NJ Coastal Study Meeting

Community Kick-off #1

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Photo credit NOAA/NASA

Today's Goals

1	2	3
Coastal Study Overview	Review Coastal Reanalysis Milestones	Discuss Opportunities for Collaboration

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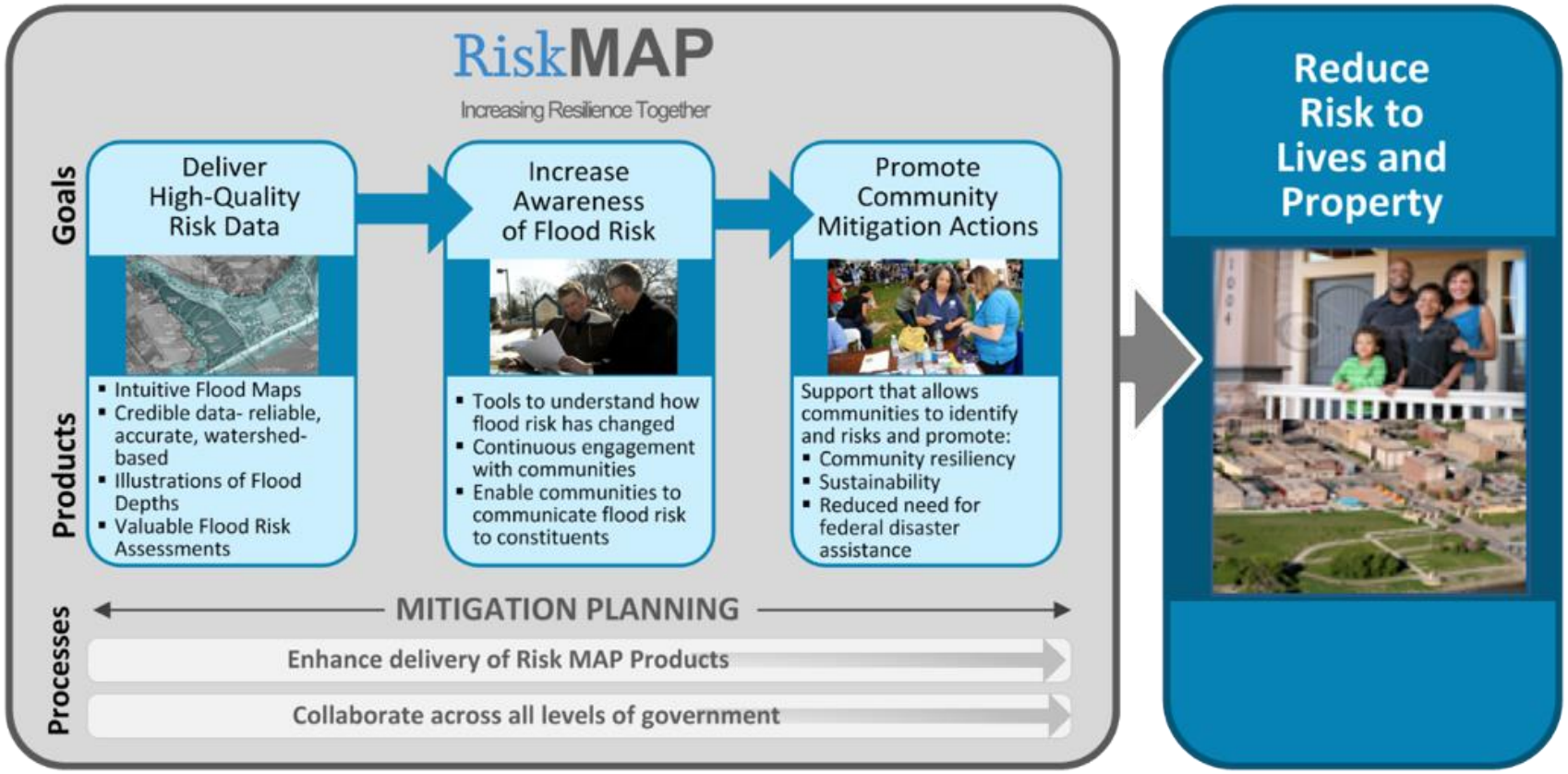
FEMA Mitigation Division

Risk MAP - Mapping Assessment and Planning:

Provide updated flood hazard data to 100% of populated U.S. coasts to create stronger and safer communities



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Flood Maps Impact Important Decisions

To Identify Hazards and Assess the Flood Risk

To Establish Rates for Flood Insurance

To Inform Local Land Use Planning

To Inform Engineers and Developers

To Equip Emergency Managers

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National Flood Insurance Program (NFIP)

- Voluntary program based on a mutual agreement between the Federal government and the local community.
- In exchange for adopting and enforcing a Floodplain Management ordinance, Federally-backed flood insurance is made available.

