

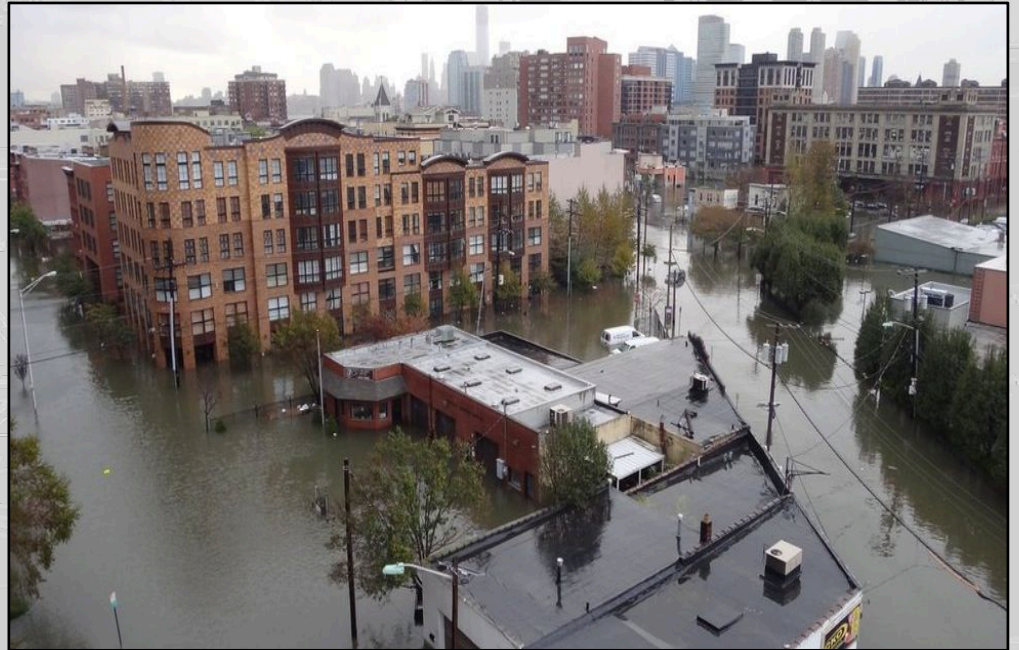
NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

PUBLIC MEETING ON INTERIM REPORT

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



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



Flooding in Hoboken, NJ October 2012



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Agenda

- Study update status
- Summary of scoping comments
- Refinements to alternative concepts
- Explanation of preliminary benefits and costs
- Next Steps – Key items for further study
- Study Schedule
- Contact Information



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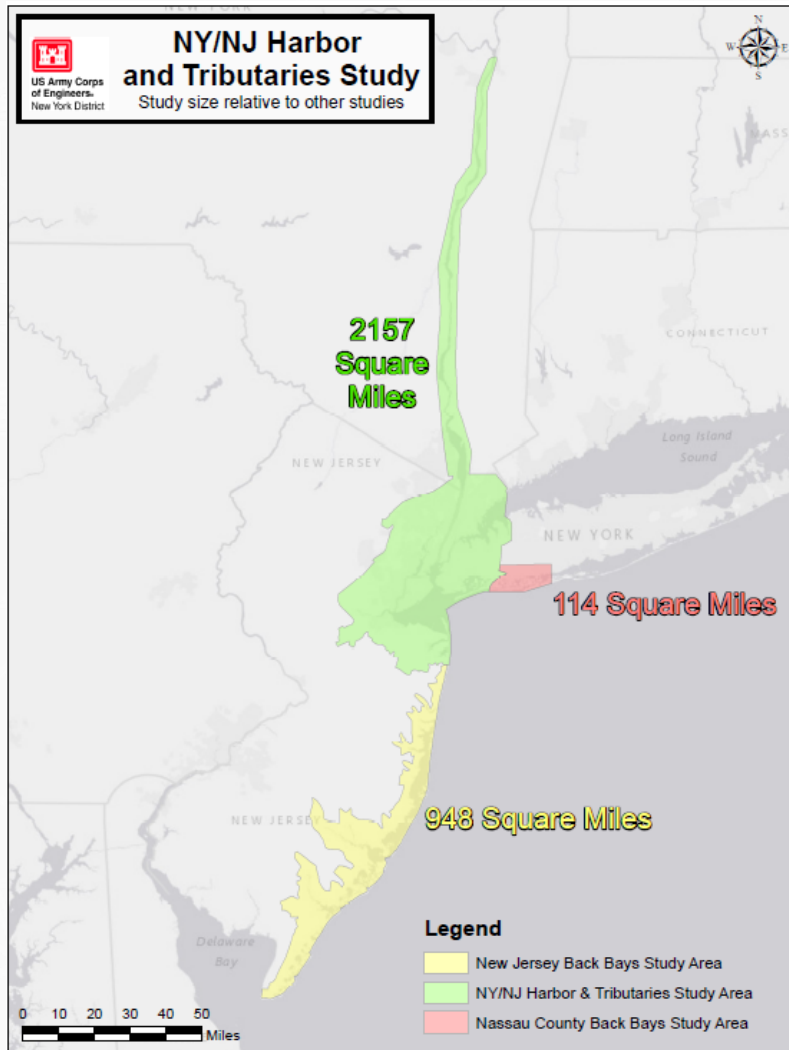
STUDY UPDATE STATUS



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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 some of the most populated cities in New Jersey



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Completed Work

- *Executed cost sharing agreement with non-federal partners (Jul16)
 - *Developed conceptual alternatives (Aug 17)
 - *Agency coordination workshops (Jan-Feb 17)
 - *Study announced in Federal Register (Feb 18)
- *122 Day NEPA scoping period (Jul-Nov18) - Collected stakeholder input through comments and numerous public meetings
 - * Exemption Request and Approval (Oct 18)
 - *Interim report released (Feb 19)

Ongoing Work

- *Communicate completed analysis
- *Identify factors to investigate further based on current analysis and stakeholder feedback (Feb-Apr 19)

Next
Steps



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- *Conduct more detailed engineering, economic, and environmental analysis
 - *Continue agency coordination
 - *Tentatively Selected Plan Milestone (Jan 20)
 - *Release Joint Draft Feasibility Report and Draft Environmental Impact Statement (Tier 1)
-
- *Public comment period from draft Report/EIS
 - *Refine analysis based on public and agency comments
 - *Agency Decision Milestone (Jul 20)
 - *Greater level of design
 - *Final Report/Tier 1 EIS (Mar 21)
-
- *Agency review of Final Report / Tier 1 EIS
 - *Chief of Engineers Recommendation to Congress (July 22)



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SUMMARY OF SCOPING COMMENTS



SCOPING PROCESS AND PUBLIC COMMENTS



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NYNJHATs Scoping Meeting Locations, Dates, and Number of Participants

Date	Location	Number of Participants
July 9, 2018, 3 PM	Lower Manhattan, New York County	139
July 9, 2018, 6 PM	Lower Manhattan, New York County	115
July 10, 2018, 3 PM	Newark, Essex County	19
July 10, 2018, 6 PM	Newark, Essex County	8
July 11, 2018	Poughkeepsie, Dutchess County	158
September 20, 2018	Coney Island, King County	78
October 3, 2018, 3 PM	White Plains, Westchester County	74
October 3, 2018, 6 PM	White Plains, Westchester County	51
October 23, 2018	Nassau County	63
Nine meetings total	Six locations	705 meeting participants total

During the comment period USACE received **4,250** submissions of comments. The majority of comments (3,295, or 77%) were identical (or nearly identical) form letters and there were many common themes and repeat comments.

- Comments came from members of the public, municipalities, elected officials, and federal agencies



GENERAL COMMENT TRENDS



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From the **4,250** submissions, **393** unique comments were identified by the USACE study team. The comments received fell into **7** themes:

1. **Environmental Impacts**
2. **Scoping Process**
3. **Storm Surge vs Sea Level Rise**
4. **Cost and Construction**
5. **Overall Study Process**
6. **Induced Flooding**
7. **Navigation Impacts**



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COMMENT THEMES AND RESPONSES

The Scoping Process

- 88% of commenters
- Requests additional time and meetings
- Requests for comprehensive information about alternatives to be provided.

RESPONSE:

- Four additional meetings held
- Comment period extended through 120 days
- Release of Interim Report before the Draft Feasibility Report

Storm Surge vs Sea Level Rise

- 84% of commenters
- Chronic flooding exacerbated by Relative Sea Level Change (RSLC)
- Alternatives should address both storm surge and RLSC

RESPONSE:

- Complementary measures to manage frequent flooding (incl. RSLC) are included
- Will be refined for draft report



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COMMENT THEMES AND RESPONSES

Environmental Impact

- 91% of commenters
- Concerns about barriers to tidal flow, water quality, wildlife, and ecology
- Contaminants and combined sewage overflows

RESPONSE:

- All potential impacts will be analyzed
- Tiered NEPA analysis provides more opportunities for public feedback than typical process.

