

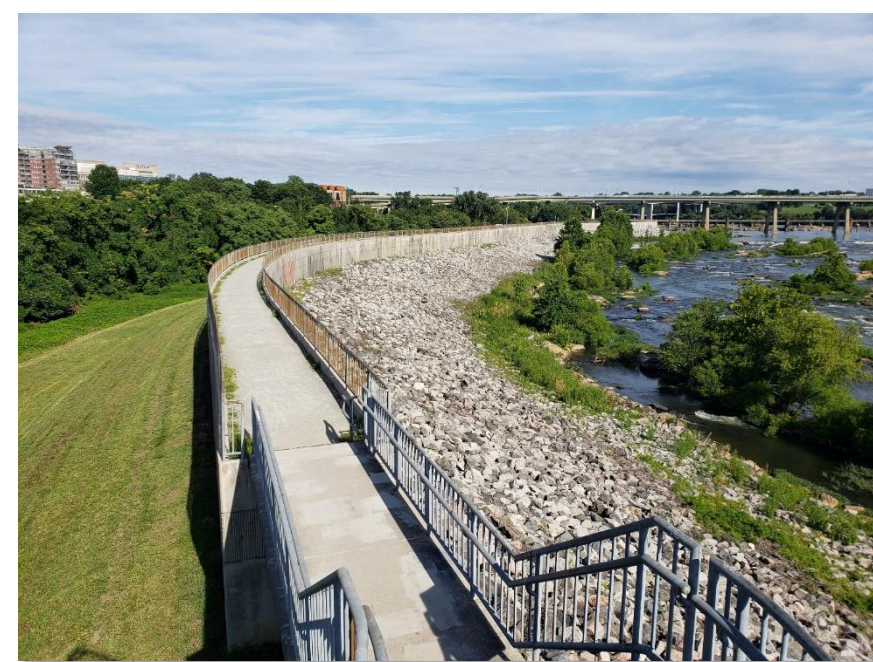
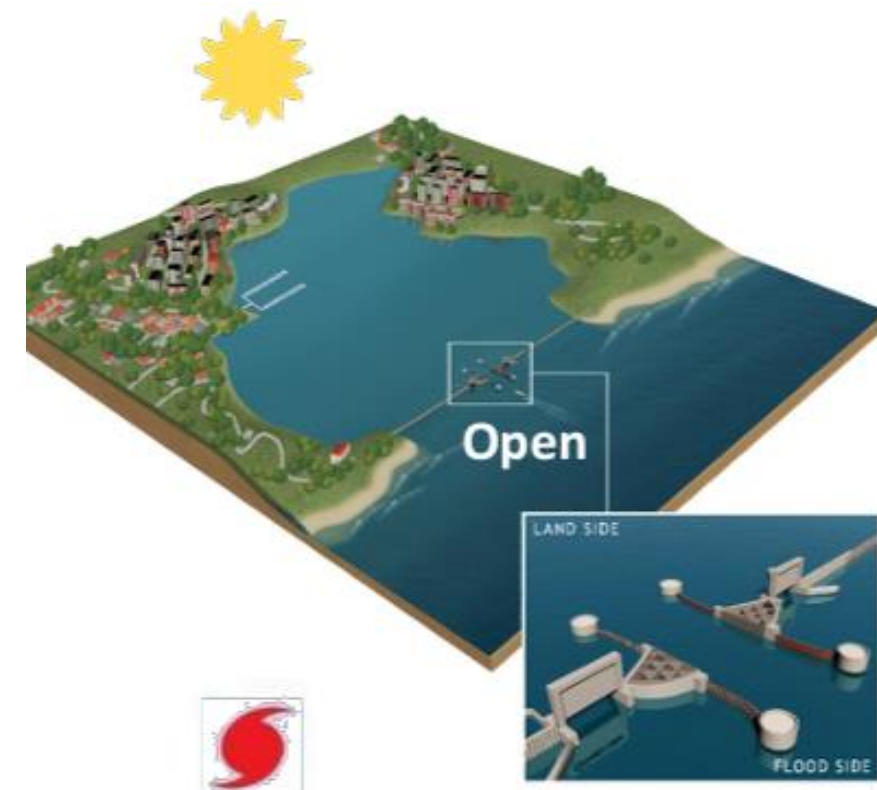
CITY OF VIRGINIA BEACH COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

Study Purpose

The purpose of the study is to investigate solutions to reduce potential damages and risk to human life, health, and safety caused by coastal storms in the City of Virginia Beach.

Impacts from sea level change are expected to increase risk and vulnerability in the region. Managing coastal storm risk will improve the city's resilience to the impacts of coastal storms and flooding.

Potential Measures to Manage Risk



Levees



Elevating residences



Storm
Surge Barriers



Floodwalls



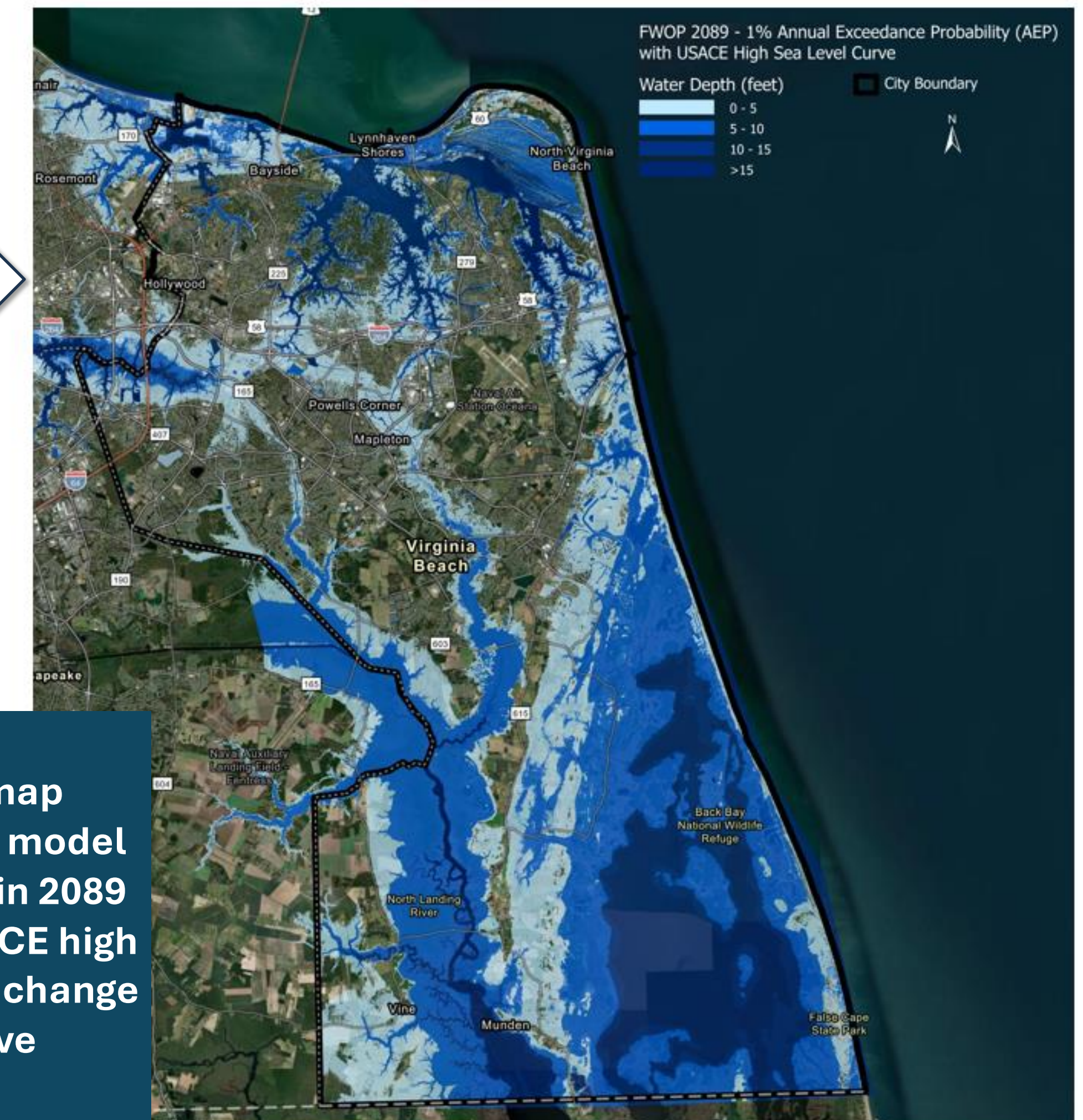
Floodproofing Critical Infrastructure

STRUCTURAL MEASURES

Physical structures that are designed to reduce the frequency of damaging levels of coastal storm inundation. Levees, floodwalls, and coastal storm surge barriers are examples of structural measures.