Federal	State	Local
• Risk Identification and Mapping • Building/Development Standards • Flood Insurance	• Building Codes • Technical Assistance • Set Enhanced Building/Development Standards	• Adoption and Enforcement of Development and Building Standards

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Coastal Study Overview

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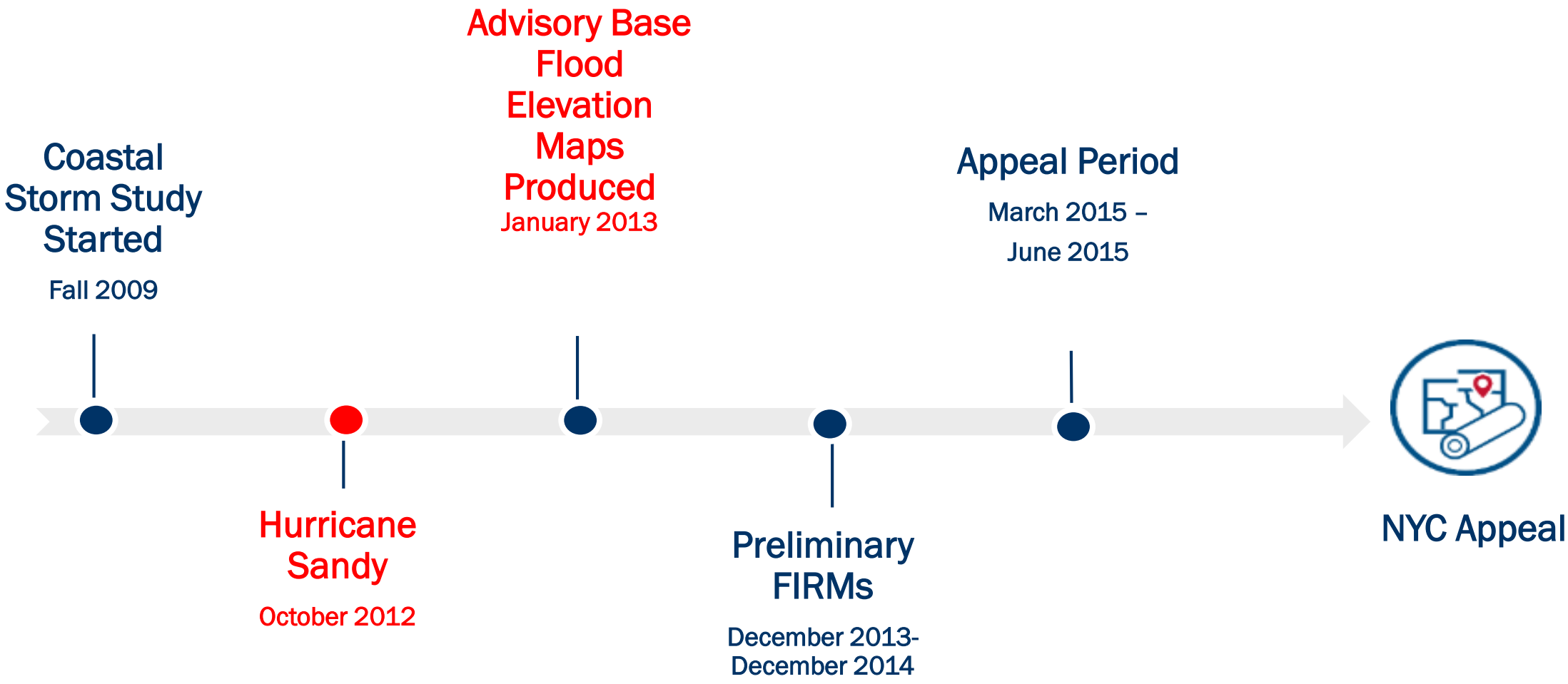
Coastal Study Analysis: 2009 - 2015



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Coastal Study Analysis: 2015 - 2017

New York City challenged two aspects of FEMA's storm surge analysis (validation of extratropical storms and representation of tidal effects)

The FEMA team agreed with NYC's findings and developed an approach to address them

FEMA initiated a series of analyses and "pressure tests" to determine next steps

Sensitivity analyses conducted and finalized Summer 2017, results are informing reanalysis

Region II storm surge, started late 2017, and r**eanalysis data** will include storms occurring post-2010 – Irene, Sandy, 2016 Nor'easter, etc.

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Summary of Post-Appeal Sensitivity Analysis (2016-2017)

- Results from the Region II Coastal Surge Sensitivity Study and a review of the post-2009 storm history will assist in evaluation of which storms should be added to the historical tropical and extra-tropical storm databases.

- There were three specific shortcomings within the FEMA study that will be addressed in surge model restudy:

Issue 1: Extratropical Storm Validation

- Model Error Analysis and Bias Assessment
- Assessment of the 1950 Storm Event
- Reanalysis of Historical Wind Fields

Issue 2: Representation of Tidal Effects

- Improve analysis of non-linear tide/surge interaction,

Issue 3: Inclusion of Post-2009 Storm Events

- Expand validation effort to include historic hurricanes to improve overall effort.

Restudy: Each of these technical activities further explore and expand on the IRB recommendations with the goal of clearly identifying lessons learned and developing technical recommendations that can be carried forward to the revised Region II coastal flood risk study. Revised flood maps will also be produced for the entire New Jersey coastal study area.