Navigational Impact

- 66% of commenters
- Potential impacts to commercial and recreational maritime activities
- Restriction of vessel movement
- Promote additional sedimentation in shipping channel

RESPONSE:

- Additional navigational traffic analysis if any barriers move forward
- Look for ways to minimize, mitigate, and avoid impacts to navigation
- Potential changes to sedimentation will be modeled



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COMMENT THEMES AND RESPONSES

Cost and Construction

- 77% of commenters
- Cost and construction duration
- Non-federal responsibilities in project support and cost sharing

Overall Study Process

- 74% of commenters
- Alternative selection rationale
- Study timescale
- Assumptions about other projects and RSLC projects

RESPONSE:

- See Cost Appendix to Interim Report
- All costs and durations are preliminary
- Non-federal support required for an alternative to proceed
- Study cost-shared 50/50 federal/non-federal

RESPONSE:

- Alternative concepts represent scales of solutions
- Assumed intermediate RSLC projections for Interim Report



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COMMENT THEMES AND RESPONSES

Induced Flooding

- 72% of commenters
- Freshwater behind barriers
- Reflection off exterior barriers

RESPONSE:

- Additional modeling for induced flooding
- Required to mitigate as part of project construction



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ENVIRONMENTAL CONSIDERATIONS

Scoping helped identify key environmental impacts of concern related to study

The Interim Report incorporates existing studies and existing condition information for the study area, as well as environmental considerations and next steps for impact analysis

Future Steps: 1) Model potential physical changes to hydrology, sediment transport, and tidal exchange from concept alternatives carried forward, 2) identify any additional needed analysis for environmental impacts

Environmental evaluation is a large part of the study process.

No construction will occur without thorough environmental evaluation and coordination with environmental resource agencies.

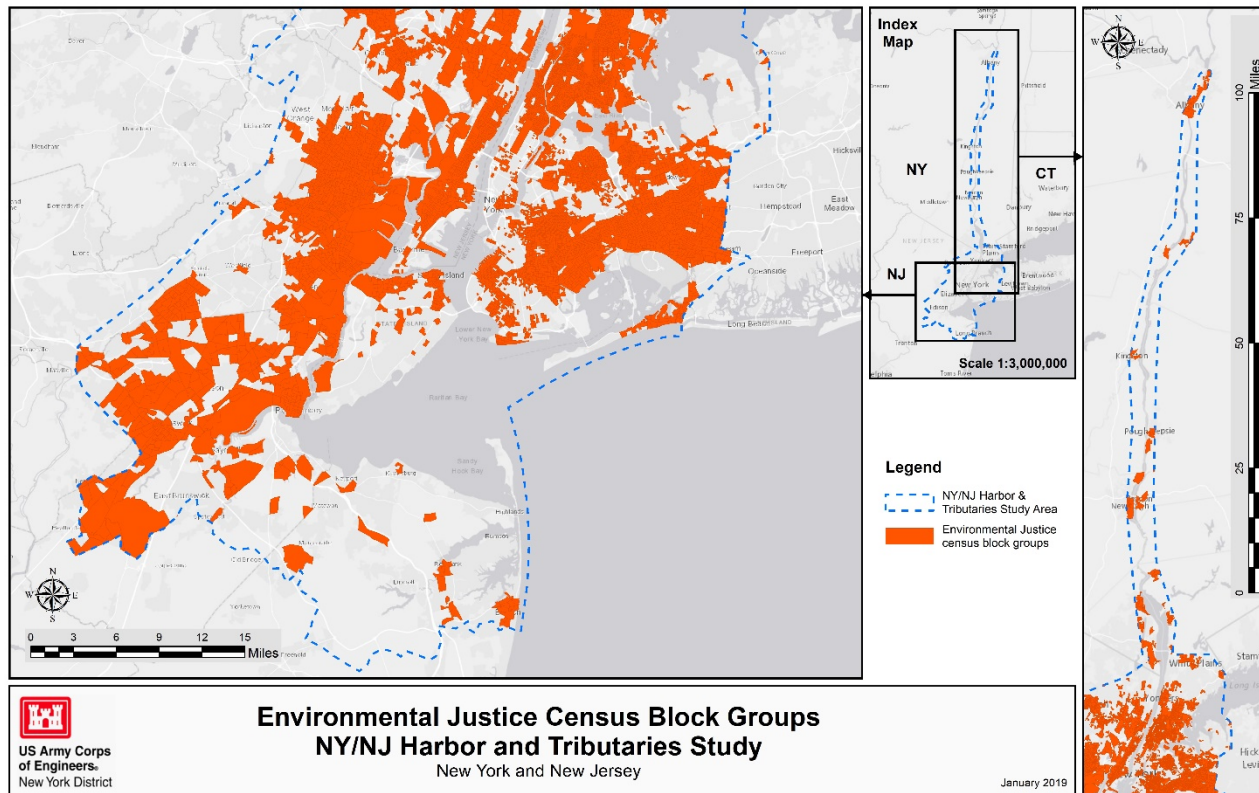


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ENVIRONMENTAL JUSTICE



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Each region of the study area contains diverse communities that may be affected by future coastal storm events. Fifty-seven percent of census block groups in the study area as a whole qualify as environmental justice communities.



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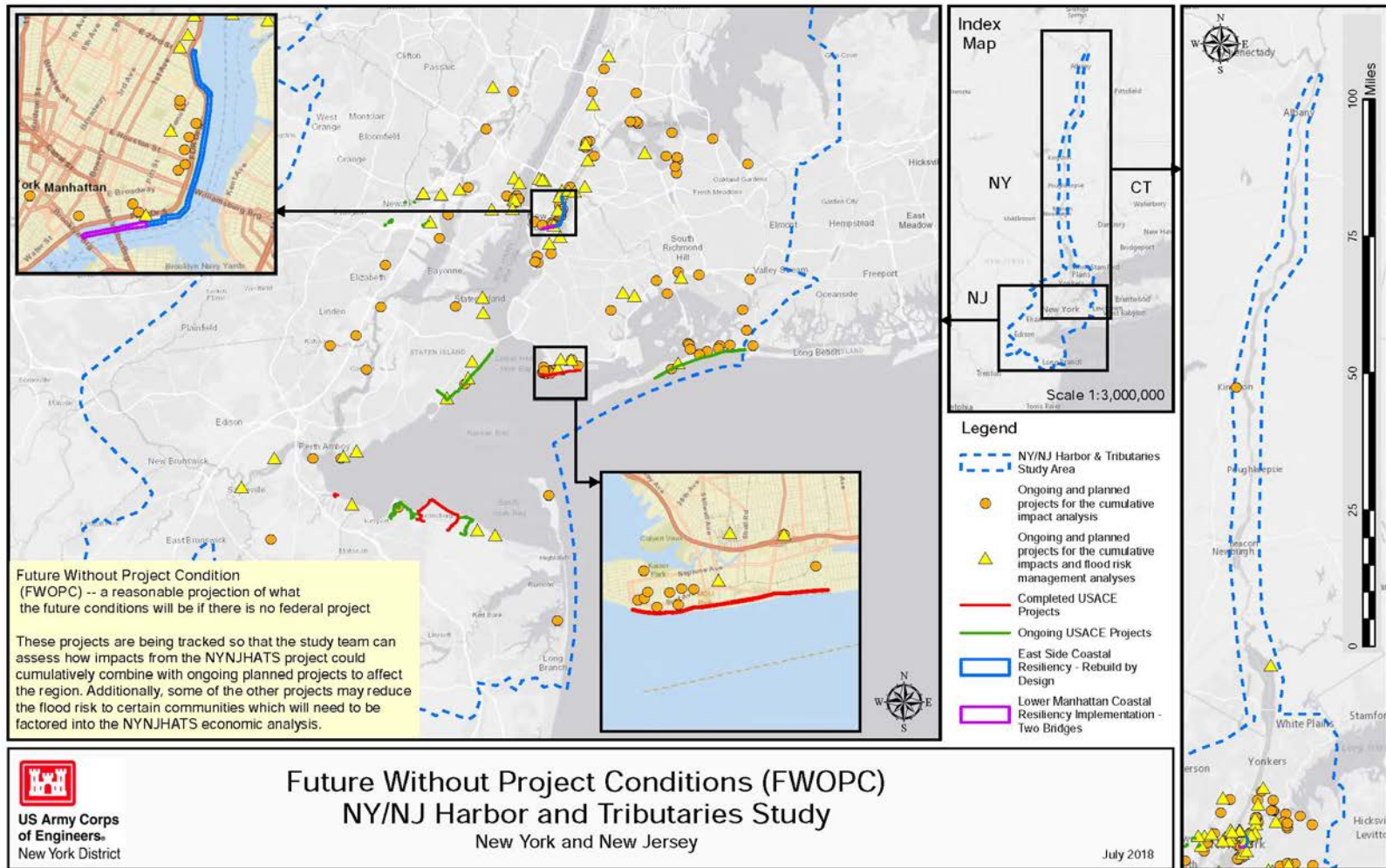


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REFINEMENT OF ALTERNATIVES



ALTERNATIVE 1: NO ACTION (FUTURE WITHOUT PROJECT CONDITIONS)



