

# NEW YORK-NEW JERSEY HARBOR AND TRIBUTARIES NEW YORK DISTRICT

## Public Engagement Appendix

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**US Army Corps  
of Engineers**



**Department of  
Environmental  
Conservation**

**NYC**  
Mayor's Office of  
Recovery & Resiliency



**US Army Corps  
of Engineers®**  
New York District

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## **INTERIM REPORT**

### **New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study**

## **PUBLIC ENGAGEMENT APPENDIX**

### **Scoping Document Agency Workshop Summary**

**February 2019**

Prepared by:  
U.S. Army Corps of Engineers  
New York District  
26 Federal Plaza  
New York, New York 10278



# SCOPING DOCUMENT

## New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Study

Albany, Bronx, Columbia, Dutchess, Greene, Kings, New York,  
Orange, Nassau, Putnam, Queens, Rensselaer, Richmond,  
Rockland, Ulster, and Westchester Counties, New York

Bergen, Essex, Hudson, Middlesex, Monmouth, Morris, Passaic,  
Somerset, and Union Counties, New Jersey

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Department of  
Environmental  
Conservation

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## LIST OF ACRONYMS

Acronym	Title
BCR	Benefit Cost Ratio
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSRM	Coastal Storm Risk Management
CWA	Clean Water Act
EIS	Environmental Impact Statement
FAA	Focus Area Analysis
HTRW	Hazardous, Toxic and Radioactive Waste
IFR/EIS	Integrated Feasibility Report/Environmental Impact Statement
KCS	Known Contaminated Sites
MBTA	Migratory Treaty Bird Act
NACCS	North Atlantic Coast Comprehensive Study
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
NGO	Non-Government Organization
NJDEP	New Jersey Department of Environmental Protection
NJHPO	New Jersey Historic Preservation Office
NWI	National Wetlands Inventory
NYCDEP	New York City Department of Environmental Protection
NYCLPC	New York City Landmarks Preservation Commission
NYCORR	New York City Mayor's Office of Recovery and Resiliency
NYNJHATS	New York-New Jersey Harbor and Tributaries Study
NYSDEC	New York State Department of Environmental Conservation
NYSHPO	New York State Historic Preservation Office
OPRHP	Office of Park, Recreation and Historic Preservation
TSP	Tentatively Selected Plan
USC	United States Code
USFWS	United States Fish and Wildlife Service

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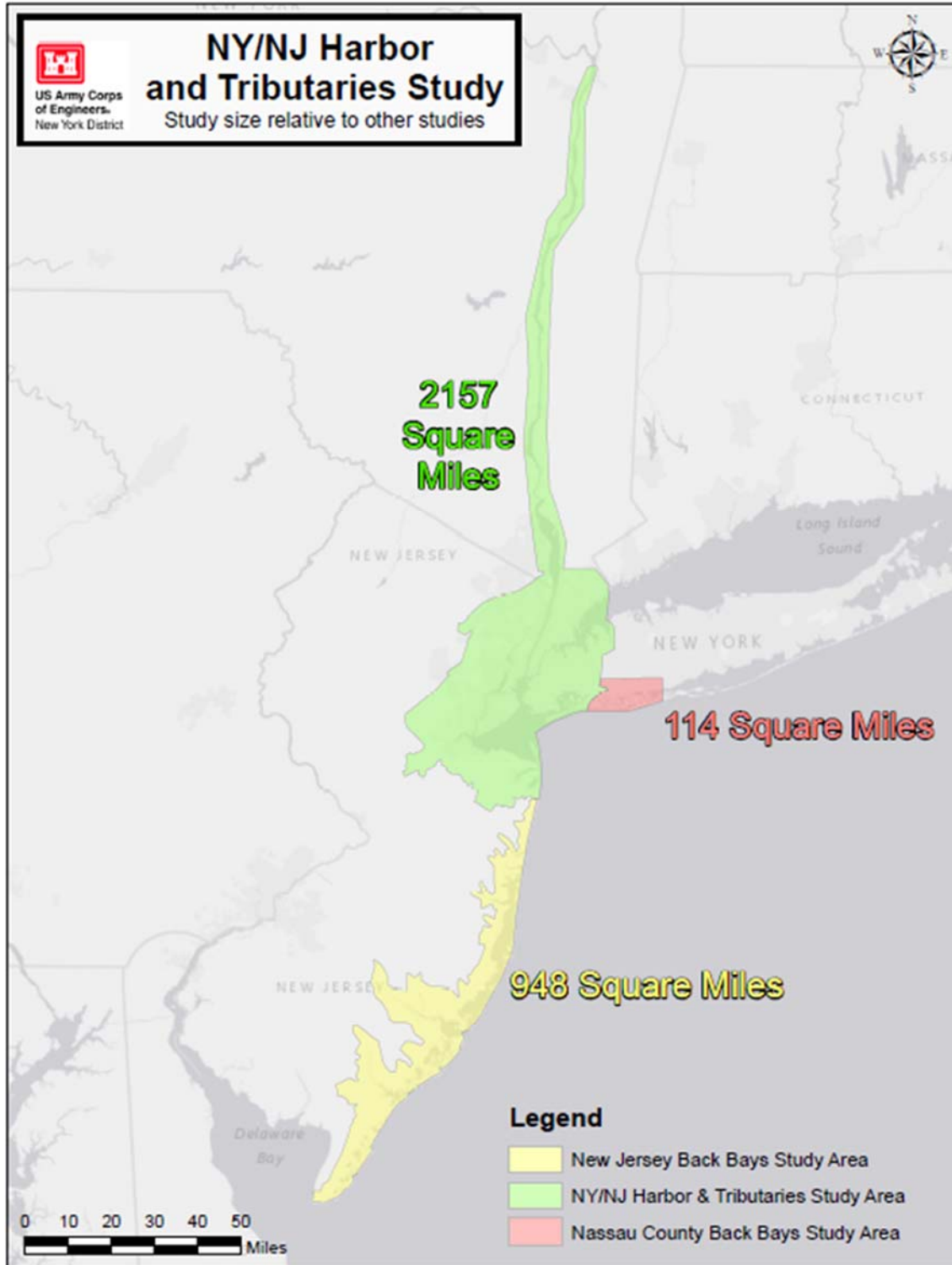
# 1 INTRODUCTION

The U.S. Army Corps of Engineers (Corps), New York District (District) and its partners, the New York State Department of Environmental Conservation (NYSDEC), with its partner, the New York City Mayor's Office of Recovery and Resiliency (NYCORR), and the New Jersey Department of Environmental Protection (NJDEP) as the non-federal sponsors, are investigating the feasibility of coastal storm risk management (CSRM) in the study area and to recommend a plan that will contribute to community and environmental resilience within the study area. The study area covers more than 2,150 square miles and comprises parts Bergen, Essex, Hudson, Middlesex, Monmouth, Morris, Passaic, Somerset, and Union, Counties in New Jersey; and Rensselaer, Albany, Bronx, Columbia, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Ulster, and Westchester Counties in New York. The study area includes all tidally affected waters and extends upstream of the Hudson River to the federal Troy Lock and Dam in Troy, New York, the Passaic River upstream to the Dundee Dam, and the Hackensack River to the Oradell Reservoir (Figure 1).

Under the direction of Public Law 113-2, the Corps completed the North Atlantic Coast Comprehensive Study (NACCS) in January 2015, which identified nine high-risk focus areas of the North Atlantic Coast that warranted additional analyses by Corps to address coastal flood risk. One of the focus areas identified was the New York-New Jersey Harbor and Tributaries study area.

Authorization for carrying out the additional analyses on the New York-New Jersey Harbor and Tributaries study area is provided by Public Law 84-71, which called for a study of the eastern and southern seaboard of the United States to identify areas where severe damages have occurred and with the goal of identifying potential measures to reduce loss of life and damages to property.

The District will be preparing a draft Integrated Feasibility Report and Environmental Impact Statement (IFR/EIS), currently anticipated for release in 2020, to document the proposed action, alternatives formulated for consideration, environmental effects and any measures necessary to avoid, minimize and mitigate impacts from the proposed action. As part of the Integrated Feasibility Report and Environmental Impact Statement development, the District is initiating public scoping. This scoping document was prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality's *Guidance Regarding NEPA Regulations*, and the Corps' *Procedures for Implementing NEPA* (Environmental Regulation [ER] 200-2) for distribution to local, county, state and federal agencies that may have an interest in the impacts and benefits derived from implementation of coastal storm risk management measures.



**Figure 1: New York-New Jersey Harbor and Tributaries Study Area (Green).** The yellow and red areas refer to other focus study areas recommended by the North Atlantic Coast Comprehensive Study.

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Public outreach and discussion has been a priority for this study and as such USACE will seek to build off past engagement with deeper and more robust stakeholder engagement as the study progresses. Given the scale and scope of this study, meetings cannot feasibly be held in every town or community with an interest in the study. The study team will therefore seek to reach as broad an audience as possible by locating meetings in transit-accessible locations, advertising meetings as early as possible, and opening up opportunities for stakeholders to join meetings remotely through webinar capabilities. Primary outreach efforts include agency workshop meetings held in 2017, and NEPA scoping meetings held in 2018. The agency workshop meetings are discussed in the Agency Workshop Summary in this Public Engagement Appendix.

Agency workshop meetings were held in January-February 2017. Over 100 local government and agency representatives participated. Common themes from the workshops include:

There is a need for a systems-level, regional analysis and approach to determine appropriate Coastal Storm Risk Management (CSRM) measures and future initiatives. For this to occur successfully, coordination and collaboration across agencies and levels of government is required. Localized efforts are only pieces to the larger regional puzzle.

Proper evaluation of a potential or a series of potential storm surge barriers is needed and must encompass flood risk management benefits and costs. They must consider all potential impacts to people, property, local economies, and the environment. Some agencies are opposed to the hard solutions such as barriers and floodwalls, whereas others are supportive. Multi-benefit solutions with natural or nature-based features are preferred.

The public and many critical assets continue to be at risk as exemplified by the effects of Hurricane Sandy. Communication of these risks, continued public outreach, education, and engagement is essential for future efforts.

Impacts to critical assets, for example transportation infrastructure and evacuation routes, power generation and supply, and wastewater infrastructure, were echoed throughout the various methods of feedback. Managing risk to the public and to critical infrastructure is vital to the CSRM Feasibility Study.

Agencies identified two technical topics in which uncertainty should be addressed. While there is uncertainty in many technical topics, these two topics were identified as great importance to the agencies. First, there is uncertainty related to appropriately defining the design condition and thus, the selection and incorporation of a sea level change scenario. Clarity and a transparent decision-making process will allow for agencies and communities to maintain engagement in the design process. Secondly, there is uncertainty associated with the occurrence and timing of fluvial (i.e., stormwater runoff) flooding with coastal flooding. There is a concern that regional storm surge barriers will exacerbate fluvial flooding.

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Structural measures that may cause negative impacts to the environment, especially to the Hudson River and its estuaries, are a major concern.

Funding, time, legislation and bureaucracy hinder the progress of coastal resiliency in many communities within the study area. There is an urgency to identify CSRM measure(s) prior to another storm or with a changing sea level condition. If a cost-effective, publicly acceptable, and feasible project cannot be identified within a reasonable timeframe, the agencies are willing to consider supporting less-than-ideal solutions that can be implemented.

Please see the Agency Workshop Summary for more detail.

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## 2 SCOPING PROCESS AND PUBLIC COMMENTS

In order to help scope the study, the study team elicited public input during the NEPA Scoping Period. This section describes the Scoping Process for the NYNJHAT feasibility study and includes the comments received, as well as responses from the study team.

### 2.1 NEPA and the Scoping Process

USACE announced the preparation of an integrated Feasibility Report/Tiered EIS for the proposed NYNJHAT feasibility study in the February 13, 2018 Federal Register, pursuant to the requirements of section 102(2)(C) of NEPA. Scoping is the process used to identify issues, concerns and opportunities for enhancement or mitigation associated with the proposed action. The purpose of the scoping process is to:

- Invite the participation of local, county, state, and federal resource agencies, Indian Tribes, non-government organizations (NGOs), and the public to identify significant environmental and socioeconomic issues related to the study;
- Determine the depth of analysis and significance of issues to be addressed in the Integrated Feasibility Report/EIS;
- Identify how the proposed alternatives would or would not contribute to cumulative effects in the study area. This includes the identification of any local, county, state, and federal resource plans and future project proposals in the study area, implementation schedules, and any data that would help to describe past and present actions and effects of the project and other development activities on environmental and socioeconomic resources;
- Gather information, quantitative data or professional opinions that may help define the scope of the analysis related to both site-specific and cumulative effects and that helps identify significant environmental issues;
- Solicit, from local, county, state and federal agencies and the public available information on the resources at issues, including existing information and study needs; and,
- Identify any information sources that might be available to characterize the existing environmental conditions and analyze and evaluate impacts.

### 2.2 Description of the Scoping Period

The NEPA scoping period for the NYNJHAT study originally spanned 45 days from July 6<sup>th</sup> - August 20, 2018, but was extended because of numerous requests from the public by 77 days for total of 122 days scoping period. The extended period was open until November 5, 2018.

During the NEPA scoping public comment period, comments were submitted to NYNJHarbor.TribStudy@usace.army.mil, mailed by hard copy, or provided in person at one or more of the Scoping Meetings that were held during the scoping period. Questions, comments,



and information received after this date were and will continue to be compiled and considered as the study progresses and included in the draft report and will be part of the administrative record.

Originally, there were five NEPA scoping meetings scheduled for this study. Pursuant to the request of congressional representatives, USACE held four additional meetings. Meeting locations were chosen to be easily accessible by transit, able to accommodate large groups, and dispersed throughout the large study area, such that interested stakeholders could reasonably travel to at least one meeting. The dates, locations, and numbers of participants for each meeting are listed in Table 1. There were a total of nine meetings in six locations that reached 705 participants,<sup>1</sup> though some participants stayed for both meetings where there were two sessions in one day and some participants came to subsequent meetings throughout the region.

Information was provided to the public through a combination of PowerPoint presentations, poster sessions, and a structured question and answer session at the meetings. A poster session, hosted by the study team, was held at the conclusion of the formal presentation.

**Table 1. NYNJHATs Scoping Meeting Locations, Dates, and Number of Participants**

<b>Date</b>	<b>Location</b>	<b>Number of Participants</b>
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
<b>Nine meetings total</b>	<b>Six locations</b>	<b>705 meeting participants total</b>

## 2.3 Total Number of Comments Received

During the comment period USACE received 4,250 submissions of comments. Fourteen different form letters were received, totaling 3,295 of the submittals. A total of 234 comment cards were submitted from attendees at the NEPA scoping meetings. Of the 234 comment submissions, 30 submissions came from municipalities (Table 2), 14 of which generated resolutions expressing positions on the study from a municipal or community board perspective (Table 3). Additionally, 21 submissions were received from 26 elected officials (Table 4). Two submissions were received from other federal agencies; the US Fish and Wildlife Service and Housing and Urban Development. The remaining 668 submissions were received by email, mail, and fax from organizations and individual citizens.

<sup>1</sup> This is the number of individual entries on the sign-in sheets at the meetings. There were individuals who opted not to sign in.

**Table 2. Municipalities Commenting on NYNJHATS**

<b>Municipalities Comments Were Received From</b>		
Town of Ossining - Village of Ossining, NY	City of Beacon, NY	County of Ulster Environmental Management Council, NY
Town of Stony Point , NY	City of Yonkers - Office of the Mayor , NY	Village of Rhinebeck, NY
Village of Hastings-on-Hudson, NY	NCY Councilman Costa Constantinides - 22nd District, Queens	Village of Sands Point, NY
Westchester County Executive, NY	Members of the Ulster County Legislature, NY	Town of North Hempstead, NY
Village of Croton-on-Hudson, NY	Village of Irvington, NY	Village of Piermont, NY
Tarrytown Environmental Council, NY	Town of Poughkeepsie , NY	Village of Sea Cliff, NY
Hudson River Drinking Water Intermunicipal Council	Village of Roslyn, NY	Village of Flower Hill, NY
Putnam County Legislature , NY	Town of Oyster Bay, NY	Town of Cortland, NY
Village of Dobbs Ferry, NY	Town of Greenwich, CT	Community Board 13 - Brooklyn, NY
Community Board #1 - Manhattan, NY	Common Council of Kingston, NY	

**Table 3. Municipalities Generating Resolutions**

<b>Municipalities Generating Resolutions</b>		
City of Beacon	Village of Croton on Hudson	Town of Cortlandt
Village of Hastings-on-Hudson	Village of Irvington	City of Kingston
City of New York, Community Board 1	Town of Ossining	Village of Ossining
Village of Piermont	Town of Poughkeepsie	Putnam County Legislature
Village of Rhinebeck	Town of Stony Point	

**Table 4. Elected Officials Who Submitted Comments**

<b>Elected Officials Who Submitted Comments</b>		
<b>Affiliation</b>	<b>Name</b>	<b>Representing</b>
<i>US House of Representatives</i>	Joe Courtney	Connecticut
	Jim Himes	Connecticut
	Nita M. Lowey	17 <sup>th</sup> District, New York
	Sean Patrick Maloney	18 <sup>th</sup> District, New York
	Rosa DeLauro	Connecticut
<i>US Senate</i>	Richard Blumenthal	Connecticut
	Christopher S. Murphy	Connecticut
<i>The Senate of the State of New York</i>	David Carlucci	38 <sup>th</sup> District
	Shelley B. Mayer	37 <sup>th</sup> District
	Terrence P. Murphy	40 <sup>th</sup> District
	Sue Serino	41 <sup>st</sup> District
	Elaine Phillips	7 <sup>th</sup> District
<i>The Assembly of the State of New York</i>	Didi Barnett	106 <sup>th</sup> District

Elected Officials Who Submitted Comments		
Affiliation	Name	Representing
<i>York</i>	William A. Colton	47 <sup>th</sup> District
	Sandy Galef	95 <sup>th</sup> District
	Deborah Glick	66 <sup>th</sup> District
	Ellen C. Jaffe	97 <sup>th</sup> District
	Yuh-Line Niou	65 <sup>th</sup> District
	Steven Otis	91 <sup>st</sup> District
	Kenneth P. Zebrowski	96 <sup>th</sup> District
<i>Dutchess County</i>	Joel Tyner	Dutchess County Legislator, 11 <sup>th</sup> District
<i>Westchester County</i>	George Latimer	Westchester County Executive
<i>NYC Council</i>	Costa Constantinides	NYC Council Member, 22 <sup>nd</sup> District
	Mark Treyger	NYC Council Member, 47 <sup>th</sup> District
<i>Community Board</i>	Joann Weiss	Community Board 13
<i>Yokers</i>	Mike Spano	Mayor of Yonkers

## 2.4 General Comment Trends

The comments received fell into seven themes, which are outlined below. A brief synopsis of each comment theme and a summary of the District's response is presented below. From the 4,250 submissions, 393 unique comments were identified by the USACE study team. These unique questions and their responses are provided in the Comment Response Document (Table 5 in Section 2.5).

### 2.4.1 Scoping Process

Throughout the scoping period, commenters requested additional time for the scoping period, additional meetings throughout the larger study area as well as additional comprehensive, detailed information about all of the alternatives being considered, to include the environmental impacts. 88% of all submissions expressed that there was not sufficient information available to the public for them to make an informed decision.

**Response:** In response to these comments, four additional meetings were added by request and the public comment period extended to run through 120 days. The purpose of a scoping meeting is to get input at an early point in the study. Details on the impacts of particular alternatives were not available at this time because the goal of the scoping process is to initiate public engagement early-on, before large amounts of resources have been invested into the study, so that the public can help to 'scope' the study.

Starting public engagement early allows the rest of the study to be shaped by the input received from the public. The scoping process helps to define what questions the study team should be asking, based on local knowledge, and can identify valuable data and information that local stakeholders share through the scoping process. More detailed information and analysis,

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including environmental impacts, will be released to the public when it is available, based on the level of design detail, in either the Draft Tier 1 EIS or the Draft Tier 2 EIS. Due to the large scale and scope of this study and the largely conceptual nature of the alternatives early on, the Tiered NEPA process will be used so that the analysis can be performed using the available concepts for the initial evaluation (Tier 1), followed by design detail in the more advanced evaluation (Tier 2). There will be multiple opportunities for public input throughout the study and design phase, as the study and project progresses.

#### 2.4.2 Storm Surge vs Sea Level Rise

Many commenters stated that they did not think storm surge should be addressed without first addressing RSLC. Concerns about RSLC were voiced in 84% of all the submissions. This is important because, for many communities, sea level rise poses a risk of chronic, daily flooding in this century. Many of these commenters expressed the opinion that the only alternative that is acceptable is Alternative 5, given that it is the only alternative that has shoreline based measures that will protect communities from both storm surge and RSLC, without impacting the harbor, river and its tributaries with surge barriers.

**Response:** This study is a bi-state long-term planning study focused on regional resiliency in the face of growing coastal flood risk which is expected to be greatly exacerbated by sea level change in this region. The congressional authorization for the New York-New Jersey Harbor and Tributary study is to address the threat of storm surge from coastal storms in the study area. Where shoreline-based measures (SBM's) are proposed, such as in Alternative 5, the threat of RSLC is also addressed by those measures. Where storm surge barriers are proposed (Alternatives 2, 3A, 3B, and 4), complementary measures to manage the risk of frequent flooding are also proposed, which would provide an integrated solution. In most cases, solutions for these high-recurrence events do not differ greatly from solutions tailored specifically for sea level rise alone, though further analysis under a separate study would be needed to understand the daily impacts of high-tide inundation due to sea level rise to the region.

#### 2.4.3 Environmental Impacts

Concerns about environmental impacts were the most ubiquitous of all the comment themes, being present in 91% of all submissions. Commenters felt that the alternatives that include surge barriers (2, 3A, 3B and 4) would have the most profound adverse environmental impacts. Concerns about impacts to tidal flow and circulation were mentioned in 68% of the submissions, contamination with Polychlorinated Biphenyls (PCBs) or combined sewer overflows (CSOs) were in 67%, wildlife and ecology (from the inability or restriction to migrate up/down river or to Long Island Sound) were in 76%, sedimentation rates were in 66%, and water quality (salinity, temperature, circulation, dissolved oxygen, nutrient concentrations, algal blooms) were in 71%.

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**Response:** The study team recognizes the potential for the proposed concept alternatives to result in some or all of the above cited serious environmental impacts. As part of the risk-informed planning process, both a Tier 1 and Tier 2 EIS will be completed on the *tentatively selected plan* (TSP) once it is selected to analyze the potential impacts. If the environmental impacts of the TSP are unacceptable, the plan will not move forward. Any plan that is ultimately recommended from this study must avoid, minimize and mitigate for environmental impacts. There will be opportunities for public input on each report (Interim Report, Tier 1 EIS, and Tier 2 EIS). A Tier 2 EIS will be prepared because not all of the site-specific design information will be available during the Feasibility Study to fully address all of the specific impact analysis. Where detail is available, full analysis will be performed in the Tier 1 EIS, and where the alternative remains more conceptual, broad analysis will be performed. The Tier 2 EIS will have the full detailed analysis for every aspect of the proposed plan, once identified, and no plan can be implemented without the preparation and coordination of a Tier 2 EIS.

#### 2.4.4 Navigation Impacts

Commenters were concerned that the alternatives that include surge barriers could have adverse impacts to the movement of boats in New York Harbor. This was a concern brought up in 66% of the submissions. This includes activity related to commercial shipping as well as recreational boating. There are concerns that surge barriers would restrict the movement of ships into and out of the harbor, disrupting the current traffic flow. Additionally, commenters feared that the surge barriers would increase sedimentation of channels, which in turn would necessitate more frequent dredging of existing navigation channels.

**Response:** If the TSP includes surge barriers, they will be carefully engineered to reduce their impact on boat traffic. Any surge barrier across a navigable waterway will include a gate large enough to allow boats to pass through. A navigational traffic analysis would be required to be completed if a surge barrier is recommended. Any potential navigational impact would be evaluated in the Tiered EIS to understand how to minimize, avoid or mitigate impacts to transportation.

#### 2.4.5 Cost and Construction

Many commenters asked questions about the cost of the project and how the construction would take place. Some common questions that were in 77% of submissions included: how much would this project cost; how long will it take to build; and, who will pay for it? Along this theme, many commenters asked what would happen if a non-federal sponsor decides not to participate in the project. Or, what would happen if the states of New York or New Jersey decided not to participate?

**Response:** The cost and construction duration are determined by what measures will be selected for the TSP. An explanation on how the preliminary cost estimates have been developed is available in the Cost Appendix to the Interim Report. Please note that the costs and benefits in

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the Interim Report are parametric and would require follow-up, site-specific investigations for refinement before any recommendation could be made. They are presented in the Interim Report only for the purposes of comparing alternative concepts.

The study is cost-shared with 50% being paid by the federal government and 50% being paid by the non-federal sponsors, the States of New York and New Jersey who split their cost-share equally. If implemented, the project would also be cost shared between the federal government and non-federal sponsor(s) and a new Project Partnership Agreement would be executed. USACE cannot implement projects without the support and participation of non-federal sponsor(s) and authorization and funding provided by Congress. If the study sponsor(s) opt not to participate in project implementation, the project would not proceed until an eligible party steps forward to act as the cost-sharing partner for implementation.

#### 2.4.6 Overall Study Process

Many of the commenters asked about how the six alternatives were selected, or how the plans were formulated, and how the existing conditions projects being used in the study, which RSLC projection we are using and why, and how many years the study will take to complete. These types of questions were present in 74% of the submissions.

**Response:** The six alternative concepts presented at the NEPA scoping meetings represent scales of solutions: system-wide, or basin-wide, or site-specific CSRM solutions. A system-wide solution has the potential to reduce the need for localized studies and projects, resulting in considerable economies of scale. However, it may not leverage the benefits of existing and planned coastal storm risk management projects, resulting in what may be unnecessary expenditures. For this reason, agreement on the list of assumed projects is critical to the calculation of potential benefits. The existing projects that were used in the economic analysis were coastal flood risk management projects that are already built, or will have funding, completed construction documents, and permits by July 2020. USACE reached out to the lead agencies and project managers to verify information on these projects. The full list of projects included can be found in the Plan Formulation Appendix of the Interim Report. At this point, the alternative concepts include assumptions of the types of measures to be included for cost estimating purposes. However, the actual type of barrier, gates, and SBM's (floodwall vs levee, nonstructural, or natural and nature-based features) have not yet been confirmed, nor their exact locations in the Interim Report. These refinements are anticipated for the draft report to be released in 2020.

In regards to RSLC, the study team is using one sea level scenario (out of three used by USACE: low, intermediate, high) for estimating potential benefits in the Interim Report. As probability values have not yet been determined for each USACE scenario, it cannot be stated with certainty which scenario is the most likely at this time. Accordingly, the study chose an intermediate curve for the Interim Report as a rough way to approximate the median value between the low and high scenarios. A more detailed consideration of project performance in light of the low,

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intermediate, and high rates of RSLC will be conducted for the draft report in 2020, when the more clearly defined locations and measures can be evaluated.

Due to the vast scale and complexity of this project, the study team was granted permission to exceed the normal three year study limit imposed on USACE studies and is authorized to take up to six years to complete the study by July 2022. This Interim Report was released in February 2019 for public comment. Subsequent public meetings will be held throughout the study area to solicit input on the Interim Report which will be incorporated into additional analyses that can be used to screen the alternatives. The TSP Milestone is targeted for January 2020 when the study team, including the states of New York and New Jersey, will convene with USACE Headquarters to identify a TSP based on the analysis. The Draft Feasibility Report and Tier 1 EIS will be released within 60 days of the TSP Milestone for public and agency comment. Comments will be incorporated into the Final Feasibility Report and Tier 1 EIS.

#### **2.4.7 Induced Flooding**

Many commenters voiced their concerns about induced flooding from surge barriers. Induced flooding could potentially come from two directions when the gates are closed; from behind the gates as freshwater from local streams accumulated behind the barrier, and from outside the gates as the storm surge reflects off the barrier and is forced into the areas adjacent to the barrier. Induced flooding was brought up in 72% of all submissions.

**Response:** The proposed alternatives will be analyzed during the feasibility study, including modelling to assess possible induced flooding from changes in hydrology from storm surge barriers under evaluation. If any of the alternatives are shown to induce flooding, these damages would need to be mitigated as part of the permitting requirements for the project, and that additional cost would factor into the benefit to cost ratio. For example, if analysis showed that freshwater would accumulate behind the barriers and cause flooding, pumps could be added to the recommended plan to remove this water and reduce damages. If flooding is induced outside of the barrier, nonstructural solutions or floodwalls could be included to reduce these damages. If it is not technically possible to mitigate for the induced flood damages caused by a storm surge barrier, or if the cost to mitigate renders a plan economically unviable such that the costs exceed the benefits, then these measures would be screened out.

### **2.5 Scoping Comments and Responses**

Of the 4,250 comments received during the scoping period, the majority were identical (or nearly identical) form letters and there were many common themes and repeat comments. In order to facilitate efficient comment responses, the unique comments were identified and responses were provided for each comment (Table 5).

**Table 5. NYNJHAT Study Scoping Comments and Responses**

ITEM	COMMENTS	RESPONSES
1	What year or condition is used for evaluating environmental mitigation goals?	Typically, mitigation requirements are defined during the study process based on project impacts anticipated to occur then refined and formalized as part of the regulatory approval prior to that impact occurring so that mitigation is done at or before the time of impact. Given the scope of this study and the long planning horizon, many project impacts may occur far later in the study as coastal flooding risks/conditions (e.g., sea level rise) warrant.
2	The relationship between the EIS & the alternative-or combination of choice. How will one determine the other? Will the Alternative choice come first & then the EIS for that choice or other way around or some variation?	The evaluation and refinement of an alternative is based on many considerations, a key one being potential environmental effects and their evaluations. So it is a constant, iterative process in the study.
3	How will each alternative impact wetlands, marshes, and other features that sequester greenhouse gasses?	This has yet to be evaluated and defined in detail on the study as the alternatives are currently conceptual in detail. Certainly, with climate change and relative sea level change and a planning horizon to the year 2100, impacts to existing wetlands, marshes and other tidal habitats may potentially occur regardless of this study.
4	What is the impact on the Upper Hudson (Troy, Kingston)?	Currently, none of the measures in any of the conceptual alternatives has direct impacts to this study region, but the alternatives and measures will be refined and modified as the study proceeds. Should some of the alternatives advance that include in-water measures such as surge gates, particularly those in the path of the Hudson River discharge to the ocean, the indirect effects of such structures would need to be carefully and thoroughly evaluated as compared to what changes may be anticipated in the future irrespective of any outcome from this study.
5	What is the role of land use planning and green infrastructure?	Land use planning and green infrastructure (which we assume to mean some type of natural or nature based feature to manage coastal storm risk) are both measures that may be included and added to any alternative that may be considered further in the study. Land use planning is typically a non-federal responsibility but is included as one non-structural measure that can address coastal storm risks, particularly in longer term planning. Green infrastructure (NNBF) have good capability to address coastal storm risks, particularly those from more frequent and less severe coastal flooding events.
6	Why did you start with hard infrastructure and only add in green infrastructure or other measured like land use planning as minor features?	The study area is so vast and vulnerable to severe coastal storms (as demonstrated by Hurricane Sandy), and the conceptual alternatives were so broad, that the 1% Expected annual exceedance probability (AEP) with intermediate RSLC projection was used as the selected event for comparison purposes. This limits the measures that might be employed to primarily structural and limited nonstructural means. The primary goal for the study is to determine which combination of measures (which may well include through the iterative study process both land use planning and green infrastructure) yield the greatest net benefits to the nation and are environmentally acceptable.
7	How will this impact pollutants in the Hudson River?	None of the measures currently under contemplation in the study generate pollution directly, but may affect the distribution of existing pollution within the estuary (particularly any in-water measures such as surge gates). Any measure that might potentially affect the distribution of pollution in the estuary would need to consider that change as part of the alternative impact assessment to be done later in the study.



ITEM	COMMENTS	RESPONSES
8	Are the only plans under serious consideration are plans 2-5 while plan 1 is effectively off the table? Or is a plausible alternative to rely on local Action without the NEPA?	Alternative 1, the "No Action" alternative is the default existing alternative which we anticipate occurring into the future. It is only by affirmative action potentially as a result of this study that some other action may be done. This would only occur if/as any other action is justified, environmentally acceptable, supported by the non-federal sponsors, and authorized and appropriated funds by the elected federal officials. Unless federal law specifically waives this requirement, NEPA laws and regulations must be fully complied with to enact any federally planned action by the Corps.
9	Is it not dangerous to fish health and survival, cleaning out sediment, etc., to interfere with tidal flow	Tidal flow within the estuary has and likely will change in time due to other existing conditions or past actions (e.g., wetland filling, freshwater diversion, navigation channel dredging, etc.). Any action under evaluation in this study that might affect tidal flows would need to evaluate this change in comparison to the existing and planned future tidal regime in the study area.
10	Why don't you hiring in environmental economists. This science is well-developed.	Environmental economists with degrees in Economics/Environmental Economics and the required coursework /education are eligible to apply for positions at the Corps of Engineers through USA Jobs with the Economist job series. The USACE is often hiring Economists. Since 1983, the Water Resources Council's Principles and Guidelines (P&G) have provided the framework for developing federal water resource studies. The Corps must adhere to certified USACE models for calculating economic benefits - at present, none of the models include ecosystem services. However, the benefits to the economy from natural infrastructure can be described and included qualitatively to help decision makers by painting a fuller picture of the costs and benefits associated with alternatives.
11	You say you do both mitigation/prevention and adaptation but need to answer regarding mitigation	The formulation process will first seek to identify environmental impacts of proposed measures, and then identify ways to either avoid the impacts or mitigate for unavoidable impacts. Mitigation plans will be developed as appropriate based on the level of detail available. Currently rough estimates for mitigation are included in the cost of the alternatives for evaluation/comparison, as discussed in the Interim Report. The upper end of estimates was included for estimated mitigation costs in order to be conservative. As alternatives are screened and further developed, the mitigation will be refined and further fleshed out. Mitigation costs are factored in the benefit/cost analysis.
12	How is the environment "valued" in dollars in this process?	The alternatives currently include mitigation cost estimates which are in dollars. The Corps does not use dollar valuation for habitat in restoration but rather uses functional habitat units, which will be assessed as part of the impact analysis.
13	Please explain how the impacts on species has been considered in the development of these initial proposals?	The cost estimates for the alternatives include rough mitigation cost estimates which consider impacts to species. The initial rough placement for feature alignments also consider avoiding impacts to habitat, but these will be further refined as more data is gathered and more information about tidal flows, hydrology, sedimentation, salinity, etc. becomes available and the analysis can include multiple variables.
14	Is the Army Corps planning on developing a method of considering the environmental impact of future projects outside of mitigation costs?	Cumulative impacts from this project and other projects planned to be built (by the Corps and others) as part of the future without project condition will be assessed as part of the Environmental Impact Statement.
15	How would this affect the local (12603) creeks and tributaries?	Impacts to creeks and tributaries will be assessed as part of the Environmental Impact Statement. At this time, we know we will need to look at tidal exchange, species migration, sedimentation, hydrology, etc.

ITEM	COMMENTS	RESPONSES
16	What streams are being considered in the Hudson River Corridor? Please give a more detailed set of information.	The study area includes portions of rivers and streams that are tidally influenced, within the portion of the Hudson River that is tidally influenced, from NY-NJ Harbor up the Hudson River as far as Troy Lock and Dam. Rivers and creeks on the Hudson River under consideration include, but are not limited to: Catskill Creek, Kinderhook Creek, Schodack Creek, Wappinger Creek, Roundout Creek, Esopus Creek, Moodna Creek, and Fishkill Creek.
17	This requires a full EIS and much more comment time for the public.	A full Tier 1 and Tier 2 EIS analysis consistent with Corps guidance and policy will be performed for this study and will include a public comment period and public engagement for the respective Drafts to elicit and incorporate public input into the EISs.
18	What about silt build-up; then dredging needs later which stir up sediments with "POB's + other harmful chemicals?	Silt buildup will be a factor to address in the operations, maintenance, replacement and rehabilitation (OMRR) Manual for the built project. The potential impacts of Hazardous, Toxic, and Radioactive Waste (HTRW) will be analyzed in the Environmental Impact Statement. If there are hazardous impacts associated with the project, then those would need to be remediated by the responsible parties prior to project implementation.
19	Alternatives 2, 3A, 3B and 4 will pose significant environmental risks to the Hudson river watershed.	Comment noted. The EIS will analyze the potential impacts of the alternatives. As required by the National Environmental Policy Act, any impacts from the plan will be avoided, minimized and mitigated for.
20	Social and ecosystem benefits must be accounted for in any analysis- especially for a study with such a long timeframe and cost.	Because this study was authorized for coastal storm risk management, the study objective must contribute to national economic development (NED) consistent with protecting the nation's environment. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED include net value of goods and services that are marketed and also those that are not marketed. Environmental, regional, and social effects that may inform trade-offs and alternative plans are documented in accounts other than the NED account.
21	I have serious concerns about the impact that some of these alternatives, particularly those involving a barrier wall, on the NY harbor. The installation of this infrastructure may be harmful to marine wildlife due noise+vibration, the trenching will churn up toxins, such as PCBs+ arsenic, that lay below the sea floor, and the construction may have an impact on marine recreational activities.	Comment noted. The EIS will analyze the potential impacts of the alternatives. As required by the National Environmental Policy Act, any impacts from the plan will be avoided, minimized and mitigated for.
22	Should be a second scoping prior to tier2. Too little information to provide good comment. Need to know what is being done for tier 1 report	Comment noted. The intent of the tiering concept is to encourage elimination of repetitive discussions and to focus on the actual issues ready for decisions at each level of environmental review. Tiering expedites the resolution of big-picture issues so that subsequent studies can focus on project-specific impacts and issues. Tiering also allows environmental analyses for each Tier 2 project to be conducted closer in time to the actual construction phase, or as funds become available for construction.
23	Tributary walls must be designed to minimize impacts on adjacent wetlands and sensitive shoreline areas.	Concur.
24	A rigorous environmental review is necessary- is that even possible given restricted time frame?	The project will include full environmental analysis as required by the National Environmental Policy Act through Environmental Impact Statement preparation. The time frame will allow the study team to include impact analysis in the formulation, design, and potential implementation of the project.

ITEM	COMMENTS	RESPONSES
25	Special measures needed to ensure minimum impact on Hudson Valley National Historic Area and National Parks sites within the entire targeted area	As an agency of the federal government, the U.S. Army Corps of Engineers must comply with the National Environmental Protection Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA) which requires that we take into account the effects of any undertaking on historic properties. As part of the Environmental Impact Assessment the District is preparing a Cultural Resources Assessment that includes compiling a list of historic resources within the area of potential effect (APE) for each alternative and considering the potential adverse effects associated with each. The District will be carrying out coordination with the New York and New Jersey State Historic Preservation Offices, the Advisory Council on Historic Preservation, Native American Tribes, and other interested parties to assist in identifying historic resources within the study area. In accordance with NEPA and the NHPA, as project plans are refined the District will identify which resources will be impacted and carry out further coordination with the SHPOs and other interested parties to develop measures to avoid or minimize adverse effects to those properties. The National Parks and the Hudson Valley National Heritage Area are included in the list of resources within the study area to be considered as the project advances. Any consideration of project measures on lands owned by the National Park Service must have the National Park Service's agreement that the measures proposed are mutual acceptable to the park's mission, whether or not a historic property is present.
26	In water barriers will damage the Hudson River Estuary	Comment noted. The EIS will analyze the potential impacts of the alternatives. As required by the National Environmental Policy Act, any impacts from the plan will be avoided, minimized and mitigated for.
27	Have you conducted wide-ranging environmental impact tests for all the plans?	The study team has gathered and organized the existing information to establish the baseline environmental impacts and has begun analyzing the potential impacts based on the level of detail available at this early conceptual planning stages. The site-specific impact analysis will be performed once the design detail is available to answer the questions needed to perform the full analysis, such as the exact location of features, heights, widths, hydrodynamic analysis, etc.
28	The inwater barriers will limit tidal ebb and flow endangering fish species and impeding flushing of contaminants out of the harbor.	These are potential impacts that the study team is analyzing. There are a number of measures, mitigation tools, and design parameters which can influence / minimize impacts to tidal range, aquatic species migration, and water quality. These include the location and depth/height of the barriers, number of gates/openings, operational parameters, etc. As part of the impact analysis and formulation process, the study team will adjust design parameters in efforts to avoid, minimize, and lastly mitigate for impacts. The Corps will coordinate with the US Fish and Wildlife Service and the National Marine Fisheries Service on threatened or endangered species that could be negatively impacted by the project. If there is a likelihood that threatened or endangered species would be negatively impacted by the project, then formal consultation and Biological Assessment would be performed to identify Conservation Measures for these species.
29	What will happen to endangered fish species if they can no longer enter and leave the Hudson River?	The Corps would not (and is not able to by law) implement a project that would contribute to the extinction of endangered species. Impacts to endangered species will be carefully analyzed and mitigation and conservation measures would be coordinated with the National Marine Fisheries Service and the US Fish and Wildlife Service. The number of gates and width of gates can be designed, based on environmental impact analysis, to avoid and minimize negative impacts to fish migration.



ITEM	COMMENTS	RESPONSES
30	How will this project - with the barrier across Eastchester Bay - at the lower end of the Hutchinson River affect the river which has the second largest wetland area and the Thomas Pell wildlife sanctuary	The study will analyze, avoid, minimize and recommend mitigation to impacted habitats within the study area based on environmental impact analyses undertaken.
31	Please inform the public about the various environmental impacts of each of the alternatives. Thank you.	The Draft Tier 1 Environmental Impact Statement (EIS) will be released to the public for comment and a series of public meetings will be held to share this analysis and elicit public and agency input to be incorporated into the Final Tier 1 EIS.
32	NYC H2O would like to see preliminary environmental impact assessments for each plan.	The Interim Report is the first preliminary document available to the public, to be followed by the Draft Tier 1 EIS.
33	Could you provide a written description of the economic analysis methodology and the proposed EIS scope of work?	Please see the Interim Report for these descriptions.
34	This study should include the effects of the barriers in areas along the Hudson north of the city and to its tributaries as well.	Concur, the analysis will include the tidally affected areas along the Hudson north of New York City and the tidally affected tributaries as well.
35	In-depth studies are needed on the impacts on endangered species, fish migration, water quality, tidal flow and other conditions before any plan is advanced.	Concur, in-depth environmental analysis is needed prior to the implementation of the project and impact avoidance, minimization, and mitigation must be considered and included in the formulation and design of the project.
36	The barrier will block tidal flows and river output flow into the sea.	Analysis of how the various barriers would impact tidal flows and hydrology will be conducted to better inform the formulation, design, and impact analysis for the Feasibility Study.
37	The barrier would destroy the military historic sites on Sandy Hook and the Rockaway Point.	As an agency of the federal government, the U.S. Army Corps of Engineers must comply with the National Environmental Protection Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA) which requires them to take into account the effects of any undertaking on historic properties. The Fort Hancock and Sandy Hook Lighthouse Historic District National Historic Landmark, as well as other historic districts associated with Gateway National Recreation Area on the Rockaway Peninsula, would be affected by the construction of Alternative 2. These historic properties are included in the Corps' assessment of this Alternative. Should this Alternative be considered further, the Corps would be required to coordinate with the National Parks Service to ensure any measure associated with Alternative 2 is compatible with the park's mission and mutually acceptable to the National Park Service. Furthermore for effects to National Historic Landmarks, such as Fort Hancock and the Sandy Hook Lighthouse, the Corps is required to minimize harm to any National Historic Landmark and is required to coordinate with the Advisory Council on Historic Preservation and the Secretary of the Department of the Interior regarding potential adverse impacts to the property.
38	The barrier would negatively impact national security, specifically the function and activity of Naval Weapon Station Earle.	The potential impacts to operations at Naval Weapon Station Earle will be considered in the Environmental Impact Statement. The operating requirements for Naval Weapon Station Earle, in conjunction with port operations, will be a key consideration in the number of gates and their assumed frequency of operations for barriers under consideration.

ITEM	COMMENTS	RESPONSES
39	The construction of Alternatives 2, 3A, 3B and 4 will dredge up industrial contaminants no buried in layers of sediment.	The potential impacts of Hazardous, Toxic, and Radioactive Waste (HTRW) will be analyzed in the Environmental Impact Statement. If there are hazardous impacts associated with the project, then those would need to be remediated by the responsible parties prior to project implementation.
40	The noise of the barriers and of construction will change the behavior of marine animals, possibly affecting migration.	Impacts due to noise during construction and operation will be analyzed as part of the Environmental Impact Statement.
41	As a tidal estuary, the Hudson River ebbs and flows with the ocean tide, with a complex mixing of water from the harbor and the freshwater from up north in the river that is the main characteristic of the ecosystem and important to the threatened and endangered species and species of concern.	Noted. Impacts to tidal range, hydrology, and water quality (including salinity) will be analyzed as part of the NEPA process for this study. Impacts to threatened and endangered species will also be analyzed and will include an analysis of potential impacts to tidal range, salinity, hydrology, and more in the analysis.
42	The barriers will alter the entire ecology of the river, starving it of nutrients, cutting off the migration and movement of fish, and starving the ocean of sediments from the oceanward flow.	The storm surge barriers that are included in Alternatives 2, 3, 4A, and 4B include gates that would remain open the majority of the time. Analysis will be done to assess whether the impacts of the barriers would cause unacceptable significant impacts, or whether the proposed barriers could be designed to avoid, minimize, and mitigate for impacts such that they become acceptable. Sediment transfer through the watershed, migration and movement of fish, as well as other factors, will all be considered in the Environmental Impact Statement that assesses the potential impacts of the proposed alternative concepts under consideration.
43	Cutting off of tidal flow could also entirely alter the marshes and aquatic vegetation, which sequester carbon, along the river.	Impacts to tidal range will be analyzed as part of the Environmental Impact Statement, which will look at whether changes to tidal flow will negatively impact marshes and aquatic vegetation and whether those impacts can be avoided, minimized, and mitigated for. The alternative concepts also include complementary features, such as natural and nature-based features like wetland/marsh restoration, which may improve the aquatic vegetation and marshes in areas where these measures are applied.
44	Do state regulations for sound during project take into account sound results disturbing wildlife and wildlife migration by interrupting ecolocation used by mammals i.e. whales etc.	Yes, impacts from noise during construction and during operation of the project will be included in the impact analysis for this study.
45	How are you gathering data, particularly for the environmental aspect of the plans, environmental impacts and water quality?	Baseline data is being gathered from the existing information of federal, state, and local agencies, as well as peer-reviewed articles in academic journals. Environmental impacts, including water quality, are typically estimated through USACE-certified models and subject matter experts.

ITEM	COMMENTS	RESPONSES
46	Storm surge barriers could have huge potential negative impacts on the NY-NJ harbor ecology and tidal flow of numerous rivers and wetlands in the area. The proposed fixed barriers could restrict or block the migratory runs of numerous native fish, some of which are federally endangered. The barriers could also increase turbidity, and increase distribution of contaminants (like PCBs and pesticides), or trap untreated sewage behind the barriers during storms. What are you doing to address these impacts?	Impacts to tidal range will be analyzed as part of the Environmental Impact Statement (EIS), which will look at whether changes to tidal flow will negatively impact marshes and aquatic vegetation and whether those impacts can be avoided, minimized, and mitigated for. Potential impacts to species migration and movement, water quality (including turbidity), and impacts from hazardous, toxic, and radioactive waste (HTRW) will similarly be analyzed in the EIS. Particular attention will be paid to social and health impacts for HTRW concerns and to threatened and endangered (T&E) species for ecological concerns, which will be coordinated with the environmental resources agencies responsible for enforcing the Endangered Species Act. If the Recommended Plan, once identified, has the likelihood to negatively impact T&E species, then the Corps will formally coordinate with US Fish and Wildlife Service to prepare a Biological Opinion. Impacts will be avoided, minimized, and mitigated as practicable and if the potential impacts are unacceptable, then the project would not be recommended for implementation. It is of note that the alternative concepts also include complementary features to address frequent flooding, such as natural and nature-based features (NNBFs) like wetland/marsh restoration, which may improve the aquatic vegetation and marshes in areas where these measures are applied. These NNBFs have the potential to improve water quality by filtering contaminants, stabilizing erosion, reducing turbidity, and provide habitat and social amenities for nearby communities, in addition to helping manage the risk of frequent flooding.
47	How long will the barrier increase residence time within the barrier (just the permanent structure not when the gated are closed) How will this affect fish/shellfish larva distribution patterns within the estuary	The answer to this is unknown at this time, but will be investigated as part of the preparation of the tiered Environmental Impact Statement.
48	The study should look at the environmental justice implications of the construction of such barriers - what neighborhoods are protected, and what is the criteria for protecting certain neighborhoods over other? What communities are being sacrificed for the well-being of others?	Environmental justice is considered and discussed for all Corps projects. The criteria for alternative concept screening will be discussed in the Interim Report for this project. The Corps and our partners work to ensure that any recommended plan does not induce impacts to adjacent neighborhoods. Any impacts must be mitigated for as part of the project and the cost for the mitigation is included in the screening analysis to ensure that no one community is "sacrificed" for the well-being of another but rather that the proposed solution is a holistic one which addresses the problems of all communities in the study area to the extent that is feasible and practicable, in accordance with the law, guidance, and regulations.
49	How will each alternative impact wetlands, marshes and other features that sequester greenhouse gases?	Any impacts to wetlands, marshes, or other aquatic vegetation would need to be mitigated based on functional habitat, such that any recommended plan would result in either no impact as far as acres of wetlands impacted, or would likely result in a net increase in functional habitat units. Of note, the alternative concepts under consideration also include natural and nature-based features, such as wetlands and marshes, so that project is likely to result in a net increase of these ecosystems which sequester greenhouse gases, filter contaminants from water, stabilize erosion on shorelines, and provide valuable habitat.
50	How will this impact pollutants in the Hudson River?	None of the measures currently under contemplation in the study generate pollutants directly, but may affect the distribution of existing pollutants within the estuary (particularly any in-water measures such as surge gates). To understand the relationship between the potential measures and the distribution of existing pollutants, typically a hydrologic model is used.

ITEM	COMMENTS	RESPONSES
51	What is the role of land use planning and green infrastructure?	Any Recommended Plan would be coordinated through local land use planning as part of the Coastal Zone Management coordination, and to avoid conflicts between our study objectives and local planned uses already in progress. Green infrastructure is one measure that can be considered to address high-frequency, low intensity flood events, or to decrease operations and maintenance requirements for hard structural measures (i.e., create a storage pond if space is available to decrease the number of times a deployable floodwall needs to be erected). Natural and nature-based features for coastal storm risk management, such as wetlands, oyster reefs, and marshes will be considered as complementary measures to address high frequency flooding.
52	Requesting a 120 day NEPA scoping period	In response to numerous requests to extend the NEPA scoping period, the scoping period was extended. The scoping period began on July 6, 2018 and extended 120 days, closing on November 5, 2018.
53	Requesting a full Environmental Impact Statement	A full Tier 1 and Tier 2 Environmental Impact Statement (EIS) will be prepared for this study and will analyze the potential broad and site-specific impacts using the available level of detail as the design progresses. No project can be built without the successful completion of the Tier 2 site-specific/detailed EIS.
54	What might be impacted on the upper estuary (Troy Dam to Kingston)?	No measures are proposed to be built in this region, and it is not expected to be impacted by this study. However, hydrologic modelling will continue to be done for confirmation.
55	This study must evaluate the potential effects on all affected water bodies, including the Hudson River and its tributaries, the New York Harbor, Great South Bay, the New York Bight, Jamaica Bay and the Long Island Sound.	As a part of this study we will be evaluating the potential effects on all affected waterbodies.
56	Why are you rushing this plan through without an environmental impact study?	The Corps is following its study process and has requested and been granted an exemption to the normal 3 year study requirement, extending the study to last 6 years due to the complexity and large scope of the study. There will be both a Tier 1 and Tier 2 Environmental Impact Statement prepared as part of this study. No decision has been made to date and the input received from the public engagement on the study will be used to help scope the analysis performed for the environmental impact statement.
57	This study should consider the effect of the alternatives on anadromous species.	Concur, the study will analyze the effect of the alternative concepts on anadromous species.
58	How does the Army Corps plan to account for increased flood risk in low-income communities of color? What is the plan to not exacerbate environmental injustice? Many communities of color and EJ Communities are located outside of the so-called "protected" areas within the scope of in-water barriers.	An environmental justice analysis has been conducted for every county in the study area. This analysis will be used to ensure that no low-income and/or minority communities are disproportionately affected by any possible negative aspects of the potential alternatives, nor disproportionately left out of the positive aspects. The Interim Report identifies the environmental justice communities in the study area.
59	Why is there no reference to the Federal Coastal Zone Management Program in the presentation? It should be part of the NEPA review.	CZM is and will be part of the NEPA review.

ITEM	COMMENTS	RESPONSES
60	No Action Alternative - what does this mean and how is this used?	The No Action Alternative is included in every array of alternatives for every study as a baseline for comparing the cost and benefits of each proposed USACE action/alternative versus the cost and benefits of doing nothing. The No Action Alternative is a projection of what would likely occur in the future over 50 years (starting from when construction of the proposed project would be completed to begin generating benefits) if USACE takes no action as a result of this study. The future projection under the No Action Alternative is also called the Future Without Project Condition.
61	What is the expected environmental disturbance of surge gates while the gates are open?	This will be analyzed and discussed in the Tier 1 Environmental Impact Statement which has not yet been prepared. However, the environmental considerations/potential impacts that would need to be avoided, minimized, and mitigated for include impacts to tidal range, species migrations, hydrology, water quality, navigation, wetlands/marshes, aesthetic impacts, noise, etc. Ways to avoid impacts include the inclusion of more/wider gates in the barrier design to minimize flow restrictions, placement of the barrier, barrier types, wetland restoration, water quality mitigation, and more.
62	The barriers impeding tidal flow could further diminish the effectiveness of clean-up efforts on the Hudson. How does the Army Corps intend to manage this risk to the local ecology and public health?	Noted. Impacts to hydrology and how that might impact ongoing restoration efforts will be analyzed as part of the Tier 1 EIS. Opportunities to avoid, minimize, and mitigate any impacts will also be investigated.
63	This study must take into account that the Hudson River is a heavily silt laden river and all actions must consider the impacts of siltification and reduced navigability.	Concur, the study will consider the geomorphology, sediment transport, as well as navigation impacts.
64	What about the fish when the gates are closed?	Barrier closures would not be expected to have long durations. For example, the preliminary impact analysis of barrier closure in the Jamaica Bay region was performed as part of the Rockaway Reformulation in 2016. This impact analysis considered a range of potential impacts with 96 hour closure being a worst case scenario (in the case of a gate failure), and 48 hour closure being a more reasonable expected closure. Temporary impacts to fish during closure will be analyzed as part of the EIS. However, during large storm/hurricane conditions which would trigger a barrier closure, impacts to fish due to turbidity caused by the storm are already expected, which can limit fish vision and mobility for many species.
65	What consideration has been given or will be given to environmental impact once cost is determined?	To date, rough mitigation costs have been included in the total cost estimates prepared for the alternative concepts. These will be refined as the study progresses. There are also design considerations that can be included which reduce environmental impact but cost more (such as including more openings in the design). These will play into the cost as well.
66	If a solution is the least expensive but has a huge environmental impact - will it still be considered?	If a proposed solution has a huge environmental impact, there are three ways to evaluate this impact. The first is to determine if it is possible to avoid this impact. If avoidance is not possible, the next step is look for ways to either minimize the impact or mitigate for the impact. Minimization and mitigation actions can be costed out, and that cost is factored into the cost portion of the benefit cost ratio, which adversely affects project justification.



ITEM	COMMENTS	RESPONSES
67	What will the Corps do if an administration turns back present environmental requirements?	The National Environmental Policy Act (NEPA) of 1969 requires federal agencies, including the Corps, to consider the potential environmental impacts of their proposed actions and any reasonable alternatives before undertaking a major federal action, as defined by 40 CFR 1508.18. The Corps specific guidance in NEPA compliance can be found in ER 200-2-2.
68	What if you discover additional issues not presently covered under NEPA?	It is unclear what the commenter is referring to. The Corps will assess the potential impacts of the proposed alternative concepts as required by NEPA and Corps policy.
69	Have impacts from storm barriers in LI Sound on Connecticut been studied/analyzed?	Although the State of Connecticut is not within the bounds of our study area, any impacts outside of our study area will be analyzed.
70	Have impacts to endangered species been calculated in the creation of these proposed plans?	No, the study just finished the scoping stage and is beginning to analyze impacts on a conceptual level based on existing information. The Interim Report identifies data gaps and targeted further analysis. The input received on the Interim Report will help to shape the additional analysis performed for impact analysis.
71	When studies are complete who implements, pays for and oversees the projects?	The Corps will cost share the implementation of the project with our non-federal sponsors. Constructed projects are operated and maintained by the non-federal sponsors.
72	How will the proposed barriers effect the Hudson River estuary ecosystem?	Each barrier would likely affect the Hudson River estuary differently, however changes in tidal prism, flow, sedimentation, and other variables are possible. These variables would typically be analyzed using a USACE-certified model, and any negative effects would be avoided, minimized, and/or mitigated for.
73	How have you or will you research and evaluate the pros/cons of the structural measures from other countries, regions for effectiveness and environmental impacts?	The study team has reached out to barrier operators in Italy, Russia, New Orleans, Connecticut, and the Netherlands to gather information on environmental impacts, operations, maintenance, and effectiveness, as well as cost. This information is being included in the feasibility study.
74	Do you have environmental experts on your team? Do you partner with experts from Riverkeeper, Food and Water Watch, Sierra Club, etc.?	Yes, the study team includes environmental experts with degrees in biology, ecology, cultural resources, hazardous, toxic, and radioactive waste, environmental policy, sustainable development, archeology, and more. The Corps is partnered with the New York State Department of Environmental Conservation, New Jersey Department of Environmental Protection, and New York City on this study. All of these partnered agencies also have environmental experts who work on the project. The Corps may look to engage the expertise of contracting firms specializing in environmental analysis, academia, and/or USACE's Engineer, Research, and Development Center, or ERDC, which also has a number of world-renowned environmental experts. On this study, Riverkeeper, Food and Water Watch, Sierra Club, etc. are considered to be stakeholders and the study team engages with them and other stakeholders as part of the public engagement process. The study team may help to facilitate the formation of an Independent Technical Working Group which can facilitate more structured input from engaged stakeholders with specific expertise in the study process.
75	Which agency will assess fishery populations?	As with all studies, the Corps will coordinate with US Fish and Wildlife Service and the National Marine Fisheries Service to assess potential impacts to fisheries and aquatic species.
76	How will environmental services factor into your cost benefit analysis?	For USACE studies, benefits must be derived through a USACE certified or approved model. At present, the suite of certified and approved benefit models do not have a way to calculate monetary values for environmental services. The study will consider the contributions of environmental services in a qualitative sense to the Environmental Quality and Other Social Effects accounts required for USACE studies, and they will play a key role in the trade-off analysis among the different alternatives.



ITEM	COMMENTS	RESPONSES
77	If New York State values environmental or ecosystem service but USACE does not, what will the NYSDEC do?	The Corps must adhere to certified USACE models for calculating economic benefits - at present, none of the models include ecosystem services. However, the benefits to the economy from natural infrastructure can be described and included qualitatively to help decision makers by painting a fuller picture of the costs and benefits associated with alternatives. In addition to addressing ecosystem services qualitatively in the study, ecosystem services are also factored into the trade-off analysis among the different alternatives. Once the study arrives at a tentatively selected plan, the non-federal study sponsors, which includes New York State acting through the Department of Environmental Conservation, have the ability to put forth a Locally Preferred Plan (LPP) as the alternate recommendation, which can provide latitude when balancing priorities between state and federal objectives. The cost-sharing for a LPP may differ, depending on what it entails and whether that matches the federal authorizations and policies, but it is nonetheless a mechanism for the State to change a recommendation as long as the LPP has a benefit to cost ratio greater than one. If no LPP is put forth and the partners do not support the federal recommendation, or if the partners have other reasons, they can suspend or terminate the study for any reason within 30 days of written notice to USACE.
78	What will happen to the benthic community due to the gates and the inherent silt?	If an alternative which includes a storm surge barrier is implemented, there are likely to be unavoidable impacts to benthic species in the footprint of the barrier and potentially beyond if there are siltation impacts that cannot be avoided. These impacts would need to be mitigated for.
79	Will the analyses include potential impacts that extend beyond the study area (i.e. further east into Long Island Sound) or will the analysis stop at the study area boundary?	Yes, all potential impacts of proposed measures will be analyzed, regardless of the study area boundary. The EIS will include a cumulative impact analysis that will: (1) identify resources to consider in the cumulative impact analysis; (2) define the timeframe for cumulative impact assessment; (3) define study area for each resource; (4) identify other reasonably foreseeable future actions that could also affect the resource; (5) assess and report potential cumulative impacts by first describing the current health and historical context for each resource and then identifying the direct and indirect impacts of the Proposed Action that might contribute to a cumulative impact; and (6) assess the need for mitigation.
80	When will ACE be studying the impact of reflection from gates on other communities storm surge, impact on existing marshes by extensive hardening of shoreline, impact on marine organisms, increase in velocity, change of water flow patterns, stagnation, and reduced oxygen	This impact analysis has been on a conceptual level and using existing information and will be further developed throughout the study, and the pre-construction engineering and design phase, based on the available level of design detail.
81	How far east in the LI Sound will the study evaluate the potential for induced flooding? Will the study look at the LI Sound Study's Comprehensive Conservation and Management Plan and comply with its goals?	The analysis will consider effects on existing management plans that are in effect within study area.
82	Shoreline measures will make the waterfront look industrial and would kill the natural grasses and limit access to the waterfront.	Many of the shoreline measures considered include natural and nature-based features which will enhance the shoreline ecosystems. However, the structural shoreline measures for coastal storm risk management do have impacts that are unavoidable, though the study team expects to be able to minimize and mitigate for those impacts and if that is not possible, this could be grounds for screening the measures out if impacts are deemed unacceptable. Access to the waterfront could be included as part of project implementation either through the inclusion of walkovers or in the form of compensation for affected parties, as appropriate.

ITEM	COMMENTS	RESPONSES
83	Publish the schedule or opportunities for public comment. At what points during Tier 1 and Tier 2 EIS would there be public meetings and comment periods? Will meetings in future include Nassau County at every point in planning?	The exact dates for public engagement are not known but will be shared with the public once they are. The Corps will endeavor, in future, to give ample advanced notice on public meetings as much as is practicable. Due to the large study area which is larger than the state of Delaware and covers two states, 25 counties, and 322 municipalities, it is not feasible to hold individual meetings everywhere where there are interested stakeholders. The meeting locations will be carefully chosen to maximize public participation by being located throughout the study area and close to transit so that interested parties can reasonably attend at least one meeting. The Corps will also continue to use virtual meetings to supplement in-person meetings, where practicable for those who cannot travel to in-person meetings. Additionally, the study team will accept and consider all comments sent on the study, whether by email, mail, or in-person.
84	Will the Corps look at the Long Island Sound Comprehensive Conservation Management Plan?	The analysis will consider effects on existing management plans that are in effect within study area.
85	What is the environmental impact of mining the materials to build the barriers? The material may well come from poor, rural areas?	Impacts related to construction will be addressed as part of the NEPA analysis.
86	What will be the impact on riverside parks and trails from Scarborough Manor to Cold Spring?	There are currently no measures planned adjacent to any riverside parks and trails on the east side of the Hudson River between Scarborough Manor and Cold Spring. However, impacts will continue to be evaluated. The current rough proposed alignment is across the street and inland from Stony Point's Riverside Park and would thus be likely to have temporary impacts during construction to Stony Point's Riverside Park. These may include noise, air, traffic, and accessibility impacts during construction. Potential impacts are discussed in the Interim Report, however, the impact analysis is preliminary and will continue to be developed as the analysis continues.
87	Why haven't the EPA, FEMA, and NOAA taken a more active role in this in order to provide an environmental component to the study of which proposals would be better for these communities?	The EPA and NOAA are Cooperating Agencies on this study and FEMA is a Participating Agency. As such they participate in periodic meetings to provide data and expert input into the study process, in addition to the formal public and agency comment periods. Representatives from each of these agencies participated in the NEPA scoping process and the agency workshops held for this study.
88	What kinds of federal or state funding or pressure can be exercised so that a thorough environmental study can be done to determine which method(s) are safer for the river and for riverfront communities, economies, industries and transportation?	This study uses both state and federal dollars to prepare a Tier 1 and Tier 2 Environmental Impact Statement which will analyze the potential impacts of the proposed concept alternatives and the detailed impacts of the Recommended Plan. The impact analysis will include socioeconomic and transportation.

ITEM	COMMENTS	RESPONSES
89	Will each proposal have a coinciding environmental study as the environmental implications for each proposed alternative are unclear at this time?	Under the SMART Planning paradigm which is consistent with NEPA, the study progress will narrow the scope of alternatives from the reasonable array of alternatives to a tentatively selected plan (TSP). At this point in the Study, the alternative concepts are being analyzed conceptually based on existing information to see whether "fatal flaws" can be identified or whether some alternatives stand out significantly from others in terms of feasibility. This analysis will be presented in the Interim Report to be released in February 2019. The Interim Report will identify data gaps and recommend areas for additional analysis, but the comments received on the Interim Report will also help to form the scope of the additional analysis. It is possible that one or more alternatives will be able to be screened out as infeasible based on initial analysis, in which case it would not be carried forward for subsequent analysis at that time. The planning process is an iterative process and builds on itself, so the study team cannot predict now which alternatives will be carried forward, but should new information come to light later, the team is able to go back and reconsider measures or alternatives previously screened or even new measures.
90	The proposals presented are too large to short-change the NEPA process. All affected communities must be included in the discussion	Public engagement on Civil Works studies is a critical and valuable component to the study process, especially for mega studies such as this one. The NEPA process begins with Scoping, which was completed on November 5, 2018. The NEPA Scoping Process was extended due to public interest and lasted 120 days, whereas the National Environmental Policy Act only requires 45 days. The NEPA process also includes one public and agency comment period on a Draft Environmental Impact Statement (EIS) normally and an agency comment period on the Final Report. For this study, there will be at least two public comment periods, first on the Interim Report, to be released February 19, 2019, and again on the Draft Tier 1 EIS. There will additionally be public input as part of the preparation of the Tier 2 EIS. Thus, this study is expanding upon the normal NEPA process due to the great regional significance of the study and the scope of the alternatives under consideration.
91	What about putting a surge gate at the eastern tip of Long Island?	This possible alternative is beyond the New York District area of responsibility (AOR) but has been referred to our higher authority offices. Generally, the geographic/topographic along with hydrodynamic conditions of the Race pose serious challenge to design and construction of surge gate structures in this region.
92	On slide 25, the presentation mentions such laws as the National Historic Preservation Act, the Clean Water Act, the Clean Air Act but did not list the Coastal Zone Management program. These alternatives must comply with this program.	Concur, the study will coordinate with DOS and local agencies and prepare a Federal Consistency Determination in compliance with the Coastal Zone Management program.
93	For all flood gates, what are the effects on water quality when the flood gates are in the open position?	The flood gates will be designed to avoid/minimize any affects to water quality when the gates are open, as much as practicable. The effects of water quality have not been modeled yet, except for preliminary analysis done for Jamaica Bay as part of the Rockaway Reformulation before that storm surge barrier analysis was transferred to this NYNJHAT Study. Water quality analysis will be documented in future iterations of the study. Unavoidable impacts will either be mitigated, or if mitigation is not technically feasible, serve as a basis for screening alternatives.
94	For all flood gates, what are the effects on water quality when the flood gates are in the closed position?	It is possible that there will be temporary impacts to water quality, such as lowered dissolved oxygen due to less vertical mixing of the water column, when the gates are closed, but there may be ways to avoid/minimize these impacts, if not mitigate for them and these will be investigated as part of the study.

ITEM	COMMENTS	RESPONSES
95	What are the effects of the levee and berm tie-ins on the usability of the beach by shore-nesting birds?	The effects on shore nesting birds will be investigated as part of the preparation of the Tier 1 EIS. However, the levees and berm tie-ins would be placed as far inland as practicable to minimize impacts and construction would be coordinated with resource agencies. Where warranted, work windows would be instituted to limit work during the nesting season of threatened and endangered species to avoid impacting their nesting season. Where natural and nature-based features are included in the design, there may be a positive effect of increased nesting habitat for shorebirds. Mitigation may also increase available nesting habitat.
96	The Corps should consult the NY NJ Harbor Estuary Program Comprehensive Conservation and Management Plan (CCMP), the Long Island Sound Study CCMP, and the Long Island Sound Blue Plan.	Thank you, the study team will review these products.
97	What would the impacts of each of the alternatives for the communities located along the Hudson River, particularly those with active waterfronts and riverfront housing?	Communities located along the Hudson River could expect to have decreased flood risk and decreased economic and safety impacts in the event of flooding. There is a potential for aesthetic impacts if features obscure the views, either partially or fully, in order to prevent flooding. There are potential impacts to recreation/access, both positive and negative depending on the opportunities and potential designs.
98	What are the impacts to the railroads that run along the Hudson River (Metro North, Amtrak)?	Potential impacts to railroads would be decreased flood risk, improved transportation resiliency, potential aesthetic impacts to riders if views are obscured, and temporary impacts during construction of track-crossing deployable gates.
99	What are the impacts to the marinas and shipping facilities along the Hudson River?	Potential measures along the Hudson River are projected to be landward of any marinas or shipping facilities and no impacts are currently projected. Once the design is sufficiently detailed, any impacts to real estate will be analyzed and presented.
100	Offshore storm surge barriers could change the sediment transport and distribution that would result in the distribution of harmful contaminants throughout the New York-New Jersey Harbor.	This possibility will be investigated, as the modeling to answer these questions still needs to be conducted. The barriers could also provide an opportunity to trap and remove polluted sediments as part of the ongoing cleanup effort.
101	Offshore storm surge barriers would trap sediments outside the barriers filling shipping channels and requiring more frequent dredging.	Sediment transport, hydrology, and impacts to transportation will be analyzed as part of this study. If more frequent dredging is anticipated to be required as a result of the proposed project, then the cost and impact of this increased dredging would be factored into the Feasibility Study screening process.
102	Offshore storm surge barriers could trap sewage	The impacts of proposed barriers on CSOs (compared to existing condition, open and closed conditions) will need to be assessed. If the barrier would exacerbate existing problems, there may be opportunities to mitigate for this. Potential mitigation opportunities might include drainage upgrades, nature-based features (wetlands that filter water and uptake nitrogen in sewage), green infrastructure upgrades to reduce impact on stormwater system, or even upgrades to wastewater treatment facilities.

