NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY (NYNJHATS)

CURRENT STUDY STATUS PDATE

CENTER FOR THE URBAN RIVER AT BECZAK, YONKERS, NEW YORK

U.S. Army Corps of Engineers, New York District

January 28, 2020







H. L. Carey Tunnel between Manhattan and Brooklyn flooded during Hurricane Sandy, October 2012



Flooding in Hoboken, NJ October 2012



STUDY AREA (in green)

- The largest and most densely populated of the 9 high-risk focus areas identified in the North Atlantic Coast Comprehensive Study (NACCS)
- Area covers 2,150+ square miles and 900+ miles of affected shoreline
- 25 counties in New York & New Jersey
- Affected population of roughly 16 million people, including New York City and the six most populated cities in New Jersey

STUDY INFORMATION & HISTORY

- Objective: Manage the risk of coastal storm damage in the study area
- Non-Federal Sponsors: New Jersey Department of Environmental Protection (NJDEP) and the New York State Department of Environmental Conservation (NYSDEC) (in partnership with the City of New York)
- September 2017: Identified preliminary alternatives
- February 2019: Released Interim Report
- Next Step: Release Draft Feasibility Report Summer 2020



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Decision





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ALTERNATIVES OVERVIEW

- Alternative 1: No Action
- Alternative 2: Harbor Wide Gate and Beach Restoration
- Alternative 3A/3B: Multiple Bay/Basin Gate and Floodwalls & Levee Systems
- Alternative 4: Single Waterbody Gate and Floodwalls & Levees
- Alternative 5: Perimeter Only





CONCEPTUAL ALTERNATIVE LAYOUTS SHOWING FEATURES INVOLVING STORM SURGE BARRIERS



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ALTERNATIVE 1: NO ACTION (FUTURE WITHOUT PROJECT CONDITIONS)







EVALUATING RELATIVE SEA LEVEL CHANGE PROJECTIONS



Measured Sea Level at the Battery, NY and Relative Sea Level Change Projections





SELECTED STORM CONDITION (1% AEP, MEAN) FOR WITH PROJECT ALTERNATIVE EVALUATION AND COMPARISON

1% AEP Water Level (50% Confidence Limit)- FWOP







POTENTIAL COASTAL FLOODING EXTENT FROM 10% AND 1% ANNUAL EXCEEDANCE PROBABILITY

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ALTERNATIVE 2 FROM INTERIM REPORT



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Index Map U. 11 14 14 é. 11 11 NY . L.L. СТ 11 Scale 1:3,000,000 Legend Natural & Nature-Based Conceptual Surge Gate Features as well as Conceptual Shoreline Based Measure (SBM) Non-Structural Measures Area benefiting from will also be considered Sandy Hook - Breezy Point and Throgs Neck in study area in tandem Gates with structural measures Area benefiting from Pelham Gate as feasible and warranted. NY/NJ Harbor & Tributaries Study Area January 2019 Areas Benefiting from Each Proposed Study Feature within **I**ri Alternative #2 - NY/NJ Harbor Wide Gate/Beach Restoration **US Army Corps** NY/NJ Harbor and Tributaries Study of Engineers. New York District Areas benefiting by currently proposed study features are based upon flooding extents associated with USACE ERDC ADCIRC modeling results (95% confidence level) **Percent of Directly** Percent of Risks **Present Value of Present Value of Affected Study Area** Avoided from GIS **Damages Avoided Estimated Alternative** Analysis (\$B) Total Cost (\$B) 94.7% 94.8% \$175.1 B \$118.1 B

All measures in alternative subject to modification/deletion/addition as study advances.

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UPDATED ALTERNATIVE 2





All measures in alternative subject to modification/deletion/addition as study advances.



