BALTIMORE COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

Baltimore Regional Transportation Board Meeting

Presenters:
Joe Bieberich & Vanessa Campbell
U.S. Army Corps of Engineers
Baltimore District
23 August 2022

Flooding at Baltimore Inner Harbor, Hurricane Isabel (2003).
Photo credit: Baltimore Sun

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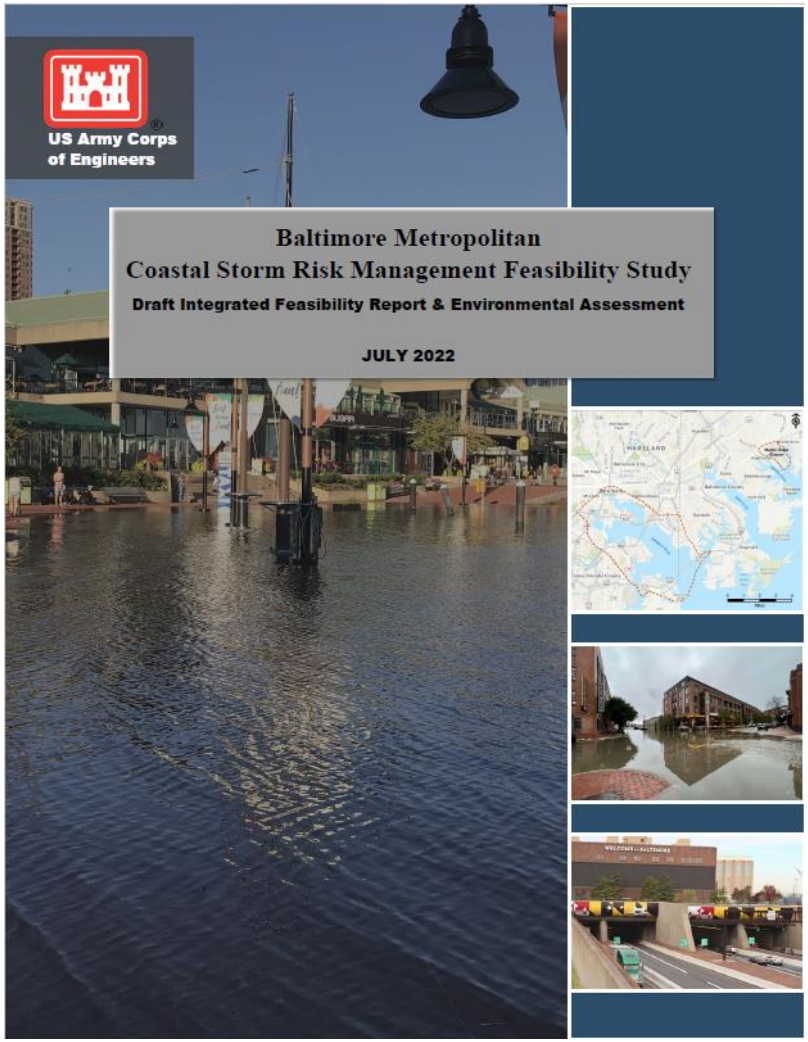
MEETING AGENDA

- Tentatively Selected Plan
- Study Purpose & Overview
- Study Schedule
- Alternatives Considered
- Draft Report
- Open Discussion with Q&A