ITEM	COMMENTS	RESPONSES
103	There should be a full study of environmental impacts before reaching a short list of alternatives.	The Corps Planning Paradigm, or SMART Planning, which is prescribed by law (WRDA 2007 and WRRDA 2014), requires the Corps to use available information, wherever possible, and to screen an array of alternatives down earlier in the study process, as much as practicable. SMART Planning does not eliminate the detail necessary to do a proper environmental impact analysis or mitigation planning; it is about developing the appropriate data at the right time to make the next decision. Determining the level of detail will often require input from FWS, NMFS, and other agencies involved in a study. The identification, consideration, and analysis of alternatives are important to the NEPA process and goal of objective decision making. That said, the study team will fully comply with the National Environmental Policy Act, or NEPA, and will perform a tiered Environmental Impact Statement that takes environmental considerations into account at each stage of the planning process.
104	Conclusions reached for New York - New Jersey Harbor cannot be applied to the Long Island Sound. Long Island Sound and its coastal communities will likely experience unique harmful impacts which must be identified and addressed.	Impacts to communities and the environment for the Long Island Sound will be analyzed as part of this study.
105	Sea barriers in western Long Island Sound will restrict tidal flushing and alter patterns of exchange between fresh and salt water and sedimentation.	The impact of barriers on tidal flushing, exchange, salinity and sedimentation will be analyzed as part of this study.
106	PCBs, algal blooms, fish species, birds/waterfowl, plants, horseshoe crabs, mussels/oysters, blue crabs, sea turtles, cetaceans, shark species, unique areas/ecosystems, recreations use of waterways, and aesthetic values to communities.	The EISs will consider these resources, among others, in the impact analysis.
107	The alternatives presented do not present a reasonable range of alternatives as required under NEPA.	These alternative concepts presented at the scoping meeting are very preliminary and represent scales of solutions (from overall system-wide to regional to localized) rather than the traditional suite of alternatives presented in USACE studies. Actual locations and site-specific measures (whether structural, nonstructural, NNBF) have yet to be developed and analyzed for the upcoming draft report in 2020. The alternative concepts represent a reasonable range of solution scales to be considered, with the actual alternative components to be identified later.
108	The Corps should analyze impacts of/to sedimentation, pH (Ocean Acidification), temperature change, combined sewer overflows, dissolved oxygen levels,	The Corps will analyze the potential impacts of the proposed project, including impacts to sedimentation, water quality, and combined sewer overflows.
109	The Corps has muddled the NEPA process with tiering	Tiering is part of the NEPA process in accordance with 40 CFR 1508.28. It is often used by other agencies, like Department of Transportation, on large projects where the level of site-specific detail is not available in the early stages of planning/study, such as with this mega study.
110	Please provide a list of all the organizations, especially environmental organizations who attended these events.	A list of scoping meeting participants is available in the Scoping Report Appendix to the Interim Report.



ITEM	COMMENTS	RESPONSES
111	Although there is some attention to potential impacts on the Hudson riverbed, fish and the quality of water, air, etc. There is not enough time for an in depth analysis of the various projects. Please extend the public input period or distribute a more detailed feasibility study to a wider network of groups.	Public engagement on Civil Works studies is a critical and valuable component to the study process, especially for mega studies such as this one. The NEPA process begins with Scoping, which was completed on November 5, 2018. The NEPA Scoping Process was extended due to public interest and lasted 120 days, whereas the National Environmental Policy Act only requires 45 days. The NEPA process also includes one public and agency comment period on a Draft Environmental Impact Statement (EIS) normally and an agency comment period on the Final Report. For this study, there will be at least two public comment periods, first on the Interim Report, to be released February 19, 2019, and again on the Draft Tier 1 EIS and the study team will preemptively extend the comment periods beyond the required 45 days. There will additionally be public input as part of the preparation of the Tier 2 EIS. Thus, this study is expanding upon the normal NEPA process due to the great regional significance of the study and the scope of the alternatives under consideration. The Interim Report has more detail and will be released on February 19, 2019, to be followed by a Draft Feasibility Report and Tier 1 EIS. Both will be released for public and agency comment.
112	The limited time frame for this review includes a butchery of the NEPA project. Meetings after this should be held in every neighborhood/ community where the barriers are planned and the adjoining communities where the redirected water is bound to go.	Public engagement on Civil Works studies is a critical and valuable component to the study process, especially for mega studies such as this one. The NEPA process begins with Scoping, which was completed on November 5, 2018. The NEPA Scoping Process was extended due to public interest and lasted 120 days, whereas the National Environmental Policy Act only requires 45 days. The NEPA process also includes one public and agency comment period on a Draft Environmental Impact Statement (EIS) normally and an agency comment period on the Final Report. For this study, there will be at least two public comment periods, first on the Interim Report, to be released February 19, 2019, and again on the Draft Tier 1 EIS and the study team will preemptively extend the comment periods beyond the required 45 days. There will additionally be public input as part of the preparation of the Tier 2 EIS. Thus, this study is expanding upon the normal NEPA process due to the great regional significance of the study and the scope of the alternatives under consideration. Due to the large study area which is larger than the state of Delaware and covers two states, 25 counties, and 322 municipalities, it is not feasible (due to the monetary and temporal time constraints of the study by law) to hold individual meetings everywhere where there are interested stakeholders. The meeting locations will be carefully chosen to maximize public participation by being located throughout the study area and close to transit so that interested parties can reasonably attend at least one meeting. The Corps will also continue to use virtual meetings to supplement in-person meetings, where practicable for those who cannot travel to in-person meetings. Additionally, the study team will accept and consider all comments sent on the study, whether by email, mail, or in-person.
113	Additional public meetings should be held in communities all the way up to Troy.	Due to the large study area which is larger than the state of Delaware and covers two states, 25 counties, and 322 municipalities, it is not feasible (due to the monetary and temporal time constraints of the study by law) to hold individual meetings everywhere where there are interested stakeholders. The meeting locations will be carefully chosen to maximize public participation by being located throughout the study area and close to transit so that interested parties can reasonably attend at least one meeting. The Corps will also continue to use virtual meetings to supplement in-person meetings, where practicable for those who cannot travel to in-person meetings. Additionally, the study team will accept and consider all comments sent on the study, whether by email, mail, or in-person.

ITEM	COMMENTS	RESPONSES
114	What different event and sea level rise scenarios have been developed to test plans?	Different probability event conditions will be evaluated during optimization of the selected alternative later in the study (planned now for approximately 2021). Different sea level rise projections will likely be evaluated leading to the Tentatively Selected Plan in spring 2020, and also at subsequent stages of the study.
115	What are opportunity costs of this investment?	No investment in terms of project construction has been made yet, as that is the focus of this feasibility study. For how USACE addresses opportunity costs, you can refer to Planning Guidance Notebook (Engineering Regulation 1105-2-100), paragraph 2-4.k: Here is an excerpt from this paragraph: "From an economic perspective, the real measure of cost is opportunity cost, i.e., the value of that which is foregone when a choice of a particular plan or measure is made. In order to capture the opportunity costs of proposed plans, NED costs include three types of costs: implementation costs, other direct costs and associated costs....Typically, opportunity costs are equal to the market prices of goods and services in competitive markets. However, market prices can be often distorted by monopoly power, price controls, taxes or subsidies. In cases where market prices do not reflect the opportunity cost of resource use, other means are used to develop NED costs. Surrogate values are often used which reflect the opportunity costs from a similar situation."
116	Are the only plans under serious consideration are plans 2-5 while plan 1 is effectively off the table? Or is a plausible alternative to rely on local Action without the NEPA?	The No Action Plan is compared against each Alternative. The Plan that reasonably maximizes net benefits, i.e. has the greatest benefit to the National Economic Development (NED) will be the NED plan, which is normally what the Corps recommends. The Recommended Plan, however, must be acceptable and must avoid, minimize and mitigate for impacts. The Corps cannot move forward to implement a recommended plan without approval and funding from Congress and without the partnership and cost-sharing of the non-federal partner(s).
117	I am concerned about the fast tracked process	It is incorrect that this study is fast tracked. In fact, this study has been extended beyond the normal three years due to the size, scope, and complexity of the study. Public engagement on Civil Works studies is a critical and valuable component to the study process, especially for mega studies such as this one. The NEPA process begins with Scoping, which was completed on November 5, 2018. The NEPA Scoping Process was extended due to public interest and lasted 120 days, whereas the National Environmental Policy Act only requires 45 days. The NEPA process also includes one public and agency comment period on a Draft Environmental Impact Statement (EIS) normally and an agency comment period on the Final Report. For this study, there will be at least two public comment periods, first on the Interim Report, to be released February 19, 2019, and again on the Draft Tier 1 EIS and the study team will preemptively extend the comment periods beyond the required 45 days. There will additionally be public input as part of the preparation of the Tier 2 EIS. Thus, this study is expanding upon the normal NEPA process due to the great regional significance of the study and the scope of the alternatives under consideration. The study is expected to last seven years instead of the normal three years to complete a Feasibility Study.
118	Formal request to have the response period be extended by 60 days.	The NEPA Scoping processes was extended until November 5, 2018 (120 days total).



ITEM	COMMENTS	RESPONSES
119	Because this impacts the whole Hudson river estuary, please hold more of these meetings in town & cities along the Hudson ( e.g. Beacon, New beach, Tarrytown, Albany, Kingston) & please hold comments open for 90 (ninety) days. Please all along estuary need <b>URT</b>	Public engagement on Civil Works studies is a critical and valuable component to the study process, especially for mega studies such as this one. Due to the large study area which is larger than the state of Delaware and covers two states, 25 counties, and 322 municipalities, it is not feasible (due to the monetary and temporal time constraints of the study by law) to hold individual meetings everywhere where there are interested stakeholders. The meeting locations will be carefully chosen to maximize public participation by being located throughout the study area and close to transit so that interested parties can reasonably attend at least one meeting. The Corps will also continue to use virtual meetings to supplement in-person meetings, where practicable for those who cannot travel to in-person meetings. Additionally, the study team will accept and consider all comments sent on the study, whether by email, mail, or in-person. The public comment period on the Interim Report was preemptively extended beyond the 45 day requirement and the comment period was set at 90 days.
120	Make sure the website shows all options on the front page so that it doesn't look like only one alternative has been selected.	Noted, thank you.
121	Scoping comment period needs to be longer still- 90 days at least- more publicity more public meetings in more different locations.	Noted, the public comment period on the Interim Report was set for 90 days. The public meetings are being publicized earlier, with three press releases instead of one, and the Corps will hold 8 (eight) public meetings instead of five in eight locations. Additionally, one or more virtual only meetings will be held for those who cannot feasibly attend a meeting in person.
122	If your study impacts on the NY/NJ Metro area, why are there no meetings in Rockland and Westchester?	Due to the large study area which is larger than the state of Delaware and covers two states, 25 counties, and 322 municipalities, it is not feasible (due to the monetary and temporal time constraints of the study by law) to hold individual meetings everywhere where there are interested stakeholders. The meeting locations will be carefully chosen to maximize public participation by being located throughout the study area and close to transit so that interested parties can reasonably attend at least one meeting. The Corps will also continue to use virtual meetings to supplement in-person meetings, where practicable for those who cannot travel to in-person meetings. Additionally, the study team will accept and consider all comments sent on the study, whether by email, mail, or in-person.
123	If one of the non-federal co.sponsors does not approve any particular alternative-is it dead?	The Corps cannot move forward with project implementation without the continued support of our non-federal sponsor(s).
124	Does cost estimate include cost of complete removal if we get it wrong?	No, the preliminary cost estimates do not include cost of removal. Although estimates do include Operations, Maintenance, Repair and Rehabilitation costs. Please see the Cost Appendix for the Interim Report for more information on the preliminary cost estimates.
125	In order to collect more public and local input extending the public comment period would be critical. And extend the period for the first tier of EIS review, likewise extending would engage local studies and public.	Concur, the Scoping Period was extended twice, with a total duration of 120 days. The Interim Report will have a 90 day comment period, instead of 45 days, and the Tier 1 EIS will also have an extended comment period due to the significant public engagement and scale and scope of the study.

ITEM	COMMENTS	RESPONSES
126	Please explain the "fast-track" process for disaster mitigation projects such as this and how these factors differed from a "typical" process. - timeline -public comments - winnowing of alternatives to selection	The NYNJHAT Study process has not been fast tracked. Under current default USACE civil works process, feasibility studies take three years to complete. USACE requested an exemption from this schedule for the NYNJHAT study and was approved on October 31, 2018 by the Assistant Secretary of the Army (Civil Works) for a 6 year study schedule to be completed in 2022. For this study, there will be at least two public comment periods, first on the Interim Report, to be released February 19, 2019, and again on the Draft Tier 1 EIS. The public comment period for the Interim Report has been extended to 90 days, which is beyond the required 45 days. There will additionally be public input as part of the preparation of the Tier 2 EIS. Thus, this study is expanding upon the normal NEPA process due to the great regional significance of the study and the scope of the alternatives under consideration.
127	Please explain how each partner-NYSDEC, NJDEP and NYC- would have to approve of - the two alternatives for further review; and, - the final selection?	The Corps partners with non-federal sponsors, in this case NYSDEC, NJDEP, and NYC, to cost-share and implement studies and projects. They review the assumptions, methods, and results for each step of the planning process. Without the explicit support of the partners, the study cannot go forward past each checkpoint.
128	What is the path through which a community or individual's property is damaged as a result of your project by which they can seek compensation?	Once the study has arrived at a Tentatively Selected Plan (TSP), the design for the TSP is further refined. A Draft Real Estate Plan is prepared which identifies the real estate easements and/or properties in kind that would need to be acquired for project implementation. USACE works through the non-federal sponsors, after Congress appropriates the funds needed for the project, to reach out to land owners and work with communities where project implementation is occurring. An appraisal is prepared by an independent appraiser, and an offer is made by the non-federal sponsor to the property owners. Property owners are offered the fair market value, as determined by the appraisal, of the property rights needed for construction and maintenance of the project.
129	Since environmental/ecosystem damage will affect the business & economies on and beside riverside towns-'marinas tourist destinations dependent on the health of river ecology. It is imperative that "eco-system services" not solely be addressed at the mitigation level but now.	Adverse impacts to the local economy (business losses) are factored into benefit cost analysis. Ecosystem services are addressed qualitatively in the study and factor into the trade-off analysis among the different alternatives.
130	How are the NYC studies being incorporated?	Coastal storm risk management projects by NYC are incorporated into the cumulative impacts discussion in the NEPA document. Of this set of NYC projects, the ones that are of magnitude large enough to affect plan selection have been identified by the City have been incorporated into the existing conditions of the economic modeling.
131	At the NYC meeting Bryce said that the six (6) alternatives would be narrowed down to just two (2) alternatives by Fall 2018. But they didn't say that (Poughkeepsie). Will you be narrowing down to 2 alternatives by Fall 2019.	The change in messaging reflects the evolution of our planning and adapting to feedback received from our partners and the public. The study team will be releasing an Interim Report in February 2019 to solicit agency and public feedback on the planning analysis to date. Based on the reviews and feedback on the Interim Report, the study team and its partners will start the dialogue in Spring 2019 on the path of study that makes the most sense - the number of alternatives to retain for consideration will be discussed at that point. USACE may, in coordination with our non-federal sponsors, screen the currently conceptual alternatives following the public review process associated with the Interim Report. Also, USACE is targeting identifying the tentatively selected plan in spring of 2020, subject to funding, and non-federal sponsor support, etc.



ITEM	COMMENTS	RESPONSES
132	The basic structure and approach to the study is flawed, and based on assumptions of environmental systems as "add-ons" to "protection" scenarios. They are also centered on Irene+ Sandy like events and do not account for daily seasonal ecosystem benefits and risks. Critical and unquantifiable aspects such as the need for flexibility, human failure, deployment failure, catastrophic loss of systems cannot translate into the BCR/BCA as it is currently formulated. Other scenarios such as managed retreat are not considered. The approach to the study should wider- the lens is too narrow+ based on outmoded ideas of success.	Many of the concerns in this comment are addressed through the prescribed USACE planning process, which is described in the Planning Guidance Notebook (see <a href="https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/er_1105-2-100.pdf">https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/er_1105-2-100.pdf</a> ). Regarding a few of the specific concerns, alternatives concepts are a preliminary stage and have yet to be refined with respect to siting and actual measures for implementation. In terms of evaluation against storm events, USACE policies require assessment of alternatives against a suite of projected storm events ranging including the 99%, 50%, 20%, 10%, 4%, 2%, 1%, and 0.5% annual chance of occurrence within the period of analysis - not just evaluation against the latest major storms.
133	A large scale nature-based integral solution should be considered + publically discussed even if it is not supported by the selection process or BCR process currently in place. NYC should be able to see + understand a broader range of alternative.	Natural and nature-based features are being considered on a large scale as integral measures to complement other features by helping to address frequent flooding. These were discussed publically during the scoping process and are discussed in more detail in the Interim Report, released on February 19, 2019.
134	It is very clear from the statement about natural + nature-based feature+ non-structure feature on the boards that these situations have not seen adequately studied and for that the parameters of this study do not support these techniques. These solutions should not be thought of as an "overlay" or "greenwashing". They are integral to a sustainable 21st century city.	The natural and nature-based features are considered to be important integral features for a complete solution. Particularly for the alternatives that contain storm surge barriers which would remain open for smaller storms, the natural and nature-based features (NNBFs) can be very effective complementary measures for managing frequent flood risk. NNBFs are not effective for managing the risk of large floods or storm surge, like that seen during Hurricane Sandy. That is why an integrated approach is being used which can leverage the power of nature for the frequent flooding, where feasible, and also consider larger man-made infrastructure for the large-scale flooding. At this stage in the study the alternative concepts have not been developed to any detail, but are concepts. This does not mean they are not being seriously considered.
135	Additional public meetings should be held.	Four additional public meetings were added to the scoping process in addition to the five that were initially scheduled. One meeting was held at the New York Aquarium on Coney Island on September 20, 2018. Two meetings were held in White Plains, NY at the Westchester County Center on October 3, 2018. The final meeting was held in Nassau County at the U.S. Merchant Marine Academy on October 23, 2018.
136	The public comment period should be extended.	The public comment period for NEPA Scoping was extended for a total duration of 120 days.
137	Good superficial introduction to alternatives but no real economic and environmental impact was given to help and hence assess them. Very short time for plans to be chosen.	The level of detail presented during the Scoping Meetings reflected the early scoping process of the study. More detail and analysis is being added and developed and will build as the study progresses. Please see the Interim Report, released on February 19, 2019 for more detail of the analysis done using existing information. This will be followed by a Draft Feasibility Report and Tier 1 EIS which will contain broad economic and environmental impact analysis, consistent with Tiered NEPA. Normal Corps Feasibility Studies last three years, whereas this study has been approved to six years due to the large scope and scale of the study.

ITEM	COMMENTS	RESPONSES
138	Our organization, JBRA (Jamaica Bay Reformulation Advocates) strongly favors alternative 2 of the options presented, and we don't know why it should take till the year 2022 before a final plan is even presented to congress for approval.	The conceptual alternatives currently scoped for the NYNJHAT study are broad and complex. Determining which, if any, alternative is environmentally acceptable given the broad locations that may be directly and indirectly affected, has the greatest net benefits and may be supported by the non-federal sponsors will require more time than the Corps default civil works studies. Furthermore, this study includes multiple rounds of public engagement and feedback on the planning process and interim results. Some of the review or feedback comments may identify investigation needs that should be addressed before proceeding to the next study milestone. Currently, the study team anticipates a completion of 2022 to allow for enough time to accommodate the public engagement, investigations, and revisions that may be needed to support a recommendation to Congress.
139	Since other areas from Maine to Florida will also be looking at solution. Will we all be competing for the same limited pot of money	Regardless of location, USACE only recommends actions to Congress and the Administration if they are environmentally acceptable, economically justified and supported by the non-federal sponsor(s). The decision of what project to federally authorize or appropriate funds is solely within the federal elected official's purview.
140	Local jurisdiction should be given site-specific (very specific) information on plans affecting their towns, cities and counties. What will they look like at each tributary in the HR estuary?	The alternative concepts currently under consideration do not have enough site-specific detail at this point for the study team to be able to engage on that level. Once the study progresses such that this level of detail is available, further public outreach in the communities where implementation would take place would of course be undertaken.
141	Assuming that success is problematic at best why not let nature take its course? Final massive prevention measures, timely evacuations and massive clean ups instead.	The risk to human life and vast amounts of significant infrastructure is currently great. A project would only be implemented if the cost of implementing it and mitigating for any and all negative impacts is less than the cost of doing nothing and paying for damage once it occurs.
142	Publicizing public meetings and number of public meetings	Noted. The study team will endeavor to give ample public notice of planned public meetings and to the extent practicable, will hold meetings throughout the study area as well as virtually to maximize participation. Due to the vastness of the study area, interested stakeholders may need to travel a short distance to participate in person in meetings, as it will not be possible to hold meetings in every county, municipality, etc. where there are interested stakeholders.
143	There is not enough information and time to make a decision.	No decisions have been made to date. The study is analyzing existing information, which will be presented in the Interim Report on February 19, 2019. Further analysis after that will be conducted and feed into the Draft Feasibility Report and Tier 1 EIS which will have a tentative decision which will be shared with the public in the Spring of 2019. Based on public and agency feedback on the Draft Feasibility Report and Tier 1 EIS, a decision will be made. This six year study process has been extended to be twice as long as the normal Corps study process of three years.
144	Need to understand the impact of the plans on the environment	Concur, this analysis is underway. The Interim Report lays out the environmental considerations based on existing information and the subsequent Tier 1 Environmental Impact Statement will analyze the broad impacts of the alternatives. As the study progresses and designs are refined, the Tier 2 site-specific analysis will also be performed.
145	There should be public meetings to share concerns	Originally five public meetings were scheduled during the Scoping Period, four additional ones were added due to Congressional requests. Due to the large public interest in the study and the large study area, eight meetings will be held in conjunction with the public comment period for the Interim Report.

ITEM	COMMENTS	RESPONSES
146	The public needs more time to learn about this issue and make comments	Noted, the Corps has extended the public comment periods to allow for more public input. The Scoping Period was extended to a total of 120 days and the Interim Report will have a 90 day comment period.
147	Money should be spent on making the river healthy.	This study is authorized and funded to assess the feasibility of coastal storm risk management for the New York and New Jersey harbor and tributary region. While the natural and nature-based features being considered as part of this study may have the added benefit of improving ecosystems, this is not an objective that this study is authorized to formulate for. Environmental impacts of any implemented project will be avoided, minimized and mitigated for.
148	The Corps should move forward with a TSP examining large-scale proposals that the states of New York and New Jersey, the City of New York, and the people of the metro area may find useful in advancing thinking about the future.	Noted.
149	The Corps has indicated its intent to analyze the various federal proposals against a no-action alternative ("Alternative 1") that tracks ongoing and planned projects that affect the study region, presumably including a number of projects put forth in the SIRR report. The Corps must exercise care in determining which projects to include in this background. For one, it should only consider those initiatives that afford value in the context of storm surge protection; while efforts to prevent seasonal flooding and sea-level rise are also vital, these problems are distinct from that of storm surges	The projects to be included in the future without project/no action assumptions have been coordinated with the agencies responsible for their implementation, based on the following criteria: 1. project should be address coastal storm risk management; 2. project will have funding and permits in place by July 2020; and 3. if implementation of the project would affect plan selection.
150	Could you provide the list of projects included in the "No Action" alternative, particularly the list of those with orange dots and another list of those with yellow triangles on the Alternative 1 map from the public meetings?	The list of projects included in the No Action assumptions can be found in the Plan Formulation Appendix to the Interim Report.
151	Due to the immensity and complexity, and lack of public meetings to explain the potential massive impacts of these project alternative, please extend the comment period 90 days and schedule more informational meetings up and down the Hudson Rivers impact area.	Noted, the Corps has extended the public comment periods to allow for more public input. The Scoping Period was extended to a total of 120 days, with nine public meetings held, and the Interim Report will have a 90 day comment period and eight public meetings throughout the study area such that interested stakeholders from throughout the study area should be able to attend at least one in-person meeting. If interested parties cannot attend in person, one or more virtual meetings will also be held.

ITEM	COMMENTS	RESPONSES
152	Environmental impacts must be studied and taken into account before narrowing down to 1-2 alternatives- This narrowing of alternatives should not be on cost alone.	Environmental impacts of the alternatives are included in the cost and benefit narrowing through the inclusion of mitigation estimates. Environmental impacts will be studied and taken into account for screening. However, the alternatives that are screened out as infeasible will not be further analyzed, so anything found to be infeasible or shown to be grossly less cost effective or not economically justified will not be analyzed in more detail. This will help reduce the cost and duration of the study, saving taxpayer dollars, as required by the Corps planning paradigm.
153	The Corps should include "ecosystem services" in its evaluation of the current array of alternatives.	Ecosystem services are included in a qualitative assessment of the alternatives with respect to their contributions to the Environmental Quality and Other Social Effects, which are in turn weighed in the trade-off analysis among alternatives.
154	Why has the public not been deluged with information about these plans that you are considering when their execution could so affect the river and the people living near to the river?	The Corps with our partners is following the NEPA process for public engagement. Now that the NEPA Scoping period is over, the Corps is getting ready to release an Interim Report with more public engagement opportunities for both commenting and in-person meetings. As part of this release the study team is preparing short videos on the alternative concepts and the study process, in addition to the Interim Report. Presentation slides for subsequent public meetings will also be shared with the public, as well as the Scoping Document detailing the public comments received during scoping with responses. Additional appendices to the Interim Report include Economics, Engineering, Cost, information on existing and planned projects that affect the study plan formulation, and a GIS Appendix. As more information is developed, more can be shared with the public. The public outreach process begins early in the study so that the public can have input in the scoping of the study.
155	The building of a sea wall between Sandy Hook NJ and Rockaway Point, NY will have a negative impact on the shipping/commerce of NY/NJ, the commerce of the nation and international economy. The barrier would shut down the main shipping channel for months.	Impacts to shipping, commerce, navigation, safety, and transportation will all be closely considered and analyzed as part of this study and the impact analysis. The Coast Guard is a Cooperating Agency on this study and will provide input and data to aid in the study and any eventual design of a Recommended Plan. Impacts to navigation which affect the economy would need to be included in the cost and benefit analysis affecting plan selection. Any recommended plan would need to support continued commerce and shipping in this economically vital harbor in order to be supportable. If a barrier is chosen and funded for implementation, construction would need to be phased in a way that would minimize impacts to navigation.
156	Alternative 6 is the best option that fits with the NYS DEC's sustainable shorelines program	Comment acknowledged.
157	It is critically important that this study include completed economic, environmental and engineering considerations of the given alternatives.	Concur. USACE is required to do so, per our Planning Guidance Notebook (Engineering Regulation 1105-2-100).
158	Meeting should be held after hours and with translators to accommodate vulnerable populations.	Noted. Meetings were held after hours for the public scoping period, from 6 to 8 pm and one from 5 to 7 pm. To date, the study team has not received any specific requests for translators for particular communities. Should the need for translators in specific communities become apparent, the study team will look into providing interpreters and translating fact sheets into foreign languages to reach any affected communities.
159	The most vulnerable populations, including communities of color and those that are low-income, should be included in a region-wide initiative.	Concur. Environmental justice analysis is being performed to ensure that low income communities of color are included in the analysis for coastal storm risk management.

ITEM	COMMENTS	RESPONSES
160	When will an explanation of the cost benefit analysis methodology be posted?	An explanation of the cost benefit analysis methodology is included in the Interim Report released on February 19, 2019.
161	When will a list of future without project condition projects be posted?	The list of future without project condition projects is available in the Interim Report Appendices, released on February 19, 2019.
162	How much federal funding can be reasonably expected for construction?	Federal funding is the sole discretion and purview of federal elected officials, as well as the non-federal sponsor(s).
163	Sheepshead Bay and other areas in the project area are home to a fleet of ships. Are these ships considered a resource in terms of flood impacts. Would such resource be deemed worthy of protection? Even though they are privately-owned?	The study would consider if the fleet could relocate in advance of a storm to minimize damages. There are associated port facilities that could not be moved, and damages to these associated facilities would be factored into the damages avoided (private ownership is not a reason for exclusion).
164	Is there a projected cost analysis of the proposed Alternatives?	Yes, the cost analysis is presented in the Cost Appendix of the Interim Report (released February 19, 2019).
165	How do you determine "economic justification"? What is the benefit to cost ratio of greater than one and what does the latter part mean?	An alternative is considered "economically justified" if the benefit to the national economy/nation is shown to be greater than the cost to implement the project, including the cost to mitigate for any impacts of the project. For coastal storm risk management projects the benefits are estimated by projecting the likely future damages that could be avoided by building the project. For more information on this, please see the Interim Report, as well as the Cost and Economic Appendices.
166	What happened to the ideas for the harbor such as those proposed for New York Rising?	Concepts from NY Rising can be incorporated into our alternatives refinement as appropriate. Those NY Rising actions that proceeded into construction would be accounted for in our assumed projects for the baseline condition.
167	What opportunity costs of this investment?	One of the functions of a feasibility study is to identify the opportunity cost of investing federal and non-federal funding into a proposed project. When the alternatives are refined with respect to action, location, and timing, a better characterization of the opportunity costs will be presented to decision makers for their consideration.
168	Hold meetings throughout the lower Hudson Valley	Due to the large study area which is larger than the state of Delaware and covers two states, 25 counties, and 322 municipalities, it is not feasible to hold individual meetings everywhere where there are interested stakeholders. The meeting locations will be carefully chosen to maximize public participation by being located throughout the study area and close to transit so that interested parties can reasonably attend at least one meeting. The Corps will also continue to use virtual meetings to supplement in-person meetings, where practicable for those who cannot travel to in-person meetings. Additionally, the study team will accept and consider all comments sent on the study, whether by email, mail, or in-person.
169	Studies must examine how the impacts would vary over the life of any structures - 100, 200 and 300 years out.	At present, USACE guidance requires a consideration of without project conditions and potential project performance over the planning horizon, which spans 100 years. Beyond 100 years, the certainty of planning projections decreases dramatically.
170	Will impacts be quantified and included in the cost-benefit analysis for those alternatives?	Yes, the cost to mitigate for impacts is included in the cost-benefit analysis.
171	Review of these plans requires local context and input.	Concur.



ITEM	COMMENTS	RESPONSES
172	Please explain the benefit to cost ratio	The benefit-cost ratio (BCR) is defined as average annual equivalent benefits divided by average annual equivalent costs. Economic feasibility requires that the BCR be equal to or greater than one. Alternatives with a BCR less than one are screened out and cannot be recommended. The BCR is used for identifying cost effective plans, but not the National Economic Development Plan (NED). The NED plan is the plan that maximizes net benefits. Net benefits are defined as average annual equivalent benefits minus average annual equivalent costs. The NED Plan is considered the "best buy" plan for the federal government with the greatest benefit to the nation and is often the Recommended Plan.
173	What do you mean when you say "in the future"?	USACE analysis is based on a projection of what will happen over the period of analysis (usually defined as 50 years starting from when a project starts to produce benefits), rather than existing conditions. Basing plan selection solely on existing conditions would leave out changes in demography, land use, relative sea level change, etc., leading to what could be an incomplete analysis by USACE standards.
174	Do the non-federal sponsors have the ability to remove a specific alternative from further study?	USACE determines which alternative, if any, best meets the applicable federal laws, regulations and policies. However, the non-federal sponsor(s) are not required to support this alternative, and can request a locally preferred option (as long as the locally preferred plan has a benefit to cost ratio above 1) to be evaluated for possible implementation.
175	Does the cost-benefit analysis include 'ecosystem services'?	USACE guidelines require a certified or approved USACE model to generate benefits. At present, these models do not yet include ecosystem services. Ecosystem services will be incorporated qualitatively in the trade-off analysis among alternatives.
176	Why is there no information on this project on the NYSDEC website?	NYSDEC is working to update their website to include information on the ongoing New York and New Jersey Harbor and Tributaries Study.
177	What are the new dates for 'winnowing down' from six alternatives to one or two?	We will be releasing an Interim Report in February 2019 to solicit agency and public feedback on the planning analysis to date. Based on the reviews and feedback on the Interim Report, the study team and its partners will start the dialogue in Spring 2019 on the path of study that makes the most sense - the number of alternatives to retain for consideration will be discussed at that point.
178	When does the 3-year time period end for completing the Feasibility Study?	It does not. The NYNJHAT study has been approved on October 31, 2018 to have a six year study period, rather than the prior three year default study duration. The Chief of Engineer's report on the NYNJHAT study is now scheduled for July 2022.
179	Who participated in the 2017 workshops and meetings in which alternatives were developed?	The alternatives were developed by the project delivery team.
180	The WRDA 2018 legislation in Congress includes expediting several projects and feasibility reports in New York and New Jersey Harbor. How does this impact the NYNJHAT feasibility study?	It does not. The NYNJHAT study has been approved on October 31, 2018 to have a six year study period, rather than the prior three year default study duration. The Chief of Engineer's report on the NYNJHAT study is now scheduled for July 2022.
181	Which steps have already occurred in the Plan Formulation Process slide?	In the Plan Formulation process slide, we are at the beginning of step 3 "Formulate alternatives to manage the risk of flooding from coastal storms" in the sense that a framework for different scales of alternatives have been identified, but the actual details of the alternatives have not been worked out yet. Because our planning process is iterative, at a minimum we anticipate revisiting step 2 "Inventory and forecast conditions" as better information is available throughout the course of the study, which will in turn affect the subsequent steps.



ITEM	COMMENTS	RESPONSES
182	What is the timeframe for getting authorization for the waiver?	The Assistant Secretary of the Army (Civil Works) approved an exemption for this study to have increased funding and study duration on October 31, 2018.
183	Why are you not holding an open question and answer session? Everyone should be able to ask questions publicly and have everyone else hear the answers?	The meeting format was intended to facilitate direct face-to-face dialogue between members of the public and the study team by including the poster session where participants could ask questions and have dialogue with team members. Additionally, the presentation was provided to help give an overview of the study and the process to meeting participants. The scoping meetings have a different objective and purpose to public hearings and are thus structured differently. The Scoping Document provides the comments received during the entire scoping period, over all nine meetings, as well as responses.
184	In-water barrier projects could have significant impacts on tug and barge traffic. Has the tug/barge industry been engaged?	The Coast Guard is a Cooperating Agency on this study and will help provide expert input into navigational safety.
185	What were the comments of the Town Supervisor of Tarrytown (who read a statement at the public meeting)?	Please contact the Town of Tarrytown for their comments.
186	What happens if the selected plan is deemed unacceptable in the tier 2 EIS? Would you go back to the other alternatives and start the process again? If not, what is the benefit of the Tier 2 EIS if the choice has already been made?	If there is an action that is found to have an unacceptable impact to the human environment that cannot be appropriately mitigated, subject to need and availability of funding, a General Re-evaluation of the recommended action would occur (consisting of new alternatives and impact analyses).
187	When will the final decision on which plan to follow be made? By Spring 2020 or Spring 2021?	The final decision within USACE resides with the Chief of Engineers with the issuance of the Chief's Report. The NYNJHAT study has been approved on October 31, 2018 to have a six year study period, rather than the prior three year default study duration. The Chief of Engineer's report on the NYNJHAT study is now scheduled for July 2022.
188	Is the Corps prohibited from saying "climate change"?	No, the Corps is not prohibited from saying climate change.
189	Is the impact to tourism industry considered in economic impacts?	Yes, in that lost revenue for businesses is included in the damages assessment.
190	Will the draft interim report in 2019 still include all of the options with equal weight?	Yes, all of the alternatives are included in the Interim Report.
191	Will public comments be posted publicly?	Yes, public comments and responses are included in this Scoping Document.
192	Sea gates will harm Jamaica Bay and other ecosystems and waste the money New York City and the state of New York have invested. Is this factored into the cost of the cost/benefit analysis?	The costs to mitigate for impacts to the environment are included in the cost-benefit analysis. The study is evaluated to contribute to national economic development (NED) consistent with protecting the nation's environment. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED include net value of goods and services that are marketed and also those that are not marketed. (Environmental, regional, and social effects that may inform trade-offs and alternative plans are documented in accounts other than the NED account.)
193	Considering the anchorage efforts in the Hudson River did not go so well, how will this project be run differently?	Comparing one proposed project to another is difficult. The NYNJHAT study is engaging with the public early and plans to have extensive exchange of information as the study proceeds, subject to continued federal appropriations and non-federal sponsors support.



ITEM	COMMENTS	RESPONSES
194	Are the five options presented the only ones that will be considered?	These alternative concepts presented at the scoping meeting are very preliminary and represent scales of solutions (from overall system-wide to regional to localized) rather than the traditional suite of alternatives presented in USACE studies. Actual locations and site-specific measures (whether structural, nonstructural, NBNF) have yet to be developed and analyzed for the upcoming draft report in 2020. The alternative concepts represent a reasonable range of solution scales to be considered, with the actual alternative components to be identified later.
195	Are these plans finally approved by Congress or another group? Who makes the final decision?	At the end of the feasibility study, USACE recommends actions to Congress and the Administration if they are environmentally acceptable, economically justified AND supported by the non-federal sponsor(s).
196	Aside from the email list, what is your communication plan to inform the wider public of the staged and plans and public comment period?	In order to effectively communicate with and engage the public and stakeholders in this study, the study team will update the study webpage with information and updates periodically, continue to hold public meetings throughout the study area in conjunction with public comment periods on the Interim Report and Draft Feasibility Report/Tier 1 Environmental Impact Statement, work to publicize milestones, updates, and public meetings through more frequent and advanced press releases. Furthermore, the study team will brief partners, elected officials, and agencies in advance of public releases and milestones to help facilitate effective communication by others on this study and ensure that elected community leaders have the information they need to answer constituents' questions or concerns. Additionally, the study team is working with the non-federal partners to help convene an independent technical working group made up of interested experts and non-governmental organizations to provide more structured input to the study and facilitate good communication between these groups and their members as well.
197	Please explain the study timeline more clearly?	The study schedule was in flux during the scoping period as the study team was requesting permission to extend the study beyond the standard three year Corps study. The NYNJHAT study was approved for a study schedule extension on October 31, 2018. The Interim Report is being released on February 19, 2019 followed by a 90 day public comment period. The Draft Feasibility Report and Tier 1 EIS is scheduled for public release in March 2020, which will also include a public comment period. Comments from agencies and the public will be addressed and the Final Feasibility Report and Tier 1 EIS is targeted for release in March 2021. The Chief of Engineers Report, which concludes the feasibility study, is targeted for July 2022.
198	At what point will the options be thinning down to the tentatively-selected options? What criteria will be used to narrow down the options? Will cost benefit be the only criteria used to select the tentatively selected option?	Screening and revising/refining the alternatives is iterative throughout the study process. The Tentatively Selected Plan will be identified and discussed in the draft feasibility report and EIS now scheduled for March 2020. The federal laws, regulations and policies will be used to screen the alternatives to determine, what, if any alternative is the tentatively selected plan. This determination is not made only on cost and benefit data but also on environmental factors/evaluations, etc.
199	What is the timescale for the cost/benefit ratio (100 years?)	USACE alternatives are evaluated within the period of analysis. The period of analysis begins when the project is implemented and begins to produce benefits. It is typically 50 years from that point. We also have to consider the planning horizon, which spans 100 years, for the effects of relative sea level change.
200	Has there been any coordination/outreach to communities and agencies in Connecticut?	No, Connecticut is considered to be outside of our study area and the area of potential impacts for the study.
201	When do you anticipate that the project will be completed?	The study is targeted for completion with a signed report from the Chief of Engineers in July 2022. If the recommendation is approved, authorized and funded for implementation, a schedule for the Preconstruction Engineering and Design Phase and the subsequent Construction Phase would be established based on the recommendation. Estimated construction durations are included in the Interim Report.



ITEM	COMMENTS	RESPONSES
202	Have local county planning offices been consulted in the creation of these plans?	Local governments were all invited to the Agency Scoping Workshops conducted at the outset of the study. Input received is summarized in the Public Engagement Appendix.
203	These barriers could entirely contradict local community flood and resiliency planning.	In general, the study team has reached out to local governments for input and is working closely with New York City as a partnering agency on the study. The study team is reviewing available information, including local flood and resiliency plans. However, if you have specific concerns related to a specific community, please share them with the study team.
204	The estimated cost of Alternative 2 has previously been estimated at \$20-\$50 billion dollars. During the presentation (October 2018) the cost of \$140 billion was cited. What is the basis for the cost escalation?	Based on rough preliminary estimates, the estimated initial construction cost of \$43B does not include contingency, operations and maintenance, repair and rehabilitation, interest during construction, engineering and design, and environmental and cultural resource mitigation costs. The initial construction cost estimate is in the former range and the total cost comes in near the \$140B number.
205	Will the analyses include potential impacts that extend beyond the study area (i.e. further east into Long Island Sound) or will the analysis stop at the study area boundary?	The impact analyses do not stop at the study boundary, but attempt to assess all potential impacts of the study even if they go beyond the study boundary.
206	Is there a posted project plan with deliverable dates and responsible parties	No, the study is still analyzing an array of alternatives and has yet to arrive at a tentatively selected plan, nor have any of the alternatives been screened out to date.
207	When might construction possibly begin? How long could construction take after it begins?	The Interim Report released February 2019 contains much of this information. Construction authorization and further design which might be necessary before construction can begin on any feature of any alternative can take years, and is subject to federal elected officials support.
208	If a barrier was constructed at the Throgs Neck and if flooding was being caused by this elsewhere who would pay for hardening of waterfront to eliminate this problem.	Any constructed project would need to pay for all measures that are needed to mitigate impacts of the project. This study is cost shared between the US Army Corps of Engineers, New York State and New York City.
209	Is the Army Corps considering FEMA-Funded Sandy recovery work in surrounding waterways such as Manhasset Bay? Federal monies are going to repair storm damage in areas that will be made more vulnerable under some of the alternatives proposed. Were there other alternatives considered? Could there be other alternatives considered? These 6 alternatives dont seem to cover all the possibilities of what could be done. Would these alternative have saved the 60 people who perished in the study area are during Sandy?	Yes, FEMA recovery work and recovery and resiliency work done by other agencies is being considered and accounted for in the study and included as part of the Without Project Future Condition. The alternative concepts presented at the NEPA scoping meetings represent scales of alternatives, with the actual measures (barriers or floodwalls, nonstructural, NNBFs) and their siting to be evaluated in the next round of plan formulation.

ITEM	COMMENTS	RESPONSES
210	Does the USACE use only Corps experts to perform analyses? Will the technical information be made available to the public?	In addition to Corps experts with degrees and training in the environmental sciences, engineering, economics, policy, archeology, etc., USACE also utilizes the expertise of our non-federal partners, architecture and engineer contracting firms, which include environmental, archeological experts, the Engineer, Research, and Development Center (ERDC), and as warranted, academic experts, or other technical experts. Technical information used to screen and evaluate alternatives is made available to the public, with the exception of cost information that is used in the contract solicitation process, or any proprietary data or information that the Corps is not authorized to share. These instances would be limited and the intent of the study team and USACE is communicate transparently and effectively with the public exactly how alternatives are developed, evaluated, and screened.
211	What are the criteria that will be used to compare alternatives?	Per paragraph 1.7.1 (a) of the Federal Principles and Guidelines (1983): (a) "Four accounts are established to facilitate evaluation and display of the effects of alternative plans. These accounts are: national economic development (NED), environmental quality (EQ), regional economic development (RED), and other social effects (OSE). These four accounts encompass all significant effects of a plan on the human environment as required by the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.). They also encompass social well-being as required by Section 122 of the Flood Control Act of 1970 (Pub. L. 91-611, 84 Stat. 1823). The EQ account shows effects on ecological, cultural, and aesthetic attributes of significant natural and cultural resources that cannot be measured in monetary terms. The OSE account shows urban and community impacts and effects on life, health and safety. The NED account shows effects on the national economy. The RED account shows the regional incidence of NED effects, income transfers, and employment effects."
212	What about the south shore of Long Island?	The south shore of Long Island is addressed by three existing USACE studies: the East Rockaway to Rockaway Inlet and Jamaica Bay General Reevaluation study (Brooklyn, Queens, and part of Nassau County), the Nassau County Back Bays Feasibility Study (Nassau County), and the Fire Island to Montauk Point General Reevaluations Study (Nassau County and Suffolk County).
213	You have shared in prior meetings that the Corps public outreach for this project was based on a mailing list of ~750 people. What are your plans to expand your outreach efforts going forward.	The stakeholder emailing list for this project is constantly being updated as people request to be added or taken off. It currently includes 4,038 email addresses (as of January 2019). Anyone who would like periodic email updates about the project can request to be added. In order to effectively communicate with and engage the public and stakeholders in this study, the study team will update the study webpage with information and updates periodically, continue to hold public meetings throughout the study area in conjunction with public comment periods on the Interim Report and Draft Feasibility Report/Tier 1 Environmental Impact Statement, work to publicize milestones, updates, and public meetings through more frequent and advanced press releases. Furthermore, the study team will brief partners, elected officials, and agencies in advance of public releases and milestones to help facilitate effective communication by others on this study and ensure that elected community leaders have the information they need to answer constituents' questions or concerns. Additionally, the study team is working with the non-federal partners to help convene an independent technical working group made up of interested experts and non-governmental organizations to provide more structured input to the study and facilitate good communication between these groups and their members as well.

ITEM	COMMENTS	RESPONSES
214	Will this study include the restoration of the Stepping Stones Lighthouse?	As an agency of the federal government, the U.S. Army Corps of Engineers must comply with NEPA and Section 106 of the National Historic Preservation Act which requires that they take into account the effects of any undertaking on historic properties. As part of the Environmental Impact Assessment the District is considering the potential effects associated with each of the proposed alternatives and is carrying out coordination with the New York and New Jersey State Historic Preservation Offices, the Advisory Council on Historic Preservation, Native American Tribes, and other interested parties. The District is not authorized to study alternatives with the sole purpose of protecting historic properties.
215	At what point are non-structural alternatives considered such as the 4400 home that were promised to be elevated as part of FIMP?	The deployment of nonstructural measures will be considered in more detail in the round of plan formulation between the Interim Report and the draft Feasibility Report.
216	What is the estimated effectiveness of any of the alternative to reduce coastal flooding risk? If the 100 yr flood becomes a 10 yr flood by 2100, this doesn't seem like a long-term plan. Is it better to support effect to gradually retreat from the coast, let nature take its course? Use the funds to prevent more severe climate change?	The recommendation to Congress at the end of the feasibility study will include consideration of the design parameters that will maximize net benefits, so it is premature to speculate on the effectiveness of the alternatives at this time. Please note that the benefits to the four "accounts" will be discussed; these are: National Economic Development, or NED, Environmental Quality, or EQ, Other Social Effects, or OSE, and Regional Economic Development, or RED. Looking at all four accounts helps decision makers see the full effect and potential benefits of the proposed action(s). The effects of RSLC upon the study area vary greatly, and this variability, along with the three scenarios of RSLC, will be assessed in identification of a tentatively selected plan. For the tentatively selected plan, which will be documented in the draft feasibility report, areas that warrant further investigation of nonstructural measures such as acquisition or buyouts will be examined in greater detail. The funds appropriated by Congress for this study can only be used for the authorized purpose as laid out in the study authorization (see the Interim Report for more detail). Climate policy is outside of the authority and missions of the US Army Corps of Engineers.
217	In area that will suffer from induced flooding- Douglaston, Great Neck - will new FEMA flood maps be drawn? Will affected properties have access to insurance as a result of the new flood zones? Would there be financial compensation for higher insurance cost and decrease in property values?	For areas of potential induced flooding, USACE must identify measures (walls, pumps, diversions, etc.) to mitigate the induced flooding. The costs for these measures are included in the costs for the alternative, and negatively affect economic justification. It is possible that if the mitigation measures are too costly, that measure might not be economically justified and USACE would consider other alignments or measures in the affected areas. As for FEMA flood maps, please contact FEMA directly for a Letter of Map Revision (LoMR) if the existing maps do not appear to match the property owner's experience.
218	It is Eastchester Bay not Pelham Bay which the "Pelham Bay" gate spans.	Concur that the Bay which the proposed Pelham Bay gate spans is the Eastchester Bay (NOAA Navigation Chart 12366). However, the proposed gate was named Pelham Bay to be more site specific since the rough conceptual location spans the "Pelham Bay Park" which is on both the proposed gate location and is also adjacent to the "Pelham Parkway". Whereas Eastchester Bay is large, Pelham Bay is a more site-specific name in this case and avoids misconceptions on location.
219	Will the Corps look at the Long Island Sound Comprehensive Conservation Management Plan?	Yes, USACE will consider the LIS CCMP recommendations in its planning.
220	When is the Corps going to study induced flooding?	USACE will consider induced flooding when there is more detail on the actual measures and siting. Study of induced flooding requires identification of measures to mitigate any induced flooding, which is factored into the cost of a proposed alternative.



ITEM	COMMENTS	RESPONSES
221	If there was induced flooding identified in relation to the Throgs Neck gate causing additional measures to be needed, would those additional measures be built before or after the large gate?	These additional measures would have to be studied *while* the large gates are under study, and their costs would become part of the benefit to cost ratio.
222	Can you please include Long Island in your meetings and outreach?	Long Island is outside the study area. Public meetings are targeted within the study area to maximize public participation of interested stakeholders. Additionally, virtual meetings are also planned for those who cannot attend in person. Due to the large study area that spans two states and 25 counties, it is not feasible to hold in-person meetings everywhere there are interested stakeholders, but meetings are targeted to be as conveniently located as possible throughout the study area so that interested stakeholders can reasonably attend.
223	Have buyout programs been effective elsewhere?	Buyout programs tend to be most effective in areas that do not have dense populations where the cost to buyout each property owner is less than the cost of protecting the properties or replacing/repairing damage.
224	Based on concerns of sewage being trapped behind gates during storm events, the Corps should look at NYCDEP wastewater report	NYCDEP's 2018 State of the Sewer Report will be used as one source of existing information.
225	What is/was the budget for the project, and what is the cost share?	The NY NJ Harbor and Tributaries study is currently estimated to cost approximately \$19.4M. These funds are cost-shared 50/50 with the non-federal study sponsors, New York State Department of Environmental Conservation and the New Jersey Department of Environmental Protection, except for \$200,000 for independent external peer review which is entirely federally funded.
226	The public cannot effectively comment without detailed information and data on the social, economic and environmental impact of each alternative. The presentation provided is inadequate.	The presentation provided was in line with the level of detail expected during the Scoping Period of the study as the public meetings to date were NEPA Scoping meetings intended to garner public input on the scope of the study. Future opportunities to comment on more detailed analysis are forthcoming throughout the study.
227	What will the impacts on communities outside the barrier? On the ocean side, Down stream or upstream of the barrier/Project area?	Impacts to communities outside the barrier are discussed broadly in the Interim Report and will be further investigated as the study progresses.
228	Historic New Bridge Landing (including the 1752 Steuban House and Bergen County Historical Society property, which houses two 18th c. houses and a 19th c. barn) - despite its historic significance and importance - as well as its vulnerability to flooding - would not be protected by these alternatives	As an agency of the federal government, the U.S. Army Corps of Engineers must comply with NEPA and Section 106 of the National Historic Preservation Act which requires that they take into account the effects of any undertaking on historic properties. As part of the Environmental Impact Assessment the District is considering the potential effects associated with each of the proposed alternatives and is carrying out coordination with the New York and New Jersey State Historic Preservation Offices, the Advisory Council on Historic Preservation, Native American Tribes, and other interested parties. The authorization for this study does not allow the Corps to target protection of individual properties, however, some of the alternatives may help minimize the effects of coastal storm damage, but they would not affect impacts from other flooding.

ITEM	COMMENTS	RESPONSES
229	The Corps should compare the models and land use and climate projections its using with those used in other regional programs, including the NY-NJ Harbor Estuary Program, the LI Sound Study, NY and NJ coastal zone management programs, NYS Hudson Estuary study, NYS Ocean Action Plan, Mid-Atlantic Regional Planning Body and Mid-Atlantic Regional Council on the Ocean.	The Department of the Army Engineer Regulation ER 1100-2-8162 (31 Dec 2013) requires that future sea level rise (SLR) projections must be incorporated into the planning, engineering design, construction and operation of all civil works projects. An overview of how USACE considers RSLC can be found at: <a href="https://planning.erdc.dren.mil/toolbox/library/LessonsLearned/Quick%20Reference%20-%20Climate%20Considerations%20Oct2018.pdf">https://planning.erdc.dren.mil/toolbox/library/LessonsLearned/Quick%20Reference%20-%20Climate%20Considerations%20Oct2018.pdf</a>
230	The Corps should consider the impacts of sea level rise on key sites and infrastructure such as the Indian Point Energy Center, the Chelsea Pump Station, and the Hudson River PCB clean up.	Concur, sea level rise and the potential impact it may have based on varying projections will be analyzed as part of this study, in particular for key infrastructure.
231	What guidance, policy regulations, etc., does the Corps follow when looking at climate change and sea level rise? Please provide the references.	The Department of the Army Engineer Regulation ER 1100-2-8162 (31 Dec 2013) requires that future sea level rise (SLR) projections must be incorporated into the planning, engineering design, construction and operation of all civil works projects. An overview of how USACE considers RSLC can be found at: <a href="https://planning.erdc.dren.mil/toolbox/library/LessonsLearned/Quick%20Reference%20-%20Climate%20Considerations%20Oct2018.pdf">https://planning.erdc.dren.mil/toolbox/library/LessonsLearned/Quick%20Reference%20-%20Climate%20Considerations%20Oct2018.pdf</a>
232	Alternative 2 is the best alternative because flood walls and levees create hinderances to harbor/riverside amenities such as parks and offers the best option for rapid recovery including recovery from inland flooding.	Thank you for sharing. USACE study processes require an accounting of benefits and costs for the alternatives under consideration, whether barriers or local floodwalls.
233	I had heard that the Corps was forbidden from consulting with the National Flood Insurance Program on program impacts and therefore the Corps' project would have no effect on flood insurance rates. Is this true?	There is no prohibition against consulting with the NFIP. However, there is a prescribed process for calculating benefits, and most of flood insurance costs are not included in this process.
234	The Corps should move people and sensitive infrastructure out of floodplains and establish natural storm absorbers such as barrier islands, salt marshes and swamps.	Thank you for sharing. USACE will consider buyouts/acquisitions/relocations as appropriate in the next round of formulation, as well as natural and nature-based features, as feasible and appropriate for the existing ecosystems/bathymetry, etc.
235	Has New York state voiced its opinion on the proposals? Has New York state declared its support for one of the alternatives?	NYSDEC has committed to an open discussion of the benefits and costs of alternative concepts. We are early in the study process and the benefits and costs in the Interim Report are very preliminary.
236	What is New York state's involvement in this study? Can New York state legally end the study? What have they contributed to it?	New York State, through the Department of Environmental Conservation, serve as a co-non-federal sponsor on this study along with the NJDEP. Either non-federal sponsor (NYSDEC and NJDEP) can suspend or terminate the study within 30 days of written notice to USACE.
237	What powers impact the flood elevations on the Flood Insurance Rate Map?	This publication may be helpful, specifically chapter 2 for water surface elevations: National Research Council. 2015. Tying Flood Insurance to Flood Risk for Low-Lying Structures in the Floodplain. Washington, DC: The National Academies Press. <a href="https://doi.org/10.17226/21720">https://doi.org/10.17226/21720</a> .

ITEM	COMMENTS	RESPONSES
238	Will each proposal be entirely funded by the federal government or will state governments and other entities have to help fund each proposal?	The study is cost-shared with New York State and the State of New Jersey and implementation would also be cost-shared with one or more non-federal partners.
239	Rather than wasting money, the Corps should admit the proposals are economically unfeasible.	The Corps analysis to date has not shown that the alternatives are economically infeasible. Please see the Interim Report for the economic analysis to date.
240	Every owner of land that will be protected by one of the proposed alternatives should contribute to the cost of the future studies.	The study is funded through taxpayer money, including that of landowners in the study area. The study must demonstrate federal interest in order to justify the benefit to the nation of spending federal tax dollars on a given study. In order for a project to be economically justified and recommended for implementation, analysis must determine that there is a net positive benefit to the national economy by constructing the recommended plan, i.e. it is a good investment of taxpayer dollars.
241	The Corps should consider RiverArch - Riparian Considerations proposals to provide flood protection for key areas - floodwalls, floodgate, rain-wells and an internal sewer system.	There is insufficient information here to provide a response. Please provide clarification.
242	The Corps should explore using living breakwaters such as oysters and seaweed to create a living wall that will slow down waves.	Concur, natural and nature-based features are being considered to address frequent flooding, including living breakwaters.
243	Breezy Point acts as a barrier island giving protection to the southern shoreline of Brooklyn, including Coney Island and Sea Gate. Shouldn't Breezy Point be given the same strengthening work as the work recently conducted at Sea Gate?	Breezy Point shoreline measures will be considered in the next round of formulation for the draft report, when specific measures and siting will be investigated.
244	Nothing should be done until the political climate allows environmentally sound and responsible remediations to be developed.	Noted, thank you.
245	Many communities - Piermont and Stony Point, Rockland County; Kingston, Esopus, Saugerties, and Lloyd in Ulster County; and Catskill, Greene County - have already advanced plans for how to address sea-level rise and the increased frequency and severity of storm events. The Corps should take into account these plans into its study.	Noted, thank you. The analysis will consider the information and effects on existing management plans that are in effect within the study area.



ITEM	COMMENTS	RESPONSES
246	The Corps should consider the following in its study: Local Waterfront Revitalization Plans, Hudson River Comprehensive Restoration Plan, Hudson River Estuary Action Agenda, Hudson River Valley Greenway, Hudson River Watertrail Association, New York State Coastal Management Plan, The Hudson River Comprehensive Restoration Plan, Responding to Climate Change in New York State (ClimAID), New York state Sea Level Rise Task Force; Building the Knowledge Base for Climate Resilience: New York City Panel on Climate Change 2015; Protecting the Pathways: A Climate Change Adaptation Framework for Hudson River Estuary Tidal Wetlands; Scenic Hudson's Sea-level Rise Mapping Tool; Simulating Effects of Sea Level Rise on the Resilience and Migration of Tidal Wetlands along the Hudson River; storm Surge Barriers: Ecological Special Concerns; and Dams and sediments on the Hudson study (See letter for web links)	Noted, thank you. The analysis will consider the information and effects on existing management plans that are in effect within the study area.
247	The Corps should consult the NY NJ Harbor Estuary Program Comprehensive Conservation and Management Plan (CCMP), the Long Island Sound Study CCMP, and the Long Island Sound Blue Plan.	Noted, thank you. The analysis will consider the information and effects on existing management plans that are in effect within the study area.
248	In-water barriers, levees, seawalls and other large-scale structural measures may provide a false sense of security and encourage further development and population density increases in low-lying areas.	Per Executive Order 11988, federal projects are evaluated for their potential to encourage development in floodplains, which is discouraged. Please also note per Section 308 of the Water Resources Development Act of 1990 that "(a) Benefit -Cost Analysis.--The Secretary shall not include in the benefit base for justifying federal flood damage reduction projects-- (1)(A) any new or substantially improved structure (other than a structure necessary for conducting a water-dependent activity) built in the 100-year flood plain with a first floor elevation less than the 100 -year flood elevation after July 1, 1991; or (B) in the case of a county substantially located within the 100-year flood plain, any new or substantially improved structure (other than a structure necessary for conducting a water -dependent activity) built in the 10-year flood plain after July 1, 1991; and (2) any structure which becomes located in the 100-year flood plain with a first floor elevation less than the 100-year flood elevation or in the 10 -year flood plain, as the case may be, by virtue of constrictions placed in the flood plain after July 1, 1991." Risk communication is an important part of the USACE feasibility study process and important for avoiding a "false sense of security".
249	The costs of operation and maintenance across the entire life cycle of the infrastructure should be included in the cost benefit analysis.	Concur, the cost of operation and maintenance across the life cycle of the project is included in the cost benefit analysis.

ITEM	COMMENTS	RESPONSES
250	The alternatives, as described, do not provide equal flood management across the study area.	The alternative concepts currently under consideration do not have enough site-specific detail at this point for the study team to be able to engage on that level. Once the study progresses such that this level of detail is available, the levels of flood risk management will be calculated for each economic reach.
251	A small number of large in-water barriers as described in Alternatives 2 and 3A do not provide redundancy in the event of failure.	The alternative concepts currently under consideration do not have enough site-specific detail at this point for the study team to be able to engage on that level. Once the study progresses such that this level of detail is available, the levels of flood risk management and measures required for robustness and redundancy will be calculated.
252	Alternative 2 is the most environmentally just and socially conscious alternative and should be kept under consideration. Alternative 2 has the capacity to minimize the risk of massive destruction in the Metropolitan area and reduce disproportionate impacts to some of the most disadvantaged areas.	The benefits and costs for the alternative concepts are preliminary and are still being refined.
253	What factors, studies and funding concerns influence the federal government's decisions?	Different branches of the federal government and different federal agencies are governed by varying authorities and budgeting processes which influence how and why they are able to spend money and what they can work on. The Army Corps of Engineers has specific mission areas and is funded by Congress to execute our missions.
254	Will the Army Corps consent to making more of an effort to raise public awareness of this study?	The Corps has conducted a significant outreach effort throughout the early Feasibility Study process, in order to both raise awareness and promote involvement. Public interest in the Feasibility Study has been high, and continual communication has been essential because the impacts could be far reaching. The public outreach program began with scoping meetings and will continue throughout the study using a variety of public information and public involvement techniques.
255	What kinds of cost negotiations can be made with the federal government?	Incomplete comment, it is unclear what the question is asking.
256	Will the taxpayers be made aware of the costs and relative benefits of the alternatives so they can have a say in what they will be paying for?	Yes, the cost benefit analysis is shared publically. No plan can be recommended unless it is deemed a good investment of taxpayer dollars, with the benefits to the national economy exceeding the cost to implement the project.
257	Rather than construct a series of offshore barriers, the Corps should adopt an integrated system of discrete onshore project that would be less costly, more protective and less destructive to the environment and local communities.	Alternative 5 is an integrated system of discrete onshore projects. However, the analysis is preliminary, with actual measures and siting still to be determined.
258	Storm surge barriers could harm vulnerable communities with the exacerbation of flooding to areas adjacent to and outside of the barriers.	Any flooding induced by the project would need to be mitigated such that there is no induced flooding and the cost to mitigate it would be included in the cost-benefit analysis. Similarly the potential impacts would also be analyzed.

ITEM	COMMENTS	RESPONSES
259	With sea level rise, in future years, overtopping the barriers, the vulnerable communities behind barriers will again be at risk.	Climate change is one of many global changes the Corps faces in carrying out its missions to help manage the nation's water resources infrastructure. This study is an effort to help the New York and New Jersey region plan for the long-term future on how to manage the growing risk of flooding, in the face of sea level change. For the alternatives that include storm surge barriers, the proposed storm surge barriers would remain open the majority of the time and could be closed in the event of a large storm or hurricane which threatens to flood the communities behind the barrier. To address frequent flooding which is expected to be exacerbated with sea level rise, complementary measures are also proposed, including natural and nature-based features like wetlands and living breakwaters. These nature-based features have an inherent natural adaptability that may allow them to naturally adapt to rising seas. Additionally, as long as sufficient upland habitat is included in the design, wetlands could migrate to higher elevations and protection for frequent flooding could still be provided, even if it is somewhat diminished. The design of any recommended plan will consider low, intermediate, and high sea level rise projections and be designed to function throughout the project life. Since future conditions are uncertain, potential adaptation strategies will also be developed and discussed, and in some cases may be built in. The Corps will conduct sensitivity analysis to assess the impacts and risks of the assumptions made for sea level rise in deciding what assumptions to include. Finally, even if sea levels rise faster than predicted, a barrier and complementary high frequency flooding features would still provide some protection and reduce the risk of flooding and the damage from flooding, so the investment would still have value to the region.
260	Offshore storm barriers could change the salinity of the Hudson River, Long Island Sound and the New York-New Jersey Harbor - altering the ecosystems associated with these waterbodies.	Concur, the potential impacts to water quality, salinity, and ecosystems will be carefully analyzed and impacts of any recommended plan will be avoided, minimized, and mitigated for.
261	Offshore storm surge barriers could change the sediment transport and distribution that would result in the distribution of harmful contaminants throughout the New York-New Jersey Harbor.	This issue will be carefully examined in the environmental impact analysis being performed as part of this study.
262	How far east of the Throgs Neck would the study consider impacts (such as induced flooding)?	The study will evaluate induced flooding to the extent that numerical modeling indicates that it may occur from a variety of possible annual exceedance probability, or AEP, conditions.
263	This study should include better alternatives such as a halt to the issuance of federal permits and other approvals for building and rebuilding in and over the public waterways, hurricane evacuation zone and floodplains that surround New York City.	USACE adheres to existing guidelines when making permit determinations. Changes to the permitting guidelines are beyond the scope of the current study effort.
264	Eliminate 'natural' or 'nature-based' alternatives or features that involve habitat-threatening fills and/or structures or other in water work that may alter or eliminate habitat features that are essential for maintaining the living marine resources.	Natural and nature-based features which would result in unacceptable habitat transfers would most likely be screened based on this criterion alone.

ITEM	COMMENTS	RESPONSES
265	Sea barriers in western Long Island Sound will restrict tidal flushing and alter patterns of exchange between fresh and salt water and sedimentation.	The potential of storm surge barriers to impact tidal flushing/exchange and range, salinity and ecosystems, as well as sedimentation patterns is being analyzed as part of the environmental impact statement preparation for this study. Any projected impacts of an eventual recommended plan would need to be avoided, minimized, and mitigated for as part of this project.
266	How are you advancing natural surge barriers?	If by natural surge barriers, you mean barrier islands, we are not currently considering barrier islands. The locations where surge barriers are proposed to protect dense areas of population and infrastructure from storm surge are also areas with navigation channels and fish migration. Structural storm surge barriers have the added advantage of being able to remain open most of the time and closed when storm surge is imminent, which can theoretically still allow for navigation and fish migration. The study is, however, proposing other natural and nature-based features, such as living breakwaters and wetlands which are useful in helping to manage the risk of frequent flooding, attenuating wave action, and have inherent adaptability and resiliency in that they are able to accrete and migrate with sea level rise and recover after storms.
267	How will the study manage and address interior drainage resulting from storm water back up due to poor sewer and other water captures within the protected area.	Interior drainage is an important component to any coastal storm risk management project design. Without effective interior drainage, a proposed project may not be able to effectively capture the benefits of keeping water out of the system from adjacent water bodies if stormwater is caught inside the protective system with no way to drain. Therefore, this project will need to look at potential upgrades to the interior drainage to ensure that any project built can effectively drain during storm conditions. Interior drainage analysis and design is performed as part of the later stages of Feasibility Study design because it is sensitive to small changes in the general alignment of a project and time-consuming to adjust if other changes are still being made.
268	Barrier alternatives address short term storm surge risks, but would not address long-term risks resulting from sea level rise. There is a danger they would eventually be misused and closed permanently for sea level rise with great impacts to ecosystems and communities.	Non-concur. The proposed alternatives are proposed as a long-term planning initiative to investigate long term regional sustainability in the face of flood risk which will be greatly exacerbated due to sea level rise. The study team is looking closely at what other cities and regions have done in terms of storm surge barriers and gleaned lessons learned on design and operation to help avoid the scenario of overuse. High frequency flooding risk reduction measures are also proposed to complement proposed barriers and would be key to reducing the frequency of closure, even with sea level rise. Also, adaptability of all features will be analyzed and thought out such that there can be ways to adapt structures and measures if seas rise quicker than the design criteria assumed. There may be the need for minor increases in barrier closure as an adaptability measure, but permanently closing barriers would be an extreme and unacceptable management measure due to the impacts to navigation and the environment that this would incur. In order to redesign a constructed project or make significant changes to the operation of a constructed project, a Major Rehabilitation or Reformulation Study would need to be undertaken to study the potential impacts and analyze the feasibility of any major changes.
269	Any initiative like this needs to be paired with appropriately scaled national action in response to climate change. Getting into an arms race with sea level rise without attempting to mitigate global warming will fail and would be an apocalyptic farce.	Climate policy and greenhouse gas regulation is outside the scope of this study and the mission areas/authority of the US Army Corps of Engineers. The Environmental Protection Agency regulates greenhouse gases and the US Congress, state and local legislatures, as well as some state and local agencies are responsible for climate and air emissions policy. However, adaptation is necessary regardless because even if all greenhouse gas emissions were to stop today, the effects of emissions to date would still continue to affect our climate for centuries to come ( <a href="https://climate.nasa.gov/news/2533/short-lived-greenhouse-gases-cause-centuries-of-sea-level-rise/">https://climate.nasa.gov/news/2533/short-lived-greenhouse-gases-cause-centuries-of-sea-level-rise/</a> ). Therefore, efforts to adapt to changing conditions, especially long term efforts which take years to study and build, cannot wait.

ITEM	COMMENTS	RESPONSES
270	What about (1) stopping building in flood zones, (2) more people out of those areas and (3) interfere emission /CO2 + gases reduction recommendations.	Zoning rules and strategic retreat are purviews of local governments and may be proposed and discussed as part of this study. Climate policy and greenhouse gas regulations are the purview of Congress and the Environmental Protection Agency, respectively. While the Corps does look at buyouts and other non-structural measures to get people out of floodplains, these measures tend to be more effective in sparsely populated areas where it is less expensive to move people than protect them or pay for damages once they occur. This study area, however, includes more than one of the most densely populated areas in the United States, which makes moving people out infeasible in most of the study area. Nonetheless, non-structural measures are being considered for this study as a complement for some areas, where appropriate.
271	What info & who decides time to close & open gates?	Operational parameters for closing and opening the gates in a storm surge barrier would need to be established should any of the alternatives with barriers be recommended.
272	What category of storm 3, 4 or 5? What about beaches in a levee?	USACE coastal storm risk management projects are designed to statistically derived water elevations that do not directly correlate to any particular category of storm. The current storm condition being used for comparison purposes between the conceptual alternatives is the 1% annual exceedance probability condition with the intermediate relative sea level change projection. However, as the study progresses the team will work to "optimize" the federal investment by identifying the coastal storm condition that maximizes the net benefits of the tentatively selected plan. Coastal storm risk management structural measures have multiple safety considerations to address the potential for breeches or other conceptual failures. Generally, levees, surge gates or other similar coastal structure measures are designed to be overtopped without failure. Even if a storm surge barrier is overtopped with a storm that exceeds the design, it would still reduce the subsequent flooding from what would have occurred without the barrier in place.
273	For alternatives which do not protect the entire harbor, how will USACE make sure that the energy from storm surge water not increased and projected onto unprotected natural shorelines where the barriers are engaged?	Surge gates can alter flooding that otherwise would have occurred by behind and outside the gates locations when closed for any particular storm event. Both situations will be fully assessed during the study should any surge gate features be included in alternatives that evaluated further in the study.