Where will
storm surge
waters go?



The map
displays model
outputs in 2089
with USACE high
sea level change
curve



Living Shorelines with reef
Structures



Wetland Restoration/
Enhancement

NONSTRUCTURAL MEASURES

Reduce flood damages without significantly altering the nature or extent of flooding. Structure elevation, floodproofing, relocation, and advanced warning systems are examples of nonstructural measures.

NATURE-BASED SOLUTIONS

Engineered features designed to act in concordance with natural features to provide flood risk management. Living shorelines, beach/dune enhancement, and oyster reef restoration are examples of nature-based solutions



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OVERVIEW

- Addresses flood risk at the hyper-local scale – property by property
- Measures may include building elevation and floodproofing
- Initial focus areas include those with highest risk to storm surge flooding and are socio-economically vulnerable

FLOODPROOFING

Benefits of Dry Floodproofing:

- Relatively cost-effective option
- Prevents structural damages
- Preservation of aesthetics: floodproofing does not significantly alter the building's exterior

ELEVATING BUILDINGS

Benefits of Elevating Buildings:

- Can help manage risk from compound flooding hazards including storm surge and groundwater, tidal, or stormwater flooding
- Manages longer-term risks from flooding exacerbated by sea level change
- Participation is **voluntary**
- Expanded community education and engagement efforts for the program during the design and construction phases

NONSTRUCTURAL MEASURES

What does “nonstructural” mean?

Nonstructural measures are permanent or contingent measures applied to a building and/or its contents that prevent or provide resistance to damage from flooding. The type, age, and size of building, among other factors determines what type of measure is most appropriate.

Nonstructural measures differ from structural measures in that they focus on reducing the consequences of flooding instead of physically blocking or preventing the flooding, i.e. reducing the probability of flooding for a given area.

“Living with Water”



Deployable stop logs to protect vulnerable entryways



Temporary flood panels



Temporary flood panels



Elevated critical equipment



Elevating a couple feet above ground can reduce damages



Building elevation in process

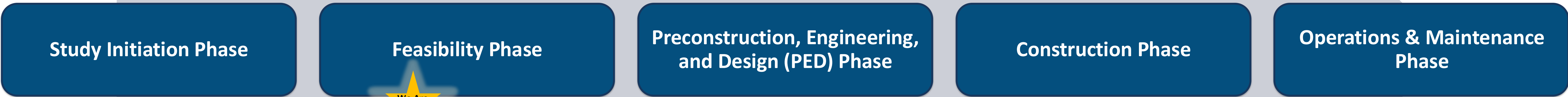


In coastal areas with more wave action, homes may be elevated higher

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Civil Works Process



Feasibility Study Process



Decision & Product Milestones

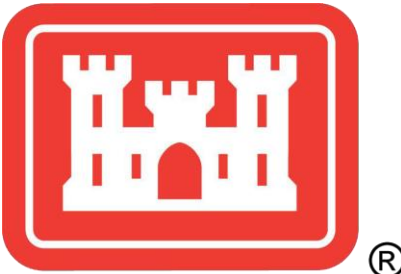
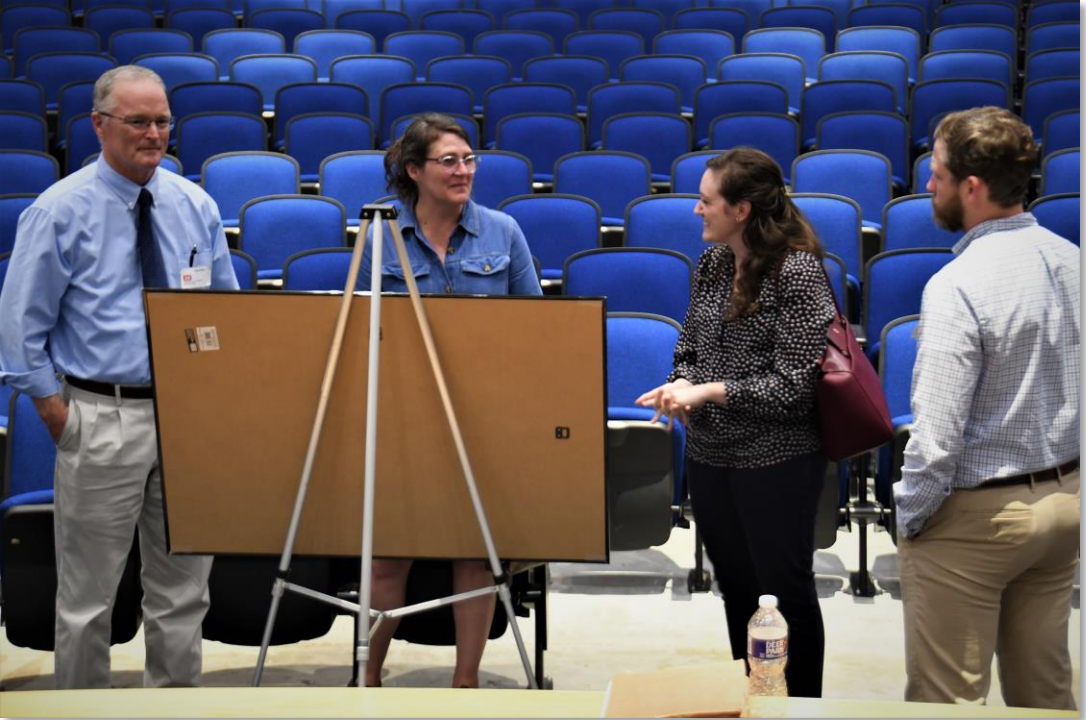


MILESTONE		Date
	Alternatives Milestone	November 2022
	Notice of Intent to prepare an EIS	Spring 2025
	Tentatively Selected Plan	Spring 2026
 	Public Release of Draft Report	Summer 2026
	Agency Decision Milestone	Spring 2027
	Final Report Submittal	Fall 2027
	Signed Chief's Report	Spring 2028

A formal comment period will occur following the issuance of the Notice of Intent in Spring 2025. In the meantime, input/feedback can be sent to vbcsrm@usace.army.mil.

Key

-  Decision Milestone
-  Product Milestone
-  National Environmental Policy Act (NEPA) Public Engagement Opportunities



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Elizabeth River Eastern Branch

Important Note: Although three potential structural alignment locations have been identified to date, further coordination between the study team and the cities of Virginia Beach and Norfolk is needed.

- Location 1 is the alignment presented in the City of Virginia Beach's Sea Level Wise Adaptation Strategy (2020)
- Location 2 alignment adjacent to S. Military Hwy
- Location 3 alignment adjacent to I-64
- Preliminary locations are under consideration. Some alignments will continue to be included, and others will be screened out based upon further analysis and stakeholder/public feedback.



