Community Meeting on Coastal Storm Risk Management

Hosted by **Councilmember Stacy Cummings** and **Councilmember Joash Schulman**

WEDNESDAY, MAY 27
6-8 PM

Frank W. Cox High School – Cafeteria

In-person meeting. Open to the public.

Welcome!

Virginia Beach Coastal Storm Risk Management (CSRM) Feasibility Study

LJ Hansen, P.E. - Director of Public Works

Mike Tippin, P.E. - Stormwater Engineering Center Administrator

May 27, 2026

Districts 8 & 9 Community Meeting

COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

STUDY INFORMATION

AUTHORIZATION

The study was authorized by Section 1201 of the America's Water Infrastructure Act of 2018. It is authorized to identify long-term solutions to minimize risk attributable to coastal storms through the potential project's 50-year economic period of analysis.

SCOPE

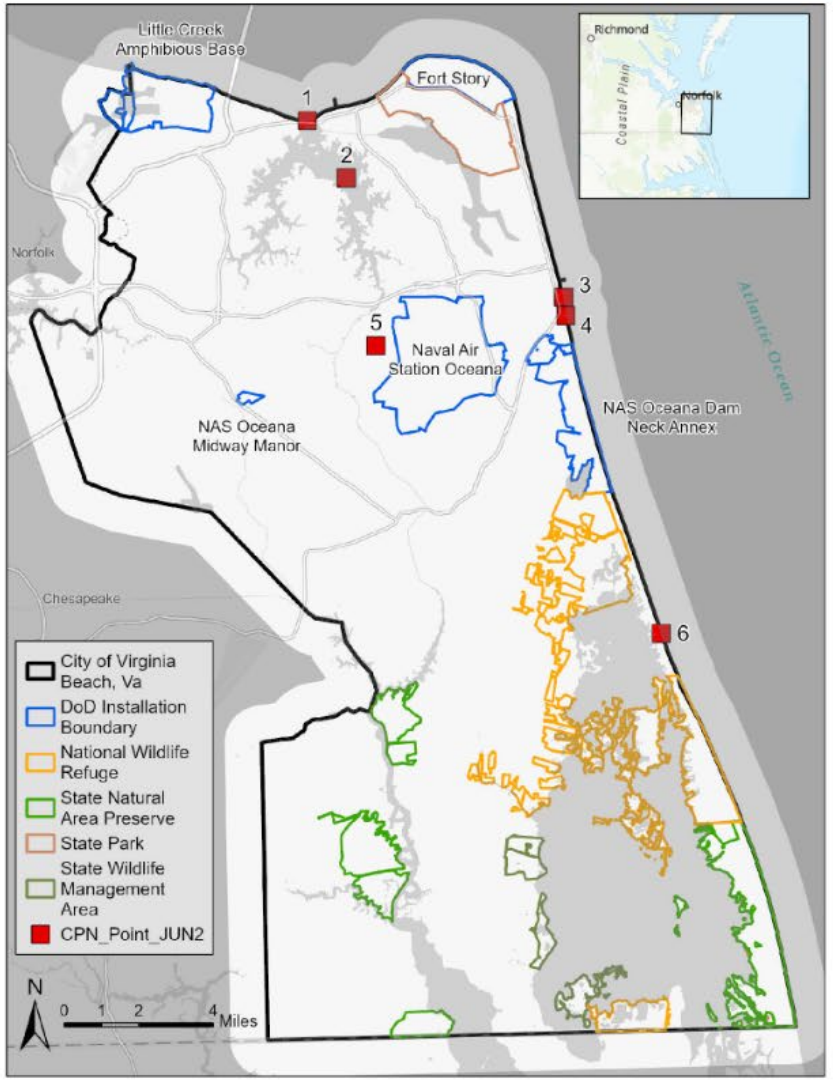
Single purpose coastal storm risk management study initiated in 2022.

The study focuses on:

1. Reducing direct and indirect risks to human life, health, and safety caused by coastal storms.
2. Reducing structural damages caused by coastal storm events.

NON-FEDERAL SPONSOR

City of Virginia Beach



Study Evolution

- 2022 (July): Study launched under USACE “SMART” framework:
  - 3-year limit
  - $3M cap ($1.5M City Share)
  - 3 levels of Corps engagement throughout (District, Division, & Headquarters)
  - Chief’s Report signed at ~10% design
- 2023 (Jan): Reclassified as “Complex” due to interconnected flooding
  - Budget increased to $5.5M, schedule extended to Spring 2026
- 2023 (Jun): Revised Headquarters Direction
  - More Robust modeling, geotechnical work, and Class 3 cost estimate
  - Total cost now $13.5M ($6.67M City Share), completion extended to Spring 2028

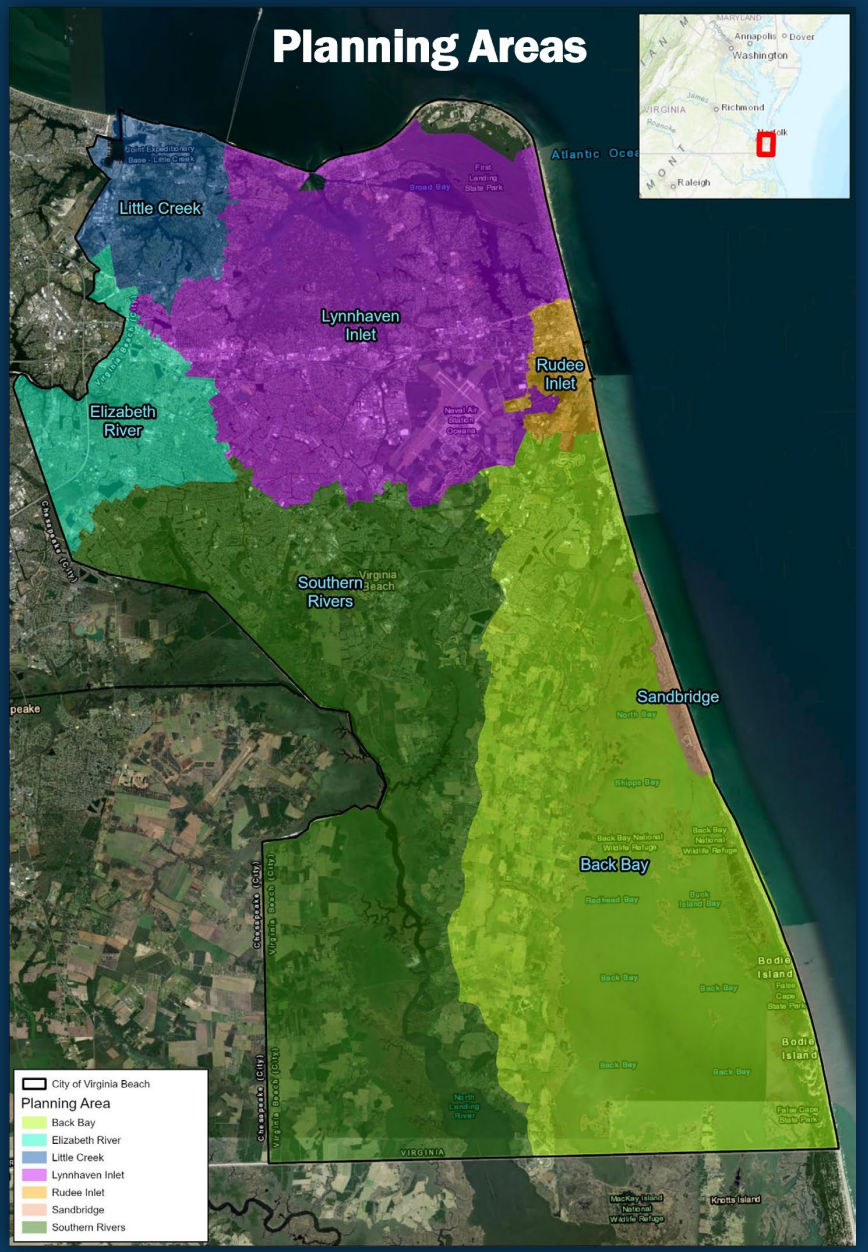
SMART – Specific, Measurable, Attainable, Risk-Informed, Timely