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Previous Appeals

NJ/NY Coastal Study: History of Appeal Submissions			
County	Total number of appeals	Number of appeals not accepted due to insufficient Information	Number of appeals resolved
Atlantic, NJ	7	1	6
Bergen, NJ	10	8	2
Cape May, NJ	8	3	5
Essex, NJ	6	1	5
Hudson, NJ	5	0	5
Middlesex, NJ	58	56	2
Monmouth, NJ	20	10	10
New York City	27	23	4
Ocean, NJ	19	3	16
Union, NJ	7	0	7

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Community Engagement

- **External outreach/engagement began Oct. 17, 2016**
  - Formal meeting w/City of New York to begin appeal resolution discussions
  - New Jersey and New York State government and congressional delegation

- **New Jersey Community Briefings were held between November 2016 – March 2017 in 10 counties reaching over 221 communities**

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Map Adoption

Several communities opted to adopt their current maps

County	Communities	LFD Date	Effective Date
Cape May	Avalon, Cape May, Cape May Point, Dennis, Middle, North Wildwood, Ocean City, Sea Isle City, Stone Harbor, Upper ,West Cape May, West Wildwood, Wildwood, Wildwood Crest, and Woodbine	4/5/2017	10/5/2017
Ocean	Point Pleasant Beach	12/20/2017	6/20/2018
Monmouth	Borough of Highlands, Little Silver, Matawan, and Monmouth Beach	12/20/2017	6/20/2018
Atlantic	Absecon, Brigantine, Egg Harbor Township, City of Egg Harbor (construction only) Hamilton, Linwood, Longport, Margate, and Mullica	2/28/18	8/28/18

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Big Picture Next Steps

Federal Sandy recovery projects will continue to be informed by preliminary FIS/FIRMs in NYC, Rockland & Westchester Counties, and coastal NJ Counties.

Flood Insurance Rate purchase requirements will continue to be based on current effective FIRMs

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Review Coastal Reanalysis Milestones

2017 - Present

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Overview of Study Area – Surge Study

- Surge Study
  - Tidal Hudson River
  - Western Long Island Sound
  - NY & Raritan Bay
  - Atlantic Ocean
  - Does NOT include Delaware Bay

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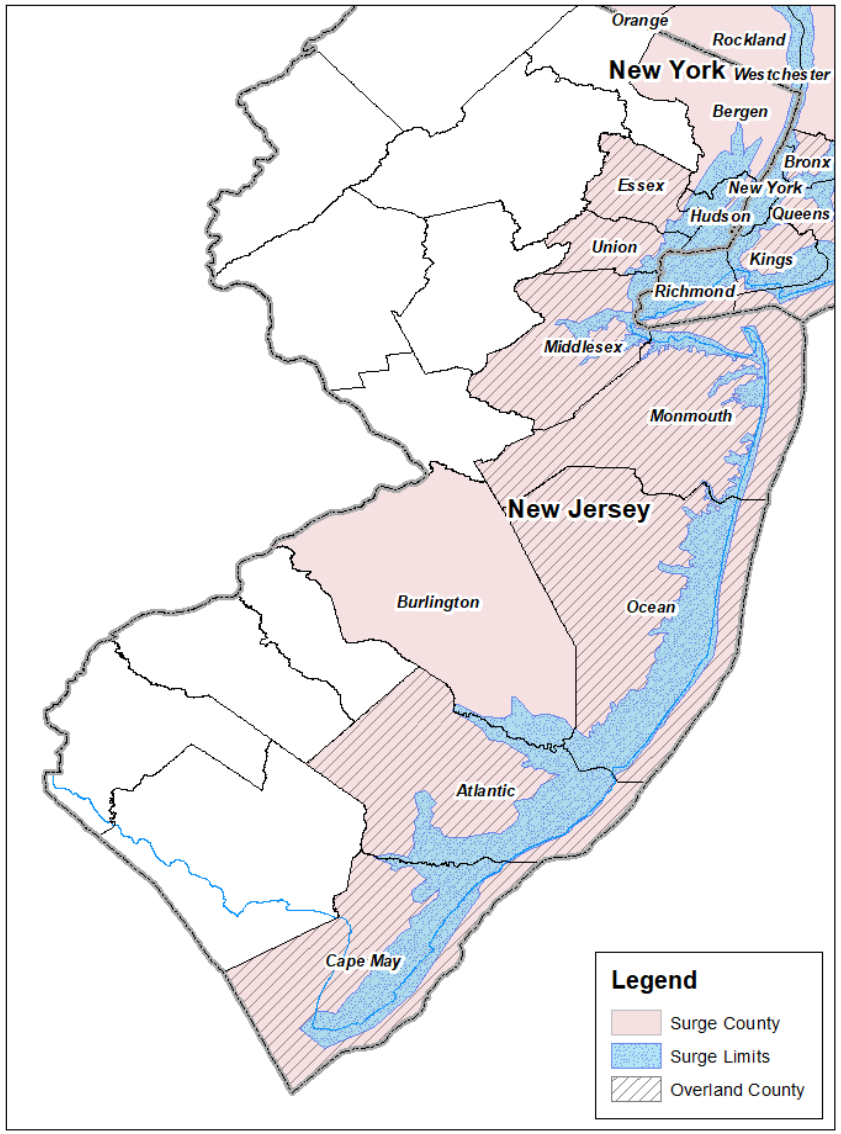
Overview of Study Area – Flood Hazard Mapping