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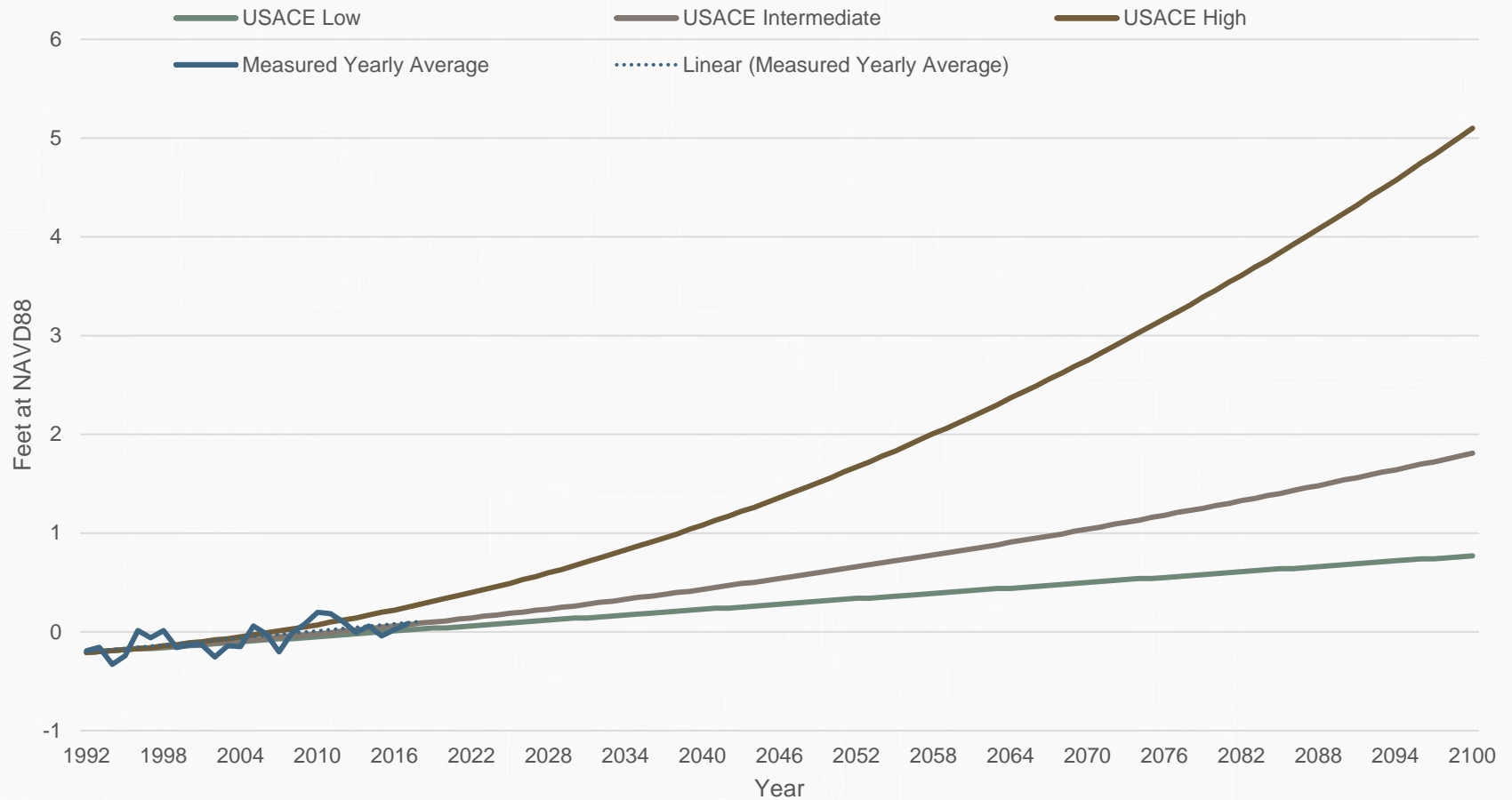


ALTERNATIVE 1: NO ACTION (FUTURE WITHOUT PROJECT CONDITIONS)



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RLSC Corps Projections vs. NOAA Measured Data (Yearly Averaged) at the Battery, NY



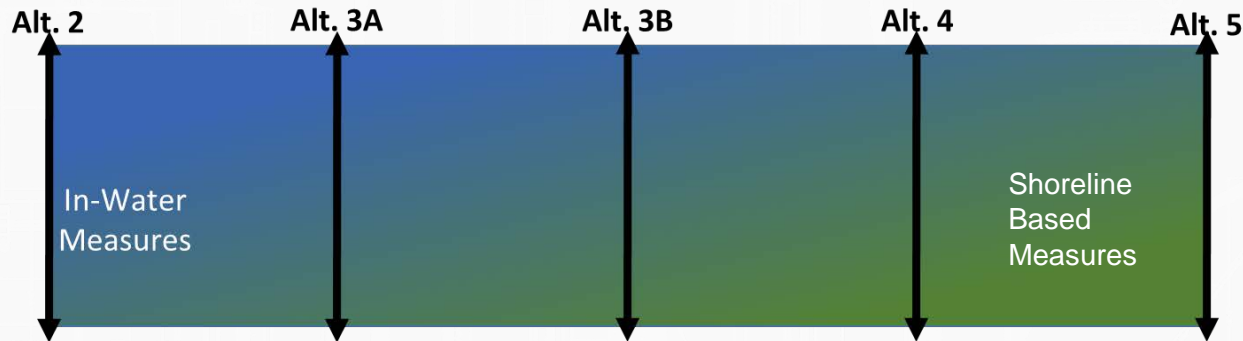


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ALTERNATIVES 2-5



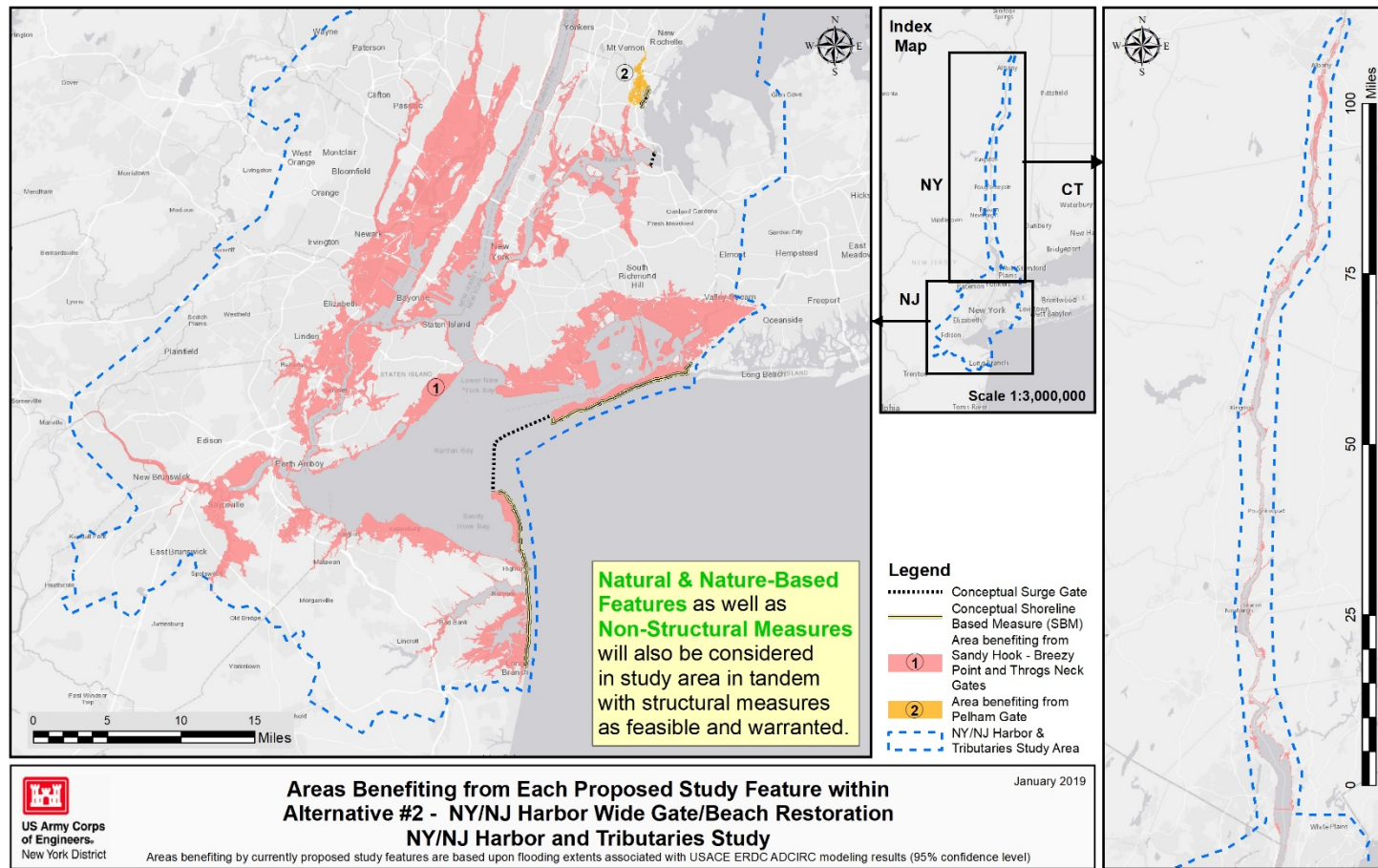
- Alternatives span conceptual spectrum for study area.
- Comparison of Alternatives Initially Focused on Economic Aspects, on Present Worth/Value Basis.
- Evaluation Apple-to-Apple Basis – 1% Probably Condition with Intermediate Sea Level Rise.
 - Estimated to inundate 291 square miles in study area.
 - Potential Economic Damages over 50 year project life of \$187 Billion (present worth).
- Benefits Estimated Using Two Different Methods (monetary and GIS).
- Costs Include Construction, O&M, mitigation, contingency, etc., developed using parametric tools refined from NACCS and elsewhere.
- Design Considerations Preliminary Only – navigation, ambient flow effects, etc.
- Substantial work necessary on any alternatives that are carried forward in study.