New USACE Requirements

- *Early Actionable Element Requirement*
  - 35% design maturity required before the Chief's Report can be signed
  - Must include Class 3 cost estimate
  - Only one structural measure in a planning area can advance initially
- *What This Means for Virginia Beach*
  - USACE Norfolk District cannot advance all structural options simultaneously
  - City must identify one **Early Actionable Element** to keep the CSRM Feasibility Study on schedule
  - All remaining options remain part of the comprehensive plan for advancement in later phases under existing authority

Purpose of the Study

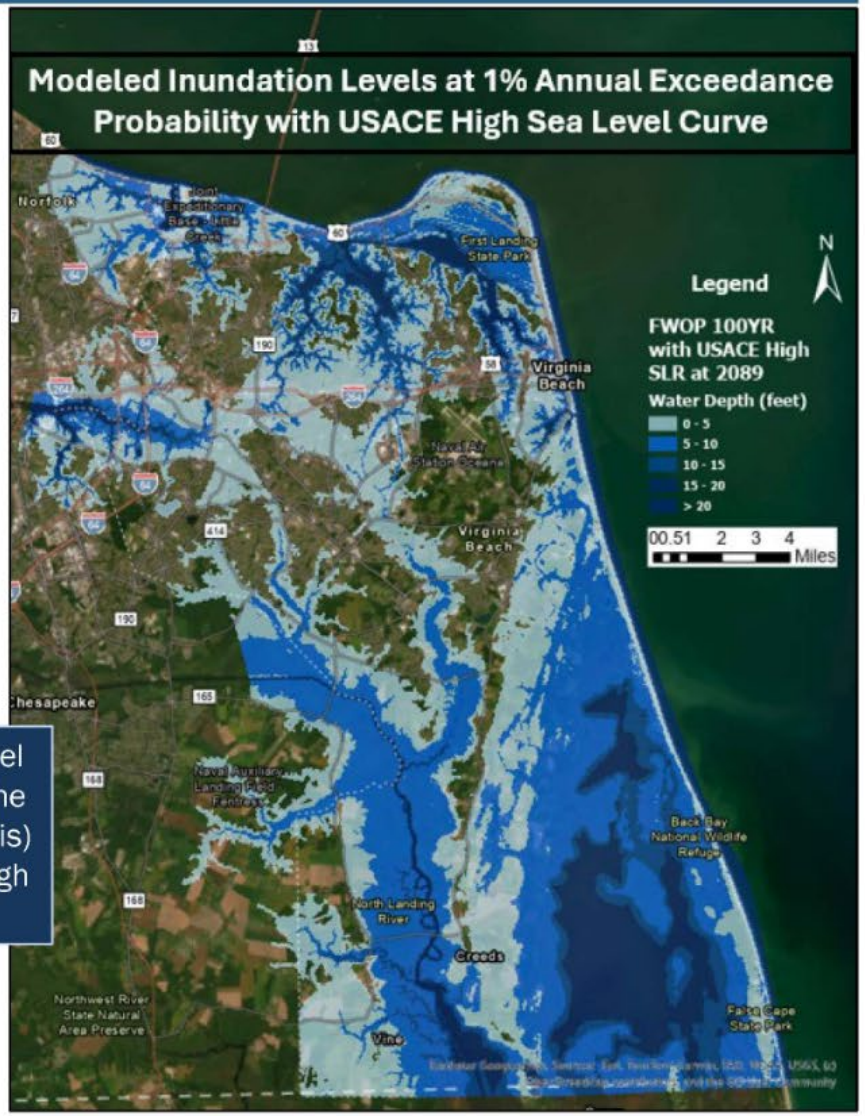
- Study is the first step to getting federal funding assistance for the project – “New Start”
- Study focuses exclusively on coastal storm inundation – not recurrent rainfall (Flood Protection Program)
- Evaluates long-term coastal storm risks across 6 Planning Areas
- Develops strategies for protecting life and property over a 50-year horizon
- Incorporates sea level rise and storm surge modeling



DEFINING THE FUTURE WITHOUT PROJECT CONDITION

Modeling predicted storm surge inundation:

- U.S. Army Corps of Engineers River Analysis System (HEC-RAS) developed by the Hydrologic Engineering Center.
- HEC-RAS is used to develop the water surface profiles for the 50-year period of economic analysis.
- Considers the USACE High Sea Level Curve.



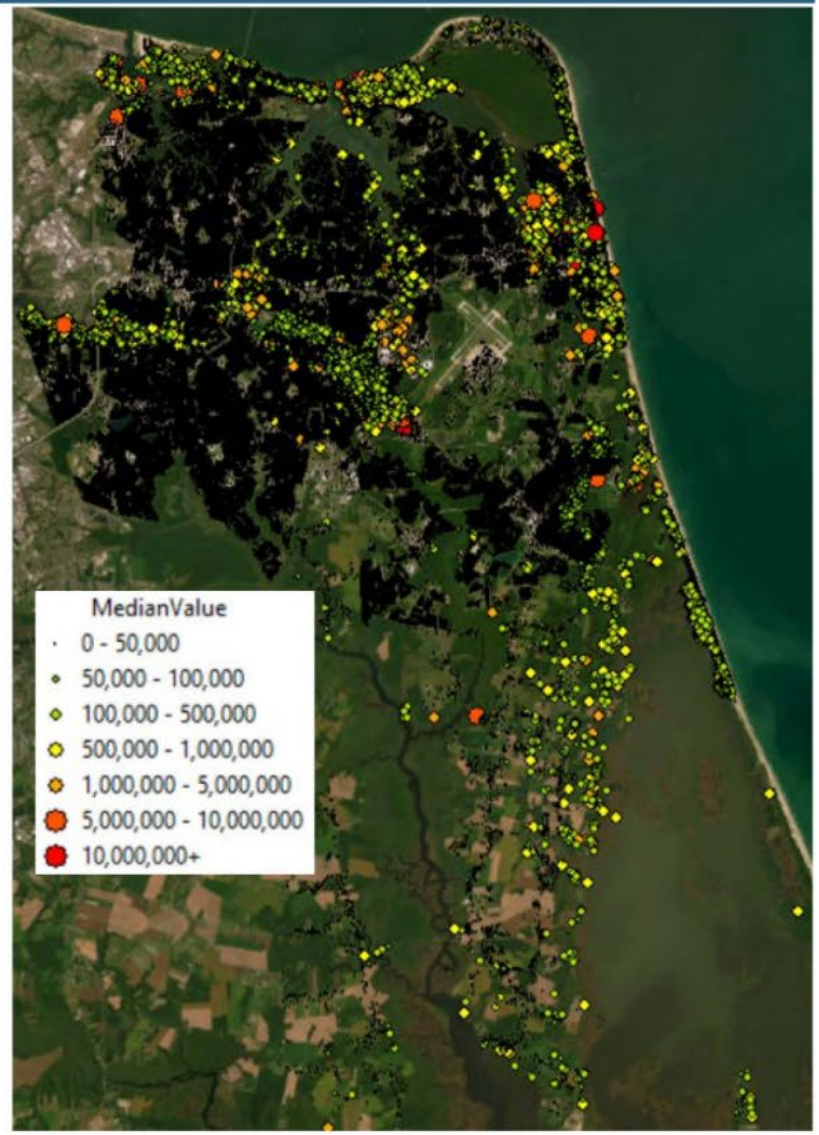
The map displays the model output in the year 2089 (the end of the period of analysis) and includes the USACE high sea level change curve.

