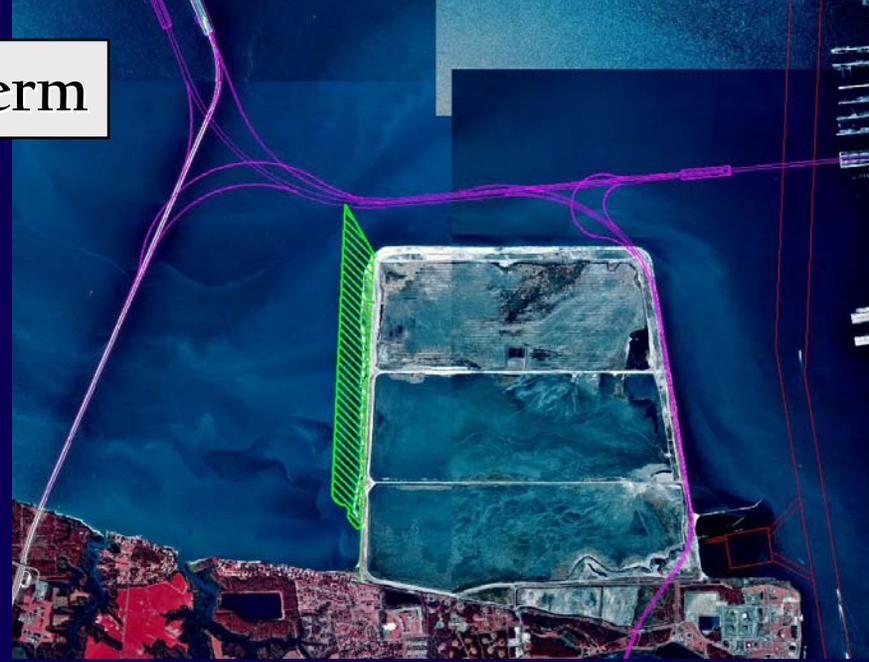


Additional
Footprints
Considered

Interior Strip Drains



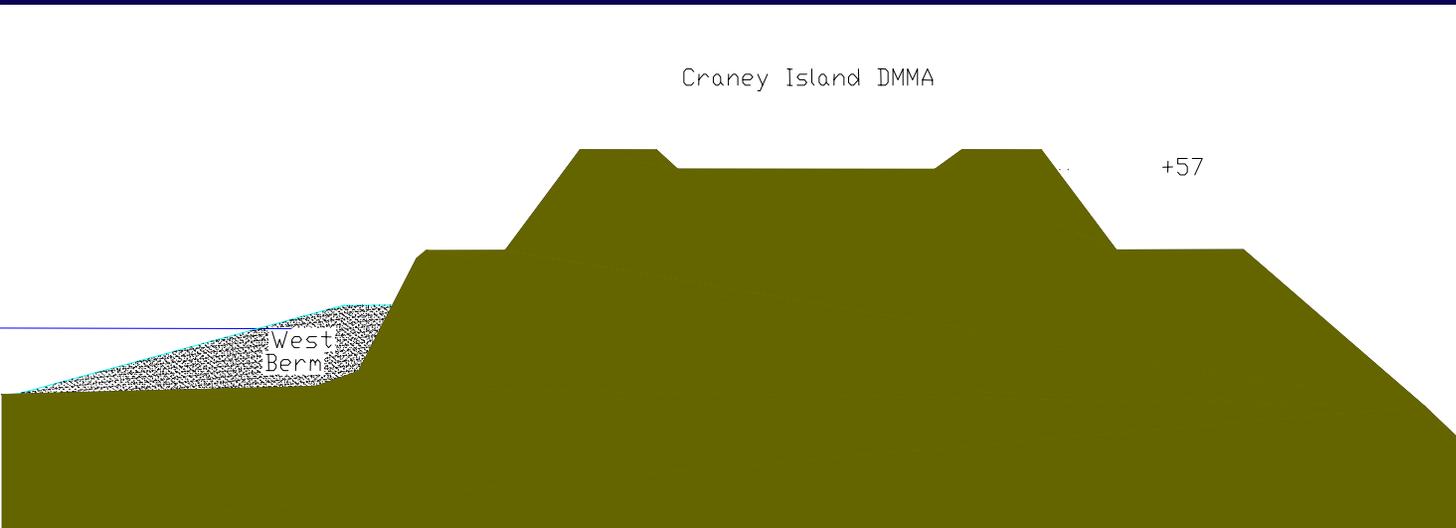
West Berm



Craney Island DMMA

+57

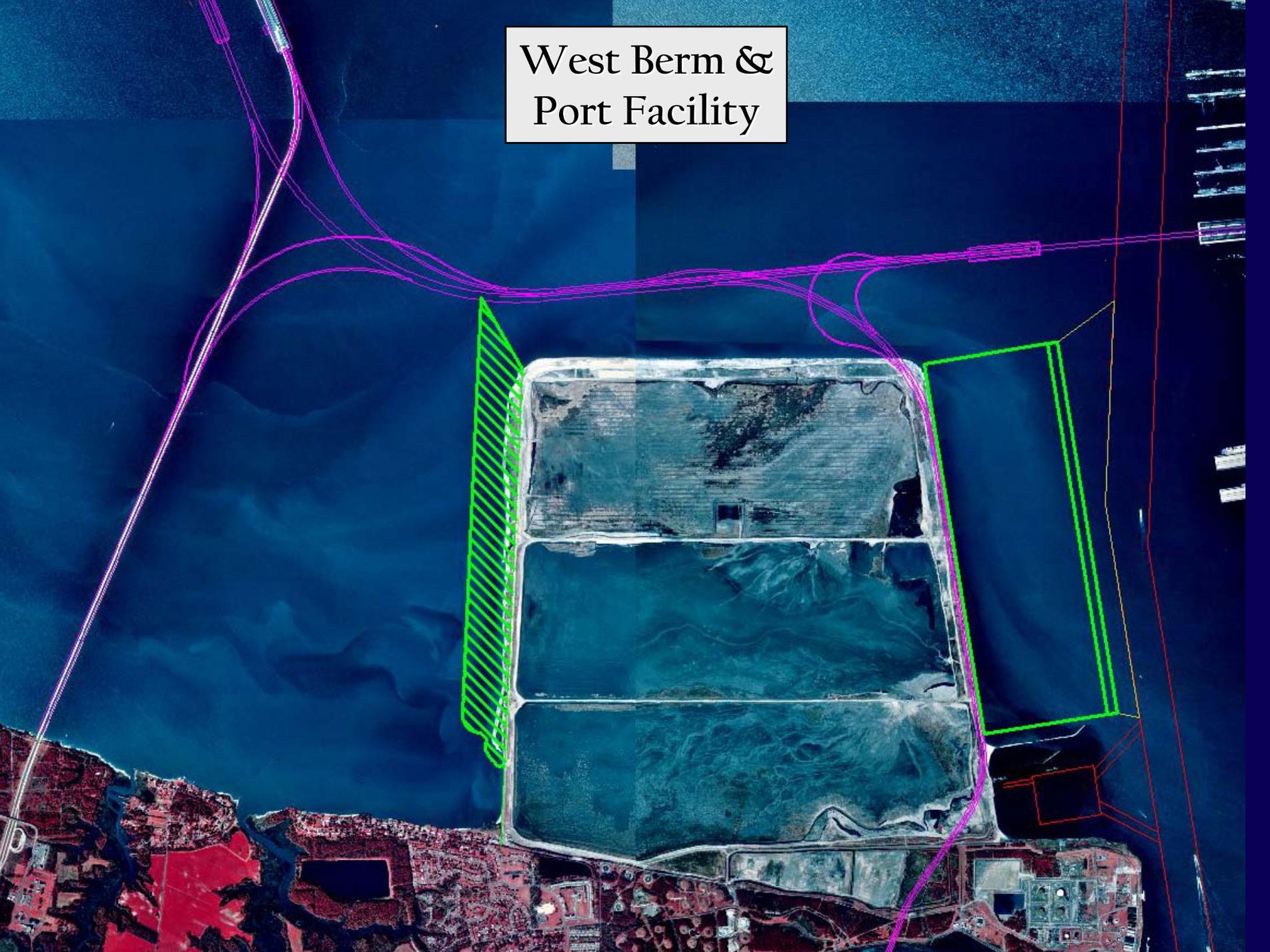
West Berm



West Berm & Interior Strip Drains



West Berm & Port Facility



West Berm &
East CDF



Objectives of Alternatives Briefing to Stakeholders

- ◆ Provide new stakeholders with...
 - Background information on the Alternatives Technical Review Committee
 - Alternatives considered and rationale for keeping/discarding alternatives.
 - Discuss Analysis Process and status