ITEM	COMMENTS	RESPONSES
274	Alternatives 2, 3A, 3B, and 4 will become inadequate in the face of rising sea levels.	This study is an effort to help the New York and New Jersey region plan for the long-term future on how to manage the growing risk of flooding, in the face of rising seas. For the alternatives that include storm surge barriers, the proposed storm surge barriers would remain open the majority of the time and could be closed in the event of a large storm or hurricane which threatens to flood the communities behind the barrier. To address frequent flooding which is expected to be exacerbated with sea level rise, complementary measures are also proposed, including nature and nature-based features like wetlands and living breakwaters. These nature-based features have an inherent natural adaptability that may allow them to naturally adapt to rising seas. Additionally, as long as sufficient upland habitat is included in the design, wetlands could migrate to higher elevations and protection for frequent flooding could still be provided, even if it is somewhat diminished. The design of any recommended plan will consider low, intermediate, and high sea level rise projections and be designed to function throughout the project life in the face of sea level rise. Since future conditions are uncertain, potential adaptation strategies will also be developed and discussed, and in some cases may be built in. The Corps will conduct sensitivity analysis to assess the impacts and risks of the assumptions made for sea level rise in deciding what assumptions to include. Finally, even if sea levels rise faster than predicted, a barrier and complementary high frequency flooding features would still provide some protection and reduce the risk of flooding and the damage from flooding, so the investment would still have value to the region.
275	What is the role of climate science policy at the state and federal level in evaluating and planning these systems?	Corps climate preparedness and resilience activities are undertaken to ensure reliable performance or mission and operations in changing conditions. Sensitivity analysis is performed to evaluate how alternatives may perform under various sea level rise conditions and what the implications would be under varying scenarios for project performance. This analysis is vital to risk-informed decision making in the face of uncertainty. Please refer to <a href="https://www.usace.army.mil/corpsclimate/">https://www.usace.army.mil/corpsclimate/</a> for more information.
276	Alternative 5 should be selected to protect against storm surge and sea level rise.	Comment acknowledged.
277	Alternatives proposed should be more concerned with higher frequency events and sea level rise issues, particularly a combination of perimeter local solutions, nature based solutions, and non-structural solutions.	The alternatives attempt to address both frequent and catastrophic flooding for comprehensive solutions that address grave risk to life safety and infrastructure from larger storms, as well as frequent flooding, which will be exacerbated by sea level rise. The alternatives do include a combination of perimeter solutions, nature-based solutions, and where appropriate, non-structural solutions, in addition to larger infrastructure solutions.
278	The set of alternatives is too narrow. The alternatives should include integral, nature-based solutions the approach the size+ scope of alternatives 2, 3A, 3B, and 4, such as large scale mudflat, shallow- water+wetland restoration of jamaica, and/or large scale reef restoration in Raritan bay. These are easier to incorporate with non-structural solutions like buyots and retreat, or local perimeter structural shoreline improvements. There should be a set of large-scale nature-based solutions on the same level as the alternatives proposed.	The alternative concepts presented at the scoping meetings are very preliminary and represent scales of solutions (from overall system-wide to regional to localized) rather than the traditional suite of alternatives presented in USACE studies. Actual locations and site-specific measures (whether structural, nonstructural, NNBF) have yet to be developed and analyzed for the upcoming draft report in 2020. The alternative concepts represent a reasonable range of solution scales to be considered, with the actual alternative components to be identified later.

ITEM	COMMENTS	RESPONSES
279	Catastrophic failure of the structural alternatives should be part of the BCR equation and a higher priority should be placed on nature-based features which do not fail catastrophically and can adapt to uncertainty- SLR, storm frequency, intensity.	All coastal storm risk management measures have limitations and trade-offs. In general, structural measures footings, etc. are designed to withstand coastal storms greater than the storm condition they are designed to address such that if a more severe coastal event occurs, the structures are overtopped but do not fail catastrophically. Generally, natural and nature based features are best suited to more frequent, less severe events and as such do not well address the storm condition being used for initial evaluation in the study but will likely have greater application to any alternatives carried forward in the study. Adaptation is certainly an important consideration to all potential coastal storm risk management measures.
280	Proposals for natural and nature-based solutions should be of a similar scale to the other alternatives with perimeter structural solutions and a robust non-structural measure.	These alternative concepts presented at the scoping meeting are very preliminary and represent scales of solutions (from overall system-wide to regional to localized) rather than the traditional suite of alternatives presented in USACE studies. Actual locations and site-specific measures (whether structural, nonstructural, NNBF) have yet to be developed and analyzed for the upcoming draft report in 2020. The alternative concepts represent a reasonable range of solution scales to be considered, with the actual alternative components to be identified later.
281	Combining both sea level rise & storm surge heights-in feet or meters- will we-NYC- be protected? 5 ft high, 8ft high, what height?	The storm condition which maximizes the net benefits for the selected alternative will be determined in 2021, should the study proceed to that stage. Currently, the 1% AEP with intermediate SLR is being used for comparison purposes. The height of this selected condition varies over the study area from 12 ft. to over 20 ft. from current sea level.
282	Climate changing all the time. Recommend doing nothing except to enforce no more building in flood plains.	Alternative 1 is the No Action plan and is compared against all other alternatives. If the analysis shows that no federal action is preferable, then that is what the study would recommend.
283	Considering there is no comprehensive plan in place to address climate change and rising sea level, doesn't it seem counterproductive to spend billions on flood mitigation when the core problem remains in unaddressed? Wouldn't it be more productive in the long run to first address and implant a cohesive rational policy to stop and/or reverse climate change?	Non-concur. A comprehensive approach to climate change includes adapting to changing conditions, especially when considering large-scale solutions that require years of study, years to build, interagency cooperation, and significant public engagement. As seen with Hurricane Sandy, there is substantial risk to human life and infrastructure in this region due to coastal flooding, which stands to increase with sea level rise. The Corps has authority and funding to study possible solutions, with engaged partners, and has thus been tasked with this study.
284	The basic problem seems to be the flooding of low lying areas in the New York City and New Jersey areas. The most logical and economic solution would be sea walls and berms. There should be nothing done to inhibit the flow of the Hudson River. The majority of "solutions" would have a direct effect on the river including the stopping of tides, which you admitted not looking at yet.	Seawalls and berms are among the measures being considered and Alternative 5 does not include in-water barrier. This is being evaluated and compared against the other alternatives for screening. The storm surge barriers included in Alternatives 2, 3A, 3B, and 4 would have gates that remain open the majority of the time so as to allow for tidal exchange, navigation, species migration, etc. The potential impacts to tidal exchange, ecosystems etc. is also being evaluated as part of this study. Any recommended alternative would need to avoid, minimize, and mitigate for impacts.
285	Will there be a significant increase in water velocity with the installation of gates?	Typically, storm surge gates cause elevated velocities nearfield to the structures as a result of entraining of the flows around the tower structures, however this would have to be numerically modeled to determine the amount and what other effects that these increased flows may cause. The study team is working with the Coast Guard as a Cooperating Agency and will carefully incorporate navigational safety into the design parameters of any plan that moves forward in the study.

ITEM	COMMENTS	RESPONSES
286	How will the gates be built to accommodate the shipping traffic in the harbor?	Navigation gates/openings would be included in the design. The study team is working with the Coast Guard as a Cooperating Agency and would consult carefully to ensure navigational safety.
287	Is it possible to close off all of the smaller inlets around the harbor and build the wall around as much of Manhattan as possible to provide protection?	Conceptual alternatives 3B, 4, and 5 include a number of shoreline-based features to address coastal storm risk exposure to Manhattan Island (among other features). How those features and alternatives fare compared to other coastal storm risk management approaches is one of the primary initial screening goals for the NYNJHAT study.
288	Your barrier leaves the historic museum of Ft. Schuyler, the naval operational support center and SUNY maritime unprotected. Flood berms should be provided for protection.	As an agency of the federal government, the U.S. Army Corps of Engineers must comply with NEPA and Section 106 of the National Historic Preservation Act which requires that they take into account the effects of any undertaking on historic properties. As part of the Environmental Impact Assessment the District is considering the potential effects associated with each of the proposed alternatives and is carrying out coordination with the New York and New Jersey State Historic Preservation Offices, the Advisory Council on Historic Preservation, Native American Tribes, and other interested parties. The authorization for this study does not allow the Corps to target protection of individual properties. As plans are further developed the protection of individual structures outside the area of protection from the barriers and floodwalls may be considered. In addition, the District will ensure, in accordance with Corps policy, that the measures will not cause flooding to these properties as the study progresses.
289	Rather than barriers, focus on community-specific plans to protect people and infrastructure.	Several alternatives include shoreline-based measures to address specific areas of high coastal storm risk along the shoreline, and may be carried further in the study. Further, non-structural measures such as greater coastal storm risk education, warning systems and evacuation planning are likely to be incorporated into any alternative that is carried further in the study. Coastal storm risk management is a shared responsibility between all levels of government and the people.
290	Will the barriers prevent the normal tidal movement of the river?	The goal would be to allow for and support continued tidal movement and minimize any impacts to such. The study team is analyzing potential impacts and any recommended plan would need to avoid, minimize, and mitigate for impacts.
291	Any plan needs to address sea level rise due to climate change at the same time as addressing risk of storm surge.	It is outside of the scope and authority of this study and the Corps to enact climate policy or regulate greenhouse gas emissions. However, the study can look at ways to manage the growing risk from rising sea level, which is one of the objectives of the study.
292	How can we help redirect water and protect construction sites in progress?	Redirection of water from any coastal storm risk management measure under contemplation in the study would need to be evaluated to ensure that the redirection (to the extent that it may occur) does not cause unaddressed induced flooding elsewhere. In general, construction sites and contracts generally have requirements to avoid impacts from any coastal storm events that may occur during construction but it is an inherent risk associated with construction in an area at risk from coastal storms.
293	Alternatives that address flooding from storm surge and sea level rise should be provided	The proposed alternatives do include measures to address flooding from both storm surge and frequent flooding which will be exacerbated by sea level rise.
294	There should be a holistic shore based approach to flooding from sea level rise.	Concur, the alternatives include complementary measures to address frequent flooding which will be exacerbated by sea level rise.
295	Building sea walls that affect the rivers is not the answer. We should work with nature.	Comment acknowledged.



ITEM	COMMENTS	RESPONSES
296	Additional detail is needed about the alternative plans, including the size and number of all ship and tidal exchange gates in all barrier alternatives and the sea level threshold for closure of the gates.	This detail has not yet been developed, but once it is will be essential for impact evaluation. Performing Tiered NEPA analysis will allow the study team to first address broad impacts more conceptually and then address the site-specific detailed impacts once the design is refined enough to answer questions such as this.
297	In-water storm surge barriers would permanently damage the Hudson River estuary and its life and do nothing to stop damage from sea level rise.	The study team is currently analyzing the potential impacts of the proposed alternatives. Impacts from any recommended plan would be avoided, minimized, and mitigated for. If the impacts are deemed to be unacceptable, then that alternative would need to either be reworked or screened out. It is not accurate that the alternatives would not address damage from sea level rise. Complementary measures are proposed to address this type of frequent flooding which stands to be exacerbated due to sea level rise.
298	The possibility of flooding from these alternatives, particularly along the Hudson River is very possible.	There is always a risk of flooding in flood prone areas, even with structures in place that are designed to manage and reduce this risk, because a storm can come which exceeds the design of the coastal storm risk management structure. Additionally, there may be residual risk that is not feasibly addressed with a recommended plan. This study will look at and attempt to measure the residual risk among the various alternatives, and the continued risk with the No Action alternative. For the No Action alternative, the risk of coastal flooding is expected to increase with future sea level rise, including along the Hudson River. The possibility of induced flooding is also being evaluated as part of this study. Preliminary results are discussed in the Interim Report released on February 19, 2019. The study will continue to evaluate the potential for induced flooding and ways to avoid, minimize, and mitigate for any induced impacts.
299	Proposals should consider less gray infrastructure and more green alternatives such as living shorelines and restored wetlands as gray infrastructure is insufficiently adaptable to be responsive to sea level rise and the rising frequency of 100-year storms.	The alternatives have an integrated approach using both gray and green infrastructure and attempting to target solutions to where they have been shown to be most effective. Adaptiveness in the face of uncertain future conditions is a key component to the evaluation and analysis process that the study team is undertaking.
300	According to Professor Klaus Jacobs, Columbia University, Lamont-Doherty Earth Observatory - barriers are short-term solutions that cause long-term issues because they don't address sea level rise. When sea level rise becomes comparable to storm surges, which may be as early as 2050, barriers will need to close permanently to keep out the rising ocean. Permanently closing the barrier would prevent the rivers from getting to the ocean. Flooding inside the barrier would be as high as the ocean on the opposite side of the barrier. NYC and inland river communities will have to address the full amount of sea level rise.	Water levels similar to those observed during Hurricane Sandy landfall are not projected to occur in the area from sea level rise alone for at least a century, under the USACE high projection. All surge gates are assumed to remain open during ambient conditions during the project life (of 50 years) as well as the planning horizon (of 100 years). To address this concern in the even longer term, the authorization for the surge gates could potentially include explicit language to forbid permanent closure. From a practical engineering standpoint, the surge gates are not designed to remain in the closed position permanently as this would preclude maintenance and repairs. Putting aside the severe environmental impact to the estuary that this would cause, if USACE was directed to implement permanent diking of the NYNJHAT estuary from the ocean, this would need to be done using other measures, such as seawalls, and would require new study/authorization and environmental impact analysis.

ITEM	COMMENTS	RESPONSES
301	It was mentioned that sector gates are preferred to those in Rotterdam. Do they require dry docks when they are not deployed? And if so, would dry docks require construction on land? How would this be accomplished in dense urban NYC?	Current conceptualized alternatives involving surge gates have assumed design approaches as have been implemented in other locations most similar to the NYNJHAT study area. The cost of maintenance throughout the project life is included in the cost estimates of the alternatives and in the cost-benefit analysis used to screen alternatives. Floating sector gates are typically maintained by having a closed cofferdam area where the gate structure is housed (effectively a dry dock) so maintenance on the gate structure can be performed there. The real estate costs, including easements for construction and maintenance, will be included in the cost-benefit analysis and the impact analysis. There are other types of storm surge barriers that do not require on-land dry docking and may be more appropriate for denser parts of the study area. The tradeoffs and appropriateness of the various designs will be considered as part of this study and further refined in the Pre-Construction Engineering and Design Phase, if the study results in an approved and funded recommendation.
302	Natural and nature-based features have been listed on each alternative but not mapped. How much will these methods be weighted when modeling the impacts under each alternative?	Each measure included within any alternative under consideration must work in a complementary fashion to other measures in the alternative and to the extent that any measure or set of measures can be separated from the others hydrodynamically and economically, it or they need to be individually justified based on their costs and potential outputs.
303	How frequently would storm gates be deployed?	Gate closure is dependent upon many factors, many of which vary by location. The Interim Report describes the conditions assumed initially comparison purposes.
304	What is being done to address sunny day flooding and sea level rise? Why not use alternatives like dunes, wetlands and reefs?	Concur, natural and nature-based features such as dunes, wetlands, and reefs are being considered as complementary measures to address frequent flooding such as sunny day and high tide flooding, all of which will be exacerbated by sea level rise.
305	Will the gates in 3A, 3B and 4 at the Throgs Neck and Pelham create a bottleneck increasing the rise of flooding in the Bronx and Queens?	Only conceptual alternative 3A has a surge gate structure at the Throgs Neck and modeling does indicate the potential for isolated induced flooding outside the barrier, so that potential impact warrants further evaluation in the study should that alternative be carried forward. As for the Pelham Bay surge gate structure (in conceptual alternatives 2-4), it has not been modeled separately but it would need to be if this feature is carried further in the study. Generally, the relatively small area affected by the Pelham Bay surge gate feature is doubtful to cause induced flooding given its size relative to western Long Island Sound but modeling would be needed to confirm this.
306	How will Alternative 2, 3A, 3B and 4 be adapted for sea level rise and will it be expensive?	Measures in any "with project" alternative will either incorporate future sea level rise in the initial design/construction of the measure and/or will include future design considerations for making modifications to the measure over time if and as sea level rise warrants such modifications. Further refinement of this will be necessary for any measures that are carried forward in the study.
307	How will Alternative 2 address daily sea level rise flooding over the next 20 to 50 years? (i.e. no storm, gates open)	The regions within the NYNJHAT study area that are susceptible to coastal flooding due solely to sea level rise impacts (e.g., Broad Channel in Jamaica Bay) are fairly limited as compared to the entire study area, however more areas will become susceptible as sea level rise continues. For such areas as it relates to conceptual alternative 2, a broad range of additional shoreline-based measures (including structural, non-structural and natural and nature based features) to address the more frequent, less severe flooding for when the surge gate structures are open and as sea level rise continues.

ITEM	COMMENTS	RESPONSES
308	How will Alternative 5 address daily sea level rise flooding over the next 20 to 50 years? (i.e. no storm)	The regions within the NYNJHAT study area that are susceptible to coastal flooding due solely to sea level rise impacts (e.g., Broad Channel in Jamaica Bay) are fairly limited as compared to the entire study area, however more areas will become more susceptible as sea level rise continues. For such areas as it relates to conceptual alternative 5, a broad range of additional shoreline-based measures (including structural, non-structural and natural and nature based features) may be implemented over time to address new areas that may be subject to more frequent flooding as sea level rise continues.
309	Will this feasibility study evaluate sea level rise flooding w/o storms?	Sea level rise does not occur in the absence of coastal storms as coastal storms are part of the existing condition and expected to continue. The primary purpose of the study is to evaluate all flooding risks posed by coastal processes over time. Coastal storms and sea level rise are integral to each other and to address one without the other in any alternative would be tenuous if not outright flawed. While flooding from sea level rise alone is far more frequent, its impacts are also far less severe than those of more severe coastal storm events, as Hurricane Sandy well demonstrated, which caused tens of billions of dollars in property damage and multiple storm-related fatalities.
310	How long will these gates be designed to be useful? How do these storm gates and measures address sea level rise? How high will they be designed to be? At what year would they be over topped, since "all walls will be over topped?"	The study presently uses the maximum 50 year "period of analysis" for economic evaluation/justification purposes but extends to 2100 for the "planning horizon". Since the project is likely to be utilized and last longer than the period of analysis, there is a need to analyze the affects and consider a longer planning horizon in the feasibility study. The period of analysis is the subset of the planning horizon over which we consider plan effects. The surge gates in conceptual alternatives 2, 3A, 3B, and 4 would be designed to address coastal storms into the future as they may be exacerbated by continued sea level rise. Their height would vary and depend on several factors including the location of the gate structure, the storm condition to which they're designed, as well as the projected sea level rise for that location. The storm condition which may overtop any of the proposed coastal storm risk management features is varied and would be subject to further study if/as those features advance in the study.
311	Is there a proposed timetable for how long each Alternative would take to build?	Yes. Construction duration estimates are included in the Interim Report (Cost Appendix) released on February 19, 2019.
312	Is there a project impact analysis that considers how effective each alternative would be?	The evaluation of each conceptual alternative also considers the residual risks (e.g., areas that are have unaddressed coastal storm risk) so the effectiveness of each conceptual alternative to broadly address coastal storm risks in the study area is considered.
313	If the gate project was approved tomorrow how long will it take to build?	The Interim Report will contain estimates (based on parametric analyses) of how long each feature in each conceptual alternative may require to construct, were that feature and alternative authorized, funded and supported by the non-federal sponsors after the feasibility study. Given the scale of the features, construction may require a few years to several, beyond a decade, which assumes funding for construction is unconstrained.
314	Combined sewer overflows or CSO's have a damaging impact on this region as a result of even slight flooding. Can more aggressive CSO measures be included within this study to reduce their future impacts further?	It is possible that mitigation would include CSO prevention measures if the recommended plan would worsen the existing CSO problems, yes. If a proposed USACE plan would worsen existing CSOs, USACE is required to provide what is known as minimum facility, or measures to bring the stormwater levels back to where they would be in the absence of a project.

ITEM	COMMENTS	RESPONSES
315	What might be the impact of heavy rainfall events in the Estuary upstream?	Water surface elevations resulting from a rainy period of 1,000 hours (roughly 42 days) were estimated using the Adaptive Hydraulics Model with closed surge barriers in place at Throgs Neck, Verrazano Narrows, and Arthur Kill. Typical storms with significant rain typically last on the order of 1-3 days, not 42 days, so the resulting water surface elevations are conservative. At 150 hours (roughly 6 days) with closed surge barriers, water surface elevations behind the barriers rose approximately 2 meters, which is the equivalent to the maximum tidal range in the harbor).
316	Keep Alternative 6 - all onshore measures moving forward to the next round of public comment	There is no Alternative 6 at this time. If you mean Alternative 5, the shoreline based measures only, it has not been screened out of the array of alternatives as of the Interim Report to be released on February 19, 2019, which is available for public comment.
317	An in-water barrier that would open and close regularly for shipping would do nothing for rising sea levels	This study is an effort to help the New York and New Jersey region plan for the long-term future on how to manage the growing risk of flooding, with consideration of climate change. For the alternatives that include storm surge barriers, the proposed storm surge barriers would remain open the majority of the time and could be closed in the event of a large storm or hurricane which threatens to flood the communities behind the barrier. To address frequent flooding which is expected to be exacerbated with sea level rise, complementary measures are also proposed, including natural and nature-based features like wetlands and living breakwaters. These nature-based features have an inherent natural adaptability that may allow them to naturally adapt. Additionally, as long as sufficient upland habitat is included in the design, wetlands could migrate to higher elevations and protection for frequent flooding could still be provided, even if it is somewhat diminished. The design of any recommended plan will consider low, intermediate, and high sea level change projections and be designed to function throughout the project life. Since future conditions are uncertain, potential adaptation strategies will also be developed and discussed, and in some cases may be built in. The Corps will conduct sensitivity analysis to assess the impacts and risks of the assumptions made for sea level rise in deciding what assumptions to include. Finally, even if sea levels rise faster than predicted, a barrier and complementary high frequency flooding features would still provide some protection and reduce the risk of flooding and the damage from flooding, so the investment would still have value to the region.
318	Will the barrier have to close permanently if normal high tide will result in Sandy-like water levels?	Water levels similar to those observed during Hurricane Sandy landfall are not projected to occur in the area from sea level rise alone for at least a century, under the USACE high projection. All surge gates are assumed to remain open during ambient conditions during the project life (of 50 years) as well as the planning horizon (of 100 years). To address this concern in the even longer term, the authorization for the surge gates could potentially include explicit language to forbid permanent closure. From a practical engineering standpoint, the surge gates are not designed to remain in the closed position permanently as this would preclude maintenance and repairs. Putting aside the severe environmental impact to the estuary that this would cause, if USACE was directed to implement permanent diking of the NYNJHAT estuary from the ocean, this would need to be done using other measures, such as seawalls, and would require new study/authorization and environmental impact analysis.

ITEM	COMMENTS	RESPONSES
319	will the barrier have to close permanently in order to maintain water levels? Will any tide be able to reach the river?	No, the Corps does not envision permanent closure of any proposed storm surge barriers, ever. All surge gates are assumed to remain open during ambient conditions during the project life (of 50 years) as well as the planning horizon (of 100 years). To address this concern in the even longer term, the authorization for the surge gates could potentially include explicit language to forbid permanent closure. Should sea level rise beyond that which is assumed in the study, then a new authority/study would need to be done to assess potential alternatives to addressing the changed conditions. This would require impact analysis as well. Currently, the NYNJHAT study area is defined by all shorelines that currently have tidal influences and therefore coastal storm risk exposure. Potential impacts to tidal range from any of the proposed alternatives that advance in the study will be assessed as part of the impact analysis for this study.
320	The smaller scale, localized and more natural projects should be put in place sooner. A more massive project does not seem to be a good use of resources, particularly the Sandy Hook and Verrazano Narrows alternatives (2 and 3A)	Comment noted.
321	The Corps should build a greater awareness to encourage sensible building and stewardship of areas prone to flooding.	Comment noted.
322	Financial incentives for people to storm-harden and lift waterfront properties and disincentives to future development in flood-prone areas should be explored.	Concur, however, financial incentives are beyond the scope of the USACE mission areas.
323	The plans for Alternative 2 looks to include a roadway that could connect New Jersey and the Rockaway Peninsula. If this were built it would harm the whole area due to the over abundance of automobile traffic it would bring to the area.	If a roadway were proposed as an element of this alternative, a full transportation study would need to be done to analyze potential impacts and inform the design.
324	How does the Army Corps intend to manage raw sewage effluent and debris that will inevitably get stuck behind the proposed barriers?	Raw sewage effluent is a result of CSOs and there may be an opportunity to mitigate the effect of CSOs as part of this project. Debris management will be a component of the operations and maintenance of any project and there may be opportunities to include trash racks, catchment basins, etc. to help make debris management more efficient.
325	What are the impacts to the communities outside the proposed Throgs Neck Barrier, specifically in terms of flooding deflection?	USACE is currently evaluating this impact. Preliminary model simulations indicate that there may be some induced flooding in some conceptual alternatives (notably conceptual alternatives 2 and 3A) that extend beyond the primary study area into western Long Island Sound and the New York Bight Apex. This will be evaluated more for any alternative that moves forward in the study and that has such potential impacts.
326	Looks like gated in NYC will constrict/restrict water flow from LIS. This would lead to storm water rise in eastern Long Island Sound, especially during a northeast storm.	Preliminary modeling indicates that any effects of surge gates (particularly in alternatives 2 and 3A) in Long Island Sounds are localized to areas of western Long Island Sound. These effects will be evaluated further should either of these alternatives advance in the study.

ITEM	COMMENTS	RESPONSES
327	What will you do to ameliorate coastal flooding in Westchester?	Shoreline-based features are identified in Westchester along the Hudson River in conceptual alternatives 3B-5. Further features may be identified for Westchester shoreline both along the Hudson River and western Long Island Sound, should any of these conceptual alternatives be advanced in the study.
328	Is there an opportunity to add an alternative after options are narrowed down? Or are the only options the existing alternatives that survive?	These alternative concepts presented at the scoping meeting are very preliminary and represent scales of solutions (from overall system-wide to regional to localized) rather than the traditional suite of alternatives presented in USACE studies. Actual locations and site-specific measures (whether structural, nonstructural, NNBf) have yet to be developed and analyzed for the upcoming draft report in 2020. The alternative concepts represent a reasonable range of solution scales to be considered, with the actual alternative components to be identified later.
329	How long will the gates be closed? Will it be closed more frequently? How long will the gates be closed during a Nor'easter?	Currently, for evaluation purposes, the study team is assuming that the surge gates would be closed for any event that exceeds the 50% annual exceedance probability (AEP) condition, and to increase as sea level rise causes this water level to be exceeded more often over time. However, this would need to be evaluated considerably further in subsequent stages of the study should any conceptual alternative involving surge gates be advanced in the study.
330	How were the locations in Westchester County identified for shoreline-based measures?	Preliminary shoreline-based features in Westchester County were identified using existing GIS and numerical modeling data of potential water level and flood events for the selected storm condition. Should any conceptual alternative that has such features (conceptual alternatives 3B-5) advance in the study, these features will be further refined and other features may be added to those alternatives.
331	Were any Long Island Sound communities considered for flooding/storm surge susceptibility? Why are no measures considered for Long Island Sound? Can coastal storm surge in Western, Central and Eastern portion of Long Island Sound?	A separate focus area study from USACE's NACCS is identified for the northern Long Island Sound shoreline (Connecticut) and the southern shoreline of Long Island Sound has previously been evaluated for coastal storm risk management the US Army Corps of Engineers. For these reasons, this area is not included in the NYNJHAT study.
332	Are you working closely with Lamont-Doherty Earth Observatory at Columbia University? They have knowledge of the Hudson River and of climate change.	The study team has not to date engaged to a large degree with the expertise of the Lamont-Doherty Earth Observatory at Columbia University on this study. The New York District has worked with them in the past, however, and may engage outside expertise, as necessary as the study progresses.
333	Why not combine Alternative 1 and Alternative 5?	All of the projects in Alternative 1 (the future without project condition without federal action as a result of this study) are already incorporated into the other alternative concepts (2 through 5). The incorporation of these projects will affect economic justification for each alternative on an individual basis. The alternative concepts have been shown without the assumed projects, and with the assumed projects. However, they are built into the benefits modeling.

ITEM	COMMENTS	RESPONSES
334	Why study measures that don't protect against sea level rise?	This study is an effort to help the New York and New Jersey region plan for the long-term future on how to manage the growing risk of flooding, with consideration of climate change. For the alternatives that include storm surge barriers, the proposed storm surge barriers would remain open the majority of the time and could be closed in the event of a large storm or hurricane which threatens to flood the communities behind the barrier. To address frequent flooding which is expected to be exacerbated with sea level rise, complementary measures are also proposed, including natural and nature-based features like wetlands and living breakwaters. These nature-based features have an inherent natural adaptability that may allow them to naturally adapt. Additionally, as long as sufficient upland habitat is included in the design, wetlands could migrate to higher elevations and protection for frequent flooding could still be provided, even if it is somewhat diminished. The design of any recommended plan will consider low, intermediate, and high sea level change projections and be designed to function throughout the project life. Since future conditions are uncertain, potential adaptation strategies will also be developed and discussed, and in some cases may be built in. The Corps will conduct sensitivity analysis to assess the impacts and risks of the assumptions made for sea level rise in deciding what assumptions to include. Finally, even if sea levels rise faster than predicted, a barrier and complementary high frequency flooding features would still provide some protection and reduce the risk of flooding and the damage from flooding, so the investment would still have value to the region.
335	Did you review the proposed flood risk management plan for the Village of Mamaroneck? What is the impact of the coastal storm risk plan on the Village of Mamaroneck?	The Chief's Report and other documents produced for the Mamaroneck Flood Risk Management Study have been used as sources of existing information. Any impact that the New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Study would have on the flood risk management project in Mamaroneck would be considered.
336	Is the Army Corps incorporating individual community flood control infrastructures into its big plan?	To the extent that notable existing coastal storm risk management projects are known, or such projects are planned (with associated funding and permits in place), these are being incorporated into Alternative 1 (i.e., the "no action" alternative) to establish a baseline for comparison to what may be conceptualized in the "with project" alternatives.
337	Can the Corps evaluate flooding from rain or sea level rise in this study or only storm surge flooding?	The Corps can and will evaluate the feasibility of managing risk from both frequent flooding and larger events.
338	What determines the scope of threats addressed by this study?	The study authority defines the study scope and purpose, which is coastal flood risk management. Please see the Interim Report for more information on the study authority.
339	Does this study address sea level rise flooding on days without storms?	Sea level rise does not occur in the absence of coastal storms as coastal storms are part of the existing condition and expected to continue. The primary purpose of the study is to evaluate all flooding risks posed by coastal processes over time. Coastal storms and sea level rise are integral to each other and to address one without the other in any alternative would be tenuous if not outright flawed. While flooding from sea level rise alone is far more frequent, its impacts are also far less severe than those of more severe coastal storm events, as Hurricane Sandy well demonstrated, which caused tens of billions of dollars in property damage and multiple storm-related fatalities.

ITEM	COMMENTS	RESPONSES
340	Does Alternative 2 or Alternative 5 address sea level rise flooding (no storms)?	Sea level rise does not occur in the absence of coastal storms as coastal storms are part of the existing condition and expected to continue. The primary purpose of the study is to evaluate all flooding risks posed by coastal processes over time. Coastal storms and sea level rise are integral to each other and to address one without the other in any alternative would be tenuous if not outright flawed. While flooding from sea level rise alone is far more frequent, its impacts are also far less severe than those of more severe coastal storm events, as Hurricane Sandy well demonstrated, which caused tens of billions of dollars in property damage and multiple storm-related fatalities.
341	What are the plans for the rest of the estuary?	Should any conceptual "with project" alternative advance in the study, additional features - notably non-structural and natural and nature-based features are likely to be added for areas of coastal storm risk that do not currently have features identified. All features in any alternative under evaluation in the NYNJHAT study are subject to refinement and modification through the iterative study process.
342	How will the inability during a storm of CSOs being prevented from flow out the area being addressed?	The project will need to mitigate for impacts caused by the project. Therefore, if the recommended plan would worsen the combined sewer overflow problem, there is an opportunity to help mitigate for it. Potential mitigation could include, upgrades to the interior drainage system, nature-based features, green infrastructure, or even upgrades to wastewater treatment plants, if warranted.
343	Would the sea wall increase the risk of flooding in adjacent areas without additional protective structures?	Perhaps, the possibility of inducing flooding is being investigated and measures to mitigate any induced flooding would be included in the overall design and the cost-benefit analysis for any recommended plan.
344	The Thames barrier, which is shown as an example, was expected to be closed 1-2 times per year but was closed 50 times in 2013-2014. Do you expect closures to have a similar frequency?	While the surge gate design example of the Thames barrier might be considered in select locations in the NYNJHAT study, the flooding dynamics and geographic/hydrodynamic conditions in the Thames area is considerably different from those in the NYNJHAT study area. Possible surge gate activation/closure in the NYNJHAT study area would need to be evaluated further should any conceptual alternative involving surge gates advance in the study.
345	Who will be responsible for operating and maintaining these structures?	The non-federal sponsor(s) would most likely be responsible, as that is the standard approach for Corps civil work projects once built. However, this will be worked out in subsequent phases to establish an operation, maintenance, repair, replacement and rehabilitation manual that clearly lays out responsibilities, etc., for any feature in any conceptual alternative that may be advanced in the study.
346	Will the study look at recurring emissions or must we do 'nothing' to prevent or reduce sea level rise and extreme weather?	Climate policy is outside of the scope of this study and is outside of the mission area of the US Army Corps of Engineers. Climate policy is the purview of Congress, the Environmental Protection Agency as a regulator of greenhouse gas emissions, as well as state and local legislatures and some agencies.
347	Shoreline measures protect against storm surge. How will they impact rainfall flooding that drains by sheet flow?	Shoreline measures can have the inadvertent effect of catching sheetflow inside of the protective alignment if not coupled with interior drainage work. Therefore the design of any recommended plan would need to analyze the existing interior drainage and provide for upgrades, as warranted, to ensure that the project can fully drain during storm conditions.
348	You project sea-level rise but what about future storms? Is sea-level rise just a substitute word for climate change?	Sea level rise is accelerating due to global climate change and directly impacts the future conditions for which we plan and a major factor in flood risk planning. Future storms are very difficult to predict. Please see the Corps Climate Preparedness and Resilience website for more information on how the Corps incorporates Climate Change into our planning process: <a href="https://www.usace.army.mil/corpsclimate/Climate_Preparedness_and_Resilience/">https://www.usace.army.mil/corpsclimate/Climate_Preparedness_and_Resilience/</a> .





ITEM	COMMENTS	RESPONSES
349	Since this project will not be constructed until likely 2024 what about more extreme sea level rise projects instead of intermediate? The models are likely to change by then and will likely get worse.	The study is initially evaluating/comparing possible conceptual alternatives to address the 1% annual exceedance probability (AEP) condition (i.e. in any given year there is a 1% chance of a storm coming that would exceed this size event) with the intermediate sea level rise projection but as the study advances, addressing coastal flooding risks associated with more frequent lesser storm events and sea level rise alone will be evaluated in more detail if and as justified. As established sound science is advanced (e.g., updated models) and incorporated by USACE, it will be incorporated into the study alternatives and design.
350	Is the 100-year storm the standard tract is being studied?	The 1% annual exceedance probability (AEP) storm condition, sometimes referred to as the 100-year event, was selected for initial comparison of the conceptual alternatives but if and as the study advances, subsequent stages of the study would see what storm condition maximizes the net benefits of whatever alternatives advance in the study, such that the final selected storm condition might be more or less probable than the 1% AEP storm condition.
351	We know that storms are becoming more extreme. Will you be studying the impact of more severe storms?	The regional or local effects of climate change on making coastal storm risks more severe is evolving and not sufficiently well established to utilize, as of yet, in future coastal feature designs. As the science advances and is incorporated into USACE engineering regulations, it will be incorporated into the study alternative design and formulation.
352	One of the risks is back-flooding as the barriers must be closed more and more over time. How will this back-flooding from the rivers be prevented?	Any structural coastal storm risk management measure, whether surge gate or shoreline-based floodwall or levee, would need to consider and address the potential for flood water behind the measure (from inland sources), if applicable. As for river discharge during ambient conditions with any of the potential surge gate features under evaluation, the gate structures allow tidal exchange as well as river discharge without causing back-flooding.
353	What happens when the wall closes to the water upstream or behind the wall? Where does the water go?	Conceptually, any inland water sources whether from tributaries, point sources, or inland drainage needs to be factored into the design of structural coastal storm risk measures such as surge gates or floodwalls/levees. Typically, this is managed by either ensuring sufficient storage capacity behind these structures to accommodate the inland/backside inputs or by pumping methods to discharge these flows outside of the structural measures.
354	Have you referred to the MTA/MNRs studies with regard to the Hudson River post Sandy?	Yes, USACE coordinated with the MTA on its post Sandy recovery projects (NYC MTA, MNR) as part of the North Atlantic Coast Comprehensive Study (USACE 2015). As part of the current effort, we have contacted MTA for updates on projects to inform our baseline assumptions.
355	What sea level rise will the solution be projected to?	The study is currently using the USACE intermediate sea level rise projection but if and as the study advances, other sea level rise projections will be evaluated to ensure that the plan identified and ultimately recommended takes into account, explicitly, the uncertainties associated with sea level rise. Potential adaptation strategies will also be included in the study, with sensitivity analyses on what would happen if sea level rise were to rise more rapidly, or less so.
356	What is the extent of sedimentation change studies?	If and as the study advances, any of the proposed features that may affect sedimentation patterns and rates in the study area (and beyond) will be evaluated. These are largely focused upon in-water measures such as surge gates, but conceptually shoreline-based measures may also affect upland sediment sources into the estuary.

ITEM	COMMENTS	RESPONSES
357	With sea level rise, at what point do you anticipate that these measures will no longer be effective?	For the planning horizon of year 2100, the conceptual features in the various "with project" alternatives would likely address all current sea level rise projections. Should these projections materially change, as science advances, this may be reevaluated but currently the features should be effective through this planning horizon.
358	Do you anticipate that shoreline measures will be needed by the end of this century?	Any measures that may be implemented as a result of this study may need to be reevaluated at the end of this century as the science and conditions then warrant. The study primary focus is for addressing coastal storm risks in this study area this century.
359	How many of the alternatives have already been implemented by USACE or others in other regions? How effective have they been? What impacts have they caused? How were impacts resolved?	Actions by USACE and other entities in this area are accounted for in the baseline assumptions, also known as the 'future without project condition'. The projects, along with the criteria for their inclusion in our assumptions, can be found in the Plan Formulation Appendix of the Interim Report.
360	I am concerned about the quality of modeling data you will receive on sea level rise from NOAA given the director, Barry Myers is a climate change denier. How will the scientific integrity of the data used in the study be maintained given the current political climate?	USACE follows a prescribed planning process, with rigorous review (including external reviewers for projects that exceed set cost, risk, or potential impact criteria, like this one). Any models used in the decision making process must be reviewed and certified by subject matter experts in order to be used. Regarding climate change, please see an overview at: <a href="https://planning.erdc.dren.mil/toolbox/library/LessonsLearned/Quick%20Reference%20-%20Climate%20Considerations%20Oct2018.pdf">https://planning.erdc.dren.mil/toolbox/library/LessonsLearned/Quick%20Reference%20-%20Climate%20Considerations%20Oct2018.pdf</a>
361	How long will the barriers during a persistent nor'easter?	This comment is incomplete, however if the question is asking how long the barriers would be closed during a nor'easter, barrier closure durations will be established as the study moves forward.
362	Do any alternatives include seawalls or other measures for Rockland County (Piermont, Nyack, Haverstraw, etc.)?	Yes. In conceptual alternatives 3B-5, some features have been identified along the Rockland County shoreline. Should any of these alternative advance for further study, these features would be refined and possibly modified as data and the study warrant. Additional features in this area may also be added as study data and analyses warrant.
363	Is the flood potential for the lower Hudson Valley (Kingston) similar to what was seen in North Carolina?	Much of the North Carolina coastal flooding in 2018 was exacerbated by excessive fluvial flooding/rainfall, which would be a consideration in the study should any of the conceptual "with project" alternatives advance.
364	How often do you expect the gates to be closed with increased sea level rise?	Gate closure is dependent upon many factors, many of which vary by location. The Interim Report describes the initially assumed conditions being used for comparison purposes.
365	Has the Dutch advised the US that we not follow their example of betting on sea level rise?	The study team has been in communication with some coastal storm risk management experts in the Netherlands and gleaned lessons learned from them, including the applicability of certain measures to fit local topography and hydrodynamic regimes.

ITEM	COMMENTS	RESPONSES
366	According to NOAA, under the worst case scenario, sea level will rise 9.8 feet by 2100. But it looks like the Corps assumes a worst-case scenario sea level rise of just 7 feet. Why?	USACE guidance contained in ER 1105-2-100, "Planning Guidance Notebook" states, "Strategies that would be appropriate for the entire range of uncertainty should receive preference over those that would be optimal for a particular rate of rise but unsuccessful for other possible outcomes." 9.8 ft. of rise is not considered explicitly, but is not ruled out. And, "A sensitivity analysis should be conducted to determine what effect (if any) changes in sea level would have on plan evaluation and selection." And, "If the plan selection is sensitive to sea level rise, then design considerations could allow for future modification when the impacts of future sea level rise can be confirmed." A plan would not be selected that would be effective for 7 feet of sea level change but would fail for 9.8 ft. At the very least, the adaptability would be built in to later account for uncertainty in the change rate, including possibly a higher rate not to exclude 9 ft. As far as why 7 feet- USACE guidance contained in ER-1110-2-8162, "Incorporating Sea Level Change in Civil Works Programs" states, "The 1987 NRC report recommended that feasibility studies for coastal projects consider the high probability of accelerating GMSL rise and provided three different scenarios.", and specifies the low, intermediate, and high scenarios.
367	Have there been or will there be modeling studies for the potential impact of each recommendation? I understand that any plan would also address mitigation by induced flooding.	Yes, please see the Interim Report to the planned modeling that the study team is targeting so far. Input received during the agency and public comment period will be used to help refine the further planned analysis/modeling. Also correct, any recommended plan would need to mitigate for any induced flooding as part of the project.
368	What have been the range of storm surges from nor'easters over the last 10-20 years compared to the estimated surge from installation of a gate in the western Long Island Sound (Throgs Neck)?	Induced flooding is being evaluated in the NYNJHAT study for the potential to increase flooding for what would have occurred otherwise from any coastal storm event, including nor'easters, in the areas outside of the Throgs Neck (in western Long Island Sound) as a possible result of surge gates at the Throgs Neck. USACE has selected 20 storms from the 1,050 available storms from North American Coast Comprehensive Study. These storms were selected to match the hazard curves near the with-project areas and specifically trying to best match the 50, 100 and 500 year storms. These 20 storms were simulated in the region of interest in the existing conditions (without surge barriers), and in the with-project (with closed surge barriers). Storm surge and meteorological measurements corresponding to the 1938–2013 period were sampled to define significant extratropical events (Northeasters). Of the 20 storms simulated, 16 showed water elevation differences between with-project and without-project of less than 0.5 feet. Of the remaining 4 storms, the differences were between 0.5 and 1 foot ONLY in the termini of Hempstead Harbor and Manhasset Bay and less than 0.5 feet everywhere else.
369	What will happen to the water that gets blocked out of NYC in the surrounding lands? What will happen to the sewage outfall?	Stormwater and wastewater management is a local responsibility. Please contact the City.
370	How often would sea barriers be tested assuming that they can be tested? How long would the tests last?	It is likely that the gates would need to be tested about once a year. It is unknown how long the tests would last, however, the goal would be for them to be as short as possible to minimize any impacts caused by the closure. This will be further evaluated as the study progresses.
371	How will this effect neighboring communities in terms of coastal flooding? Time frames before and after storms back u?	The potential effects of any features in any of the conceptual alternatives that are advanced in the study will be evaluated for possible adverse effects on neighboring areas (whether inside the defined study area or outside) to ensure that potential impacts, such as induced flooding, are acceptably addressed.

ITEM	COMMENTS	RESPONSES
372	Marine Traffic flow - where will vessels wait out storm while the gates are closed?	Generally, during more severe coastal storm events, there is little navigation just before, during or after due to the effects of the coastal storm alone. Nonetheless, effects to navigation and safety will be analyzed for any navigation gate structure included in the conceptual alternatives, if they are advanced in the study. The Corps is working with the US Coast Guard as a Cooperating Agency on this study and will seek and incorporate their expertise on navigational safety as well.
373	Why was the study conducted in NYC, north of NYC, and the Jersey Shore but Long Island was not part of the study. Did Irene or Sandy reach the 100-year even level? Exactly what areas are being targeted for protection in this study?	The study area is largely bound by the watershed and by other areas that have been studied for Coastal Storm Risk Management, or CSR, previously or are identified for separate study. Any particular coastal storm event, such as Hurricane Sandy, does not equate to any particular statistical condition unless a specific geographic location is set, meaning a 100-year flood event with a 1% annual chance in Lower Manhattan, has a different probability of occurrence at other locations. The NJNJHAT study is seeking to develop the best coastal storm risk management methods for all locations in the study area with substantial risk from coastal storms. The fundamental challenge is identify what the best means and methods for accomplishing this given the vastness and complexity of this study area.
374	Do surge gates move? How do boats get through them?	Yes, the gates are movable and would remain open most of the time so that boats and aquatic species can pass through them. They can be closed to protect vulnerable communities from flooding otherwise caused by storm surge.
375	Will sewage in Little Neck Bay be trapped there if surge gates are used?	The study will analyze the flows and sedimentation patterns and potential impacts from the various alternatives, including water quality. Any recommended plan would need to avoid, minimize and mitigate for impacts from the recommended plan.
376	Is there an increase in surge height on the high side of storm gates	During a storm event, wave runup against a closed surge gate (or other coastal feature) can increase water levels immediately adjacent to the surge gate, but broader induced flooding is dependent upon geographic and bathymetric features in the broader area around the surge gates. Evaluation of the wave runup as well as the broader potential induced flooding will be evaluated for any surge gate features that may be advanced for further evaluation in the NYNJHAT study.
377	Will sea walls and or other surge protective features be built around the perimeter of properties to the east of the Throgs Neck? All properties will be flooded at the expense of this plan	Evaluation of the broader potential induced flooding will be conducted for any surge gate features advanced for further evaluation in the NYNJHAT study. Should there be such induced flooding, it would need to be mitigated by addressing the increased coastal storm risks for areas impacted by the induced flooding, if it cannot be minimized or avoided.
378	I encourage you to work towards non-structural alternatives only. Sea level rise is increasing and the regional plan association and other entities support manage retreat from the shorelines	Nonstructural treatments will be considered, where appropriate, in the next round of formulation. Depending on the topography, flows, and concentration of development, there may be cases where a structural solution is more effective than a purely nonstructural solution.
379	What is the depth of the East River at the gate location and how would gates be built to that depth?	For the Newtown Creek Barrier, the authorized channel depth is -23 ft. MLLW, and the elevation for the preliminary proposal of the sill of the gate is -22 ft. MLLW (which is equivalent to -25 ft. NAVD88). According to NOAA charts, the approximate water depth in the area currently sited for the Throgs Neck surge gate features is -40-45 ft. NAVD88. Surge gates of this depth of water have been constructed elsewhere and are considered potentially feasible for this area, subject to further evaluation should this feature advance in the study. Surge gates, if ultimately recommended, would be designed such that navigation would continue through the open barriers.

ITEM	COMMENTS	RESPONSES
380	Historically has a buy out program below a given number of feet of high water been effected including turning said land into public property	Once a structure is bought out the land on which it sits is not eligible for development.
381	what is the cause of rising coastal sea rise and global warming	Sea-level change has been the focus of intense interest by the U.S. water resources science agencies (NOAA and USGS), along with other agencies contributing to the U.S. Global Change Research Program where it has been general but not unanimous consensus among the scientific community that global climate change and sea level change is caused by anthropogenic greenhouse gas emissions.
382	The NYSDEC informed the Village of Saddle Rock, NY it could not build a floodwall greater than 10 feet above mean low water. He stated that Saddle Rock has seen four 100-year storm events in the past 10 years. He stated that during one of these events the storm surge was at 18 feet above mean sea level, and he believes that, if the Throgs Neck gate is built, the storm surge will reach 26 feet above mean sea level. He urged the Corps to consider an alternative with barriers at the Verazzano-Narrows and at the Eastern end of Long Island (The Race) to "protect everyone."	This possible alternative is beyond the New York District area of responsibility (AOR) but has been referred to our higher authority offices. Generally, the geographic/topographic along with hydrodynamic conditions of the Race pose serious challenges to design and construction of surge gate structures in this region. In conducting preliminary modeling to assess the potential for storm surge barriers to induce flooding, USACE has selected 20 storms from the 1,050 available storms from North American Coast Comprehensive Study. These storms were selected to match the hazard curves near the with-project areas and specifically trying to best match the 50, 100 and 500 year storms. These 20 storms were simulated in the region of interest in the existing conditions (without surge barriers), and in the with-project (with closed surge barriers). Storm surge and meteorological measurements corresponding to the 1938–2013 period were sampled to define significant extratropical events (Northeasters). Of the 20 storms simulated, 19 show a difference between the with-project (with a gate closed at Throgs Neck) and the without-project (existing condition) water surface elevation of less than 0.5 feet. Of the remaining (20th of 20) storms, the difference between the with and without-project conditions of less than 1 foot.
383	Which of the alternatives will include the Throgs Neck gate and/or affect the Long Island Sound?	All of the alternatives include the Throgs Neck and the western Long Island Sound, whether the flood risk would be addressed through barriers, floodwalls, or combinations thereof. The exact measures and their locations have not yet been determined.
384	It is Eastchester Bay not Pelham Bay which the "Pelham Bay" gate spans.	Although the proposed gate spans the "Pelham Bay Park" and is adjacent the "Pelham Parkway" the comment is correct and according to NOAA Navigation Chart 12366, the Hutchinson River appears to empty into the Eastchester Bay. The schedule did not allow for all documents associated with the Interim Report to be updated, however, all future references to this gate or study features in this location will be appropriately named "Eastchester Bay" and not "Pelham Bay" going forward.
385	When is the Corps going to study induced flooding?	USACE has performed some preliminary evaluations of potential induced flooding for the various "with project" conceptual alternatives involving larger surge gate features (i.e., alternatives 2-3B). Some induced flooding seems apparent in some locations related to these conceptual alternatives but further evaluation is necessary should any of these features be advanced in the study.
386	If there was induced flooding identified in relation to the Throgs Neck gate causing additional measures to be needed, would those additional measures be built before or after the large gate?	Should any construction result from this study, the implementation of any project features must be sequenced to avoid or eliminate the potential for increased flooding to any affected area, both those behind and those in front of those features.

ITEM	COMMENTS	RESPONSES
387	NYC, NYSDEC, and NJDEP are all non-federal sponsors/cooperating agencies in this project. If any of these entities come out against an aspect of the project, will the Corps abandon the alternatives that include those options?	Once the study arrives at a tentatively selected plan, the non-federal study sponsors have the ability to put forth a Locally Preferred Plan (LPP) as the alternate recommendation, which can provide latitude when balancing priorities between state and federal objectives. The cost-sharing for a LPP may differ, depending on what it entails and whether that matches the federal authorizations and policies, but it is nonetheless a mechanism for the State to change a recommendation as long as the LPP has a benefit to cost ratio greater than one. If no LPP is put forth and the partners do not support the federal recommendation, or if the partners have other reasons, they can suspend or terminate the study for any reason within 30 days of written notice to USACE.
388	To mitigate the problem of storm damage a culvert should be installed in Coney Island Creek to restore the flow of stormwater	Stormwater management is a local responsibility. Please contact the City of New York regarding stormwater issues.
389	What will be the impact on riverside businesses if the water level rises?	It would depend on how much the water level rises, how quickly, and what measures, if any, are taken by others to manage this risk/damage. If water levels rise such that they threaten the safety and structural integrity of the buildings, the businesses would need to move, would be destroyed and need to be rebuilt, or the businesses would need to invest in floodproofing to get them out of the floodplain and reduce the risk of flooding.
390	What will be the impact on large industrial complexes such as the Indian Point nuclear power plant, Sing Correctional Facility, the sewage treatment plants in Ossining and Peekskill and the MTA Hudson Line maintenance garage and freight yard near Croton Landing?	Many of these complexes are captured in the critical infrastructure layer of our inventory of resources at risk. The study team has attempted to capture if these facilities have embarked on disaster recovery plans that will address future flood risk and include that work in our baseline assumptions.
391	The best and most proven ways to protect populations are: evacuation of low areas in advance of storms; prepare for flooding so that infrastructure and energy systems are minimally damaged by high water; and release flood-prone lands from structures that can be built elsewhere.	Noted.
392	This study should take into account other existing and planned flood proposals.	Concur, the study team has conducted extensive outreach with local, state, and federal agencies and groups to identify all flood risk projects that are part of the future without project condition. These are presented in the Interim Report. Each alternative is compared against the No Action/Future Without Project Condition to help assess and screen the alternatives.

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### **3 STUDY WEBPAGE AND CONTACT INFORMATION**

**Additional information and updates as the study progresses can be found at**

<http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/>

**Questions, comments and suggestions regarding the study and the scope of issues to be evaluated within the Integrated Feasibility Report/Environmental Impact Statement can be sent to the study's email:**

[NYNJHarbor.TribStudy@usace.army.mil](mailto:NYNJHarbor.TribStudy@usace.army.mil)

## **2017 Agency Workshop Summary**

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

Prepared for:



**US Army Corps  
of Engineers®**

March 24, 2017



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# Section 1

## Introduction

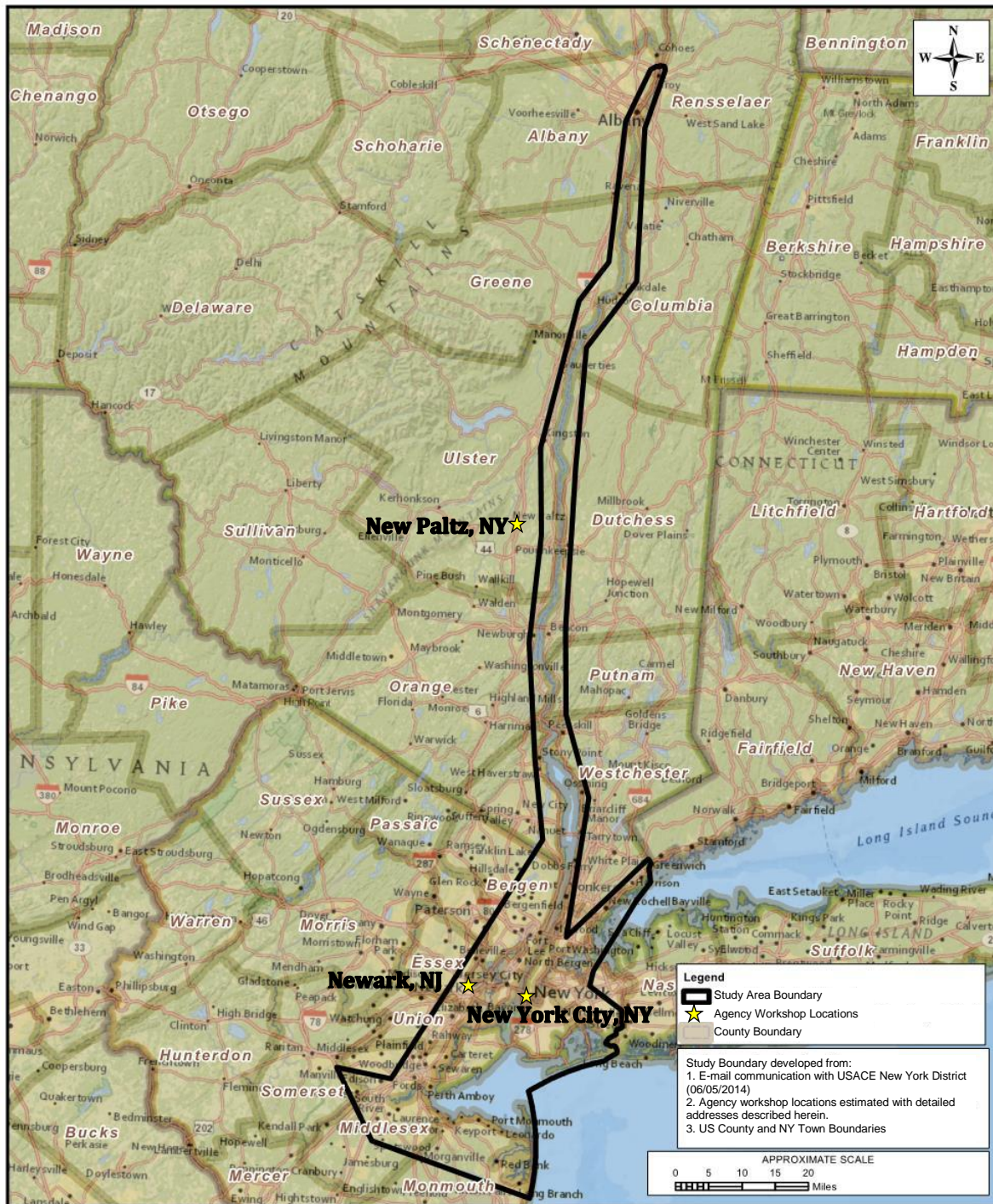
This report summarizes the discussions and findings of three agency workshops conducted by the US Army Corps of Engineers (USACE) New York District as part of the New York – New Jersey Harbor and Tributaries (NYNJHATS) Coastal Storm Risk Management (CSRM) feasibility study. Three meetings were held within the NYNJHATS study area (Figure 1), one each in Newark, New Jersey; New York City, New York; and New Paltz, New York. These meetings were designed to encourage participants to share information, generate discussions, and continue the process of collaborating to help establish a common vision to reduce coastal flood risk and increase resilience within the NYNJHATS area.

This section serves as an introduction to the study, while Section 2 of this report provides background and information on the topics discussed during the workshops. Section 3 summarizes the structure of the workshops and the agencies represented at each meeting. The documentation of meetings held are presented in Sections 4, 5, and 6, which synthesize the major themes identified and discussed by the participants at the Newark, New York City, and New Paltz workshops, respectively. Despite a consistent structure and framing, each of the three workshops – and separate group discussions within the workshops – generated different ideas and showed the somewhat unique perspectives of the participants.

To supplement the three workshops, an online and paper questionnaire were distributed to solicit additional feedback from participating agency staff and from those unable to attend the meetings. The results and feedback received questionnaire are summarized in Section 7.

Finally, Section 8 provides a conclusion by summarizing common and recurring themes from all outreach efforts. These themes are those that might be expected to have the strongest collective support from across the NYNJHATS area for reducing coastal flood risk and increasing community resilience.

Meeting materials including handouts, slides presented at each meeting, agendas, and descriptions of topics from the group discussions are included in **Appendix A** of this report. **Appendix B** contains the attendance sheets from each of the three agency workshops. **Appendix C** contains general meeting notes. **Appendix D** contains images of the handwritten notes taken as part of the group discussions. **Appendix E** contains photographs taken from the meetings. **Appendix F** contains documentation of other forms of feedback received electronically and via the questionnaire.



**Figure 1 – New York New Jersey Harbor and Tributaries Study Area and Agency Workshop Locations**



## Section 2

### Background

In October of 2012, Hurricane Sandy hit the northeastern coast of the United States exposing the vulnerability of the NYNJHATS area to coastal storms. With estimated damages and economic losses of \$65 billion, Hurricane Sandy is the second costliest hurricane in the nation's history and the largest storm of its kind to hit the U.S. east coast<sup>1</sup>. Without action, future coastal storm and associated flood risk across this region is expected to increase with changes in climate and sea level. Recognizing this vulnerability in the aftermath of Hurricane Sandy, the U.S. Congress authorized the North Atlantic Coast Comprehensive Study (NACCS) as part of the Disaster Relief Appropriations Act, of 2013 (Public Law 113-2). The January 2015 NACCS final report identifies nine high risk areas of the North Atlantic Coast that warrant additional analyses by USACE to address coastal flood risk; the NYNJHATS area is one of these areas. The NYNJHATS CSRM feasibility study is building upon the NACCS and other completed and ongoing efforts to strategically increase the region's resilience to coastal storms.

As a first step in the development of the feasibility study, a cost-sharing agreement was signed in August 2016, between USACE, the New Jersey Department of Environmental Protection (NJDEP), and the New York State Department of Environmental Conservation (NYSDEC).

Following the USACE Planning Process, the Project Management Plan (PMP), and Scope of Work (SOW) are currently being developed and refined by USACE, and will be updated throughout the process. The three agency workshops were held to solicit feedback to refine the scope of the PMP, and to identify non-governmental organizations (NGOs) and other key stakeholders to engage in the project planning process.

The following questions were asked to solicit and frame feedback provided by the participating agency stakeholders:

1. *How do various agencies see the problems and opportunities that can be addressed in the study, and what are the objectives and constraints the study should adopt?*
2. *What work are various agencies engaged in or are planning, and what existing information and data do they have that can potentially be leveraged in the study?*
3. *What types of management measures do various agencies see as appropriate or necessary for CSRM?*
4. *What specific areas of concern or interest do various agencies have, and how would they like to be engaged with this study as it progresses? Also, with which NGOs should USACE engage?*

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<sup>1</sup> USACE North Atlantic Coast Comprehensive Study Main Report, accessible at [http://www.nad.usace.army.mil/Portals/40/docs/NACCS/NACCS\\_main\\_report.pdf](http://www.nad.usace.army.mil/Portals/40/docs/NACCS/NACCS_main_report.pdf)

## Section 3

### Workshop Structure and Participation

The three agency workshops adhered to a similar format. A presentation by USACE was first given to introduce the purpose of the meeting and to summarize USACE efforts to date. The presentation also highlighted the series of major topics for discussion:

- 1) Problems, Opportunities, Objectives, and Constraints,**
- 2) Agency Work and Existing Information,**
- 3) Management Measures, and**
- 4) Agency Areas of Interest and Concern.**

With the exception of the New Paltz workshop, participants were divided into small groups of approximately eight to twelve individuals. These small groups were organized to enable broad participation and promote diverse discussion with representation from various agencies. During the Newark and New York City workshops, summaries of the smaller group discussions were subsequently reported out to the entire audience. In the New Paltz workshop, which had fewer total participants, topics were discussed as a single large group.

The first agency workshop was held on January 18, 2017 at the New Jersey Transit Planning Authority office located at 1 Newark Center in Newark, New Jersey. Approximately 30 participants attended the meeting, representing agencies such as NJDEP, US Environmental Protection Agency (USEPA), New Jersey Sports and Exposition Authority (NJSEA), New Jersey Department of Transportation (NJDOT), National Parks Service, Monmouth County Planning Division, New Jersey Transit Planning Authority (NJTPA), US Department of Housing and Urban Development (USHUD), and the City of Elizabeth, New Jersey. A sign-in sheet from this meeting is provided in Appendix B.

The second agency workshop was held on January 24, 2017 at the Ted Weiss Federal Building located at 290 Broadway in New York, New York. The meeting was attended by approximately 50 participants, representing agencies such as NJDEP, NYSDEC, New York State Senator Andrew Lanza's Office, New York City Office of Recovery and Resiliency (NYCORR), New York City Department of Transportation (NYCDOT), New York City Parks Department, New York State Department of Environmental Conservation, Hudson County Planning, Port Authority of New York and New Jersey (PANYNJ), Hudson River Park Trust, General Services Administration (GSA), US Coast Guard (USCG), USEPA, and Federal Emergency Management Administration (FEMA). A sign-in sheet from this meeting is provided in Appendix B.

The third agency workshop was held on February 7, 2017 at the State University of New York at New Paltz, 75 South Manheim Boulevard in New Paltz, NY. The meeting was attended by

approximately 25 participants, representing agencies such as NYSDEC, PANYNJ, New Jersey Transit Corporation, FEMA, New York State Department of Transportation (NYSDOT), Orange County Planning Department, Ulster County Planning Department, Ulster County Transportation Council, Town of Cortlandt, and the Hudson River Estuary Program. A sign-in sheet from this meeting is provided in Appendix B.

## Section 4

# Major Themes: Newark, New Jersey Workshop

### 4.1 Problems, Opportunities, Objectives, and Constraints

The USACE study team sought input on the problems, opportunities, objectives, and constraints to help define a clear and common understanding of the problems to be solved and opportunities to be realized. Workshop participants were asked to frame each problem and opportunity statement to consider which resources are impacted and how. Study objectives lay out the purposes of the planning process and what the study aims to accomplish. Constraints were defined, in part, as those unique aspects of the planning study that alternative plans should avoid. Several problems, opportunities, objectives, and constraints were discussed in small group settings. **Table 1** highlights major topics and themes that were discussed in the breakout groups:

**Table 1. Problems, Opportunities, Objectives, and Constraints Identified at the Newark, New Jersey Workshop**

	Discussion Items
Problems	<ul style="list-style-type: none"><li>• Coastal storms may disrupt transportation, including roadways and ports, limiting mobility. Traffic controls may be compromised due to power outages.</li><li>• Coastal flooding may impact power transmission, fuel supply, and delivery. Hurricane Sandy illustrated the damages from coastal flooding to industrial and waterfront recreational facilities, for example, the damage in the City of Elizabeth, NJ.</li><li>• Several earthen legacy berms were overtopped during Hurricane Sandy; these berms remain vulnerable to storm damage.</li><li>• Electrical transmission may be disrupted during coastal storm events and generators are necessary to maintain service.</li><li>• Heavy rainfall events, when coupled with coastal flooding, may lead to combined sewer overflows (CSOs) and sanitation problems that impact water quality and pose a health risk.</li><li>• Back bays are subject to coastal storm erosion and poor water quality.</li><li>• Economic impacts of coastal flooding are far-reaching, including lost productivity (i.e., work and school).</li><li>• There is currently a lack of maintenance and rehabilitation funding and no responsible party for maintaining existing infrastructure. For example, it is unclear which agency is responsible for clearing ditches.</li><li>• Many planned infrastructure improvements do not have existing funding streams and rely on FEMA pre- and post-disaster funding.</li></ul>



Problems (continued)	<ul style="list-style-type: none"> <li>• The without-project condition is challenging to define because of uncertainty associated with proposed or partially complete activities and is used in evaluating the benefit-cost analysis for a project.</li> <li>• USACE Coastal Storm Risk Management (CSRM) projects may be vulnerable to increased overtopping with sea level change.</li> <li>• There is a current problem with expediency for repairs and improvements of CSRM projects.</li> <li>• Levee systems that are considered unacceptable, due to lack of maintenance prior to a storm, are not eligible for rehabilitation funding following a disaster.</li> <li>• Levee inspection reports are provided several years after an inspection is completed.</li> <li>• Structures may be susceptible to catching fire after a storm.</li> <li>• The public may be unaware of existing emergency action plans.</li> <li>• There is a large amount of uncertainty in defining current and future risks.</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• Evaluate solutions at a systems level, consider the implications of such projects on the larger region and develop a comprehensive resiliency plan, bringing together various efforts underway across the watershed or coastshed.</li> <li>• Integrate CSRM solutions to also provide economic development benefits to communities.</li> <li>• Incorporate sustainability into proposed projects.</li> <li>• Pool resources and efforts across agencies.</li> <li>• Use this opportunity to incorporate natural and nature-based features (NNBFs) and nonstructural alternatives in developing solutions.</li> <li>• Change legislation to improve political and regulatory flexibility to assist in the management of coastal storm risk.</li> <li>• Improve ecosystems and habitat with CSRM solutions. Consider solutions that create green infrastructure, improve habitat, and coordinate methods of addressing environmental constraints early in the planning process.</li> <li>• Update and modify USACE CSRM projects to lessen the vulnerability of overtopping with increased sea levels.</li> <li>• Identify permitting issues and methods to expedite permitting processes.</li> <li>• Revisit existing CSRM projects and evaluate them for adequacy as a risk management solution.</li> <li>• Evaluate Rebuild by Design projects to ensure that crest elevations are adequate.</li> <li>• Encourage USACE to provide more timely operations and maintenance feedback.</li> <li>• Consider FEMA and USHUD regulatory requirements. If the requirements are incorporated into this study, then it could be used by other agencies.</li> <li>• Improve event forecasting.</li> <li>• Develop emergency resources and food banks for use during and following events.</li> <li>• Improve awareness of emergency action plans.</li> </ul>

Objectives	<ul style="list-style-type: none"> <li>• Reduce coastal storm risk and flood damage.</li> <li>• Improve risk communication with communities and improve public outreach and engagement when developing CSRM projects and solutions.</li> <li>• Work with nature in developing CSRM solutions.</li> <li>• Implement solutions that provide economic development benefits to communities.</li> <li>• Streamline permitting and coordination of solutions.</li> <li>• Identify local projects that do not have sufficient funding to be implemented.</li> <li>• Identify potential continuous funding streams for infrastructure maintenance.</li> <li>• Consider how proposed alternatives from this study can connect to ongoing USACE/ local dredging and future dredging. Engage the USEPA dredging team and other resource agencies early in the planning process.</li> </ul>
Constraints	<ul style="list-style-type: none"> <li>• Navigation corridors must remain accessible.</li> <li>• Projects must not cause negative ecological impacts.</li> <li>• Funding for projects may be limited. This may be particularly true for local projects.</li> <li>• CSRM solutions must be publicly acceptable.</li> <li>• Contaminated soils may cause issues with project progress. Cleanup must occur before USACE can continue with a project at a contaminated site, and often local funding is limited to support cleanup.</li> <li>• There are several ongoing efforts that are currently being constructed or have already received funding. Any new proposed projects must consider existing projects within the region.</li> <li>• Permitting requirements and other bureaucracy may be cumbersome and slow down the process of implementing projects.</li> <li>• There are potential limitations on efficacy of NNBs in urban areas.</li> <li>• If projects are not developed soon, solutions may be forced by necessity and less desirable solutions may be selected. Therefore, timing is a critical element in developing solutions.</li> </ul>

## 4.2 Agency Work and Existing Information

Existing and planned agency projects/work, activities, as well as available information discussed during the Newark, New Jersey workshop is summarized in **Table 2**:

**Table 2. Agency Work and Existing Information Identified at the Newark, New Jersey Workshop**

	Discussion Items
Federal	<ul style="list-style-type: none"> <li>• USACE / NJDEP Raritan Bay project</li> <li>• Naval Weapons Station Earle - joint land use study with climate adaptation planning (scheduled to be completed: January 2018)</li> <li>• USEPA environmental data</li> <li>• FEMA data and information on locations of structural elevation and buyouts</li> </ul>
State / Regional	<ul style="list-style-type: none"> <li>• State Transportation Improvement Plan</li> <li>• Contamination Assessment and Reduction Project (CARP) (NYSDEC and NJDEP)</li> <li>• USHUD Rebuild by Design</li> <li>• Regional sediment management plan</li> <li>• Comprehensive restoration plan</li> <li>• NJ Fostering Regional Adaptation through Municipal Economic Scenarios (FRAMES)</li> <li>• PANYNJ Goods Movement Plan, Emergency Response Plan and Resiliency Plan</li> <li>• PANYNJ update of terminals at the airports</li> <li>• NJDEP Coastal Resiliency Plan</li> <li>• Transmission line plans and updates</li> <li>• Long Island wind farm planning efforts</li> <li>• Passaic River remediation plan</li> </ul>
Municipal / County	<ul style="list-style-type: none"> <li>• County hazard mitigation plans for potential projects</li> <li>• County or municipal emergency management plans that have been recently updated may have future projects identified</li> <li>• City of Elizabeth, New Jersey Sewage Treatment Plant (funded by a FEMA grant)</li> </ul>

It was not possible to capture all ongoing or completed studies from each agency represented at this meeting. It was noted that topographic data is available for areas of interest. A breakout group suggested the collection and incorporation of GIS datasets of existing projects and studies from the following agencies (as a sample) to better understand ongoing efforts:

- Department of Homeland Security
- FEMA
- US Fish & Wildlife
- National Oceanic and Atmospheric Administration
- NJ Transit

- NJDEP
- NJ Bureau of Dam Safety

In addition, it was conveyed that information on sand and sediment sources is not readily available and there is a current data gap.