- Flood Hazard Mapping Communities:
  - NYC (5 Boroughs); Atlantic, Cape May, Essex, Hudson, Middlesex, Monmouth, Ocean, and Union Counties in NJ



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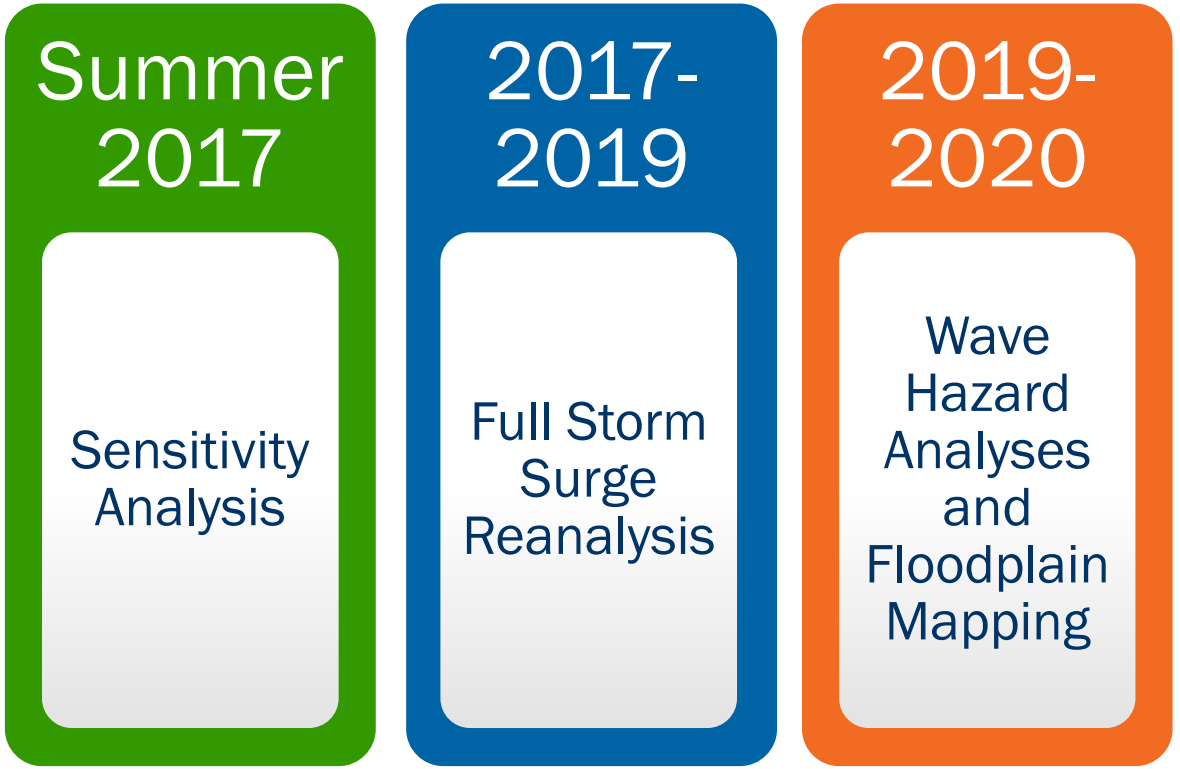
Key Milestones

- All work to be performed with tight quality control
- Revised FIRMs will be produced for NYC and NJ coastal study areas
- Engaging NYC and NYS & NJ agencies as part of Stakeholder Committee



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Quality Assurance

- **Independent Coastal Steering Committee (CSC)**
  - Internal group of experts in storm surge modeling and FEMA coastal study process
  - Independent from study production

- **Will establish a Stakeholder Committee for external oversight**
  - State of New Jersey, State of New York, NYC, FEMA, and CSC

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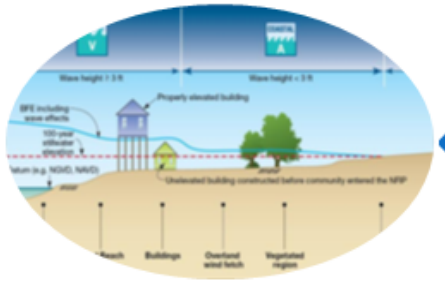
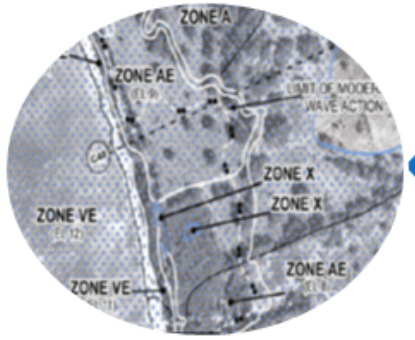
NY-NJ Storm Surge Study - Project Goals



Determine revised Base Flood Elevations (BFEs) and flood inundation boundaries for 1% annual-chance (base) flood total water levels



Update the coastal Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) Panels

Assist communities with incorporating this information into risk assessment and hazard mitigation planning