EXAMPLE SURGE GATE RENDERING (FOR ILLUSTRATION PURPOSES ONLY, DESIGN AND SITING SUBJECT TO CHANGE)







AMBROSE VELOCITIES



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Max Flood





Max Ebb





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ALTERNATIVE 2 POTENTIAL INDUCED FLOODING



1% AEP Water Level (50% Confidence Limit)- FWOP



1% AEP Water Level Change from FWOP to Alt 2





MITIGATION FOR POTENTIAL INDUCED FLOODING



Measures will be included within the HAT Study Alternatives to mitigate for the (increased) flood risk as a result of the primary structural measures (e.g., storm surge barriers)

Measures can be both structural and non-structural

- Structural:
 - –Increase elevation and extents of proposed Shore Based Measures (e.g., floodwalls and levees)
 - -Include (newly added) Shore Based Measures
- Non-Structural
- -Acquisition & Relocation
- -Building Retrofit (wet or dry floodproofing)

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UPDATED ALTERNATIVE 3A





All measures in alternative subject to modification/deletion/addition as study advances.



EXAMPLE SURGE GATE RENDERING (FOR ILLUSTRATION PURPOSES ONLY, DESIGN AND SITING SUBJECT TO CHANGE)







EXAMPLE SURGE GATE RENDERING W/ EXISTING NAV FEATURES (FOR ILLUSTRATION PURPOSES ONLY, DESIGN AND SITING SUBJECT TO CHANGE)







EXAMPLE SURGE GATE RENDERING (FOR ILLUSTRATION PURPOSES ONLY, DESIGN AND SITING SUBJECT TO CHANGE)







EXAMPLE SURGE GATE RENDERING (FOR ILLUSTRATION PURPOSES ONLY, DESIGN AND SITING SUBJECT TO CHANGE)







WL (ft, MSL)

> 15

9 - 10

8-9

< 8

ALTERNATIVE 3A POTENTIAL INDUCED FLOODING



1% AEP Water Level (50% Confidence Limit)- FWOP



1% AEP Water Level Change from FWOP to Alt 3A



UPDATED ALTERNATIVE 3B



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All measures in alternative subject to modification/deletion/addition as study advances.



EXAMPLE SURGE GATE RENDERING (FOR ILLUSTRATION PURPOSES ONLY, DESIGN AND SITING SUBJECT TO CHANGE)







12 - 13

11 - 12

10 - 11 9 - 10

8-9

< 8

WL (ft, MSL)

ALTERNATIVE 3B POTENTIAL INDUCED FLOODING



1% AEP Water Level (50% Confidence Limit)- FWOP

1% AEP Water Level Change from FWOP to Alt 3B





UPDATED ALTERNATIVE 4





All measures in alternative subject to modification/deletion/addition as study advances.



ALTERNATIVE 4 POTENTIAL INDUCED FLOODING



1% AEP Water Level (50% Confidence Limit)- FWOP

1% AEP Water Level Change from FWOP to Alt 4





2.6%

UPDATED ALTERNATIVE 5





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All measures in alternative subject to modification/deletion/addition as study advances.

\$35 B

4.0%

\$9 B



UPDATED NET BENEFITS AND BCR FOR ALTERNATIVES 2-5 (FY 19 P.L. @ 2.875%)



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| Alternative Concept* | Cost (Present Value) | Construction Period (Years) | Net Benefits (PV) – All closures at 50% flood |
|---|-------------------------|--------------------------------|---|
| 1 – No Action | | | |
| 2 – Outer Harbor Surge Gates and Shore-Based Tie-ins | \$62 B | 25 | \$69 B |
| 3A – Regional Surge Gates & Shoreline- Based Measures | \$35 B | 18 | \$114 B |
| 3B – Mid-Size Surge Gates & Shoreline- Based Measures | \$30 B | 9 | \$74 B |
| 4 – Small Surge Gates & Shoreline- Based Measures | \$21 B | 9 | \$75 B |
| 5 – Shoreline-Based Measures only | \$10 B | 9 | \$26 B |

NOTE: All study estimates, data, features, etc. are subject to revision/refinement as study advances.