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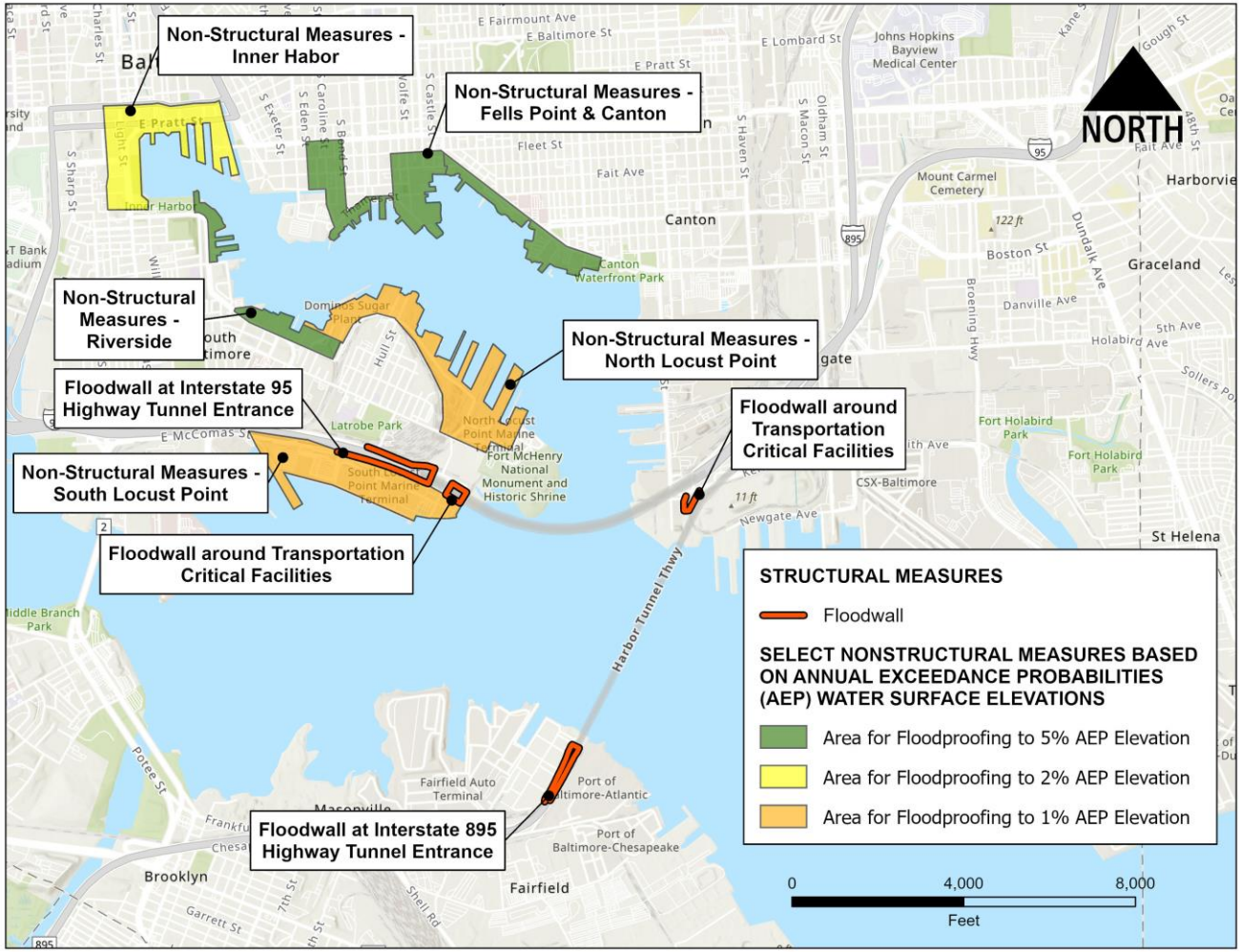
TENTATIVELY SELECTED PLAN

Alternative 5A: Critical Infrastructure with Select NS Plan

- I-95 and I-895 tunnel entrances and associated critical infrastructure (ventilation buildings)
- Nonstructural measures in Locust Point, Riverside, Inner Harbor, Canton and Fells Point

Components:

- Concrete T-walls
- Stop Log structures
- Floodproofing



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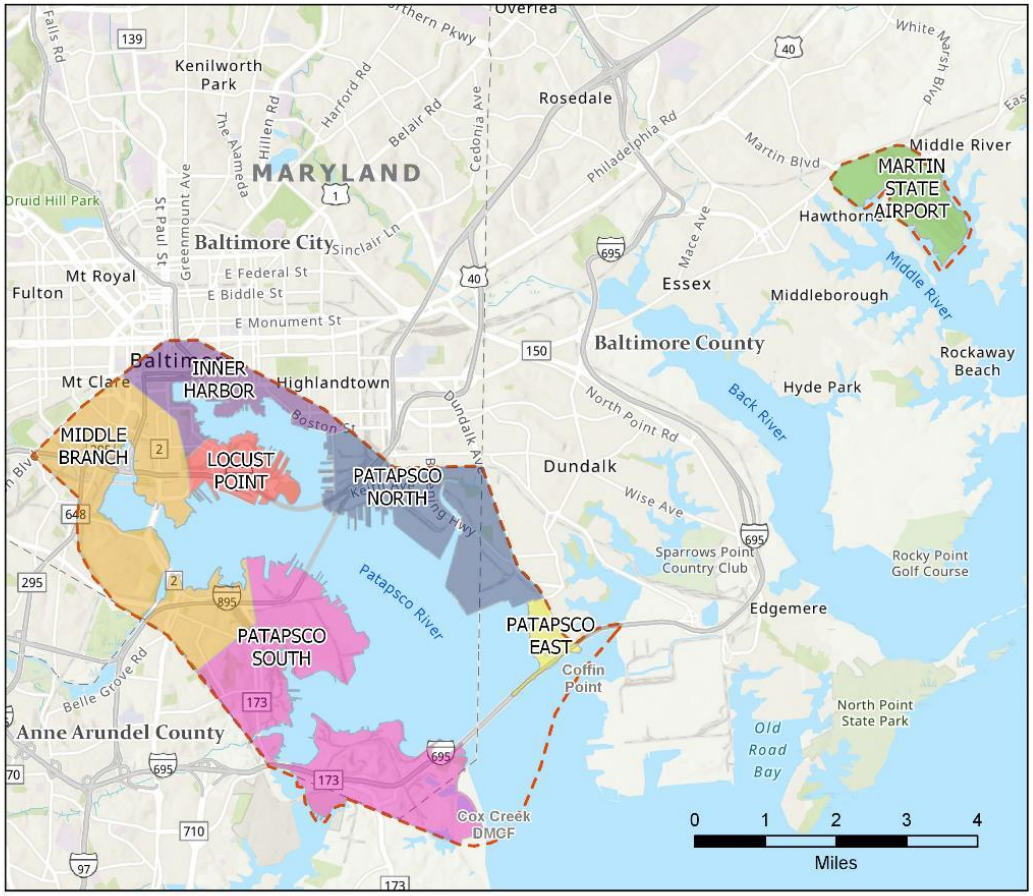
Study Area and Planning Units