ALTERNATIVE 2



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Percent of Directly Affected Study Area	Percent of Risks Avoided from GIS Analysis	Present Value of Damages Avoided (\$B)	Present Value of Estimated Alternative Total Cost (\$B)
94.7%	94.8%	\$175.1B	\$118.1B

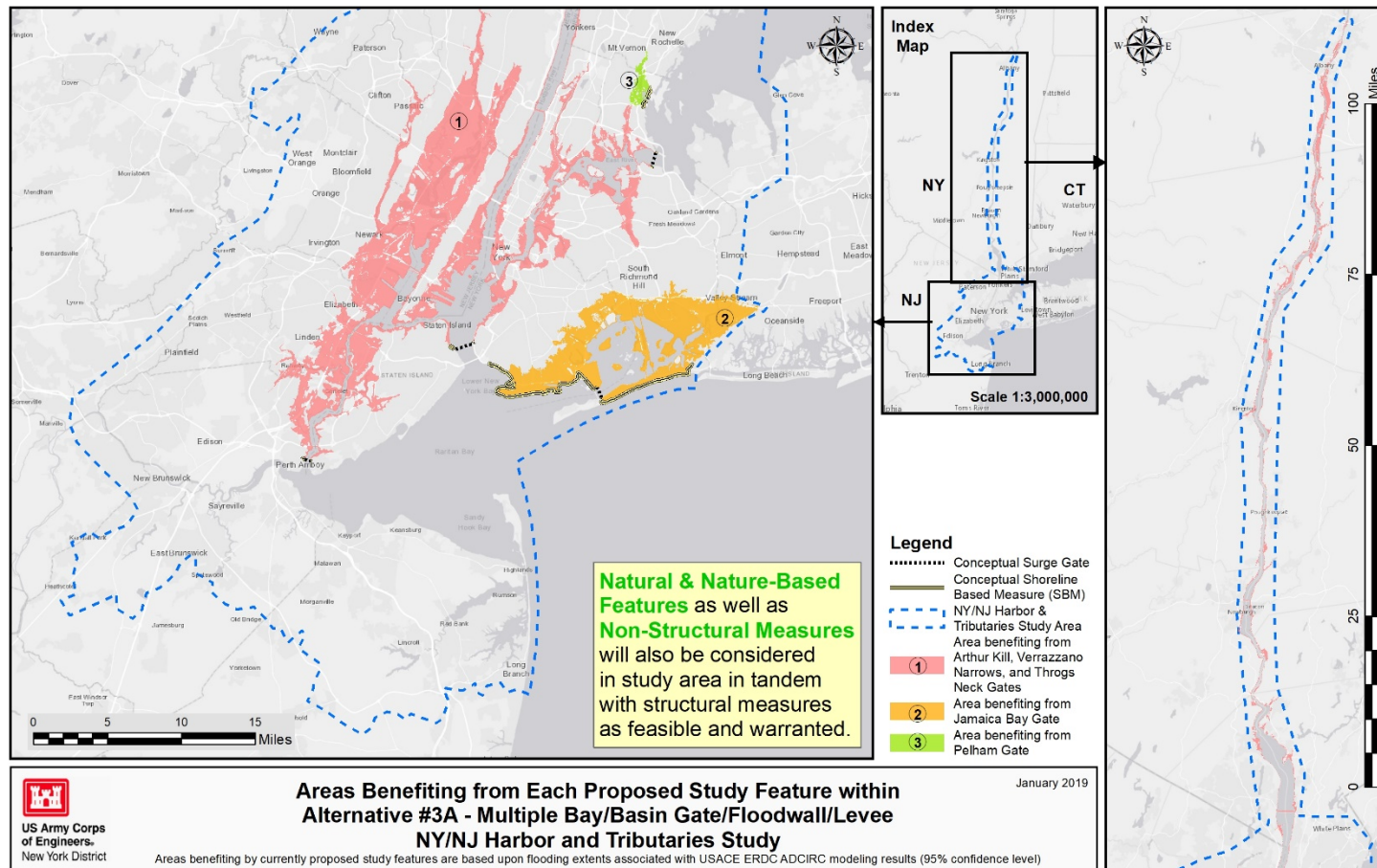
All measures in alternative subject to modification/deletion/addition as study advances.



ALTERNATIVE 3A



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Percent of Directly Affected Study Area	Percent of Risks Avoided from GIS Analysis	Present Value of Damages Avoided (\$B)	Present Value of Estimated Alternative Total Cost (\$B)
74%	78.2%	\$171.1B	\$47.1B

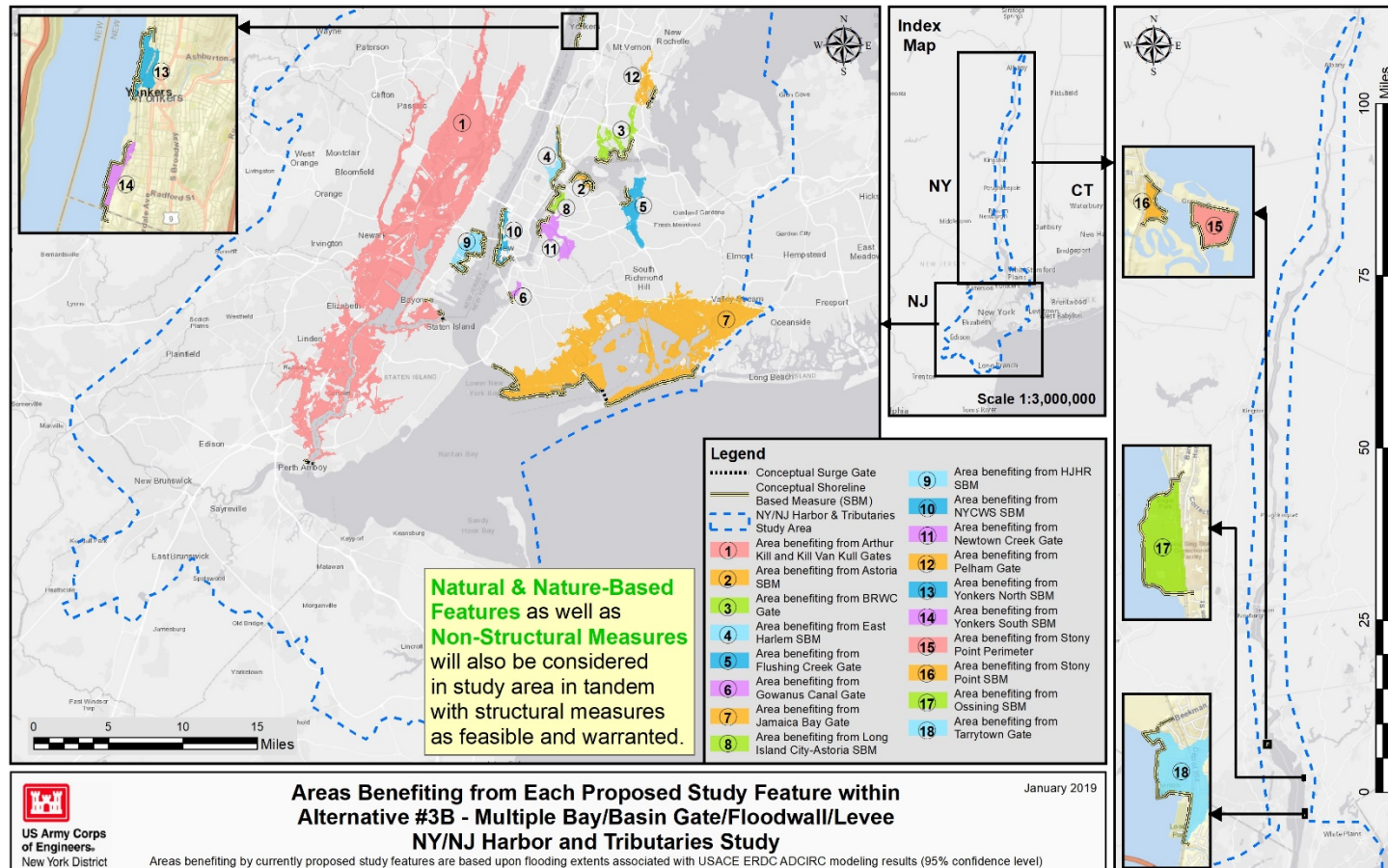
All measures in alternative subject to modification/deletion/addition as study advances.



