BALTIMORE COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

Public Meeting





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

Multimote Group

TANKIER GATE VOI 2NDANA





NON-FEDERAL SPONSOR









MARYLAND TRANSIT ADMINISTRATION











MOTOR VEHICLE ADMINISTRATION



MARYLAND AVIATION ADMINISTRATION











MEETING AGENDA

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







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







Study Area and Planning Units



BALTIMORE COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

CITY OF BALTIMORE, ANNE ARUNDEL AND BALTIMORE COUNTIES





US Army Corps of Engineers Baltimore District







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



RMY

FLOOD INUNDATION MAPPING



RMY

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



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, Caton, 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



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

NNBF can include:

- Beaches
- Wetlands
- Living levee



* Locations and programs shown are approximate, to be confirmed in the Master Plan

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





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.





MARYLAND DEPARTMENT

OF TRANSPORTATION

of Engineers

Baltimore District

U.S.ARMY

Source: Federal Emergency Management Agency

ECONOMIC EVALUATION

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

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







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-coastalstudy/

Draft Feasibility Report and EA

Appendix A - Civil Engineering

Appendix D - Geotechnical

ppendix H - Agency and Public Coordina

Appendix E - Economics Appendix F - Real Estate Appendix G - Environmental and Cultural

Appendix B - HNH Appendix C - Cost Engineering

Resources

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US Army Corps of Engineers Baltimore District Website	
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altimore Coastal Storm Risk Management Study	
Stakeholder Update	July 2022 Draft Feasibility Report

Download Report

All Comments Welcome: BaltimoreCoastalStudy@usace.army.mil

(MDOT), have published for public review and comment a draft report and Environmental Assessment (EA) to o

and I-895 tunnels, as well as at the Fort McHenry and Harbor Tunnels ventilation buildings. The plan also proposes nonstructural floodproofing

infrastructure, and historic and cultural resources, while considering future climate and sea level change

ral floodproofing is voluntary. The net annual benefits of this plan are esti

entation of coastal storm risk management (CSRM) measures in Baltimore would reduce coastal flood risk to vulnerable populations, critica

has worked to develop the Tentatively Selected Plan (TSP), which incorporates floodwalls and closure structures at the interstate (I)-





QUESTIONS & DISCUSSION



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