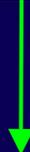
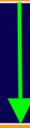
Alternative Analysis Process

Historical Document Review

Alternatives Created

Alternative Review
and Coordination

Selection of footprints for hydrodynamic
and lifespan modeling



Alternative Analysis Process

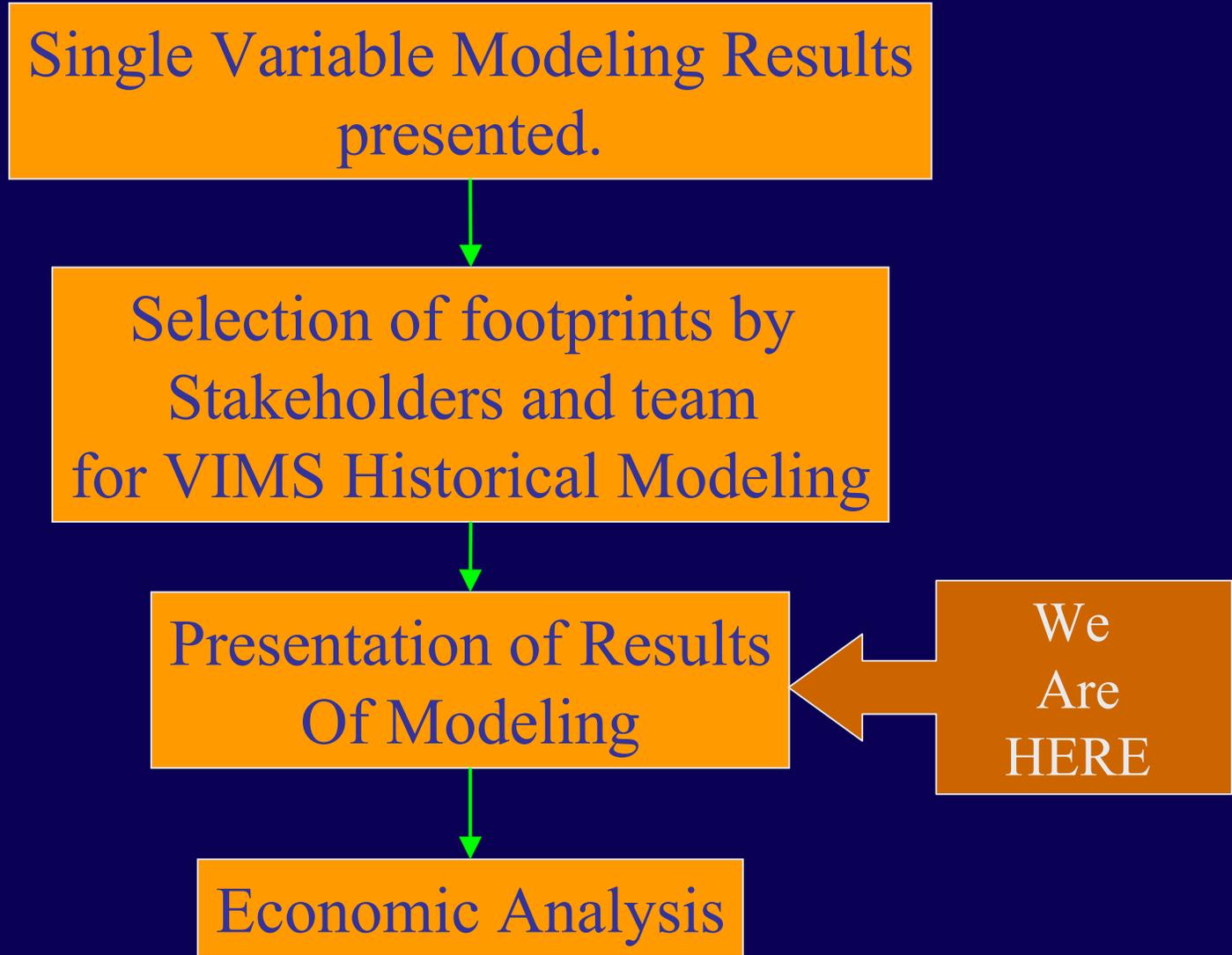
Single Variable Modeling Results presented.