INITIAL FUTURE WITHOUT PROJECT RESULTS

Future Without Project (FWOP) Conditions

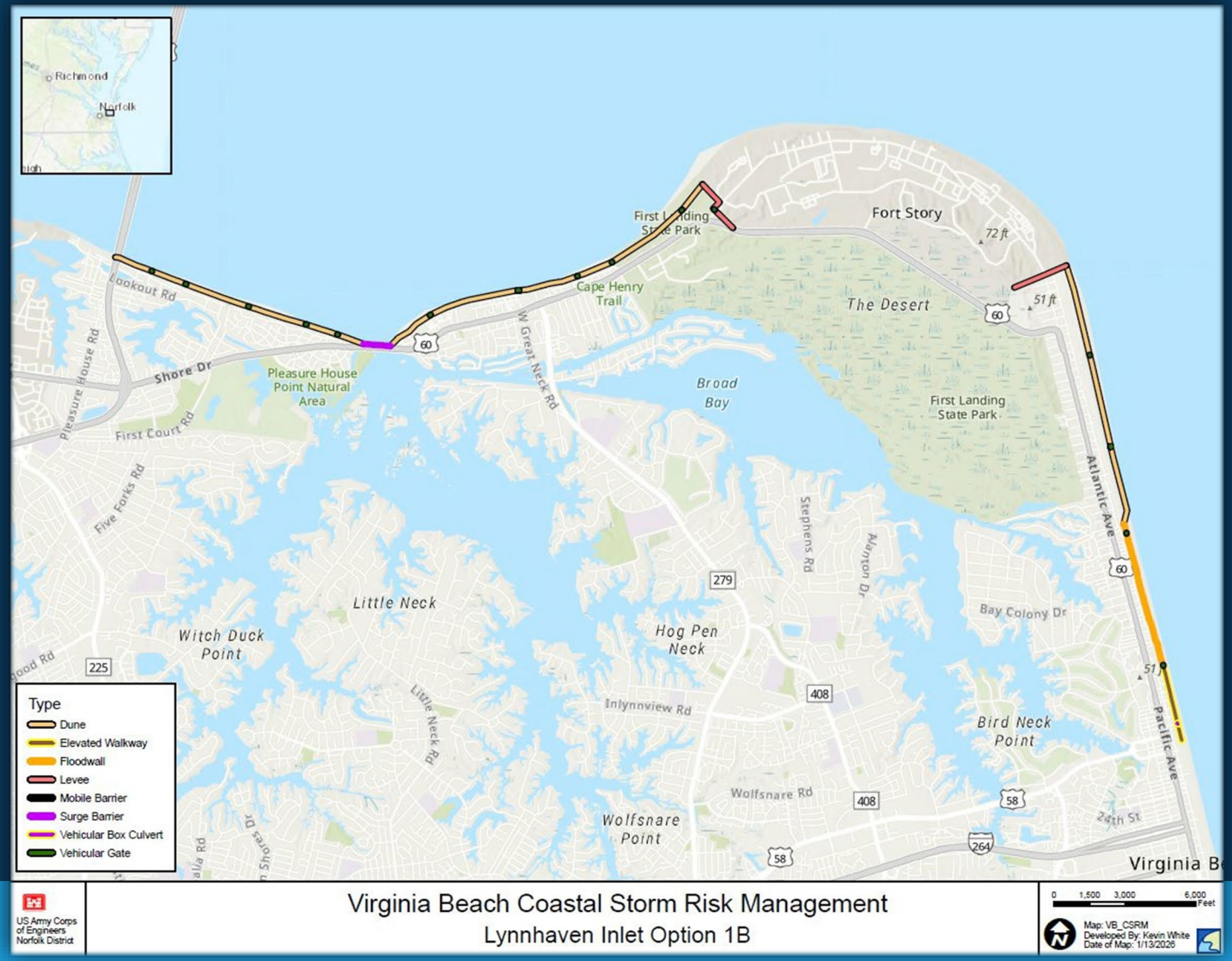
- Asset inventory of approximately 150,000 structures, including 131 identified critical infrastructure assets.
- Damages ($) include structure and content losses.
- Other benefit categories: life safety risk, recreation, agriculture loss.

Planning Area	Structure Count
Little Creek	12,521
Lynnhaven Inlet	63,100
Elizabeth River	17,135
Southern Rivers	32,920
Back Bay	11,418
Sandbridge	1,524
Rudee Inlet	5,945



Staff Recommendation

Recommended Early Actionable Element: Lynnhaven Inlet Surge Barrier

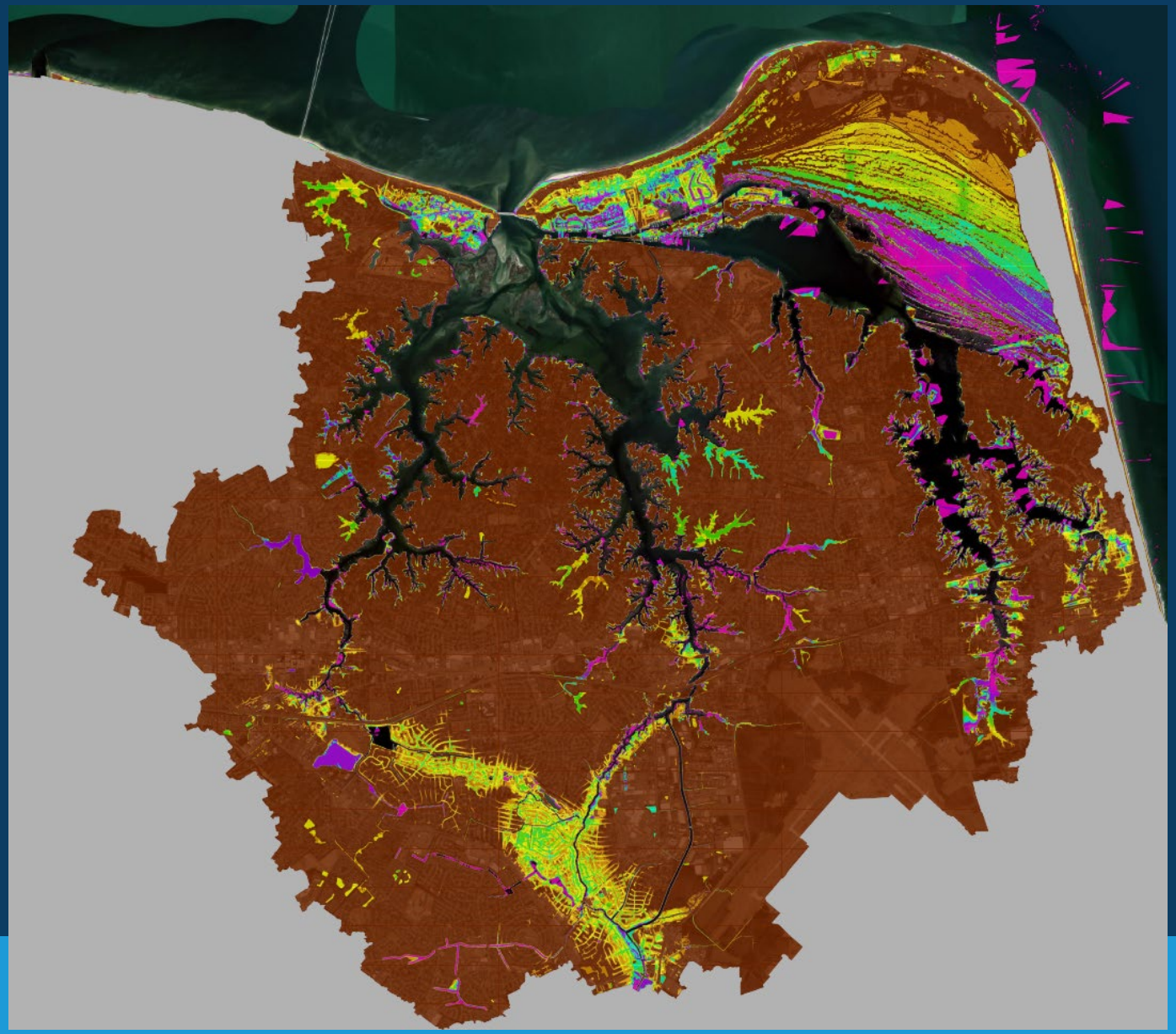


Recommendation based on:

- Lynnhaven inlet and connected waterways affects a large area with a significant population, experiencing some of the greatest impacts from flooding
- A surge barrier here would have the potential to afford immediate benefit and protection

High-risk Interior Neighborhoods

High-risk Interior Neighborhoods



- Lynnhaven Inlet is the source of tidal flooding for much of the City
- Affecting tidal levels in:
  - Central Resort
  - Bay Colony
  - Great Neck
  - Town Center
  - Windsor Woods/Princess Anne Plaza


BROAD BAY
CANAL
HACKBERRY


ROADWAY
SUBJECT
TO
FLOODING

Staff Recommendation

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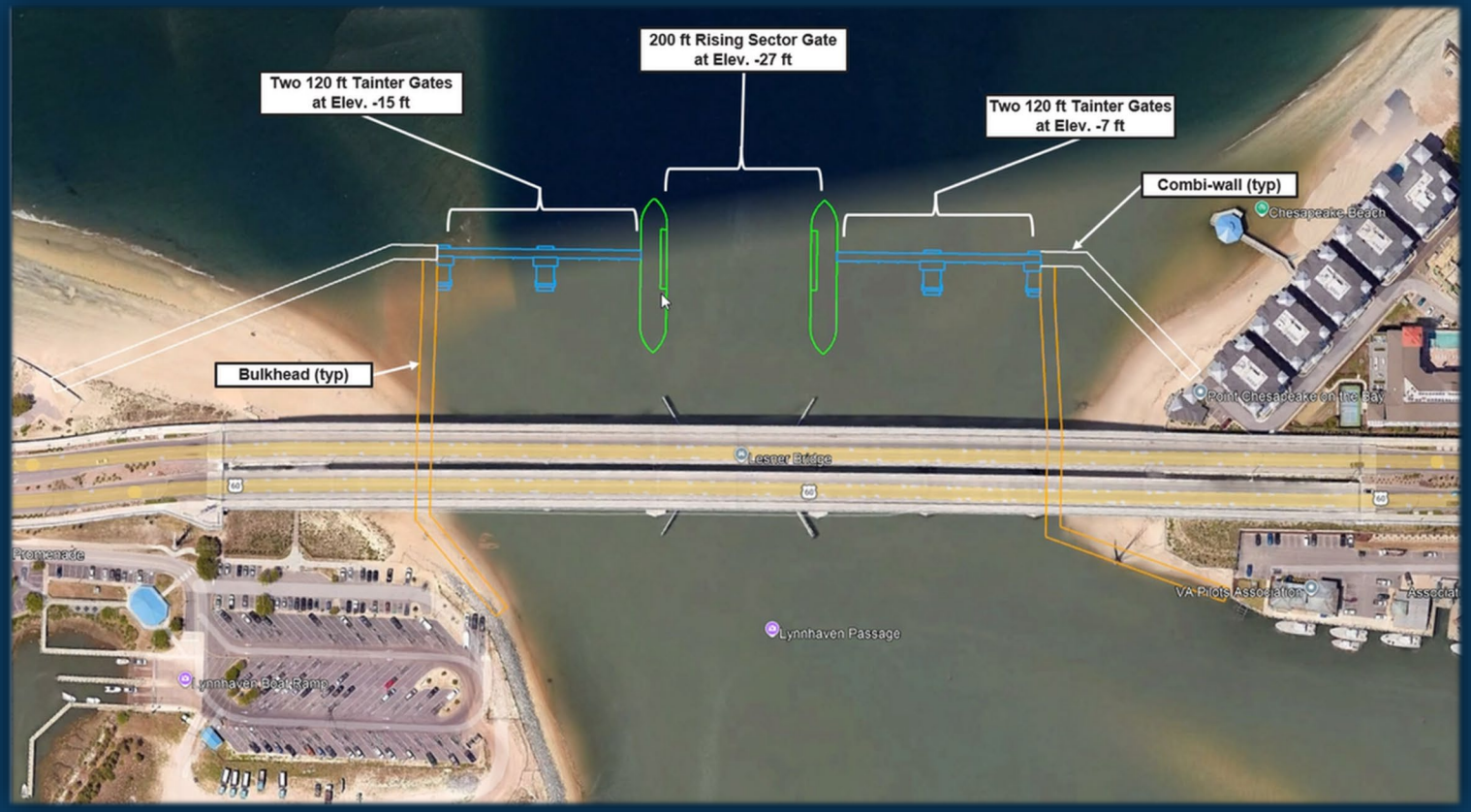
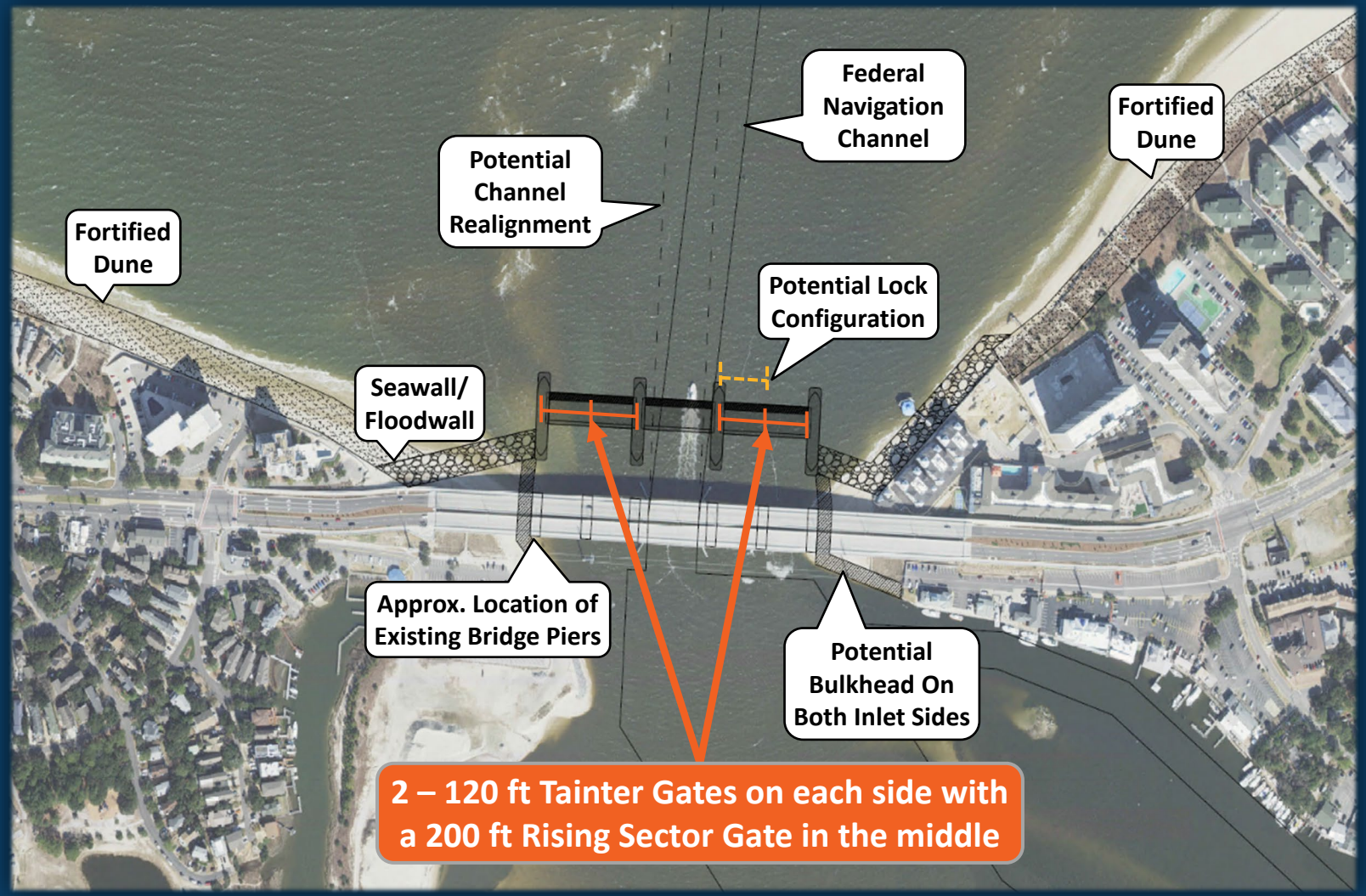