### 4.3 Management Measures

There are many potential management measures that could provide CSRM. These measures include structural, nonstructural, and policy and programmatic measures, as well as NNBFs. Examples of management measures were presented and defined for the participants prior to soliciting feedback on this topic. Management measures discussed at the Newark, New Jersey workshop are summarized in **Table 3**.

**Table 3. Management Measures Identified at the Newark, New Jersey Workshop**

	Discussion Items
Structural	<ul style="list-style-type: none"> <li>• Elevate homes and structures in areas of high flood risk.</li> <li>• Develop upland seawalls.</li> <li>• Fill in areas of high flood risk to elevate the land surface and mitigate flooding.</li> <li>• Build islands offshore to provide sheltering from wave activity.</li> <li>• Build levees to provide coastal flood protection.</li> <li>• Build floodwalls.</li> <li>• Construct gates or storm surge barriers to provide coastal flood protection.</li> <li>• Elevate highways and use them as barriers or levees to provide transportation access and flood protection.</li> </ul>
Policy & Programmatic / Nonstructural	<ul style="list-style-type: none"> <li>• Reduce stormwater runoff with upland and tributary solutions to minimize additional flooding.</li> <li>• Reuse dredged material.</li> <li>• Relocate or buy-out structures to remove them from areas of high flood risk. However, there is often not enough funding for all potential structures that need it.</li> </ul>
NNBF	<ul style="list-style-type: none"> <li>• Construct oyster reef breakwaters to provide protection against high wave activity.</li> <li>• Create wetlands to provide a buffer for storm surge propagation and provide an area for wave dissipation.</li> <li>• Construct NNBFs since they provide multi-benefits, including adding green space, carbon sequestration, and habitat development.</li> </ul>

## 4.4 Agency Areas of Interest and Concern

During the Newark, New Jersey workshop, the small group participants provided a range of ideas and suggestions for specific areas of interest and concern. **Table 4** summarizes areas of interest and concern as well as additional agencies to engage in this effort.

**Table 4. Agency Areas of Interest and Concern Identified at the Newark, New Jersey Workshop**

	Discussion Items
Areas of Interest and Concern	<ul style="list-style-type: none"> <li>• Port infrastructure are critical in this region to the transfer of goods. The economies depend on the ports operating. Their resilience to coastal flood risk is critical to the economy.</li> <li>• Airports are vulnerable to coastal floods in this region and are a critical piece of infrastructure and transportation for the region.</li> <li>• Bridges, tunnels, and transportation routes are critical infrastructure, especially for evacuation and may be compromised during coastal storms.</li> <li>• Power and electrical grid infrastructure is critical to maintaining function during and following an event.</li> <li>• Fuel availability was an issue during Hurricane Sandy and impacted the economy.</li> <li>• Environmental areas (i.e., Meadowlands and Jamaica Bay) are sensitive habitats.</li> <li>• Bays have sensitive ecosystems with water quality and erosion hazard concerns.</li> <li>• Dams (i.e., on the Passaic River) are at risk.</li> <li>• Harbors are important since the supporting infrastructure need to be near the water.</li> <li>• Develop networks of critical flow paths at both short-term and long-term resiliency scales.</li> <li>• Consider timing of regional solutions relative to local solutions.</li> <li>• The City of Hoboken, New Jersey has areas of low-lying development subject to coastal flooding.</li> <li>• The Town of Kearney, New Jersey has existing CSO problems and sanitary issues when coupled with flood events.</li> <li>• The City of Elizabeth, New Jersey has significant storm surge flooding problems.</li> <li>• The timing of when a storm hits may impact communities differently. Variables include tides, snow, and ice conditions. How are these variables considered and addressed when discussing coastal storm risk and identifying management solutions?</li> </ul>
Agencies to Engage	<ul style="list-style-type: none"> <li>• Hackensack River Keeper</li> <li>• Harbor operations organizations, such as boating associations</li> <li>• Several NGOs and academic institutions with coastal resiliency grants</li> <li>• FEMA</li> <li>• USCG</li> </ul>

## 4.5 Newark, New Jersey Workshop Summary

The discussions within each of the small breakout groups in Newark focused on the same themes, but were unique based on the perspectives of the participants. One theme that resonated across all discussion groups was the recognition of the need of a regional solution to the coastal storm risk problem in the NYNJHATS area. Discussions identified and recognized several local and regional efforts and ongoing projects related to CSRM. Several participants identified the need to coordinate these efforts, and in some cases, highlighted the opportunity to pool resources and funding to accomplish common goals for the region. One of the breakout groups discussed a proposed regional storm surge barrier and identified potential constraints to this type of regional solution.

*Several participants identified the need to coordinate local and regional CSRM efforts and even pool resources to accomplish common goals for the region in the form of multi-purpose projects that provide economic development, habitat restoration, water quality improvement, transportation, power infrastructure upgrades, and more. The lack of responsibility and funding to maintain and repair existing and planned CSRM infrastructure was highlighted and the need for nonstructural measures that propose solutions to this administrative failure, coupled with recommendations for policy and bureaucratic change that may improve on-the-ground management paradigms.*

The problems discussed by all groups were largely informed by the damages caused by Hurricane Sandy. Coastal storm flooding is a major concern for many coastal New Jersey municipalities. Following Hurricane Sandy, problems persisted with transportation access, food supply, fuel supply, power outages, and water quality issues related to CSOs. These problems also led to a loss of productivity in local businesses and schools. The lack of responsibility and funding available for maintenance and repair of existing and planned CSRM projects was also identified as a problem.

Two of the three breakout groups identified potential CSRM projects in the region as having the opportunity to provide multiple benefits. Benefits that could be coupled with potential CSRM projects discussed in the meetings include economic development, habitat improvement, water quality improvement, recreational opportunities, sustainability initiatives and improvements to transportation, power transmission, and utilities. One example of this type of multi-benefit solution discussed in the breakout groups is the elevation of a highway that could also act as a levee or barrier to avoid inland inundation.

The influence of the without-project condition on the benefit-cost analysis to determine the feasibility of CSRM projects was also discussed. One breakout group discussed the challenge of defining the without-project condition since various projects are planned, in-progress, or nearly complete and thus, the without-project condition is constantly changing. Another group discussed how critical the definition of the without-project condition is since it is used to calculate project benefits.

Many participants identified legislation, policies, and bureaucracy as constraints towards developing CSRM projects. These governance issues can often be cumbersome and impede project progress. Associated opportunities to streamline permitting and coordination were identified. Funding was also identified as a constraint. There were several local projects identified as ready for implementation, but lacked sufficient funding and as mentioned above, there are limitations in funding for maintenance activities.

During the presentation at the Newark, New Jersey workshop, the following questions and answers were discussed:

*Question:* How can USACE account for differences in real estate values in different localities? There can be inequalities of executing a benefit-cost analysis in a neighborhood with high real estate value compared to a neighborhood with low real estate value.

*Answer:* There are many comparisons being made in these analyses. It's not often that the higher value neighborhoods illustrate higher benefits. Benefits are evaluated based on a comparison of a with- and without-project condition. High value land exists in both the with- and without-project condition and therefore is somewhat removed from this evaluation. The density of development will also play a factor. Good GIS coverage is necessary for this type of analysis.

*Question:* A clarifying question was asked regarding the four Principle and Guideline accounts. The Principles and Guidelines are divided into four accounts:

1. National Economic Development (NED)
2. Environmental Quality (EQ)
3. Other Social Effects (OSE)
4. Regional Economic Development (RED)

Some of these accounts are dollar denominated, while others are non-monetary. This indexing allows for the consideration of a diversity of social goals. For further clarification, a participant asked for an example of a social factor.

*Answer:* An example was given for the community of Mamaroneck, New York. This community may have a large elderly population or a population without personal vehicles. These types of factors would be considered social factors.

*Question:* Environmental Impact Statements (EISs) were discussed during the meeting. A participant asked whether development of such a report would be part of the USACE planning process.

*Answer:* USACE stated that they are anticipating the need to incorporate this information for approval. This is a large-scale study that is being scoped. USACE is looking for feedback on the best way to incorporate an EIS into the study given its size and scale. Supplemental EIS reports could be incorporated into the design phase. Otherwise, the EIS phase could be very lengthy and



cumbersome for a study of this size. USACE requested information from the participants regarding what critical information is needed up front. An alternative approach would be to tier the EIS, which a USEPA representative recommended, but certain assumptions would have to be made that would be cumulative. USACE requests help in identifying what critical EIS information should be considered in this phase of the study.

*Answer:* The feasibility study process is almost identical to the National Environmental Policy Act (NEPA) process. The decision document will be integrated with the NEPA document into an “integrated document” to make the drafting and review process more efficient and to improve the quality of the report.



## Section 5

### Major Themes: New York City, New York Workshop

#### 5.1 Problems, Opportunities, Objectives, and Constraints

Similar to the list of topics at the Newark workshop, breakout groups at the New York City workshop discussed problems, opportunities, objectives, and constraints. Many of the responses were related to damages and repercussions of Hurricane Sandy. **Table 5** highlights major topics and themes that were discussed:

**Table 5. Problems, Opportunities, Objectives, and Constraints Identified at the New York City, New York Workshop**

	Discussion Items
Problems	<ul style="list-style-type: none"><li>• New York City has low-lying coastal areas with buildings that have shallow foundations.</li><li>• Combined sewer overflows (CSOs) occur during rainfall events and create water quality concerns. Drainage must be considered for any future CSRM solutions.</li><li>• Critical infrastructure at-risk of coastal flooding, such as wastewater treatment plants, infrastructure in vulnerable areas, subways, airports, fuel depots, ports, and marine infrastructure, cannot distance themselves from water.</li><li>• Transportation is interrupted and/or compromised during coastal flood events.</li><li>• Coastal storms may cause loss of power, impacts to utilities, and fuel shortages and may have other revenue and economic losses.</li><li>• Addressing flooding at a localized scale may reduce flood risks in one location, but may worsen flooding in an adjacent area.</li><li>• Data are limited to support a benefit-cost analysis. Current economic methods are not in place to assign reasonable monetary value to ecosystems to better evaluate natural and nature based features.</li><li>• Design conditions are not currently defined. There are several different sea level change scenarios.</li><li>• Uncertainties exist with FEMA flood mapping.</li><li>• There is limited available space for implementing CSRM solutions.</li><li>• There is a lack of a long-term vision.</li><li>• There is a lack of public communication on coastal storm risks.</li></ul>

	Discussion Items
Opportunities	<ul style="list-style-type: none"> <li>• Coordinate and collaborate with multiple agencies in developing more resilient communities.</li> <li>• Improve interagency relationships and communication.</li> <li>• Improve communication and education of stakeholders with regard to risks, particularly targeting vulnerable populations.</li> <li>• Evaluate comprehensive and long-term solutions from a true regional and system-level perspective. This includes consideration of large storm surge barrier projects at a regional level.</li> <li>• Improve delineations of high risk areas and create more accurate FEMA flood maps.</li> <li>• Consider multi-benefit solutions to reduce flood risk while benefiting the environment and the economy, improving transit, or developing power. A reduction in flood risk would also reduce the number of homeowners requiring flood insurance and would reduce the cost of the insurance program.</li> <li>• Improve legislation to better address coastal flood risks.</li> <li>• Improve planning for future storm events.</li> <li>• Develop synergy across projects where projects can build upon each other.</li> <li>• Plan for a longer (i.e., greater than 50 year) time horizon.</li> </ul>
Objectives	<ul style="list-style-type: none"> <li>• Understand existing and future risks and understand their source (i.e., if they are caused by stormwater drainage issues or coastal flood hazards).</li> <li>• Reduce flood risks.</li> <li>• Define design conditions for CSRM projects and solutions.</li> <li>• Develop a reasonable timeline to implement solutions and secure sufficient funding.</li> <li>• Improve coordination of infrastructure planning by considering land use and the impact of regulations on development.</li> <li>• Enhance social cohesion and infrastructure.</li> <li>• Raise awareness and educate the public regarding CSRM.</li> <li>• Justify projects with economic reasoning.</li> <li>• Consider environmental justice and achieve social equity in developing CSRM solutions.</li> </ul>

	Discussion Items
Constraints	<ul style="list-style-type: none"> <li>• Funding may be limited for projects.</li> <li>• If projects are not developed soon, solutions may be forced by necessity and less desirable solutions may be selected. Therefore, timing is a critical element in developing solutions.</li> <li>• Impacts to habitats, ecosystems and the environment must be considered in developing solutions.</li> <li>• Regulations and bureaucracy may limit solutions.</li> <li>• Evacuation routes need to be maintained.</li> <li>• Data and technical information for defining risk and developing measures and solutions may be unavailable or limited.</li> <li>• Community buy-in is needed to effectively implement a CSRM project.</li> <li>• Waterfront access will need to be maintained for recreation, public space and navigation.</li> <li>• Competing priorities exist.</li> <li>• Contaminated land may limit potential CSRM projects that USACE can implement, or add additional cost and time to remediate contamination. Similarly, USACE may not be able to develop projects in areas with cultural resources and environmentally sensitive areas. Existing development and population density may also limit available space for implementing a project.</li> <li>• The National Flood Insurance Program has regulations on development that must be considered.</li> </ul>

## 5.2 Agency Work and Existing Information

There are numerous agencies on Federal, state, regional and local levels that are executing CSRM projects in the New York City area. Many projects are related to post-Hurricane Sandy recovery.

**Table 6** captures existing and planned agency work and information that was discussed during the New York City, New York workshop.

**Table 6. Agency Work and Existing Information Identified at the New York City, New York Workshop**

	Discussion Items
Federal	<ul style="list-style-type: none"> <li>• USHUD Rebuild by Design, and Rebuild by Design Executive Steering Committee. Consider using the steering committee as a model for part of this study.</li> <li>• USEPA Sandy Projects Coordinator.</li> <li>• FEMA has performed or is in the process of performing National Flood Insurance Program (NFIP) modeling and analysis.</li> <li>• FEMA Sandy Coordination Team and Project Database.</li> <li>• FEMA is considering including Natural and Nature Based Features in their benefit-cost analysis.</li> <li>• There are certain regulations for critical facilities that are necessary for construction/development.</li> </ul>
State / Regional	<ul style="list-style-type: none"> <li>• New York State Energy Research and Development Authority has performed sea level change modeling, land cover change, and Jamaica Bay modeling.</li> <li>• NYS Office of Emergency Management has a database that may be useful for the study.</li> <li>• NJDEP has performed flood reduction research for green infrastructure.</li> <li>• NYS 2014 Community Risk and Resiliency Act               <ul style="list-style-type: none"> <li>• NYSDEC managed the grants.</li> <li>• Projects need to demonstrate consideration of sea level change.</li> </ul> </li> <li>• NJ Department of Community Affairs – consider using this model for the NYNJHATS study since it includes a public outreach plan and public language access plan.</li> <li>• PANYNJ has developed a risk assessment and design guidelines for climate resilience.</li> </ul>
Municipal / County	<ul style="list-style-type: none"> <li>• Consider referencing specific county Hazard Mitigation Plans for potential projects.</li> <li>• Updated county or municipal Emergency Management Plans which may have future projects identified.</li> <li>• The Elizabeth, New Jersey sewage treatment plant updates funded by a FEMA grant.</li> </ul>

	Discussion Items
Local / Academic	<ul style="list-style-type: none"> <li>• Community group planning efforts</li> <li>• Staten Island Blue Belt green infrastructure</li> <li>• Wastewater treatment plant hardening / pump station upgrades</li> <li>• SUNY Stony Brook monthly working group</li> <li>• Project Uplift (Governor's Office of Storm Recovery [GOSR] NY Rising Community Reconstruction pilot program in Staten Island and neighborhoods of Brooklyn)</li> </ul>

In addition to the existing information and ongoing efforts listed above, the participants discussed a need for additional efforts to evaluate impacts of CSRM measures in upland areas and on the broader regional system.

### 5.3 Management Measures

There are many potential management measures that could provide CSRM. These measures include structural, nonstructural, policy and programmatic measures, as well as NNBFs. Examples of management measures were presented and defined for the participants prior to soliciting feedback on this topic at the New York City meeting.

The entire toolbox of retrofitting and management measures seemed appropriate for the NYNJHATS area by some participants, with many people favoring those that could provide multi-purpose and multi-benefit solutions. However, participants suggested that each of these measures should be evaluated within the time horizon of the risk that is being addressed. For example, some measures may be best suited to mitigate risks for existing coastal storm activity, while other measures may target mitigating risks caused by additional sea level change. Discussions revealed that the public may favor NNBFs as CSRM solutions. However, a need for an equitable way to evaluate these “green” solutions was identified.

Management measures discussed at the New York City, New York meeting are in **Table 7**:

**Table 7. Management Measures Identified at the New York City, New York Workshop**

	Discussion Items
Structural	<ul style="list-style-type: none"> <li>• Elevate infrastructure, such as pump stations and protect substations.</li> <li>• Incorporate wet/dry floodproofing.</li> <li>• Install backflow prevention.</li> <li>• Use deployable barriers (e.g., Tiger dams).</li> <li>• Construct in-water barriers.</li> <li>• Construct levees, floodwalls, seawalls.</li> <li>• Install permeable surfaces.</li> <li>• Consider water retention solutions (automated gates versus stop logs).</li> </ul>

	Discussion Items
Structural (continued)	<ul style="list-style-type: none"> <li>• A regional storm surge barrier that considers:               <ul style="list-style-type: none"> <li>• Potential locations:                   <ul style="list-style-type: none"> <li>▪ Sandy Hook to Long Island</li> <li>▪ Throgs Neck</li> </ul> </li> <li>• Who is protected? Who is left out? What are the trade-offs?</li> <li>• How do smaller CSRM projects factor into the consideration of a larger project?</li> <li>• Perform alternative analysis</li> <li>• Reference to current monthly working group</li> <li>• Costs and funding issues</li> <li>• Evaluate constructability</li> <li>• Timing and construction duration</li> <li>• Environmental constraints</li> <li>• The need for active public participation</li> <li>• Design for sea level change and storm surge</li> <li>• The need for further study, particularly in a regional, comprehensive study</li> </ul> </li> </ul>
Policy & Programmatic / Nonstructural	<ul style="list-style-type: none"> <li>• Enact stricter land use planning / zoning.</li> <li>• Manage communication with the public / people management.</li> <li>• Evaluate how insurance and financial drivers mitigate risk.</li> <li>• Consider legislative changes to address flood-proofing of structures.</li> <li>• Consider incentives for flood-proofing.</li> <li>• Provide incentives for homeowners to address flood risk.</li> <li>• Evaluate potential buyouts.</li> <li>• Incorporate urban design into flood control projects.</li> <li>• Develop comprehensive preparation planning.</li> <li>• Shift policies from individual responsibilities to regional approaches.</li> <li>• Change the Manual on Uniform Traffic Control Devices (MUTCD) standard to increase pervious pavement.</li> <li>• Incorporate adaptive management techniques.</li> <li>• Exercise deployable measures or systems once a year for training / emergency planning.</li> </ul>
NNBFs	<ul style="list-style-type: none"> <li>• Construct green infrastructure such as living breakwaters and living shorelines.</li> </ul>

## 5.4 Agency Areas of Interest and Concern

Many of the agencies that attended the New York City workshop represented multiple, ongoing CSRM efforts from all levels of government. **Table 8** summarizes areas of interest and concern, as well as additional agencies to engage in this effort.

**Table 8. Agency Areas of Interest and Concern Identified at the New York City, New York Workshop**

	Discussion Items
Areas of Interest and Concern	<ul style="list-style-type: none"> <li>• The development of short term protection may not consider a longer-term (2050/2100) time horizon.</li> <li>• Local problems should be addressed by specific solutions since CSRM measures cannot be a “one size fits all” because of the uniqueness of the physical, environmental, and social conditions of an area.</li> <li>• Evaluate all projects as an integrated whole and in a regional context.</li> <li>• Understand all risks and account for residual risks.</li> <li>• Identify funding sources.</li> <li>• Evaluate shoreline protection and flood management.</li> <li>• Promote public education and communication.</li> <li>• Consider equitable methods for evaluating “green” options.</li> <li>• Consider a “reality check” on large engineering projects to ensure that these types of projects are feasible, constructible, and will manage coastal storm risk.</li> <li>• Develop appropriate design conditions and a planning horizon and consider the joint probability of storm surge and rainfall.</li> <li>• Develop benchmarks for comparison to proposed CSRM projects to determine appropriate benefits that a CSRM project will provide.</li> <li>• Ensure the accuracy of flood maps by using best available data and science.</li> <li>• Fluvial flooding.</li> <li>• Secondary hazards (e.g., fires following a coastal flooding event).</li> <li>• Coordination of existing and ongoing projects.</li> <li>• Impacts to port infrastructure and operations.</li> <li>• Need to maintain functionality of health and hospital facilities.</li> <li>• Airport flooding and transportation accessibility.</li> <li>• In order to continue service, power infrastructure (permanent vs. generators) and utility infrastructure must be protected.</li> <li>• Petroleum and fuel availability may be limited during and after disasters.</li> <li>• Availability of insurance for at-risk structures.</li> </ul>

	Discussion Items
Areas of Interest and Concern (continued)	<ul style="list-style-type: none"> <li>• Providing a network of roadways that provide improved transportation corridors and CSRM benefits.</li> <li>• Evacuation routes and operations of critical facilities must be maintained.</li> <li>• Contracting for CSRM measures is an area of interest.</li> <li>• The difference between the FEMA/USACE benefit-cost analysis definitions of future without-project condition.</li> </ul>
Federal Agencies to Engage	<ul style="list-style-type: none"> <li>• Federal Transit Administration</li> <li>• Federal Highway Administration</li> <li>• USHUD Grantees</li> <li>• Rebuild by Design Executive Steering Committee</li> <li>• Office of Management and Budget (OMB)</li> <li>• Urban Waters Partnership (Federal Urban Waters)</li> </ul>
Regional / State Agencies to Engage	<ul style="list-style-type: none"> <li>• NJ Department of Community Affairs</li> <li>• MTA / LIRR / Amtrak / Metro-North / NJ Transit / PATH</li> <li>• Waterfront Alliance (Waterfront Edge Design Guidelines [WEDG])</li> <li>• Regional planning authority</li> <li>• Lower East Side Ecology Center</li> </ul>
Local Agencies and Other Institutions to Engage	<ul style="list-style-type: none"> <li>• One Billion Oyster Project</li> <li>• Science and Resilience Institute at Jamaica Bay</li> <li>• NYC Parks Department</li> <li>• NYC Emergency Management</li> <li>• NYC Department of Design and Construction</li> <li>• NYC Housing Authority</li> <li>• NYC Health and Hospitals / Veterans Affairs (VA) hospitals</li> <li>• Rutgers University professor and other academic institutions that research CSRM and living breakwaters</li> <li>• Business improvement districts</li> <li>• Environmental justice groups</li> <li>• Community and neighborhood groups</li> <li>• Community assistance units</li> <li>• Chambers of commerce</li> <li>• Insurance companies</li> </ul>



## 5.5 New York City, New York Workshop Summary

The meeting in New York City was the largest workshop of the three meetings. The discussions within each of the small breakout groups differed based on the interest and perspectives of the participants. However, despite the diversity across groups, each group identified and discussed the need for a collaborative, system-wide or regional evaluation of CSRM for this effort to be successful. The limitation of individual, small-scaled measures and their potential to exacerbate risks elsewhere was also discussed in several of the small groups. There were several considerations associated with the possible construction of a large-scale, regional projects (i.e., proposed storm-surge barrier[s]), some of which are outlined in **Table 7**.

During the discussion, it was also recognized that to implement and identify CSRM measures at a system-wide and regional perspective, coordination and collaboration is required across agencies. Coordination is particularly imperative in the New York City area, where there are several ongoing resilience and CSRM studies and projects involving several agencies. Agencies involved in these efforts are identified and summarized in Section 5.4.

In addition, time was considered a constraint and was identified across several of the small group discussions. There is an urgency to identify CSRM measures prior to another storm or changing sea level condition. If a cost-effective, publicly acceptable, and feasible project cannot be identified within a reasonable timeframe, less-than-ideal solutions may be implemented out of necessity. Permitting, bureaucracy, regulations, and legislation issues were also identified as constraints across all group discussions. Changes to the existing legislations, permitting processes and regulations and streamlining of these processes were identified as measures in some groups to help with addressing flood risks and aid in the process of developing a feasible and timely project.

One objective of this study, which was ubiquitously identified across the small group discussions, was to

*Every group at the New York City meeting highlighted the need for a collaborative, system-wide or regional evaluation of flood risk management. Many raised the risk of individual, small-scale measures being limited and potentially exacerbating risk elsewhere, yet the current need is considered urgent and therefore some projects may move ahead while the regional solution is studied.*

*Nonstructural measures to address flood risk were also identified, including changing existing legislation and regulations, and streamlining permitting processes, etc. to enable more efficient risk management. Another nonstructural measure that every group named was clear risk definition and communication.*

*Each group discussed the need for clearly defined design conditions, i.e., what sea level change scenario is appropriate, which FEMA flood map should be used, and is flooding coming from stormwater runoff or coastal waters?*

better define the design conditions for this project and to better define and communicate risk. There is uncertainty associated with several efforts, such as the FEMA flood map products that were recently appealed by New York City. There is also uncertainty on the source of flooding, whether it originates from stormwater runoff or coastal flooding sources. For potential future conditions, there are several sea level change projections presented by USACE and NOAA. It is unclear which of the projections is the most appropriate to use for a design scenario. While there are still many remaining unknowns and data limitations that exist to define risk, it is also important to provide digestible information regarding flood risks to the public for their participation, acceptance, and understanding.

During the large group presentation at the New York City workshop, the following question was asked and answered:

*Question:* What were some lessons that were learned from Hurricane Sandy in terms of multi-agency cooperation and data sharing?

*Answer:* During and after completion of the NACCS, USACE worked with and shared information with other agencies to identify challenges and opportunities. Stakeholder and information sessions were held, and lessons learned were documented.

A representative from FEMA responded that there were 19 agencies operating in the New York City area that are collaborating and coordinate to reduce coastal storm risk. To avoid duplicating effort, the Sandy Regional Infrastructure Resilience Coordination group was established, with representatives from USACE, USEPA, USHUD, FEMA, DOI, DOT, and other Federal agencies involved in post-Hurricane Sandy recovery efforts. This concentration of Federal efforts is unprecedented at this scale for this type of effort.

## Section 6

### Major Themes: New Paltz, New York Workshop

#### 6.1 Problems, Opportunities, Objectives and Constraints

Several problems, opportunities, objectives and constraints were discussed among the participants at the New Paltz, New York workshop. Instead of dividing the participants as was organized at the Newark or New York City workshops, all participants discussed the various topics in one large group. **Table 9** highlights several major topics and themes that were discussed.

**Table 9. Problems, Opportunities, Objectives and Constraints Identified at the New Paltz, New York Workshop**

	Discussion Items
Problems	<ul style="list-style-type: none"><li>• Flooding may impact transportation infrastructure located in the floodplain, such as roads, airports, and railroad infrastructure along the Hudson River.</li><li>• Riverine flooding is more of a concern than coastal storms in the Hudson Valley.</li><li>• However, simultaneous impacts of coastal storm flooding and fluvial flooding during hurricanes and nor'easters may cause more damage.</li><li>• There are contaminated sites that are subject to flooding (brownfields, Superfund sites, etc.) and may cause additional water quality issues.</li><li>• Environmental degradation, specifically, sedimentation of submerged aquatic vegetation (SAV) beds, was observed after Hurricane Irene.</li><li>• Relative sea level change may cause additional flooding.</li><li>• Risk communication with the public could be improved.</li><li>• There is the “perpetual cycle” of building in floodplains and protecting homes and infrastructure.</li><li>• There is a “hidden time span” problem with encouraging wise use and development of the floodplain.</li></ul>
Objectives	<ul style="list-style-type: none"><li>• Refine planning for relative sea level change scenarios and confidence. Reach an agreement on an assumption.</li><li>• Consider ways to protect people while encouraging retreat in the long-term.</li><li>• Invest in dual-purpose opportunities (e.g., creating open space [from buyout areas] that could also be used for solar facilities).</li><li>• Consider areas with repetitive losses and dense development.</li><li>• Consider ways to protect water-dependent infrastructure such as ports.</li><li>• Consider alternatives to hard structures such as walls that may trap water or change hydraulic flow.</li><li>• Consider a combined CSRM/FRM project.</li></ul>

	Discussion Items
Constraints	<ul style="list-style-type: none"> <li>• Lack of funding for implementation is a constraint.</li> <li>• The age and lifespan of existing infrastructure, such as dams, is often beyond the planning horizon.</li> <li>• The time needed to plan, design and construct CSRM projects may be lengthy.</li> <li>• There are sites with contamination (brownfields, Superfund sites, etc.) within the study area.</li> <li>• Minimize impacts to transportation infrastructure.</li> </ul>

## 6.2 Agency Work and Existing Information

Existing and planned agency work, as well as existing information discussed during the New Paltz, New York workshop is summarized in **Table 10**.

**Table 10. Agency Work and Existing Information Identified at the New Paltz, New York Workshop**

	Discussion Items
Federal	<ul style="list-style-type: none"> <li>• FEMA Mitigation Group.</li> <li>• FEMA Public Assistance project database.</li> <li>• FEMA also maintains repetitive loss data which tracks insured loss, which is about 30-40% of structures in the floodplain around the Hudson River tributaries.</li> <li>• Federal Highway Administration (FHWA) is undertaking a post-Hurricane Sandy study (estimated completion March 2017), which contains maps and vulnerability assessments.</li> <li>• The Federal Transit Authority (FTA) Supplemental has information regarding Hurricane Sandy.</li> </ul>
State / Regional	<ul style="list-style-type: none"> <li>• NYSDEC Hudson River Estuary Program has prepared vulnerability assessments and plans, a watershed boundary dataset, a study of hydraulic constructions, watershed flooding assessments, wastewater treatment plant/flood damage studies, opportunities for water quality improvements and information on aging dam infrastructure.</li> <li>• NYSDEC performed a GIS exercise with FEMA data of repetitive insured losses.</li> <li>• NYSDOT performed an internal assessment of vulnerabilities to flooding.</li> <li>• PANYNJ has embarked on master planning efforts.</li> <li>• New Jersey Transit has a new river monitor.</li> <li>• The New York Rising efforts developed community recovery plans were successful within Long Island communities, but many upstate communities (e.g., Town of Olive, Town of Shandaken) did not have as good of an experience.</li> <li>• New York State Energy Research and Development Authority contracted LiDAR data for the Hudson River to consider CSRM and relative sea level change.</li> </ul>

	Discussion Items
Municipal / County / Academic / Private	<ul style="list-style-type: none"> <li>• Contact the Rutgers University Center for Resilient Landscapes.</li> <li>• New Jersey Institute of Technology Engineering Division performed work for the City of Hoboken.</li> <li>• Consider and reference the Scenic Hudson study (Beacon, New York) and other studies completed by Cornell University.</li> <li>• Columbia University developed a storm surge and riverine flooding study/model, which considers confluence of coastal flooding and rainfall (a joint effort with Stevens Institute of Technology).</li> <li>• Stevens Institute of Technology developed a storm surge and riverine flooding study/model and a “96-hour” pre-disaster 3D forecast model.</li> <li>• University of Rhode Island developed a storm surge visualization tool for South Providence, RI to evaluate buildings in the path of storm surge.</li> <li>• The Nature Conservancy developed climate adaptation data and plans.</li> <li>• Contact the Ulster County Office of Environment.</li> <li>• City of Hoboken and City of Kearny, New Jersey have plans for the Meadows maintenance facility.</li> <li>• The Scenic Hudson Report discussed relative sea level change (Beacon, New York work).</li> <li>• The City of Kingston, New York has vulnerability assessments/plans and resiliency work.</li> <li>• The Port of Albany and Port of Rensselaer have information regarding their water infrastructure.</li> <li>• CSX Corporation, MetroNorth and Amtrak. CSX is regulated on a Federal level, thus coordination with USACE HQ may be necessary.</li> </ul>

## 6.3 Management Measures

There are many potential management measures that could provide CSRM. These measures include structural, nonstructural, policy and programmatic measures, as well as and NNBFs. Examples of management measures were presented and defined for the participants prior to soliciting feedback on this topic. The discussion at the New Paltz, New York meeting are summarized in **Table 11**.

**Table 11. Management Measures Identified at the New Paltz, New York Workshop**

	Discussion Items
Policy & Programmatic / Nonstructural	<ul style="list-style-type: none"> <li>Consider local and homeowner preferences.</li> <li>Adapt to live with water.</li> <li>Accept risk associated with living in a vulnerable area.</li> <li>Evaluate changes to land use planning.</li> <li>Consider successful strategies from other cities (e.g., London, England).</li> <li>Communicate risk effectively to the public.</li> </ul>

Although discussions related to management measures were generally and primarily related to programmatic or policy measures, there was significant discussion about a regional structural measure: a storm surge barrier. Some of the attendees do not support a potential barrier because of the potential negative environmental impacts it may cause.

## 6.4 Agency Areas of Interest and Concern

Some of the discussion revolving around areas of interest and concern were driven by representatives from the State of New York. **Table 12** summarizes areas of interest and concern.

**Table 12. Agency Areas of Interest and Concern Identified at the New Paltz, New York Workshop**

	Discussion Items
Areas of Interest and Concern	<ul style="list-style-type: none"> <li>Coordinate with the Hudson River Habitat Restoration team.</li> <li>Synergy and overlap of CSRM and ER measures.</li> <li>Consider tradeoffs and ask communities for preferences.</li> <li>Consider impacts to fish due to construction of large in-water structures.</li> <li>Communicate that floodwalls are “there to protect the properties, not the people.”</li> <li>Participate in technical advisory committees.</li> <li>Allow for marsh migration.</li> <li>Maintain port accessibility with a barrier.</li> <li>Consider interior drainage.</li> <li>Learn to live with water – accept and communicate risk.</li> <li>Engage the strong environmental community along the Hudson River.</li> </ul>

## 6.5 New Paltz, New York Workshop Summary

During the group discussion at the New Paltz, New York workshop, the dialogue focused around the major concerns and potential impacts of a regional storm surge barrier. Environmental concerns discussed included the potential impacts to fish, wildlife, and sediment. In addition, concerns were raised regarding the impact of the barrier on the hydraulics of the river, which may exacerbate fluvial flooding. The potential for coastal storm surge and high tide conditions to be coupled with rainfall, causing even more flooding, was discussed.

*Many of the participants in attendance at the New Paltz workshop had science-based or technical backgrounds. Concerns about the impact to important species, habitat, and water quality was a prominent topic of discussion during this workshop. Attendees emphasized that more discussion about how sea level change will be incorporated into the study is needed. In addition to the potential environmental impacts of one or more storm surge barriers, there was a discussion of the benefits of implementing natural and nature-based features.*

The area along the Hudson River is serviced by multiple forms of transportation infrastructure, including regional railroads and commercial operations. The group conveyed concerns regarding the impact of increased flooding on regional transportation infrastructure. Other discussions revolved around concerns related to the prediction, scenarios, and accounting of sea level change in the plan formulation. Attendees emphasized that more discussion about how sea level change will be incorporated into future studies is needed. Other general discussions throughout the meeting focused on the public acceptance of a level of residual risk, and the consequences of living near and with water.

Many of the participants in attendance at the New Paltz workshop had science-based or technical backgrounds. This led to discussions regarding the environmental issues and priorities for the Hudson River. Thus, concerns about the impact to important species, habitat, and water quality was a prominent

topic of discussion during this workshop. The participants identified additional stakeholder groups, including specific contacts at the Hudson River Estuary Program and Cornell University.

In addition to the environmental impacts of one or more storm surge barriers, there was a discussion of the benefits of implementing natural and nature-based features. There is interest in investigating the possible synergies that are present with CSRM projects if restoration measures enhance the environment rather than impact it negatively, as grey infrastructure often does.



## Section 7

# Major Themes from Questionnaires

Multiple methods of soliciting information and feedback were employed during this outreach effort. In addition to the three agency workshops, electronic and paper questionnaires were distributed to all invited participants. Some participants of the agency workshops opted to fill out the questionnaire and those responses, if not captured in the agency workshop summaries, are listed herein. The electronic questionnaire method allowed for responses relating to specific problems and concerns that may not have been conveyed during general group discussion, specific coastal resiliency projects, reports, and references (e.g., from the USGS Coastal and Marine Science Center and the NYSDOT Division of Policy and Planning).

## 7.1 Problems, Opportunities, Objectives and Constraints

Responses from the electronic questionnaire were primarily from agencies who could not attend the workshops. All responses from these methods are found in **Appendix F**. Several problems, opportunities, objectives and constraints were considered. **Table 13** highlights several major topics and themes that were found in the questionnaire responses.

**Table 13. Problems, Opportunities, Objectives and Constraints Identified via the Questionnaire**

	Discussion Items
Problems	<ul style="list-style-type: none"><li>• The large scale of the Hudson Valley hinders the ability to identify specific projects through this study.</li><li>• Potential loss of parkland and swimming beaches.</li><li>• Potential increase in coastal development that may not be appropriate given risks.</li><li>• Forested watershed protection can prevent sediment movement downstream.</li><li>• Need for more wetland buffers rather than “hard” edges along the waterfront.</li><li>• The coast is vulnerable to sea level rise and flooding.</li><li>• New York State is a “home rule” state and planning is largely accomplished at the local municipal level.</li><li>• In addition to coastal flooding, riverine flooding potential exists.</li></ul>



	Discussion Items
Opportunities	<ul style="list-style-type: none"> <li>• Use natural systems to reduce flood risk.</li> <li>• Evaluate impacts from sea level change.</li> <li>• Maintain access to the Hudson River.</li> <li>• Consider impacts to draft of large vessels.</li> <li>• Evaluate impacts to vital infrastructure, such as treatment plants in the floodplain.</li> <li>• Evaluate impacts to low-lying areas putting residents, business and cultural assets at risk of inundation.</li> <li>• Evaluate impacts on water quality and oxygen levels.</li> <li>• Use distributed systems to mitigate risk, model open space protections, forest protection and wetland migration areas.</li> <li>• Prioritize projects based on assets and need rather than politics.</li> <li>• Collaborate with Cornell University (Climate Adaptive Design Studio).</li> <li>• Produce science-based tools and products that enable safer, productive, and more resilient communities and natural resources.</li> <li>• Consider measures to address flooding from the Hackensack River that also include creating recreational opportunities.</li> <li>• Consider the potential for roadways to serve as barriers.</li> <li>• Use of NNBFs to minimize flooding impacts.</li> <li>• Consider dredging of local rivers and waterways (i.e., Hackensack River).</li> <li>• Opportunities to rebuild/reconstruct transportation assets should also consider public transportation and connectivity needs including transit, rail and non-motorized modes.</li> <li>• Transportation infrastructure investments should consider co-benefits such as improvements to quality of life and greenhouse gas and air pollutant emission reductions.</li> <li>• Identify how adaptive capacities can be accommodated in the near-term to allow for implementing adaptive measures later in the century.</li> </ul>
Objectives	<ul style="list-style-type: none"> <li>• Increase safety to as much of the public as possible, but for those who refuse, consider limiting federal assistance.</li> <li>• Secure vital infrastructure.</li> <li>• Reduce repetitive loss regarding the transportation system.</li> <li>• Protect freshwater tidal wetlands.</li> <li>• Protect park land and swimming beaches.</li> <li>• Maintain a deep-water port for large vessels.</li> <li>• Provide unbiased, policy-relevant scientific data, knowledge and tools that can be used to improve the information on which management decisions are based.</li> </ul>

## Constraints

- Data is outdated or not frequent enough for land-cover, land-use, elevation, etc.
- Nonstationary sea level which reduces confidence in long-term design.
- Dense development is a constraint to determining appropriate CSRM measures.
- Railroad infrastructure (e.g., Amtrak, CSX, Metro-North) are located along the shoreline.
- Ecological impacts of the surge barrier and hardened shoreline could adversely affect coastal fisheries.
- Environmental permitting is needed to implement CSRM measures.
- Time and cost is a constraint. Transportation infrastructure has a vast unmet need to bring the state's infrastructure into a state of good repair.
- Obtaining stakeholder buy-in to the process and selected measure can be challenging.
- Coastal areas are densely populated and the State and local transportation agencies must provide transportation services to these developed and vulnerable coastal areas.

Much of the NYC Metro Area has been developed and investing in new transportation infrastructure, such as rail lines above the current and projected Hudson River floodplain elevation, would require costly right of way acquisitions.

The USGS also provided useful information in regards to data gaps that the agency perceives as relevant to coastal resilience in the study area and include:

- The influence of event-driven geomorphic change on habitat availability.
- Quantification and understanding of nearshore sediment fluxes on subaerial change.
- Effect and integration of future sea level change with storm impact predictions.
- Long-term geomorphic change of wetlands and estuaries in response to storms and sea level change.
- Shorelines and elevation data to support robust vulnerability assessments require annual or more frequent updates.
- Ecological impact assessments require updated land cover and land use estimates update at an annual or more frequent interval.

Similarly, NYSDOT provided a list of data gaps that include:

- Refinement of modeling for future conditions is needed to support planning and engineering decisions. Future projections should improve and refine sea level rise, precipitation and greenhouse gas emission scenarios. Ecological impact assessments require updated land cover and land use estimates update at an annual or more frequent interval.

- Modeling combined vulnerabilities for projections of coastal flooding with heavy/extreme precipitation events.
- Cost and benefit models for various adaptation strategies are needed for future risks to public and private investments in vulnerable areas.
- Effective retreat strategies should be identified along with strategies on how to best communicate these to the public and private/commercial investors.
- Develop effective public outreach strategies and tools to communicate flooding risk.

## 7.2 Agency Work and Existing Information

Existing and planned agency work, as well as existing information provided via the questionnaire, is summarized in **Table 14**.

**Table 14. Agency Work and Existing Information Identified via the Questionnaire**

	Discussion Items
Federal	<ul style="list-style-type: none"> <li>• USGS provided a thorough list of existing and ongoing agency efforts and available information (see <b>Appendix F</b> for detailed responses) and includes coastal landscape modeling for future scenarios, modeling of ocean circulation and sediment transport within NY Harbor and Hudson River Estuary, evaluation of estuarine and wetland physical responses to storms, evaluation of coastal change hazards and forecasts to storms, etc.</li> <li>• USGS provided a multitude of articles and reference publications for consideration of existing and ongoing work.</li> <li>• USEPA supports various coastal resiliency projects by reviewing environmental assessments and environmental impact statements for a variety of Federal agencies.</li> </ul>

	Discussion Items
State / Regional	<ul style="list-style-type: none"> <li>• NYSDEC Hudson River Estuary Program is funding watershed assessments to identify flood mitigation strategies for future implementation.</li> <li>• NYSDEC is coordinating coastal community planning efforts, hydraulic construction assessments, dam removal opportunities and green infrastructure projects.</li> <li>• NYSDEC is mapping LiDAR and river bathymetry, supporting sustainable living shoreline projects, and is conducting various studies in coordination with academic institutions.</li> <li>• Consider engaging the Mid-Atlantic Regional Planning Body (MARCO)</li> <li>• Need to engage the railroads (regional transportation infrastructure).</li> <li>• NYSDOT provided a list of various past and ongoing coastal resilience studies and projects including New York Sea Level Rise Taskforce Report to the NYS Legislature, NYS 2100 Commission Report, NYSDOT Flooding Vulnerability Assessment, NY Rising Community Reconstruction Program studies, FHWA Post Sandy Transportation Resiliency Study, NYSDEC Community Risk and Resiliency Act, Nassau Expressway (Route 878) Reconstruction and Elevation project, Deep Water Port Study at Old Shoreham Power Plant, and related climate-related research studies and modeling efforts.</li> <li>• NYSDOT recommended to obtain a list of reconstruction projects from the FHWA Emergency Relief and FEMA Public Assistance.</li> </ul>
Municipal / County	<ul style="list-style-type: none"> <li>• Various reports, studies, and efforts are currently being performed by the City of Kingston, New York and Ulster County.</li> <li>• The City of Kingston has current and future initiatives to address resiliency with an engaged community and capacity within city government. In addition, the City secured funding and projects to implement.</li> <li>• These efforts are related to waterfront development, in addition to risk assessments associated with an increase in sea level.</li> <li>• The Ulster Planning Department carries out land use planning for Ulster County and hosts the Ulster County Transportation Council. Information related to both planning efforts and transportation-related resiliency efforts are available.</li> <li>• The Ulster County Transportation Council is part of the Metropolitan Planning Organization (MPO) for the Kingston urbanized area.</li> <li>• The Borough of New Milford has performed flood mitigation at Hirschfield Brook, a tributary to the Hackensack River.</li> </ul>

### 7.3 Management Measures

Management measures addressed in the questionnaire are summarized in **Table 15**. Some of the responses from the questionnaires echoed similar viewpoints to those in the New Paltz, New York workshop. Some responders stated the potential negative impacts of a storm surge barrier and hardened shorelines on the environment, water quality, and regional fisheries. However, a

response from PANYNJ indicated that there are ongoing discussions and efforts related to a proposed regional storm surge barrier that warrants further evaluation (see **Appendix F** for the information from the Metro NY-NJ Storm Surge Working Group).

**Table 15. Management Measures Identified via the Questionnaire**

	Discussion Items
Policy & Programmatic / Nonstructural	<ul style="list-style-type: none"> <li>• Collaborate with community members, partners and state agencies and consider their concerns and preferences.</li> <li>• Various coastal resiliency projects being performed in and near the City of Kingston, specifically watershed management plans, tidal waterfront task force to evaluate vulnerability to flooding along Rondout-Hudson Waterfront, various waterfront development plans and work with future resilient development.</li> <li>• Other planning efforts include a multi-community sea level change implementation learning group.</li> <li>• Purchase open space lands as a site of future flooding and prevent them from being developed.</li> <li>• Consider strategic retreat.</li> <li>• Protect forest watersheds to prevent sediment movement downstream.</li> </ul>
Structural	<ul style="list-style-type: none"> <li>• City of Kingston is evaluating various concepts for the design and engineering of shoreline improvements to the city's waterfront.</li> <li>• Other efforts in this area include promenade design, walking trails, and contaminated site clean ups.</li> <li>• Consider a regional storm surge barrier.</li> </ul>
NNBF	<ul style="list-style-type: none"> <li>• Living shorelines could be a potential measure.</li> <li>• The habitat restoration and comprehensive restoration plans for the Hudson River north of the Tappan Zee Bridge and Troy. NY lists many local resiliency-type projects.</li> </ul>

## 7.4 Agency Areas of Interest and Concern

Areas of interest and concern, as well as some additional agencies to engage in this effort, are summarized in **Table 16**.

**Table 16. Agency Areas of Interest and Concern Identified via the Questionnaire**

	Discussion Items
Areas of Interest and Concern	<ul style="list-style-type: none"> <li>• The Hudson River Estuary Program's interest is a resilient watershed and Hudson River ecosystem.</li> <li>• Evaluate the impact of sea level change.</li> <li>• Improve public health and safety.</li> <li>• Mitigate the release of toxic chemicals during an event, mitigate the spread of mold.</li> <li>• Ensure the safe evacuation of the public.</li> <li>• Provide economic vitality to the waterfront.</li> <li>• Maintain/improve public access to the Hudson River while protecting infrastructure and public safety.</li> <li>• Concerns related to the impact of a storm surge barrier on fisheries and other species.</li> <li>• Perform risk assessments.</li> <li>• Increase protection of existing and new infrastructure, such as wastewater treatment plants or nuclear power plants (i.e., Indian Point Nuclear Reactor).</li> <li>• Reduce repetitive losses related to the transportation system.</li> <li>• Plan for and incorporate resiliency.</li> <li>• Plan appropriately for development along the coast.</li> <li>• Use natural systems, such as wetlands or native planting, to reduce flood risk.</li> <li>• Protect and maintain natural freshwater wetlands.</li> <li>• Maintain a deep port for large vessels.</li> <li>• Sediment retention by potential barriers may occur. The removal of the sediment may be costly.</li> <li>• Provide reliable scientific information to describe and understand the Earth's processes to minimize loss of life and property from natural disasters.</li> <li>• Provide robust and relevant scientific research by producing science-based tools and products for safer, productive and more resilient communities and natural resources (see <b>Appendix F</b> for detailed USGS response).</li> <li>• Consider engaging more county-level agencies.</li> <li>• Continued outreach to the City of Kingston and Ulster County.</li> <li>• Flooding from the Hackensack River and its tributaries.</li> <li>• Strengthen existing transportation networks (see <b>Appendix F</b> for detailed NYS DOT response).</li> <li>• Strategically expand transportation networks in order to create redundancies.</li> <li>• Build for a resilient future with enhanced guidelines, standards, policies, and procedures.</li> </ul>

	Discussion Items
Agencies to Engage	<ul style="list-style-type: none"><li>• NY City Office of Resiliency</li><li>• NY Metropolitan Transportation Council (NYMTC)</li><li>• Hudson River rail (owners, operators)</li><li>• Municipalities along study area</li><li>• Scenic Hudson (NGO)</li></ul>

## Section 8

# Conclusions

### 8.1 Major Themes

This report summarizes the discussions and findings of three agency workshops held throughout the NYNJHATS study area as part of the NYNJHATS CSRM feasibility study. Three meetings were held, one each in Newark, New Jersey; New York City, New York; and New Paltz, New York. The intent of the meetings was to share and solicit information, generate discussion and continue the process of local collaboration for a common vision to reduce coastal flood risk and increase resilience within the NYNJHATS area. In addition, an online and paper questionnaire were distributed to solicit additional feedback from agency stakeholders, supplemental to the meetings, or from those agency stakeholders who were unable to attend a meeting. The results and feedback received via questionnaire and any general emailed responses were considered and incorporated.

*Common themes included general support for this study, which is a systems-level regional analysis engaging and collaborating across agencies and levels of government. Some were opposed to structural solutions, like a storm surge barrier, whereas others supported it, but all raised specific concerns of risk and the need to address it, including better communication of risk to the public. A sense of urgency was communicated and the need for timely action, though there was common understanding that it will take time to gather the information and data needed to properly conduct long-term risk management planning in such a large and complicated area.*

Throughout the agency discussion process, a few common themes became apparent:

- *There is a need for a systems-level, regional analysis and approach to determine appropriate CSRM measures and future initiatives. For this to occur successfully, coordination and collaboration across agencies and levels of government is required. Localized efforts are only pieces of the larger regional puzzle.*
- *Proper evaluation of a potential or a series of potential storm surge barriers is needed and must encompass flood risk management (FRM) benefits and costs. They must consider all potential impacts to people, property, local economies, and the environment. Some agencies are opposed to the measure, whereas some support it. Multi-benefit solutions with natural or nature-based features are generally preferred.*
- *The public and critical infrastructure continue to be at risk, as seen by the effects of Hurricane Sandy. Communication of these risks, continued public outreach, education, and engagement is essential no matter the type of risk management solution.*



- *Impacts to critical infrastructure (e.g., transportation infrastructure and evacuation routes, power generation and supply, and wastewater infrastructure) were echoed by many agencies. Managing risk to the public and to critical infrastructure should be a focus of the study.*
- *Uncertainty exists in two technical topics. First, there is uncertainty related to appropriately defining the design condition and thus, the selection and incorporation of sea level change scenarios. Clarity and a transparent decision-making process will allow for agencies and communities to maintain engagement in the design process. Secondly, there is uncertainty associated with the occurrence and timing of fluvial (i.e., riverine) flooding with coastal flooding. There is a concern that a storm surge barrier or set of barriers will exacerbate fluvial flooding during flood conditions.*
- *Potential negative impacts to the environment, especially to the Hudson River and its estuaries, should be investigated and mitigated.*
- *Funding, time, legislation, and bureaucracy hinder the progress of coastal resiliency in many communities. There is an urgency to identify CSRM measures prior to another storm or changing sea level condition. If a cost-effective, publicly acceptable, and feasible project cannot be identified within a reasonable timeframe, less-than-ideal solutions may be implemented out of necessity.*

## 8.2 Next Steps

The summation of topics and themes from these three agency workshops, and questionnaires will be used by USACE for future efforts related to the NYNJHATS CSRM feasibility study. These efforts include continued collaboration and coordination with the agencies represented, and additional outreach to agencies or communities that were recommended during these workshops. Another agency workshop focused on discussions with NGOs will take place in the upcoming months.

The common themes and various detailed discussions with stakeholders will help inform the scope of the study. Feedback, data sources, and information about existing and proposed coastal resiliency work provided by the agencies will be reviewed and incorporated as the groundwork for the study and the PMP.

## Appendix A

### Meeting Agenda and Presentation Slides

Agendas and presentations were similar for all meetings

# **New York New Jersey Harbor and Tributaries Agency Stakeholder Workshop**

**January 24, 2017**

**9 am – 1 pm**

## **AGENDA**

1. **9:00 am – 9:10 am: Sign-in and Take Seats**
2. **9:10 am – 9:25 am: Welcome & Introductions**  
*NYSDEC, NYC – Mayor's Office, USACE*
3. **9:25 am - 9:35 am: Meeting Purpose**
4. **9:35 am – 9:45 am: Study Background**
5. **9:45 am – 10:00 am: Overview of the USACE Planning Process & NEPA Process**
6. **10:00 am – 10:10 am: Planning Fundamentals**
  - Problems, Opportunities, Objectives, Constraints
  - Without Project Future Conditions
7. **10:20 am – 10:55 am: Facilitated Breakout Session 1**
  - Breakout Topic #1: Problems, Opportunities, Objectives, and Constraints
  - Breakout Topic #2: Agency Work and Existing Information
8. **11:00 am – 11:20 am: Facilitated Breakout Session Reporting**
9. **11:20 am – 11:35 am: Coastal Storm Risk Management Measures**
10. **11:45 am – 12:30 pm: Facilitated Breakout Session 2**
  - Breakout Topic #3: Management Measures
  - Breakout Topic #4: Agency Areas of Interest and Concern
11. **12:35 pm – 12:55 pm: Facilitated Breakout Session Reporting**
12. **12:55-1:00 pm: Meeting Summary and Next Steps**

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

US Army Corps of Engineers, New York District

New Jersey Department of Environmental Protection

New York State Department of Environmental Conservation,  
in partnership with the New York City Office of Recovery  
and Resiliency

*"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."*



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# PURPOSE OF WORKSHOP

What is the NY/NJ Harbor & Tributary Study?

How does it fit into and build upon completed/ongoing efforts?

What problems, opportunities, objectives and constraints do you see in the watershed areas you work in?

What work is planned in the watershed and what additional management measures are needed?

Discuss Next Steps

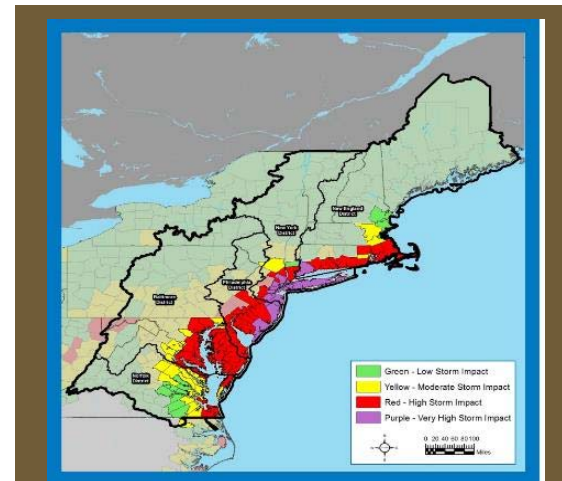


# NORTH ATLANTIC COAST COMPREHENSIVE STUDY (NACCS)

## GOALS

- Provides a **Risk Management Framework – not a plan**
- Supports **Resilient Coastal Communities** and robust, sustainable coastal landscape systems
- **Considers future sea level rise scenarios**, to reduce risk to vulnerable population, property, ecosystems, and infrastructure
- Whole of Government Approach

“That using up to \$20,000,000\* of the funds provided herein, the Secretary shall conduct a comprehensive study to address the flood risks of vulnerable coastal populations in areas that were affected by Hurricane Sandy within the boundaries of the North Atlantic Division of the Corps ....”  
(\*19M after sequestration)



[www.nad.usace.army.mil/CompStudy](http://www.nad.usace.army.mil/CompStudy)

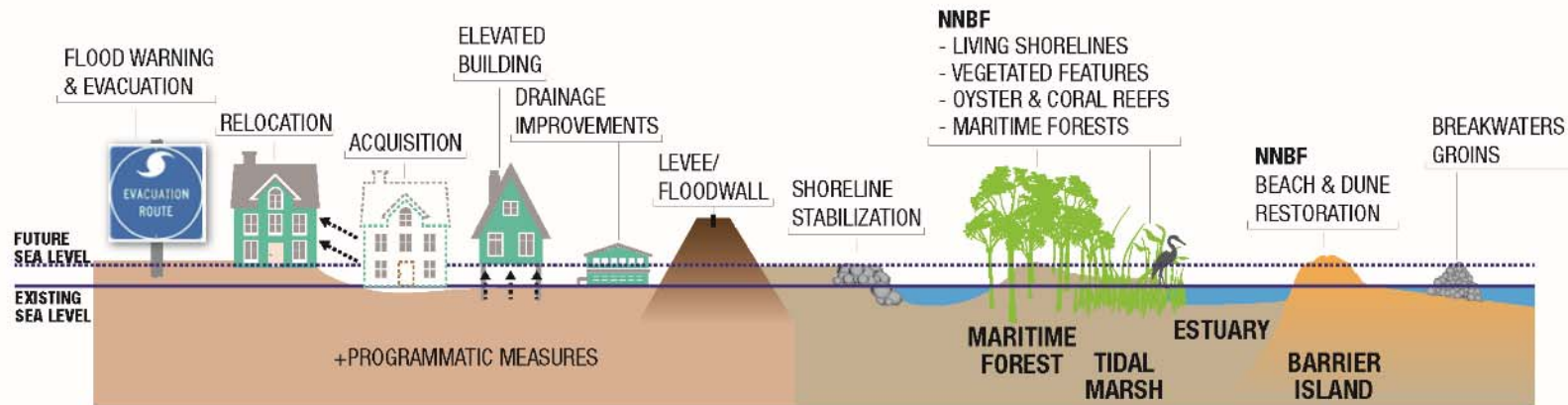


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# FINDINGS

- **Shared** responsibility of all levels of Government and partnerships
- Rethink approaches to **adapting to risk**
- Resilience and sustainability must consider a **combination and blend** of measures



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# COASTAL STORM RISK MANAGEMENT FRAMEWORK

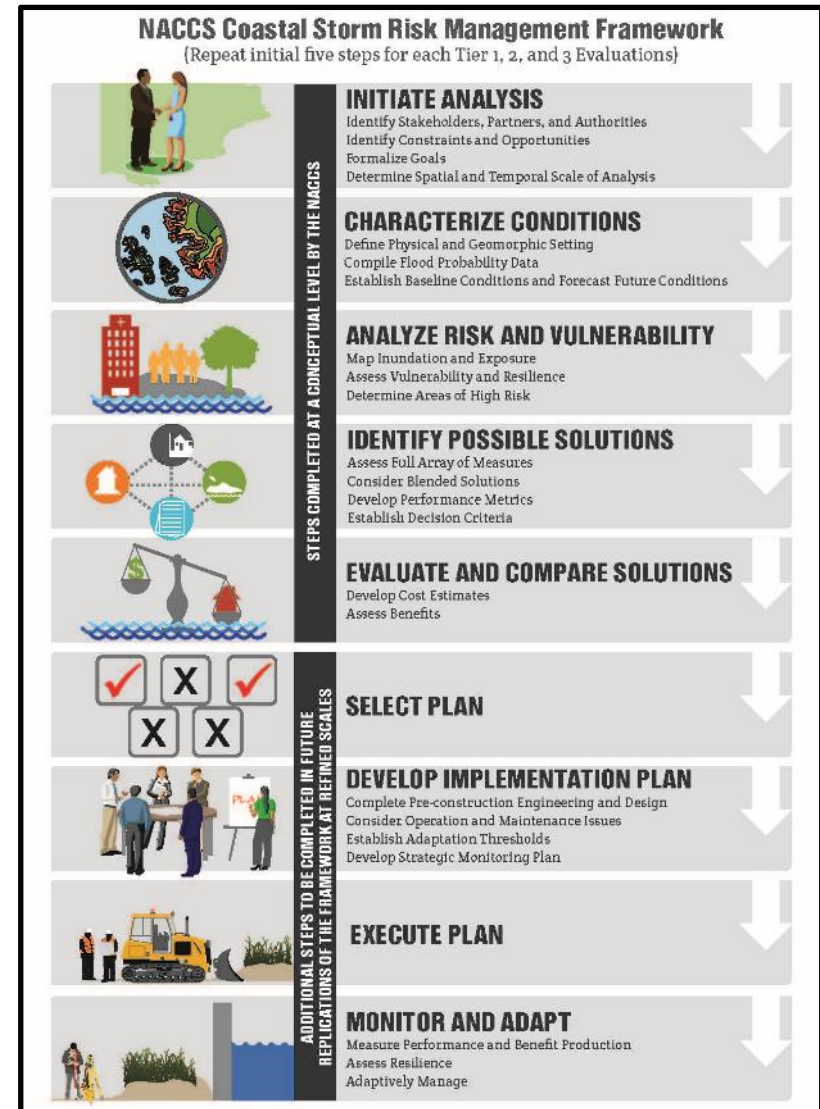
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Managing coastal storm risk is a shared responsibility and requires:

- Shared tools
- Common methodology that all parties can follow together to assess risk and identify solutions

The framework is:

- A 9-step process
- Customizable for any coastal area or watershed
- Repeatable at state and local scales
- Transferable to other areas of the country



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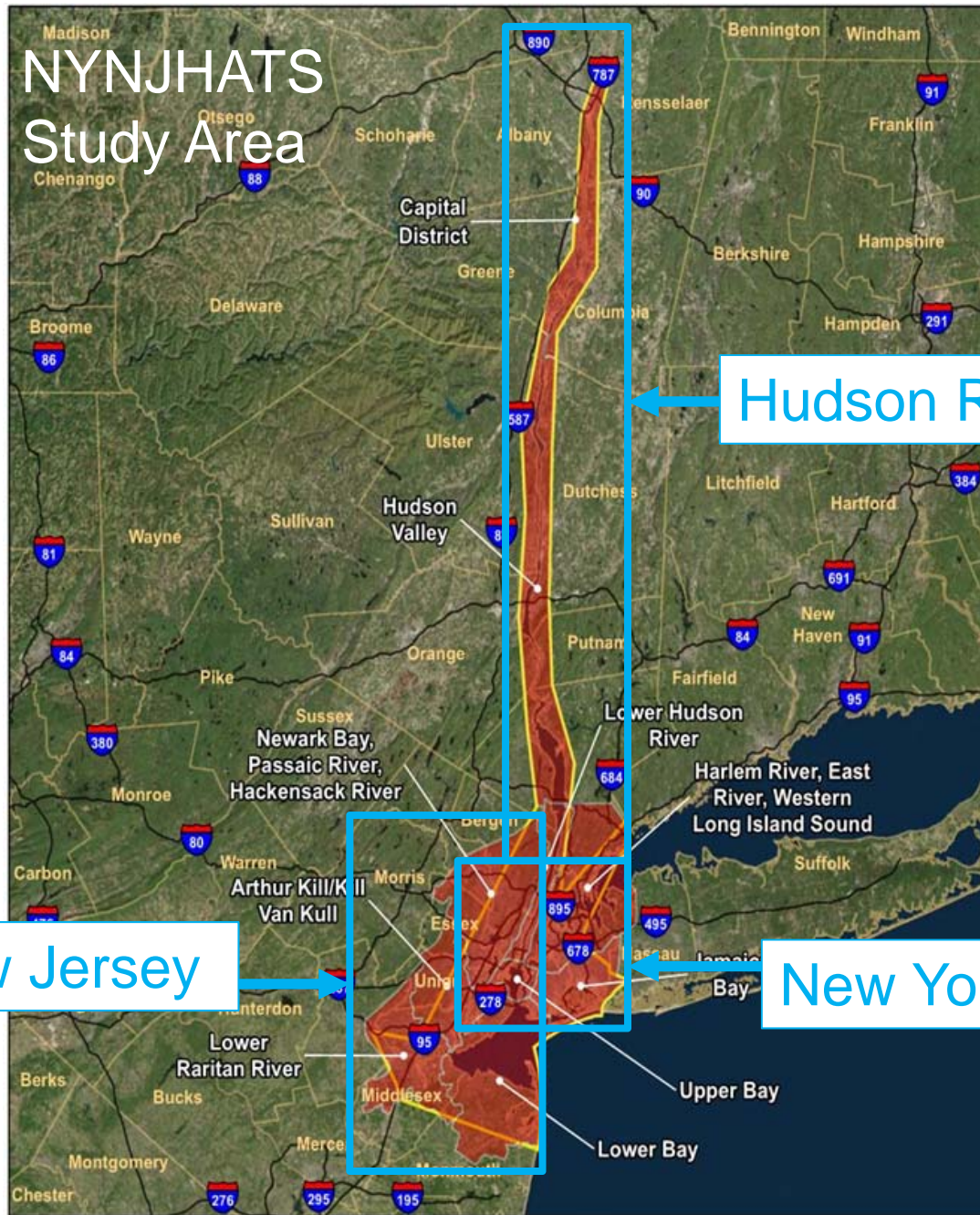


# NYNJHATS Study Area

New Jersey

Hudson River Valley

New York City



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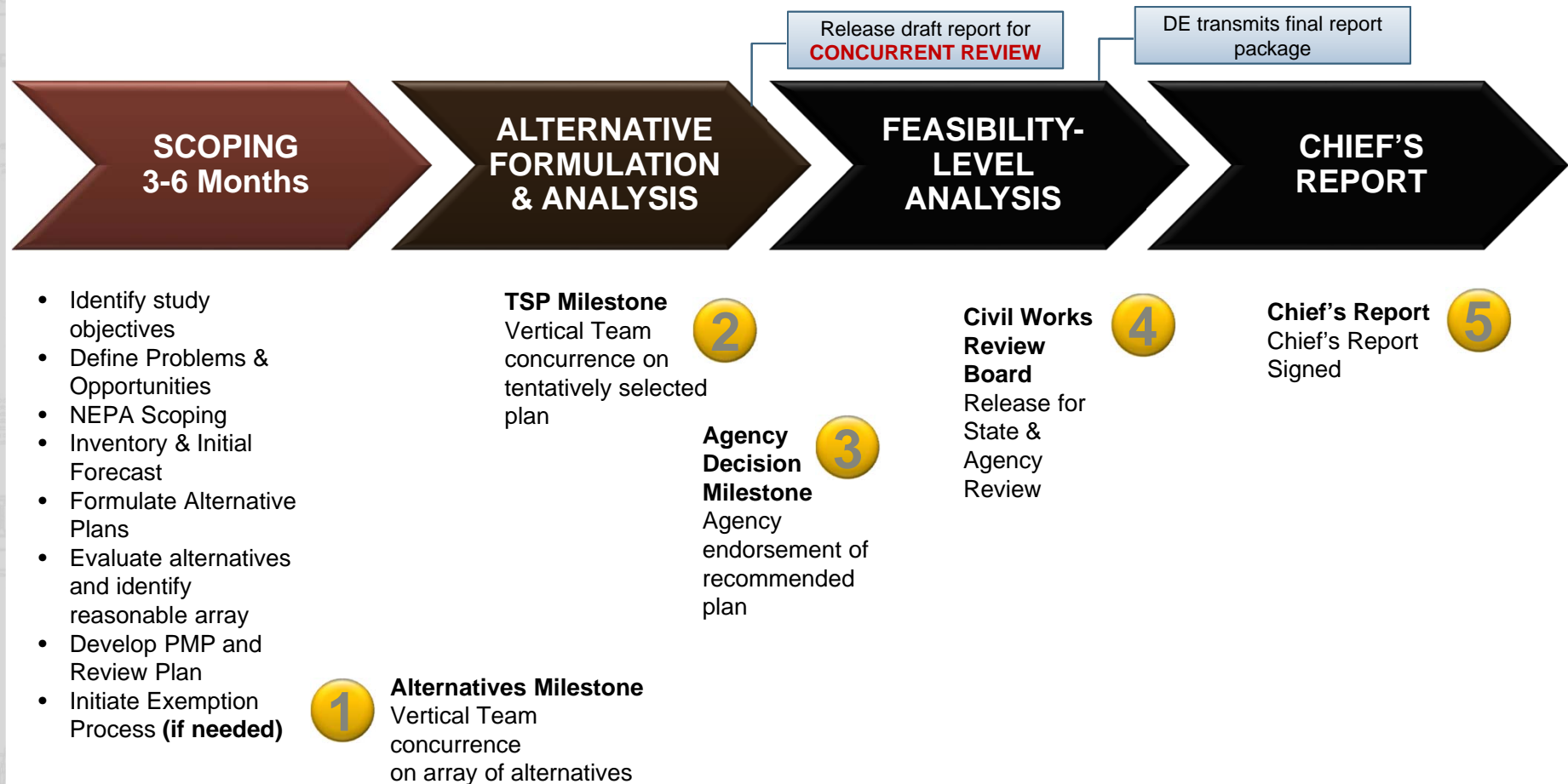


# WHERE ARE WE IN THE CORPS PLANNING PROCESS?

- Feasibility Cost Sharing Agreement was first step – executed August 2016 with the New Jersey Department of Environmental Protection and the New York State Department of Environmental Conservation, our non-Federal sponsors
  - City of New York is a study partner
  
- Ongoing: refinement of Project Management Plan (PMP) and Scope of Work (will be updated throughout study)
  - Workshop feedback will be used to refine scope of PMP
  - Workshop participants can help by identify Non-Governmental Organizations and other key stakeholders
  
- New paradigm of *risk-informed decision making* focuses on “decision points” rather than more “task oriented” planning



## Typical SMART Feasibility Study Process



# NYNJHATS COASTAL STORM RISK MANAGEMENT STUDY: POST STUDY

9

- Chief's Report to Congress
- Congress authorizes the project for construction
- Preconstruction, Engineer and Design (PED) phase begins
- Project must be budgeted (“new start” construction currently very competitive)
- Once Federal and non-Federal funds are both available, construction can begin



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# PROBLEMS & OPPORTUNITIES



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# WHY IDENTIFY PROBLEMS & OPPORTUNITIES?