VICINITY

LEGEND

- STUDY AREA

PLANNING UNITS

- INNER HARBOR
- LOCUST POINT
- MARTIN STATE AIRPORT
- MIDDLE BRANCH
- PATAPSCO EAST
- PATAPSCO NORTH
- PATAPSCO SOUTH

BALTIMORE COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

CITY OF BALTIMORE, ANNE ARUNDEL AND BALTIMORE COUNTIES

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STUDY OBJECTIVES

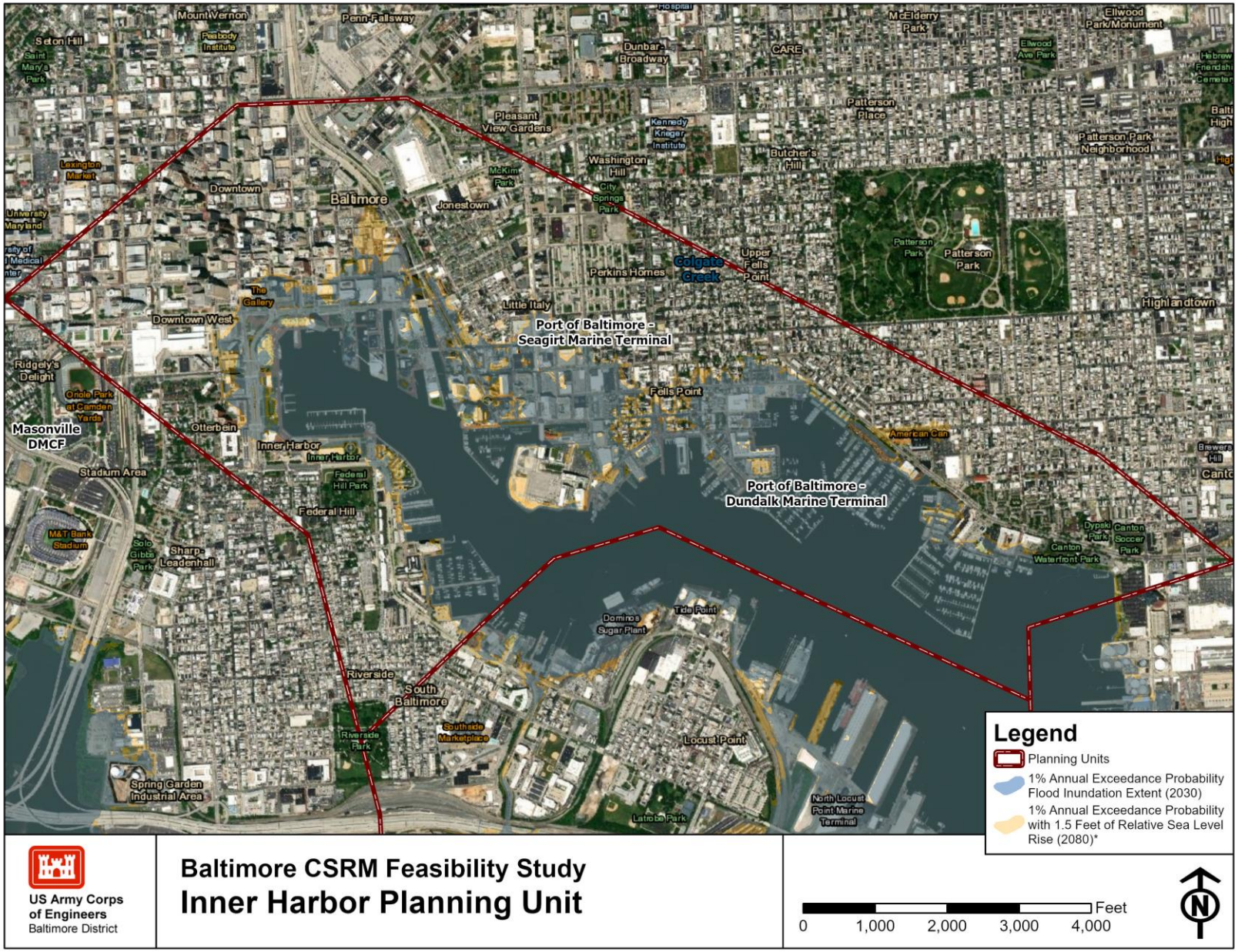
City of Baltimore:

- Reduce risk to **human health and safety** from coastal storm impacts in the study area.
- Reduce **economic damages** from coastal flooding in the study area to residential, commercial, industrial, and government buildings.
- Reduce disruption of **critical infrastructure** assets, services, and interdependent systems caused by coastal flooding in communities throughout the study area.
- Improve the **resiliency of critical infrastructure** in the study area to impacts from coastal storms.
- Consider incorporation of **natural and nature-based features** in solutions.

Martin State Airport:

- Reduce coastal flooding impacts that disrupt or damage **transportation and emergency service infrastructure** and assets at supporting operations at Martin State Airport.

FLOOD INUNDATION MAPPING



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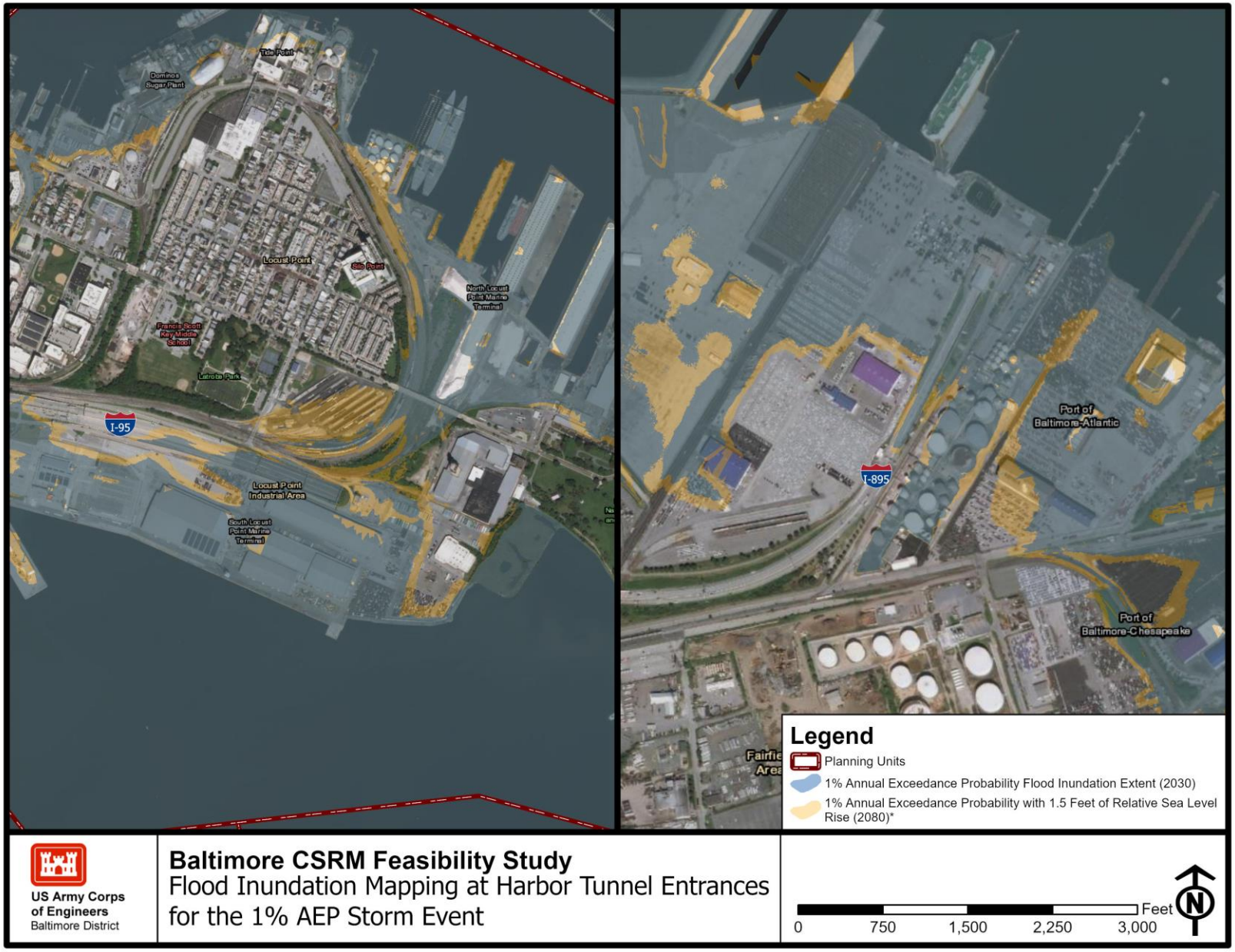