Lynnhaven Inlet Storm Surge Barrier Concept

- Surge barrier across Lynnhaven Inlet with a rising sector gate and Tainter gates
- Floodwalls and fortified dunes along bay and ocean sides
- Ultimately creates continuous Chesapeake Bay → Fort Story protection line

Benefits of the Recommended Alternative

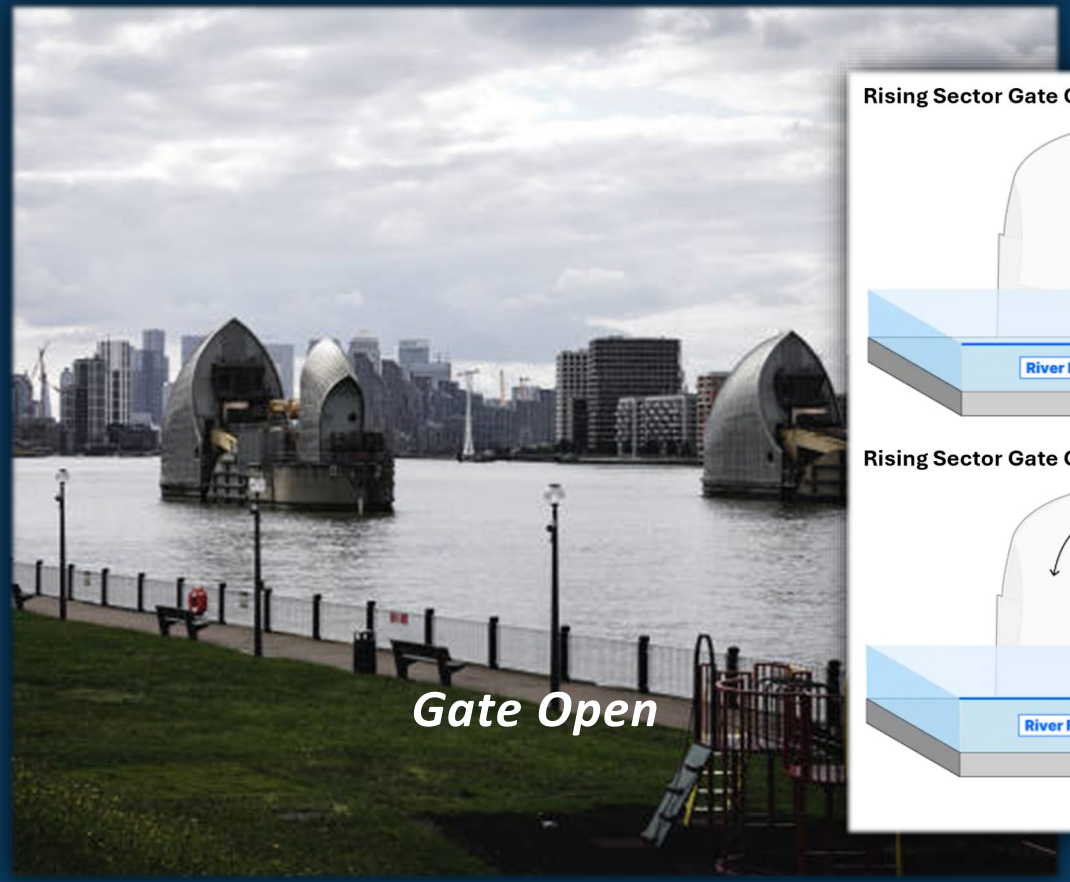
- Provides greatest surge protection at a critical entry point
- Reduces Chesapeake Bay-driven tidal influence on the stormwater system
- Strategically protects multiple high-risk interior neighborhoods (e.g., Ocean Park/Mariners Landing, Bay Island, Lynnhaven Colony, Windsor Woods)