Focus study team and stakeholders on why we are undertaking this study

Provide clear, common understanding of problems to be solved and opportunities to be realized

Used to develop planning objectives for the study



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# SPECIFY PROBLEMS & OPPORTUNITIES

**Problems:** negative

**Opportunities:** positive

Without a clear statement of the problems or the opportunities, it is impossible to develop study objectives



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# WHAT ARE PROBLEMS & OPPORTUNITIES?

<u>Characteristic</u>	<u>Problem</u>	<u>Opportunity</u>
<b>FOCUS</b>	Existing, undesirable; What is	Future, desirable; what could be
<b>MESSAGE</b>	Negative; objection	Positive; desire
<b>OCCURRENCE</b>	Past, present, expected in future	Not in past, maybe in present, possibly in future
<b>RELATIONSHIP TO OTHER RESOURCES</b>	Existing condition adversely affects other resources	Existing condition does not affect other resources
<b>IMPLICIT OBJECTIVES OF ACTION</b>	Create less objectionable future condition	Create more desirable future condition
<b>CONSEQUENCE OF DOING NOTHING</b>	Direct, immediate, adverse	Indirect & long term



# DEVELOPING PROBLEMS & OPPORTUNITIES

## Problem/Opportunity Statement

- ✓ Subject
- ✓ Effect
- ✓ Location
- ✓ Cause (if known)

**Impact:** Who/what resources are affected, where, how

**Significance:** Relationship between the problem/opportunity and a significant resource



*Good  
problem/  
opportunity  
statements  
don't include  
solutions!*



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# OBJECTIVES & CONSTRAINTS



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# SPECIFY OBJECTIVES & CONSTRAINTS

Objectives are what you are working towards

**Objective** = do good

**Constraint** = don't do, can't do

Objectives and constraints indicate what is important to people



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# OBJECTIVES

- Something aimed at or striven for; a statement of the intended purposes of the planning process or what an alternative plan should try to achieve
- Planning objectives reflect what we want to accomplish with a plan and the changes between without- and with-project conditions
- Include the effect, subject, location, timing, and duration
- Specific and measurable



# CONSTRAINTS

- Statements of things unique to a specific planning study that alternative plans should avoid
- Simply stated: “Don’t cause problems or negative effects”
- What a plan cannot or should not do



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# CONSTRAINTS

## Planning Constraints

- Universal givens
- Unique to each study

## Study Resource Constraints

- Time
- Money
- Talent



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# FUTURE WITHOUT PROJECT CONDITIONS

Ongoing Projects

Relative Sea Level Change Scenarios



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# RELATIVE SEA LEVEL CHANGE (RSLC)

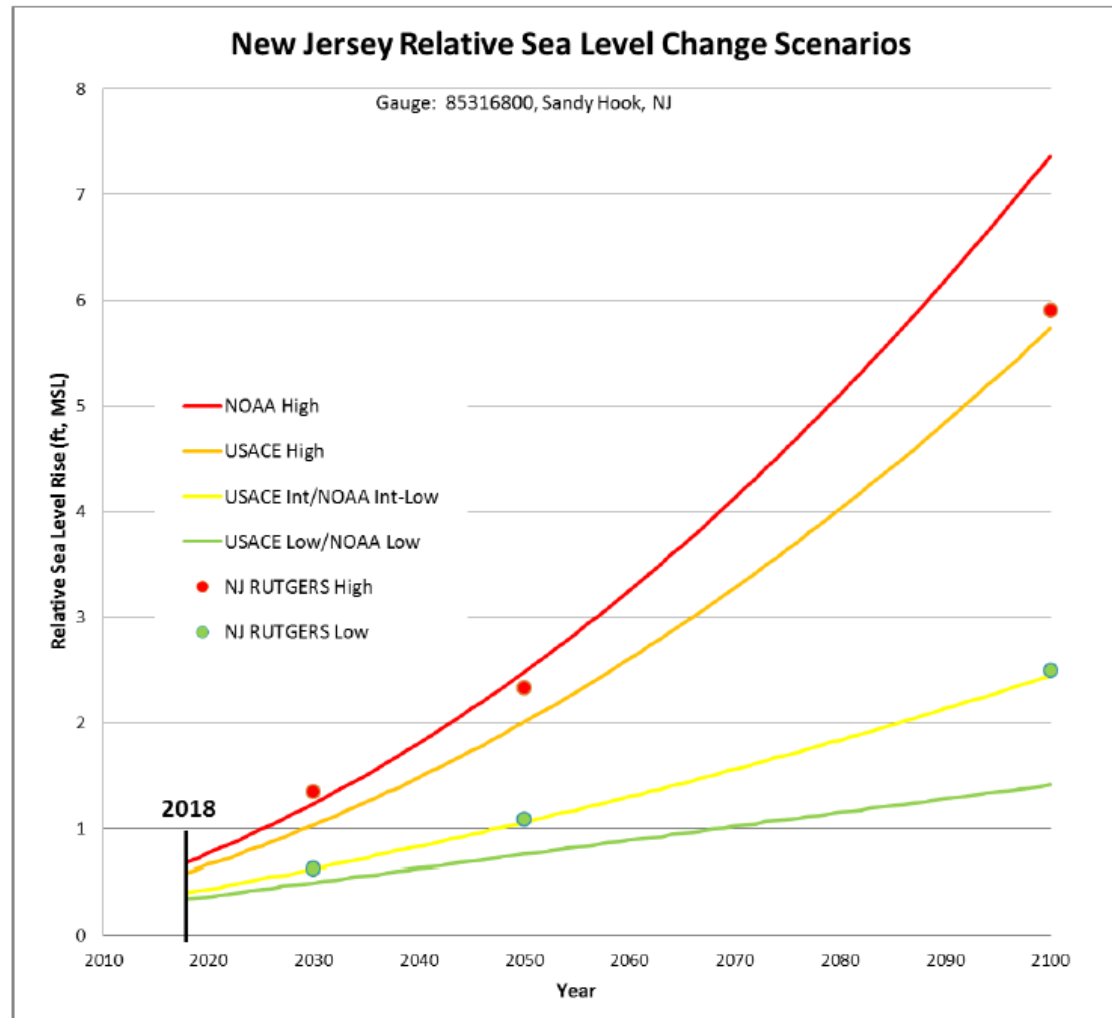


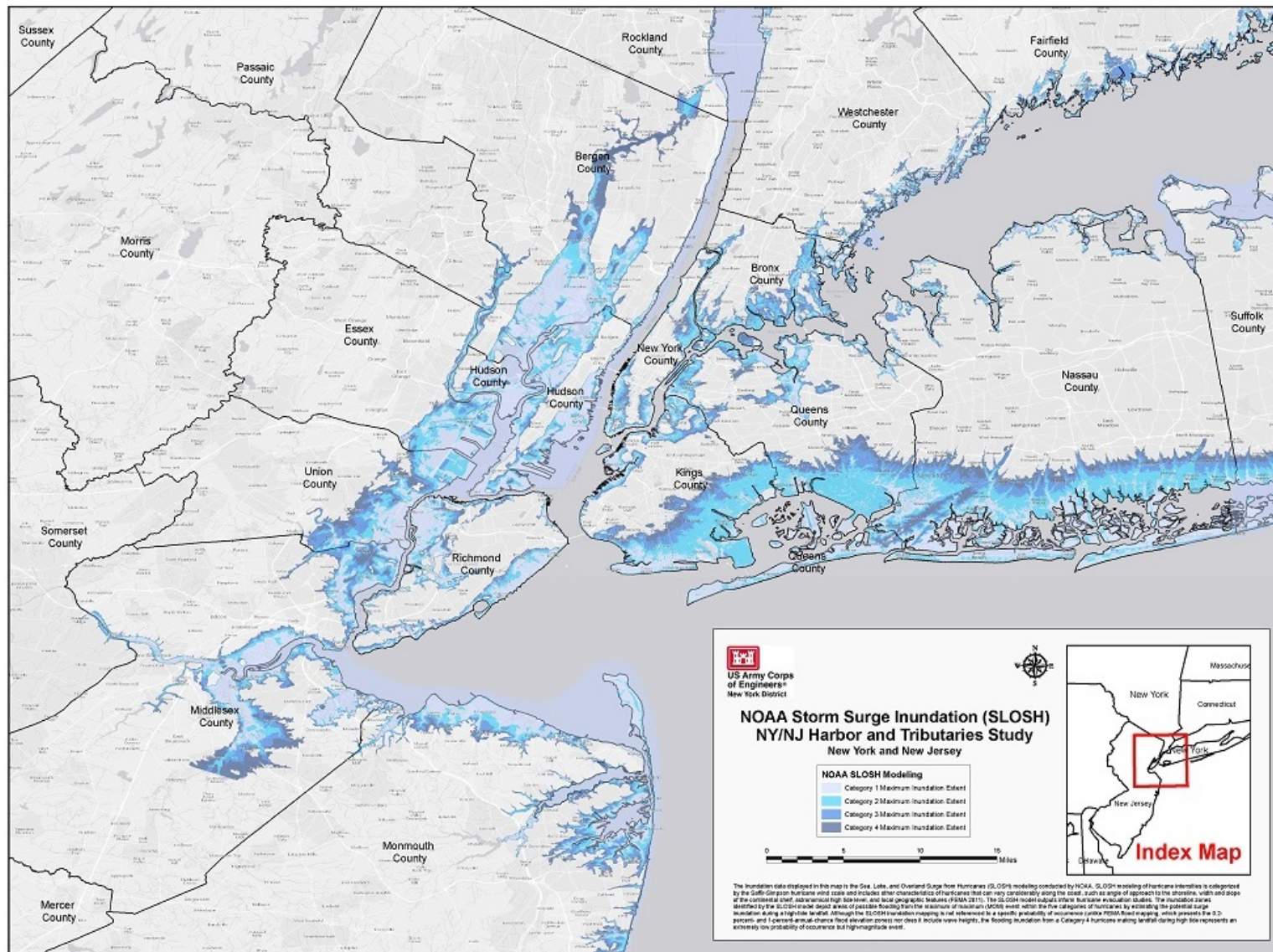
Figure 6. Relative Sea Level Change for New Jersey (Miller et al., 2013) and for Sandy Hook, NJ for USACE and NOAA Scenarios



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# BREAKOUT SESSION I

Topic 1: Problems, Opportunities,  
Objectives, and Constraints

Get into groups

Develop key  
statements  
individually and  
as a group

Describe  
impact and  
significance for  
each statement

Report up to  
five statements  
to the larger  
workshop

Topic 2: Agency Work and Existing  
Information; Data Gaps

# WORKSHOP GROUND RULES

Everyone participate, no one dominate

One speaker at a time

Share your unique perspective

All ideas are valid

Listen for understanding – inquire (ask) before you  
advocate (persuade)

Be aware of meaningless abstraction

Be intrigued by the difference you hear

Participate 100%

Have fun!



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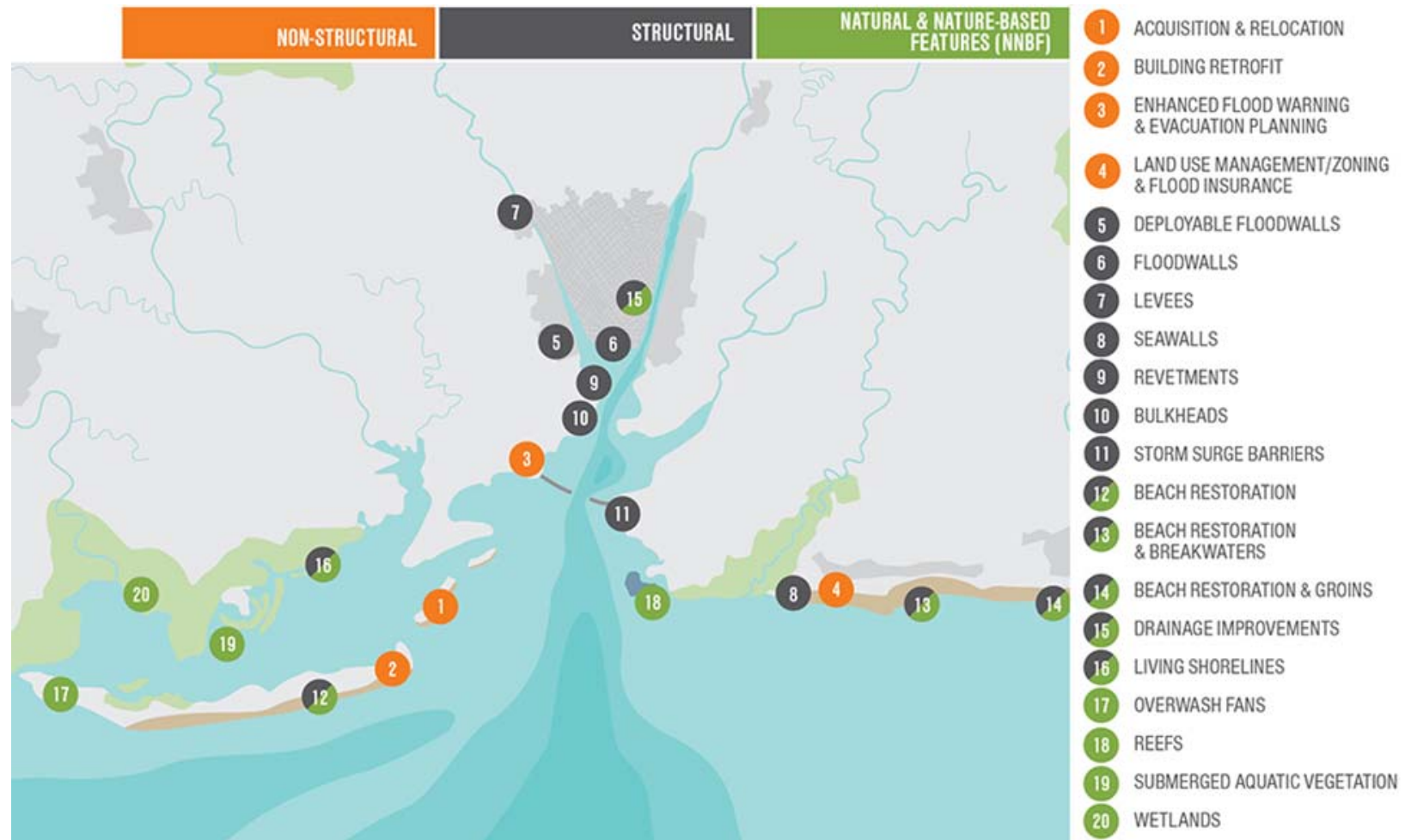
# MANAGEMENT MEASURES



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# MANAGEMENT MEASURES

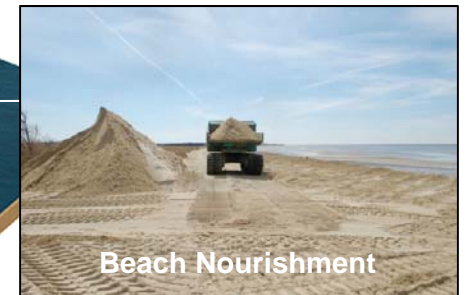
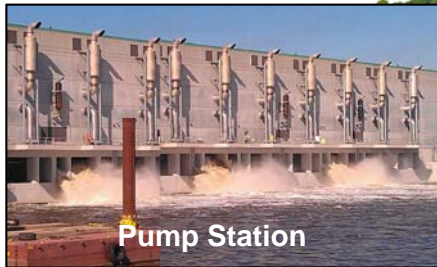


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# MEASURES WORKING TOGETHER



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# MANAGEMENT MEASURES

## STRUCTURAL

Floodwalls  
and Levees

Deployable  
Floodwalls

Storm Surge  
Barriers



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# MANAGEMENT MEASURES

## STRUCTURAL - FLOODWALLS AND LEVEES



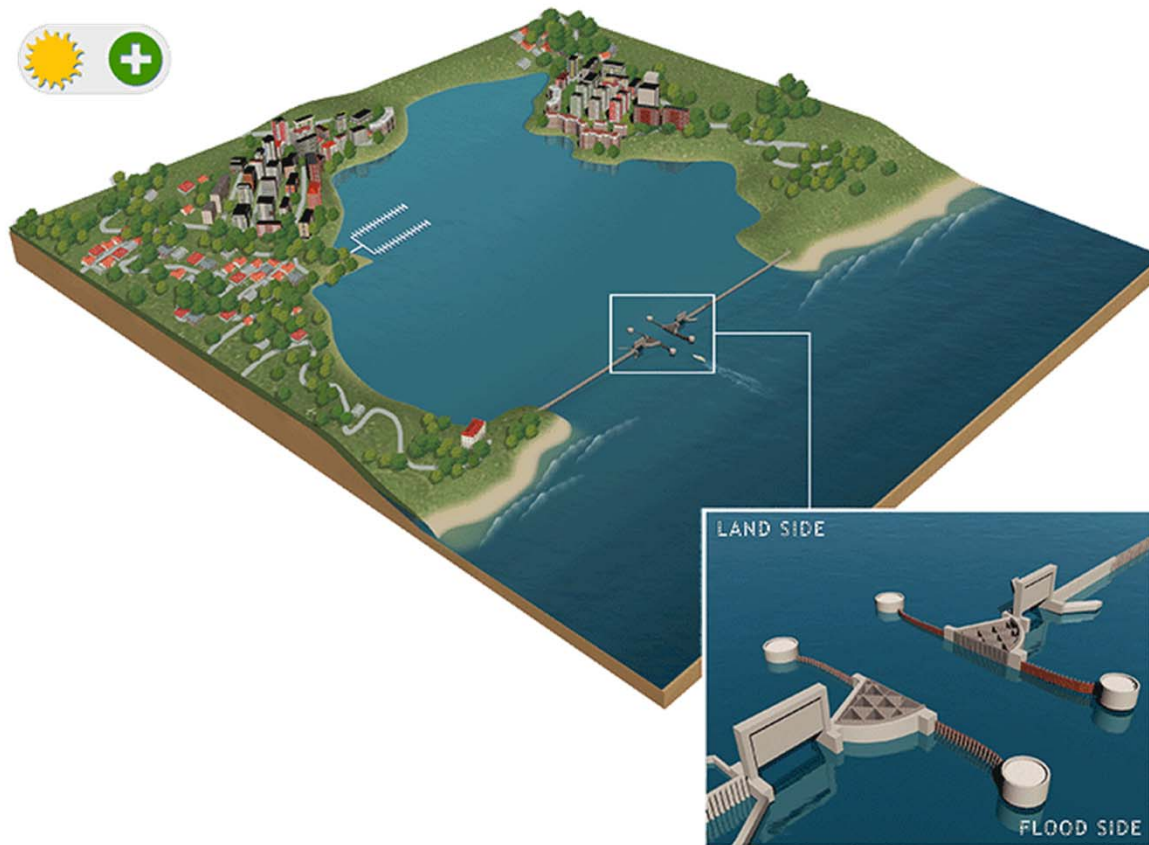
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# MANAGEMENT MEASURES

## STRUCTURAL – STORM SURGE BARRIERS



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# MANAGEMENT MEASURES

## NONSTRUCTURAL

Non-residential  
Floodproofing  
(Wet or Dry)

Elevation  
(including  
utilities)

Relocation

Acquisition

Flood Warning

Flood  
Insurance

Flood Plain  
Regulation

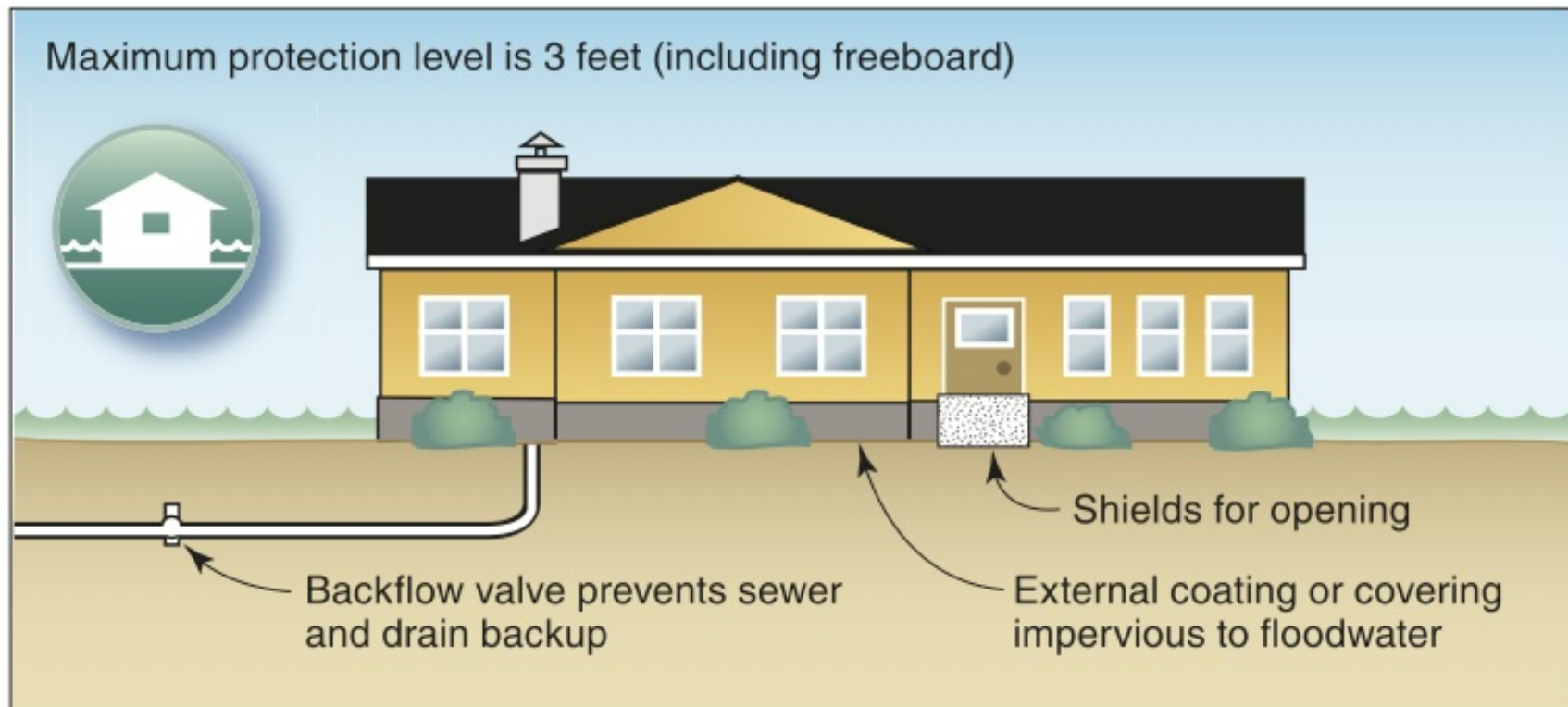


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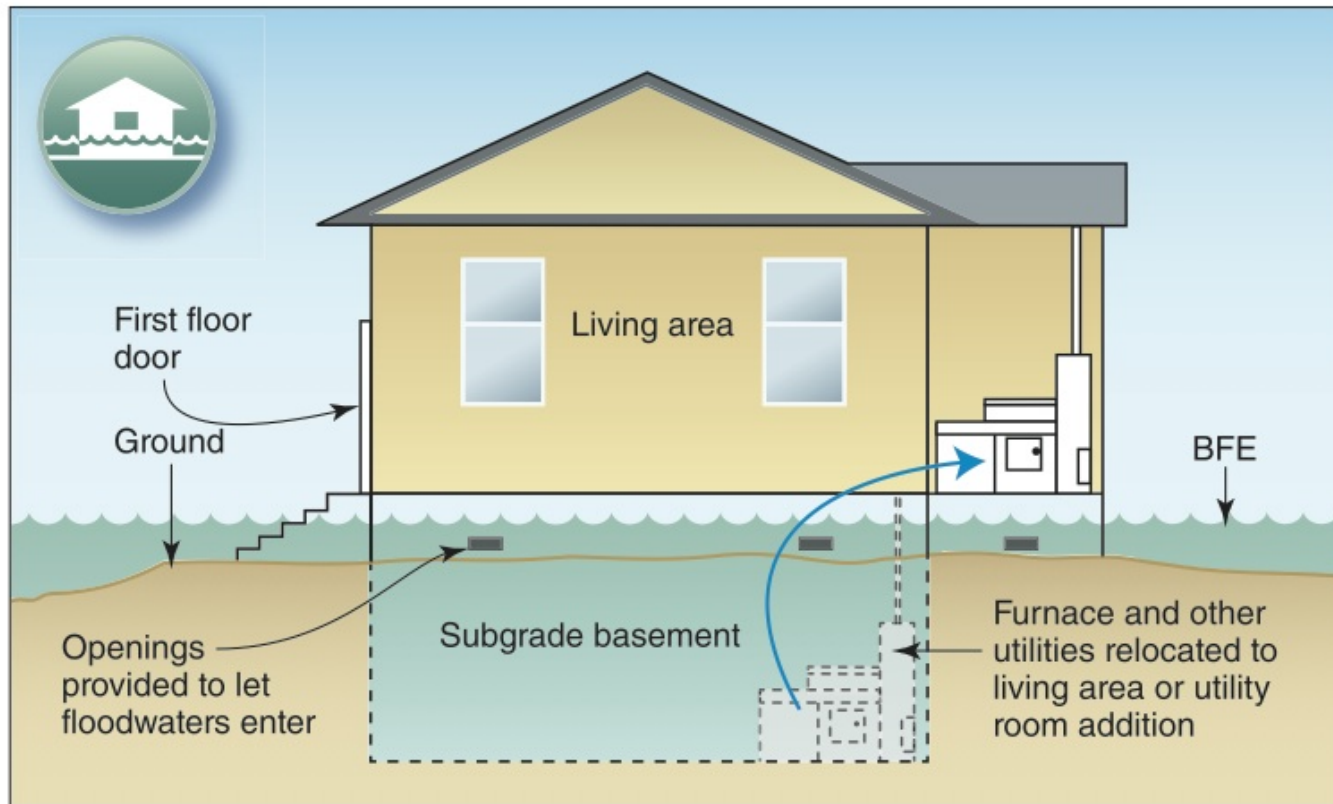
# MANAGEMENT MEASURES

## NONSTRUCTURAL – DRY FLOODPROOFING



# MANAGEMENT MEASURES

## NON-STRUCTURAL – FLOODPROOFING - WET

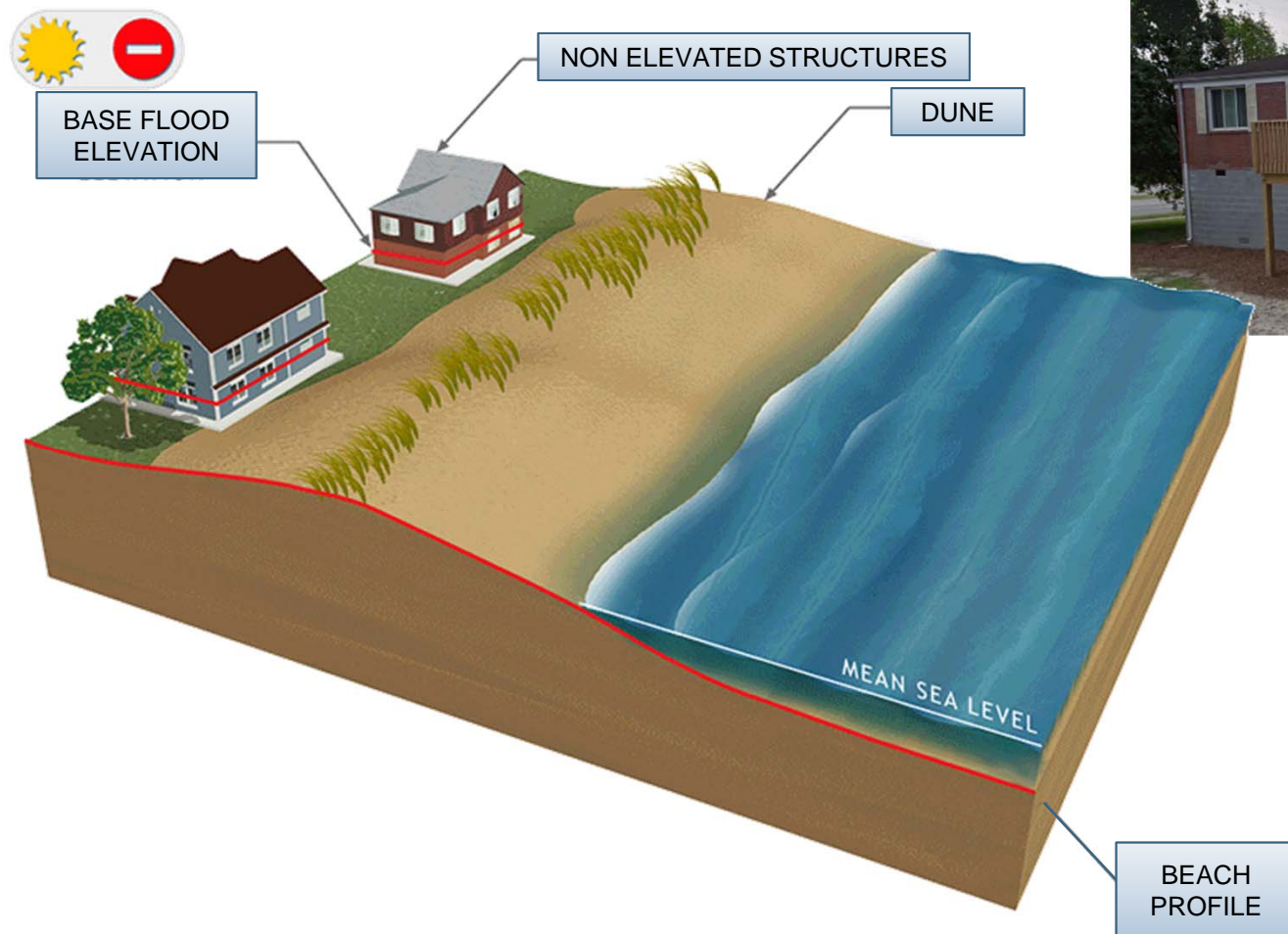


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# MANAGEMENT MEASURES

## NONSTRUCTURAL - ELEVATION



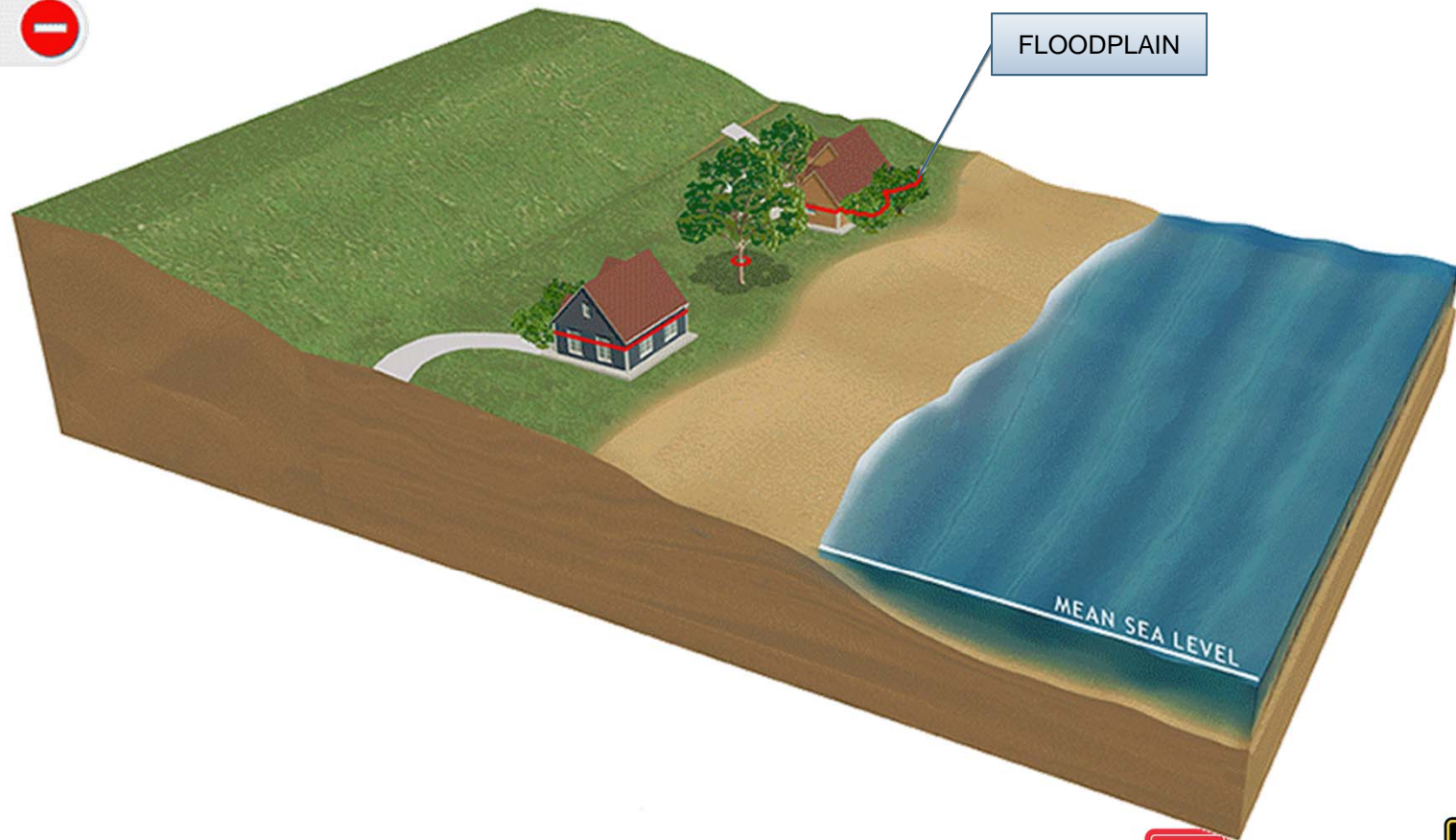
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# MANAGEMENT MEASURES

## NONSTRUCTURAL – ACQUISITION OR RELOCATION



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# MANAGEMENT MEASURES

## NATURAL AND NATURE-BASED

Beach  
Restoration

Drainage  
Improvements

Living  
Shorelines

Reefs

Submerged  
Aquatic  
Vegetation

Wetlands



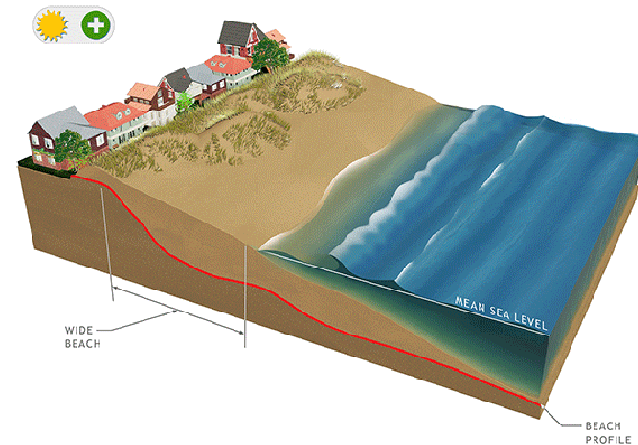
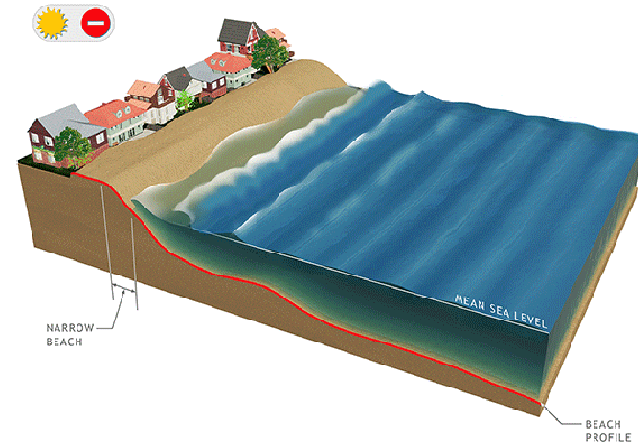
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# MANAGEMENT MEASURES

## NATURAL AND NATURE-BASED – BEACH NOURISHMENT

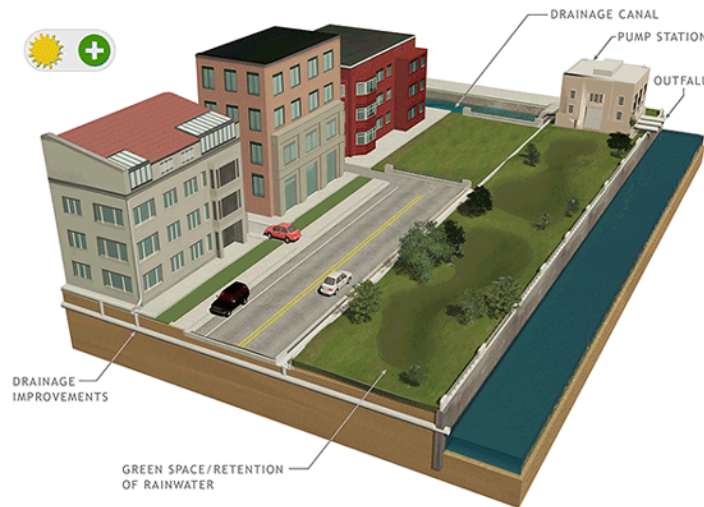
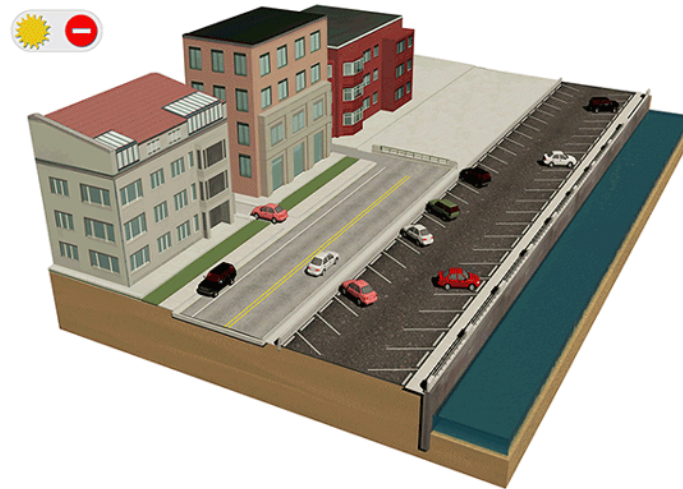


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# MANAGEMENT MEASURES

## NATURAL AND NATURE-BASED – DRAINAGE IMPROVEMENTS

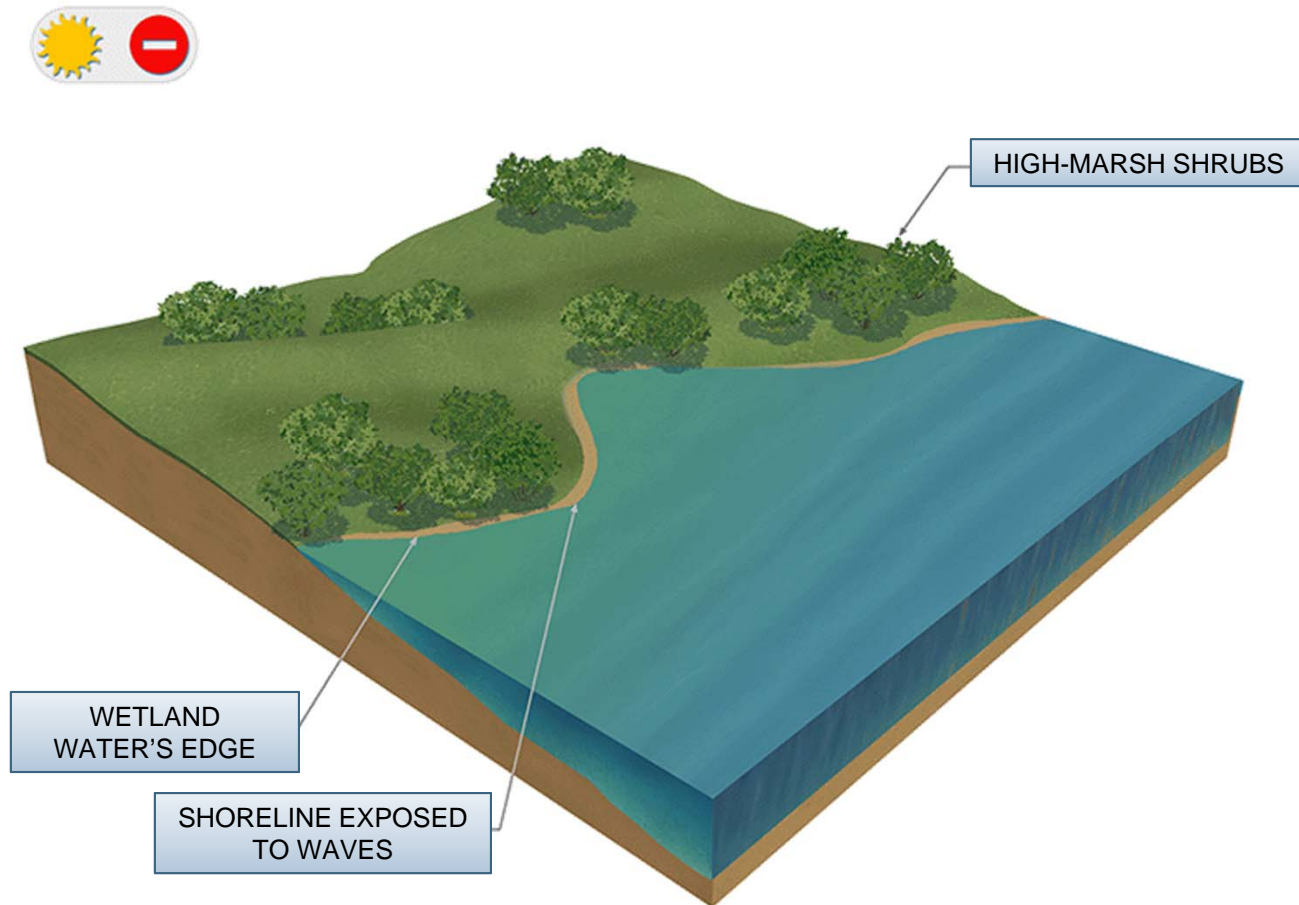


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# MANAGEMENT MEASURES

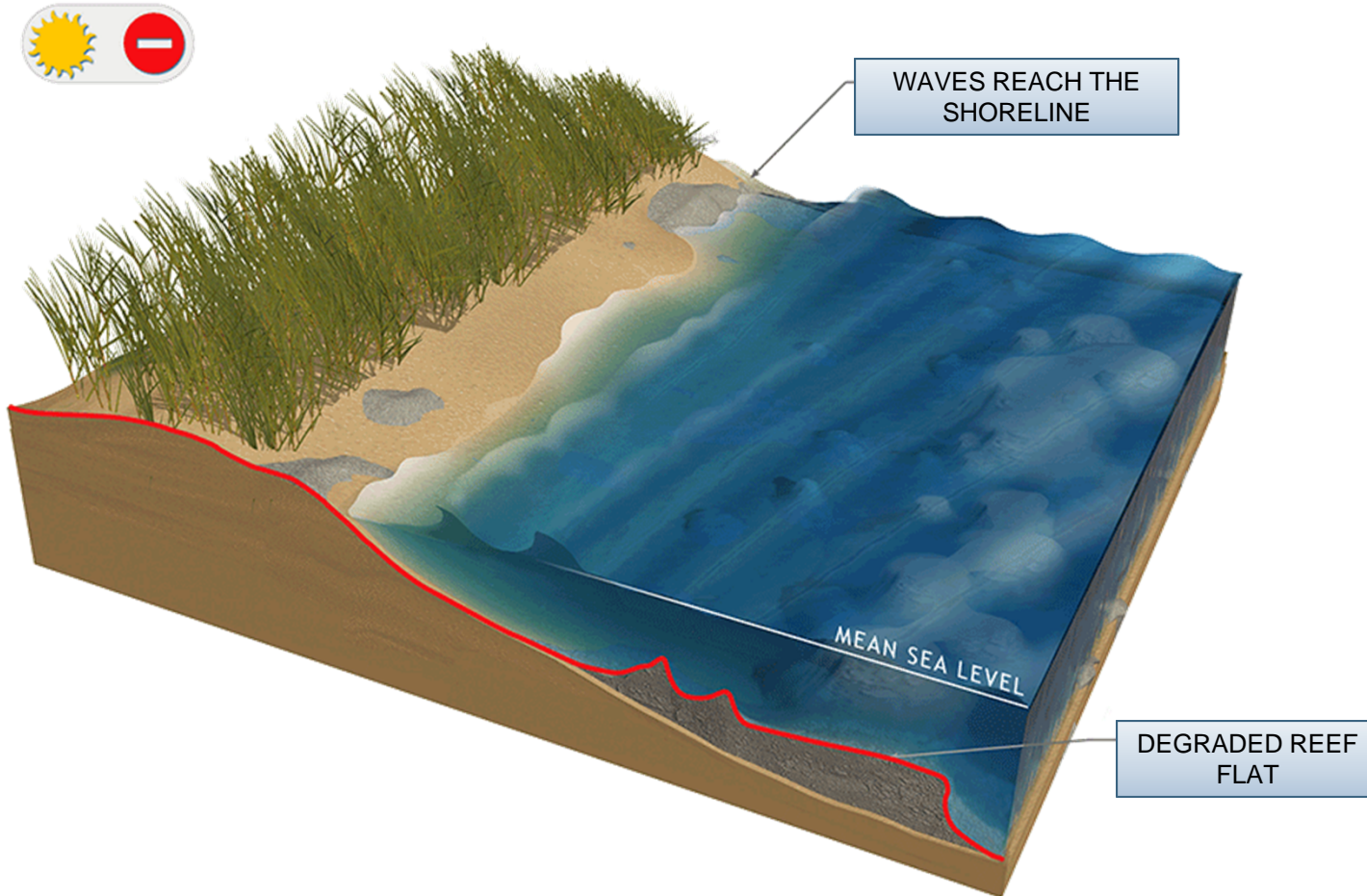
## NATURAL AND NATURE-BASED – LIVING SHORELINES





# MANAGEMENT MEASURES

## NATURAL AND NATURE-BASED – REEFS

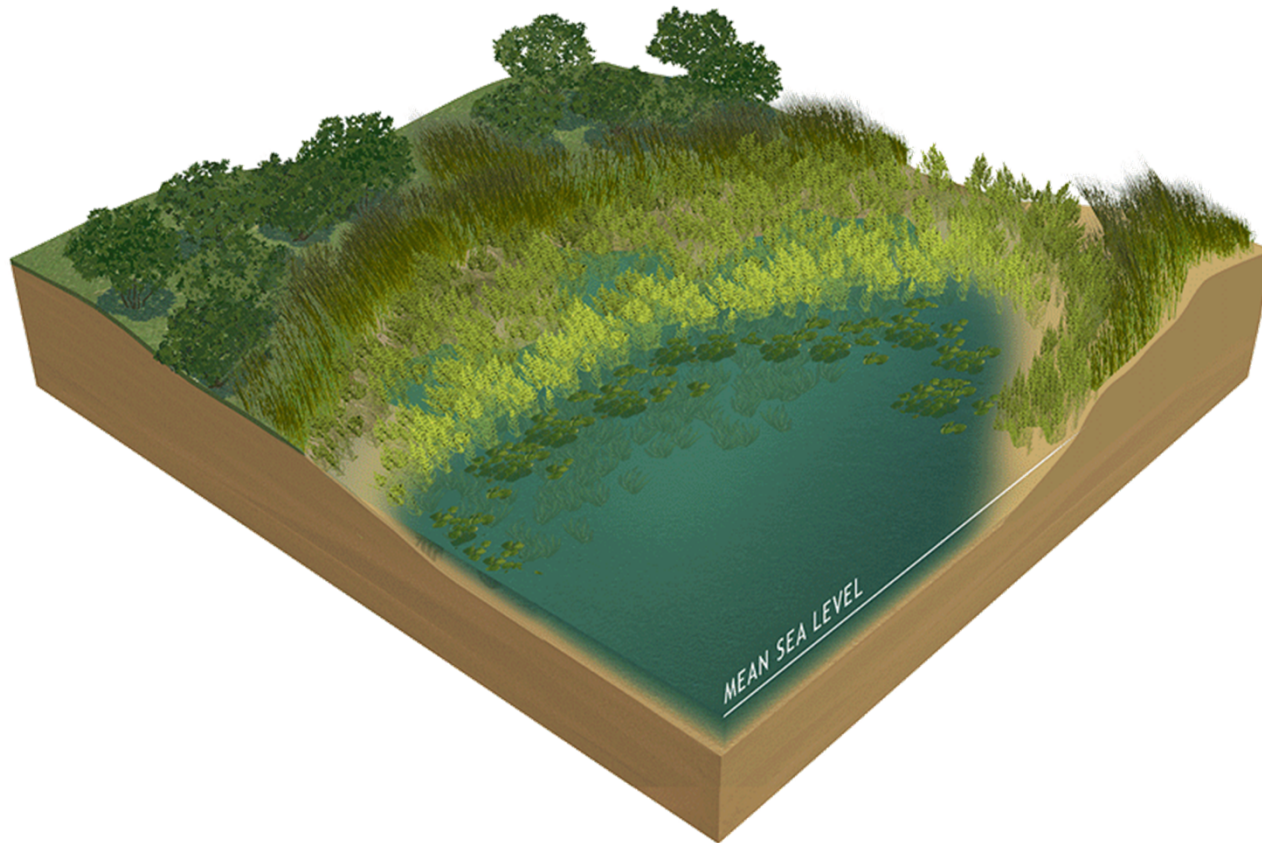


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# MANAGEMENT MEASURES

## NATURAL AND NATURE-BASED – WETLANDS



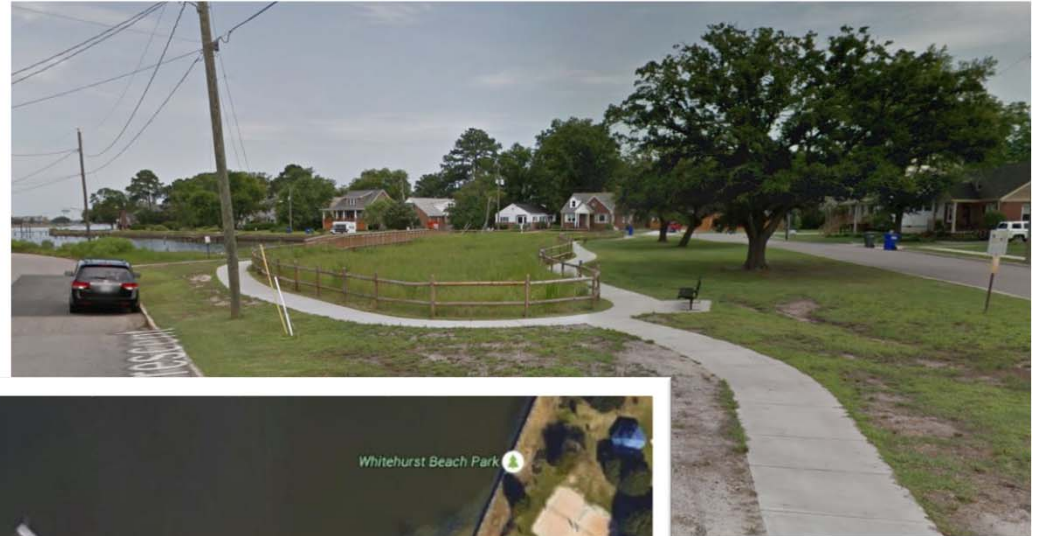
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# MANAGEMENT MEASURES

## NATURAL AND NATURE-BASED – WETLANDS



  
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# BREAKOUT SESSION II

## Topic 3: Management Measures

Get into teams

Brainstorm  
potential  
management  
measures  
individually and as  
a team

Report up to five  
management  
measures for your  
team

Remember to  
include Structural  
and Non-  
Structural  
Measures

## Topic 4: Agency Areas of Interest and Concern

# WHAT'S NEXT?



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# **NYNJHATS COASTAL STORM RISK MANAGEMENT STUDY: PATH FORWARD**

Jan. to Feb. 2017: Agency Workshop

Spring 2017: NGOs and other key stakeholders

Summer 2017: NEPA Scoping Meeting

Winter 2017: Alternatives Milestone (I)

Winter 2018: Alternatives Milestone (II)



# NEXT STEPS

- Gap Analysis of Available Data
- Continue to develop Management Measures (i.e. Building Blocks)
- Use Formulation Strategies to Develop Alternatives
- Develop Screening Criteria and Modeling Strategy



## For questions or comments please contact:

Susan McCormick

Chief, Coastal Erosion Management Program

New York State Department of Environmental Conservation  
(518) 402-8185

Matthew Chlebus

Environmental Engineer, Coastal Erosion Management Program

New York State Department of Environmental Conservation  
(518) 402-8185

Samuel Hersh

Policy Advisor, Office of Recovery and Resiliency

City of New York, Mayor's Office

(212) 676-3966



## For questions or comments please contact:

John Ritchey, P.E.

Bureau Chief, Bureau of Flood Control

New Jersey Department of Environmental Protection

(609) 984-0859

Bryce Wisemiller

Senior Project Manager, Programs & Projects Management

US Army Corps of Engineers

(917) 790-8307

Olivia Cackler, Ph.D.

Lead Planner, Planning Division

US Army Corps of Engineers

(917) 790-8705



## **Appendix B**

### **Attendance Sheets**

**Newark, New Jersey**

**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop**  
**Newark, NJ - 01/18/2017**

Name	Community/Agency	Title	E-Mail	Telephone
John Ritchey	NJDEP	Bureau Chief	john.ritche@dep.nj.gov	609 984 0859
Hobbie Tang-Smith	NJDEP	Executive Assistant	hobbie.tang-smith@dep.nj.gov	609 292 6459
John Moyle	NJDEP	Director	John.Moyle@dep.nj.gov	609 984 0859
Michael Embrich	USACE	Public Affairs	Michael.Embrich@usace.army.mil	
Daria Mazay	USACE	USACE Env Planning	daria.s.mazay@usace.army.mil	917-790-8726
Danielle Tommaso	USACE	Planner	danielle.m.tommaso@usace.army.mil	917-790-8527
Cliff Jones	USACE	Env Planning	clifford.s.jones@usace.army.mil	917-790-8700
Joe Dawson	NJTPA	Planner	JDawson@NJTPA.org	908 461-0800
REBECCA MEJIA	BOSWELL	PROJECT MGR	rmejia@boswellengineering.com	201-641-0770
ANNE STRAUSS-WIEDER	NJTPA	Director, Regent	STRAUSS-WIEDER@NJTPA.org	973-639-8409
Jeff Perlman	NJTPA	Mgt, Envir. Planning/Policy	jperlman@njtpa.org	973-639-8445
Niek Vermaat	NJDEP/Louis Berger	VP Region 2	nvermaat@louisberger.com	917-509-0468
Donna Mahon	HUD	Field Env. Officer - NJ	donna.n.mahon@hud.gov	973-776-7260
Ellen Simon	USACE	Asst. Dist. Counsel	ellen.b.simon@usace.army.mil	917-790-8158
Mike Potesch	USEPA	Engineer/Nepe	potesch.michael@epa.gov	201 637 4147

**New York City, New York**



**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop  
Newark, NJ - 01/18/2017**

Name	Community/Agency	Title	E-Mail	Telephone
Lingard Knutson	U.S. EPA	Env. Scientist	knutson.lingarda@epa.gov	212 637 3747
Olivia Cackler	USACE	planner	olivia.n.cackler@usace.army.mil	917 790 8705
Jason Shea	USACE	Planner	jason.a.shea@usace.army.mil	917-790-8727
Cheryl Rezendes	NJSEA	Prin. Planner	cheryl.rezendes@nymeadowlands.gov	201-460-8386
Fawzia Shapiro	NJSEA	Assistant Chief Engineer	fawzia.shapiro@nymeadowlands.gov	201-460-4678
Paul Trummello	USACE	Chief Civil Works	paul.trummello@usace.army.mil	917-790-8200
Stan Lulewicz	GBA	Senior Engineer	slulewicz@gbn-inc.com	212-421-6283
Dan Loomis	CITY OF ELIZABETH	CITY ENGINEER	DLOOMIS@ELIZABETHNJ.GOV	908-920-4209
STEVEN RINADI	CITY OF ELIZABETH	PRINCIPAL ENGINEER	SRINADI@ELIZABETHNJ.GOV	908-920-4208
Christina Rasmussen	USACE	Hydraulic Engineer	christina.rasmussen@usace.army.mil	917 790 8264
Patti Rafferty	NPS	Chief Resource Stewardship	patricia.rafferty@nps.gov	718 354 4625
Linda Brennan	Monmouth County Planning Division	Supervising Planner	linda.brennan@monmouth.nj.us	732-431-7460 46470
SCOTT DOUGLAS	NJDOT OFFICE OF MARITIME	PROJECT MGR	scott.douglas@dot.nj.gov	609-530-4770
John Dunlea	Neglia Engineering RES. ~ Town of Kearny	Design Engineer	jdunlea@neglia-engineering.com	201-939-8805
Jennifer Fogliano	NJTPA	Planner	jfogliano@njtpa.org	973-639-8403

**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop  
New York City, NY - 01/24/2017**

Name	Community/Agency	Title	E-Mail	Telephone
Nancy Brighton	USACE - NYD	Ch, Watershed Section	Nancy.J.Brighton@usace.army.mil	917-790-8703
Tom Hodson	CENAN-PL-F	C. Plan Formulation Br.	thomas.j.hodson@usace.army.mil	
Frank Schwarz	NJDEP	Project Manager	frank.schwarz@dep.nj.gov	609.777.0452
Ross M. Feltes	NJSEA	Chief Natural Resources Management	ross.feltes@njstatehouse.gov	201-460-4919
Jonathan Shimmell	USCG	Coast Guard Project Mgr	Jonathan.A.Shimmell@uscg.mil	8503411873
Paul Tumminello	USACE	Program Mgr	paul.tumminello@usace.army.mil	917-790-8270
John Dawson	FEMA	REO Representative	john.dawson@fema.dhs.gov	202-286-1627
Josh DeFlorio	PANYNJ	Chief, Resilience	jdeflorio@panynj.gov	212-435-6221
Noreen Doyle	HRPT	Exec. Vire President	n.doyle@hrpt.ny.gov	917-661-8756
Irene Chang-Ciruela	FEMA	Specialty Coordination & Policy Advisor	irene.changciruela@fema.dhs.gov	202.285.4754
Roselle Henn	USACE	Senior Coastal Planner NAD	roselle.e.henn@usace.army.mil	917-952-2298
Joanna Field	NYS DEC	Biologist	joanna.field@dec.ny.gov	718-482-4057
Trevor Johnson	NYC DCP	Planner	tjohnson@planning.nyc.gov	212-720-3445
Stephanie Lamster	EPA-R2	Envi. Scientist	Lamster,Stephanie@epa.gov	212-637-3405
Cliff Jones	USACE	Chief Planning	clifford.s.jones@usace.army.mil	917-790-8700

**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop**  
**New York City, NY - 01/24/2017**

Name	Community/Agency	Title	E-Mail	Telephone
Karen Lynn Baumer	USACE	Planner	karen.l.baumer@usace.army.mil	718 840 8608
ENCEE SHAFER	USACE	Engineer	ENCEE.R.Shaffer@USACE.army.mil	917-790-8360
Sam Hersch	BRR	Policy Advisor	shersch@edgell.nyc.gov	212-676-3866
Marit Larson	NYC Parks	Chief Nat. Reserve	marit.larson@parks.nyc.gov	212 360 1415
Jason Bottcher	Hudson County Planning	GIS Specialist/CEM	j.bottcher@hemp.us	201 217 5137
Bob Nymann	USEPA	Regional Compliance Manager	nyman-robert@epa.gov	212-637-3804
SHANNON ANDREW	USCG	Waterways Div. Chief	Shannon.Landrew@uscg.mil	203 468 4432
Kurie Axt	DEC	Dredge Team	kurie.axt@dec.ny.gov	718 482 4074
Mark Lowery	NYS DEC	Chief Policy Analyst	mark.lowery@dec.ny.gov	518-402-8827
Jennifer Cass	NYCEDC	Vice President/Capital	jcass@edc.nyc	212-312-3865
Sue McCormick	NYS DEC			
Matt Chelbus	NYS DEC			
Al Fuchs	NYS DEC			



**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop**  
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Name	Community/Agency	Title	E-Mail	Telephone
Steve Zahn	NYSDEC	Reg Dir	steve.zahn@dec.ny.gov	785-482-4949
John Ritchey	NJDEP	Bureau Chief	john.ritchey@dep.nj.gov	609 984 0859
Danielle Tommaso	USACE	Planner	danielle.tommaso@usace.army.mil	917-790-8527
Daria Mazy	USACE	Environmental Planner	daria.s.mazy@usace.army.mil	917-790-8726
Tom Burko	GSA	Sustainability/NEPA	thomas.w.burko@gsa.gov	212-264-0800
John McKee	FEMA	Regional Env Office	john.mckee@fema.dhs.gov	202 704 7168 15-50V
Patrick Tushy	FEMA	FPRO	patrick.tushy@fema.dhs.gov	
Mike Ruffini	EPA	NEPA	mike.ruffini@epa.gov	212 637 4147
Andrew Lynn	PA	Director Planning	alynn@panynj.gov	212 435 4487
Peter Wopke	USACE-PL	Chief, Env Anal	peter.m.wopke@usace.army.mil	917 790-8634
SARAH NEIBSON	NYCPARKS	Chief, Long Plan Planning	sarah.neibson@parks.nyc.gov	212 360 3438
DAN BRUNN	MAYOR'S OFFICE	Se Dir Comm	dbrunn@cityhall.nyc.gov	212 788 8834
JAINY BAVISHI	MAYOR'S OFFICE	Director ORR	jbaavishi@cityhall.nyc.gov	212-748-0333
Alan D'Amato	NYC DOT	City Planner	ad@dot.nyc.gov	212 879-6688
Bernie Malone	PANYNJ	Deputy Dir O&EP	bmalone@panynj.gov	212 435-4154

**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop**  
**New York City, NY - 01/24/2017**

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**New Paltz, New York**

**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop**  
**New Paltz, NY - 02/07/2017**

Name	Community/Agency	Title	E-Mail	Telephone
George Long	NYS DOT	Hydraulics Eng	george.long@dot.ny.gov	518-457-9730
Burt Samuelson	Ulster County Planning	Senior Planner	Bsam@co.ulster.ny.us	845-339-24-90
Matt Maraglio	NYS DOS	Coastal Resource Spc	matthew.moraglio@dos.ny.gov	518-473-3371
Brian Packowski	USACE	Civil Engineer	brian.j.packowski@usace.army.mil	732-476-9338
Stephan Pezdek	PANY NJ	Sr Planner Resiliency	spezdak@panynj.gov	212-435-2795
Brian Slack	Ulster County Transportation Council	Principal Transportation Planner	bsla@co.ulster.ny.us	518-334-5590
Gregg Kenney	NYSDEC	Biologist	gress.kenney@dec.ny.gov	845-256-3199
Michael Audin	FEMA	Dep. Reg. Environmental Office	michael.audin@fema.dhs.gov	732-804-9216
Brad Mason	NJT	Director	bmason@njtransit.com	732-973-8088
Fran Dunwell	NYSDEC	Estuary Coordinator	frances.dunwell@dec.ny.gov	845-256-3016
Brad Wenskoski	NYSDEC	Environmental Program Spec.	brad.wenskoski@dec.ny.gov	518-407-8185
Elisabeth Lennon	NYS DOT	Env Coordinator	elisabeth.lennon@dot.ny.gov	518-457-7344
Kelly Morris	Orange County Planning Dept.	Senior Planner	kdmorris@orangecountygov.com	845-615-3840
Susan Maresca	NYSDEC	Habitat Program Manager	susan.maresca@dec.ny.gov	718-482-6461

**New York/ New Jersey Harbor and Tributaries Agency Stakeholder Workshop**  
**New Paltz, NY - 02/07/2017**

Name	Community/Agency	Title	E-Mail	Telephone
Scott Cuppett	Hudson River Estuary Program - DEC	Watershed Manager	scott.cuppett@dec.ny.gov	845-256-3029
Matt Chlebus	NYSDEC	Env Eng	matthew.chelbus@dec.ny.gov	518-402-8134
Arthur D'Angelo Jr.	Town of Cortlandt	Civil Engineer	artied@townofcortlandt.com	914-734-1062
Bill Nechamen	NYSDEC	Chief - Flood Plain Management	william.nechamen@dec.ny.gov	518-402-8146
Kristin Marcell	Hudson River Estuary Program	Climate Resilience Project Coordinator		
Name	Community/Agency	Title	E-Mail	Telephone



## Appendix C

### Notes

**Newark, New Jersey**

# NJ Agency Workshop

One of most important studies were doing  
Nationwide impacts. 1st Port Eastern seaboard  
3rd largest in nation. Priority for economy  
to keep it open.

The most complex study we can embark on  
(LA River next). Ecosystem, SLR, tidal  
influences. Two sponsors unusual. Multi-state  
unusual.

NYC 51st State in some ways ble of all the  
RCS.

More efficient & more effective study process  
through the gates.

<sup>national insurance  
program</sup>  
NFIP

through FEMA Region 2

Abaken project

Meadowlands project

Depreciated replacement value of building  
densely populated areas produce more benefits b/c  
land values still have value after a flood.  
Indexing & GIS approaches will need to  
be used for this study. Restricted to the  
variables where we have GIS data.

Indexing approach allows combination of WED,  
RED, OSE & EQ. Need to generate data on  
social vulnerability

There is some question whether we'll be allowed  
to measure in this way.

OSE  
example

Elderly ppl, ppl w/o cars, difficult to evacuate

Bigger risk there & then potentially  
bigger benefits there.

Tiered NEPA <sup>ok</sup> (EPA) — Lynggard

Cumulative impacts will be important  
even in tier 1. If we put dunes on  
all beaches, what is cumulative effect  
on critters in sand.

What else has to be addressed in tier 1?  
Higher degree of coordination necessary w/  
agencies early on.

Mike P (EPA) will be coordinating EPA  
comments

50 year  
period of  
analysis

Transportation opportunities  
Tie problems to significant resources  
Breakout #2: Pros, Needs, Opps

100 yr  
planning  
horizon

Donna HUD FEMA Reg 2, NYS NJ, Env Reviews  
NJDEP, Coastal Resilience

Fauzia Shapiro NJSEA (Civil Engineer) formerly  
NJ Meadowlands,  
Christina Kasmussen

Cherry Rezendes, NJSEA Planner. Rebuild by  
Design Study  
Dan

City Engineer, City of Elizabeth  
Mike Poetzsch DEPA was w/ Corps  
John Maple - DEP, dam safety. FRM studies

Deep each have own probs  
erosion problem

-Regulatory Flexibility & legislative changes  
Constraints: env. & navigation  
- where can things go

Acceptance & political support constraint  
- multi-jurisdiction / neighborhood.

Obj. Protect vulnerable pops, econ.  
dev, comm risk, work w/ nature

Group 1

Probs - electrical transmission, high  
generator  
sewage treatment facility problems

Warehouses (food, fuel, supplies) on  
higher ground.

Management Measures

Jackolantern effect of home raising spreading

Grass hard structures to keep sand on  
Drainage improvements - like Dutch, they  
live w/ water

long shorelines - oyster reefs near or at  
shoreline, natural breakwater. Not as  
much erosion

Group study

ability to  
reduce  
O&M costs

who in Group  
working on this

update agenda for next wk &  
beginning of ppt to match what is said

paper

(Danielle) Todd Bridges - ERDC - Quantifiable Benefits  
NNBFs. Model Cert not done  
Jamaica Bay restoration packaging as NNBFs  
For Rockaway you need to show CBA  
benefits for NNBFs

Borgue (did 3 case studies and Lake  
Borgue surge barrier)

US quantified ecosystem ben in \$ of NNBFs  
(Alaska)

also key for acceptability for cooperating  
agencies  
also avoids mitigation

Patti Parks Service. Not on board w/  
residual risk / storm surge barrier

Inter agency agreement to MPR them \$ to  
engage w/ us. Dedicated regulator to fast  
track.

Require USFWS folks sit in our office

Q: How can USACE take into account differences in real estate values in different localities... It's like comparing apples & oranges

A: So many comparisons are being made!

It's not often the higher value neighborhoods that have higher benefits.

Benefits are based on with or without project.

Land value is still there in with + without project.

Intensity of development will make a difference.

CALS helps us compare areas of different development

↳ need GIS coverage

Q: 4 P+G accounts

A: Principles & Guidelines divides benefits into 4 accounts

① NED dollar denominated

② EQ } non-dollar denominated

③ OSE

④  $\frac{2}{3}$  RED? \$ denominated

Indexing allows us to combine

Need data on social vulnerability

Q: Example of a social factor?

A: Example of community: Mammaronex  
↳ elderly, no cars,

Q: EIS report w/in process

A: we are incorporating w/ the report for approval

This is a large-scale study. ~~How should~~

They want feedback on the best way to incorporate an EIS given the size & scale of this study

could we incorporate supplemental EIS when we get into design phase, cause we could get stuck in EIS phase forever for something this big.

What answers do we need up front?



You could tier the EIS, but you have to make assumptions going into it that are cumulative

USACE wants help identifying what is needed in the Tier 1 report and provide solutions

Q: USACE process is almost identical to the NEPA process  
Caple!