STUDY SCHEDULE- TENTATIVE

Milestone	Date*
Preparing and Evaluating Alternatives	Nov 2019 to May 2022
Start Public Review Period	**01 July 2022**
End Public Review Period	**19 Aug 2022**
Respond to Comments and Revise Report	Aug 2022 – Oct 2022
Agency Decision Milestone*	**31 October 2022**
Continue Alternative Design and Optimization	Oct 2022 - Feb 2023
Feasibility Study Ends	March 2024
Start Design (pending funding)	2024 - 2026
Construction (pending funding)	Late 2020's

*Agency Decision Milestone: Tentatively Selected Plan becomes Recommended Plan of USACE and Non-Federal Sponsor

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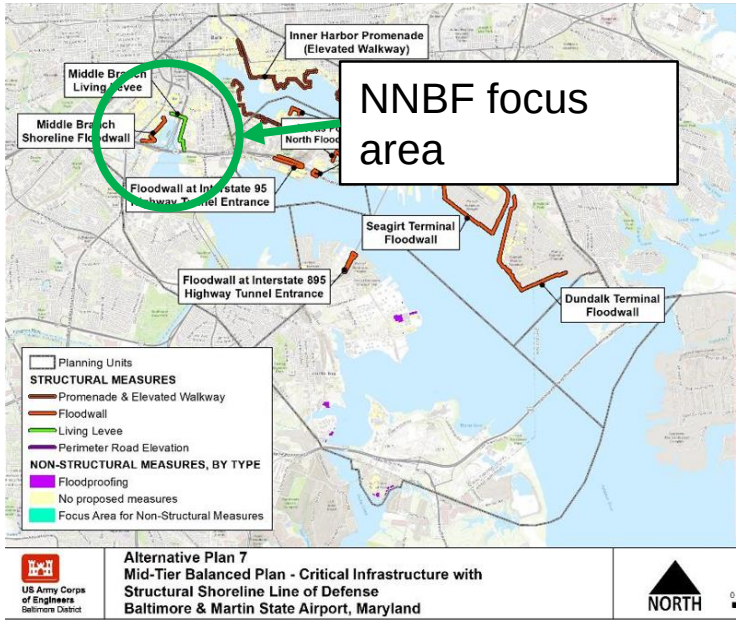
FINAL ALTERNATIVES

Alt. #	Description
0	**No Action**
4	**Critical Only** (I-95 & I-895 tunnel entrance floodwall, floodproofing: Ft McHenry Federal facilities, Patapsco WWTP, Martin State Airport facilities)
5	**Critical & Nonstructural** (Alternative 4 + floodproofing: Inner Harbor, Canton, Fells Point, Locust Point)
5A	**Critical Infrastructure & Select Nonstructural** (Alternative 5 with select floodproofing: Locust Point, Inner Harbor, Canton, Riverside, and Fells Point)
6	**Critical Balanced** (Alternative 5 + Seagirt Terminal floodwall)
7	**Mid-tier Balanced** (Shoreline floodwalls along Inner Harbor, Canton, Fells Point, Locust Point, Seagirt Terminal, and Wheelabrator Incinerator Plant. I-95 & I-895 tunnel entrance floodwall. Martin State Airport road elevation. Floodproofing: Patapsco WWTP, Martin State Airport)

NATURAL AND NATURE-BASED FEATURES



NNBF can include:

- Beaches
- Wetlands
- Living levee

Reimagine Middle Branch:

- Community-driven initiative to reconnect South Baltimore to its shoreline
- Funding received for living shoreline project in BGE's Spring Garden area of Ridgely's Cove.