ALTERNATIVE 3B



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Percent of Directly Affected Study Area	Percent of Risks Avoided from GIS Analysis	Present Value of Damages Avoided (\$B)	Present Value of Estimated Alternative Total Cost (\$B)
54%	60.1%	\$160.8B	\$43B

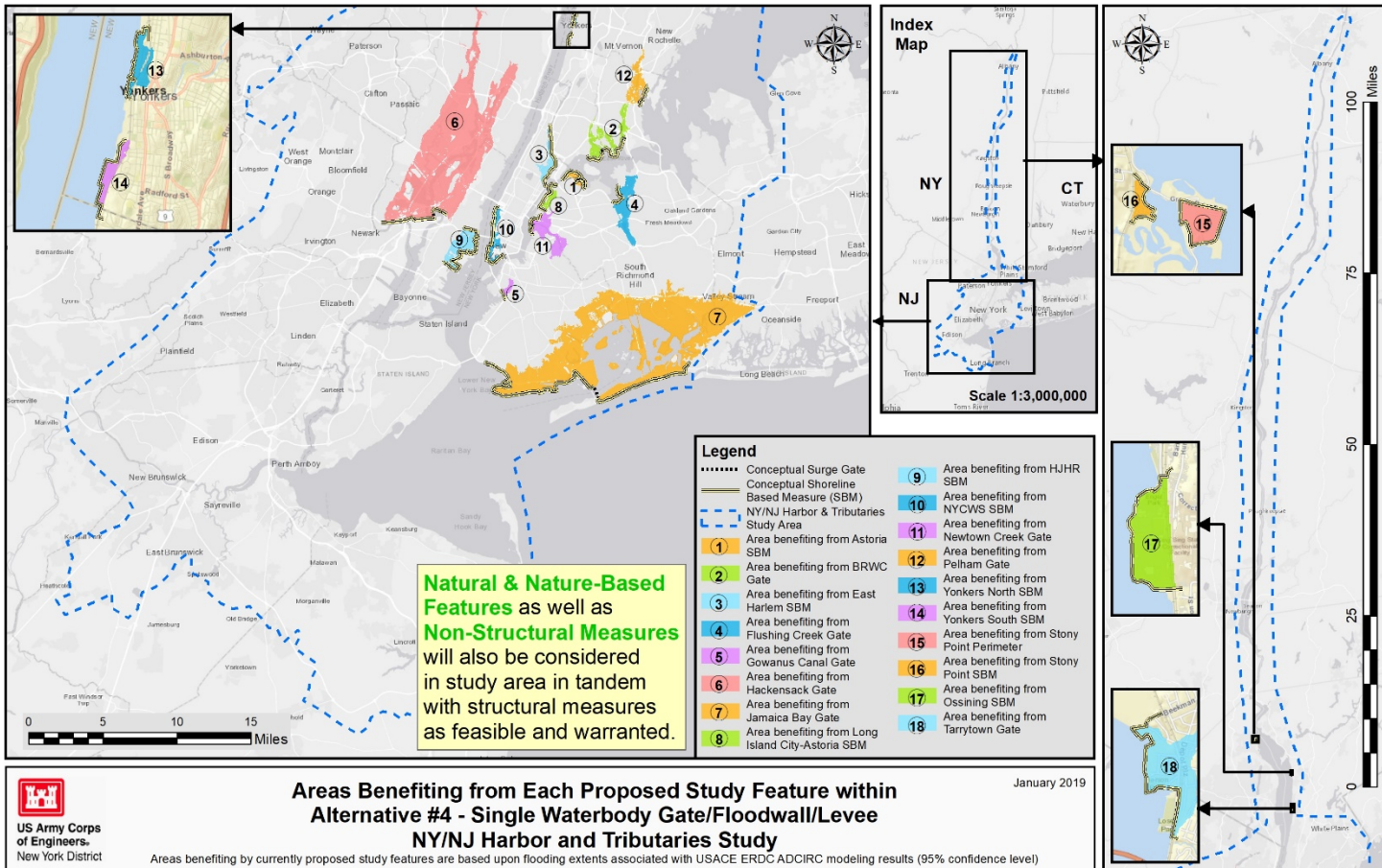
All measures in alternative subject to modification/deletion/addition as study advances.



ALTERNATIVE 4



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Percent of Directly Affected Study Area	Percent of Risks Avoided from GIS Analysis	Present Value of Damages Avoided (\$B)	Present Value of Estimated Alternative Total Cost (\$B)
34.5%	41.8%	\$148.6B	\$32B

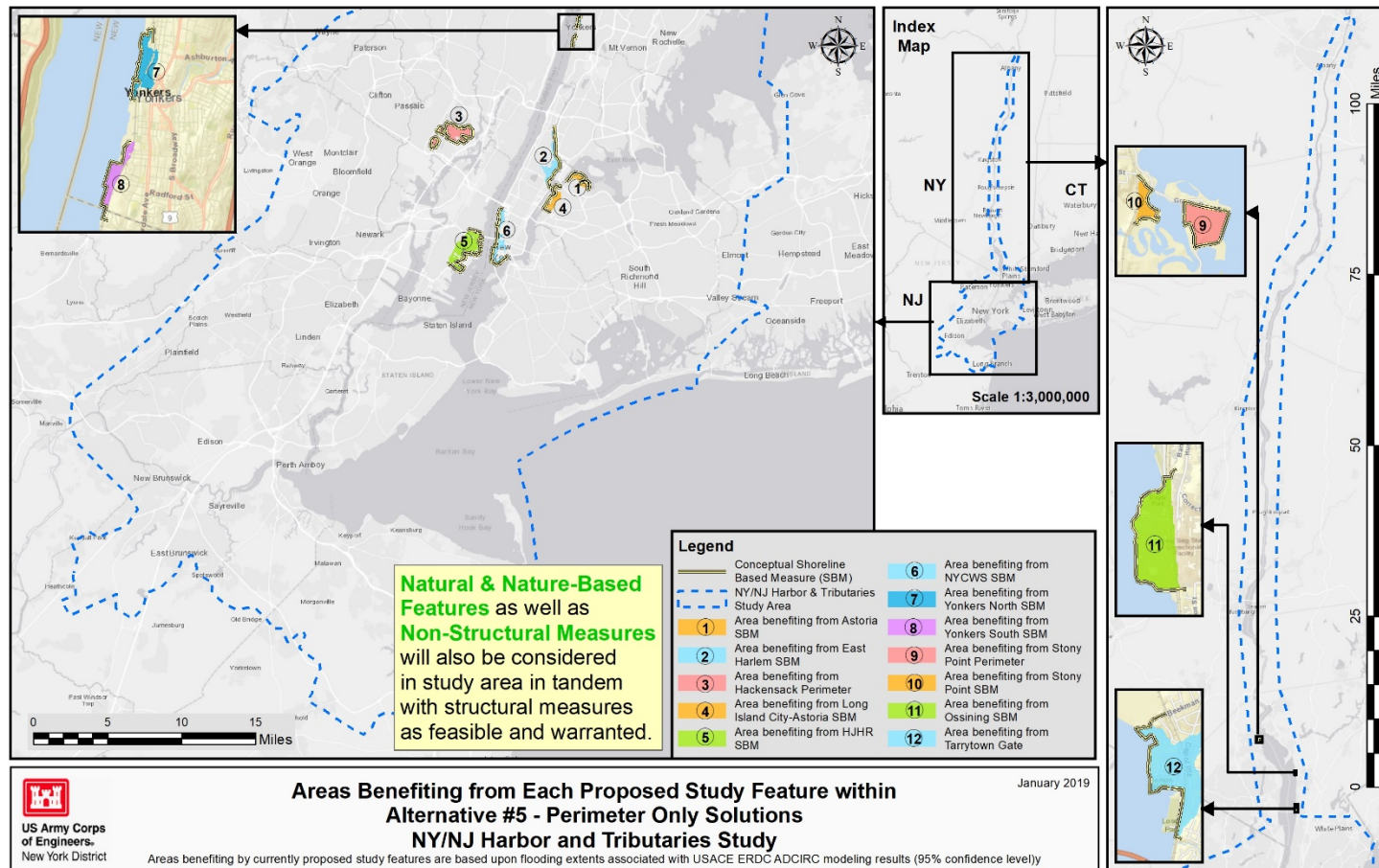
All measures in alternative subject to modification/deletion/addition as study advances.