**Planning
considerations for the
Eastern Branch of the
Elizabeth River:**



Community/
Neighborhood Impacts

Socially Vulnerable
Populations

Existing Infrastructure

Norfolk CSRM Project

Existing Environmental
Resources

Real Estate
Requirements

Industrial Waterway
Uses

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Little Creek Measures



Structural Measure 1

- Includes a surge barrier comprised of gate across Little Creek Inlet and associated floodwall and sand dune fortification along the bay front. This is similar to proposed engineered defenses in the Sea Level Wise Adaptation Strategy.
- Norfolk CSRM Project currently includes a proposed storm surge barrier at Pretty Lake (future phase of the project).



Structural Measure 2

- Includes the beach/dune feature only and does not include a storm surge barrier at Little Creek Inlet.

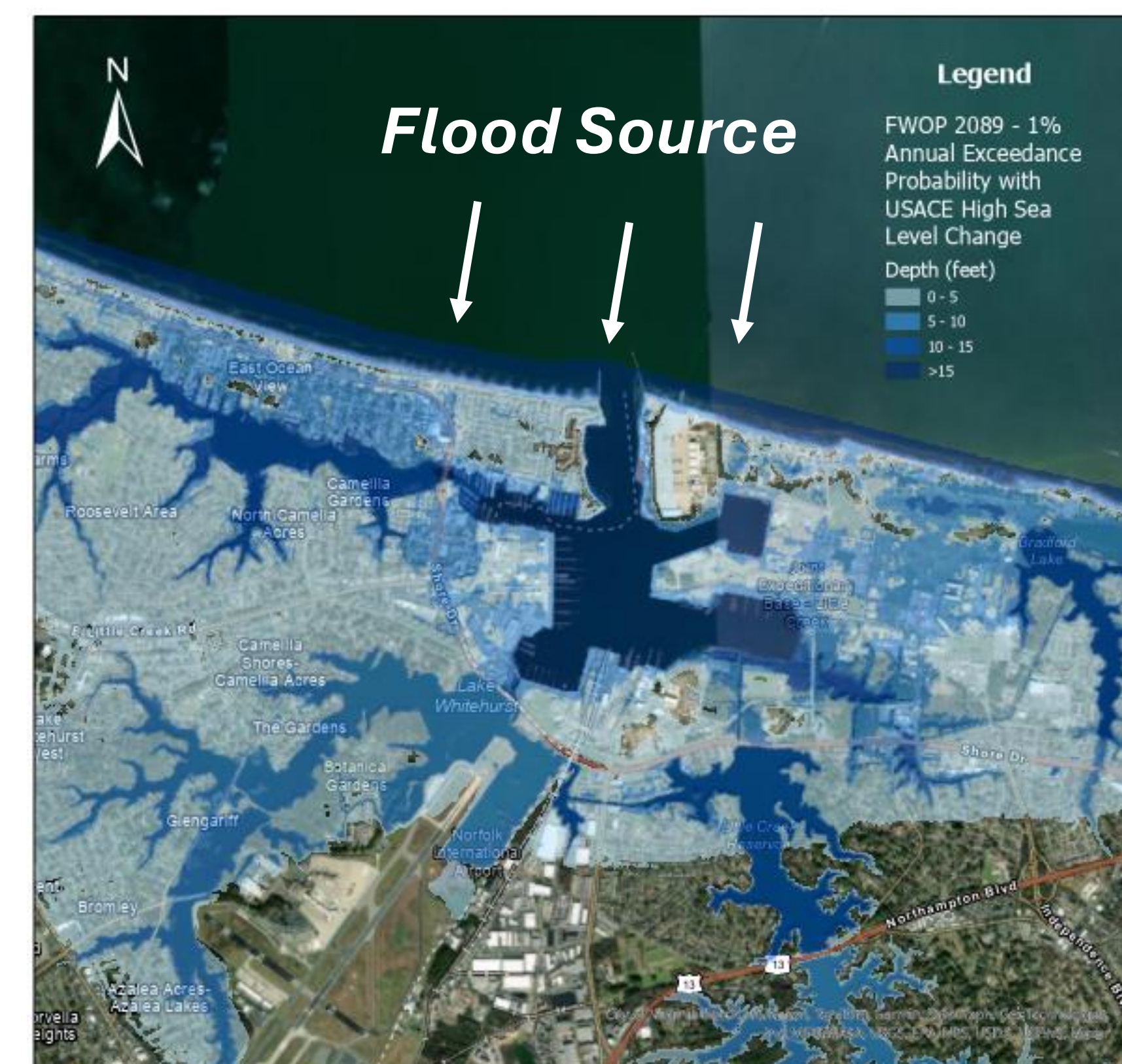


Structural Measure 3

- Includes a floodwall outside of the boundaries of JEB-Little Creek along Northampton Blvd.

Flood Source

The flood source for the Little Creek Measures is the Chesapeake Bay. The flood source is denoted with white arrows on the inundation map.



Future Without Project Inundation 1% AEP (100yr) at year 2089 with High Sea Level Change

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Lynnhaven Inlet Measures



Structural Measure 1

- Similar to proposed engineered defenses in the Sea Level Wise Adaptation Strategy.
- Includes a surge barrier at Lynnhaven Inlet and dune fortification along the bay front. The alignment also includes a floodwall section along the western terminus.