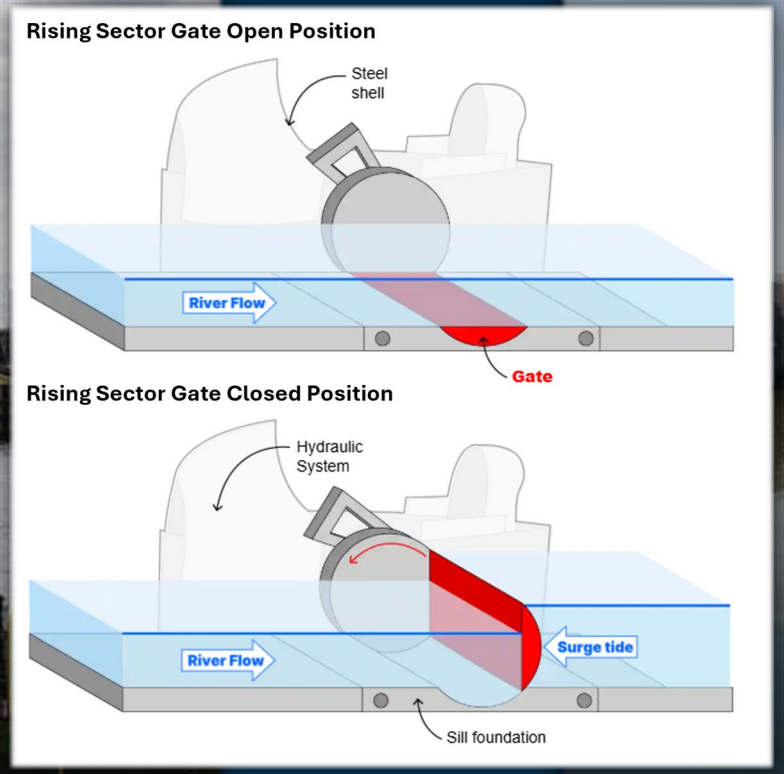


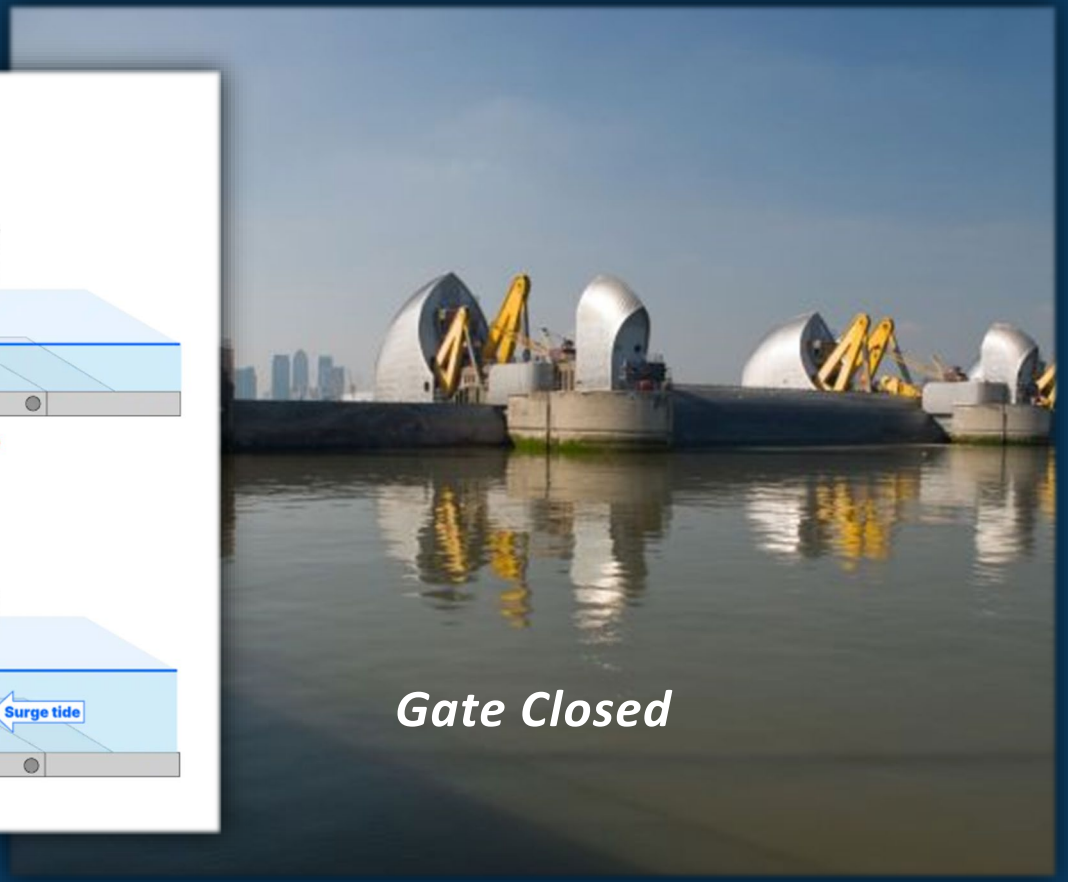
Lynnhaven Inlet Storm Surge Barrier Concept

Example of Tainter gates – Fox Point Hurricane Barrier, Providence, Rhode Island

Lynnhaven Inlet Storm Surge Barrier Concept



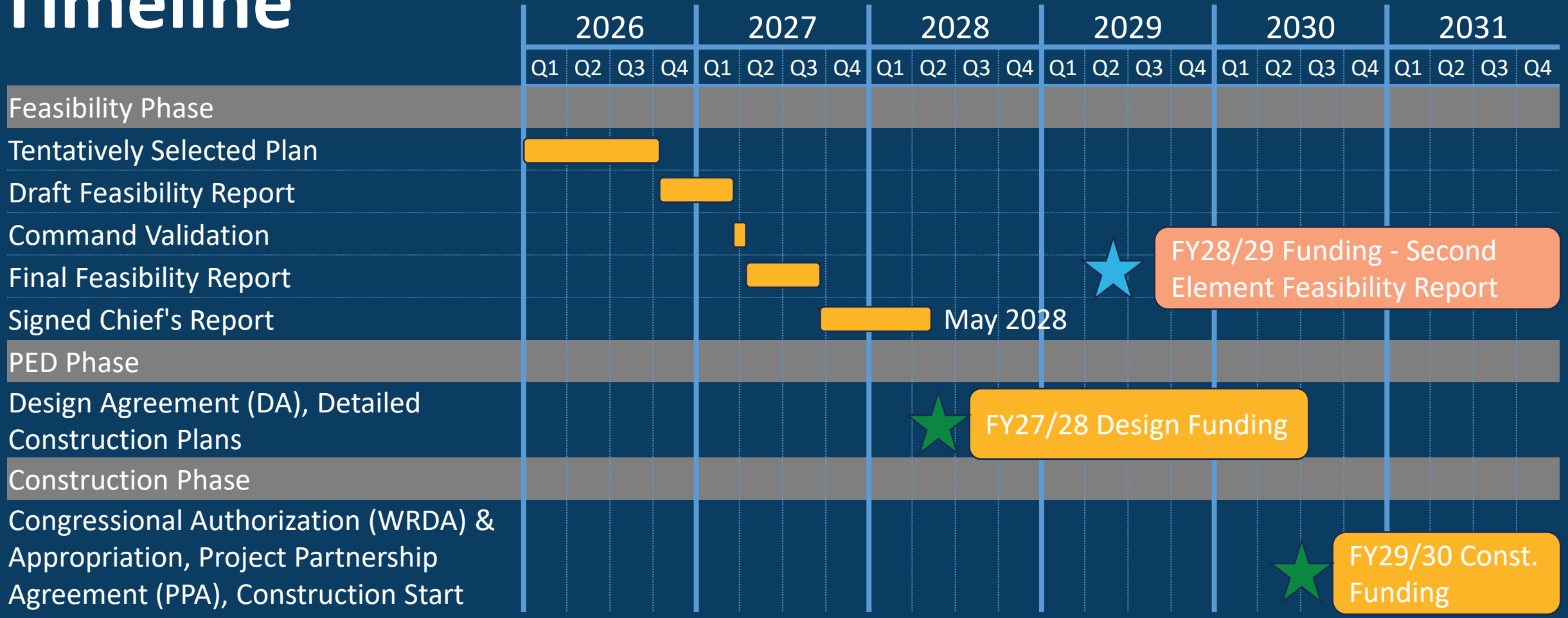




Example of rising sector gates – Thames Barrier in London

Preliminary Concept Drawing

Timeline



PED – Preconstruction Engineering & Design
WRDA – Water Resources Development Act

35% City Funding Required

50% City Funding Required

Upcoming Public Meetings

- Wednesday, June 10, 6-7:30 p.m., Virtual
- Monday, June 15, 2-3:30 p.m., Virtual
- Wednesday, June 17, 6-8 p.m., Frank W. Cox High School, 2425 Shorehaven Drive

USACOE Website - www.nao.usace.army.mil/VBCSRM

Protection Elevations

Location (Planning Area)	Structural Measures	Current Design	Sponsor Preference
Little Creek	SSB: Floodwalls: Dunes (Bay Side):	20' 16' 17'	20' 16' Coordinate with Norfolk
Lynnhaven	SSB: Floodwalls (Bay Side): Dunes/Levees (Bay Side): Floodwalls (Ocean Side): Dunes/Levees (Ocean Side):	20' 16' 17' 16' 21'	20' 16' 17' 16' 21'
Rudee (Resort Beach)	SSB: Floodwalls/Seawalls: Dunes:	22' 19' 21'	22' 16' (adapt to 19') 21'
Back Bay	Dunes: Elevated Road/Levees:	21' 13'	21' 13'
Elizabeth River	SSB: Floodwalls:	18' 18'	18' 15' (adapt. to 18')
Southern Rivers	SSB: Elevated Road/Levees:	13' 13'	9' 9'