For more info visit: reimaginemb.com

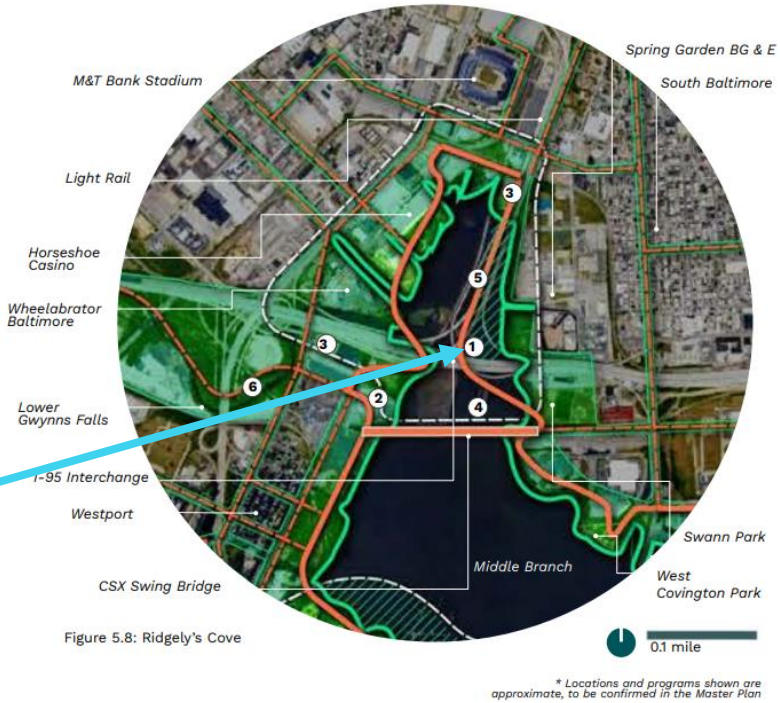


Figure 5.8: Ridgely's Cove

Source: Reimagine Middle Branch, Project Brief Report

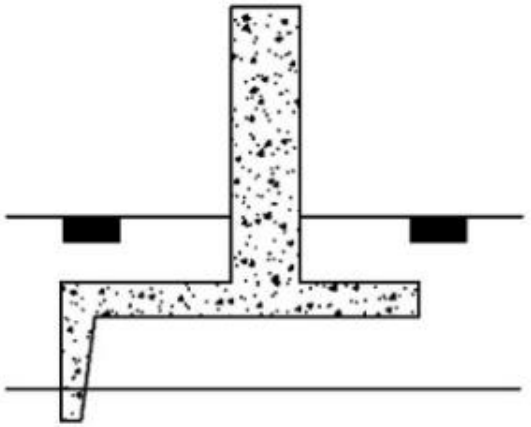
STRUCTURAL ALTERNATIVE FORMULATION

- Study area was divided into planning units based on land use, zoning, shoreline type, and general setting.

- Water Surface Elevation Modeling
  - Level of Performance = Top of the wall/levee
  - Based on Coastal Storms + Sea Level Change through 2080 (1.55 feet)

- The level of performance is 12.2 feet NAVD88*

- Concept Level Engineering Design was used to develop costs estimates



Typical Cross Section of a T-wall

*NAVD88 = North Atlantic Vertical Datum of 1988

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NONSTRUCTURAL ALTERNATIVE FORMULATION

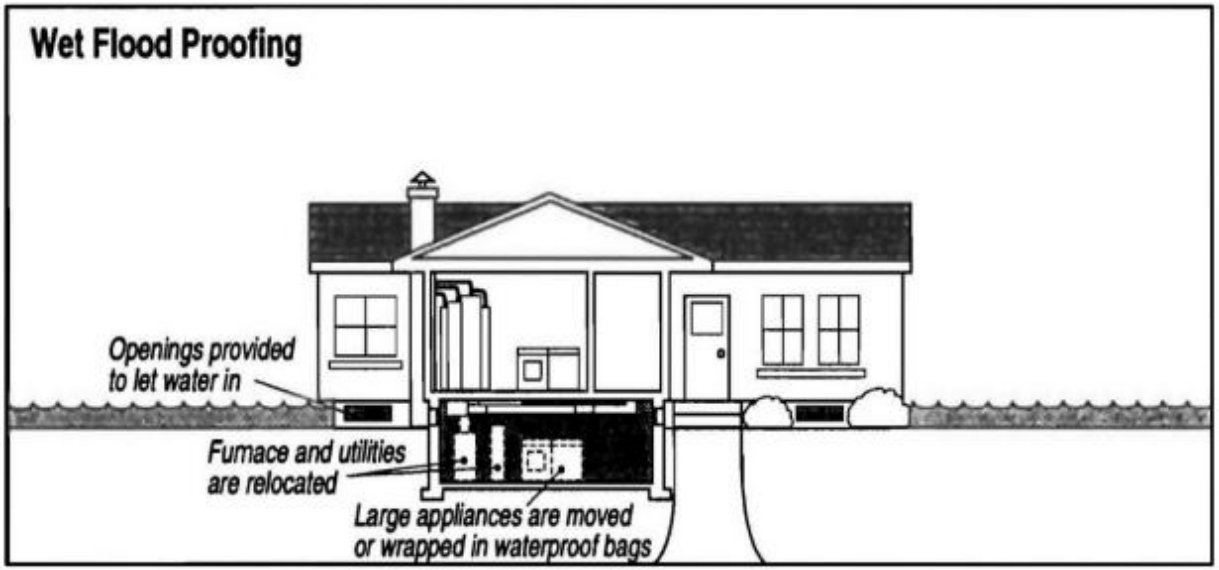
- Buildings were clustered or grouped by neighborhoods (as defined by Baltimore City), within the study area.