ALTERNATIVE 5



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Percent of Directly Affected Study Area	Percent of Risks Avoided from GIS Analysis	Present Value of Damages Avoided (\$B)	Present Value of Estimated Alternative Total Cost (\$B)
3.2%	4.4%	\$48.6B	\$14.8B

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



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EXPLANATION OF PRELIMINARY BENEFITS AND COSTS

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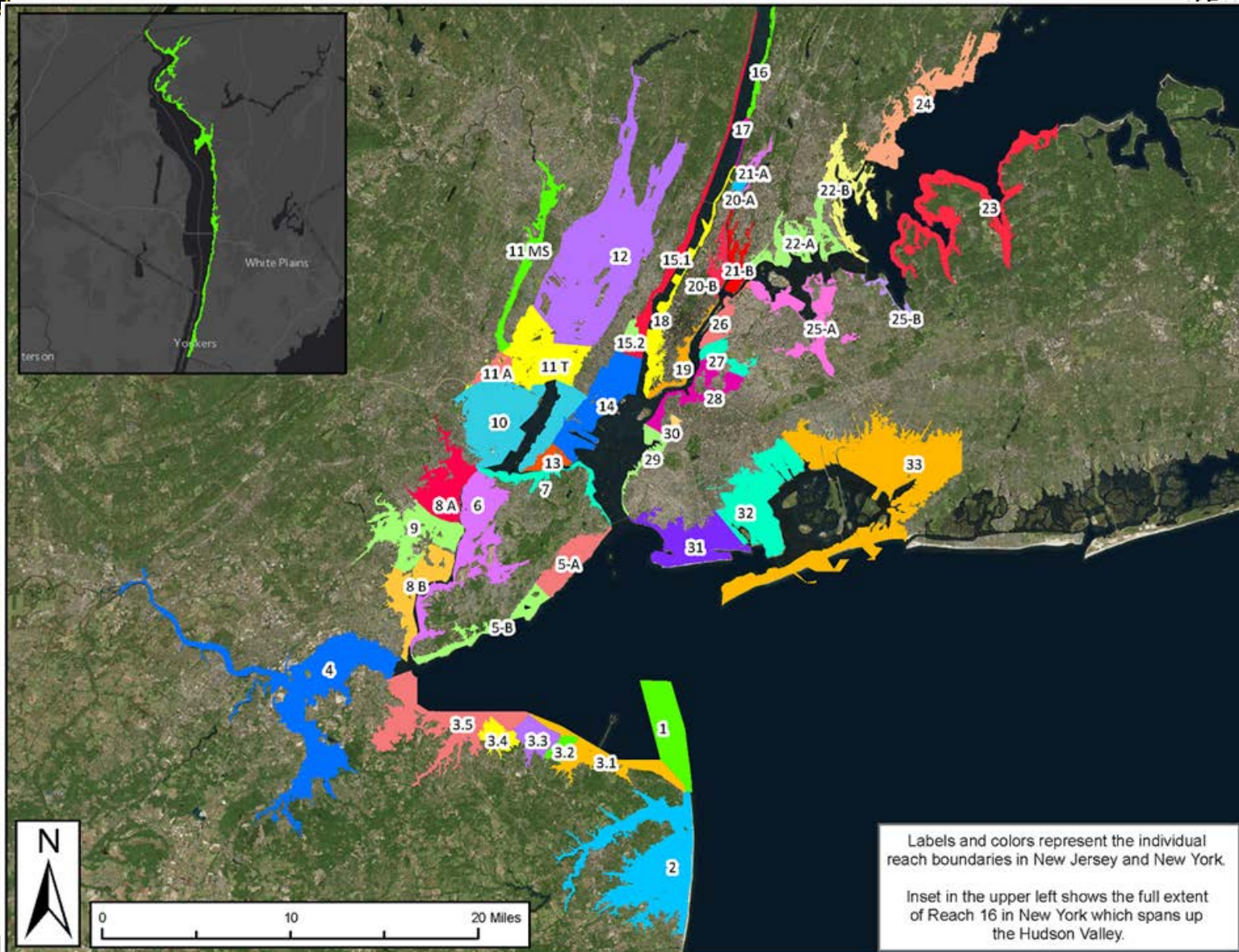
DELINEATION OF STUDY REACHES



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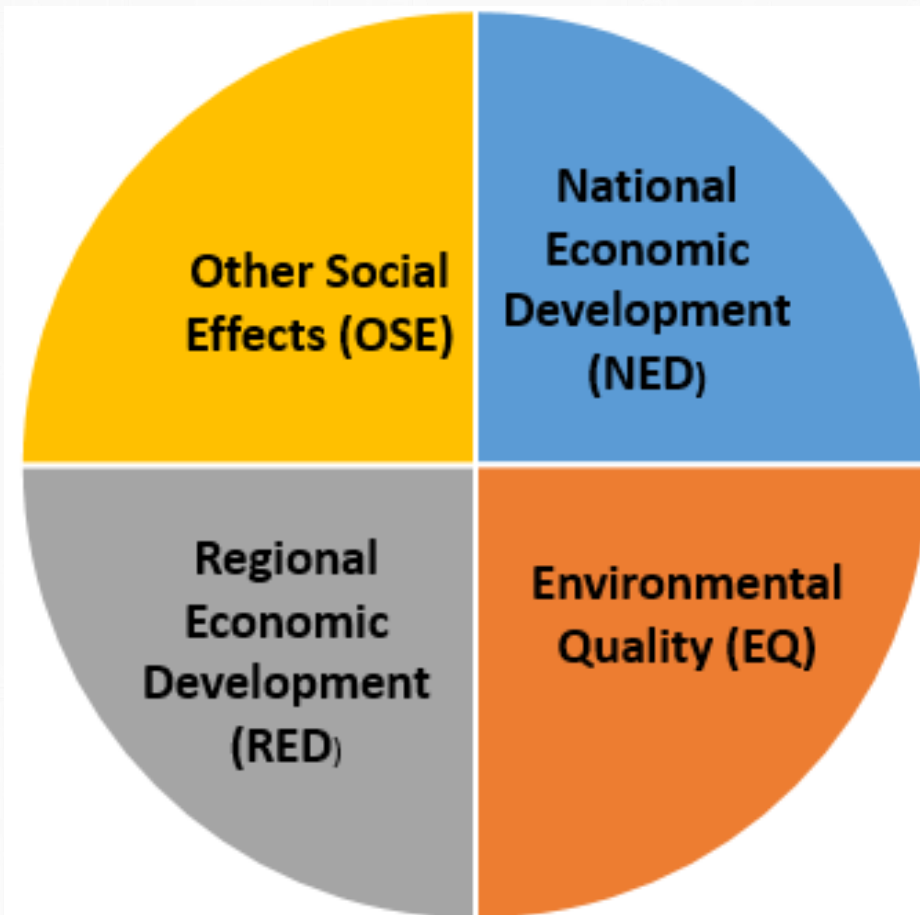
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BENEFITS

Federal Principles and Guidelines (1983)



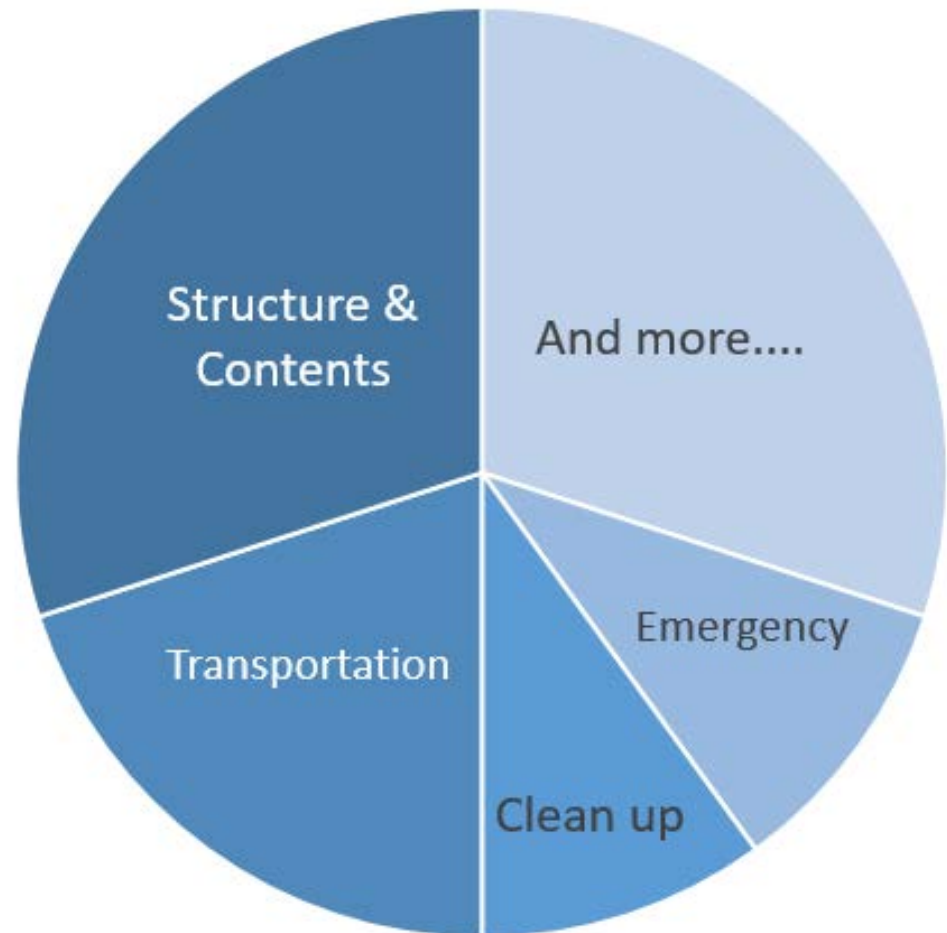
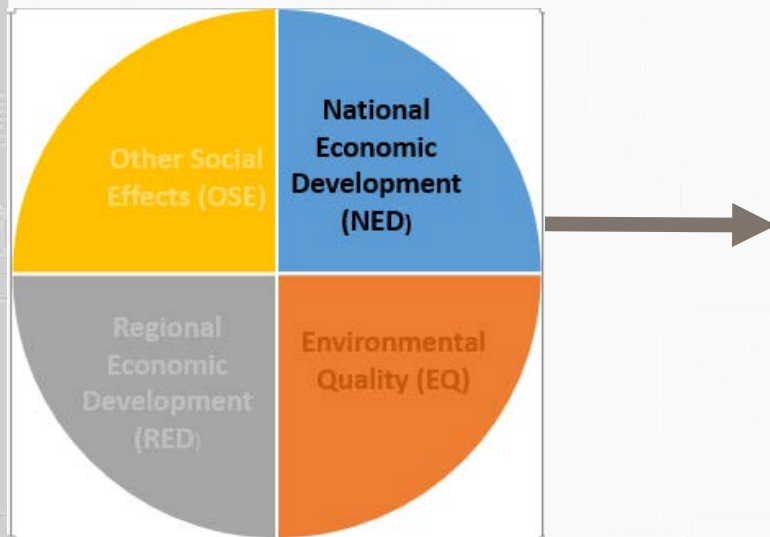