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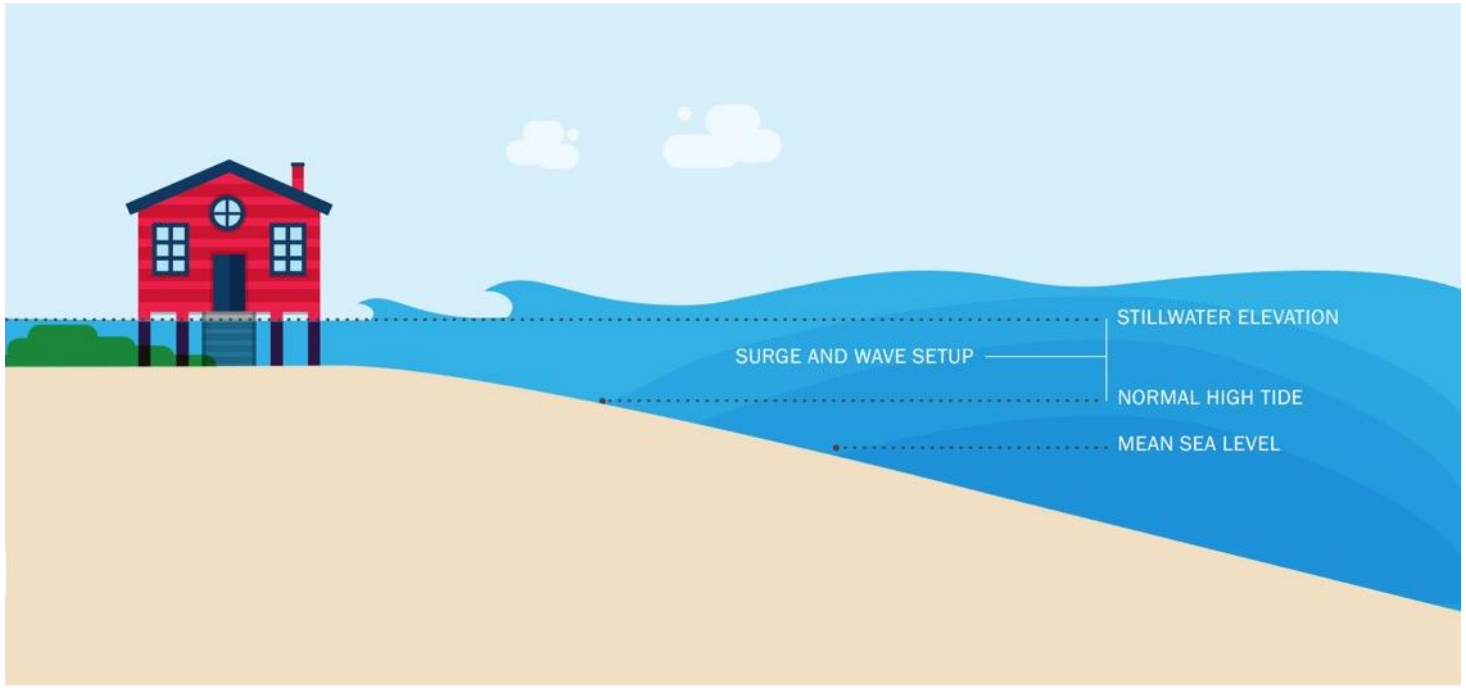
Coastal Study Phase 1: Storm Surge Study



EVALUATE WATER LEVELS AND STORM SURGE

In order to identify coastal flood hazards, FEMA analyzes sea level, tides, wave setup, and storm surge. Storm surge is the water that is pushed toward the shore by strong winds during a storm. Wave setup is the increase in water level caused by the onshore movement of water due to waves breaking.