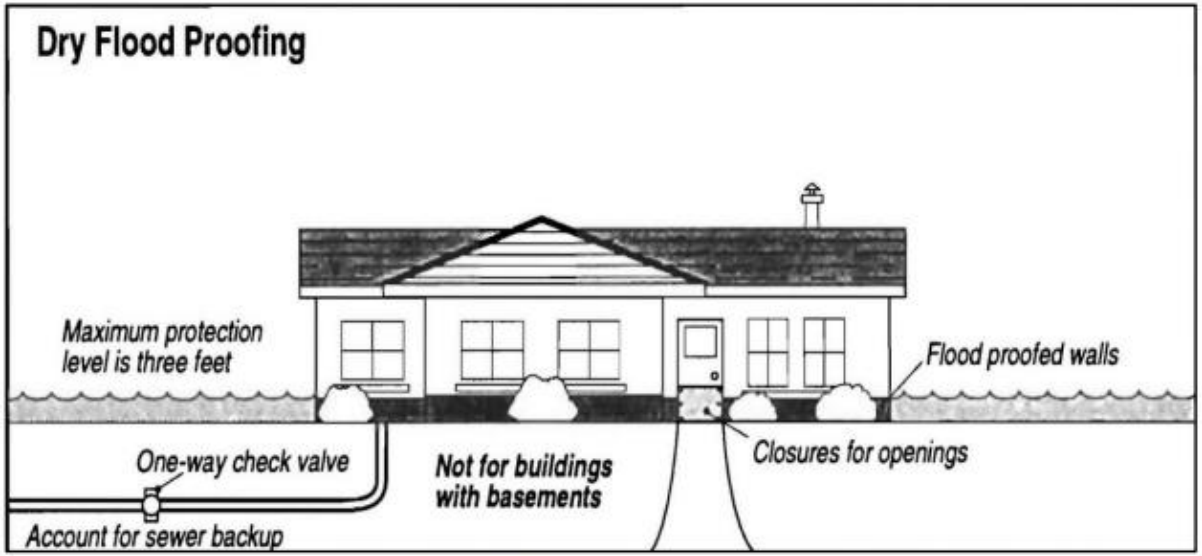
- Buildings in each grouping were evaluated based on location, flood inundation depth, first floor elevation, and building type.

- Groupings were evaluated under the 1% AEP (100-yr storm), 2% AEP (50-yr storm), and 5% AEP (20-yr storm) scenarios.
  - AEP = Annual Exceedance Probability

- Nonstructural measure proposed is flood proofing. Application of flood proofing (wet or dry) would be determined on a structure-by-structure basis. Participation in floodproofing would be voluntary.

FLOOD PROOFING





Source: Federal Emergency Management Agency

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ECONOMIC EVALUATION

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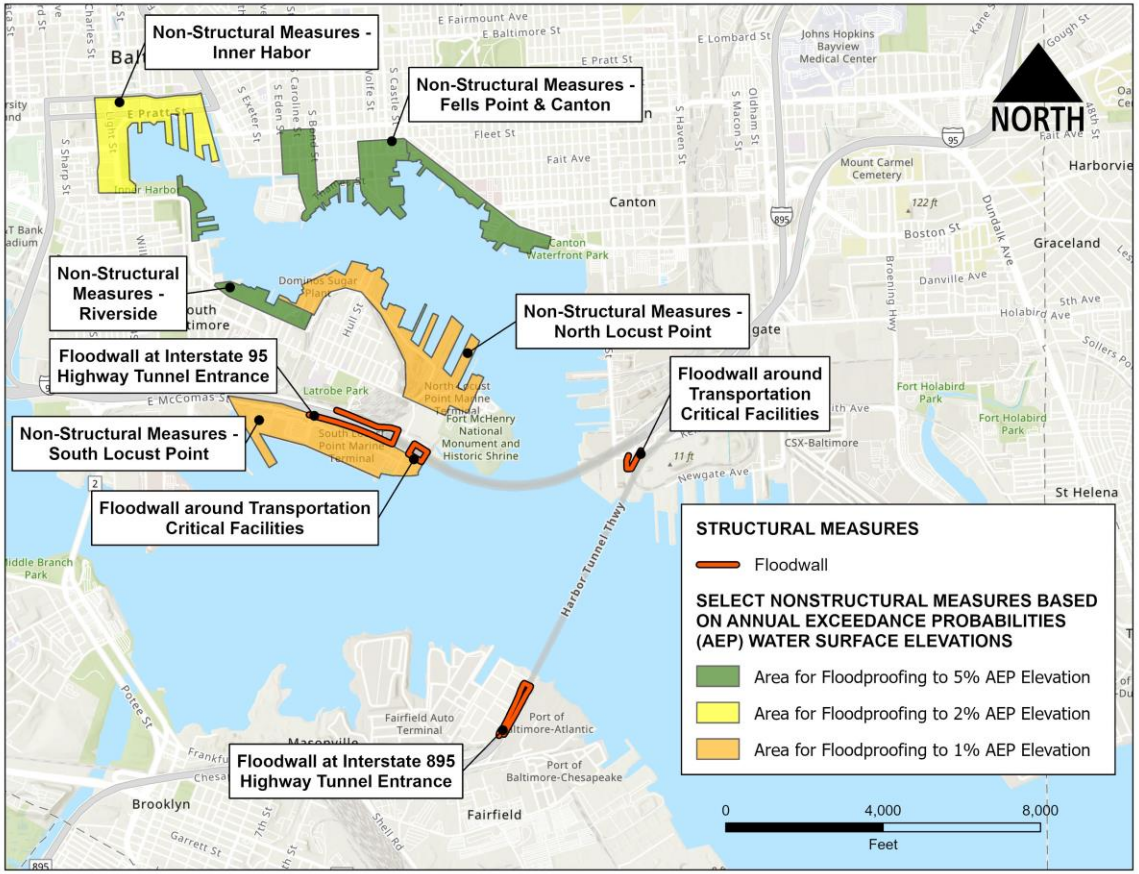