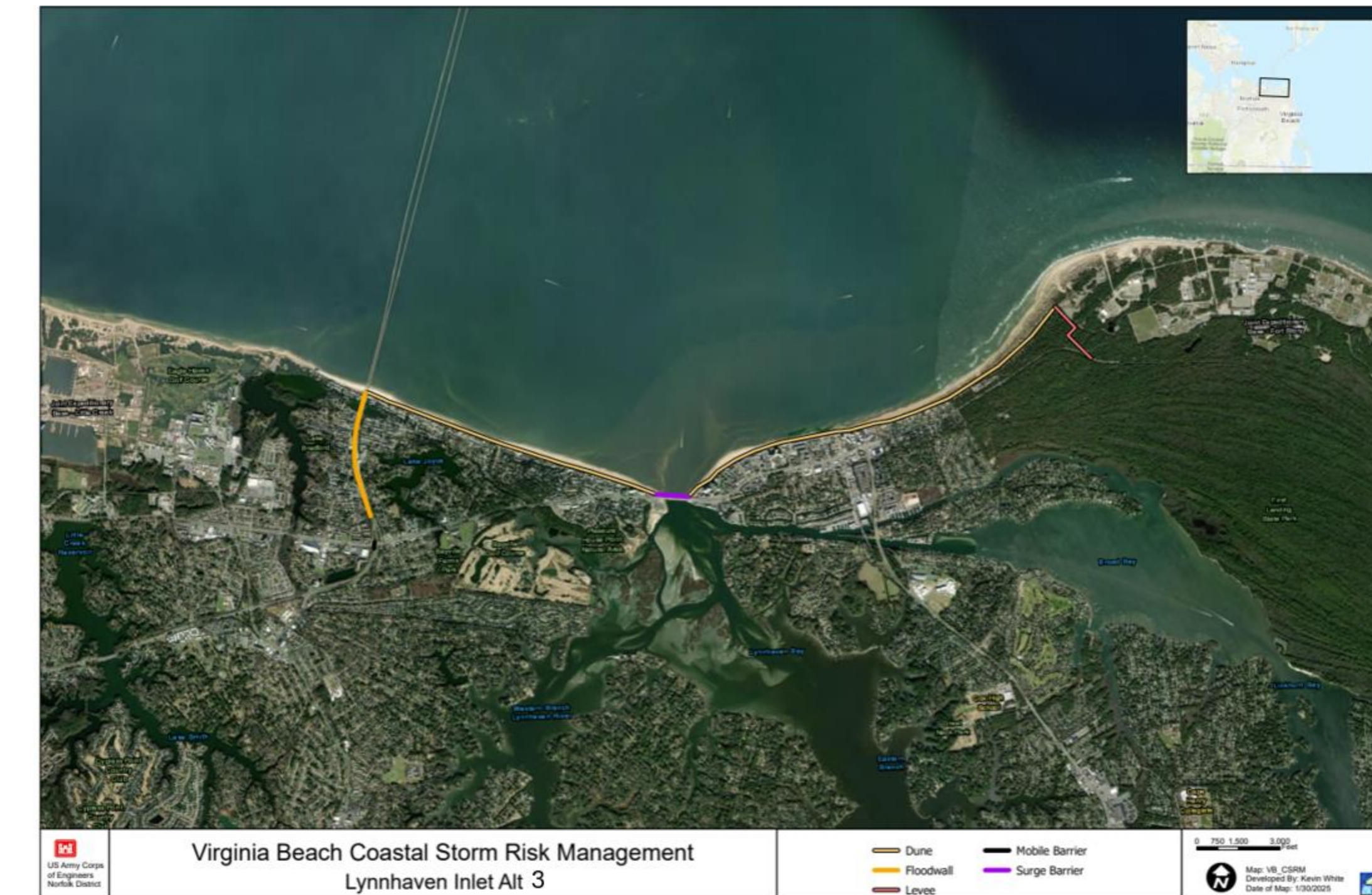


Structural Measure 2

- Includes a series of floodwalls, and several gate structures, including a gate proposed at the 'Narrows' where Broad Bay converges with Linkhorn Bay.

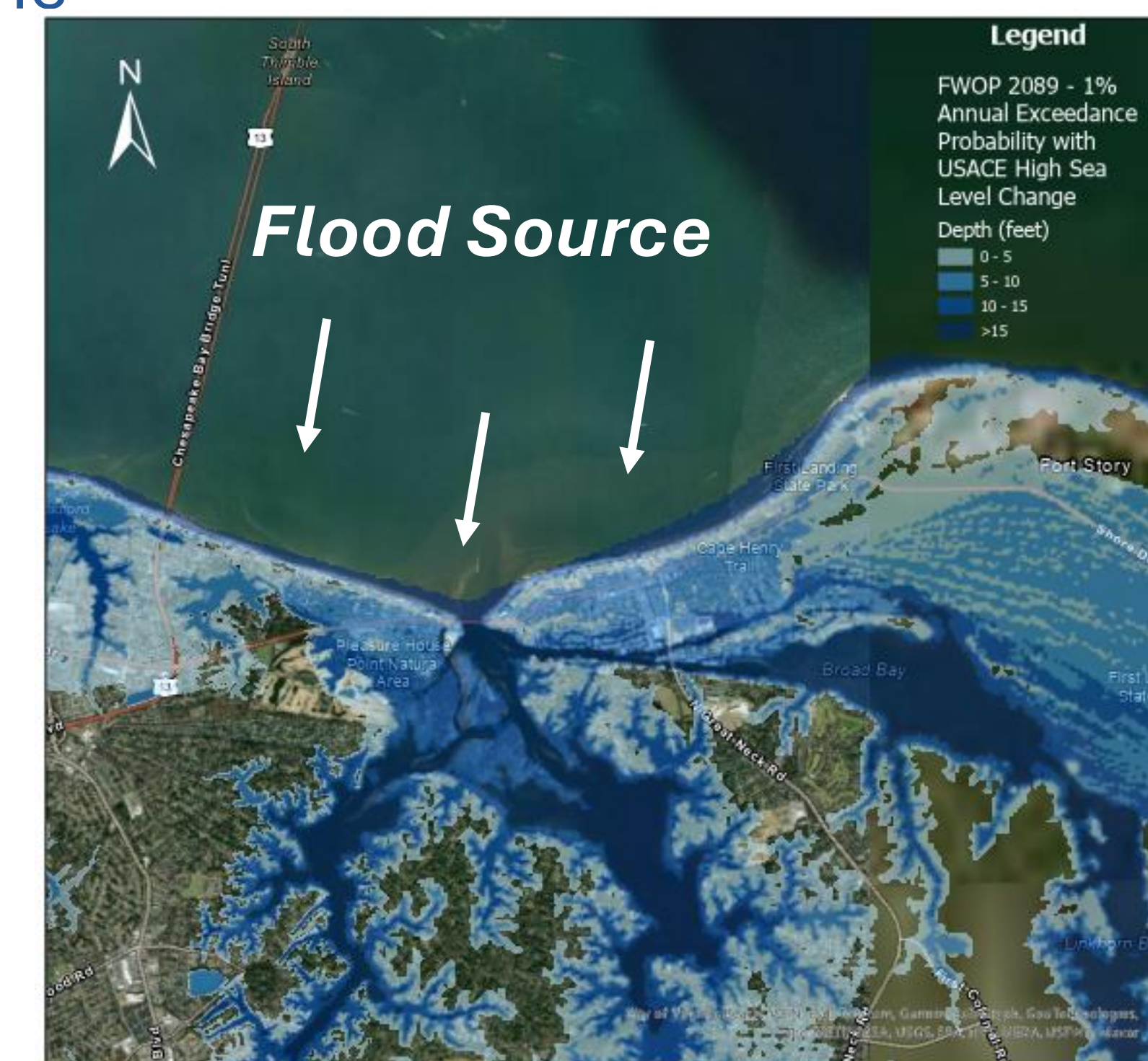
Flood Source

The flood source for the Lynnhaven Inlet Measures is the Chesapeake Bay. The flood source is denoted with white arrows on the inundation map.



Structural Measure 3

- Similar to Structural Measure 1 but does not include a proposed dune/beach feature at JEB-Fort Story.