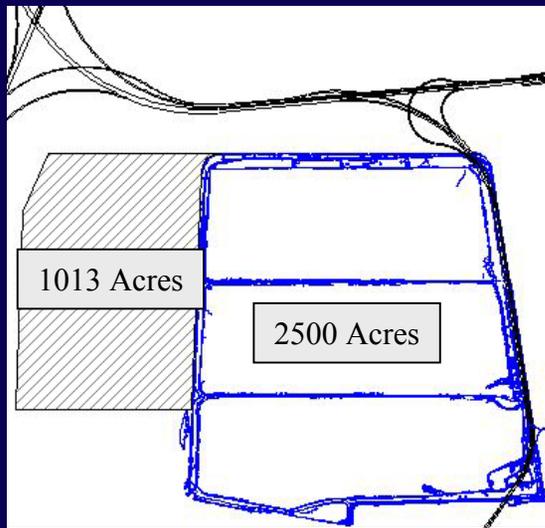
Selection of footprints by Stakeholders and team for VIMS Historical Modeling

Presentation of Results Of Modeling

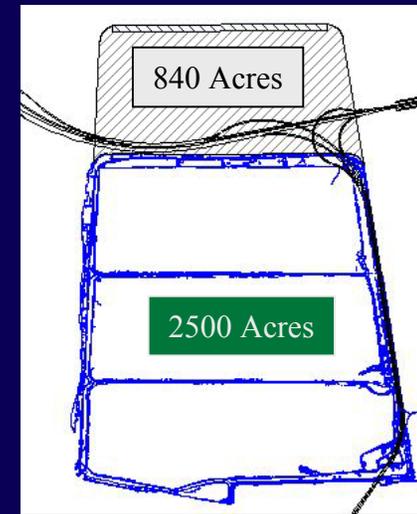
We
Are
HERE

Economic Analysis





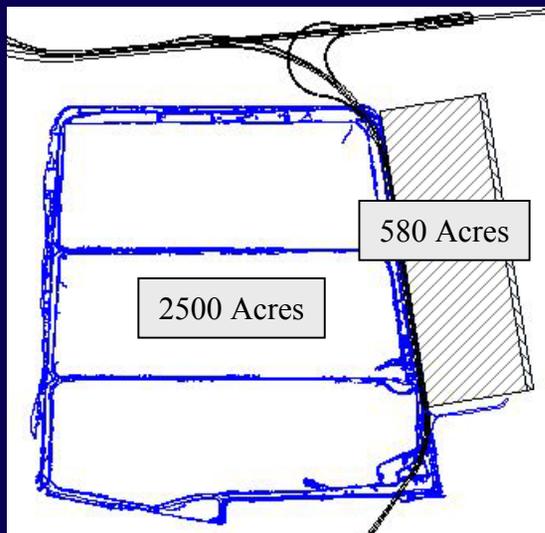
Modified Option 5



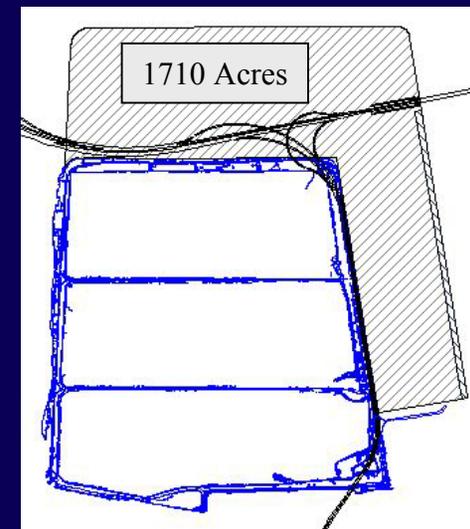
Option 6