**New York City, New York**

Jan 12<sup>th</sup>

## Partner Meeting / NYNJHATs

Matt Chelbis & Sue McCormick AL  
Joana Field  
John Kitchie  
John Mayle  
Kirstin Marcell - DEC, Region 3  
Matt Maraglio  
Matt Regio (?) env State  
Patti  
Sam Heish NYC  
Al Fuchs  
Steve Zahn

Newtown Creek, Gowanus & Coney Island they have info & don't want to sit on hands while we evaluate other areas

Wants SACETTO buy in on PMP approach

When is first charrette?

Make sure ppl realize consequences/risk of making these decisions now.

NFS engagement w/ Fed electeds also help  
LOBBY

● Tunnels, bridges, airports, ports (Andy, Port Auth)  
Opp to look comprehensively protect facilities "retail approach", then gaps inevitable for truly regional

DEP, compr. CSRM & stormwater, sea level rise / modeling / LDP - what can you fund across municipalities  
SLR + storm surge (dwants SLR in terms ft. elevation)  
different solutions for the diff problems.

Paul T: opp to reduce flood risk & improve env & economy of region, waterfront areas  
opp to dev & have those go hand in hand to improve living env & economy for ppl.

● Queen infrastr. (shoreline restoration, living shorelines, parks, shoreline accessibility)  
ex. Jamaica Bay & NJ projects.  
Add transportation to hard structures  
Leveraging funds w/ partners  
Articulating constraints

NYC DOT (Alan) have assets at risk, streets & highways. What about protecting the CSRM infrastruct. continuous chain of public infrastr. along waterfront  
Class of use (ferries) can't retreat from water - in interplay w/ water how do they protect selves. Ferry Terminal

Sen Opp Homeowners w/ flood insurance  
Lanaz Cost of this could make whole communities  
affordable. Opp to mitigate this by decreasing flood insurance rates,

were Chang-Cumund Interventions post-Sandy  
FEMA Region II

NYC Parks Sarah Nelson

owe public amenities. Don't sacrifice  
parkland for CSRM. Quality design, keeping  
beautiful  
Opp. dual purpose infr.

Accessibility / rsc for parks, ppl, business  
Parkland and roadways  
through arterials are along waterfront, how to  
protect those

Coast Guard  
not flooded. buildings open, AC/heat work,  
Integral part of response. Function is main objective  
open says Coast Guard  
Goal: fort still be

EPA  
Mike  
Opp: data sharing on lessons learned Coast  
Guard where \$ spent

Constraint: time

\* Add to agency stakeholder list: Rabi Keber, EPA  
Coordinator / Lead Sandy. → ask Mike for contact info

\* Rebuild by Design (read up on)

LIDAR data exists  
NYSERDA modeling

Sue McCormick: What are folks' thoughts on  
barrier. Malcolm Bowman SUNY Prof  
white papers

Frogs neck plus huge barrier (DOT)  
no residual risk to low income

This is appropriate time/place/agency to look at  
storm surge. Don't heed smaller barrier (Rockaway)  
if do large. Can still do green infr. smaller stuff w/

owe public amenities. Don't sacrifice parkland for CSRM. Quality design, keep it beautiful

pp. dual purpose infr.

Accessibility / rsc for parks, ppl, business parkland and roadways  
rough arterials are along waterfront, how to protect those

Coast Guard buildings open, AC/heat work, if flooded. Function is main objective  
integral part of response, goal: fort still be open says Coast Guard

pp: data sharing on lessons learned Coast Guard where \$ spent

constraint: time

Add to agency stakeholder list: Rabi Keber, EPA coordinator / Lead Sandy → ask Mike for contact info

Rebuild by Design (read up on)

IDAR data exists  
NY SERPA modeling

McCormick: What are folks thoughts on barrier. Malcolm Bowman SUNY Prof  
White Paper

rogs neck plus huge barrier (DOT)

low residual risk to low income

this is appropriate time/place/agency to look at storm surge. Don't heed smaller barrier (Rockaway) if do large. Can still do green infr. smaller stuff w/

large barrier Sandy Hook & Breezy Pts long issues It would limit what we would do if the big barrier done.

How much would it limit local projects? The barrier decades time frame. Scale of local projects Δ. Do more modest projects. Do you end up w/ redundant projects? Double spending money. 6 years from finishing this study.

Coast G demolished bldgs & moved to higher locations. Not accessible to public \$74M permeable surfaces considered but they're expensive NJ likes living shorelines → lots of contaminated property How to limit CSO discharges. Identify management measures to that.

Measures that meet multiple purposes considers dev, & future conditions. Residential & other communities. Wall has to provide amenities & have other built in infrastructure

- drainage

law - transportation  
wet/dry floodproofing → law Δs

if homeowner floodproofing doesn't reduce flood ins. rates. Law Δ There needed. Working group for that on non-struct.

Sen Lanza supports <sup>optional</sup> bayside Oakwood Beach multi-faceted analysis → flood risk not just financial. Risk to home hasn't really b'd but the financial impact Δ'd

Premium communicates the risk to ppl who are in floodplain

We can ~~do we~~ work w/ non-fed sponsor  
acquisition, floodproofing & raising houses,  
Buyouts.

Project Uplift out of NY Rising (on Staten  
Island & \_\_\_\_\_). Alex Zablocki

Drainage under walls  
Where will interior drainage systems <sup>get</sup> located

Parks big proponents of natural measures

FEMA has dev modeling on economic benefits  
of green infra.

FEMA BCA Formula. Hazard Mit.  
Mike Moriarty & Public Assistant

Viewscapes for Seawalls  
Regulatory Δ to authorize other purposes / recreation  
Areas of Interest & Concern  
Regional Plan Association - released report  
on SLR  
NYNJ Harbor Estuary

Email update would be great (FEMA, Sen  
Leahy) - what's happening.  
Notify folks  
CG Waterways Management

Roadways / dual role / waterfront parks  
resiliency of those itself, Become area of  
intervention

Evacuation routes must be considered

Port Authority jurisdiction to enable folks to move across Hudson R; move freight in and out. Critical that these facilities can continue to operate. Lifeblood for economy. Everytime to exercise system you shut down something. If you close more frequently 1-2x per year or once every 2 years. Are you shutting down FDR Drive. How to capture that cost? How to look at passive measures.

Value to Bringing everyone together in one meeting.

Hospitals - access to them & other critical facilities

Dep of Energy

\* FTA, FHWA also big players check they're on list.

Languages / how to approach HUD Grantees are best resource, public engagement piece. HUDCA comm affairs Public Outreach Plan. Important Guideline Irene & Tim McEvoy suggested this as good rec

Citizen participation early critical Each HUD grantee has public website on how they're spending their \$ Does ORR have master list they can amend

**New Paltz, New York**

**New York-New Jersey Harbor & Tributaries  
7 February 2017 Stakeholder Workshop  
New Paltz, New York**

**Problems**

- Storm surge and flooding impacts to railroad infrastructure along the Hudson River
- Risk communication
- Degraded water quality – low dissolved oxygen in the summer
- Relative sea level change
- Environmental degradation – specifically, sedimentation of SAV beds after Hurricane Irene
- The “perpetual cycle” of protecting homes and infrastructure
- Simultaneous impacts of coastal storm flooding and fluvial flooding during hurricanes and nor’easters
- Contamination (brownfields, Superfund sites, etc.)
- Impacts to transportation infrastructure located in the floodplain – roads, airports, etc.
- Riverine flooding – coastal storms not so much a problem in the Hudson Valley
- “Hidden time span” problem with encouraging wise use and development of the floodplain

**Opportunities**

- Collaborative planning
- Risk analysis planning
- Encourage municipalities to consider better ways to construct municipal projects
- Risk communication with local municipalities
- Land use planning – communicate with the public, work with local governments to change land use plans
- Consider the use of infrastructure when recommending projects
- Improve water quality
- Consider the costs and benefits of a project to transportation infrastructure
- Dam removal as a resilience strategy
- Consider important Hudson River resources – fish, whales, T&E sturgeon, recreational facilities
- Consider building a project that considers CSRM, FRM, and ER missions
- Consider strategies from the private sector – relocating resources/facilities to higher elevations; make parts of electrical infrastructure mobile
- Consider technology and technological advances – minimally-staffed vehicles, driverless cars, automation, early warning systems via text messages
- Consider the use of natural and nature-based features
- Improve habitat
- Balance the building to future conditions with utility to present conditions
- Watershed planning – don’t induce development, protect open space, consider sediment movement
- Consider the impacts of relative sea level change
- Consider the staged remediation of contaminated areas
- Consider the economic/commercial impact of barriers



- Consider strategic retreat opportunities
- Increase open space/storage
- Consider moving transportation infrastructure (airports) that are in floodplains
- Consider the relationship between seasonal dissolved oxygen levels and hurricane seasons (example: water quality is typically degraded in September and October, which is prime hurricane season)
- Consider the cost of dredging (trapped sediments) needed due to a barrier

### **Objectives**

- Refine relative sea level change scenario planning and confidence – agree on an assumption
- Consider ways to protect people while encouraging retreat in the long term
- Invest in dual-purpose opportunities
- Consider areas with repetitive losses and dense development
- Consider ways to protect water-dependent infrastructure such as ports
- Consider alternatives to hard structures such as walls that can trap water or change hydraulic flow
- Consider a combined CSRM/FRM project

### **Constraints**

- Funding
- Age of infrastructure such as dams
- Time needed to plan and construct
- Contamination (brownfields, Superfund sites, etc.)
- Avoid impacts to transportation infrastructure

### **Agency Work, Existing Information & Data Gaps**

- Hudson River Estuary Program – vulnerability assessments and plans; watershed boundary data set; study of hydraulic constructions; watershed flooding assessments; wastewater treatment; plant/flood damage study; opportunities for water quality improvements; aging dam infrastructure
- City of Kingston, NY – vulnerability assessments and plans; resiliency work
- FEMA Mitigation Group
- Rutgers University Center for Resilient Landscapes
- New Jersey Institute of Technology Engineering Division – Hoboken work
- FEMA repetitive loss data – tracks insured loss, about 30 – 40% of structures in the floodplain around the Hudson River tributaries
- NYSDEC – GIS exercise w/FEMA data of repetitive insured losses
- FEMA Public Assistance projects
- FHWA - post-Hurricane Sandy study (est. completion March 2017); maps; vulnerability assessments
- NYSDOT – internal assessment of vulnerabilities to flooding
- University of Rhode Island – storm surge visualization tool
- PANYNJ master planning

- New Jersey Transit - new river monitor
- New York Rising community recovery plans
- Columbia University – storm surge and riverine flooding study/model; confluence of coastal flooding and rainfall (joint effort with Stevens Institute of Technology)
- Stevens Institute of Technology – storm surge and riverine flooding study/model; “96 hour” pre-disaster 3D forecast models
- Hoboken and Kearny, NJ plans for the Meadows maintenance facility
- Supplemental for FTA – information from Sandy
- New Jersey Transit – Hoboken terminal
- Ulster County Office of Environment
- NYCDEP water supply work in Ulster County
- The Nature Conservancy – climate adaptation data/plans
- University of Rhode Island – storm surge visualization tool for South Providence (houses in the path of storm surge)
- Scenic Hudson report on relative sea level change; Beacon, NY work
- New York State Energy Research and Development Authority – Dewberry contract for LiDAR data up the Hudson River (CSRM/RSLC)
- Water infrastructure at Port of Albany and Port of Rensselaer

#### **Management Measures**

- Consider local and homeowner preferences
- Live with the water
- Acceptance of risk
- Land use planning
- Look at successful strategies from other cities
- Risk communication

#### **Areas of Interest**

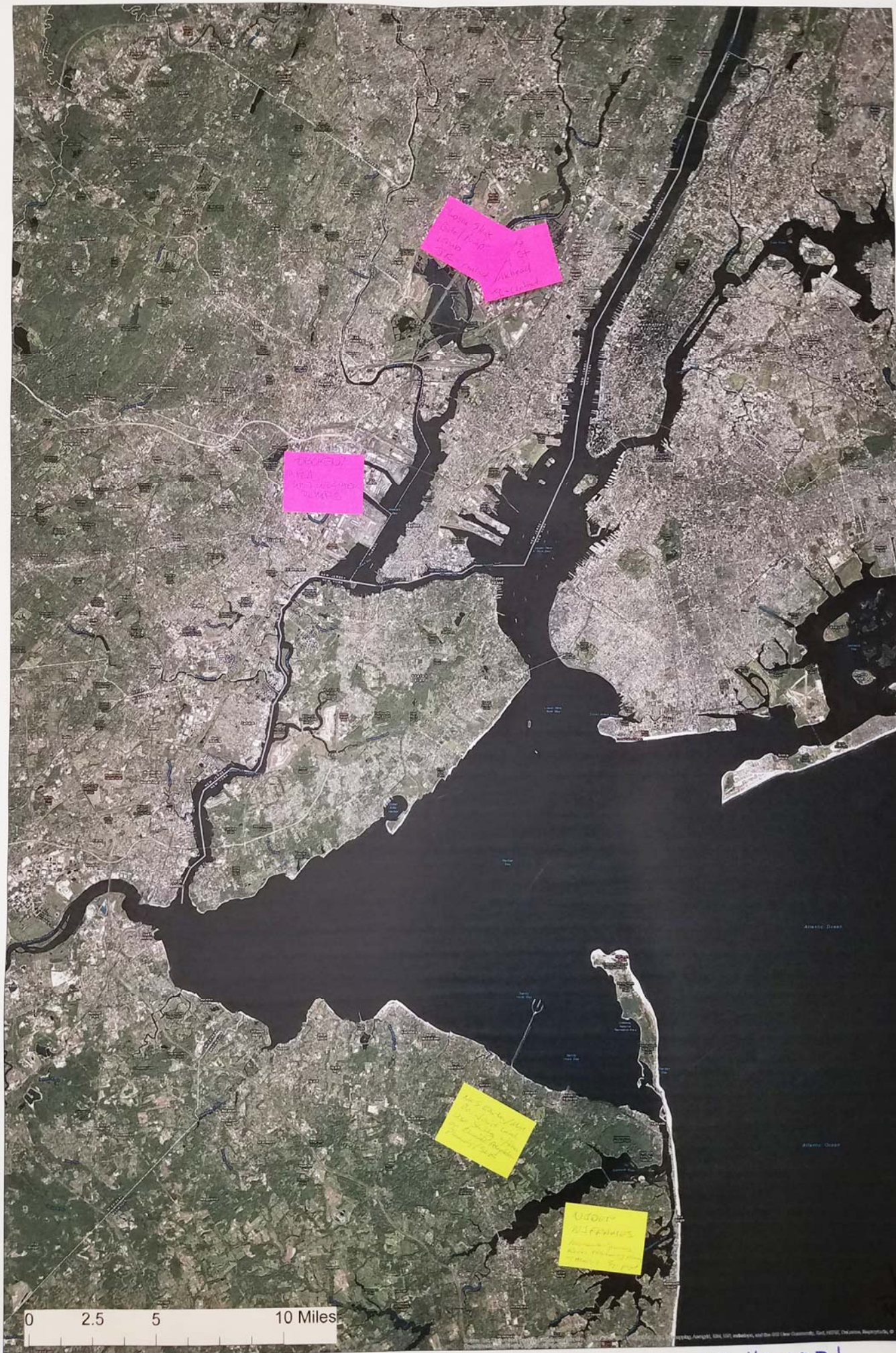
- Coordination with the Hudson River Habitat Restoration team
- Synergy and overlap of CSRM and ER measures
- Consider tradeoffs – ask communities for preferences
- Impacts to fish due to construction of large in-water structures
- Communicate that floodwalls are “there to protect the properties, not the people”
- Participation in technical advisory committees
- Don’t impede marsh migration
- Maintaining port accessibility with a barrier
- Interior drainage
- Learning to live with water
- Accepting risk
- Risk communication
- Engage the strong environmental community along the Hudson River

## **Appendix D**

### **Group Discussions**

**Newark, New Jersey**





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NS 1/18 GROUP 1



# GROUP 1

1/18 NS

- OLIVIA CACKLER
- GINGER CROOM
- JOHN RITCHEY
- DAVE DAWSON
- REBECCA MEJIA
- ANNE STRAUSS
- PATTI RAFFERTY
- LINDA BRENNEN
- MICHAEL EMBRICH
- JASON SHEA
- JOHN DUNLEA



# TOPIC # 1: PROBLEMS, NEEDS, + OPPORTUNITIES

Problems:

- Electrical Transmission - High Generator Usage
- Fuel Delivery / Shortages
- Widespread effects
- Food Deliveries
- Significant Economic Effects
- Sewage Treatment Facilities (Coastal Monmouth Co.)
- Traffic Control due to Outages PVSC
- Lack of Knowledge of EAPs Middletown Sewage Authority
- Flooding of Critical Infrastructure (Bayonne) South Monmouth Sewage Auth.
- Substation Belford

Needs:

Event Forecasting - Continued Improvements

Opportunities:

Emergency Food Storage / Food Bank

Warehouses at higher ground

EAPs - Public Education on Existing Plans

Potential Projects embedded in all Hazard mitigation Plans

Would like to see NIBF as part of any project

NS 1/18/17

Group #1



Problems: • Hoboken - inundation areas

CSOs - Kearney

current overflow mitigation problem  
sanitation problems w/ flooding

- Critical Infrastructure (Hoboken)  
Trains  
Sewer system

- Hoboken - low lying residential areas

Loss of work & school

Regional Transportation Issues



# Topic # 2

## Constraints, Considerations and Objectives

Constraints: NPS - ~~potential surge barrier~~ potential surge barrier would span 2 pieces of NPS land  
(as related to a potential barrier)

navigation constraints w/ any type of barrier

major consideration: all other projects w/in the region that are already being constructed heavy investment already  
- how to account for "cumulative" impact of all other projects

Both existing condition & w/o project condition are so vital to calculating benefits

Ecological impacts → ~~potential~~ consideration

Question on study focus - CSRM

Objectives: Reduce Flood Damage, Erosion  
Increase Community Resilience  
NNBFs  
Nonstructural Alternatives

NS 1/18/17  
Group #3



# TOPIC #3 Agency Work & Existing Info

- How are all non-structural projects being captured
- USACE to be reaching back out to NJDEP local contacts for updates as the study progresses
- Review all county Haz. Mitigation plans for projects / potential projects
- List of projects (from map)
  - Seacaucus
  - Hoboken
  - Little Ferry - gates, etc.
  - NJDEP / FRAMES - Navesink R. area, <sup>also Climate</sup> Adaptation Plan
  - John R. to provide list
  - NWS Earle - joint land use study  
Climate Adaptation Planning  
Jan 2018 Completion

NJ 1/18/17  
Group #1 #4



## TOPIC #4 MANAGEMENT MEASURES

- Shrewsbury/Navesink River - potential barriers
- Seabright - NS
- Highland - floodwall
- Atlantic Highland
- Port Monmouth - under construction
- Union Beach - study nearly completion, levee, floodwalls, gates
- Smaller surge barriers in isolated areas
  - from previous studies
- Hoboken - not covered by any other Corps study
- Consider raising highways to also act as a barrier as well as avoiding inundation
- Will consider full suite of mgmt measures as described in presentation

NS 1/18/17  
Group #1 (5)



## TOPIC #5 Areas of Interest

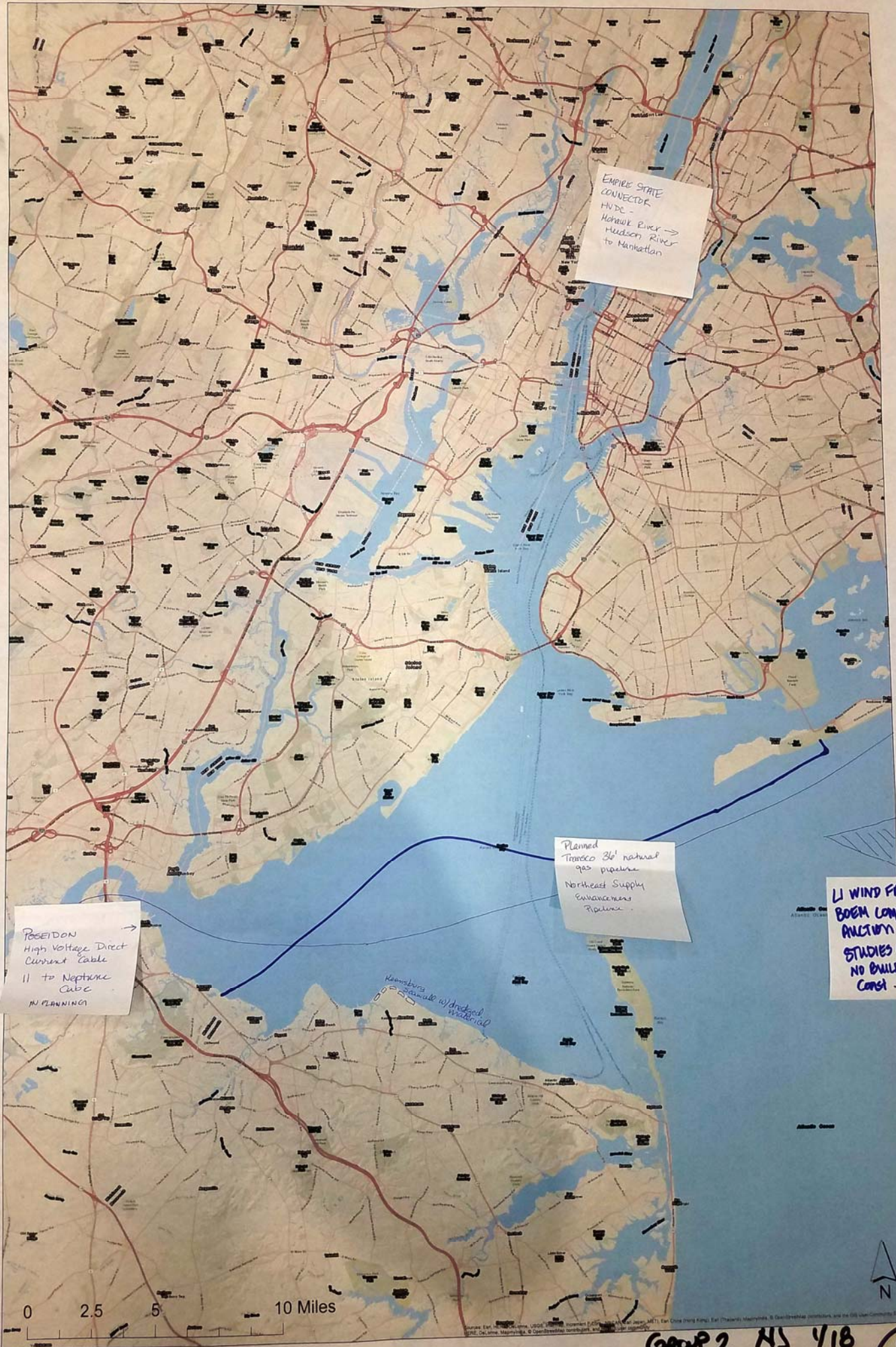
- Get feedback from FEMA/USCG - attending 1/24/17 mtg
- more feedback from communities via e-questionnaire

NJ 1/16/17  
Group #1 (6)









EMPIRE STATE  
CONNECTOR  
HVDC -  
Mohawk River -  
Hudson River  
to Manhattan

Planned  
Transco 36" natural  
gas pipeline  
Northeast Supply  
Enhancements  
Pipeline

LI WIND FARM  
BOEM COMPLETED  
AUCTION  
STUDIES ONLY  
NO BUILD UNTIL  
CONST. PLAN

POSEIDON  
High Voltage Direct  
Current Cable  
11 to Neptune  
Cable  
IN PLANNING

Kew-Forest  
Walden  
material



# GROUP 2

ND 1/10

- DANIELLE TOMMASO
- LAUREN KLONSKY
- ABBIE TANG
- JEFF PERLMAN (JENNIFER FOGUANO)
- NIEK VERAART
- LINGARD KNUTSON
- STEVEN RINALDI
- SCOTT DOUGLAS
- PAUL TUMMINELLO (STEVE COUCH)



# TOPIC # 1: PROBLEMS, NEEDS, + OPPORTUNITIES

- Problem: coastal flooding generally
  - OPPORTUNITIES: reduce coastal storm risk  
improve economy  
improve environment / habitat  
(example: restore marshes)  
example: infrastructure improvements  
such as sewers  
reuse of dredged material  
Recreation  
move areas behind wetland buffers + make recreation opportunities  
housing transit
- PROBLEM AREAS: (ENVIRONMENTAL)
- Jamaica Bay
  - Hackensac
  - Hudson

GROUP 2  
NS 1/18

## Coastal Erosion in Arthur Kill

tidal wetlands cannot move landward + get fragmented  
↳ translate losses into economic impacts

~~NEED~~ NEED?: Regulatory Flexibility  
NEED/OPPORTUNITY: Legislation Δ

NS 1/18



# TOPIC #1

## OPPORTUNITIES:

GROUP 2  
NS 1/18

couple economic drivers (ex: power or transportation) w/ barriers

PROBLEM: lack of sediment into our bays

OPPORTUNITY: think about hard vs. soft solutions  
~~cost~~

NEEDS: Regional / system solutions, not just @ the shoreline

OPPORTUNITY: Link nuisance flooding to long-term flood risks for improved communication w/ associated probabilities

NEEDS: Public outreach + engagement

OPPORTUNITY: Clean up contaminated sediment & improve water quality

OPPORTUNITY: Improve existing transportation with solution [also increases partnerships] + power / utilities

OPPORTUNITY: Coordinate / leverage resources across agencies

OPPORTUNITY: leverage existing studies

OPPORTUNITY: couple w/ economic development proj.

NS 1/18

(2)



# TOPIC #2: CONSTRAINTS, CONSIDERATIONS, & OBJECTIVES

Group 2

## CONSTRAINTS & CONSIDERATIONS

Environmental & navigation (ex: storm surge)  
contaminated sediment  
barriers

Water quality concerns

Transportation infrastructure & utility infrastructure

Funding

loss of regional planning

Political Support

Neighborhood Acceptance

Multi-jurisdiction participation / acceptance

↳ each w/ individual planning / solutions

Time → if we don't act now, solutions may be forced  
by need

Uncertainty

Regulations

## ~~CONSIDERATIONS~~ OBJ:

- Protect ~~vulnerable~~ vulnerable populations
- economic development
- communicate risk
- work w/nature



## TOPIC #1 SUMMARY

PROBLEMS: Coastal Flooding (generally) + erosion  
resources for habitat,  
Specific Areas: BAYS: Environmental Problems

### NEEDS & OPPORTUNITIES:

- Reduce coastal storm risk
- Improve economy + couple w/economic develop. proj.
- • Communication of risks / Public outreach + engagement
- Cross-agency coordination + leverage existing studies
- Couple projects w/environmental improvement opportunities
- Couple projects with recreation / housing / transit opportunities
- • Cross agency collaboration / pool resources + funding
- Regulatory Flexibility + Legislation Δ

## TOPIC #2 SUMMARY

### CONSTRAINTS & CONSIDERATION

- Environmental & Navigation
- Funding
- Acceptance (multi-jurisdiction/neighborhood) & Political Support
- Time
- Uncertainty
- Existing Infrastructure

### OBJECTIVES:

- Protect vulnerable populations
- Economic Development
- Communicate Risk
- Work w/ Nature



# GROUP 2 TOPIC #3: AGENCY WORK & EXISTING INFORMATION 1/18 NJ

- Comprehensive Restoration Plan
- CARP - Contaminant Assessment Reduction Projects
- RSMP - Regional Sediment Management Plan
- Transportation Infrastructure

STIP - State transportation Improvement Plan

- Goods Movement Plan - Port Authority - Regional  
(Check w/Steve Brown @ Port Authority)

- ~~NOAA~~ NOAA

- NJ FRAMES?

- Fish & wildlife

- USACE & DEP Raritan Bay

- NJ Transit

- rebuild by design

GIS COLLECTION FROM AGENCIES

- Port Authority  
Emergency  
Response /  
Resiliency  
Plan

GAPS:

- sand sources [BOEM?]

AGENCIES:

critical infrastructure

- Homeland Security (NJ + NY)

- Fish & wildlife

- FEMA

- NJ Transit

- NOAA

- NJ DEP

- Dam Safety



## GROUP 2 TOPIC # 4 : MANAGEMENT MEASURES

N<sup>3</sup>  
1/18

- oyster reef breakwater
- upland walls
- filling in some areas
- CDFS / Dredged Material reuse
- island building
- moving homes
- upland & up tributary solutions
- elevating
- levees



## GROUP 2 TOPIC 5: Areas of Interest or concern

- PORT INFRASTRUCTURE (Plan for critical pieces exists)
- AIRPORTS
- BRIDGES
- POWER INFRASTRUCTURE
- FUEL
- Sensitive environmental areas
  - ↳ Meadowlands/Jamaica Bay
  - ↳ Future w/o action to define value
- Dams (Passaic River)

consider Flows + Networks of short-term + long-term  
critical locations  
SYSTEMS

disaster  
response  
↓

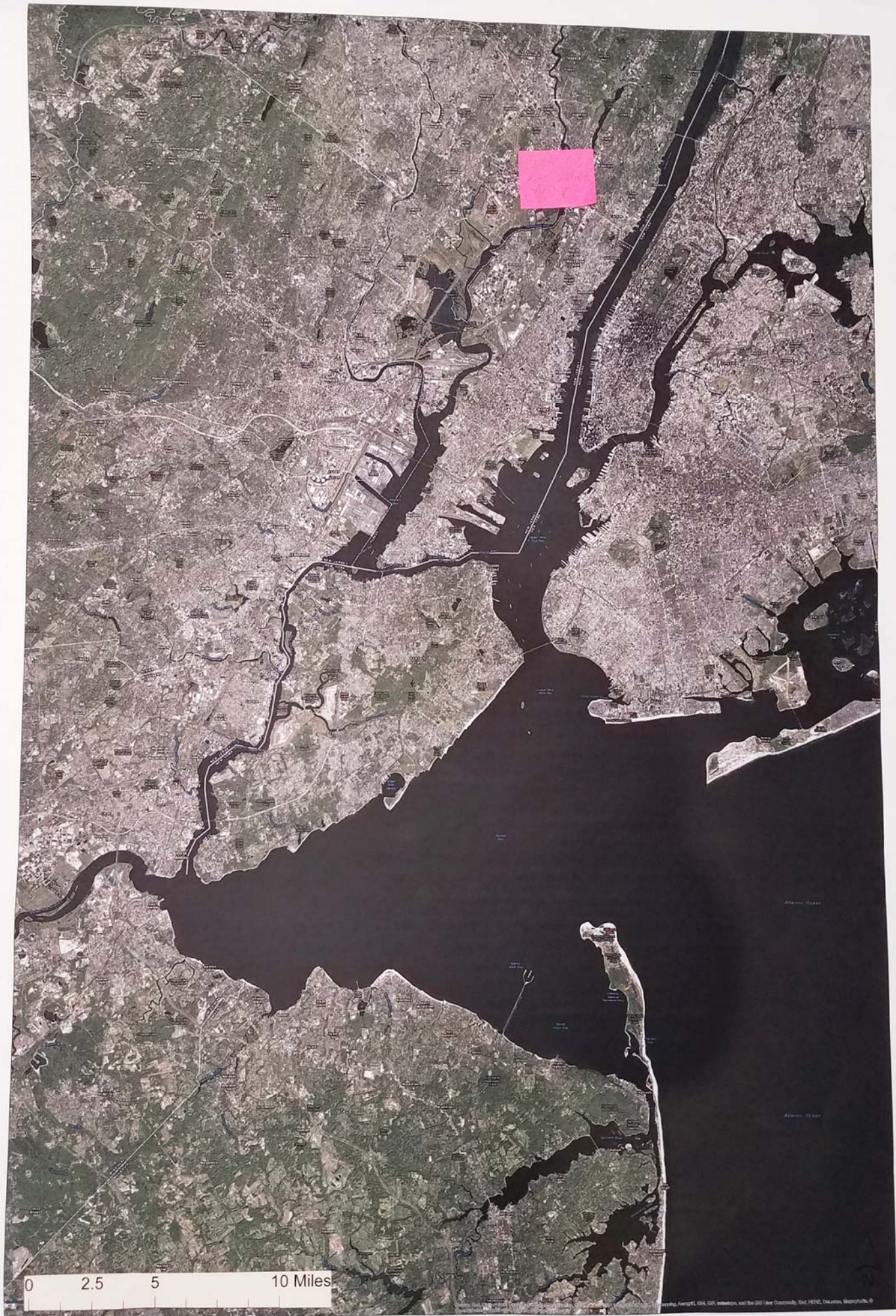
economic  
erosion  
↑

Regional Solutions compared to local solutions  
(consider timing)

NJ 1/18

⑦





NS 1/18 Group 3

10



# GROUP 3

NJ 1/18

- DARIA MAZEY
- STAN LULEWICZ
- JOHN MOYLE
- DONNA MAHON
- MIKE POETZSCH
- CHERYL REZENDES
- FAWZIA SHAPIRO
- DAN LOOMIS
- ELLEN SIMON
- CHRISTINA RASUSSEN
- BRYCE WISEMILLER



# TOPIC #1: PROBLEMS, NEEDS, + OPPORTUNITIES

NS 1/18

Group 3

Opportunity:  
Resiliency

- More comprehensive
- Hard to know in real time what is actually being done to inform WOPC and specific projects are being implemented.
- Opportunity to integrate into our project at various stages & capture variability
- City Elizabeth - biggest problem - flooding from surge
- \$10.5M damages, marine farm, industrial, recreational waterfront, damage to multi-million \$ cheese factory. 14 ft. surge
- Corps FRM project (levee, floodwall) vulnerable to increased overtopping w/ SLR
- OPP to update & modify



Problem w/ expediency for repairs & improvements NJ  
11/18  
Group 3

Levees unacceptable prior to storm so  
no rehab \$ available

Opp to ID permitting issues & way  
to expedite process

Opp to revisit existing flood control  
projects for adequacy

Prob - ~~new~~ reports on levee inspections  
come 3~4 years after inspections. Still don't  
have 2014, 2015, 2016 reports

Opp - more timely feed back from Corps to  
improve O&M locally



# Constraints, Considerations, & Objectives

- Bureaucracy, permitting reqs cumbersome & slows down process.
- Objective - streamline permitting & coordination process.
- Legacy berms overtopped during Sandy Rebuild by Design (raising berms if enough)
- Constraint - money locally for projects.  
Obj. identify local projects, no sufficient funding
- Infrastructure improvements needing consideration that don't have funding. Rely on FEMA funding.
- Things aren't maintained yet we build new ones when existing ones not maintained
- Prob clearing ditches. Who has jurisdiction?



Prob

- Hard to know who has responsibility for what maintenance.

Opp: <sup>clearly</sup> establish maintenance responsibilities and identify potential continuous funding streams for infrastructure maintenance.

- Env constraints. Opp to coordinate early on, as projects designed to create green infrastr. & have impr.

- Constraint: contamination, you need others to cleanup before you can move forward. Not enough \$ for cleanup

- Opp to bring together various actions underway as part of a watershed systems approach

N2 1/18  
Group 3



Consideration - how our proposed alternatives connect to ongoing Corps & local dredging, as well as future dredging.

Get EPA dredging team & other RSC agencies onboard early.

Cooperating agencies - knowing upfront what RSC agencies consider to be constraints, get ideas on mitigation up front.

Scoping into

Dpp - sustainability

NS  
GROUP 3 1/18

5



GROUP 3

NS 1/18

### TOPIC # 3: AGENCY WORK & EXISTING INFORMATION

<sup>existing</sup> Information, reports, data ~~gaps~~, Inter-agency coordination

FEMA data → GIS databases

Countries updated OEM Emergency Plans → ID'd future projects (not always funded)

State Police NJ - County Mitigation Plans

Elizabeth only municipality in County w/ own Mitigation Plan.

NJDEP Coastal Resiliency Plan (NOAA grant)  
low info on participating communities  
proposed resiliency efforts. Good source info.

Elizabeth Sewage Treatment Plant, if FEMA grant, take ownership of Corps pump station.  
Hasn't been able to get answer. Talking to Ops.

Topography, GIS data, wildlife & airport  
Port Auth upgrading terminals at Port Auth



EPA env. data

coastal resiliency grant has living shoreline component.

Passaic River Remediation

## Management Measures

Not enough \$ for elevations (non-struct)  
unmet need. FEMA data on where elevation/  
buyouts appropriate.

Need for Contractors

Identify Lessons Learned from Sandy for  
next time (non-struct) → Ask FEMA

Constraints: public reaction to proposals

How to avoid houses catching fire after storm

Concerns about efficacy of NIBFs in  
urban area



# Areas of Interest & Concern

- ① Agency interests & concerns
- ② How would you like to be involved?
- ③ How to best engage you?
- ④ Which NGOs engaged in your work?

River Keeper (Hackensack)

Harbor ops orgs (maritime), boating associations

Coastal Resiliency Grant has NGOs / academia  
Donna will send contact info.

And diff regulatory reqs & FEMA has others  
If we could incl. those then others can use report  
Donna also send list of regulatory reqs.

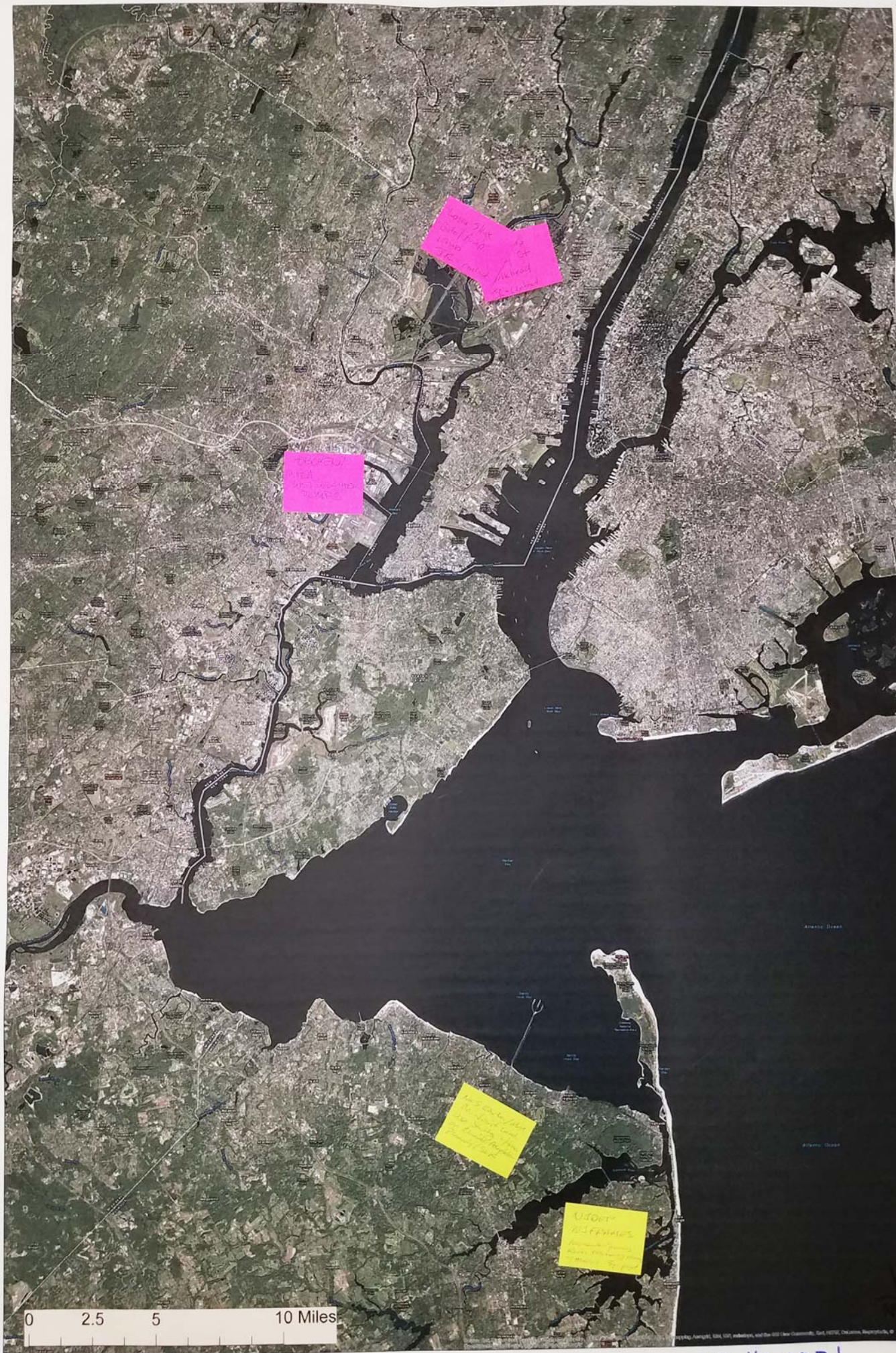
Contact by email, invite to mtrp & they'll con  
website w/ study updates. Listserv -> email  
group to look at website for updates.



NS 1/18 Group 3

How do you address things like timing  
of storm (snow, housing, tide, light)  
day frozen?





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NS 1/18 GROUP 1

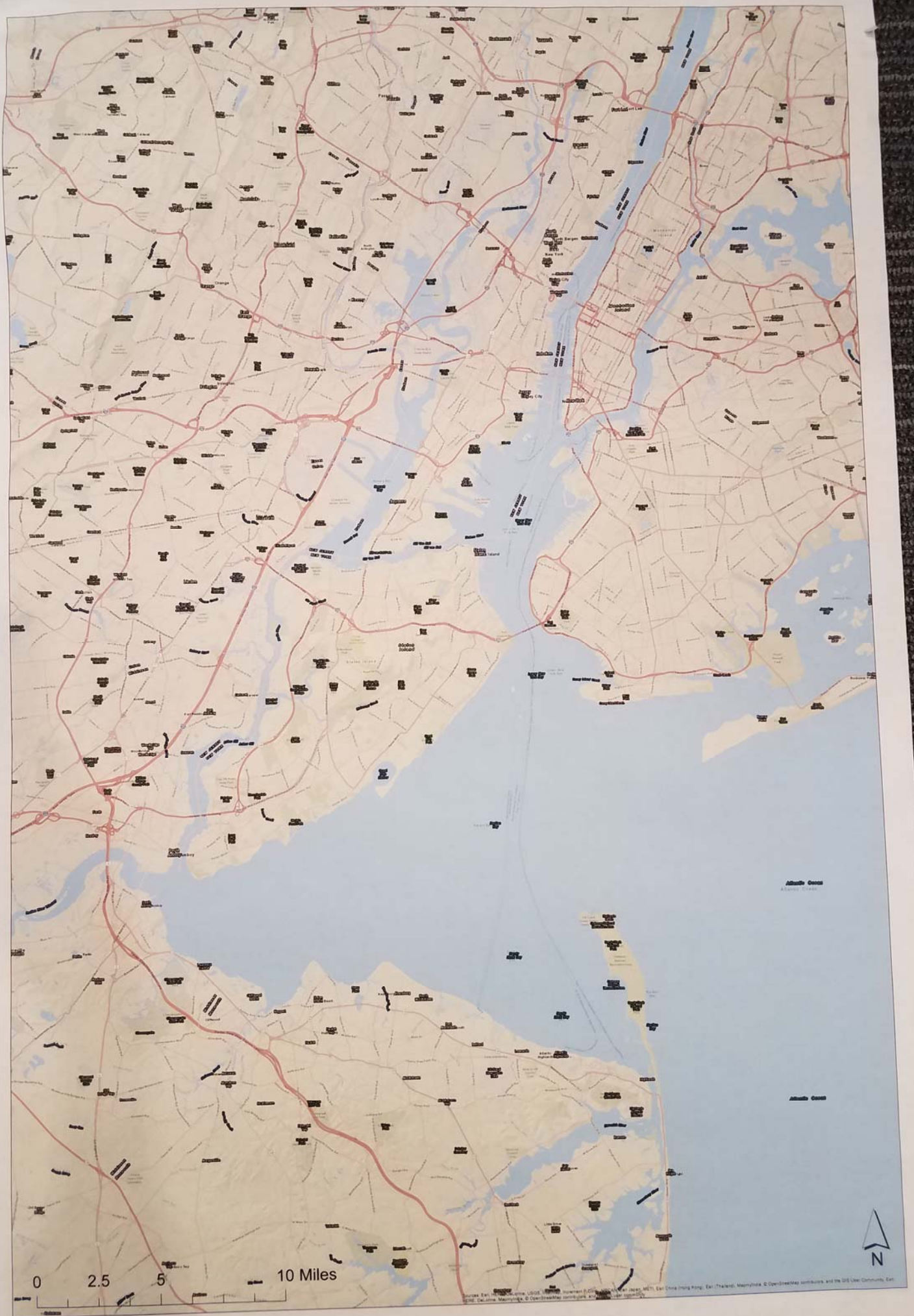


**New York City, New York**

## GROUP 1

1/24 NYC

LAUREN KLONSKY  
ROBERT NYMAN  
PATRICK TUOHY  
NOREEN DOYLE  
ROSS FELTES  
JENNIFER CASS  
MARIT LARSON  
MATT CHLEBUS  
BERNICE MALIONE  
CATHERINE MCVAY  
OLIVIA CACKLER  
JOANNA FIELD  
~~KIM McEVoy~~ KATIE AXT  
~~CHRIS~~  
RASMUSSEN





## GROUP 1 TOPIC 1

PROBLEMS, OPPORTUNITIES, OBJECTIVES, CONSTRAINTSPROBLEMS :: Flooding @ South St. Seaport / E. Side Resiliency

- FUNDING
- SCALE / SYSTEMS APPROACH
- TIMING
- FOOTPRINT (IMPACT TO NEIGHBORS) / SCALE
- WORKING w/ PRIVATE PROPERTY OWNERS
- INFORMATION SHARING ACROSS AGENCIES IS LACKING
- CONTAMINATED LAND (USACE CONSTRAINT)
  - Cultural resources
  - Environmental resources / habitat
- COMMUNICATION
- TRADE OFF OF ECOSYSTEM + PROTECTION
- UNDERSTANDING CAUSE OF RISK (Stormwater vs. Coastal)
- DATA AVAILABILITY TO SUPPORT BCA
  - ↳ ECOSYSTEM / NATURE BASED
- ENCROACHMENTS
- Define Design Conditions
  - NFIP Regulations
  - CSD + Stormwater quality
  - Classification of Sandy NOT as a hurricane w/ regard to insurance
  - economic impacts

## GROUP 1 TOPIC 2: AGENCY WORK + EXISTING INFORMATION

NYC 1/24  
PG 2

- How are benefits of projects taken into consideration?
- PORT AUTHORITY RISK ASSESSMENT
- FEMA: NFIP Modeling + Analysis
- RAISE SHORELINES PROJECT: LIDAR EDC
  - Project site priority list
  - Sea level rise maps (vdatum adjusted)
- NYCERDA: sea level rise modeling + land cover  $\Delta$   
Jamaica Bay modeling
- GAP/DATA NEED: System impacts considering upland areas
- Green Infrastructure impacts on flood reduction  
DEP office of Green infrastructure
- Community group planning efforts
- Federal regulations on critical facilities (E.O.)

# GROUP 1 TOPIC 3: MANAGEMENT MEASURES

NYC 1/24

PG. 3

- "living breakwaters"
- living shorelines
- seawalls (access issues)
- deployable dams (Tiger Dam)
- levee (consider accreditation)
- People management & policies
  - ↳ tides
- Comprehensive preparation planning / Policy
  - Shifting from individual responsibilities
- changing MUTCD standard to increase pervious pavement
- Non-structural acquisition ~~+~~ + relocation
- adaptive management planning to long-term multi-scenario and uncertainty
- Green infrastructure
- policies for CSO/stormwater quality
- re-zoning
- ~~the~~ community awareness



1/24 NYC  
PG. 4

# GROUP 1 TOPIC 4: AREAS OF INTEREST + CONCERN + OTHER AGENCIES

- One billion oyster project  
Murray Fisher
  - Insurance Companies
  - Rutgers Professor - living breakwaters
  - Waterfront Alliance (WEDGE)
  - Science + resilience Inst. Jamaica Bay
  - Urban Waters Partnership (Fed urban waters)
  - NYC Parks
  - LES Ecology
  - NY ~~DEE~~ DDC
  - NYC Emergency Management
  - OMB
  - Chambers of Commerce
  - BID (business improvement district)
  - MTA / LIRR / AMTRAK / Metro North / NJ Transit / PATH
  - NYCHA
  - ENVIRONMENTAL JUSTICE GROUPS
  - Health + Hospitals / VA Hospital
  - Community + Neighborhood Groups
  - Community Assistance Unit
- AREAS OF CONCERN

  - Port operations + Infrastructure
  - Functionality of H+H
  - Airport flooding
  - power infrastructure
  - utility infrastructure
  - Petroleum/Fuel
  - Insurance
  - RPA
  - NY Rising Groups
  - Food Bank Bronx (EDC)
  - NYCDOT (here)
  - Education
  - Shelters
  - Small businesses

## GROUP 4

1/24 NYC

DARIA MAZEY

JONATHAN STIMMELL

MICHAEL POETZSCH

JAINIEY BAVISHI

SARAH NEILSON

ANDREW LYNN

SUE MCCORMICK

PAUL TUMMINELLO

NANCY BRIGHTON

ANTHONY REINHART

IRENE CHANG-CIMINO

ALAN OLMSTEAD

KIM MCEVOY



# GROUP #4

## TOPIC #1 - Problems, Opportunities Objectives & Constraints

### Problems:

- Assets at risk - varies types
- Classes of use (e.g. fertics, etc.) that cannot distance or remove themselves from water
- Need to maintain waterfront accessibility
- Need continuous lines of protection (as related to roads)

### Opportunity:

- Evaluate comprehensive & long term solutions, true regional perspective
- Way to integrate water management, ~~resilience~~ resilience
- Opportunity to evaluate various solutions
- Reduce flood risk and other benefits to improve "living environment & economy"  
- Green infrastructure

## Group #4 TOPIC #1

### Opportunities:

- Identifying Constraints actually helps articulate opportunities for other agencies/projects
- Any measures identified as part of this study could help lessen flood risk → lessen # of homeowners requiring flood ins. and/or reducing costs of flood insurance
- Multi-agency coordination
- Better planning for next storm/event
- Better legislation to help address problem



Group #4

MC 1/24

## TOPIC #1 SUMMARY

### Problems:

- Assets @ risk - various types
- Various classes of use that cannot distance themselves from water
- Need to maintain waterfront accessibility

### Opportunities:

- Evaluate comprehensive, long-term sol.
- Measures to reduce flood risk → decrease flood ins. req. → save \$\$
- Multi-agency coordination → better planning for next event

Constraint: also an opp. for more open space

- Don't sacrifice public space/recreation

## Constraints:

- Making sure not to sacrifice public space/recreation uses when alternatives are considered

(can also be an opportunity to create even more park/open space)

- Need to maintain waterfront access

- Time

- no action may lead to less desirable solutions

- Keeping community feel
- Regulatory restraints
- maintaining evacuation routes (roadway)
- maintaining navigation

# GROUP #4

## TOPIC 3 - Management Measures

- Potential Surge Barrier - Thoughts & discussion
  - monthly working group
  - 1-option - Sandy Hook → Long Island
  - 1-option - Throgs Neck

How to incorporate both SLC & Storm surge in that potential alternative

- warrants further study, particularly in this regional, comprehensive study
- larger barrier wouldn't preclude other measures for consideration (e.g. NNBF behind/as part of a alternative)



Group #4

## TOPIC 3 - Management Measures

- Potential Surge Barrier (cont'd)
  - how do local projects factor in if any large potential barriers) is/are being considered
- Current measures - move to higher ground (USCG)
- Permeable surfaces - some consideration but costly for facilities

# Group #4

## TOPIC #3 - Management Measures

- Goal of any/multiple measures to meet multiple objectives

- Potential legislative changes to address flood-proofing

- example - homeowners moving out of flood risk area but currently does not qualify for lower flood ins. rates (for homes that cannot be elevated)  
incentives for flood proofing  
- must account for all risks - not just monetary damage (balance)

- Potential Buyouts?

Volunteer

Home-owner directed

(3)

## Group #4, Topic 3 - Management Measures

- Potential "individual" homeowner measures
  - Acquisition
  - Flood proofing
  - Raising home elevations

Can be considered as part of an alternative

- ref. Fire Island to M.P.

## - Project Uplift

- Nonprofit pilot program
- Follow-on from NY Rising
- Staten Island



# GROUP #4

## TOPIC 3 - management Measures

- is there a "middle ground" for  
Sea walls &/or barriers  
What other features can be incorporated
- urban design incorporated  
into flood control projects

## GROUP #4

### TOPIC #3 - Management Measures

- Full range
  - non-structural, home owner level
  - Structural - surge barrier(s)
  - middle ground (incorporate features)
- NS
  - consider legislative changes to further incentivize homeowners
- NNBF
  - a part of any potential alternatives
- Structural
  - Potential Surge Barrier(s)
  - warrants further analysis, particularly in regional, comp. study
  - include other measures +
  - monthly working group - SUNYSB



Group # 4

Topic 4

• Areas of Interest and Concern  
ways to continue communication

- RPA - include
- Would like regular updates
- Roadway network - dual role
- Roadway network - resiliency
- Eastside Coastal Resiliency project
  - includes potential flood gates @ FDR Dr.
- Maintaining evac routes
- Maintaining critical facility ops
  - PANYNJ - all assets

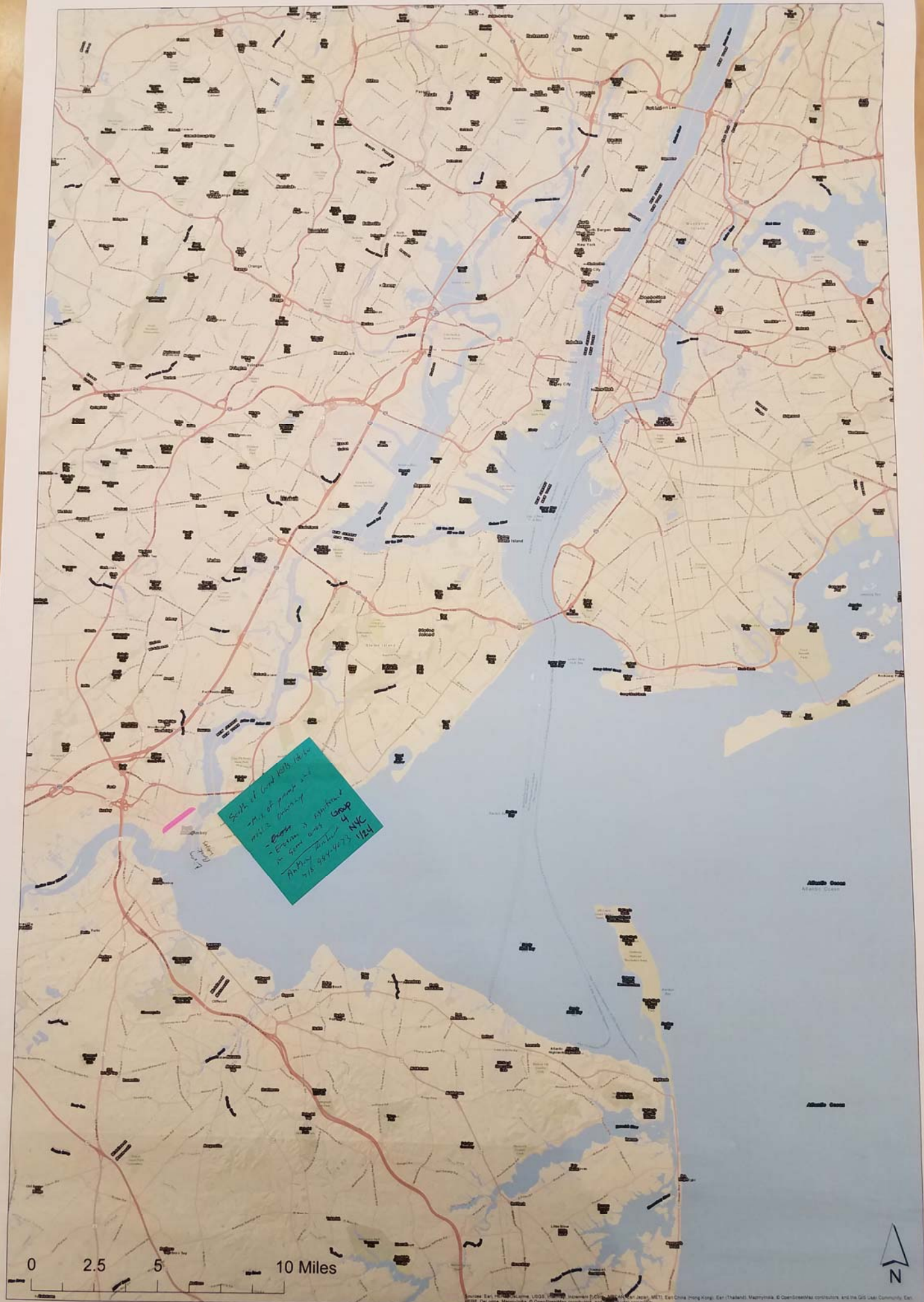
Group #4

Topic 4

## Areas of Interest & Concern

- FTA/FHWA Coordination
- Any feedback on NGO/community Coordination
- HUD grantees as best resources
- NJDCA-public outreach plan  
Public language access plan
- RBD - exec. steering comm.
- FEMA NNBFBCA
- minor other agencies
- Sandy resilience coord. DB-from FEMA
- NYC project list





GROUP 5

FRANCES BUI

BRYCE WISEMILLER

TOM HODSON

JOHN DAWSON

DAN ZARRILLI

JOSHUA DEFLORIDO

AL FUCHS

JOHN DAWSON

JOHN RITCHEY

STEVEN PAPA

ROSELLE HENN

JAMES GARIN

STEPHANIE LAMSTER

GROUP 5  
NYC 1/24



# PROBLEMS:

GROUP 5  
NYC 1/24/17

- NYC LOWLYING COASTAL AREAS
  - BUILDINGS BUILT LOW
  - DRAINAGE ISSUES ASSOCIATED WITH STREET RAISING
- MANAGING DRAINAGE FROM NEW MEASURES
- FUEL SHORTAGE
- LOSS OF POWER
- TRANSPORTATION INTERRUPTION
- UTILITIES (ELECTRIC, WATER, ETC.)
  - IDENTIFYING HOLES
- REVENUE LOSS (TRANSPORTATION,
  - TOLL/PASSENGER LOSS
  - UTILITY PROVIDERS
  - OTHER BUSINESSES
- SCHOOL DAYS
- USAGE REQUIREMENTS FOR ECONOMICS



# OPPORTUNITIES:

GROUP 5

NYC 1/24/17

- SYSTEMS LEVEL ANALYSIS  
COORDINATION (NOT JUST ASSET  
OR FACILITY LEVEL)
- CASCADING EFFECTS CONSIDERATION
- DIFFERENT PERSPECTIVE  
"LONG-TERM" APPROACH.  
E.G. BUILDING OUT ~~THE~~ LONGER LIFE SPAN
- SYNERGY OF OTHER PROJECTS,  
BUILD UPON ONE ANOTHER
- NATURAL SYSTEMS APPROACHES
- IMPROVE AREAS  
"BONND BROOK" EXAMPLE  
ECONOMIC INJECTION

# CONSTRAINTS:

GROUP 5  
NYC 1/24/17

- LAND CONSTRAINTS  
"BMP"
- MAGNITUDE OF PROJECT  
LARGE SCALE OF NYNHTATS  
PROJECT
- COMMUNITY BUY-IN
- REGULATORY  
FEMA DISCOURAGE VS. HUD DEVELOPMENT
- BUDGETS \$\$\$
- ENVIRONMENTAL
- FEMA FIRM NYC APPEAL  
TECHNICAL INFORMATION

# OBJECTIVES:

Group 5  
NYC 1/24/17

## . FLOOD MITIGATION

- ' LEVERAGING HARD/SOFT MEASURES  
W/IN FEDERAL SCOPE
- ECONOMIC JUSTIFICATION FOR A  
PLAYBOOK OF DIFFERENT MEASURES
- BETTER UNDERSTANDING  
FUTURE CONDITIONS



# MANAGEMENT MEASURES: GROUP 5

NYC  
1/24

## FEMA PASSIVE MEASURES

- WET/DRY FLOODPROOFING
- REMOVAL FROM RISK

FEMA v. HUD POLICY / REGULATION

PANYNT - SOME DEPLOYABLES  
ROBUST TO PRIORITY AREAS

- BACKFLOW PREVENTION  
ONE SOLUTION TO ANOTHER PROBLEM

- PUMP STATIONS

• ELEVATE / PROTECT SUB STATIONS /  
CONTROL

- NATURE-BASED (ISSUES WITH ESA)
- IN WATER BARRIERS (ISSUES w/ TRAMP)
- FLOODWALLS (ISSUES WITH COMMUNITY FLOW / SIGHT LINES)
- DUAL PURPOSE (ex. GATES = BENEFITS)  
MULTI-PURPOSE / OPPORTUNITIES
- FEMA STUDY (STONY BROOK FOR JB)  
RICK WORD FEMA CONTACT  
DHS/ES



GROUP 5 MLC  
1/24

# MEASURES THAT MINIMIZE MAINTENANCE INSURANCE / FINANCIAL RISK MITIGATION MEASURES

## REGIONAL BARRIER?

- ALTERNATIVES ANALYSIS
- BASIN-WIDE APPROACH
- ACTIVE PARTICIPATION
- MAINTENANCE 1 VS. MANY
- CONSTRUCTABILITY
- FUNDING
- TIMING
- EXPERIENCE IN CONSTRUCTION
- ENVIRONMENTAL CONSTRAINTS

GROUP 5 MLC  
1/24  
AGENCY AREA OF INTEREST /  
CONCERN:

DEPLOYABLES - LEAD UP TIME / FALSE  
PERMANENT POWER VS. GENERATORS ALARM  
GATES REPLACING STOP LOGS

SAND BAGS ARE VERY DEPLOYABLE!  
AUT. ACTUATED ~~TOO~~ GATES (SOMETIMES  
EXPENSIVE)  
EXERCISE DEPLOYABLES ONCE A YEAR  
LONG TERM CONTRACTING ON CALL

FEMA & USACE BCA DEFINITIONS  
FUTURE WOT PROJECT

PROJECT SCALES v. LOCALIZED IMPACT

JOINT PROBABILITY OF STORM SURGE  
RAINFALL

FLUVIAL FLOODING

PRIMARY EVENT CASCADES TO SECONDARY  
- FIRE  
- CLOSURES

HIGHER RETURN PROB + SLR  
"MUNDANE" EVENT CAUSE FUTURE PROJ.

# AGENCY WORK + EXISTING INFO

GROUP 5

NYC  
1/2

- EPA SANDY COORDINATOR (PROJECTS)  
RABI KIEBER

- FEMA SANDY COORDINATION TEAM  
PROJECT LEVEL REVIEW  
PATRICK TOEY  
- LARGE SCALE EFFORTS  
STATE OSM DATABASE

RICK LORD NYS DB

- NYC ORR DATABASE RESILIENCY  
- DRAINAGE BEHIND STRUCTURES

- PILOT - CLOUD BURSTING  
STATEN ISLAND BLUE BELT GT

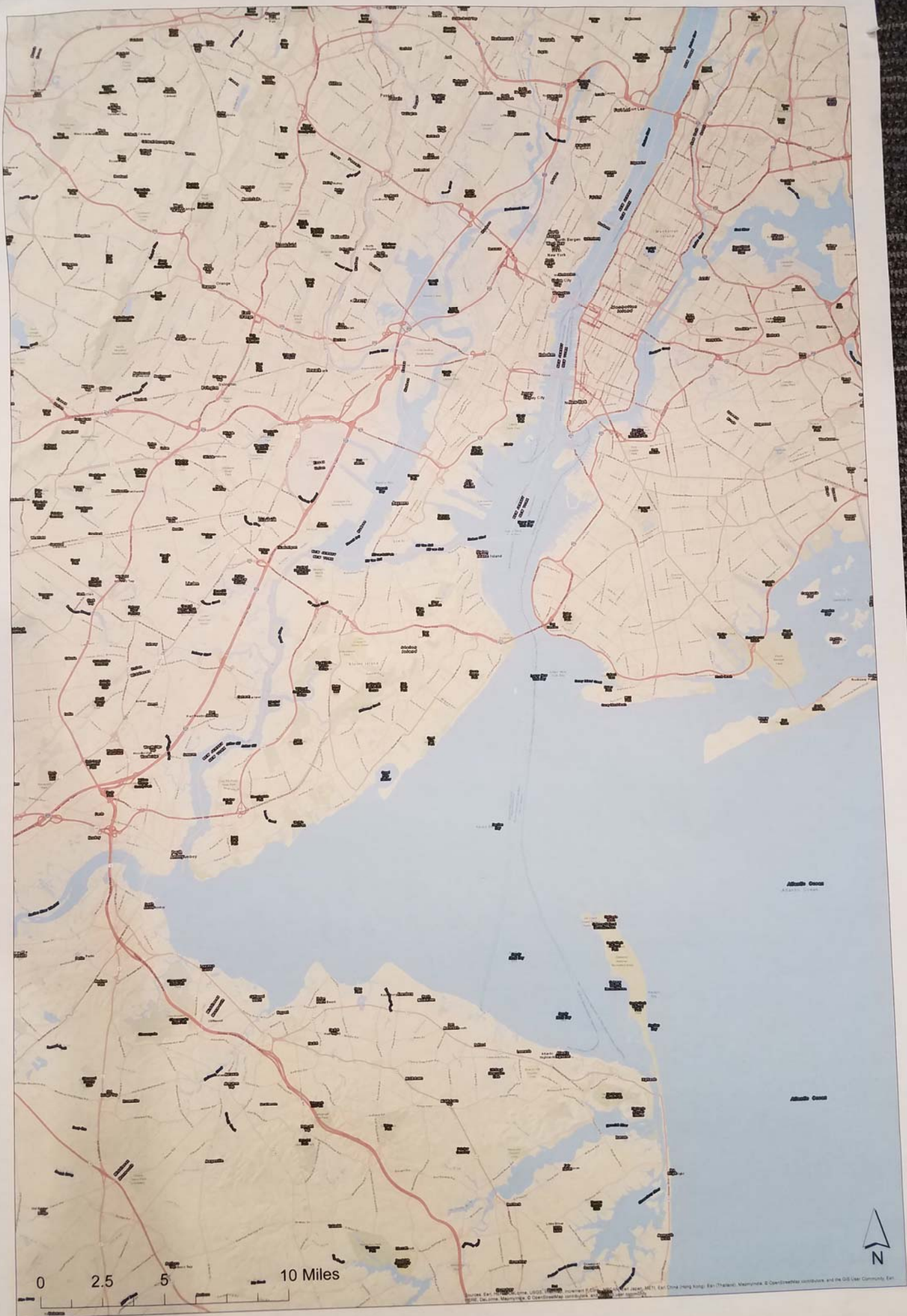
- WWTP HARDENING / PUMP STATION

- CLIMATE CHANGE STUDIES

- FEMA / NEPA REGULATIONS  
FOR GREEN INFRASTRUCTURE

- PA NY NJ CLIMATE CHANGE RESILIENCE







## GROUP 6

NYC 1/24

DANIELLE TOMMASO

SETH KELLOGG

FRANK SCHWARZ

STEVEN ZAHN

JOHN MCKEE

THOMAS BURKE

TREVOR JOHNSON

SAM HERSH

MARK LOWERY

CLIFF JONES

JASON BUTTCHER

BOB SCHNECK

SHANNON ANDREW

# PROBLEMS

20) Can't protect Everything

1) DRAINAGE

2) CSOs

21) Different sea level rise Scenarios

10) Vulnerable populations

(elderly)

- organization  
- who are they?