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Back Bay Measures

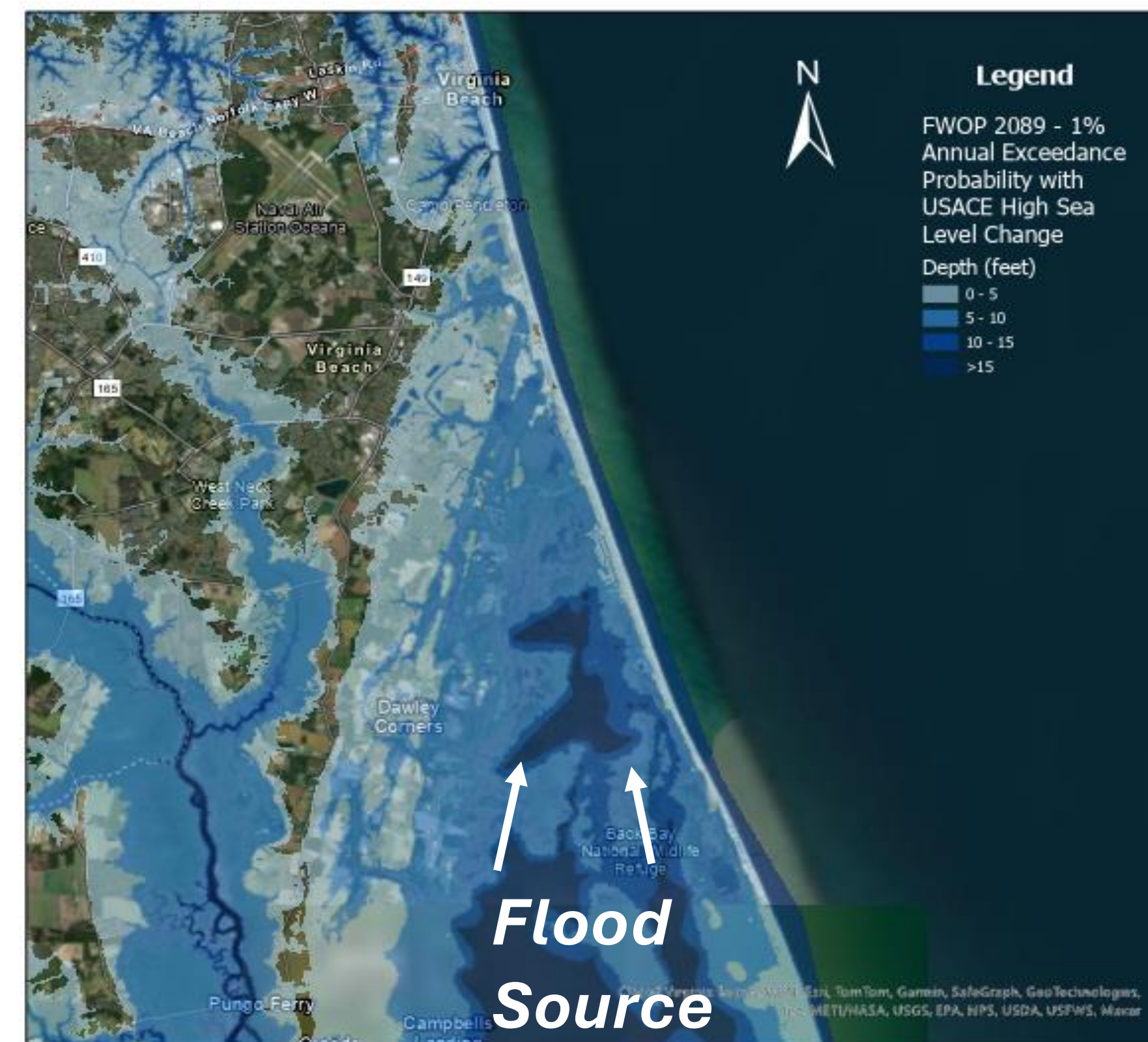
Structural Measure 1

- Similar to proposed engineered defenses in the Sea Level Wise Adaptation Strategy.
- Includes a series of floodwalls along the Sandbridge community and elevating Sandbridge Road.



Structural Measure 2

- Includes evaluation of elevating Sandbridge Roadway and has two waterway gate crossings.
- At this time, no structural measures are proposed or the Sandbridge community in Measure 2. A nonstructural plan would be implemented for the Sandbridge community.



**Future Without Project Inundation
1% AEP (100yr) at year 2089 with
High Sea Level Change**

Flood Source

The flood source for these measures is the Back Bay, and flooding propagates northward. The flood source is denoted with white arrows on the inundation map.

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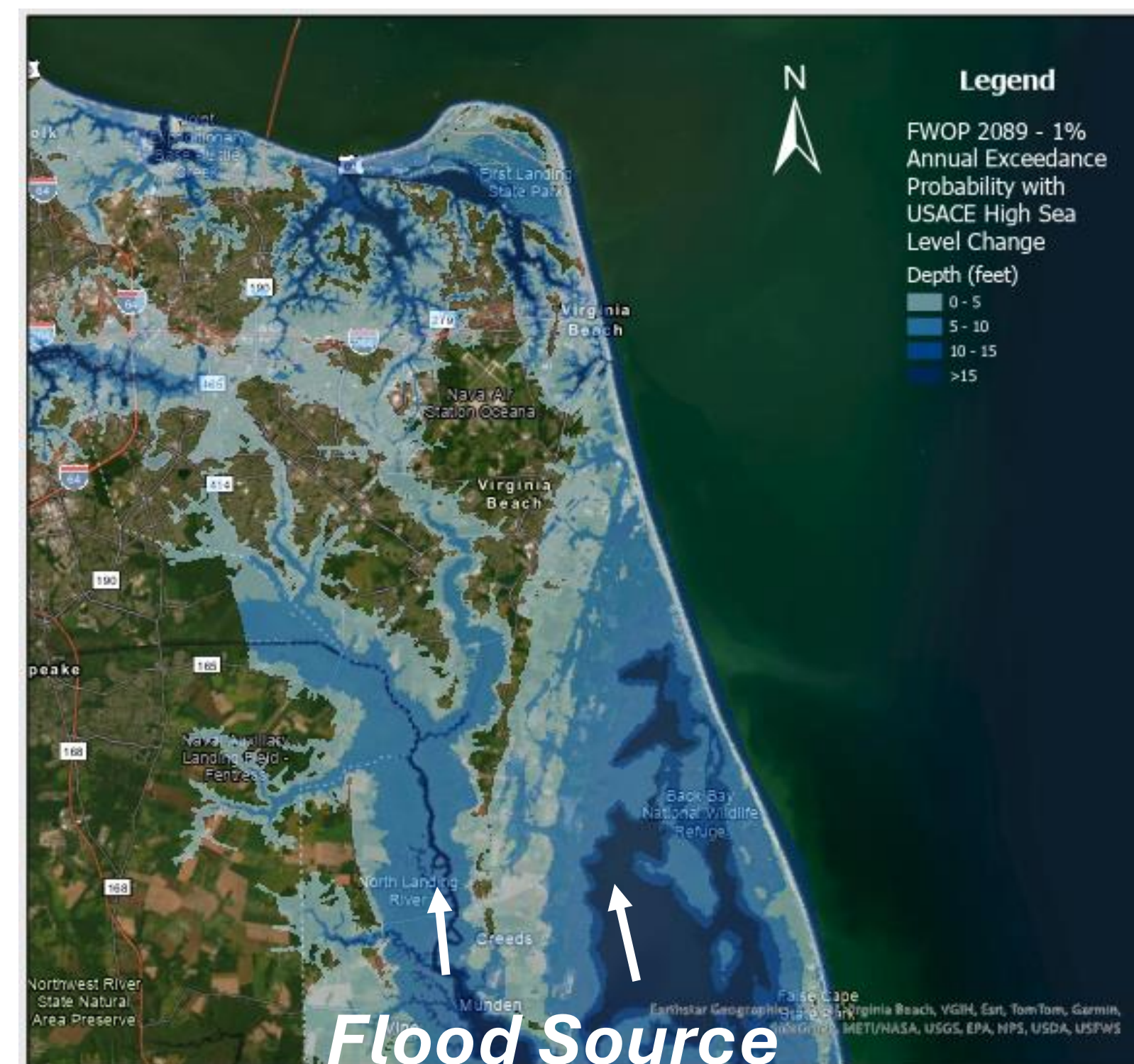
Southern Rivers Measures

Structural Measure 1

- Similar to proposed engineered defenses in the Sea Level Wise Adaptation Strategy.
- Includes various reaches of elevated roadway, levee, and waterway gate closure crossings.

Structural Measure 2

- Includes various reaches of elevated roadway, levee, and waterway gate closure crossings. This measure includes a gate closure at North Landing River



Flood Source
Future Without Project Inundation
1% AEP (100yr) at year 2089 with High
Sea Level Change

Flood Source

The flood source for the Southern Rivers Measures is the North Landing River and the Back Bay. The flood source is denoted with white arrows on the inundation map.