VIMS Single Variable Modeling

Option 7



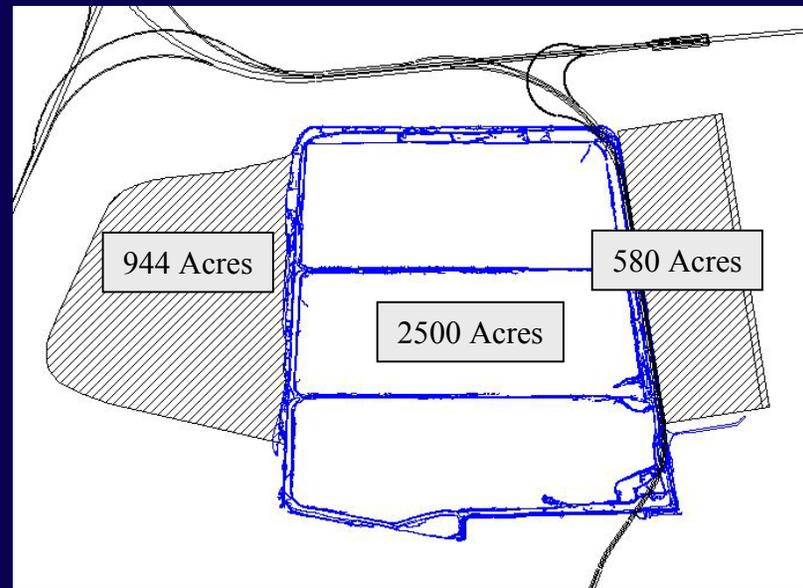
Modified Option 9



VIMS

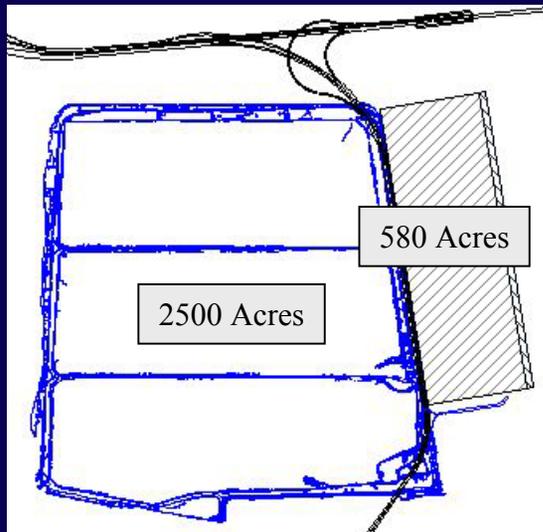
Historical Modeling

(Selected by Stakeholders)

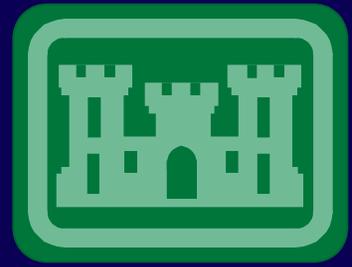


West Placement Area
& East Port Facility

East Port Facility

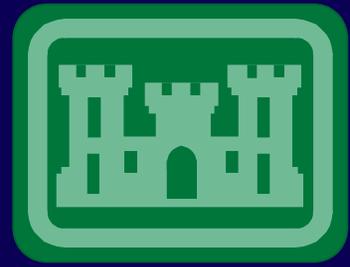


Questions?