3) WWTP/Infrastructure in vulnerable areas

- Bayview/Pnt Elizabeth

- fuel depot

- Subway

- Airport

- Shipping lanes (kill Van Kull)

4) Property values

11) Social Infrastructure

12) Space limitations for solutions

5) Insurance

6) Financing

7) Responsiveness

8) Complexity

9) Underfunded

19) Uncertainties of FEMA Flood Maps

13) Ecological Sensitive areas

14) Backup of tunnels

15) Resistance to permitting building in known issue areas

16) Ideological constraints

17) Contamination

18) Limitations of structural solutions *1/24 people*

# Opportunities

- 1) Look at regional planning / solutions / Long term  
- Land use planning
- 2) Restore sensitive ecological areas / bioengineering
- 3) Multiple uses for projects (ie synergy w/ power or transit)
- 4) Create more accurate FEMA flood maps
- 5) Education for stakeholders of risk  
- Targeted Outreach
- 6) Reach out to vulnerable populations
- 7) Improve interagency relationships / Communications
- 8) Relationship framework effective for other incidents
- 9) Restored Ecology
- 10) Clear water Harbor



# Objectives

- 1) Enhance Social cohesion / infrastructure
- 2) Raise awareness
- 3) Have sufficient funding + reasonable timeline
- 4) Enhancing Coordination of infrastructure planning
  - Proactive not Reactive
  - land use — regulatory
- 5) Evacuation
- 6) Limit Downtime
- 7) Social Equity
  - Environmental Justice



# CONSTRAINTS

- 1) \$
- 2) Bureaucracy
- 3) Political Will
- 4) Communication
- 5) Ideology
- 6) Time frame
- 7) Diversity of Stakeholders
- 8) Complexity
  - engineering
  - regulations
  -
- 9) Competing priorities in goals
  - imbalance
- 10) lack of long term Vision
- 11) Land use constraint
  - Urban areas
  - Population Density
  - Ecologically sensitive
  - Contamination
- 12) Entrenched Interests

# Local / State Existing Plans #6 Topic#2

## 1) Hudson County → Strategic Recovery Report

- Master Plan
- Economic Development Plan
- Community CRS Eligibility
- Code adequacy / enforcement
- Identify inefficiency

Hoboken / Jersey City have own plans

## 2) Rebuild by design

## 3) <sup>NY</sup> 2014 Community Risk + Resiliency Act

- NYSDEC managed grants
- Need to demonstrate consideration of Sea Level Rise

## 4) NYC → framework for growth w/in storm planning

- encourage
- neutral
- limit

# Management Measures

- 1) Elevate + Retreat come off the table too fast → Keep as part of analysis
- 2) Use whole toolbox of retrofitting measures
- 3) Existing code is not set up for these management measures
- 4) FEMA sees all the measures
  - historic resources
  - environmental resources
- 5) Integrate reviews for speed
- 6) Approaches that mitigate / eliminate litigation
- 7) Need compensatory ecosystem mitigation
- 8) Public likes nature based features
- 9) Time horizon of flood risk (storm vs. Sea level)
- 10) Green Infrastructure → high level storm stores
- 11) Land use planning / zoning

Concerned  
about



# MANAGEMENT MEASURES

②

- 12) Need a more equitable way to value "green" benefits
- 13) Manage Communication w/ public (start memory)
- 14) Surge barrier
  - Who is protected?
  - Who do you leave out?
  - What are the tradeoffs?
  - Can protect larger area
  - Cost prohibitive



# AREAS of Interest or Concern

1/24  
Group 6

- 1) Develop a ~~map~~ plan to educate and communicate with the public
- 2) Need a more equitable way to value "green" options
- 3) Are large engineering projects realistic?
  - Cost prohibitive
  - Who do you protect?
- 4) Storm ~~sea~~ surge vs. tidal / sea level rise
- 5) How do you account for residual risk?
  - Following program implementation
- 6) What are the agreed benchmarks?  
50yr / 100yr / sea level
- 7) Accuracy of floodmaps
- 8) Analyze existing / ongoing projects and how they do detail / project condition

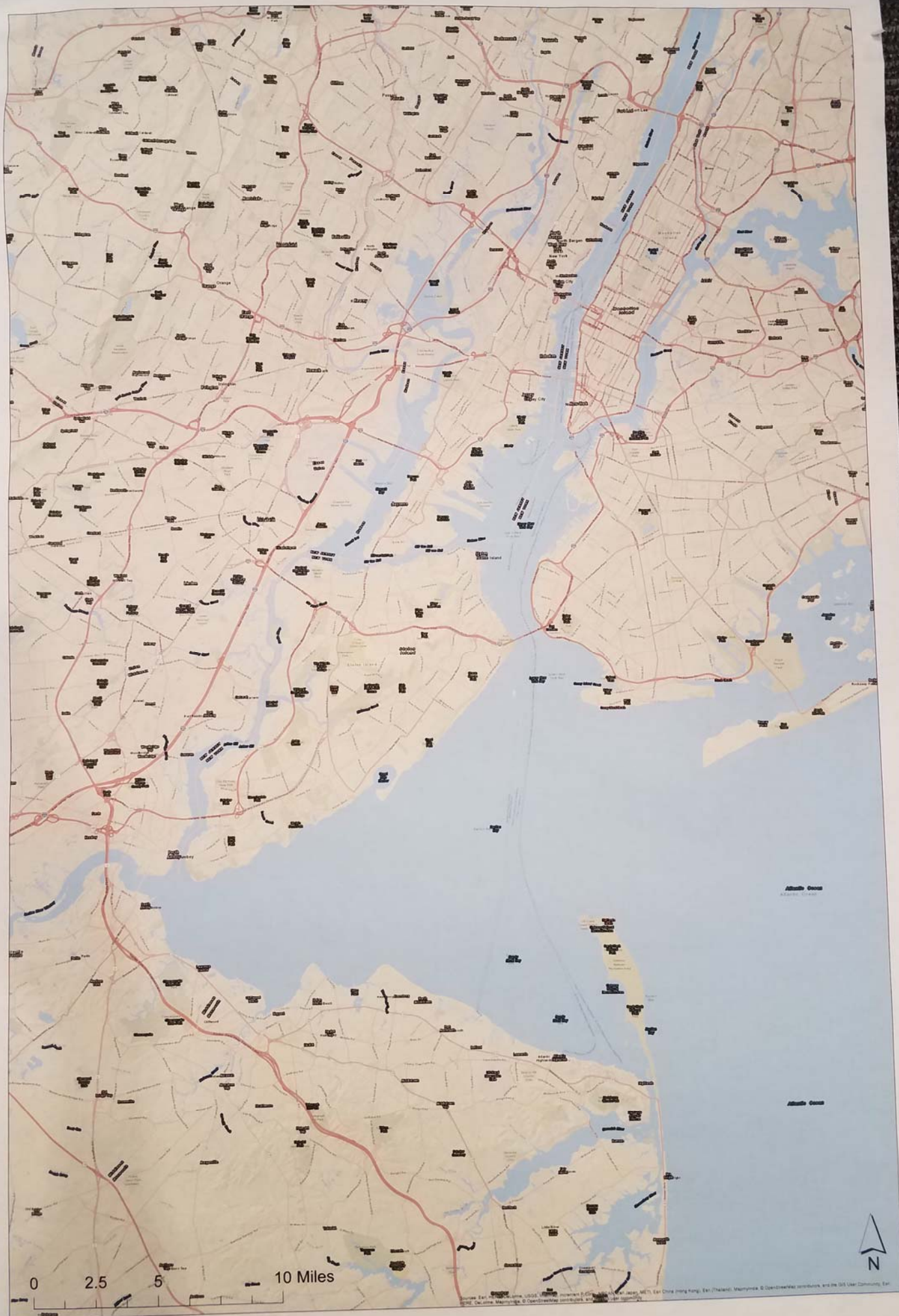
# AREAS OF INTEREST / CONCERN ②

---

- 9) How do we Condense the time line to the extent possible to be protected sooner?
  - need to be careful to follow public participation BSPs to avoid litigation
- ★ 10) Keep long term horizon (2050/2100) in mind
- 11) Be willing to address local problems with specific solutions → Not one size fits all
- 12) Need to look at all projects as an integrated whole
- 13) Localized / temporary measures can't get stranded
- 14) Understand all risks, not just Sandy impacts
- 15) Funding Sources / Structures / competition

- 1) Through risk based analysis that take into account sea level + storm surge
- Also account for residual risk
  - All geographies → not Sandy specific
- 2) Need to be realistic about cost prohibitive options and have a more equitable way to "value" green alternatives.
- 3) Establish Current (ongoing projects) and Future conditions (planning horizon)
- 4) Analyze local solutions in a regional context
- 5) Need Accurate Flood maps







## Appendix E

### Photograph Log

**Agency Workshops**  
**NY and NJ Harbor and Tributaries Coastal Storm Risk Management Feasibility Study**



*Daria Mazey (USACE) leads the discussion of a small breakout group at the Newark, NJ meeting on 1/18/2017.*



*Participants of a small breakout group listen to the group summary at the Newark, NJ meeting on 1/18/2017.*

**Agency Workshops**  
**NY and NJ Harbor and Tributaries Coastal Storm Risk Management Feasibility Study**



*Daria Mazey (USACE) summarizes the discussion for the report-out at the Newark, NJ meeting on 1/18/2017.*



*One of the small breakout groups listens at the Newark, NJ meeting on 1/18/2017.*

**Agency Workshops**  
**NY and NJ Harbor and Tributaries Coastal Storm Risk Management Feasibility Study**



*The audience listens to the USACE presentation at the New York City, NY meeting on 1/24/2017.*



*Cliff Jones (USACE) presents at the New York City, NY meeting on 1/24/2017.*



**Agency Workshops**  
**NY and NJ Harbor and Tributaries Coastal Storm Risk Management Feasibility Study**



*Danielle Tommaso (USACE) presents at the New York City, NY meeting on 1/24/2017.*

## **Appendix F**

### **Questionnaire Forms**



## Workshop Questionnaire for Agencies on the New York New Jersey Harbor and Tributaries Feasibility Study for Coastal Storm Risk Management

This form covers the information we are hoping to obtain from you over the course of the workshop. Feel free to fill parts or all of it out in advance, or if you prefer, to fill it out during or after the workshop. It can be returned directly to Olivia Cackler at [Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil). Thank you for contributing to the New York New Jersey Harbor and Tributaries Feasibility Study!

### 1. Agency:

USEPA

### 2. Role in your region:

NEPA engineer

### 3. Point of Contact:

Name:

Michael Poetzsch

Address:

290 Broadway NY, NY

Phone:

212 637 4147

Email:

poetzsch.michael@epa.gov

### 4. Agency's area of interest and your concerns:

NEPA process followed



**5. Coastal Resiliency work completed that your agency was involved in:**

Scope of project and details on location, etc.

Rabi Keber - Lead Sandy/BPA  
Coordinator

**6. Coastal Resiliency work in the planning stages that your agency is involved in:**

Scope of proposed work, etc.

See above





7. Your area's problems, needs and opportunities:

opportunity to integrate  
prior studies / lesson learned  
from EPA, FEMA, etc.  
coast guard, etc.

8. Your area's constraints, considerations and objectives:



#### 9. Available reports: 1 – completed, 2 – in progress

#### 10. Other available information:



### 11. Data gaps:

### 12. How would you like to be involved in the study?

participate in all reviews,  
scoping + other public mtgs.



13. Are there NGOs or other stakeholders in your area that should be included in the study?

14. Do you have questions for us?

Where / will FEMA lessons  
learned report be integrated  
into project





## Workshop Questionnaire for Agencies on the New York New Jersey Harbor and Tributaries Feasibility Study for Coastal Storm Risk Management

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### 1. Agency:

NYC Dept of Transportation (NYC DOT)

### 2. Role in your region:

- NYC roads, signals, streetlights, etc and some NYC Highways
- Many (but not all) NYC Bridges
- Staten Island Ferry - Battery Park Underpass

### 3. Point of Contact:

Name:

Alan Olmsted

Address:

NYC DOT  
55 Water St, 6th Floor, NY, NY, 10004

Phone:

(212) 839-6685

Email:

[aolmsted@dot.nyc.gov](mailto:aolmsted@dot.nyc.gov)

### 4. Agency's area of interest and your concerns:

Mobility, infrastructure



##### 5. Coastal Resiliency work completed that your agency was involved in:

Scope of project and details on location, etc.

- Various post-Sandy repairs to roads, bridges, Batter, Park Underpass, Staten Island Ferry facilities
- Repairs to movable bridges

##### 6. Coastal Resiliency work in the planning stages that your agency is involved in:

Scope of proposed work, etc.

- Participation in various NYC/IRR projects
- SI Ferry Terminal floodproofing
- New SI Ferry vessels
- Improved roadway reconstruction
- Batter, Park Underpass resiliency



## 7. Your area's problems, needs and opportunities:

## 8. Your area's constraints, considerations and objectives:



## 9. Available reports: 1 – completed, 2 – in progress

## 10. Other available information:





### 11. Data gaps:

### 12. How would you like to be involved in the study?



**13. Are there NGOs or other stakeholders in your area that should be included in the study?**

**14. Do you have questions for us?**



## Workshop Questionnaire for Agencies on the New York New Jersey Harbor and Tributaries Feasibility Study for Coastal Storm Risk Management

This form covers the information we are hoping to obtain from you over the course of the workshop. Feel free to fill parts or all of it out in advance, or if you prefer, to fill it out during or after the workshop. It can be returned directly to Olivia Cackler at [Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil). Thank you for contributing to the New York New Jersey Harbor and Tributaries Feasibility Study!

### 1. Agency:

NYS Senator Andrew Lanza's office

### 2. Role in your region:

### 3. Point of Contact:

Name: Anthony Reinhardt

Address: 3845 Richmond Ave, 2B

Phone: 718-984-4073

Email: Reinhardt@NYSenator.gov

### 4. Agency's area of interest and your concerns:

Shoreline protection and flood management  
Funding needs  
Timeline  
Related to Staten Island



**5. Coastal Resiliency work completed that your agency was involved in:**

Scope of project and details on location, etc.

**6. Coastal Resiliency work in the planning stages that your agency is involved in:**

Scope of proposed work, etc.





## 7. Your area's problems, needs and opportunities:

2 studies underway on Staten Island

1 study progressing - discussions on impact to business,  
access to shoreline, impact on flood insurance rates

1 study further behind, on southern most areas of ~~ST~~  
Staten Island

↳ Significant coastal erosion issues

↳ shoreline ownership questions

↳ concerns about reality of possible improvements

2 of 3 hospitals on SI are in flood zones

↳ ultimately cost of flood insurance and how it can  
be mitigated w/ projects

## 8. Your area's constraints, considerations and objectives:

Constraint

Current south shore study ~~evaluation~~ of  
it does not progress, will create  
larger concerns of erosion

↳ South of Great Kills Harbor



## 9. Available reports: 1 – completed, 2 – in progress

## 10. Other available information:



## 11. Data gaps:

## 12. How would you like to be involved in the study?



13. Are there NGOs or other stakeholders in your area that should be included in the study?

Jedburghville area

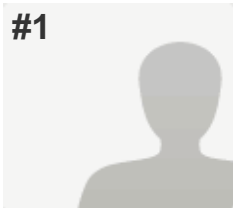
↳ Living Breakwaters

Project up Lst J → through Gov's office  
of Storm Recovery

14. Do you have questions for us?



#1



**COMPLETE**

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, January 24, 2017 9:40:26 AM

**Last Modified:** Tuesday, January 24, 2017 9:54:57 AM

**Time Spent:** 00:14:30

**IP Address:** 199.168.151.106

**PAGE 1: Questionnaire**

**Q1: Agency:**

NYSDEC Hudson River Estuary Program

**Q2: Role in your region:**

Watershed management. Working with municipalities, community watershed groups, and landowners to plan and implement water resource projects to benefit water quality and quantity, including resilience to precipitation extremes.

**Q3: Point of Contact:**

Name:	Scott Cuppett
Address:	NYSDEC-HREP, 21 South Putt Corners Road, New Paltz, NY 12561
Phone:	8452563029
Email:	scott.cuppett@dec.ny.gov

**Q4: Agency's area of interest and your concerns:**

The Estuary Program's interest is a resilient watershed and Hudson River ecosystem.

**Q5: Coastal Resiliency work completed that your agency was involved in: Scope of project and details on location, etc.**

We provide technical support, research, and funding for community and watershed planning. We are part of DEC, but the program is not representing the various flood management programs DEC offers.

**Q6: Coastal Resiliency work in the planning stages that your agency is involved in: Scope of proposed work, etc.**

We are currently funding watershed assessments to identify flood mitigation strategies for future implementation. We are also coordinating a coastal community planning effort, as well as stream/road crossing assessments for hydraulic constrictions, dam removal opportunities, and green infrastructure projects.

**Q7: Your area's problems, needs and opportunities:**

Hudson Valley has a vast array of challenges and opportunities. The scale of the Hudson Valley is too large for us to identify specific projects through this survey.

**Q8: Your area's constraints, considerations and objectives:**

*Respondent skipped this question*

**Q9: Available reports: 1 – completed, 2 – in progress**

*Respondent skipped this question*

**Q10: Other available information:**

*Respondent skipped this question*

**Q11: Data gaps:**

*Respondent skipped this question*

---

**Q12: How would you like to be involved in the study?**

Stakeholder

---

**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

I don't know who is invited to these sessions to make recommendations. There is likely overlap. Certainly county level agencies should be included.

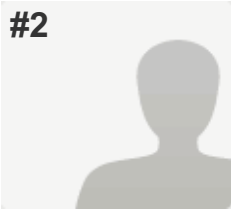
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**Q14: Do you have questions for us?**

*Respondent skipped this question*

---

#2



**COMPLETE**

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, February 07, 2017 9:04:44 AM

**Last Modified:** Tuesday, February 07, 2017 10:12:38 AM

**Time Spent:** 01:07:54

**IP Address:** 64.72.74.50

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**PAGE 1: Questionnaire**

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**Q1: Agency:**

City of Kingston

---

**Q2: Role in your region:**

Municipality

---

**Q3: Point of Contact:**

Name:	Julie Noble
Address:	467 Braodway, Kingston, NY 12401
Phone:	845-481-7339
Email:	julielnoble@kingston-ny.gov

---

**Q4: Agency's area of interest and your concerns:**

Sea Level Rise Impacts, Hudson River Access, Public Health and Safety, Economic Vitality on the Waterfront, Maintaining a Sense of Place, Safe Evacuation, Protection of Freshwater Tidal Wetlands, Protection of Parkland and Swimming Beach, Maintaining a deep water port for large vessels, Using natural systems to reduce flood risk, Securing vital infrastructure, including the Waste Water Treatment Plant

---

**Q5: Coastal Resiliency work completed that your agency was involved in: Scope of project and details on location, etc.**

Coastal Resiliency Work, City of Kingston

- 1) Tidal Rondout Creek Watershed Management Plan: City of Kingston retained Milone and McBroom to create a watershed management plan for the tidal section of the Rondout Creek, 2015.
  - 2) Tidal Waterfront Flooding Task Force 2012-2013; Convened to evaluate the present and future vulnerability to flooding, storm surge, and sea level rise along the Rondout-Hudson Waterfront. Culminated in Planning for Rising Waters: Final Report.
  - 3) City of Kingston LWRP: in 1992, the City of Kingston adopted a Local Waterfront Revitalization Program (LWRP), which, among other things, describes the goals and implementation policies of waterfront development for the City of Kingston. The LWRP's area of analysis extends from the northern boundary of Kingston into the Hudson River to the southern boundary of Kingston in the Hudson River, following the Rondout Creek along the Kingston boundary, and extending into the City of Kingston.
  - 4) The Kingston Waterfront Development Implementation Plan followed the LWRP in 2002. Its primary area of analysis includes the Kingston waterfront along the Rondout Creek, between Block Park and Kingston Point Park, and all of Kingston Point Park. Its purpose was to build on the planning goals and policies presented in the LWRP by providing implementation strategies for them.
  - 5) Waterfront Brownfield Opportunity Area Step 3, Hudson Riverport Final Implementation Plan:  
The City of Kingston worked with community members, partners and NYS agencies to create a plan for fostering redevelopment of brownfield properties for 192 acres of Kingston's Rondout Creek and Hudson River Waterfront. December 2015
  - 6) East Strand Flooding and Stormwater Management Analysis  
October 2013, the City of Kingston retained Milone & MacBroom, Inc. (MMI) to assess the redevelopment potential of the East Strand Street waterfront along the Rondout Creek, near the confluence with the Hudson River.
  - 7) Climate Adaptive Design Studio- Cornell University students worked with City staff and local stakeholders to re-envision Block Park and Island Dock for future development potentials that would be resilient and adaptive to sea level rise. Fall 2016
  - 8) Rondout Harbor Management Plan, June 2014
-



**Q6: Coastal Resiliency work in the planning stages that your agency is involved in: Scope of proposed work, etc.**

- 1) Sea Level Rise Implementation Learning Group: 2016-2018, City of Kingston has convened four communities: Stony Point, Catskill, Piermont and Kingston to collaboratively advance recommendations from the Task Force Reports. Support is from Hudson River Estuary Program and in collaboration with Scenic Hudson and the Consensus Building Institute.
  - 2) City of Kingston has funding through the EFC for Long Term Capital Plan for the Waste Water Treatment Plant
  - 3) Department of State Waterfront Resiliency Design- The City of Kingston will be hiring a consultant to provide contractual services for site reconnaissance, design, engineering, and permitting for shoreline improvements on the City's waterfront. 2017
  - 4) Climate Adaptive Design Studio, Spring Semester 2017- Cornell University students are working with City staff and local stakeholders to re-envision Kingston Point for future development potentials that would be resilient and adaptive to sea level rise.
  - 5) Hudson Landing Promenade Design and build; 2017; the City of Kingston has funding to construct a public promenade along the Hudson Landing Waterfront
  - 6) Central Hudson Brownfield Site Clean up-DEC directed Central Hudson clean up of previous coal gasification site to include excavation, dredging, and solidification of pollutants. Will follow with a cleanup management plan for the site, on the Rondout Creek.
  - 7) Kingston Greenline and Kingston Point Rail Trail- Concepts developed and funding is secured to begin construction in 2017 for a walking trail along Kingston's waterfront and connecting it to Midtown Kingston
- 

**Q7: Your area's problems, needs and opportunities:**

See #4 for concerns.

Risks- WWTP located in floodplain, low elevation waterfront puts residents, restaurants, businesses and cultural institution at risk of flooding and inundation, maintaining/improving public access while protecting infrastructure and public safety

-Kingston has many advancements on our waterfront with current and future initiatives to address resiliency. We have an engaged community and capacity within city government to work on these issues. We have been successful in securing funding and have numerous funding sources and projects lined up to work on resiliency on the waterfront.

---

**Q8: Your area's constraints, considerations and objectives:**

See #4

---

**Q9: Available reports: 1 – completed, 2 – in progress**

- 1) All reports mentioned in #6 are available at the City of Kingston's Economic Development page.  
East Strand Stormwater Management Analysis  
Hudson Riverport Implementation Plan  
Rondout Harbor Management Plan  
Tidal Waterfront Flooding Task Force Final Report  
Tidal Rondout Creek Watershed Management Plan  
Kingston's Local Waterfront Revitalization Program  
East Strand Flooding and Stormwater Management Analysis  
Kingston Waterfront Development Implementation Plan  
Kingston Climate Action Plan  
Kingston Comprehensive Plan: 2025
  - 2) Kingston Waterfront Resiliency Design  
Long Term Capital Plan for WWTP
-

**Q10: Other available information:**

All information about each of these plans and projects is available at [www.kingston-ny.gov](http://www.kingston-ny.gov).

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**Q11: Data gaps:**

*Respondent skipped this question*

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**Q12: How would you like to be involved in the study?**

Please keep me informed of the proceedings. I/Kingston will participate as available.

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**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

*Respondent skipped this question*

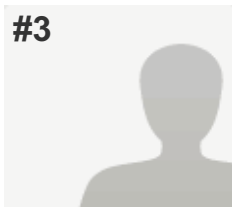
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**Q14: Do you have questions for us?**

*Respondent skipped this question*

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#3



## COMPLETE

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, February 07, 2017 4:57:47 PM

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### PAGE 1: Questionnaire

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#### Q1: Agency:

Department of the Interior, U.S. Geological Survey

#### Q2: Role in your region:

Center Director, Woods Hole Coastal and Marine Science Center (Woods Hole, MA)

Center Director, St. Petersburg Coastal and Marine Science Center (St. Petersburg, FL)

#### Q3: Point of Contact:

Name:	Rob Thieler; Cheryl Hapke
Address:	384 Woods Hole Rd, Woods Hole, MA 02543; 600 Fourth Street South St. Petersburg, FL 33701
Phone:	508-457-2211; 727-502-8068
Email:	rthieler@usgs.gov; chapke@usgs.gov

#### Q4: Agency's area of interest and your concerns:

The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life. The USGS Coastal and Marine Geology Program (CMGP) prepares the Nation for the challenges of changing coastal and marine environments by conducting robust and relevant scientific research and by producing science-based tools and products that enable safer, productive, and more resilient communities and natural resources.

#### Q5: Coastal Resiliency work completed that your agency was involved in: Scope of project and details on location, etc.

Coastal Landscape Response to Sea-Level Rise, Northeastern U.S. (Maine to Virginia): Probabilistic modeling approach predicts the response to sea-level rise across the coastal landscape under a range of future scenarios beginning in the 2020s by evaluating the likelihood of inundation as well as dynamic coastal change. The research was conducted in conjunction with resource managers and decision makers from federal and state agencies, and non-governmental organizations and utilized a structured decision-making approach to ensure research outcomes meet decision making needs. The coastal response information can be used to inform corresponding habitat models, as well as to map out alternative management strategies to optimize conservation efforts and allocate regional resources in the future.

NY Harbor and Hudson River Estuary. The transport of water into and out of the Hudson River Estuary and through the New York Harbor is controlled by estuarine processes of density driven flows, tides, and fresh water input. This combination of processes controls the distribution of sea water, contaminant transport, and flows in the region. Modifications of local bathymetry or geometric configuration of the system will alter these flows and modify residual circulation in the Harbor and Estuary. Over the past decade, we have collaborated with the Woods Hole Oceanographic Institution and the Hudson River Foundation to develop a calibrated three-dimensional ocean circulation and sediment transport model of the Hudson River and New York Harbor region. Research has identified the processes controlling estuarine circulation, tidal propagation, and storm driven transport of sediment through the system. Modifications to the

system would alter these long-term processes.

Estuarine Physical Response to Storms (Jamaica Bay, NY; Barnegat Bay, NJ; Chincoteague Bay, MD/VA): in this project we assessed the estuarine and adjacent wetland responses of three Atlantic lagoonal estuaries to major storm events such as Hurricane Sandy. Evaluations of sediment transport, geomorphic change, circulation, wetland stability, and stratigraphic history supported development of models that can be used to assess storm impacts on estuarine health, vulnerability of adjacent communities, and the resilience of restored and natural wetlands.

Hurricane Sandy Wetland Synthesis (Forsythe NWR, NJ): In this project we developed 1) an assessment of wetland vulnerability and 2) forecasting tools to evaluate wetland response to persistent processes (e.g., tides), future storms, and sea-level rise. These tools quantify wetland resilience and the ecosystem's ability to respond without diminished productivity or loss of ecosystem services. This assessment estimates the benefits and sustainability of restoration projects that rely on wetlands to mitigate future physical, biological, and anthropogenic impacts (through flood mitigation, habitat provision, carbon sequestration). We have quantified many of the primary drivers of wetland change and their effect on ecosystem services and combined these data and derived products into a GIS framework, along with derived metrics to provide a framework for delivering actionable information that can be used to inform future response to storms and SLR.

Fire Island, NY: Inner-shelf to Nearshore connectivity. Through a series of oceanographic deployments, geophysical surveys, and deterministic numerical modeling approaches we have identified connections between the geologic framework of the inner-shelf to coastal nearshore changes. Specifically we have identified the physical processes that are modified by geologic features in the coastal zone to affect long-term shoreline change response along Fire Island. Modification of waves by seafloor bathymetric features create alongshore variations of breaking wave height, driving alongshore gradients of wave driven flows, that create long-term shoreline variations. Based on this research, it is compelling that any future modifications to the inner-shelf will most likely have direct long-term response on shoreline change. This is a culmination of decades of research, linking many interdisciplinary research approaches.

Fire Island, NY: Linking Nearshore Processes and Coastal Vulnerability. This project built on an extensive body of existing knowledge of the Long Island barrier island system (see above) with a focus on filling crucial data gaps in the nearshore and subaerial systems. The objectives were to support the development of refined predictive models of vulnerability to future change from storms, sea-level rise and human activities on management time scales. Critical data collection and assessment for this project included: 1) collection of geophysical data in the very nearshore coastal zone to assess near-term sediment volume available for post-storm recovery and 2) observations of recovery within the subaerial system to establish linkages between nearshore geophysics, process observations and onshore observations, and to ground-truth model predictions.

National Assessment of Coastal Change Hazards storm response, long-term shoreline change, and sea-level rise vulnerability. Research to understand the magnitude and variability of extreme storm impacts on sandy beaches has improved real-time and scenario-based predictions of coastal change to support management of coastal infrastructure, resources, and safety. Nationally consistent analysis of shoreline positions and maps of changes along open-ocean sandy shores of the conterminous U.S. and parts of Alaska and Hawaii are updated to indicate trends in the nation's shoreline evolution. Historical and recent observations of shoreline change are combined with model simulations to determine the probability of coastal change due to sea-level rise (Gutierrez et al., 2010, 2014, Plant et al., 2015).. All three of these vulnerability assessments (storms, long-term shoreline change, sea-level rise) are available on our coastal change hazards portal (<http://marine.usgs.gov/coastalchangehazardsportal/>).

Operational Total Water Level and Coastal Change Forecasts. The USGS National Assessment of Coastal Change Hazards project is working with the National Weather Service (NWS) and the National Centers for Environmental Prediction (NCEP) to combine wave predictions from the Nearshore Wave Prediction System (NWPS) with USGS-derived beach morphology to provide regional weather offices detailed forecasts of wave-induced water levels. The interagency operational model is available at select pilot sites and model forecast can be accessed in the Total Water Level and Coastal Change Forecast viewer. The viewer includes predictions of the timing and magnitude of water levels at the shoreline and potential impacts to coastal dunes.

Hurricane Sandy Response - Storm Impacts and Vulnerability of Coastal Beaches. This project used post-Sandy lidar elevation data to update assessments of storm-induced coastal erosion hazards for Northeast beaches. Extensive data sets on beach morphology and storm hydrodynamics were used to evaluate and improve the accuracy of pre-landfall forecasts of erosion in the Sandy-affected area.

Hurricane Sandy Response - Estuarine Shoreline and Barrier-Island Sandline Change Assessment. A quantitative understanding of long- and short-term physical changes along wetland coastlines is required to support assessments of ecological and societal vulnerabilities to environmental change. This project integrate a wetland assessment with existing coastal-change hazard assessments for the adjacent dunes and beaches along the NJ coastline and along



existing coastal-change hazard assessments for the adjacent dunes and beaches along the NJ coastline and along Assateague Island (MD, VA). It produced new data and models to quantify impacts to the estuarine shorelines.

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**Q6: Coastal Resiliency work in the planning stages that your agency is involved in: Scope of proposed work, etc.**

Probabilistic Beach Change from Storms and Recovery, Fire Island, New York: We are developing a multidisciplinary and multi-scale approach to predict the likelihood of beach change under a range of general storm/recovery that is founded on 1) comprehensive measurement of the regional sediment budget (shelf and nearshore), 2) extensive understanding of centennial- and decadal-scale (e.g., pre-storm) beach behavior, and 3) detailed post-storm monitoring of beach behavior. A series of post-Sandy datasets and reports, including shoreface bathymetry and seismic surveys, terrestrial lidar, and quarterly beach profile surveys support this work (see completed products). To capitalize on these investments and enhance our assessment and prediction capability, we are augmenting an already-planned nearshore vibracoring program to verify geophysical interpretations and refine sediment availability estimates so that they can be integrated with existing models. With these data, we will be able to integrate nearshore and existing subaerial metrics and deliver probabilistic model predictions as science and decision products.

Great South Bay, New York: Due to the breach and formation of a new tidal inlet in the Otis Pike Wilderness Area of Fire Island during Hurricane Sandy (termed the Wilderness Breach), we are being sought from the US Fish and Wildlife Service, the National Park Service, and others to provide expert guidance on the significance of barrier island breaches and managed inlets to backbay water level changes; specifically in Great South Bay, NY. We are monitoring and analyzing backbay water level records and performing numerical simulations of differing storm scenarios and breach/inlet dimensions to investigate how water levels vary in the backbay. In addition to the evaluation of relative flooding hazards, the modeling results can be used for evaluation of nature-based features, such as the reduction of waves, surge and flooding potential due to vegetation.

Cross-shore and Inlets Processes: Coastal resiliency work planned includes the application of a coupled deterministic modeling system to hindcast selected storm case scenarios to identify the primary processes that caused observed coastal change. Some of the scenarios include the shoreline change from Hurricane Irene (2011), shoreline change and breach from Hurricane Sandy (2012), and breach from Hurricane Matthew (2016). Modeling scenarios will focus on determining why breaches occurred at the specified locations, timing of maximum surge and inundation effects, and coastal morphologic change responses.

Hurricane Sandy Coastal Resiliency Program Beach and Dune Restoration Monitoring and Data Collection: The proposed plan (awarded but not yet funded) will use remote sensing techniques and targeted in-situ observations to monitor the post-restoration evolution of beaches, dunes, vegetative cover, and sediment budgets at NFWF beach and dune restoration sites over a 7-year period. We will use these data to evaluate if/how restoration projects improved ecological outcomes and decreased storm vulnerability relative to unaltered environments, thereby providing input necessary for estimating cost-effectiveness. Our plan consists of sampling 150-km of coastline using lidar and imaging that includes specific beach-dune sites from New Jersey to New York, including locations within Cumberland and Cape May counties (NFWF 434329 & USFWS-6), Seven Mile Island (NFWF 41991), Little Egg Harbor (NFWF 44109), and Monmouth Beach (NFWF 43986) in New Jersey and Jacob Riis Gateway National Recreational Area (JRGNRA; NPS-IA) and Shinnecock Reservation (NFWF 44225) in New York. By measuring how both altered and unaltered systems behave during the monitoring period, we can define a baseline against which restoration success can be measured. In addition to remotely-sensed data, in-situ shoreface observations will be collected from Seven Mile Island, NJ (NFWF 41991) and JRGNRA, NY (NPS-IA) and in-situ marsh observations will be collected from Seven Mile Island, NJ (NFWF 41991) and from several estuarine sites (USFWS-6). All of the data collected during the monitoring period will be published in USGS Data Series/Releases or Open-File Reports. Updated vulnerability assessments for the project areas based on remotely sensed elevation-based metrics will be made available through the USGS Coastal Change Hazards Portal (<http://marine.usgs.gov/coastalchangehazardsportal/>) providing indication of the extent to which the restoration reduced storm risk. Finally, project outcomes will be documented in technical reports, peer-reviewed journal articles, and at informational/technical conferences (as needed) in order to broadly report both the utility of methods for monitoring the specified metrics and on project performance. This will support the establishment of restoration “best practices” and the evaluation of cost-effectiveness.

Developing capabilities to forecast long-term shoreline change, barrier island morphology and Piping Plover Habitat: We have been developing the capability to conduct probabilistic models that bring together remote sensing and shoreline datasets to evaluate shoreline change probabilities for U.S. coasts. These probabilities have been applied at multiple scales so that knowledge of larger system behavior can be applied at finer scales to inform management. At the coarsest scale, we have used coastal vulnerability databases to develop Bayesian networks that calculate the probability of long-term shoreline changes as a function of relative sea-level rise rates, wave and tidal climate, geomorphic setting, and coastal slope (Gutierrez et al., 2010, 2011, 2014). At finer scales we have been working to

utilize long-term shoreline change information from the U.S. Geological Survey, shoreline and dune morphology metrics (also from the USGS) and coastal lidar-derived information to develop metrics that can be used with Bayesian networks to forecast future barrier island morphology given information regarding long-term shoreline change rates and management practices (Gutierrez et al., 2015). At the finest scale, we have been collaborating with the U.S. Fish and Wildlife Service and the Virginia Tech Shorebird Program to understand Piping Plover nesting habitat selection (Thieler et al., 2016; Zeigler et al., accepted). Habitat selection data are being used to develop Bayesian networks that can be used evaluate nesting habitat suitability based on historical, present, and likely future conditions (Zeigler et al., accepted; Zeigler et al., in prep). As part of this work, we have collaborated with the shorebird monitoring and management community to further develop data collection tools and protocols that coordinate and standardize the efforts of a large number of people over broad spatial scales (Thieler et al., 2016; Zeigler et al., accepted). Because the majority of Piping Plover breeding habitats exist on barrier islands, this work has been conducted in parallel to the Bayesian network modelling efforts mentioned previously. Consequently, these networks can then be used to evaluate future Piping Plover habitat distribution both at site specific scales and wider regional scales.

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### **Q7: Your area's problems, needs and opportunities:**

USGS CMGP does not have a specific physical presence in the study area. As listed in response to questions 5, 6, and 9, we conduct scientific research in the study area and develop data, knowledge and tools that can be applied to coastal resilience work. USGS CMGP has a long and productive history of working collaboratively with USACE to address priority scientific and data needs.

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### **Q8: Your area's constraints, considerations and objectives:**

As a science agency within the U.S. Department of the Interior, USGS is responsible for providing unbiased, policy-relevant scientific data, knowledge and tools that can be used to improve the information on which management decisions are based.

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### **Q9: Available reports: 1 – completed, 2 – in progress**

Coastal Response to Sea Level Rise, Northeast (ME to VA) Completed:

Lentz, E.E., Thieler, E.R., Plant, N.P., Stippa, S.R., Horton, R., and Gesch, D.B. (2016). Evaluation of dynamic coastal response to sea-level rise modifies inundation likelihood. *Nature Climate Change*, doi:10.1038/nclimate295.  
Lentz, E.E., Stippa, S.R., Thieler, E.R., Plant, N.G., Gesch, D.B., and Horton, R.M., 2015, Evaluating coastal landscape response to sea-level rise in the northeastern United States—Approach and methods: U.S. Geological Survey Open-File Report 2014-1252, <http://dx.doi.org/10.3133/ofr20141252>.

Fire Island Coastal Change Completed:

Hapke, C.J., Brenner, O., Hehre, R., 2015, Quantifying the geomorphic resiliency of barrier island beaches: Proceedings Coastal Sediments 2015, San Diego, 11 – 15 May 2015, [http://dx.doi.org/10.1142/9789814689977\\_0249](http://dx.doi.org/10.1142/9789814689977_0249).  
Hapke, C.J., Brenner, Owen, Hehre, Rachel, and Reynolds, B.J., 2013, Coastal change from Hurricane Sandy and the 2012–13 winter storm season—Fire Island, New York: U.S. Geological Survey Open-File Report 2013–1231, 37 p., <http://pubs.usgs.gov/of/2013/1231/>.  
Hapke, C.J., Plant, N.G., Henderson, R.E., Schwab, W.C., and Nelson, T.R., 2016. Decoupling processes and scales of shoreline morphodynamics. *Marine Geology*, v 381, p. 42-53.  
Lentz, E.E. and Hapke, C.J., 2011, The development of a probabilistic approach to forecast coastal change: Coastal Sediments 2011, [http://dx.doi.org/10.1142/9789814355537\\_0140](http://dx.doi.org/10.1142/9789814355537_0140).  
Lentz, E.E., Hapke, C., 2011, Geologic framework influences on the geomorphology of an anthropogenically modified barrier island: assessment of dune/beach changes at Fire Island, New York: *Geomorphology* 126, 82–96, <http://dx.doi.org/10.1016/j.geomorph.2010.10.03>.  
Lentz, E.E., Hapke, C.J., Stockdon, H.F. and Hehre, R.E., 2013, Improving understanding of near-term barrier island evolution through multi-decadal assessment of morphologic change: *Marine Geology* 337, 125–139, <http://dx.doi.org/10.1016/j.margeo.2013.02.004>.  
Nelson, T.R., Hapke, C.J., 2015, Shoreface response and recovery to Hurricane Sandy: Fire Island, NY, Proceedings Coastal Sediments 2015, San Diego, 11 – 15 May 2015, [http://dx.doi.org/10.1142/9789814689977\\_0012](http://dx.doi.org/10.1142/9789814689977_0012).  
Van Ordmont, M., Hapke, C., Roelvink, D., Nelson, T.R., 2015, The Effects of Geomorphic changes During Hurricane Sandy on Water Levels in Great South Bay, Proceedings Coastal Sediments 2015, San Diego, 11 – 15 May 2015, [http://dx.doi.org/10.1142/9789814689977\\_0221](http://dx.doi.org/10.1142/9789814689977_0221).  
Wilson, Kathleen E., Adams, Peter N., Hapke, Cheryl J., Lentz, Erika E., Brenner, Owen, 2015, Application of Bayesian Networks to hindcast barrier island morphodynamics: *Coastal Engineering*, Volume 102, Pages 30-43, ISSN 0378-3839, <http://dx.doi.org/10.1016/j.coastaleng.2015.04.006>.  
Safak, I., List, J.H., Warner, J.C., and Kumar, N. (2017). Observations and 3D hydrodynamics-based modeling of decadal-scale shoreline change along the Outer Banks, North Carolina, *Coastal Engineering*, 120, 78-92.

- Safak, I., List, J.H., and Warner, J.C. (2016). Barrier island breach evolution: Alongshore transport and bay-ocean pressure gradient interactions. *J. Geophys. Res. Oceans*, 121, doi:10.1002/2016JC012029.
- Schwab, W.C., Baldwin, W.E., and Denny, J.F., 2016, Assessing the impact of Hurricanes Irene and Sandy on the morphology and modern sediment thickness on the inner continental shelf offshore of Fire Island, New York: U.S. Geological Survey Open-File Report 2015–1238, 15 p., <http://dx.doi.org/10.3133/ofr20151238>.
- Schwab, W.C., Baldwin, W.E., and Denny, J.F., 2014, Maps showing the change in modern sediment thickness on the Inner Continental Shelf Offshore of Fire Island, New York, between 1996–97 and 2011: U.S. Geological Survey Open-File Report 2014–1238, <http://dx.doi.org/10.3133/ofr20141238>.
- Schwab, W.C., Denny, J.F., and Baldwin, W.E., 2014, Maps showing bathymetry and modern sediment thickness on the inner continental shelf offshore of Fire Island, New York, pre-Hurricane Sandy: U.S. Geological Survey Open-File Report 2014–1203, <http://dx.doi.org/10.3133/ofr20141203>.
- Schwab, W.C., Baldwin, W.E., Denny, J.F., Hapke, C.J., Gayes, P.T., List, J.H., and Warner, J.C., (2014). Modification of the Quaternary Stratigraphic Framework of the Inner-Continental Shelf Offshore of Fire Island by Holocene Marine Transgression: *Marine Geology*, v. 355, 346–360 p.  
<http://www.sciencedirect.com/science/article/pii/S0025322714001960>.
- Schwab, W.C., Thieler, E.R., Allen, J.R., Foster, D.S., Swift, B.A., Denny, J.F., 2000a, Influence of Inner-Continental Shelf Geologic Framework on the Evolution and Behavior of the Barrier-Island System between Fire Island Inlet and Shinnecock Inlet, Long Island, New York. *Journal of Coastal Research* 16, 408–422.
- Hapke, C.J., Lentz, E.E., Gayes, P.T., McCoy, C.A., Hehre, R., Schwab, W.C., Williams, S.J., 2010, A review of sediment budget imbalances along Fire Island, New York: Can nearshore change explain the deficit?. *Journal of Coastal Research* 26(3), 510–522.
- Schwab, W.C., Baldwin, W.E., Hapke, C.J., Lentz, E.E., Gayes, P.T., Denny, J.F., List, J.H., and Warner, J.C., 2013, Geologic evidence for onshore sediment transport from the inner-continental shelf: Fire Island, New York. *Journal of Coastal Research* 29(3), 536–544.
- Warner, J.C., List, J., Schwab, B., Voulgaris, G., Armstrong, B.A., and Marshall, N. (2014). Inner-shelf circulation and sediment dynamics on a series of shore-face connected ridges offshore of Fire Island, NY. *Ocean Dynamics*, 64, 1767–1781. doi:10.1007/s10236-014-0781-y
- Zambon, J.B., He, R., and Warner, J.C. (2014). Tropical to Extratropical: Marine Environmental Changes Associated with Superstorm Sandy Prior to its Landfall, *Geophysical Research Letters*, 41, doi:10.1002/2014GL061357.
- Armstrong, B.N., Warner, J.C., List, J.H., Martini, M.M., Montgomery, E., Voulgaris, G., and Traykovski, P. (2014). Coastal Change Processes Project data report for observations near Fire Island, New York, January to April 2012: U.S. Geological Survey Open-File Report 2014-1159, available online at <http://pubs.usgs.gov/of/2014/1159/>
- Armstrong, B.N., Warner, J.C., List, J.H., Martini, M.A., Montgomery, E.T., Traykovski, Peter, and Voulgaris, G. (2015). Coastal Change Processes Project data report for oceanographic observations near Fire Island, New York, February through May 2014: U.S. Geological Survey Open-File Report 2015–1033, <http://dx.doi.org/10.3133/ofr20151033>.
- Martini, M.A., Warner, J.C., List, J.H., Armstrong, B.A., and Montgomery, E. (2012). Observations of ocean circulation and sediment transport processes offshore of Fire Island, NY. *Oceans, MTS/IEEE, Hampton Roads, VA*, Oct 14–19, 2012, p1–8.
- Fire Island Coastal Change In Progress:
- Brenner, O.B., Lentz, E.E., Hapke, C.J., Henderson, R.E., Wilson, K.E., and Nelson, T.R., (submitted), Characterizing storm response and recovery using the Beach Change Envelope.
- Hapke, C.J., Nelson, T.R., (in preparation), Morphologic Evolution of the Wilderness Area Breach at Fire Island, NY: 2012–2015. U.S. Geological Survey Open File Report
- Locker, S.D., Miselis, J.L., Buster, N.A., Hapke, C.J., Wadman, H.M., McNinch, J.E., Forde, A.S., and Stalk, C.A., 2017, Nearshore Sediment Thickness, Fire Island, New York: U.S. Geological Survey Open-File Report 2017-xxxx, xx p., <http://doi.org/10.3133/2017xxxx>. (awaiting final bureau approval)
- Schwab, W.C., Baldwin, W., Warner, J.C., List, J.H., and Denny, J.F. (submitted). Change in Morphology and Modern Sediment Thickness on the Inner-Continental Shelf Offshore of Fire Island New York between 2011 and 2014: Assessing the Effect of Hurricane Impact. *Marine Geology*.
- Safak, I., List, J.H., Warner, J.C., and Schwab, W.C. (submitted). Persistent shoreline shape induced from offshore geologic framework: effects of shoreface connected ridges. *Journal of Geophysical Research*.
- van Ormondt, M., Nelson, T.R., Hapke, C.J., in prep. Morphodynamic modelling of the Wilderness Breach: Part 1, In preparation for submission to XXXXX.
- van Ormondt, M., Nelson, T.R., Hapke, C.J., in prep. Morphodynamic modelling of the Wilderness Breach: Part 2, In preparation for submission to XXXX.
- Warner, J.C., Schwab, W.C., List, J.H., Safak, I., Liste, M., and Baldwin, W. (accepted). Inner-shelf ocean dynamics and seafloor morphologic changes during Hurricane Sandy. *Continental Shelf Research*.
- Wilson, K.A. Lentz, E.E., Miselis, J., and Brenner, O.B., in preparation, Working Title: Probabilistic prediction of storm response and recovery along sandy beaches.

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

### Shoreline Change, Barrier Island Morphology, and Piping Plover Habitat Completed:

Gutierrez, B.T., Plant, N.G., and Thieler, E.R., 2011, A Bayesian network to predict vulnerability to sea-level rise: data report. U.S. Geological Survey Data Series 601, available at: <https://pubs.usgs.gov/ds/601>

Gutierrez, B. T., Plant, N.G. and Thieler, E.R., 2011, A Bayesian network to predict the coastal vulnerability to sea-level rise, *J. Geophys. Res.: Earth Surf.*, 116(F02009), 1–15, doi:10.1029/2010JF001891.

Gutierrez, B.T., Plant, N.G., Pendleton, E.A., and Thieler, E.R., 2014, Using a Bayesian Network to predict shore-line change vulnerability to sea-level rise for the coasts of the United States: U.S. Geological Survey Open-File Report 2014–1083, 26 p., <https://dx.doi.org/10.3133/ofr20141083>.

Geider, K.D., Karpanty, S.M., Fraser, J.D., Catlin, D.H., Gutierrez, B.T., Plant, N.G., Turecek, A.M., Thieler, E.R., 2014, A Bayesian Network approach to predicting nest presence of the federally-threatened piping plover (*Charadrius melodus*) using barrier island features, *Ecological Modelling*, 276, 38-50.

Gutierrez, B. T., Plant, N. G., Thieler, E. R., and Turecek, A., 2015, Using a Bayesian network to predict barrier island geomorphologic characteristics, *J. Geophys. Res. Earth Surf.*, 120, 2452–2475, doi:10.1002/2015JF003671.

Thieler, E.R., Zeigler, S., Winslow, L., Hines, M. K., Read, J. S. and Walker, J. I., 2016, Smartphone-based distributed data collection enables rapid assessment of shorebird habitat suitability, *PlosOne*, v. 11, <http://dx.doi.org/10.1371/journal.pone.0164979>

### Shoreline Change, Barrier Island Morphology, and Piping Plover Habitat In Progress:

Zeigler, S. L., Thieler, E. R., Gutierrez, B. T., Plant, N. G., Hines, M., Fraser, J., Catlin, D. H., Karpanty, S. M. Accepted. Smartphone technologies and Bayesian networks to assess shorebird habitat selection. *Wildlife Society Bulletin*.

Zeigler, S. L., Thieler, E. R., Gutierrez, B. T., Plant, N. G., Sturdivant, E., Fraser, J., Catlin, D. H., Karpanty, S. M. In preparation. Quantification of early successional breeding habitat for shorebirds following Hurricane Sandy and subsequent barrier island recovery.

Zeigler, S. L., Thieler, E. R., Gutierrez, B. T., Plant, N. G., Sturdivant, E., Fraser, J., Catlin, D. H., Karpanty, S. M. In preparation. Drivers of piping plover habitat selection along the U.S. Atlantic coast.

### Additional Hurricane Sandy-related Work Completed:

Birchler, J.J., Stockdon, H.F., Doran, K.S., and Thompson, D.M., 2014, National assessment of hurricane-induced coastal erosion hazards—Northeast Atlantic Coast: U.S. Geological Survey Open-File Report 2014–1243, 36 p., doi: 10.3133/ofr20141243

Doran, K.S., Long, J.W., and Overbeck, J.R., 2015, A method for determining average beach slope and beach slope variability for U.S. sandy coastlines: U.S. Geological Survey Open-File Report 2015–1053, 5 p., doi: 10.3133/ofr20151053

Doran, K.S., Stockdon, H.F., Sopkin, K.L., Thompson, D.M., and Plant, N.G., 2013, National assessment of hurricane-induced coastal erosion hazards: Mid-Atlantic Coast: U.S. Geological Survey Open-File Report 2013-1131, 34 p.

Overbeck, J.R., J.W. Long, H.F. Stockdon, and J.J. Birchler, May 2015, Enhancing Evaluation of Post-storm Morphologic Response Using Aerial Orthoimagery from Hurricane Sandy: *Proceedings of the Coastal Sediments 2015*.

Sopkin, K.L., Stockdon, H.F., Doran, K.S., Plant, N.G., Morgan, K.L.M., Guy, K.K., and Smith, K.E.L., 2014, Hurricane Sandy—Observations and analysis of coastal change: U.S. Geological Survey Open-File Report 2014–1088, 54 p.

Stockdon, H.F., Doran, K.J., Sopkin, K.L., Smith, K.E.L., and Fredericks, Xan, 2013, Coastal topography—Northeast Atlantic coast, post-hurricane Sandy, 2012: U.S. Geological Survey Data Series 765.

Stockdon, H.F., Thompson, D.M., and Long, J.W., 2014, Evaluation of wave runup predictions from numerical and parametric models: *Coastal Engineering*, v.92, p. 1-11, doi: 10.1016/j.coastaleng.2014.06.004

Bernier, J. C., N. J. Zaremba, C. J. Wheaton, A. M. Ellis, M. E. Marot, and C. G. Smith (2016), Sedimentologic characteristics of recent washover deposits from Assateague Island, Maryland, U.S. Geological Survey Data Series 999, <http://dx.doi.org/10.3133/ds999>.

Bernier, J. C., J. C. Bernier, S. Douglas, J. Terrano, J. A. Barras, N. G. Plant, and C. G. Smith (2015), Land-Cover Types, Shoreline Positions, and Sand Extents Derived from Landsat Satellite Imagery, Assateague Island to Metompkin Island, Maryland and Virginia, 1984 to 2014, USGS Data Series, 968.

Bishop, J. M., Richmond, Z. B.M., L. N.J., B.D., and H. H. Kane (2016a), Hurricane Sandy washover deposit data from southern Long Beach Island, New Jersey: Grain-size, elevations, and graphic core logs, U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F7PK0D7S>.

Bishop, J. M., Richmond B.R., Z. N.J., B. D. Lunghino, and H. K. Kane (2016b), Hurricane Sandy washover deposits on southern Long Beach Island, New Jersey, U.S. Geological Survey Open-File Report 2016–1090, <http://dx.doi.org/10.3133/ofr20161090>, 14 p.

Guy, K. K. (2015b), Back-island and open-ocean shorelines, and sand areas of Assateague Island, Maryland and Virginia, April 12, 1989, to September 5, 2013, U. S. Geological Survey Data Series.

Guy, K. K. (2015c). Back-island and open-ocean shorelines, and sand areas of Assateague Island. Maryland and



Virginia, April 12, 1989, to September 5, 2013, U.S. Geological Survey Data Series 928.

Guy, K. K. (2015d), Back-island and open-ocean shorelines, and sand areas of the undeveloped areas of New Jersey barrier islands, March 9, 1991, to July 30, 2013, U.S. Geological Survey Data Series 0960.

Smith, C. G., M. E. Marot, A. M. Ellis, C. J. Wheaton, J. C. Bernier, and C. S. Adams (2015), Sedimentological and radiochemical characteristics of marsh deposits from Assateague Island and the adjacent vicinity, Maryland and Virginia, following Hurricane Sandy, U. S. Geological Survey Open-File Report, 2015-1169.

Swiderski, D. C., J. F. Terrano, and K. E. L. Smith (2016), Historical Shoreline for New Jersey (1971 to 1978): Vector Digital Data, U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F76T0JR7>.

Terrano, J. F., and K. E. L. Smith (2015), Estuarine Shoreline and Barrier-Island Sandline Change Assessment, U.S. Geological Survey Data Release, <http://dx.doi.org/10.5066/F71Z42HN>.

Zaremba, N. J., K. E. L. Smith, J. M. Bishop, and C. G. Smith (2016), Ground-penetrating radar and differential global positioning system data collected from Long Beach Island, New Jersey, April 2015, U.S. Geological Survey Data Series 1006, <http://dx.doi.org/10.3133/ds1006>.

Zaremba, N. J., C. G. Smith, J. C. Bernier, and A. Forde (in press), Application of Ground Penetrating Radar for identification of overwash events and other geomorphic features in the stratigraphic record: Assateague Island, MD, *Journal of Environmental and Engineering Geophysics*

#### Estuarine Physical Response Completed:

Aretxabaleta, A. L., Butman, B., and Ganju, N. K., 2014, Water level response in back-barrier bays unchanged following Hurricane Sandy, *Geophysical Research Letters*, 41, 3163-3171. PDF File

Beudin, A., Kalra, T.S., Ganju, N.K. and Warner, J.C., 2017. Development of a coupled wave-flow-vegetation interaction model. *Computers & Geosciences*, 100, 76–86. PDF File

Defne, Z., Ganju, N.K. and Aretxabaleta, A., 2016. Estimating time-dependent connectivity in marine systems. *Geophysical Research Letters*. PDF File

Defne, Z., and Ganju, N. K., 2014, Quantifying the residence time and flushing characteristics of a shallow, back-barrier estuary: application of hydrodynamic and particle tracking models, *Estuaries and Coasts*, 38, 1719-1734. PDF File

del Barrio, P., Ganju, N. K., Aretxabaleta, A. L., Hayn, M., García, A., and Howarth, R. W., 2014, Modeling future scenarios of light attenuation and potential seagrass success in a eutrophic estuary, *Estuarine, Coastal and Shelf Science*, 149, 13-23. PDF File

Ganju, N. K., Brush, M. J., Rashleigh, B., Aretxabaleta, A. L., del Barrio, P., Grear, J. S., ... & Vaudrey, J. M., 2015, Progress and challenges in coupled hydrodynamic-ecological estuarine modeling, *Estuaries and Coasts*, 1-22. PDF File

Ganju, N.K., Defne, Z., Kirwan, M.L., D'Alpaos, A., Carniello, L., and Fagherazzi, S., 2017. Spatially integrative metrics reveal hidden vulnerability of microtidal salt marshes. *Nature Communications*, 8, 14156. PDF File

Ganju, N.K., Kirwan, M.L., Dickhudt, P.J., Guntenspergen, G.R., Cahoon, D.R., and Kroeger, K.D., 2015, Sediment transport based metrics of wetland stability, *Geophysical Research Letters*. PDF File

Ganju, N. K., Miselis, J. L., and Aretxabaleta, A. L., 2014, Physical and biogeochemical controls on light attenuation in a eutrophic, back-barrier estuary, *Biogeosciences*, 11, 7193-7205. PDF File

Ganju, N. K., Nidzieko, N. J., and Kirwan, M. L., 2013, Inferring tidal wetland stability from channel sediment fluxes: Observations and a conceptual model. *Journal of Geophysical Research: Earth Surface*, 118(4), 2045-2058. PDF File

Ganju, N.K., Suttles, S.E., Beudin, A., Nowacki, D.J., Miselis, J.L. and Andrews, B.D., 2016, Quantification of storm-induced bathymetric change in a back-barrier estuary. *Estuaries and Coasts*, pp.1-15. PDF File

Leonardi, N., Defne, Z., Ganju, N.K. and Fagherazzi, S., 2016. Salt marsh erosion rates and boundary features in a shallow Bay. *Journal of Geophysical Research: Earth Surface*. PDF File

Leonardi, N., Ganju, N.K., and Fagherazzi, S., 2015, Absence of a critical threshold for erosion determines salt-marsh survival during violent storms and hurricanes, *Proceedings of the National Academy of Sciences*. PDF File

Miselis, J.L., Andrews, B.D., Nicholson, R.S., Defne, Z., Ganju, N.K. and Navoy, A., 2015. Evolution of mid-Atlantic coastal and back-barrier estuary environments in response to a hurricane: Implications for barrier-estuary connectivity. *Estuaries and Coasts*, pp.1-19. PDF

Aretxabaleta, A. L., Ganju, N. K., Butman, B., and Signell, R. P., in progress, Observations and a linear model of water level in an interconnected inlet-bay system, *Journal of Geophysical Research - Oceans*, doi:10.1029/2016JC012318.

#### New York Harbor and Hudson River Estuary Completed:

Ralston, D. K., Warner, J.C., Geyer, W.R., and Wall, G.R. (2013). Sediment transport due to extreme events: the Hudson River estuary after Tropical Storms Irene and Lee, *Geophysical Research Letters*, 40 (20), pp. 5451-5455. doi: 10.1002/2013GL057906.

Ralston, D. K., W. R. Geyer, and J. C. Warner (2012), Bathymetric controls on sediment transport in the Hudson River estuary: Lateral asymmetry and frontal trapping, *Journal of Geophysical Research, Oceans*, 117, C10013, doi:10.1029/2012JC008124.

**Q10: Other available information:**

Coastal Landscape Response to Sea Level Rise Completed:

Lentz, E.E., Stippa, S.R., Thieler, E.R., Plant, N.G., Gesch, D.B., and Horton, R.M. 2015, Coastal landscape response to sea-level rise assessment for the northeastern United States (ver. 2.0., December 2015): U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F73J3B0B>.

Fire Island Coastal Change Completed:

Brenner, O.T., Hapke, C.J., Lee, K.G., and Kimbrow, D.R., 2016, Terrestrial-based lidar beach topography of Fire Island, New York, May 2015: U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F7862DKH>.

Brenner, O.T., Hapke, C.J., Lee, K.G., and Kimbrow, D.R., 2016, Terrestrial-based lidar beach topography of Fire Island, New York, June 2014: U.S. Geological Survey Data Series 980, <http://dx.doi.org/10.3133/ds980>.

Brenner, O.T., Hapke, C.J., Spore, N.J., Brodie, K.L., and McNinch, J.E., 2015, Ground-based lidar beach topography of Fire Island, New York, April 2014: U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F77H1GNN>.

Brenner, O.T., Hapke, C.J., Spore, N.J., Brodie, K.L., and McNinch, J.E., 2015, Ground-based lidar beach topography of Fire Island, New York, April 2013: U.S. Geological Survey Data Series 921, <http://dx.doi.org/10.3133/ds921>.

Brownell, A.T., Hapke, C.J., Spore, N.J., and McNinch, J.E., 2015, Bathymetry of the Wilderness Breach at Fire Island, New York, June 2013: U.S. Geological Survey Data Series 914, <http://dx.doi.org/10.3133/ds914>.

Henderson, R.H., Hapke, C.J., Brenner, O.T., and Reynolds, B.J., 2015, Hurricane Sandy beach response and recovery at Fire Island, New York: Shoreline and beach profile data, October 2012 to October 2014: U.S. Geological Survey Data Series 931, <http://dx.doi.org/10.3133/ds931>.

Nelson, T.R., Miselis, J.L., Hapke, C.J., Wilson, K.E., Henderson, R.E., Brenner, O.T., Reynolds, B.J., and Hansen, M.E., 2016, Coastal bathymetry data collected in June 2014 from Fire Island, New York—The wilderness breach and shoreface: U.S. Geological Survey Data Series 1007, <http://dx.doi.org/10.3133/ds1007>.

Quarterly post-Sandy beach profile surveys: <https://coastal.er.usgs.gov/fire-island/research/sandy/beach-profiles.html>

Quarterly post-Sandy shoreline change updates: <https://coastal.er.usgs.gov/fire-island/research/sandy/shoreline-change.html>

Fire Island Coastal Change In Progress:

Nelson, T.R., Miselis, J.L., Hapke, C.J., Brenner, O.T., Henderson, R.E., Reynolds, B.J., and Wilson, K.E., xxxx, Coastal bathymetry data collected in October 2014 from Fire Island, New York: Wilderness Breach, Shoreface, and Bay: U.S. Geological Survey Data Series xxxx, <http://dx.doi.org/10.3133/dsxxxx>.

Nelson, T.R., Miselis, J.L., Hapke, C.J., Brenner, O.T., Henderson, R.E., Reynolds, B.J., and Wilson, K.E., xxxx, Coastal bathymetry data collected in May 2015 from Fire Island, New York: the Wilderness Breach and shoreface: U.S. Geological Survey Data Series xxxx, <http://dx.doi.org/10.3133/dsxxxx>.

Shoreline Change, Barrier Island Morphology, and Piping Plover Habitat Completed:

Sturdivant, E. J., Thieler, E. R., Zeigler, S. L., Winslow, L. A., Hines, M. K., Read, J. S., Walker, J. I.. Biogeomorphic classification and images of shorebird nesting sites on the U.S. Atlantic coast: U.S. Geological Survey data release. 2016. doi: 10.5066/F70V89X3

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**Q11: Data gaps:**

We identify the following science and data gaps relevant to coastal resilience in the study area:

- 1) The influence of event-driven geomorphic change on habitat availability.
  - 2) Quantification and understanding of nearshore sediment fluxes on subaerial change.
  - 3) Effect and integration of future sea-level rise with storm impact predictions.
  - 4) Long-term geomorphic change of wetlands and estuaries in response to storms and SLR
  - 5) Shorelines and elevation data to support robust vulnerability assessments requires annual (or more frequent) updates.
  - 6) Ecological impact assessments require updated land-cover land-use estimates updated at annual (or more frequent) intervals.
-

**Q12: How would you like to be involved in the study?**

USGS can participate in many aspects of the study, including field data collection, analysis, and development of adaptive management plan metrics. USGS has the capacity to develop and deploy scientific infrastructure to evaluate efficacy and impacts of coastal resilience measures, and provide data, knowledge and tools that can inform decision making.

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**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

N/A.

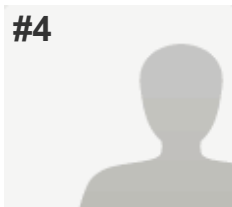
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**Q14: Do you have questions for us?**

Not at this time.

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#4



## COMPLETE

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, February 14, 2017 10:40:40 AM

**Last Modified:** Tuesday, February 14, 2017 10:44:14 AM

**Time Spent:** 00:03:34

**IP Address:** 137.161.255.58

### PAGE 1: Questionnaire

#### Q1: Agency:

Ulster County Planning Department

#### Q2: Role in your region:

The Planning Dept carries out land use planning for Ulster County and also hosts the Ulster County Transportation Council. The Planning Dept. also administers housing programs.

#### Q3: Point of Contact:

Name:	Dennis Doyle
Address:	PO 1800 244 Fair Street Kingston, NY 12402
Phone:	8433403339
Email:	ddoy@co.ulster.ny.us

#### Q4: Agency's area of interest and your concerns:

Please keep the Ulster County Planning Department informed about this study.

**Q5: Coastal Resiliency work completed that your agency was involved in:** Scope of project and details on location, etc.

*Respondent skipped this question*

**Q6: Coastal Resiliency work in the planning stages that your agency is involved in:** Scope of proposed work, etc.

*Respondent skipped this question*

**Q7: Your area's problems, needs and opportunities:**

*Respondent skipped this question*

**Q8: Your area's constraints, considerations and objectives:**

*Respondent skipped this question*

**Q9: Available reports:** 1 – completed, 2 – in progress

*Respondent skipped this question*

**Q10: Other available information:**

*Respondent skipped this question*

**Q11: Data gaps:**

*Respondent skipped this question*

#### Q12: How would you like to be involved in the study?

At this point, continue to send invitations to planning department staff for upcoming meetings and workshops.



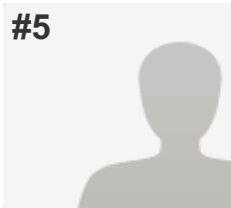
**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

*Respondent skipped this question*

**Q14: Do you have questions for us?**

*Respondent skipped this question*

#5



## COMPLETE

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, February 14, 2017 10:44:31 AM

**Last Modified:** Tuesday, February 14, 2017 12:11:25 PM

**Time Spent:** 01:26:53

**IP Address:** 137.161.255.58

### PAGE 1: Questionnaire

#### Q1: Agency:

NYSDEC

#### Q2: Role in your region:

Estuary Program Coordinator

#### Q3: Point of Contact:

Name:	Fran Dunwell
Address:	21 S Pott Corners Rd New Paltz NY 12561
Phone:	8452563016
Email:	frances.dunwell@dec.ny.gov

#### Q4: Agency's area of interest and your concerns:

*Respondent skipped this question*

#### Q5: Coastal Resiliency work completed that your agency was involved in: Scope of project and details on location, etc.

- Many on-going projects
- Lidar Maps
- River Bottom Maps
- Living Shoreline Projects - sustainable shorelines
- NYSERDA Columbia University Models
- Cornell University Climate Studies
- NAAC Study of Stream highway construction (more assessment underway. 20% complete)

#### Q6: Coastal Resiliency work in the planning stages that your agency is involved in: Scope of proposed work, etc.

- Working in depth with Catskill, Piermont, Kingston, Stony Point and Hudson NY
- FCSA USACE & NYS DEC/NYSDOC for restoration
- Hudson River Research Reserve studies with DEC & NOAA

#### Q7: Your area's problems, needs and opportunities:

- Living Shorelines
- We are doing a FCSA with USACE for habitat restoration& a comprehensive restoration plan for the Hudson north of the Tappan Zee Bridge & Troy. many local projects are being identified Look at those lists.
- Purchase open space lands at site of future flooding to prevent them from being developed.
- strategic retreat
- Forested watershed protection will prevent sediment movement downstream
- use distributed systems to mitigate risk modeling open space protections, forest protection, wetland immigration areas
- need to engage the railroads.

**Q8: Your area's constraints, considerations and objectives:**

- Indian Point Reactor
- no way to predict the height of sea level rise in 100 years and what will happen after 100 years. Use worst case.
- Ecological impact of surge barrier or hardened shoreline could adversely affect coastal fisheries. the Hudson is the spawning ground for migratory fish- striped bass herring, shad, ect which would be significantly be impacted by certain engineering approaches such as hard shoreline & barriers. Millions of fish born here support fisheries from NY to the Carolinas.
- Railroad is effectively the shoreline for about 70% of the estuary. Cant Ignore Them - AMTRAK, CSX, Metro-North
- Fluvial Flooding & Coastal Flooding may coincide. How do you get Floodwater out?
- Sediment Retention by a potential storm surge barrier, cost of sediment removal if trapped.
- NY NJ Port Channel Deepening
- Impact of a barrier on oxygen levels.

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**Q9: Available reports: 1 – completed, 2 – in progress**

- Contact the HR National Estuarine Research Reserve Office

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**Q10: Other available information:**

*Respondent skipped this question*

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**Q11: Data gaps:**

*Respondent skipped this question*

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**Q12: How would you like to be involved in the study?**

Frequent updates in meetings like this.

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**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

Yes- ask us to send you our list.

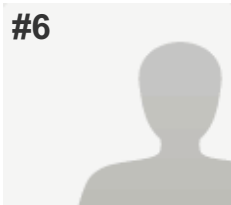
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**Q14: Do you have questions for us?**

*Respondent skipped this question*

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#6



**COMPLETE**

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, February 14, 2017 12:14:16 PM

**Last Modified:** Tuesday, February 14, 2017 12:20:15 PM

**Time Spent:** 00:05:59

**IP Address:** 137.161.255.58

PAGE 1: Questionnaire

**Q1: Agency:**

Ulster County Transportation Council - Metropolitan Planning Organization (MPO) for the Kingston urbanized Area

**Q2: Role in your region:**

*Respondent skipped this question*

**Q3: Point of Contact:**

Name:

Brian Slack

Address:

244 Main St Kingston NY 12401

Email:

bsla@co.ulster.ny.us

**Q4: Agency's area of interest and your concerns:**

Risk Assessment, Reduction of repetitive loss w regard to the transportation system.  
Trans. System Preservation.

**Q5: Coastal Resiliency work completed that your agency was involved in: Scope of project and details on location, etc.**

*Respondent skipped this question*

**Q6: Coastal Resiliency work in the planning stages that your agency is involved in: Scope of proposed work, etc.**

Resiliency Planning w regard to undersized culverts in ulster county  
Scope of Work is under development; focus will likely look at local and county roads, inventory existing facilities, conduct a hydrologic scenario model considering future conditions & I.D. undersized facilities for replacement.

Primary Goals - Transp. system preservation; reduction of repetitive loss.

Geographic focus area is still under development

Local roads? County Roads? State facilities not under consideration

**Q7: Your area's problems, needs and opportunities:**

*Respondent skipped this question*

**Q8: Your area's constraints, considerations and objectives:**

*Respondent skipped this question*

**Q9: Available reports: 1 – completed, 2 – in progress**

*Respondent skipped this question*

**Q10: Other available information:**

*Respondent skipped this question*



**Q11: Data gaps:**

*Respondent skipped this question*

**Q12: How would you like to be involved in the study?**

*Respondent skipped this question*

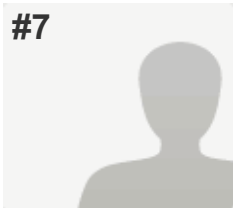
**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

*Respondent skipped this question*

**Q14: Do you have questions for us?**

*Respondent skipped this question*

#7



## COMPLETE

**Collector:** Web Link 1 (Web Link)

**Started:** Tuesday, February 14, 2017 1:22:15 PM

**Last Modified:** Tuesday, February 14, 2017 1:56:14 PM

**Time Spent:** 00:33:58

**IP Address:** 137.161.255.58

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### PAGE 1: Questionnaire

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#### Q1: Agency:

USEPA

#### Q2: Role in your region:

Review comment of EAs/ EISs

#### Q3: Point of Contact:

Name:	Lingard Knutson
Address:	290 Broadway NY NY 10007
Phone:	2126373747
Email:	knutson.lingard@epa.gov

#### Q4: Agency's area of interest and your concerns:

Resiliency  
Appropriate planning/Building on Coast  
Protection of New Infrastructure  
Wetlands (Native Planting)  
Health - Lots of chemicals and stuff get released during storms. Mold is an issue.

#### Q5: Coastal Resiliency work completed that your agency was involved in: Scope of project and details on location, etc.

FEMA Projects - Hospitals NYCAA  
Corps Coastal Projects  
HUD - RBD CDBG (if NEPA)  
FTA/FRA - NJ Transit Resilient projects  
Hudson River Tunnel

#### Q6: Coastal Resiliency work in the planning stages that your agency is involved in: Scope of proposed work, etc.

All aspects depends on when the lead agency invites EPA into the Project

#### Q7: Your area's problems, needs and opportunities:

Prioritization of Projects (\$) (Need-not politics)  
A lot of coastal development (which may not be appropriate)  
Need for more wetland buffers - we have a lot of "hard" waters edge

**Q8: Your area's constraints, considerations and objectives:**

Constraints: high/dense development

Considerations: Do most people care what's done (say wetlands buffer that might take houses vs hard tidal flood gate)

if people don't care - how can we work on educating them or is it an economic question

Objective: Make as many people as possible safe as possible. (and if they don't want it, federal assistance after a storm should be refused)

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**Q9: Available reports: 1 – completed, 2 – in progress**

*Respondent skipped this question*

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**Q10: Other available information:**

*Respondent skipped this question*

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**Q11: Data gaps:**

*Respondent skipped this question*

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**Q12: How would you like to be involved in the study?**

EPA Rep is Mike Poetach

If you need transportation/energy | LNG stuff - just call me.