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West Neck Creek Bridge Measure



West Neck Creek
Bridge facing west

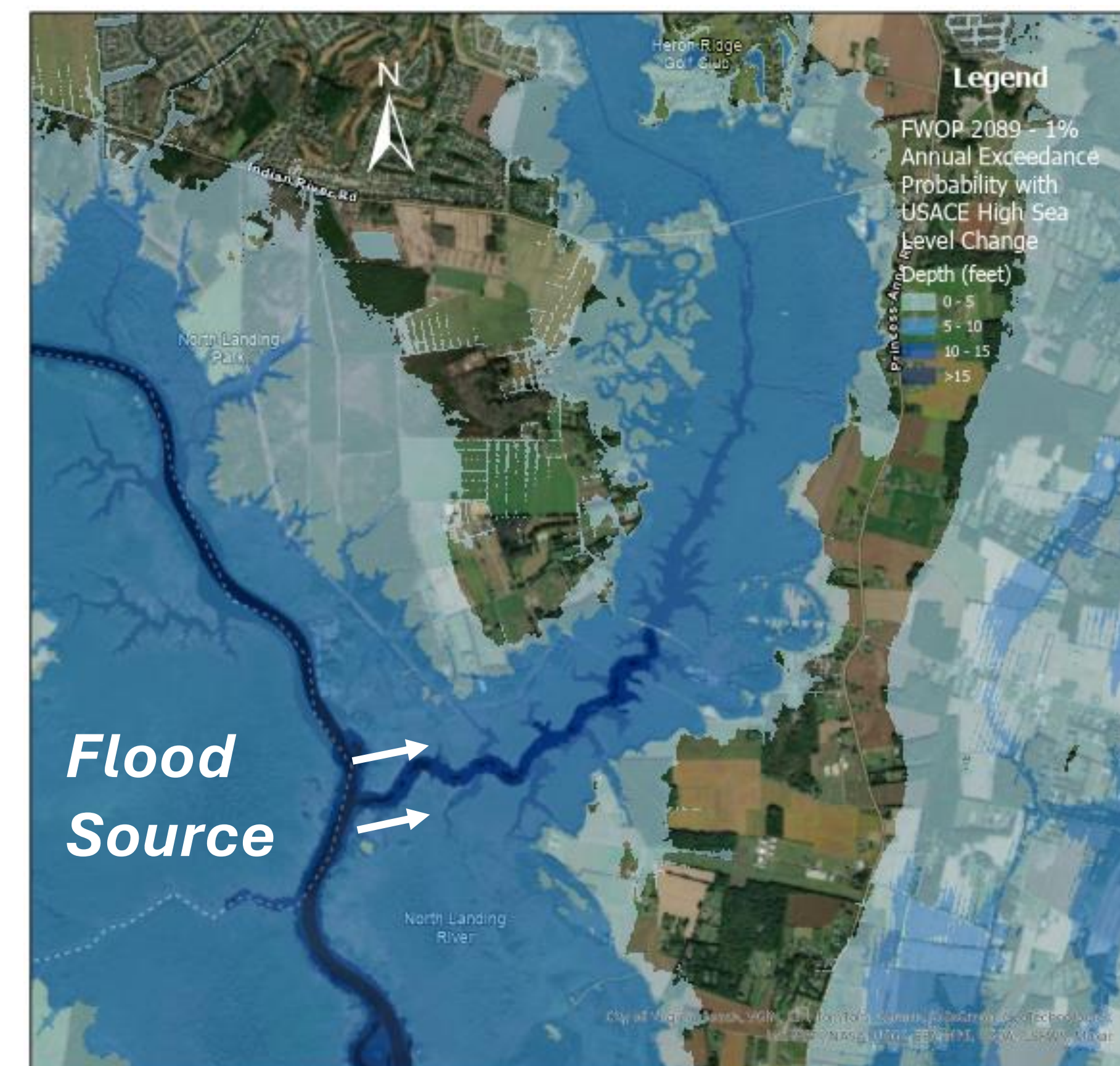


View North from the West
Neck Creek Bridge

- Alignment includes elevated roadway and gate adjacent to West Neck Creek bridge. There is a levee section at the northern terminus to complete the line of protection and mitigate against wrap around flooding for the 1% AEP.

Flood Source

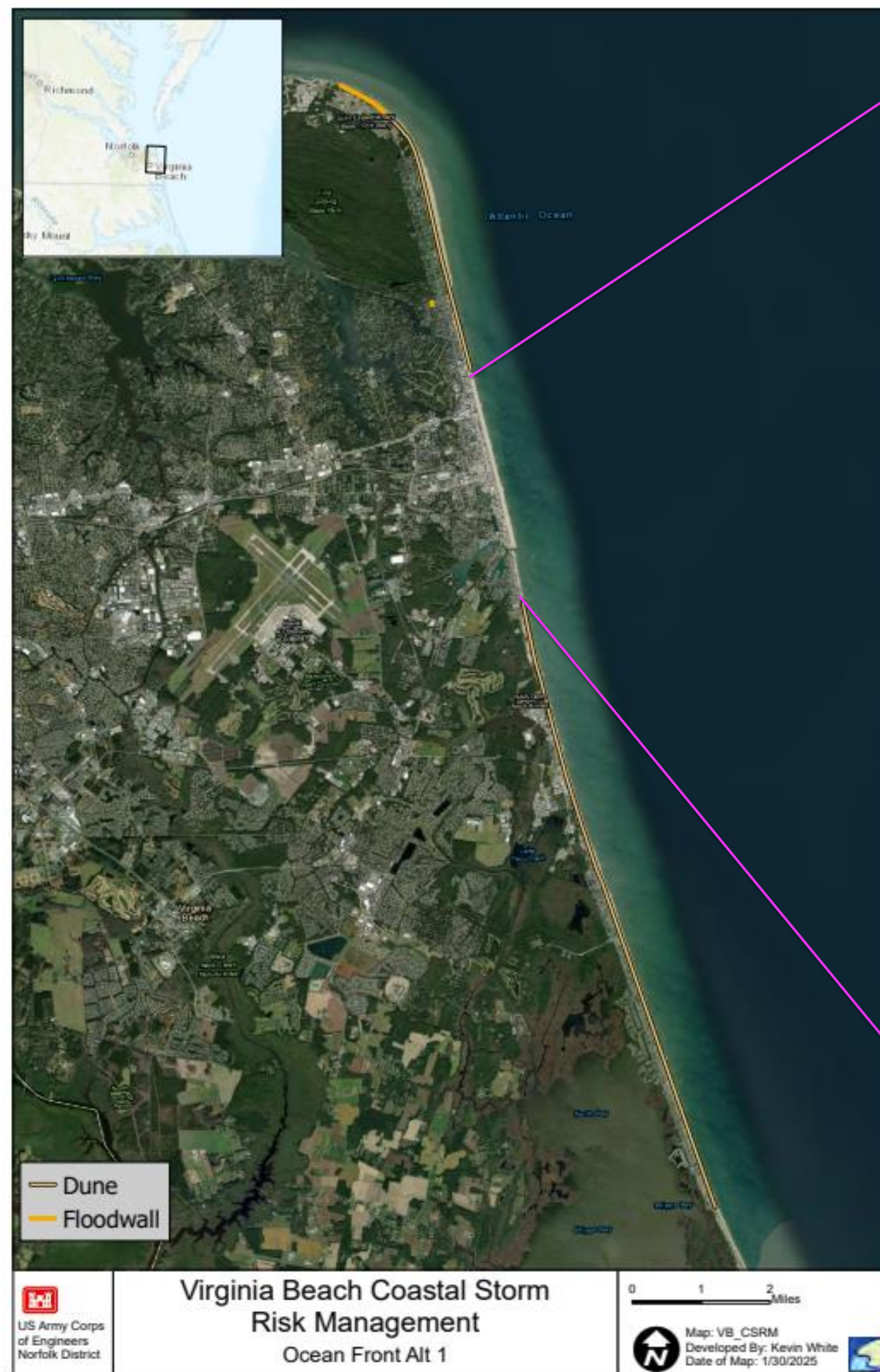
The flood source for the West Neck Creek Measure is the North Landing River. The flood source is denoted with white arrows on the inundation map.