Projecting Fill Capacity

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R
D
C

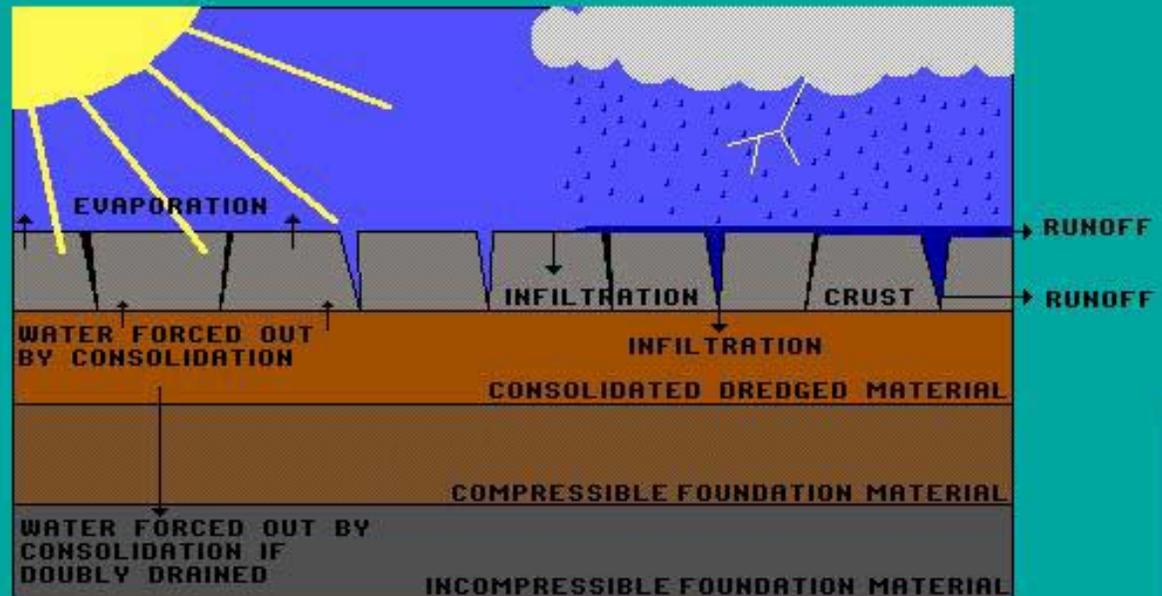


◆ Projecting Fill Capacity

- Primary Consolidation, Secondary Compression and Desiccation of Dredge Fill (PSDDF) 1996
- PSDDF Model and User's Guide available on USACE/ERDC/EL Webpage

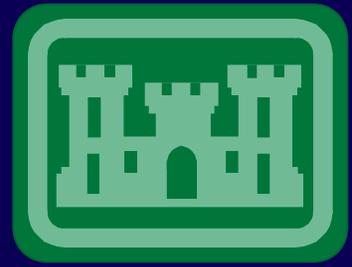
ERDC

CONCEPTUAL DIAGRAM OF CONSOLIDATION AND DESICCATION PROCESS



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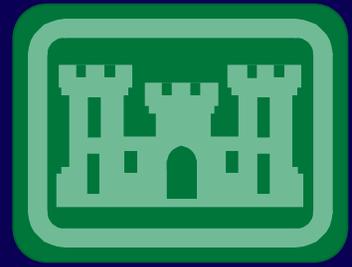


◆ Output

– Elevation vs. Elapsed Time

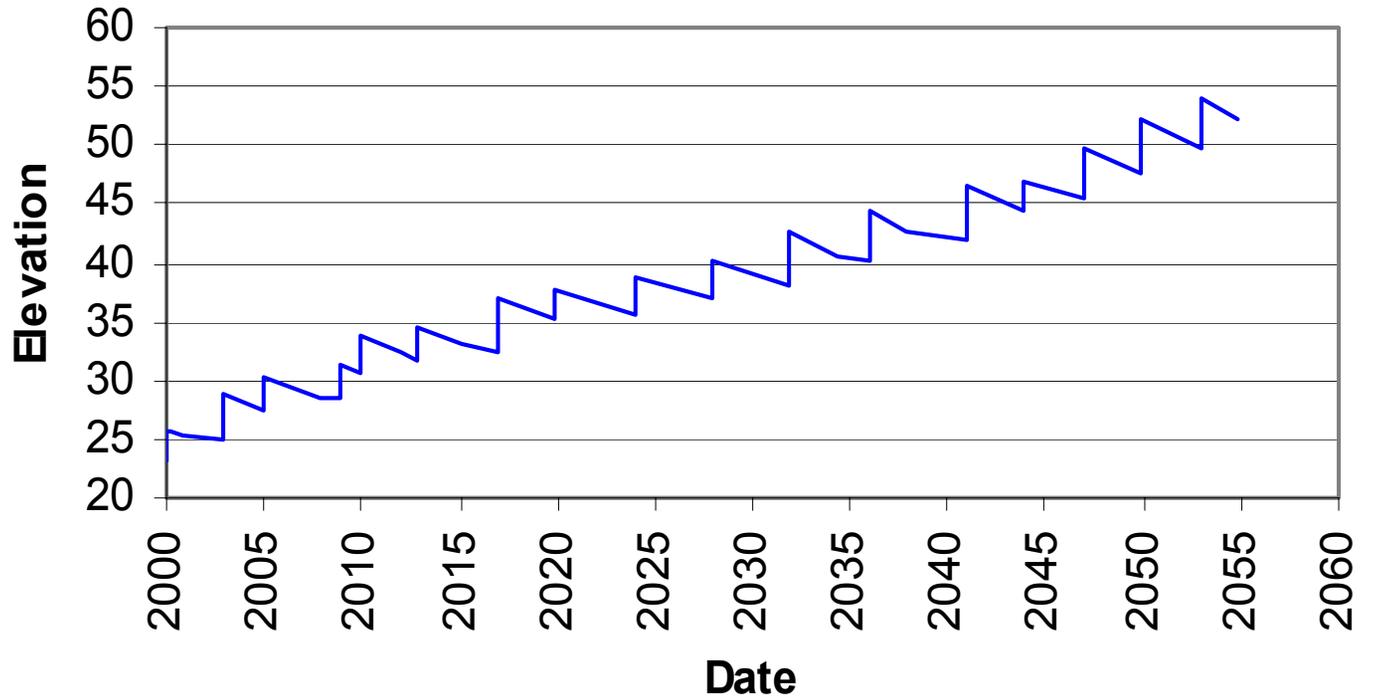
- Lifespan when cell exceeds filling elev.
- DM Volumes; total in-channel for lifespan