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**Q13: Are there NGOs or other stakeholders in your area that should be included in the study?**

Mid Atlantic Regional Planning Body (MARCO)

The regional view may give the Corps a different perspective.

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**Q14: Do you have questions for us?**

*Respondent skipped this question*

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1.

Department of the Interior, U.S. Geological Survey

2.

Center Director, Woods Hole Coastal and Marine Science Center (Woods Hole, MA)

Center Director, St. Petersburg Coastal and Marine Science Center (St. Petersburg, FL)

3.

Rob Thieler; Cheryl Hapke

384 Woods Hole Rd, Woods Hole, MA 02543; 600 Fourth Street South St. Petersburg, FL 33701

508-457-2211; 727-502-8068

rthieler@usgs.gov; chapke@usgs.gov

4.

The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life. The USGS Coastal and Marine Geology Program (CMGP) prepares the Nation for the challenges of changing coastal and marine environments by conducting robust and relevant scientific research and by producing science-based tools and products that enable safer, productive, and more resilient communities and natural resources.

5.

Coastal Landscape Response to Sea-Level Rise, Northeastern U.S. (Maine to Virginia): Probabilistic modeling approach predicts the response to sea-level rise across the coastal landscape under a range of future scenarios beginning in the 2020s by evaluating the likelihood of inundation as well as dynamic coastal change. The research was conducted in conjunction with resource managers and decision makers from federal and state agencies, and non-governmental organizations and utilized a structured decision-making approach to ensure research outcomes meet decision making needs. The coastal response information can be used to inform corresponding habitat models, as well as to map out alternative management strategies to optimize conservation efforts and allocate regional resources in the future.

NY Harbor and Hudson River Estuary. The transport of water into and out of the Hudson River Estuary and through the New York Harbor is controlled by estuarine processes of density driven flows, tides, and fresh water input. This combination of processes controls the distribution of sea water, contaminant transport, and flows in the region. Modifications of local bathymetry or geometric configuration of the system will alter these flows and modify residual circulation in the Harbor and Estuary. Over the past decade, we have collaborated with the Woods Hole Oceanographic Institution and the Hudson River Foundation to develop a calibrated three-dimensional ocean circulation and sediment transport model of the Hudson River and New York Harbor region. Research has identified the processes controlling estuarine circulation,



tidal propagation, and storm driven transport of sediment through the system. Modifications to the system would alter these long-term processes.

Estuarine Physical Response to Storms (Jamaica Bay, NY; Barnegat Bay, NJ; Chincoteague Bay, MD/VA): in this project we assessed the estuarine and adjacent wetland responses of three Atlantic lagoonal estuaries to major storm events such as Hurricane Sandy. Evaluations of sediment transport, geomorphic change, circulation, wetland stability, and stratigraphic history supported development of models that can be used to assess storm impacts on estuarine health, vulnerability of adjacent communities, and the resilience of restored and natural wetlands.

Hurricane Sandy Wetland Synthesis (Forsythe NWR, NJ): In this project we developed 1) an assessment of wetland vulnerability and 2) forecasting tools to evaluate wetland response to persistent processes (e.g., tides), future storms, and sea-level rise. These tools quantify wetland resilience and the ecosystem's ability to respond without diminished productivity or loss of ecosystem services. This assessment estimates the benefits and sustainability of restoration projects that rely on wetlands to mitigate future physical, biological, and anthropogenic impacts (through flood mitigation, habitat provision, carbon sequestration). We have quantified many of the primary drivers of wetland change and their effect on ecosystem services and combined these data and derived products into a GIS framework, along with derived metrics to provide a framework for delivering actionable information that can be used to inform future response to storms and SLR.

Fire Island, NY: Inner-shelf to Nearshore connectivity. Through a series of oceanographic deployments, geophysical surveys, and deterministic numerical modeling approaches we have identified connections between the geologic framework of the inner-shelf to coastal nearshore changes. Specifically we have identified the physical processes that are modified by geologic features in the coastal zone to affect long-term shoreline change response along Fire Island. Modification of waves by seafloor bathymetric features create alongshore variations of breaking wave height, driving alongshore gradients of wave driven flows, that create long-term shoreline variations. Based on this research, it is compelling that any future modifications to the inner-shelf will most likely have direct long-term response on shoreline change. This is a culmination of decades of research, linking many interdisciplinary research approaches.

Fire Island, NY: Linking Nearshore Processes and Coastal Vulnerability. This project built on an extensive body of existing knowledge of the Long Island barrier island system (see above) with a focus on filling crucial data gaps in the nearshore and subaerial systems. The objectives were to support the development of refined predictive models of vulnerability to future change from storms, sea-level rise and human activities on management time scales. Critical data collection and assessment for this project included: 1) collection of geophysical data in the very nearshore coastal zone to assess near-term sediment volume available for post-storm recovery and 2) observations of recovery within the subaerial system to establish linkages between nearshore

geophysics, process observations and onshore observations, and to ground-truth model predictions.

National Assessment of Coastal Change Hazards storm response, long-term shoreline change, and sea-level rise vulnerability. Research to understand the magnitude and variability of extreme storm impacts on sandy beaches has improved real-time and scenario-based predictions of coastal change to support management of coastal infrastructure, resources, and safety. Nationally consistent analysis of shoreline positions and maps of changes along open-ocean sandy shores of the conterminous U.S. and parts of Alaska and Hawaii are updated to indicate trends in the nation's shoreline evolution. Historical and recent observations of shoreline change are combined with model simulations to determine the probability of coastal change due to sea-level rise (Gutierrez et al., 2010, 2014, Plant et al., 2015). All three of these vulnerability assessments (storms, long-term shoreline change, sea-level rise) are available on our coastal change hazards portal (<http://marine.usgs.gov/coastalchangehazardsportal/>).

Operational Total Water Level and Coastal Change Forecasts. The USGS National Assessment of Coastal Change Hazards project is working with the National Weather Service (NWS) and the National Centers for Environmental Prediction (NCEP) to combine wave predictions from the Nearshore Wave Prediction System (NWPS) with USGS-derived beach morphology to provide regional weather offices detailed forecasts of wave-induced water levels. The interagency operational model is available at select pilot sites and model forecast can be accessed in the Total Water Level and Coastal Change Forecast viewer. The viewer includes predictions of the timing and magnitude of water levels at the shoreline and potential impacts to coastal dunes.

Hurricane Sandy Response - Storm Impacts and Vulnerability of Coastal Beaches. This project used post-Sandy lidar elevation data to update assessments of storm-induced coastal erosion hazards for Northeast beaches. Extensive data sets on beach morphology and storm hydrodynamics were used to evaluate and improve the accuracy of pre-landfall forecasts of erosion in the Sandy-affected area.

Hurricane Sandy Response - Estuarine Shoreline and Barrier-Island Sandline Change Assessment. A quantitative understanding of long- and short-term physical changes along wetland coastlines is required to support assessments of ecological and societal vulnerabilities to environmental change. This project integrate a wetland assessment with existing coastal-change hazard assessments for the adjacent dunes and beaches along the NJ coastline and along Assateague Island (MD, VA). It produced new data and models to quantify impacts to the estuarine shorelines.

6.

Probabilistic Beach Change from Storms and Recovery, Fire Island, New York: We are developing a multidisciplinary and multi-scale approach to predict the likelihood of beach change under a range of general storm/recovery that is founded on 1) comprehensive measurement of the regional sediment budget (shelf and nearshore), 2) extensive

understanding of centennial- and decadal-scale (e.g., pre-storm) beach behavior, and 3) detailed post-storm monitoring of beach behavior. A series of post-Sandy datasets and reports, including shoreface bathymetry and seismic surveys, terrestrial lidar, and quarterly beach profile surveys support this work (see completed products). To capitalize on these investments and enhance our assessment and prediction capability, we are augmenting an already-planned nearshore vibracoring program to verify geophysical interpretations and refine sediment availability estimates so that they can be integrated with existing models. With these data, we will be able to integrate nearshore and existing subaerial metrics and deliver probabilistic model predictions as science and decision products.

Great South Bay, New York: Due to the breach and formation of a new tidal inlet in the Otis Pike Wilderness Area of Fire Island during Hurricane Sandy (termed the Wilderness Breach), we are being sought from the US Fish and Wildlife Service, the National Park Service, and others to provide expert guidance on the significance of barrier island breaches and managed inlets to backbay water level changes; specifically in Great South Bay, NY. We are monitoring and analyzing backbay water level records and performing numerical simulations of differing storm scenarios and breach/inlet dimensions to investigate how water levels vary in the backbay. In addition to the evaluation of relative flooding hazards, the modeling results can be used for evaluation of nature-based features, such as the reduction of waves, surge and flooding potential due to vegetation.

Cross-shore and Inlets Processes: Coastal resiliency work planned includes the application of a coupled deterministic modeling system to hindcast selected storm case scenarios to identify the primary processes that caused observed coastal change. Some of the scenarios include the shoreline change from Hurricane Irene (2011), shoreline change and breach from Hurricane Sandy (2012), and breach from Hurricane Matthew (2016). Modeling scenarios will focus on determining why breaches occurred at the specified locations, timing of maximum surge and inundation effects, and coastal morphologic change responses.

Hurricane Sandy Coastal Resiliency Program Beach and Dune Restoration Monitoring and Data Collection: The proposed plan (awarded but not yet funded) will use remote sensing techniques and targeted in-situ observations to monitor the post-restoration evolution of beaches, dunes, vegetative cover, and sediment budgets at NFWF beach and dune restoration sites over a 7-year period. We will use these data to evaluate if/how restoration projects improved ecological outcomes and decreased storm vulnerability relative to unaltered environments, thereby providing input necessary for estimating cost-effectiveness. Our plan consists of sampling 150-km of coastline using lidar and imaging that includes specific beach-dune sites from New Jersey to New York, including locations within Cumberland and Cape May counties (NFWF 434329 & USFWS-6), Seven Mile Island (NFWF 41991), Little Egg Harbor (NFWF 44109), and Monmouth Beach (NFWF 43986) in New Jersey and Jacob Riis Gateway National Recreational Area (JRGNRA; NPS-IA) and Shinnecock Reservation (NFWF 44225) in New York. By measuring how both altered and unaltered systems behave during the monitoring period, we can define a baseline against which restoration success can be measured. In addition to

remotely-sensed data, in-situ shoreface observations will be collected from Seven Mile Island, NJ (NFWF 41991) and JRG NRA, NY (NPS-IA) and in-situ marsh observations will be collected from Seven Mile Island, NJ (NFWF 41991) and from several estuarine sites (USFWS-6). All of the data collected during the monitoring period will be published in USGS Data Series/Releases or Open-File Reports. Updated vulnerability assessments for the project areas based on remotely sensed elevation-based metrics will be made available through the USGS Coastal Change Hazards Portal (<http://marine.usgs.gov/coastalchangehazardsportal/>) providing indication of the extent to which the restoration reduced storm risk. Finally, project outcomes will be documented in technical reports, peer-reviewed journal articles, and at informational/technical conferences (as needed) in order to broadly report both the utility of methods for monitoring the specified metrics and on project performance. This will support the establishment of restoration “best practices” and the evaluation of cost-effectiveness.

Developing capabilities to forecast long-term shoreline change, barrier island morphology and Piping Plover Habitat: We have been developing the capability to conduct probabilistic models that bring together remote sensing and shoreline datasets to evaluate shoreline change probabilities for U.S. coasts. These probabilities have been applied at multiple scales so that knowledge of larger system behavior can be applied at finer scales to inform management. At the coarsest scale, we have used coastal vulnerability databases to develop Bayesian networks that calculate the probability of long-term shoreline changes as a function of relative sea-level rise rates, wave and tidal climate, geomorphic setting, and coastal slope (Gutierrez et al., 2010, 2011, 2014). At finer scales we have been working to utilize long-term shoreline change information from the U.S. Geological Survey, shoreline and dune morphology metrics (also from the USGS) and coastal lidar-derived information to develop metrics that can be used with Bayesian networks to forecast future barrier island morphology given information regarding long-term shoreline change rates and management practices (Gutierrez et al., 2015). At the finest scale, we have been collaborating with the U.S. Fish and Wildlife Service and the Virginia Tech Shorebird Program to understand Piping Plover nesting habitat selection (Thieler et al., 2016; Zeigler et al., accepted). Habitat selection data are being used to develop Bayesian networks that can be used evaluate nesting habitat suitability based on historical, present, and likely future conditions (Zeigler et al., accepted; Zeigler et al., in prep). As part of this work, we have collaborated with the shorebird monitoring and management community to further develop data collection tools and protocols that coordinate and standardize the efforts of a large number of people over broad spatial scales (Thieler et al., 2016; Zeigler et al., accepted). Because the majority of Piping Plover breeding habitats exist on barrier islands, this work has been conducted in parallel to the Bayesian network modelling efforts mentioned previously. Consequently, these networks can then be used to evaluate future Piping Plover habitat distribution both at site specific scales and wider regional scales.

7.

USGS CMGP does not have a specific physical presence in the study area. As listed in response to questions 5, 6, and 9, we conduct scientific research in the study area and develop data, knowledge and tools that can be applied to coastal resilience work. USGS CMGP has a



long and productive history of working collaboratively with USACE to address priority scientific and data needs.

8.

As a science agency within the U.S. Department of the Interior, USGS is responsible for providing unbiased, policy-relevant scientific data, knowledge and tools that can be used to improve the information on which management decisions are based.

9.

Coastal Response to Sea Level Rise, Northeast (ME to VA) Completed:

Lentz, E.E., Thieler, E.R., Plant, N.P., Stippa, S.R., Horton, R., and Gesch, D.B. (2016). Evaluation of dynamic coastal response to sea-level rise modifies inundation likelihood. *Nature Climate Change*, doi:10.1038/nclimate295.

Lentz, E.E., Stippa, S.R., Thieler, E.R., Plant, N.G., Gesch, D.B., and Horton, R.M., 2015, Evaluating coastal landscape response to sea-level rise in the northeastern United States—Approach and methods: U.S. Geological Survey Open-File Report 2014-1252, <http://dx.doi.org/10.3133/ofr20141252>.

Fire Island Coastal Change Completed:

Hapke, C.J., Brenner, O., Hehre, R., 2015, Quantifying the geomorphic resiliency of barrier island beaches: *Proceedings Coastal Sediments 2015*, San Diego, 11 – 15 May 2015, [http://dx.doi.org/10.1142/9789814689977\\_0249](http://dx.doi.org/10.1142/9789814689977_0249).

Hapke, C.J., Brenner, Owen, Hehre, Rachel, and Reynolds, B.J., 2013, Coastal change from Hurricane Sandy and the 2012–13 winter storm season—Fire Island, New York: U.S. Geological Survey Open-File Report 2013–1231, 37 p., <http://pubs.usgs.gov/of/2013/1231/>.

Hapke, C.J., Plant, N.G., Henderson, R.E., Schwab, W.C., and Nelson, T.R., 2016. Decoupling processes and scales of shoreline morphodynamics. *Marine Geology*, v 381, p. 42-53.

Lentz, E.E. and Hapke, C.J., 2011, The development of a probabilistic approach to forecast coastal change: *Coastal Sediments 2011*, [http://dx.doi.org/10.1142/9789814355537\\_0140](http://dx.doi.org/10.1142/9789814355537_0140).

Lentz, E.E., Hapke, C., 2011, Geologic framework influences on the geomorphology of an anthropogenically modified barrier island: assessment of dune/beach changes at Fire Island, New York: *Geomorphology* 126, 82–96, <http://dx.doi.org/10.1016/j.geomorph.2010.10.03>.

Lentz, E.E., Hapke, C.J., Stockdon, H.F. and Hehre, R.E., 2013, Improving understanding of near-term barrier island evolution through multi-decadal assessment of morphologic change: *Marine Geology* 337, 125–139, <http://dx.doi.org/10.1016/j.margeo.2013.02.004>

Nelson, T.R., Hapke, C.J., 2015, Shoreface response and recovery to Hurricane Sandy: Fire Island, NY, *Proceedings Coastal Sediments 2015*, San Diego, 11 – 15 May 2015, [http://dx.doi.org/10.1142/9789814689977\\_0012](http://dx.doi.org/10.1142/9789814689977_0012).

Van Ordmont, M., Hapke, C., Roelvink, D., Nelson, T.R., 2015, The Effects of Geomorphic changes During Hurricane Sandy on Water Levels in Great South Bay, *Proceedings Coastal Sediments 2015*, San Diego, 11 – 15 May 2015, [http://dx.doi.org/10.1142/9789814689977\\_0221](http://dx.doi.org/10.1142/9789814689977_0221).

Wilson, Kathleen E., Adams, Peter N., Hapke, Cheryl J., Lentz, Erika E., Brenner, Owen, 2015, Application of Bayesian Networks to hindcast barrier island morphodynamics: Coastal Engineering, Volume 102, Pages 30-43, ISSN 0378-3839, <http://dx.doi.org/10.1016/j.coastaleng.2015.04.006>.

Safak, I., List, J.H., Warner, J.C., and Kumar, N. (2017). Observations and 3D hydrodynamics-based modeling of decadal-scale shoreline change along the Outer Banks, North Carolina, Coastal Engineering, 120, 78-92.

Safak, I., List, J.H., and Warner, J.C. (2016). Barrier island breach evolution: Alongshore transport and bay-ocean pressure gradient interactions. J. Geophys. Res. Oceans, 121, doi:10.1002/2016JC012029.

Schwab, W.C., Baldwin, W.E., and Denny, J.F., 2016, Assessing the impact of Hurricanes Irene and Sandy on the morphology and modern sediment thickness on the inner continental shelf offshore of Fire Island, New York: U.S. Geological Survey Open-File Report 2015–1238, 15 p., <http://dx.doi.org/10.3133/ofr20151238>.

Schwab, W.C., Baldwin, W.E., and Denny, J.F., 2014, Maps showing the change in modern sediment thickness on the Inner Continental Shelf Offshore of Fire Island, New York, between 1996–97 and 2011: U.S. Geological Survey Open-File Report 2014–1238, <http://dx.doi.org/10.3133/ofr20141238>.

Schwab, W.C., Denny, J.F., and Baldwin, W.E., 2014, Maps showing bathymetry and modern sediment thickness on the inner continental shelf offshore of Fire Island, New York, pre-Hurricane Sandy: U.S. Geological Survey Open-File Report 2014–1203, <http://dx.doi.org/10.3133/ofr20141203>.

Schwab, W.C., Baldwin, W.E., Denny, J.F., Hapke, C.J., Gayes, P.T., List, J.H., and Warner, J.C., (2014). Modification of the Quaternary Stratigraphic Framework of the Inner-Continental Shelf Offshore of Fire Island by Holocene Marine Transgression: Marine Geology, v. 355, 346-360 p. <http://www.sciencedirect.com/science/article/pii/S0025322714001960>.

Schwab, W.C., Thielier, E.R., Allen, J.R., Foster, D.S., Swift, B.A., Denny, J.F., 2000a, Influence of Inner-Continental Shelf Geologic Framework on the Evolution and Behavior of the Barrier-Island System between Fire Island Inlet and Shinnecock Inlet, Long Island, New York. Journal of Coastal Research 16, 408-422.

Hapke, C.J., Lentz, E.E., Gayes, P.T., McCoy, C.A., Hehre, R., Schwab, W.C., Williams, S.J., 2010, A review of sediment budget imbalances along Fire Island, New York: Can nearshore change explain the deficit?. Journal of Coastal Research 26(3), 510-522.

Schwab, W.C., Baldwin, W.E., Hapke, C.J., Lentz, E.E., Gayes, P.T., Denny, J.F., List, J.H., and Warner, J.C., 2013, Geologic evidence for onshore sediment transport from the inner-continental shelf: Fire Island, New York. Journal of Coastal Research 29(3), 536-544.

Warner, J.C., List, J., Schwab, B. Voulgaris, G., Armstrong, B.A., and Marshall, N. (2014). Inner-shelf circulation and sediment dynamics on a series of shore-face connected ridges offshore of Fire Island, NY. Ocean Dynamics, 64, 1767–1781. doi:10.1007/s10236-014-0781-y

Zambon, J.B., He, R., and Warner, J.C. (2014). Tropical to Extratropical: Marine Environmental Changes Associated with Superstorm Sandy Prior to its Landfall, Geophysical Research Letters, 41, doi:10.1002/2014GL061357.

Armstrong, B.N., Warner, J.C., List, J.H., Martini, M.M., Montgomery, E., Voulgaris, G., and Traykovski, P. (2014). Coastal Change Processes Project data report for observations near Fire Island, New York, January to April 2012: U.S. Geological Survey Open-File Report 2014-1159, available online at <http://pubs.usgs.gov/of/2014/1159/>

Armstrong, B.N., Warner, J.C., List, J.H., Martini, M.A., Montgomery, E.T., Traykovski, Peter, and Voulgaris, G. (2015). Coastal Change Processes Project data report for oceanographic observations near Fire Island, New York, February through May 2014: U.S. Geological Survey Open-File Report 2015-1033, <http://dx.doi.org/10.3133/ofr20151033>.

Martini, M.A., Warner, J.C., List, J.H., Armstrong, B.A., and Montgomery, E. (2012). Observations of ocean circulation and sediment transport processes offshore of Fire Island, NY. Oceans, MTS/IEEE, Hampton Roads, VA, Oct 14-19, 2012, p1-8.

#### Fire Island Coastal Change In Progress:

Brenner, O.B., Lentz, E.E., Hapke, C.J., Henderson, R.E., Wilson, K.E., and Nelson, T.R., (submitted), Characterizing storm response and recovery using the Beach Change Envelope.

Hapke, C.J., Nelson, T.R., (in preparation), Morphologic Evolution of the Wilderness Area Breach at Fire Island, NY: 2012-2015. U.S. Geological Survey Open File Report

Locker, S.D., Miselis, J.L., Buster, N.A., Hapke, C.J., Wadman, H.M., McNinch, J.E., Forde, A.S., and Stalk, C.A., 2017, Nearshore Sediment Thickness, Fire Island, New York: U.S. Geological Survey Open-File Report 2017-xxxx, xx p., <http://doi.org/10.3133/2017xxxx>.

(awaiting final bureau approval)

Schwab, W.C., Baldwin, W., Warner, J.C., List, J.H., and Denny, J.F. (submitted). Change in Morphology and Modern Sediment Thickness on the Inner-Continental Shelf Offshore of Fire Island New York between 2011 and 2014: Assessing the Effect of Hurricane Impact. Marine Geology.

Safak, I., List, J.H., Warner, J.C., and Schwab, W.C. (submitted). Persistent shoreline shape induced from offshore geologic framework: effects of shoreface connected ridges. Journal of Geophysical Research.

van Ormondt, M., Nelson, T.R., Hapke, C.J., in prep. Morphodynamic modelling of the Wilderness Breach: Part 1, In preparation for submission to XXXXX.

van Ormondt, M., Nelson, T.R., Hapke, C.J., in prep. Morphodynamic modelling of the Wilderness Breach: Part 2, In preparation for submission to XXXX.

Warner, J.C., Schwab, W.C., List, J.H., Safak, I., Liste, M., and Baldwin, W. (accepted). Inner-shelf ocean dynamics and seafloor morphologic changes during Hurricane Sandy. Continental Shelf Research.

Wilson, K.A. Lentz, E.E., Miselis, J., and Brenner, O.B., in preparation, Working Title: Probabilistic prediction of storm response and recovery along sandy beaches.

#### Shoreline Change, Barrier Island Morphology, and Piping Plover Habitat Completed:

Gutierrez, B.T., Plant, N.G., and Thieler, E.R., 2011, A Bayesian network to predict vulnerability to sea-level rise: data report. U.S. Geological Survey Data Series 601, available at: <https://pubs.usgs.gov/ds/601>

Gutierrez, B. T., Plant, N.G. and Thieler, E.R., 2011, A Bayesian network to predict the coastal vulnerability to sea-level rise, *J. Geophys. Res.: Earth Surf.*, 116(F02009), 1–15, doi:10.1029/2010JF001891.

Gutierrez, B.T., Plant, N.G., Pendleton, E.A., and Thieler, E.R., 2014, Using a Bayesian Network to predict shore-line change vulnerability to sea-level rise for the coasts of the United States: U.S. Geological Survey Open-File Report 2014–1083, 26 p., <https://dx.doi.org/10.3133/ofr20141083>.

Geider, K.D., Karpanty, S.M., Fraser, J.D., Catlin, D.H., Gutierrez, B.T., Plant, N.G., Turecek, A.M., Thieler, E.R., 2014, A Bayesian Network approach to predicting nest presence of the federally-threatened piping plover (*Charadrius melodus*) using barrier island features, *Ecological Modelling*, 276, 38-50.

Gutierrez, B. T., Plant, N. G., Thieler, E. R., and Turecek, A., 2015, Using a Bayesian network to predict barrier island geomorphologic characteristics, *J. Geophys. Res. Earth Surf.*, 120, 2452–2475, doi:10.1002/2015JF003671.

Thieler, E.R., Zeigler, S., Winslow, L., Hines, M. K., Read, J. S. and Walker, J. I., 2016, Smartphone-based distributed data collection enables rapid assessment of shorebird habitat suitability, *PlosOne*, v. 11, <http://dx.doi.org/10.1371/journal.pone.0164979>

#### Shoreline Change, Barrier Island Morphology, and Piping Plover Habitat In Progress:

Zeigler, S. L., Thieler, E. R., Gutierrez, B. T., Plant, N. G., Hines, M., Fraser, J., Catlin, D. H., Karpanty, S. M. Accepted. Smartphone technologies and Bayesian networks to assess shorebird habitat selection. *Wildlife Society Bulletin*.

Zeigler, S. L., Thieler, E. R., Gutierrez, B. T., Plant, N. G., Sturdivant, E., Fraser, J., Catlin, D. H., Karpanty, S. M. In preparation. Quantification of early successional breeding habitat for shorebirds following Hurricane Sandy and subsequent barrier island recovery.

Zeigler, S. L., Thieler, E. R., Gutierrez, B. T., Plant, N. G., Sturdivant, E., Fraser, J., Catlin, D. H., Karpanty, S. M. In preparation. Drivers of piping plover habitat selection along the U.S. Atlantic coast.

#### Additional Hurricane Sandy-related Work Completed:

Birchler, J.J., Stockdon, H.F., Doran, K.S., and Thompson, D.M., 2014, National assessment of hurricane-induced coastal erosion hazards—Northeast Atlantic Coast: U.S. Geological Survey Open-File Report 2014–1243, 36 p., doi: 10.3133/ofr20141243

Doran, K.S., Long, J.W., and Overbeck, J.R., 2015, A method for determining average beach slope and beach slope variability for U.S. sandy coastlines: U.S. Geological Survey Open-File Report 2015–1053, 5 p., doi: 10.3133/ofr20151053

Doran, K.S., Stockdon, H.F., Sopkin, K.L., Thompson, D.M., and Plant, N.G., 2013, National assessment of hurricane-induced coastal erosion hazards: Mid-Atlantic Coast: U.S. Geological Survey Open-File Report 2013-1131, 34 p.



Overbeck, J.R., J.W. Long, H.F. Stockdon, and J.J. Birchler, May 2015, Enhancing Evaluation of Post-storm Morphologic Response Using Aerial Orthoimagery from Hurricane Sandy: Proceedings of the Coastal Sediments 2015.

Sopkin, K.L., Stockdon, H.F., Doran, K.S., Plant, N.G., Morgan, K.L.M., Guy, K.K., and Smith, K.E.L., 2014, Hurricane Sandy—Observations and analysis of coastal change: U.S. Geological Survey Open-File Report 2014–1088, 54 p.

Stockdon, H.F., Doran, K.J., Sopkin, K.L., Smith, K.E.L., and Fredericks, Xan, 2013, Coastal topography—Northeast Atlantic coast, post-hurricane Sandy, 2012: U.S. Geological Survey Data Series 765.

Stockdon, H.F., Thompson, D.M., and Long, J.W., 2014, Evaluation of wave runup predictions from numerical and parametric models: Coastal Engineering, v.92, p. 1-11, doi: 10.1016/j.coastaleng.2014.06.004

Bernier, J. C., N. J. Zaremba, C. J. Wheaton, A. M. Ellis, M. E. Marot, and C. G. Smith (2016), Sedimentologic characteristics of recent washover deposits from Assateague Island, Maryland, U.S. Geological Survey Data Series 999, <http://dx.doi.org/10.3133/ds999>.

Bernier, J. C., J. C. Bernier, S. Douglas, J. Terrano, J. A. Barras, N. G. Plant, and C. G. Smith (2015), Land-Cover Types, Shoreline Positions, and Sand Extents Derived from Landsat Satellite Imagery, Assateague Island to Metompkin Island, Maryland and Virginia, 1984 to 2014, USGS Data Series, 968.

Bishop, J. M., Richmond, Z. B.M., L. N.J., B.D., and H. H. Kane (2016a), Hurricane Sandy washover deposit data from southern Long Beach Island, New Jersey: Grain-size, elevations, and graphic core logs, U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F7PK0D7S>.

Bishop, J. M., Richmond B.R., Z. N.J., B. D. Lunghino, and H. K. Kane (2016b), Hurricane Sandy washover deposits on southern Long Beach Island, New Jersey, U.S. Geological Survey Open-File Report 2016–1090, <http://dx.doi.org/10.3133/ofr20161090>, 14 p.

Guy, K. K. (2015b), Back-island and open-ocean shorelines, and sand areas of Assateague Island, Maryland and Virginia, April 12, 1989, to September 5, 2013, U. S. Geological Survey Data Series.

Guy, K. K. (2015c), Back-island and open-ocean shorelines, and sand areas of Assateague Island, Maryland and Virginia, April 12, 1989, to September 5, 2013, U.S. Geological Survey Data Series 928.

Guy, K. K. (2015d), Back-island and open-ocean shorelines, and sand areas of the undeveloped areas of New Jersey barrier islands, March 9, 1991, to July 30, 2013, U.S. Geological Survey Data Series 0960.

Smith, C. G., M. E. Marot, A. M. Ellis, C. J. Wheaton, J. C. Bernier, and C. S. Adams (2015), Sedimentological and radiochemical characteristics of marsh deposits from Assateague Island and the adjacent vicinity, Maryland and Virginia, following Hurricane Sandy, U. S. Geological Survey Open-File Report, 2015-1169.

Swiderski, D. C., J. F. Terrano, and K. E. L. Smith (2016), Historical Shoreline for New Jersey (1971 to 1978): Vector Digital Data, U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F76T0JR7>.

Terrano, J. F., and K. E. L. Smith (2015), Estuarine Shoreline and Barrier-Island Sandline Change Assessment, U.S. Geological Survey Data Release, <http://dx.doi.org/10.5066/F71Z42HN>.

Zaremba, N. J., K. E. L. Smith, J. M. Bishop, and C. G. Smith (2016), Ground-penetrating radar and differential global positioning system data collected from Long Beach Island, New Jersey, April 2015, U.S. Geological Survey Data Series 1006, <http://dx.doi.org/10.3133/ds1006>.

Zaremba, N. J., C. G. Smith, J. C. Bernier, and A. Forde (in press), Application of Ground Penetrating Radar for identification of overwash events and other geomorphic features in the stratigraphic record: Assateague Island, MD, *Journal of Environmental and Engineering Geophysics*

#### Estuarine Physical Response Completed:

Aretxabaleta, A. L., Butman, B., and Ganju, N. K., 2014, Water level response in back-barrier bays unchanged following Hurricane Sandy, *Geophysical Research Letters*, 41, 3163-3171. PDF File

Beudin, A., Kalra, T.S., Ganju, N.K. and Warner, J.C., 2017. Development of a coupled wave-flow-vegetation interaction model. *Computers & Geosciences*, 100, 76–86. PDF File

Defne, Z., Ganju, N.K. and Aretxabaleta, A., 2016. Estimating time-dependent connectivity in marine systems. *Geophysical Research Letters*. PDF File

Defne, Z., and Ganju, N. K., 2014, Quantifying the residence time and flushing characteristics of a shallow, back-barrier estuary: application of hydrodynamic and particle tracking models, *Estuaries and Coasts*, 38, 1719-1734. PDF File

del Barrio, P., Ganju, N. K., Aretxabaleta, A. L., Hayn, M., García, A., and Howarth, R. W., 2014, Modeling future scenarios of light attenuation and potential seagrass success in a eutrophic estuary, *Estuarine, Coastal and Shelf Science*, 149, 13-23. PDF File

Ganju, N. K., Brush, M. J., Rashleigh, B., Aretxabaleta, A. L., del Barrio, P., Gear, J. S., ... & Vaudrey, J. M., 2015, Progress and challenges in coupled hydrodynamic-ecological estuarine modeling, *Estuaries and Coasts*, 1-22. PDF File

Ganju, N.K., Defne, Z., Kirwan, M.L., D'Alpaos, A., Carniello, L., and Fagherazzi, S., 2017. Spatially integrative metrics reveal hidden vulnerability of microtidal salt marshes. *Nature Communications*, 8, 14156. PDF File

Ganju, N.K., Kirwan, M.L, Dickhudt, P.J., Guntenspergen, G.R., Cahoon, D.R., and Kroeger, K.D., 2015, Sediment transport based metrics of wetland stability, *Geophysical Research Letters*. PDF File

Ganju, N. K., Miselis, J. L., and Aretxabaleta, A. L., 2014, Physical and biogeochemical controls on light attenuation in a eutrophic, back-barrier estuary, *Biogeosciences*, 11, 7193-7205. PDF File

Ganju, N. K., Nidzieko, N. J., and Kirwan, M. L., 2013, Inferring tidal wetland stability from channel sediment fluxes: Observations and a conceptual model. *Journal of Geophysical Research: Earth Surface*, 118(4), 2045-2058. PDF File

Ganju, N.K., Suttles, S.E., Beudin, A., Nowacki, D.J., Miselis, J.L. and Andrews, B.D., 2016, Quantification of storm-induced bathymetric change in a back-barrier estuary. *Estuaries and Coasts*, pp.1-15. PDF File

Leonardi, N., Defne, Z., Ganju, N.K. and Fagherazzi, S., 2016. Salt marsh erosion rates and boundary features in a shallow Bay. *Journal of Geophysical Research: Earth Surface*. PDF File

Leonardi, N., Ganju, N.K., and Fagherazzi, S., 2015, Absence of a critical threshold for erosion determines salt-marsh survival during violent storms and hurricanes, *Proceedings of the National Academy of Sciences*. PDF File

Miselis, J.L., Andrews, B.D., Nicholson, R.S., Defne, Z., Ganju, N.K. and Navoy, A., 2015. Evolution of mid-Atlantic coastal and back-barrier estuary environments in response to a hurricane: Implications for barrier-estuary connectivity. *Estuaries and Coasts*, pp.1-19. PDF

Aretxabaleta, A. L., Ganju, N. K., Butman, B., and Signell, R. P., in progress, Observations and a linear model of water level in an interconnected inlet-bay system, *Journal of Geophysical Research - Oceans*, doi:10.1029/2016JC012318.

#### New York Harbor and Hudson River Estuary Completed:

Ralston, D. K., Warner, J.C., Geyer, W.R., and Wall, G.R. (2013). Sediment transport due to extreme events: the Hudson River estuary after Tropical Storms Irene and Lee, *Geophysical Research Letters*, 40 (20), pp. 5451-5455. doi: 10.1002/2013GL057906.

Ralston, D. K., W. R. Geyer, and J. C. Warner (2012), Bathymetric controls on sediment transport in the Hudson River estuary: Lateral asymmetry and frontal trapping, *Journal of Geophysical Research, Oceans*, 117, C10013, doi:10.1029/2012JC008124.

10.

#### Coastal Landscape Response to Sea Level Rise Completed:

Lentz, E.E., Stippa, S.R., Thieler, E.R., Plant, N.G., Gesch, D.B., and Horton, R.M. 2015, Coastal landscape response to sea-level rise assessment for the northeastern United States (ver. 2.0., December 2015): U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F73J3B0B>.

#### Fire Island Coastal Change Completed:

Brenner, O.T., Hapke, C.J., Lee, K.G., and Kimbrow, D.R., 2016, Terrestrial-based lidar beach topography of Fire Island, New York, May 2015: U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F7862DKH>.

Brenner, O.T., Hapke, C.J., Lee, K.G., and Kimbrow, D.R., 2016, Terrestrial-based lidar beach topography of Fire Island, New York, June 2014: U.S. Geological Survey Data Series 980, <http://dx.doi.org/10.3133/ds980>.

Brenner, O.T., Hapke, C.J., Spore, N.J., Brodie, K.L., and McNinch, J.E., 2015, Ground-based lidar beach topography of Fire Island, New York, April 2014: U.S. Geological Survey data release, <http://dx.doi.org/10.5066/F77H1GNN>.

Brenner O.T., Hapke, C.J., Spore, N.J., Brodie, K.L., and McNinch, J.E., 2015, Ground-based lidar beach topography of Fire Island, New York, April 2013: U.S. Geological Survey Data Series 921, <http://dx.doi.org/10.3133/ds921>.

Brownell, A.T., Hapke, C.J., Spore, N.J., and McNinch, J.E., 2015, Bathymetry of the Wilderness Breach at Fire Island, New York, June 2013: U.S. Geological Survey Data Series 914, <http://dx.doi.org/10.3133/ds914>.

Henderson, R.H., Hapke, C.J., Brenner, O.T., and Reynolds, B.J., 2015, Hurricane Sandy beach response and recovery at Fire Island, New York: Shoreline and beach profile data, October 2012 to October 2014: U.S. Geological Survey Data Series 931, <http://dx.doi.org/10.3133/ds931>.

Nelson, T.R., Miselis, J.L., Hapke, C.J., Wilson, K.E., Henderson, R.E., Brenner, O.T., Reynolds, B.J., and Hansen, M.E., 2016, Coastal bathymetry data collected in June 2014 from Fire Island, New York—The wilderness breach and shoreface: U.S. Geological Survey Data Series 1007, <http://dx.doi.org/10.3133/ds1007>.

Quarterly post-Sandy beach profile surveys:

<https://coastal.er.usgs.gov/fire-island/research/sandy/beach-profiles.html>

Quarterly post-Sandy shoreline change updates:

<https://coastal.er.usgs.gov/fire-island/research/sandy/shoreline-change.html>

Fire Island Coastal Change In Progress:

Nelson, T.R., Miselis, J.L., Hapke, C.J., Brenner, O.T., Henderson, R.E., Reynolds, B.J., and Wilson, K.E., xxxx, Coastal bathymetry data collected in October 2014 from Fire Island, New York: Wilderness Breach, Shoreface, and Bay: U.S. Geological Survey Data Series xxxx, <http://dx.doi.org/10.3133/dsxxxx>.

Nelson, T.R., Miselis, J.L., Hapke, C.J., Brenner, O.T., Henderson, R.E., Reynolds, B.J., and Wilson, K.E., xxxx, Coastal bathymetry data collected in May 2015 from Fire Island, New York: the Wilderness Breach and shoreface: U.S. Geological Survey Data Series xxxx, <http://dx.doi.org/10.3133/dsxxxx>.

Shoreline Change, Barrier Island Morphology, and Piping Plover Habitat Completed:

Sturdivant, E. J., Thieler, E. R., Zeigler, S. L., Winslow, L. A., Hines, M. K., Read, J. S., Walker, J. I.. Biogeomorphic classification and images of shorebird nesting sites on the U.S. Atlantic coast: U.S. Geological Survey data release. 2016. doi: 10.5066/F70V89X3

11.

We identify the following science and data gaps relevant to coastal resilience in the study area:

- 1) The influence of event-driven geomorphic change on habitat availability.
- 2) Quantification and understanding of nearshore sediment fluxes on subaerial change.
- 3) Effect and integration of future sea-level rise with storm impact predictions.
- 4) Long-term geomorphic change of wetlands and estuaries in response to storms and SLR



5) Shorelines and elevation data to support robust vulnerability assessments requires annual (or more frequent) updates.

6) Ecological impact assessments require updated land-cover land-use estimates updated at annual (or more frequent) intervals.

12.

USGS can participate in many aspects of the study, including field data collection, analysis, and development of adaptive management plan metrics. USGS has the capacity to develop and deploy scientific infrastructure to evaluate efficacy and impacts of coastal resilience measures, and provide data, knowledge and tools that can inform decision making.

13.

N/A.

14.

Not at this time.

## Bui, Frances

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**From:** Croom, Ginger  
**Sent:** Friday, February 03, 2017 5:36 PM  
**To:** Bui, Frances; Klonsky, Lauren S.  
**Subject:** FW: Agency Workshop Invitation and Questionnaire on behalf of USACE New York District  
**Attachments:** storm.surge.summary.1-19-17.pdf

FYI

---

**From:** Lynn, Andrew [mailto:[alynn@panynj.gov](mailto:alynn@panynj.gov)]  
**Sent:** Friday, February 03, 2017 2:53 PM  
**To:** Croom, Ginger <[CroomGL@cdmsmith.com](mailto:CroomGL@cdmsmith.com)>; Cackler, Olivia N NAN02 <[Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil)> (<[Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil)>); Wisemiller, Bryce W CIV CENAN CENAD (US) <[Bryce.W.Wisemiller@usace.army.mil](mailto:Bryce.W.Wisemiller@usace.army.mil)>  
**Cc:** Daria.S.Mazey@usace.army.mil  
**Subject:** RE: Agency Workshop Invitation and Questionnaire on behalf of USACE New York District

I realize that the first attachment in my last email contained only part of the full document. Here is the complete summary.

---

**From:** Lynn, Andrew  
**Sent:** Tuesday, January 31, 2017 2:04 PM  
**To:** 'Croom, Ginger' <[CroomGL@cdmsmith.com](mailto:CroomGL@cdmsmith.com)>; Cackler, Olivia N NAN02 <[Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil)> (<[Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil)>); Wisemiller, Bryce W CIV CENAN CENAD (US) <[Bryce.W.Wisemiller@usace.army.mil](mailto:Bryce.W.Wisemiller@usace.army.mil)>  
**Cc:** [Daria.S.Mazey@usace.army.mil](mailto:Daria.S.Mazey@usace.army.mil)  
**Subject:** RE: Agency Workshop Invitation and Questionnaire on behalf of USACE New York District

Dear Ginger, Olivia and Bryce,

The Port Authority will be filling out USACE questionnaire and submitting to you soon.

In the meantime, I am sending you the attached descriptions of the proposals of the Metropolitan New York-New Jersey Storm Surge Working Group. I represent the Port Authority on this Working Group. We think the proposed regional storm surge barrier merits thorough study by the USACE's harbor-wide study. It is the most promising truly regional approach to dealing with storm surge and addresses the gaps and shortcomings of the patchwork of resiliency projects being advanced piecemeal by local governments. I described this proposal at the break sessions during the Agency Workshop last week. These documents contain more information.

Andrew Lynn  
Director, Planning and Regional Development

---

**From:** Croom, Ginger [mailto:[CroomGL@cdmsmith.com](mailto:CroomGL@cdmsmith.com)]  
**Sent:** Friday, January 20, 2017 4:58 PM  
**To:** Cackler, Olivia N NAN02 <[Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil)> (<[Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil)>); Wisemiller, Bryce W CIV CENAN CENAD (US) <[Bryce.W.Wisemiller@usace.army.mil](mailto:Bryce.W.Wisemiller@usace.army.mil)>

Cc: [Daria.S.Mazey@usace.army.mil](mailto:Daria.S.Mazey@usace.army.mil)

Subject: Agency Workshop Invitation and Questionnaire on behalf of USACE New York District

Dear Governmental Stakeholder,

As a follow-up to the letter invitation from the U.S. Army Corps of Engineers New York District that you received on January 9, 2017, this email serves as a reminder of two upcoming workshops:

- **January 24, 2017, 9 am – 1 pm, Federal Building, 290 Broadway, New York, NY,** 30<sup>th</sup> Floor, Prefunction Area (Entrance at corner of Duane St. and Broadway)
- **February 7, 2017, 9 am – 1 pm, SUNY, New Paltz, NY,** Room 418 of the Student Union Building. See attached letter invite for more location details.

If you have not already attended the workshop conducted on January 18, 2017, please considering attending one of the upcoming workshops. Please RSVP by replying all so that your RSVP goes to Mr. Wisemiller, Dr. Cackler and me).

Furthermore, if you cannot attend any of the scheduled workshops, **we would like to obtain your feedback by completing the attached questionnaire.** The questionnaire can be completed using the attached link (preferred):

<https://www.surveymonkey.com/r/NYNJHATS>

The questionnaire can also be completed using the attached Word document and emailing back to Mr. Wisemiller, Dr. Cackler and me.

Thank you in advance for your feedback regarding this study.

Ginger Croom, PE  
Associate  
**CDM Smith**  
75 State Street, Suite 701  
Boston, MA 02109  
617-999-9631 (mobile)  
617-452-6594 (phone and fax)  
[www.cdmsmith.com](http://www.cdmsmith.com)

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# Protecting Greater Metropolitan New York from Future Disastrous Storm Surges

## Metropolitan New York—New Jersey Storm Surge Working Group

The World Economic Forum has declared that the largest threat to human civilization and the cause of most anxiety is the failure worldwide to mitigate and adapt to the effects of climate change.<sup>1</sup> The recent fourth anniversary of Superstorm Sandy and the associated catastrophic damage, destruction and human misery that resulted is a reminder that the greater New York Metropolitan area (specified here to include northern New Jersey, western Long Island and western Connecticut) continues to be largely exposed to future megastorms. In fact, the threat grows greater with every passing year due to the expected increase in frequency and severity of extreme storm events, exacerbated by rising sea levels along the eastern seaboard. More than a million residents live at risk from storm surges in communities that are located in the floodplains of the New York City boroughs of Brooklyn, Queens and Staten Island, as well as the south shore of western Long Island and many low-lying communities in New Jersey. Some communities, such as those surrounding Jamaica Bay, have already begun to experience flooding during lunar spring tides, even in settled weather.

Rising sea levels coupled with catastrophic storm surges have prompted many local studies and projects that include hardening coastal infrastructure such as transportation terminals, subway and tunnel entrances; redesigning and lifting the lower floors of buildings; building new and raising existing bulkheads; elevating waste water treatment plants and sewer outfalls; protecting airports; modifying building codes and updating zoning regulations. But, to date, there have been no comprehensive studies of regional metropolitan flood protection systems, similar to those already in operation (and found to be very cost effective) in many coastal cities of global significance in Europe and Southeast Asia. In the absence of a regional approach, New York City and other municipalities in the tri-state area have taken their own prudent steps to advance local flood protection measures which, due to the nature of post-disaster funding, are not part of a coordinated regional protection system.

In the aftermath of Superstorm Sandy, the Metro NY-NJ Storm Surge Working Group (SSWG) was formed to assess the continuing threat of major damage and disruption from future storms and to study how a regional protection approach could best be evaluated and promoted. The group includes distinguished business, academic and civic leaders from across the metropolitan area. The SSWG argues that it is critical for the continuing survival, viability and security of the entire area to give serious consideration to a regional, economically feasible, flood risk reduction system that transcends geographical and political boundaries and that will greatly reduce the risk of flooding of the many coastal cities and suburban communities lying within its perimeter. Such a regional approach is in keeping with the NYS 2100 Commission report, *Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure*, released by Governor Andrew Cuomo in January, 2013.

The report recommendations include developing "...a comprehensive resilience strategy, including a restoration plan and storm surge barrier assessment, for New York Harbor."

In the wake of Sandy, a number of initiatives have been undertaken to reduce the risk of future flooding. Many of these have been federally-funded with post-disaster reimbursements from sources including the Army Corps of Engineers (with projects already authorized and designed, but not appropriated), FEMA, and HUD. Rebuild by Design, a HUD-sponsored competition to imagine flood risk reduction projects that would also benefit communities, attracted 148 entries. State and local agencies in the tri-state region responded quickly and efficiently to the post-disaster funding sources, resulting in projects to rebuild infrastructure and strengthen communities and provide additional protection from flooding.

But what has become clear as projects are being designed and executed throughout the region is that there is not an overall plan to tie the individual projects together. On a regional scale, this means New York City is working on measures that will protect itself without investigating impacts on New Jersey and Long Island communities, or efficiencies that could be achieved through joint projects. On a slightly smaller scale, funding dictates that each individual project must have an "independent utility"; adjoining projects are designed as if the neighboring project were not there. There is no general agreement on design timelines or the anticipated rate of sea level rise, and no single entity to define or enforce design guidelines, so flood risk reduction projects are being designed for various, somewhat arbitrary, flood levels.

Post-Sandy disaster funding is time-limited with rules intended to ensure that design and construction occur as quickly as possible. Unfortunately, these resources have not been accompanied by parallel funding for the study and development of comprehensive solutions that would consider the region over a much longer time horizon (100-150 years). This has resulted in a large number of disconnected projects designed for different levels of resilience that protect some neighborhoods but not others.

The Army Corps of Engineers as the federal agency designated to maintain navigable waterways around the US is best placed to undertake the detailed large-scale studies that are required for bi- or multi- state regional solutions. In response to the destructions wrought by Superstorm Sandy, the Corps has already published its *North Atlantic Coast Comprehensive Study* (2015), which recommended

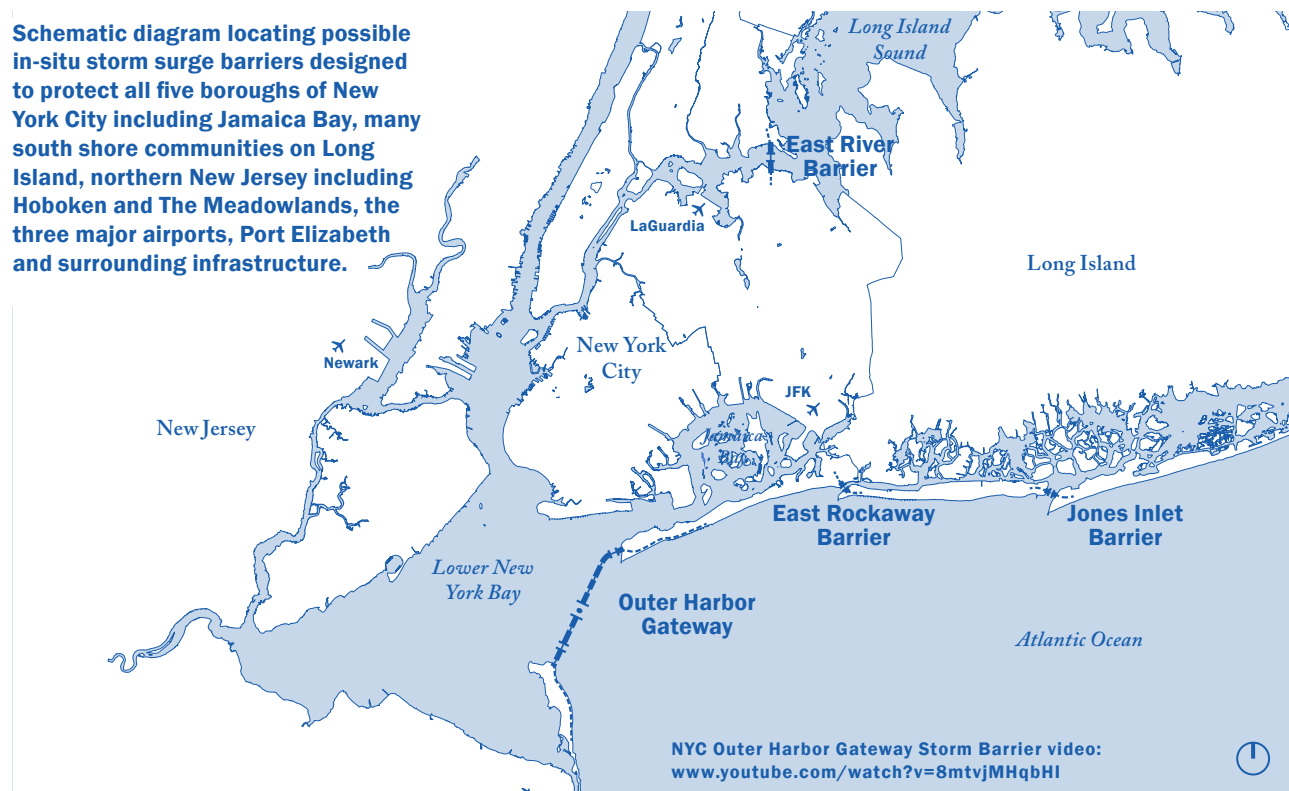
feasibility studies for a number of areas including the NY/NJ Harbor and its tributaries. Scoping for the later feasibility study is now beginning and could, with appropriate resources, be completed in early 2017. Once scoping is complete, the Corps can begin the study itself.

The SSWG believes a regional approach must consider a system that incorporates operable in-water surge barriers of similar scale to those operating or under construction in London, Rotterdam, Venice, St. Petersburg and other global cities facing threats of storm surges and flooding. In the US, the recently-completed expanded barrier system in New Orleans adds to the New England barriers already in successful operation for many years in Stamford, CT, Providence, RI and New Bedford, MA.

The SSWG further believes that the Corps study should thoroughly investigate such a regional flood protection system as the primary line of defense. Then the various local projects underway, such as raising neighborhood bulkheads, building seawalls, elevating and flood-proofing public parks, would become an additional secondary system designed only to protect the region against a slowly rising sea level (estimated to be 3-6 feet by 2100) and not storm surges. This means these seawalls would need to be a fraction of the height of the currently proposed — 12-15 foot walls around Battery Park and Hoboken, for example. Such high walls in these densely populated areas are proving to be much more expensive and difficult to build, as well as being controversial as to where exactly they would be located and how much view and access to the waterfront would be lost. We call this double-pronged approach “bifurcation.” The Group supports consideration of an in-situ storm surge barrier system located i) at the ocean gateway to the New York/New Jersey Harbor estuary; ii) across the upper East River where it connects with western Long Island Sound (where large storm surges occur); iii) across the East Rockaway & Jones Inlets (to protect the City of Long Beach and back-bay communities); iv) across Fire Island Inlet (to protect Great South Bay and adjacent communities). Other inlets further east (e.g., Moriches and Shinnecock) also need to be addressed.

It is critical that the Corps studies be implemented and completed as soon as possible, and the public should encourage elected officials to support the Corps by providing adequate funding. However, many uncoordinated local projects will be designed and built before the Corps studies are published. Given the underlying urgency of providing a functional solution that will endure for at least 100 years,

**Schematic diagram locating possible in-situ storm surge barriers designed to protect all five boroughs of New York City including Jamaica Bay, many south shore communities on Long Island, northern New Jersey including Hoboken and The Meadowlands, the three major airports, Port Elizabeth and surrounding infrastructure.**



studies should begin immediately in parallel to frame the regional system. The study should address issues such as:

- the effectiveness of the regional system under various storm scenarios;
- the effect, if any, that barriers would have on water levels in adjacent areas;
- quantifying the environmental impacts that an in-situ barrier system might have on tidal flows, sedimentation, flushing of the harbor, fish migration and the local ecology;
- developing preliminary designs and construction-cost estimates, along with an assessment of the benefits provided;
- comparing costs and benefits of a large regional system versus the economies of a system of individual projects;
- addressing long-term coastal and regional retreat scenarios if and when continuing sea level rise begins to overtop both local flood protection measures and large in-situ barriers.

In collaboration with the SSWG, the National Institute for Coastal and Harbor Infrastructure (NICHI) is now

beginning an advocacy campaign to build public understanding and support for the study, design, and construction of a regional barrier system that would greatly reduce the risk of flooding of the Metropolitan urban core and the surrounding suburban communities into the next century and beyond.<sup>2</sup> The SSWG provides technical support to NICHI and others working to advance these goals.

In conclusion, Greater New York Metropolitan area will continue to be a leading world city well into the next century if it embraces a bold regional initiative to make the infrastructure improvements necessary to move beyond resilience into protection. A comprehensive White Paper encompassing these proposals in more detail will be released in early 2017.

Signed, Malcolm J. Bowman & Robert Yaro  
for the Metropolitan NY-NJ Working Group

<sup>1</sup> Bloomberg Brief, January 21, 2016.

<sup>2</sup> NICHI: <http://www.nichi.environmentalhistory.org/>



## Workshop Questionnaire for Agencies on the NY and NJ Harbor and Tributaries Feasibility Study for Coastal Storm Risk Management

This form covers the information we are hoping to obtain from you over the course of the workshop. Feel free to fill parts or all of it out in advance, or if you prefer, to fill it out during or after the workshop. It can be returned directly to Olivia Cackler at [Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil). Thank you for contributing to the NY and NJ Harbor and Tributaries Feasibility Study!

**1. Agency:**

Borough of New Milford

**2. Role in your region:**

Borough Engineer

**3. Point of Contact:**

Name: Margita Batistic

Address: Boswell Engineering  
330 Phillips Avenue  
South Hackensack, NJ 07606

Phone: 201-641-0770

Email: [mbatistic@50statesengineering.com](mailto:mbatistic@50statesengineering.com)

**4. Agency's area of interest and your concerns:**

Flooding from Hackensack River and its tributaries and long-term solutions to same

**5. Coastal Resiliency work completed that your agency was involved in**  
Scope of project and details on location, etc.

Flood mitigation at Hirschfield Brook (Hackensack River Tributary)

**6. Coastal Resiliency work in the planning stages that your agency is involved in:**  
Scope of proposed work, etc.

**7. Your area's problems, needs and opportunities:**

- Address flooding from Hackensack River while potentially creating recreational opportunities
- Potential for roadways to serve as barriers
- Use of natural and nature based features to minimize flooding impacts
- Hackensack River dredging

**8. Your area's constraints, considerations and objectives:**

- Environmental permitting
- Time and cost
- Stakeholder buy-in

**9. Available reports: 1 – completed, 2 – in progress**

**10. Other available information:**

**11. Data gaps:**

**12. How would you like to be involved in the study?**

We would like to attend upcoming progress meetings and assist in writing/developing the plan as needed.



**13. Are there NGO's or other stakeholders in your area that should be included in the study?**

**14. Do you have questions for us?**



## Workshop Questionnaire for Agencies on the New York New Jersey Harbor and Tributaries Feasibility Study for Coastal Storm Risk Management

This form covers the information we are hoping to obtain from you over the course of the workshop. Feel free to fill parts or all of it out in advance, or if you prefer, to fill it out during or after the workshop. It can be returned directly to Olivia Cackler at [Olivia.N.Cackler@usace.army.mil](mailto:Olivia.N.Cackler@usace.army.mil). Thank you for contributing to the New York New Jersey Harbor and Tributaries Feasibility Study!

### 1. Agency:

**New York State Department of Transportation – Headquarters Office (NYSDOT)**

### 2. Role in your region:

- NYSDOT coordinates and develops comprehensive transportation policy for the State; coordinates and assists in the development and operation of transportation facilities and services for highways, railroads, mass transit systems, ports, waterways and aviation facilities; and, formulating and keeping current a long-range, comprehensive statewide master plan for the balanced development of public and private commuter and general transportation facilities.
- NYSDOT administers a public safety program for railroads and motor carriers engaged in intrastate commerce; directs state regulation of such carriers in matters of rates and service; and, providing oversight in matters relative to the safe operation of bus lines, commuter railroads and subway systems that are publicly subsidized through the Public Transportation Safety Board.



### 3. Point of Contact:

Name: Elisabeth Lennon

Address: NYSDOT, Division of Policy and Planning, 50 Wolf Road, Albany, NY 12232

Phone: 518/457-7344

Email: [elisabeth.lennon@dot.ny.gov](mailto:elisabeth.lennon@dot.ny.gov)

### 4. Agency's area of interest and your concerns:

#### From 2100 Commission Report:

##### **Strengthen existing transportation networks**

Improve the State's existing infrastructure with an emphasis on key bridges, roads, tunnels, transit, rail, airports, marine facilities, and transportation communication infrastructure.

Focus on improved repair, as well as protecting against multiple hazards including flooding, seismic

impact and extreme weather.

- Protect transit systems and tunnels against severe flooding
- Invest in upgrades to bridges, tunnels, roads, transit and railroads for all hazards
- Strengthen vulnerable highway and rail bridges
- Protect waterway movements
- Safeguard airport operations

##### **Strategically expand transportation networks in order to create redundancies**

Make the system more flexible and adaptive. Encourage alternate modes of transportation.

- Modernize signal and communications systems
- Build a bus rapid transit network
- Expand rail access to/from Manhattan
- Create new trans-Hudson tunnel connection
- Expand rail Access to/from Manhattan with Metro-North Penn Station access
- Expand capacity on the LIRR's Main Line
- Develop alternative modes of transportation

##### **Build for a resilient future with enhanced guidelines, standards, policies, and procedures**

Change the way we plan, design, build, manage, maintain and pay for our transportation network in

light of increased occurrences of severe events.

- Review design guidelines



- Improve long-term planning and fund allocation
- Improve interagency and interstate planning

#### 5. Coastal Resiliency work completed that your agency was involved in:

Scope of project and details on location, etc.

##### **New York Sea Level Rise Taskforce Report to the NYS Legislature December 2010 - Considered entire**

**NY coast exposed to sea level rise. Identified coastal vulnerabilities and made recommendations**

**to reduce these.** [http://www.dec.ny.gov/docs/administration\\_pdf/slrtffinalrep.pdf](http://www.dec.ny.gov/docs/administration_pdf/slrtffinalrep.pdf)

**NYS 2100 Commission Report (quoted in 4).** After Hurricane Sandy struck, the 2100 Commission was created by Gov. Cuomo to review the vulnerabilities faced by the State's infrastructure systems, and develop specific recommendations that can be implemented to increase New York's resilience in five main areas: transportation, energy, land use, insurance, and infrastructure finance. <http://www.governor.ny.gov/sites/governor.ny.gov/files/archive/assets/documents/NYS2100.pdf>

**NYSDOT Flooding Vulnerability Assessment** - NYSDOT completed a statewide flooding risk assessment for state-owned transportation infrastructure based on historical flooding events as well as an assessment of future increases of extreme precipitation and associated flooding. A comprehensive survey was conducted that included knowledgeable "on the ground" operations staff within each of NYSDOT's 11 regional offices. (Data is not shared publically.)

##### **Recommend that USACE obtain a current list of reconstruction projects from Federal Highways**

##### **Administration Emergency Relief and FEMA's Public Assistance groups.**

Some examples with NYSDOT involvement:

- Western Fire Island: Ocean Parkway reconstruction after Hurricane Sandy. Installed sheet piling for embankment protection.

**Other NYSDOT project examples:**

- Loop Parkway and Meadowbrook Parkway bascule bridges projects installed new submarine cables. Submarine cables are used for power and communications lines between the two trunnion towers.
- Long Island NYSDOT region progressed scour critical bridge work which installed rip-rap under most of its salt water bridges.

**NY Rising Community Reconstruction Program**

The New York State Department of Transportation (NYSDOT) has been an active participant in the NY

Rising Community Reconstruction Program. This program, led by the Governor Cuomo's Office of

Storm Recovery has been established to provide additional rebuilding and revitalization assistance to

Communities severely damaged by Hurricanes Sandy and Irene and Tropical Storm Lee. The effort

included the establishment of more than 100 community-specific resiliency plans, with assistance

from expert planning staff to guide the communities through the process.

<https://stormrecovery.ny.gov/community-reconstruction-program>





## 6. Coastal Resiliency work in the planning stages that your agency is involved in:

Scope of proposed work, etc.

### Projects/studies in progress:

#### **FHWA Post Sandy Transportation Resiliency Study NY-NJ-CT:**

[https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing\\_and\\_current\\_research/hurricane\\_sandy/index.cfm](https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/hurricane_sandy/index.cfm)

The objective of this project is to assess the impacts of October 2012's Hurricane Sandy, (and to a lesser extent, Hurricane Irene, Tropical Storm Lee, and the Halloween Nor'easter in 2011)

on the transportation assets within the greater NY-NJ-CT metropolitan region, assess the vulnerability of those assets to the impacts of extreme weather events and the possible future impacts of climate change, and identify adaptation strategies to increase the resilience of the transportation system. The project is expected to be complete in the Spring 2017.

#### **NYSDEC Community Risk and Resiliency Act:** <http://www.dec.ny.gov/energy/102559.html>

The purpose of the Act is to ensure that certain state monies, facility-siting regulations and permits

include consideration of the effects of climate risk and extreme-weather events, coastal and inland flooding.

- NYS adopted sea level rise projections. <http://www.dec.ny.gov/energy/45202.html>
- Developing NYS Flood Risk Management Guidance that will require the consideration of future sea level rise and inland flooding in permit and funding programs.
- Adding a Resiliency Criteria to the NYS Smart Growth Public Infrastructure Act.
- Developing Natural Resiliency Measures Guidance
- Developing Model Local Laws Guidance

#### **Nassau Expressway (Route 878) Reconstruction and Elevation.**

Plans to reconstruct and elevate a segment of the Nassau Expressway in Nassau County (near JFK) are in place.

The planned work will mitigate flooding and improve existing drainage. Road serves as an Emergency Storm

Evacuation Route for more than 400,000 people. Work will begin in 2019.

#### **Deep Water Port Study at Old Shoreham Power Plant.** To study the potential for a deep water port at the old

Shoreham Power Plant. The Shoreham Deepwater Port Study is at the feasibility study level, and will incorporate sea level rise projections. If feasible, a new intermodal facility on Long Island for receiving imports and distributing local goods to distant markets has the potential to remove commercial traffic from



the island's congested roadways and improve air quality.

**NYS Climate Science Clearinghouse;** <https://www.nyclimatescience.org/>

The New York Climate Change Science Clearinghouse (NYCCSC) is a gateway for policymakers, local planners, and the public to identify and access documents, data, websites, tools, and maps relevant to climate change adaptation and mitigation across New York State. The goal of the NYCCSC is to support scientifically sound and cost-effective decision-making. The vision is a dynamic site where users can find information in multiple ways, including through interactive tools that use data from different sources.

**NYSERDA undertakes climate related research projects.**

<https://www.nyserdera.ny.gov/All-Programs/Programs/Environmental-Research/Climate-Change-Research>

Site also has links to the ClimAID Report for NY State and other research.

**Marsh Migration Modeling with SLAMM (Sea Level Affecting Marshes Model)**

- View the maps: [www.slamview.org](http://www.slamview.org) or <http://maps.CoastalResilience.org/newyork> (Future Habitat tab) Principle Investigator: Jonathan Clough, Warren Pinnacle Consulting

This project used models to estimate how wetlands along New York State's coastlines may move and change because of future sea-level rise. Tidal marshes are among the most susceptible ecosystems to climate change, especially to accelerated sea-level rise. Rising sea levels may result in tidal marsh submergence and habitat migration as salt marshes transgress landward and replace tidal freshwater and irregularly flooded marshes. This project provided map-based projections of the potential effects of sea-level rise on the wetland communities of Long Island and New York City. The results will help land-use planners identify appropriate adaptation strategies for these marshes and nearby areas.

**A second follow-up SLAMM study is being conducted now and includes a roadway component.**

Building on the previous SLAMM project, this project will better incorporate roads and infrastructure into the



model analysis, better visualize marsh migration pathways, and develop a decision-support tool that will assist

decision makers in planning adaptation strategies for marsh conservation and coastal community resiliency.

The study area will consist of NYC, Westchester County, and Nassau County. In addition to providing data for

environmental resource managers, this work will benefit policymakers in the energy, transportation, and

drinking water infrastructure sectors.

### **Floodplain Mapping with Sea Level Rise**

Principle Investigator: Brian Batten, Dewberry Engineers

This project studies potential flood zones in the Hudson Valley and on Long Island, using a different

modeling method than the Columbia/Stevens project (Flood Mapping Visualization Tool for Planners

and Storm Surge Modeling). The two projects will allow a comparison of modeling methods to better

inform future assessments. In addition to the 1% and 0.2% annual chance floodplains (100-year and

500-year floodplains), this project will also delineate the limit of moderate wave action (LiMWA)

under future sea level rise scenarios and provide a land-loss estimation tool.



## 7. Your area's problems, needs and opportunities:

Much of NY's coast is vulnerable to sea level rise and flooding. NY State is a "home rule" state and planning is largely accomplished at the local municipal level. Consequently, much of NY's coastal areas are densely populated and the State and local transportation agencies must provide transportation services to these developed and vulnerable coastal areas.

In addition to coastal flooding, riverine flooding potential exists as well. If Sandy had also brought heavy rainfalls, flooding would have been significantly worse.

Opportunities to rebuild/reconstruct transportation assets should also consider public transportation and connectivity needs including transit, rail and non-motorized modes. Transportation infrastructure investments should consider co-benefits such as improvements to quality of life and greenhouse gas and air pollutant emission reductions.

NY City Metro Area has numerous congestion and traffic bottlenecks including many of the large bridges and tunnels.

Opportunities should be identified on how adaptive capacities can be accommodated in the near-term to allow for implementing adaptive measures later in the century.



## 8. Your area's constraints, considerations and objectives:

Transportation funding constraints. Transportation infrastructure has a vast unmet need to bring the state's infrastructure into a state of good repair.

Real estate ownership constraints: Much of the NY City Metro Area has been developed and investing in new transportation infrastructure, such as rail lines above the current and projected Hudson River floodplain elevation, would require costly right of way acquisitions.

## 9. Available reports: 1 – completed, 2 – in progress

See 5 and 6.





#### 10. Other available information:

The NYS Climate Science Clearinghouse; <https://www.nyclimatescience.org/> has extensive information for the area.



## 11. Data gaps:

### **Modeling and Projections.**

Refinement of modeling for future conditions is needed to support planning and engineering decisions. Future projections should improve and refine sea level rise, precipitation and greenhouse gas emission scenarios.

### **Model Combined Vulnerabilities**

Model projections for coastal flooding with heavy/extreme precipitation events.

### **Cost and Benefit Models**

Cost and benefit models for various adaptation strategies are needed for future risks to public and private investments in vulnerable areas.

### **Retreat Strategies**

Effective retreat strategies should be identified along with strategies on how to best communicate these to the public and private/commercial investors.

### **Communicating Flood Risk**

Develop effective public outreach strategies and tools to communicate flooding risk.

## 12. How would you like to be involved in the study?

Be involved in a reviewing role.

Be able to provide input in regard to transportation resilience and co-benefits.

## 13. Are there NGOs or other stakeholders in your area that should be included in the study?

**NY City Office of Resiliency**

**NY Metropolitan Transportation Council (NYMTC)**

**Hudson River rail (owners, operators)**

**Municipalities along study area**

**Scenic Hudson (NGO)**



#### 14. Do you have questions for us?