POTENTIAL EFFECTS OF GATE OPERATION ON FORMULATION & TSP SELECTION

NYNJ HAT Study Alternative Net Benefits (PV) as of 11 Jul 19



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■ Large Gates Initially Operating at 10% AEP

■ Large Gates Initially Operating at 50% AEP



FACTORS AFFECTING ALTERNATIVE SCREENING & NEEDING FURTHER EVALUATION



| Benefits Likely Increase | Effect TBD | Costs Likely Increase |
|---|--|---|
| Evaluate other RSLC scenarios | Operations assumptions (7 ft. NAVD88 closure trigger) | Refine hydrodynamic modeling <i>(induced flooding, tidal exchange)</i> |
| Period of Analysis (2105) | Navigation – impacts to port operations and mitigation | Real Estate (site specific) |
| Refine & expend benefits modeling (other accounts, critical infrastructure, etc.) | | Environmental & Cultural Mitigation Costs <i>(site specific)</i> |
| | | Interior drainage (\$B) |
| | | Cost refinements (site specific) |



PRELIMINARY DRAFT INDUCED FLOODING FEATURES



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PRELIMINARY DRAFT

| Measure | Alt 2 | Alt 3A | Alt 3B | Alt 4 |
|--------------------------|----------|----------|---------|----------|
| Buried Seawall/Dune | 0.17 mi | 7.90 mi | 4.85 mi | 4.85 mi |
| Seawall | 11.76 mi | 13.54 mi | 0.57 mi | 3.48 mi |
| Elevated Promenade | 0.51 mi | 1.26 mi | 0.46 mi | - |
| Floodwall | 4.13 mi | 8.09 mi | 3.36 mi | 27.29 mi |
| Levee | 5.60 mi | 18.43 mi | 2.37 mi | 4.49 mi |
| Deployable Flood Barrier | 5 | 23 | 10 | 48 |
| Storm Surge Barrier | 4 | 6 | - | - |
| Tide Gate | 12 | 15 | - | 3 |
| | | | | |
| Sum | 22.2 mi | 49.2 mi | 11.6 mi | 40.1 mi |



RESIDUAL RISK FEATURES



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PRELIMINARY DRAFT

| Feature type | ALT 2 | ALT 3A | ALT 3B | ALT 4 |
|------------------|-------|--------|--------|-------|
| Berm | 3 mi | 0 mi | 0 mi | - |
| Deep Bulkhead | 12 mi | 8 mi | 3 mi | - |
| Floodwall | 15 mi | 14 mi | 12 mi | - |
| Revetment | 3 mi | 2 mi | 2 mi | |
| Shallow Bulkhead | 0 mi | - | - | - |
| Tide Gate | 3 | 3 | 3 | |
| Vehicular Gate | 2 | 2 | 2 | - |
| Navigable Gate | 6 | 6 | 4 | |
| | | | | |
| SUM | 34 mi | 25 mi | 17 mi | 0 mi |



New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study



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NEXT STEPS – KEY ITEMS FOR FURTHER STUDY





FACTORS AFFECTING ALTERNATIVE SCREENING & NEEDING FURTHER EVALUATION



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|---|--|---|
| Evaluate other RSLC scenarios | Operations assumptions | Refine hydrodynamic modeling <i>(induced flooding, tidal exchange)</i> |
| Period of Analysis | Navigation – impacts to port operations and mitigation | Real Estate (site specific) |
| Refine & expend benefits modeling (other accounts, critical infrastructure, etc.) | | Environmental & Cultural Mitigation Costs <i>(site specific)</i> |
| | | Interior drainage |
| | | Cost refinements (site specific) |



NACIDER GAL





of Engineers® New York District DISCHARGES VERSUS SALINITY AT POINT/TRANSECT 1

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TYPES OF NEPA ANALYSIS



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- Categorical Exclusion
- Environmental Assessment (EA)
- Environmental Impact Statement (EIS)

Tiered Environmental Impact
 Statement (EIS)

Level of Analysis & Number of Reviews

Least

Most



NEW YORK BIGHT ECOSYSTEM MODEL







ADDITIONAL INFORMATION



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□ Interim Report and this presentation can be accessed at the following address:

www.nan.usace.army.mil/NYNJHATS

- Webinar Presentation/Video of Interim Report Summary was posted in March 2019 to website.
- □ Study Status and Update Paper planned for release to public by early 2020.

Comments are always welcome – please submit to:
<u>NYNJHarbor.TribStudy@usace.army.mil</u>





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Questions?