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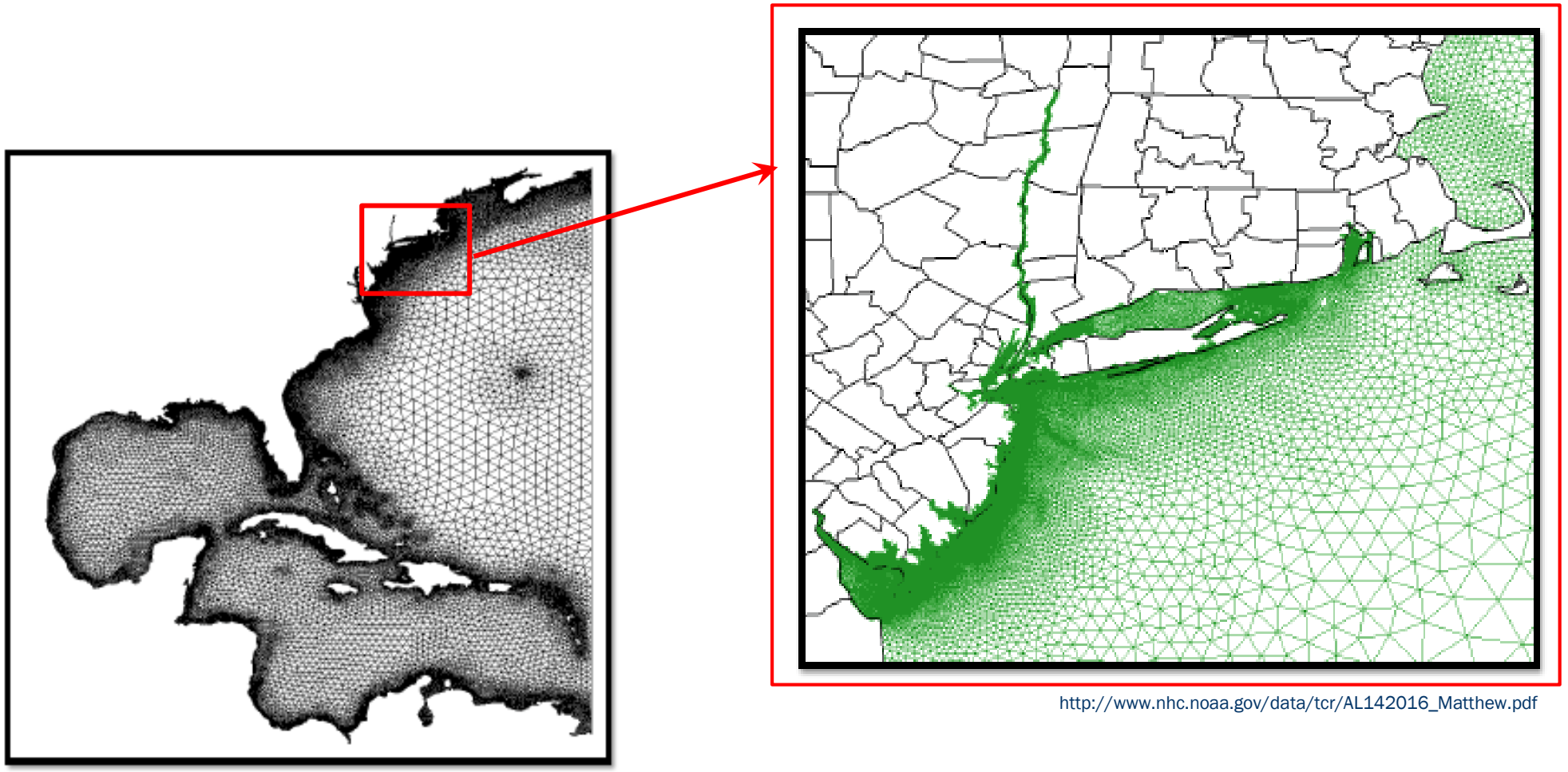
NYNJ Study SWAN+ADCIRC Mesh



http://www.nhc.noaa.gov/data/tcr/AL142016_Matthew.pdf

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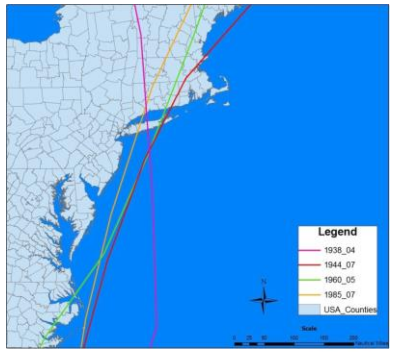
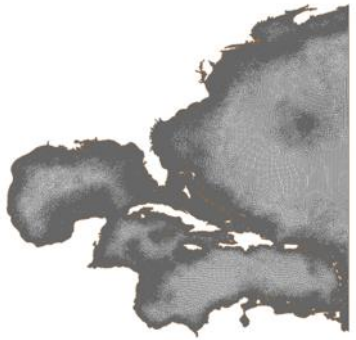
Approach - Storm Surge Stillwater Elevation (SWEL)





Storm Forcing
Hurricane Tracks

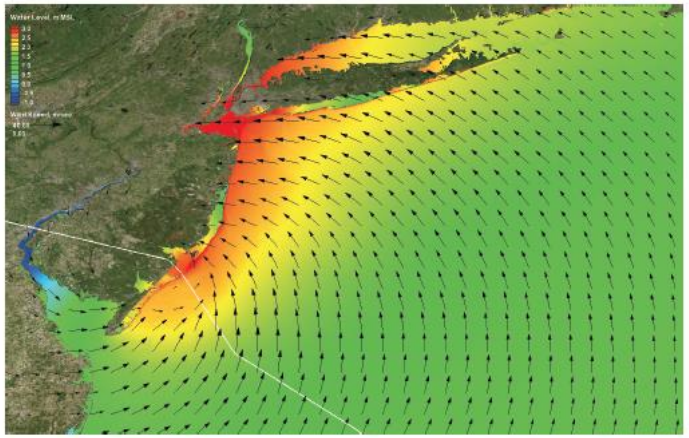
Storm Surge Modeling

Winds

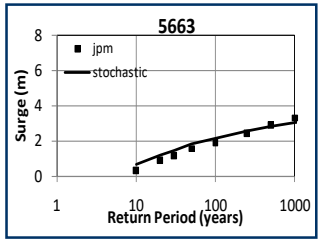
Waves ⟷ **Water Levels**

Return Period Analysis
JPM-OS for Tropical Storms (low freq.)
EST Analysis for Extra-Tropical Storms (high freq.)
Analysis to Develop Combined Probability

SWEL



High-Resolution Bathymetry / Topography Mesh



JPM-OS: Joint Probability Method - Optimum Sampling
EST: Empirical Simulation Technique