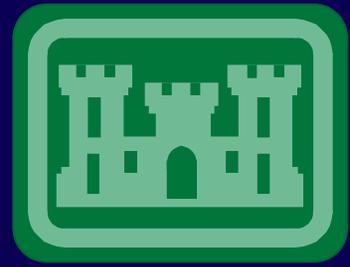
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CCDR ORDER

Craney Island Center Cell Option 5B, Alt 1





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ERDC
FILLING
SIMULATIONS
LIFESPANS

◆ Lifespan of Options

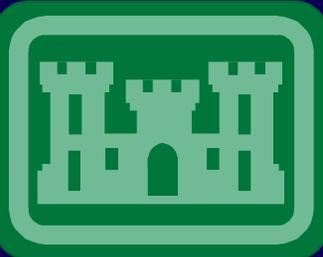
– Existing Site: 2029

- 5 mcy/yr inflow limit
- 25mcy demand cannot be met
- Volume Stored: 120 mcy



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- 
- ◆ Lifespan of Options
- Port Expansion: 2032
 - Port cell fills in 2.5yrs
 - Volume Stored: 139 mcy

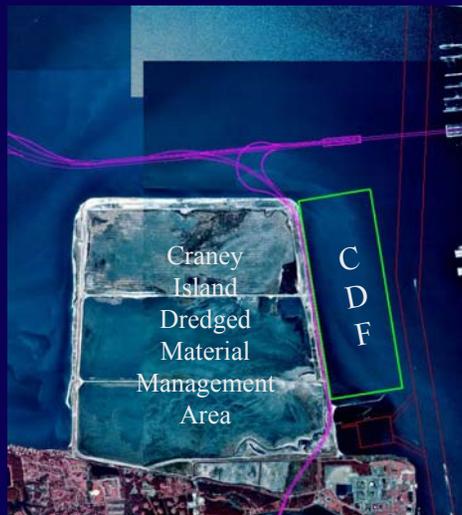


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◆ Lifespan of Options

– East CDF Expansion: 2036

- 4 cells rotated
- Volume Stored: 179 mcy



◆ Lifespan of Options

– Existing Site:

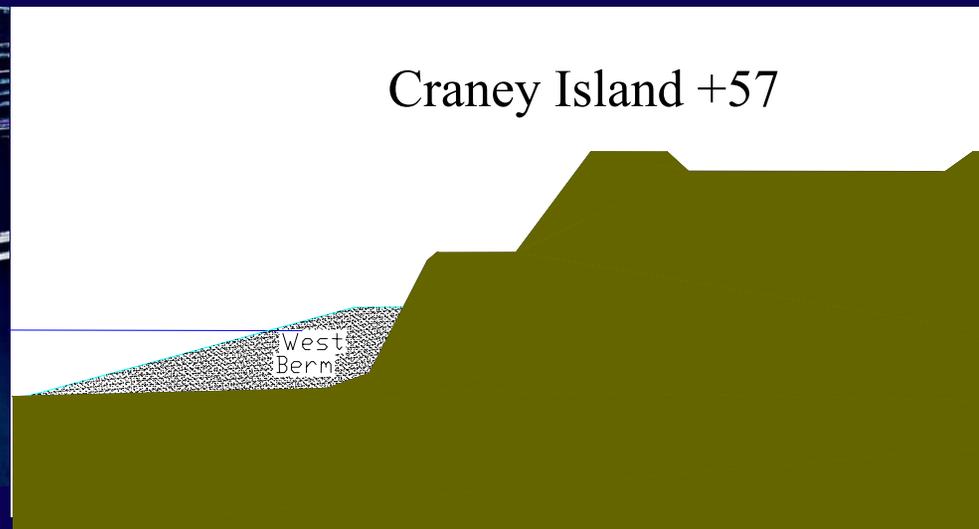
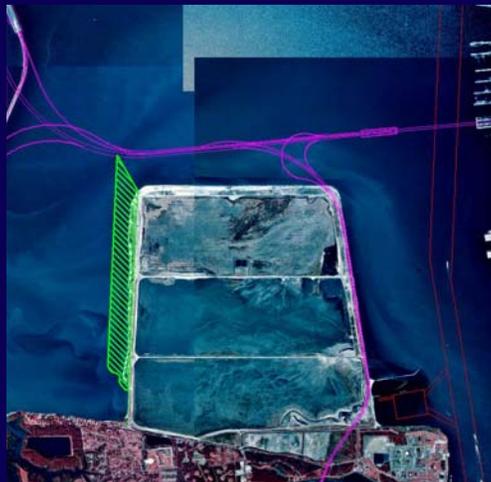
- Interior Strip Drains: 2038
- Volume Stored: 162 mcy



◆ Lifespan of Options

– Existing Site:

- West Berm: 2044
- Volume Stored: 190 mcy



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◆ Lifespan of Options

– Port + West Berm: 2045

- Port cell fills in 2.5 yrs.
- Volume Stored: 204 mcy

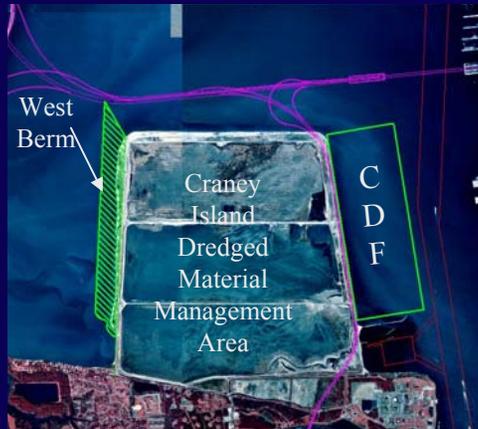


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◆ Lifespan of Options

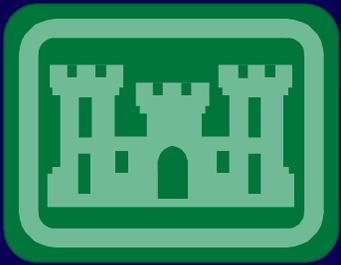
- East CDF + West Berm: 2049
- Volume Stored: 241 mcy

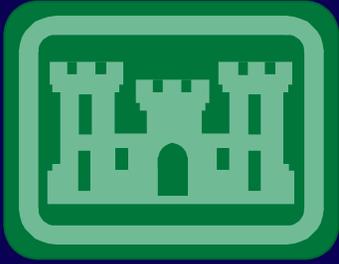


◆ Lifespan of Options

– Existing Site,

- Interior Strip Drains + West Berm: 2053
- Volume Stored: 234 mcy





◆ Lifespan of Options

- West CDF Expansion: 2058
- Volume Stored: 284 mcy



◆ Lifespan of Options

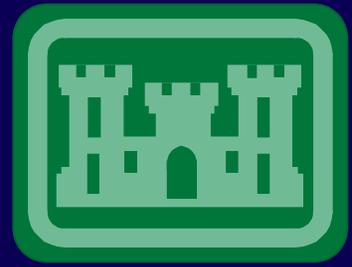
- West CDF Expansion + Port: 2061
- Volume Stored: 280 mcy





L I F E S P A N

- ◆ Life span determines
 - Yardage to Ocean
 - Dredged Material Stored
- ◆ Both feed the economic comparisons for the average-annual, least-cost analysis.



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Questions?