Economic Summary

- Total Economic Cost: $138M (includes 45% contingency)
- Average Annual Cost: $4.6M
- Average Annual Benefits: $9M
- Average Annual Net Benefits: $4.4M
- Benefit to Cost Ratio: 2.0

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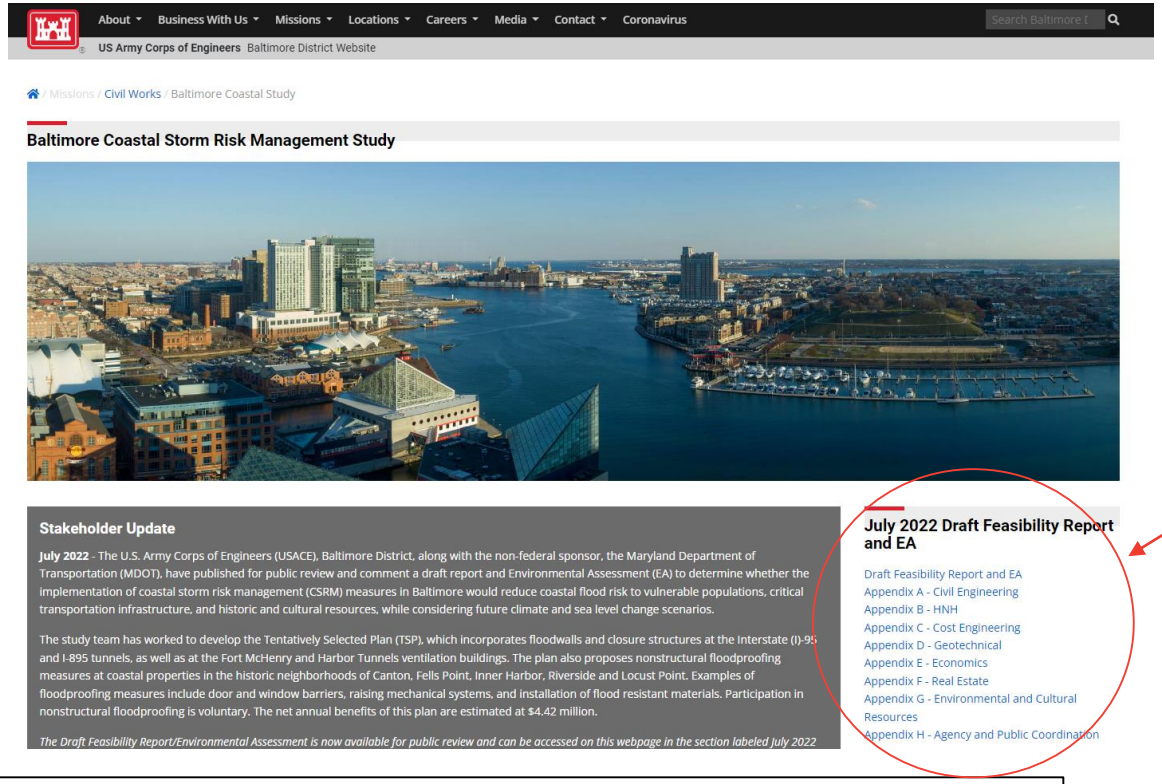
IMPACTS TO THE HUMAN ENVIRONMENT

- Preserving of historical character of neighborhoods.
- Temporary impacts during construction (noise, soils, traffic).
- No in-water construction.
- Investigations to determine presence of contaminated soils and cultural resources during design phase.
- Beneficial impacts from improved resiliency.
- Floodwalls around the tunnel entrances would maintain access to transportation corridors and improve response times for flood preparation.

PUBLIC REVIEW THROUGH 19 AUGUST

https://www.nab.usace.army.mil/missions/civil-works/baltimore-coastal-study/



Download Report

All Comments Welcome:
BaltimoreCoastalStudy@usace.army.mil

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QUESTIONS & DISCUSSION

Inner Harbor during high tide flooding, October 2019.
Credit: USACE

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