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NED BENEFIT TYPES



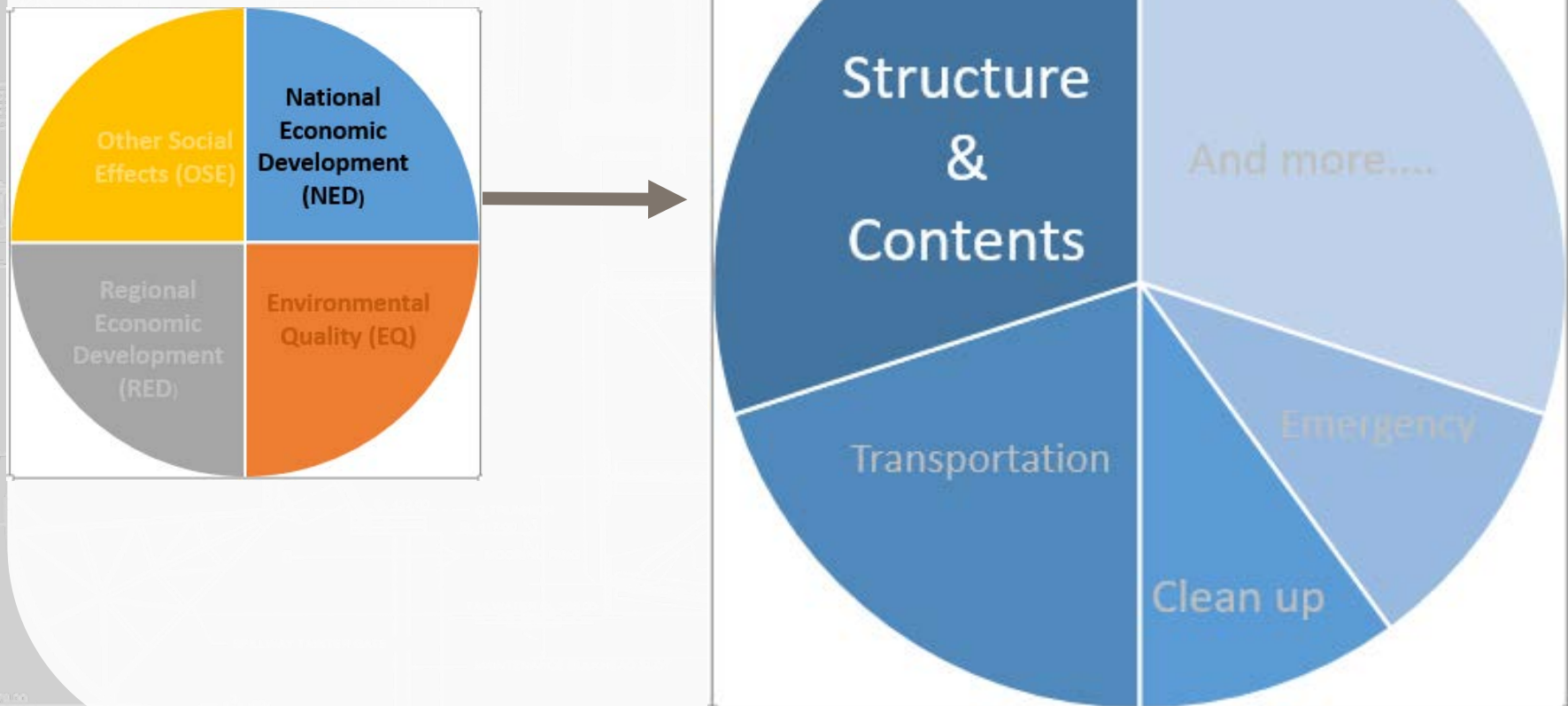


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NED BENEFITS – STRUCTURE & CONTENTS





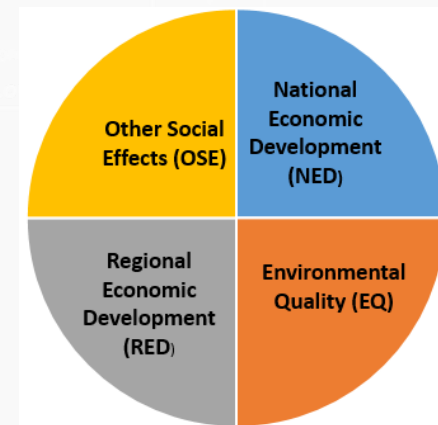
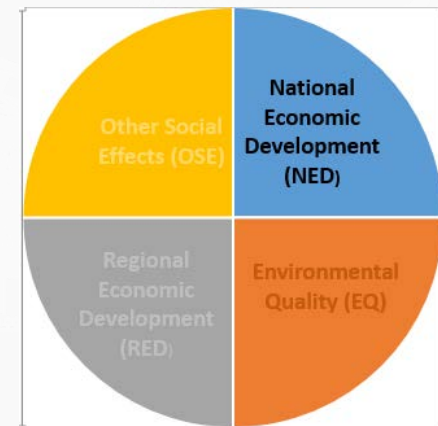
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PRELIMINARY BENEFITS CALCULATION

- Hydrologic Engineering Center – Flood Damage Analysis (HEC-FDA)
 - Focus on structure and contents
 - Monetary outputs
 - Leverages existing analyses
 - Tracks performance over time
- GIS Based Outputs
 - Four accounts – more inclusive
 - Snapshot in time





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PRELIMINARY BENEFITS

Alternative Concept	HEC-FDA Project Benefits in Present Value	GIS Risk Reduced
1- No Action*	--	--
2 – Sandy Hook – Breezy Point barrier	\$175,111,554,000	143,471,207
3A- Regional barriers	\$171,123,883,000	116,350,849
3B – Mid size barriers	\$160,778,406,000	88,312,497
4 – Small Barriers	\$148,586,916,000	61,015,129
5- Perimeter only	\$48,634,753,000	6,017,650

* Without Project Damages calculated \$187,000,000,000



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COSTS CALCULATION

Parametric basis (top down approach) for
construction activities and durations



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SHORELINE COSTS



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- 100+ Miles of shoreline measures among all alternatives
- Per Linear Foot, unit prices estimated based on Army Corps & partners experience
- Very Limited, Limited, Unlimited category to capture cost and access drivers
- Natural & Nature-Based Features (NNBFs) to be incorporated into next level designs and costs

SHORELINE BASED MEASURE UNIT COST TABLE			
FEATURES \ ACCESS	Very Limited	Limited	Unlimited
Floodwall	\$ 37,500	\$ 11,250	\$ 6,000
Levee	\$ 9,000	\$ 3,750	\$ 2,000
Seawall	\$ 11,500	\$ 4,500	\$ 3,000
Operable Flood Gate	\$ 75,000	\$ 30,000	\$ 16,500
Elevated Promenade	\$ 45,000	\$ 15,000	\$ 7,500
Buried Seawall/Dune	\$ 15,000	\$ 6,000	\$ 3,000
Tide Gate	\$ 75,000	\$ 30,000	\$ 16,500



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STORM SURGE BARRIER COSTS

- 17 international reference storm surge barriers inform cost model
- Design dimensions produced based on wave and storm models
- Regression analysis used to estimate respective weights of contributing design elements to duration and cost
- Parametric model not informed by material takeoffs – Next phase will incorporate
- Formula shown below table to the right

Proposed Storm Surge Barrier	Estimated Initial Cost of Construction by Model (w/o Contingency)	Estimated Duration of Construction
	[\$, 2019Q1]	[Years]
Throgs Neck	\$ 3,640,000,000	10
Sandy Hook - Breezy Point	\$ 36,455,000,000	25*
Verrazzano Narrows	\$ 8,469,000,000	18
Arthur Kill	\$ 1,671,000,000	7
Kill Van Kull	\$ 3,574,000,000	8
Jamaica Bay	\$ 2,378,000,000	9
Hackensack River	\$ 719,000,000	4
Gowanus Canal	\$ 85,000,000	2
Newtown Creek	\$ 170,000,000	3
Flushing Creek	\$ 200,000,000	3
Gerritson Creek	\$ 98,000,000	2
Sheepshead Bay	\$ 343,000,000	3
Coney Island Creek	\$ 187,000,000	3
Bronx River	\$ 150,000,000	3
Westchester Creek	\$ 170,000,000	3
Pelham Barrier	\$ 318,000,000	4

Model developed with regression analysis on a three parameters: the areas of navigable, auxiliary flow and dam features. Cost = \$19000 x 'Navigable Area' + \$14000 x 'Auxiliary Flow Area' + \$3000 x 'Dam Area'

*SH-BP Barrier construction duration is estimated with the same reference-based parametric duration model as the others, but assumes that the total span will be constructed in 3 parts, concurrently.