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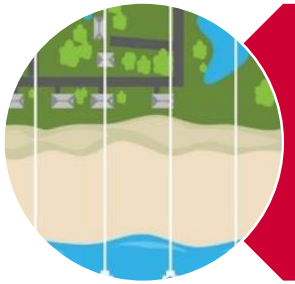
Coastal Study Phase 2: Wave Hazard Analysis



Define cross-shore transects

Evaluate storm-induced erosion and shore protection structures

Wave hazard modeling: overland wave propagation & wave run-up/overtopping

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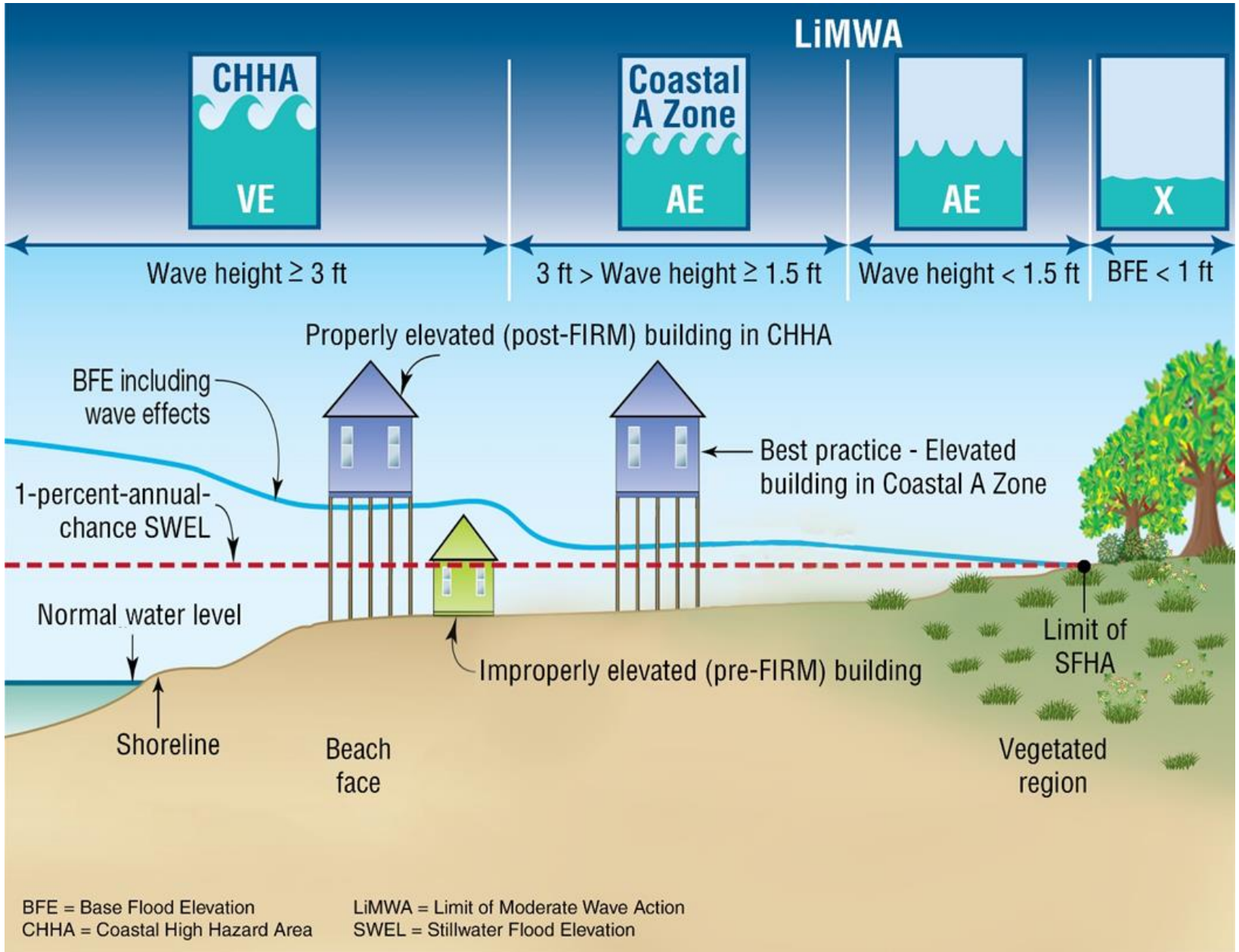
LiMWA
CHHA
VE
Coastal A Zone
AE
AE
X
Wave height ≥ 3 ft
3 ft > Wave height ≥ 1.5 ft
Wave height < 1.5 ft
BFE < 1 ft
Properly elevated (post-FIRM) building in CHHA
BFE including wave effects
1-percent-annual-chance SWEL
Best practice - Elevated building in Coastal A Zone
Normal water level
Improperly elevated (pre-FIRM) building
Limit of SFHA
Shoreline
Beach face
Vegetated region
BFE = Base Flood Elevation
CHHA = Coastal High Hazard Area
LiMWA = Limit of Moderate Wave Action
SWEL = Stillwater Flood Elevation