***Future Without Project
Inundation
1% AEP (100yr) at year
2089 with High Sea
Level Change***

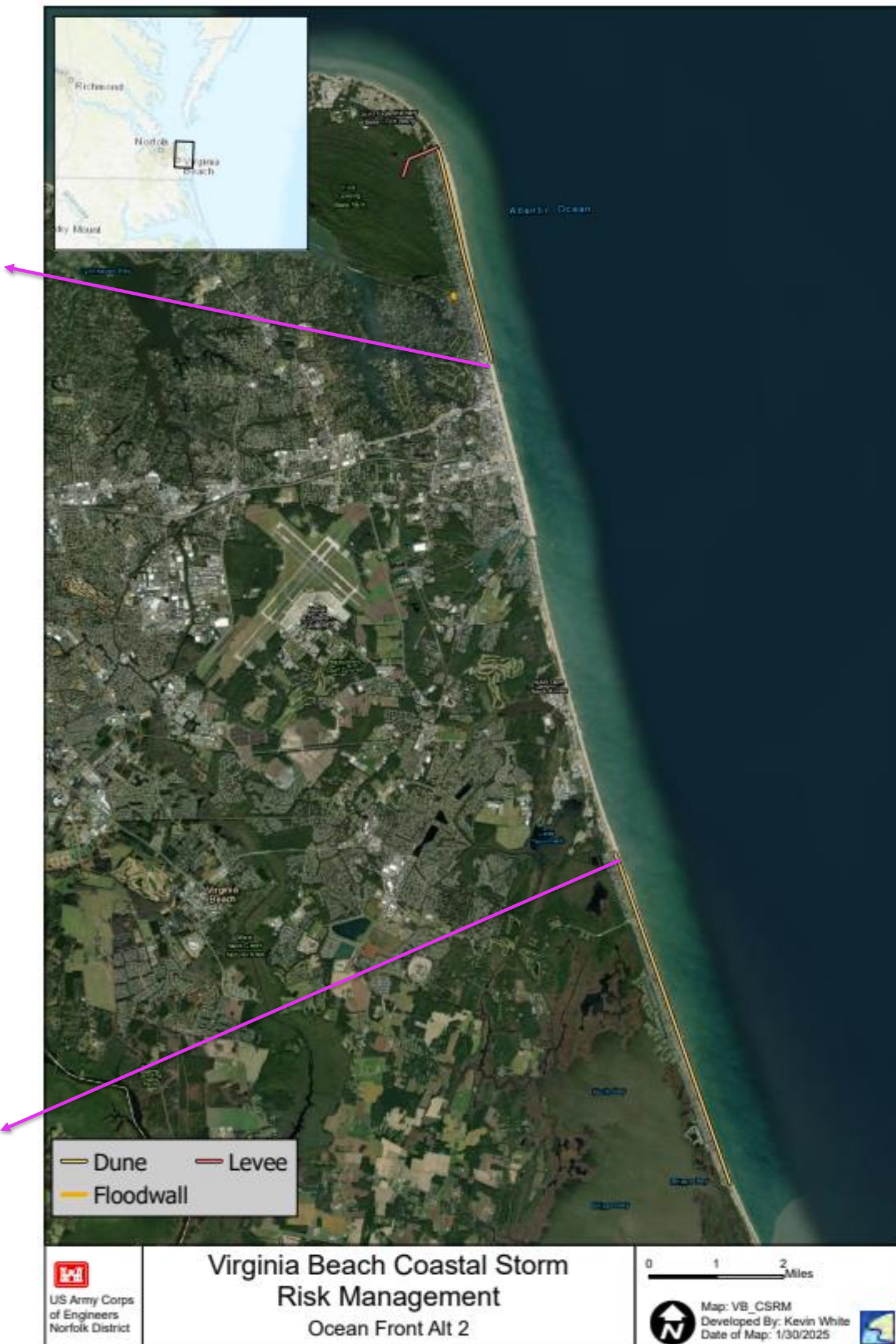
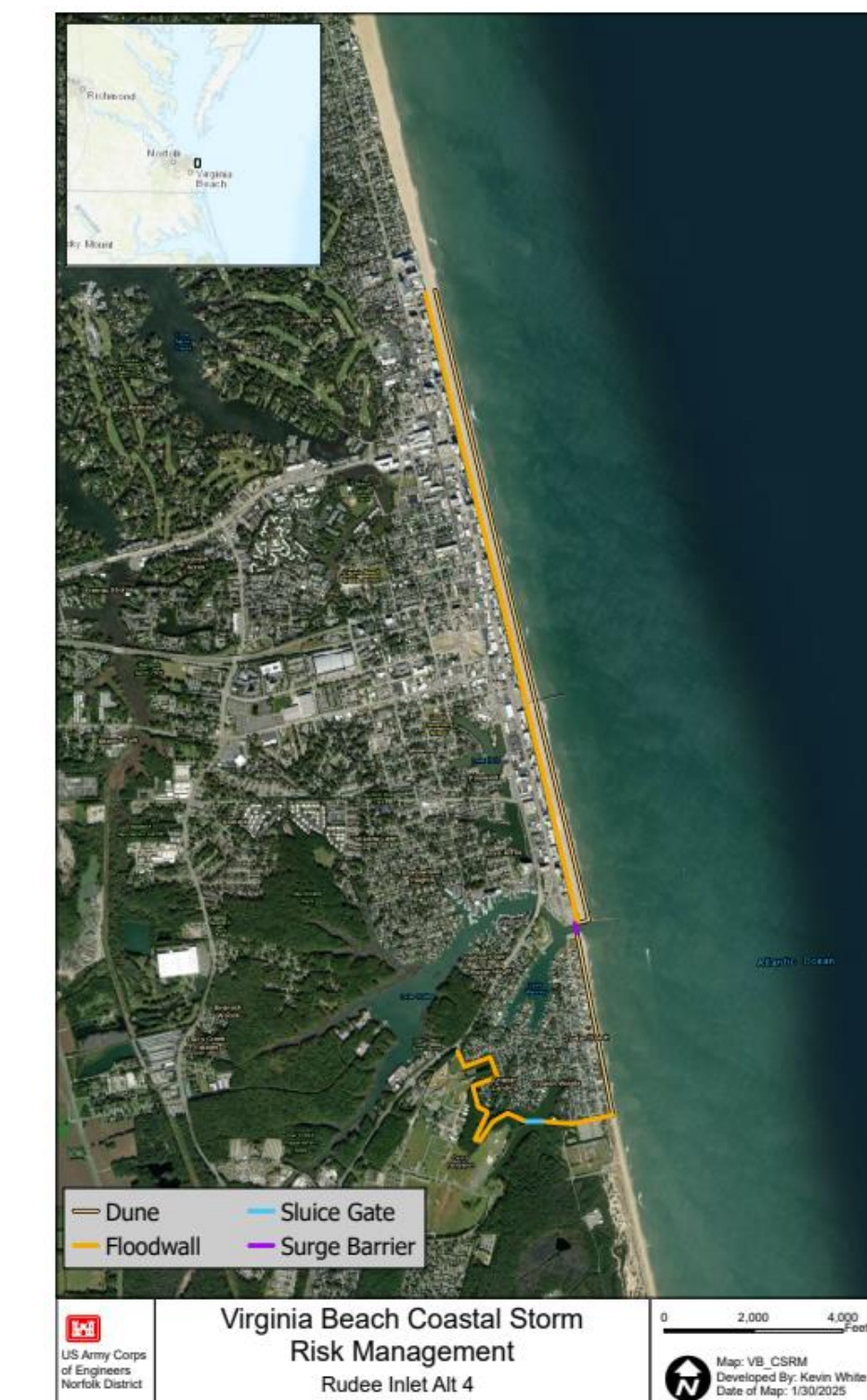
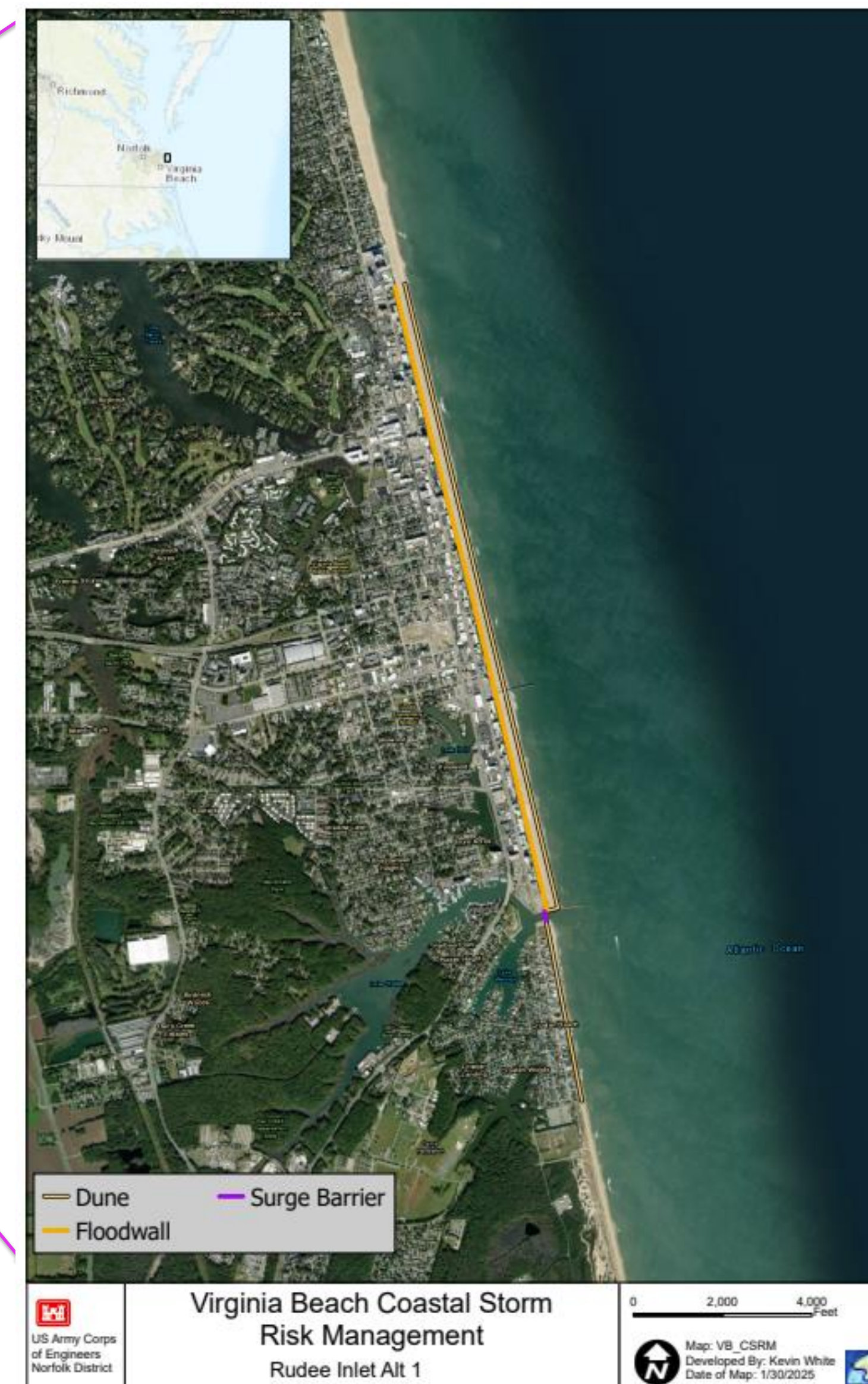
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Ocean Front and Rudee Inlet Measures