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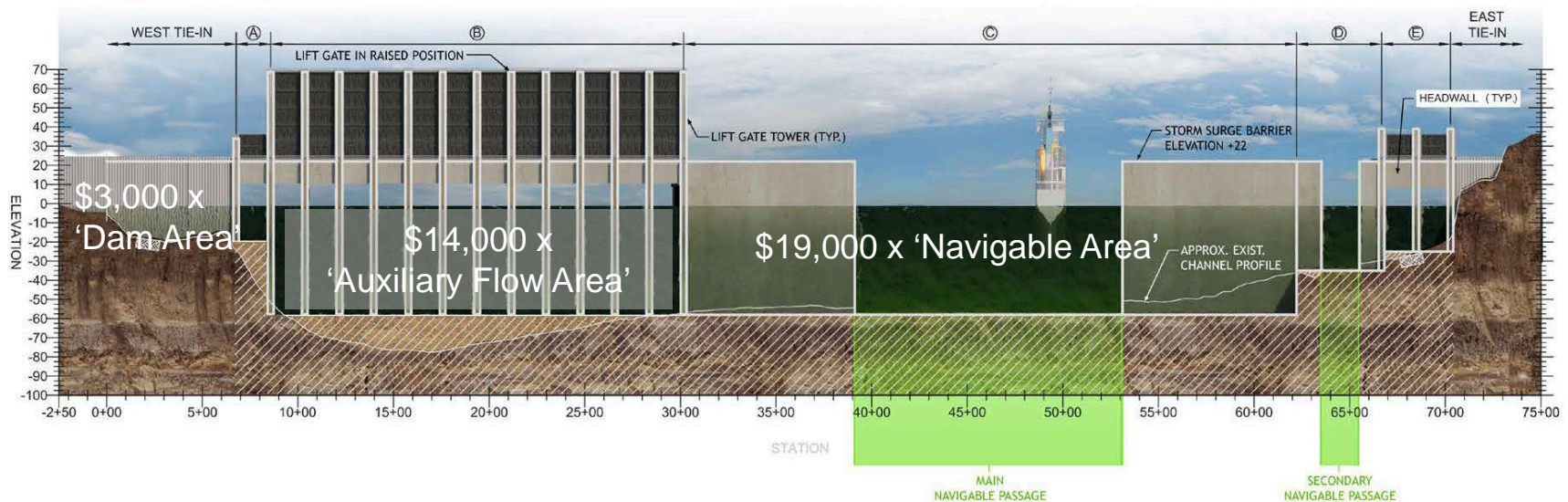


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SURGE BARRIER COST BY AREA

VERRAZANO NARROWS STORM SURGE BARRIER (LOOKING NORTH, GATES IN OPEN POSITION)

GRAPHIC IS FOR VISUALIZATION PURPOSES ONLY, NOT TO SCALE



LEGEND :

- Ⓐ GATE SERIES (PER TABLE XX)
- ☐ GATE SILL AND FOUNDATION (TBD)

NOTE HORIZONTAL SCALE AND VERTICAL SCALE ARE DISTORTED

NOTES:

THIS ELEVATION VIEW SHOWS A CONCEPTUAL GEOMETRIC DESIGN. THIS PRELIMINARY DEPICTION OF THE GEOMETRY OF THE NAVIGABLE PASSAGES, AUXILIARY FLOW GATES AND STORM SURGE BARRIER CONFIGURATION SHALL NOT BE CONSTRUED AS RECOMMENDATIONS OR REQUIREMENTS FOR ACTUAL DESIGN FOR IMPLEMENTATION. SIGNIFICANT ADDITIONAL STUDY IS REQUIRED TO SUBSTANTIATE THE CONCEPTUAL DESIGN OF THIS STORM SURGE BARRIER.



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TOTAL COST BY ALTERNATIVE

- Contingencies, Planning Engineering & Design, Supervision & Administration and Operations and Maintenance costs calculated based on typical values for comparable flood protection projects
- Total duration of alternatives assumes concurrent construction of all separable elements
- Interest During Construction calculated with 2.875% Discount Rate
- Costs shown in 2019 US Dollars

Alternative	Construction Cost (w/ contingency)	Environmental and Cultural Mitigation	Real Estate	IDC, PED, S&A	OMRR	Total	Duration
2	\$57.9	\$0.27	\$0.03	\$49.0	\$11.6	\$118.8	25 Years
3a	\$25.6	\$0.24	\$0.11	\$14.3	\$6.9	\$47.1	18 Years
3b	\$23.9	\$1.27	\$0.27	\$9.7	\$7.9	\$43.0	9 Years
4	\$17.6	\$1.27	\$0.27	\$6.9	\$6.0	\$32.0	9 Years
5	\$8.0	\$1.38	\$0.15	\$2.7	\$2.7	\$14.8	9 Years

*All costs shown in Billions



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NET BENEFITS AND RESIDUAL DAMAGES FOR ALTERNATIVES 2-5 (FY 19 P.L., IDC 2.875%)

Alternative Concept*	Net Benefits (PV) – All closures at 50% flood**	Associated Residual Damages
1 – No Action	--	--
2 – Outer Harbor Surge Gates and Shore-Based Tie-ins	\$57,000,000,000	\$16,500,000,000
3A – Regional Surge Gates & Shoreline-Based Measures	\$124,000,000,000	\$20,500,000,000
3B – Mid-Size Surge Gates & Shoreline-Based Measures	\$117,800,000,000	\$32,300,000,000
4 – Small Surge Gates & Shoreline-Based Measures	\$116,600,000,000	\$43,000,000,000
5 – Shoreline-Based Measures only	\$33,800,000,000	\$142,900,000,000

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



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NEXT STEPS – KEY ITEMS FOR FURTHER STUDY



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FACTORS AFFECTING ALTERNATIVE SCREENING & NEEDING FURTHER EVALUATION

Benefits Likely Increase	Effect TBD	Costs Likely Increase
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 (<i>site specific</i>)
Refine & expend benefits modeling (<i>other accounts, critical infrastructure, etc</i>)		Environmental & Cultural Mitigation Costs (<i>site specific</i>)
		Interior drainage
		Cost refinements (<i>site specific</i>)



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SCHEDULE AND STUDY CONTACT INFORMATION



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STUDY SCHEDULE



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Upcoming Dates

Action	Dates
Release Interim Report to public	Feb. 19, 2019
Brief Cooperating Agencies	Feb. 26, 2019
Public Meetings on Interim Report	Mar-Apr. 2019
Draft Integrated Feasibility Report and Tier 1 Environmental Impact Statement	Mar. 2020
Public Meetings on Draft Report	Apr. 2020
Final Integrated Feasibility Report and Tier 1 Environmental Impact Statement	Mar. 2021
Chief of Engineer's Report	Jul. 2022



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INTERIM REPORT AVAILABILITY

- ❑ Interim Report can be accessed at the following address:

❑ www.nan.usace.army.mil/NYNJHATS

- ❑ Webinar Presentation/Video of Interim Report Summary will be posted in March 2019 to website.

- ❑ Public Meetings Dates and Locations:

- Tuesday, March 12th, 2019, 5-7pm. Location: Westchester County Center, Westchester, NY.
 - Wednesday, March 13th, 5:30-7:30pm at South Shore Educational Complex (Auditorium), 6565 Flatlands Avenue, Brooklyn, NY.
 - Tuesday, March 19th, 2019, 5-7pm. Location: Snug Harbor Cultural Center, 1000 Richmond Terrace, Staten Island, NY.
 - Wednesday, March 27th, 5-7pm. Location: Middletown Arts Center, 36 Church St., Middletown, NJ 07748.
 - Wednesday, April 3rd, 5-7pm. Location: Hudson Valley Community Center, 110 Grand Avenue, Poughkeepsie, NY.
 - Tuesday, April 9th, 5-7pm. Location: Alexander Hamilton U.S. Custom House, 1 Bowling Green, New York, NY 10004.
 - Thursday, April 11th, 5-7pm. Location: Meadowlands Environment Center, 2 DeKorte Park Plaza, Lyndhurst, NJ 07071.
 - Wednesday, April 17th, 5-7pm. Location: Hostos Community College, D Building/Savoy Manor Building, 120 East 149th St, 2nd Floor, Bronx, NY 10451.
- ❑ Comments are always welcome, but would be particularly useful if provided as early as possible, such as within two weeks of the last meeting in April (May 1, 2019), so to help inform the study as it advances. There is no comment deadline since the Interim Report is informational (non-decisional).