How the Gates Might Be Utilized – Very Preliminary

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PRELIMINARY CLOSURE INFORMATION

Closure Threshold is the forecasted water level for which operation of a storm surge barrier is authorized:

– 4 feet NAVD88 (preliminary)

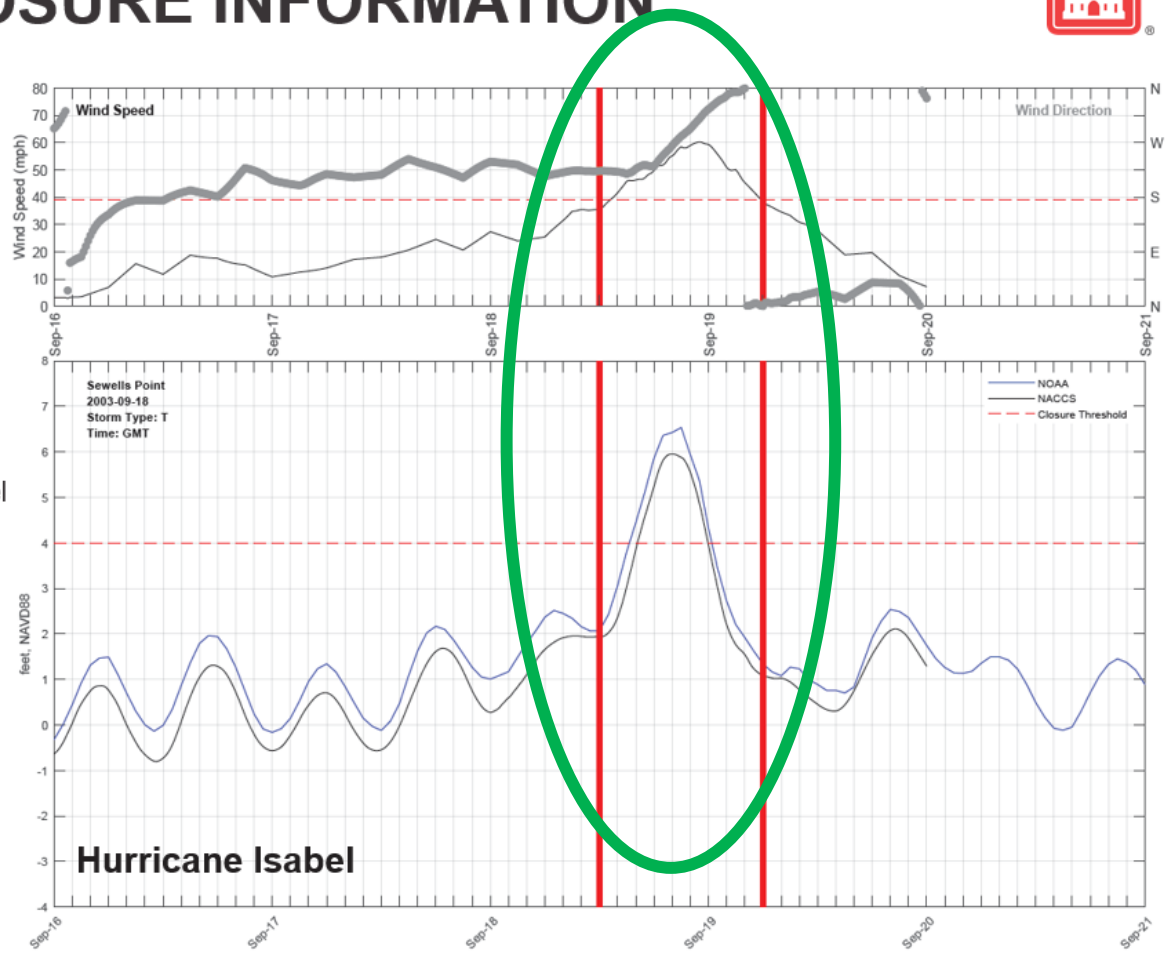
Closure Timing

– Gates will remain open until navigation has cleared or until the following conditions are met:

- Gates will begin closing 2 hours before water level are forecasted to exceed closure threshold.
- Gates will close if the site experiences tropical storm force winds (39 mph).
- Gates will close at the lowest water surface elevation practicable to increase the storage capacity of the basin.

Reopening Timing

– Gates will reopen after the storm passes on falling tide when the head difference on the gates is < 1 foot.



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Hurricane vs Nor’easter

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HISTORICAL STORMS - CLOSURES

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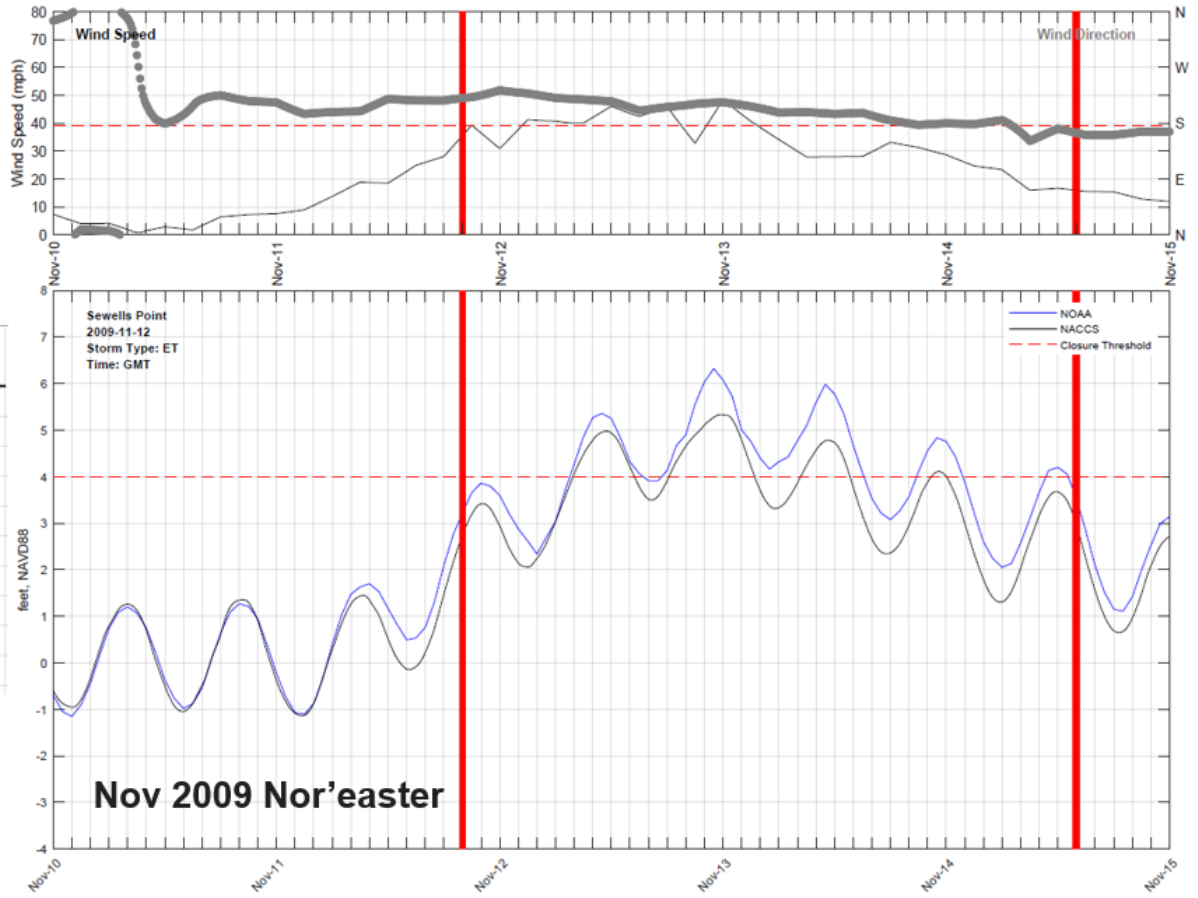
Top Ten	Date	Type	feet, NAVD88	Closure Duration (Hours)
1	8/23/1933	Hurricane	6.41	14
2	9/18/2003	Hurricane	6.28	18
3	11/12/2009	Nor'easter	6.12	66
4	8/28/2011	Hurricane	5.95	26
5	3/7/1962	Nor'easter	5.61	44
6	10/29/2012	Hurricane	5.19	54
7	9/18/1936	Hurricane	5.11	20
8	11/22/2006	Nor'easter	5.02	14
9	2/5/1998	Nor'easter	4.97	52
10	10/7/2006	Nor'easter	4.91	50