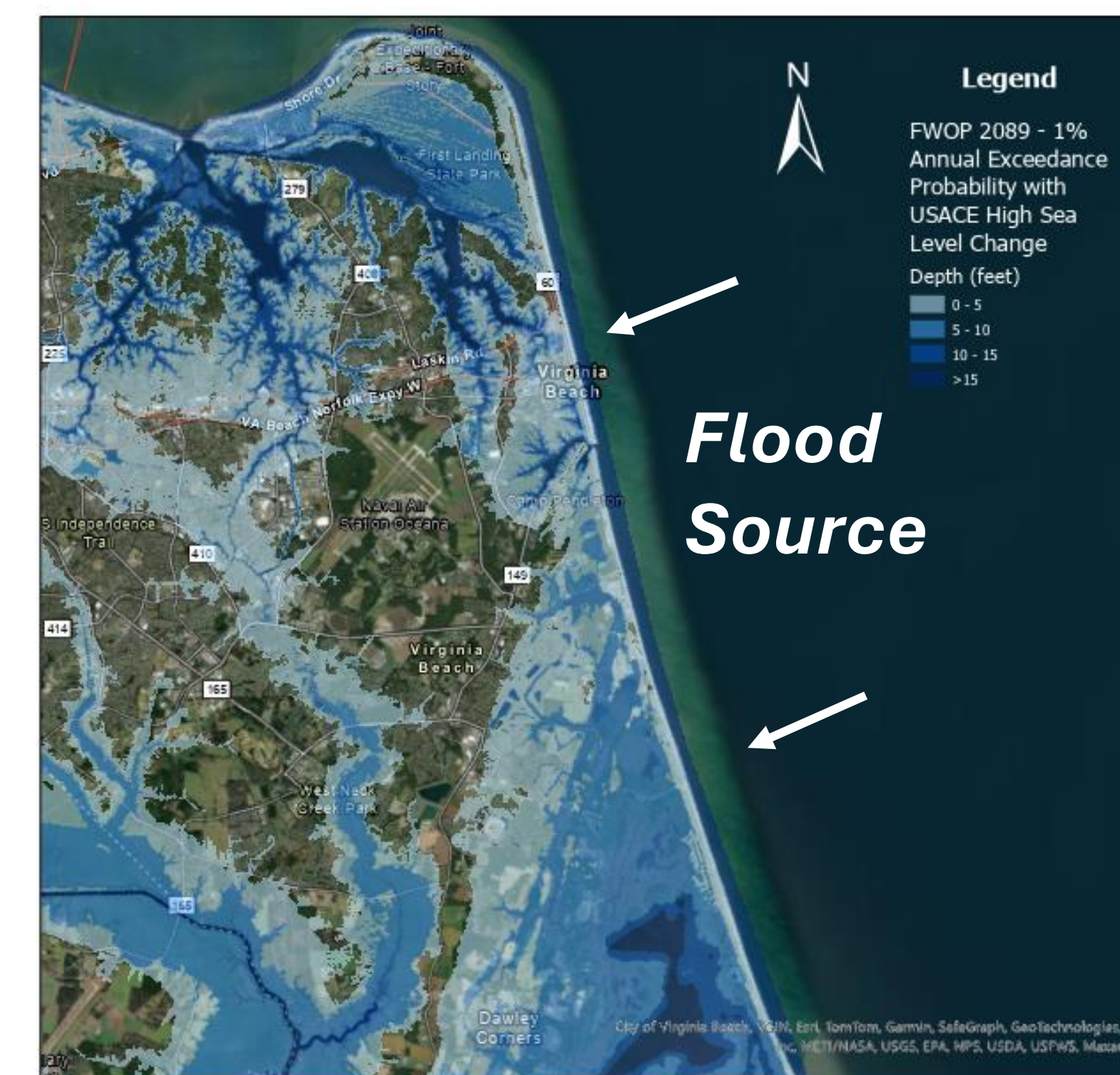
Structural Measure 1

- Ocean Front and Rudee Inlet Measure 1 are similar to proposed engineered defenses in the Sea Level Wise Adaptation Strategy. It includes a dune system along the entire ocean front and a surge barrier at Rudee Inlet.



Structural Measure 2

- Ocean Front and Rudee Inlet Measure 2 includes a dune system along portions of the ocean front, a surge barrier at Rudee Inlet, and a floodwall section along NAS Oceana Dam Neck Annex.



**Future Without Project Inundation
1% AEP (100yr) at year 2089 with High Sea
Level Change**

Flood Source

The flood source for the Ocean Front and Rudee Inlet is the Atlantic Ocean. The flood source is denoted with white arrows on the inundation map.