Closure Duration (Hours)

Storm Type	Average	Min	Max
Hurricane	26.4	14	54
Nor'easter	45.2	14	66



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Closure Frequency – Very Preliminary

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CLOSURE FREQUENCY – HISTORICAL DATA

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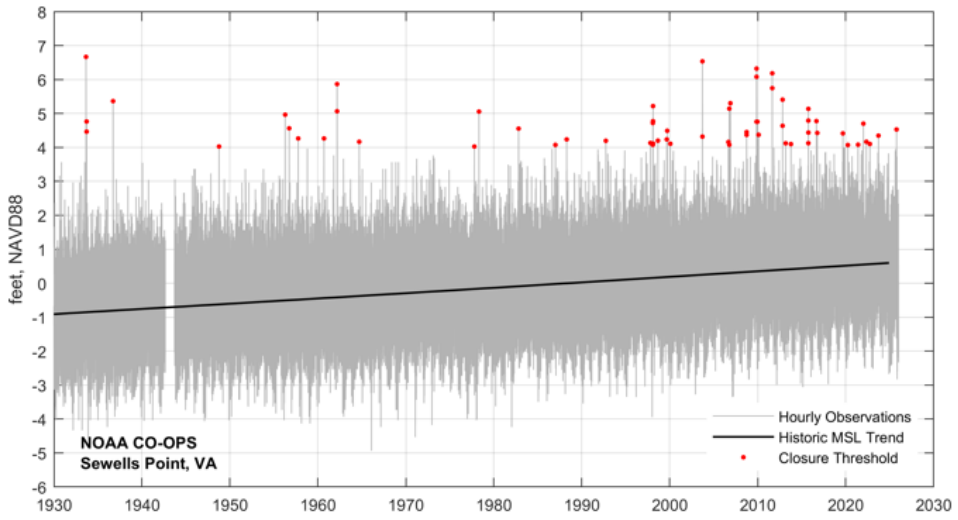
NOAA Tide Station at Sewells Point, VA

Closure Threshold = 4.0 ft NAVD88

- 60 closure days since 1930
- 33 closure days since 2000



	Number of Closure Days per Decade		
Decade	4 ft NAVD88	5 ft NAVD88	6 ft NAVD88
1930s	4	2	1
1940s	1	0	0
1950s	3	0	0
1960s	4	2	0
1970s	2	1	0
1980s	3	0	0
1990s	10	1	0
2000s	13	5	3
2010s	14	4	1
2020s	7	0	0

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Closure Frequency – Projections – Very Preliminary

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CLOSURE FREQUENCY – PROJECTIONS

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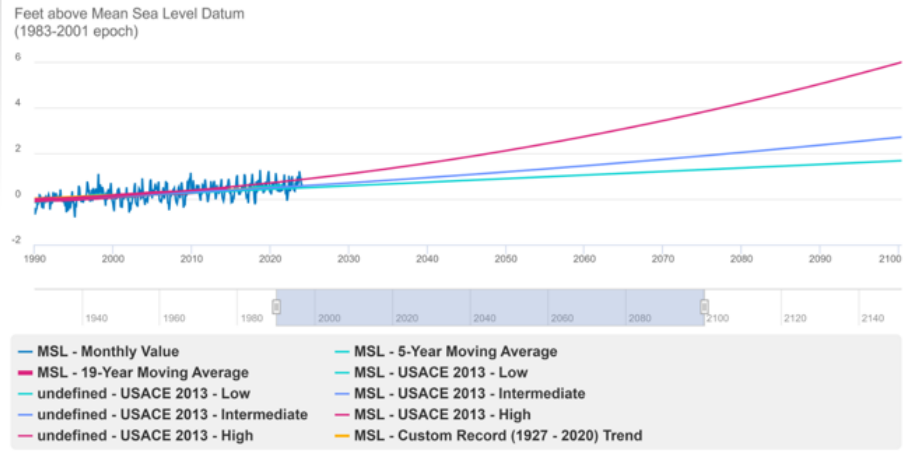
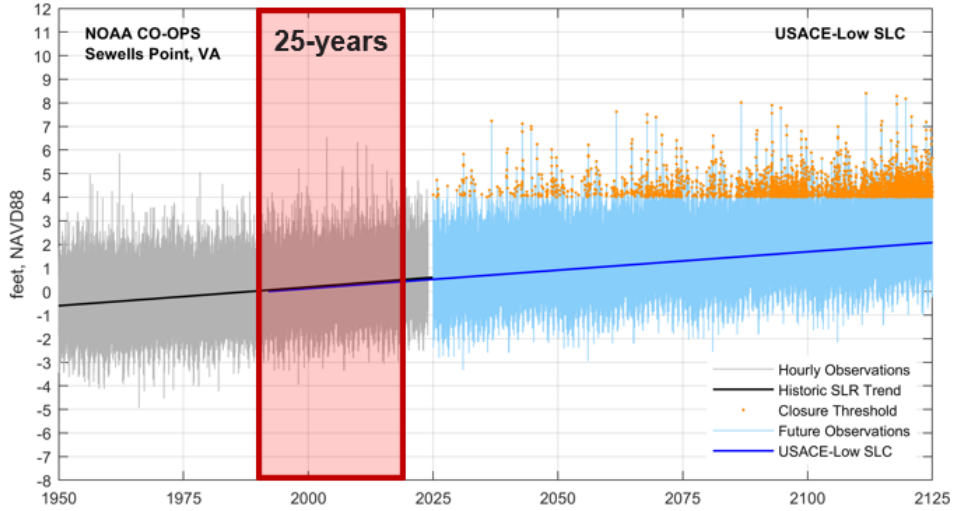
Sea Level Data and Projections: Sewells Point, VA (8638610)
NOAA Tide Gauge



SLC rate used in equation based projections: 4.75 mm/yr (1.56 ft/100 yrs)
MSL record span: 1927 to 2024 (97 years)



Number of Closure Days per Year

	4 ft NAVD88			5 ft NAVD88			6 ft NAVD88		
	Low SLC	Int. SLC	High SLC	Low SLC	Int. SLC	High SLC	Low SLC	Int. SLC	High SLC
2030s	2	3	10	0	0	1	0	0	0
2040s	3	5	33	0	1	3	0	0	0
2050s	4	9	122	1	1	12	0	0	1
2060s	6	17	273	1	2	59	0	0	6
2070s	8	36	345	1	3	213	0	0	31
2080s	12	75	357	1	7	334	0	1	164
2090s	17	148	358	2	15	356	0	2	323

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Questions?

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Thank you for attending!