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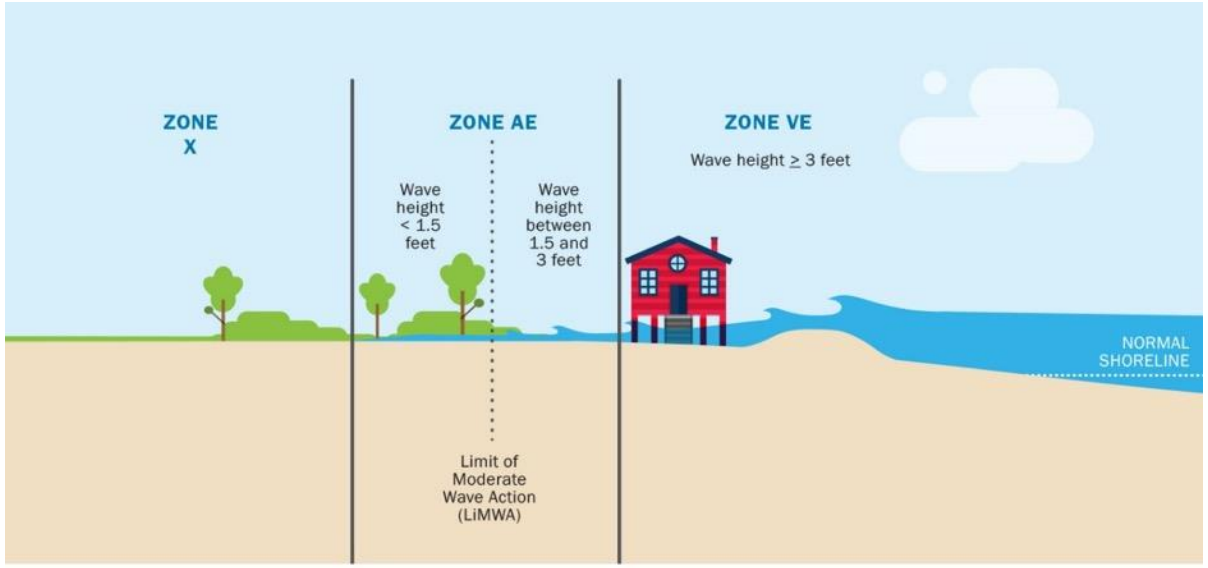
Coastal Study: Floodplain Mapping



COASTAL FLOOD HAZARD MAPPING

Results of the coastal flood hazard assessment are used to create flood maps. The maps include flood zone designations that indicate areas at high-risk for flooding, e.g., Zone VE and Zone AE. Zone VE indicates a coastal high hazard area where wave action and/or high-velocity water can cause structural damage during severe storms. Zone VE is also assigned to areas identified as the Primary Frontal Dune. Zone AE is mapped for inundated areas with less hazardous wave action. Each zone has a base flood elevation (BFE), which is the elevation to which floodwater is anticipated to rise during the 1-percent-annual-chance flood. The Limit of Moderate Wave Action (LiMWA) may also be mapped to indicate the inland limit of waves 1.5 feet or greater for floodplain management purposes.

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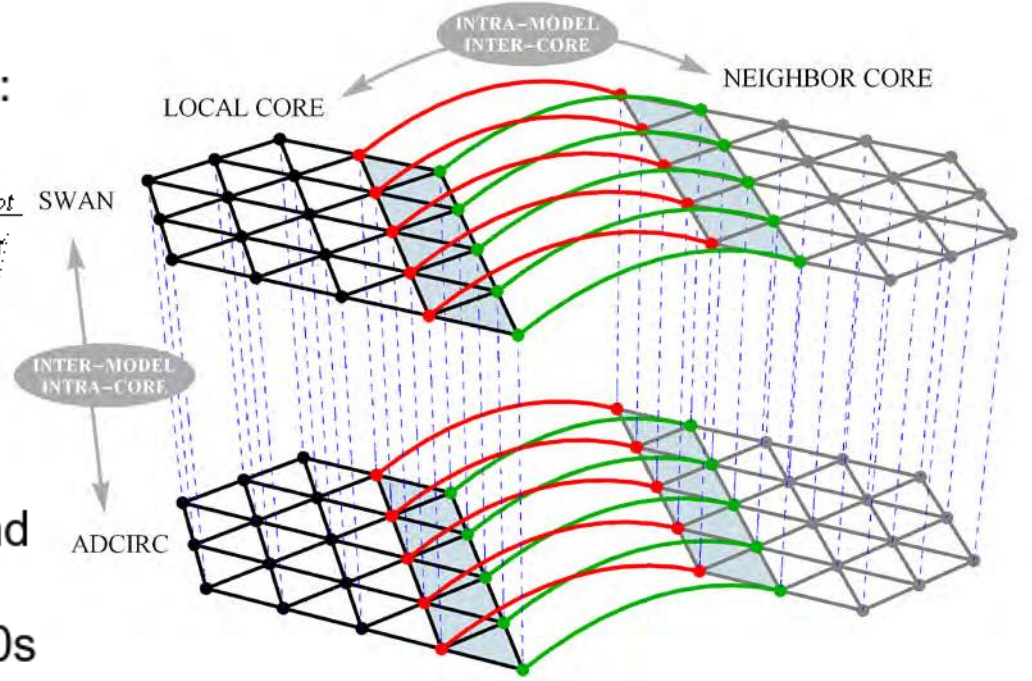
Detailed Study Process

'Tight' Coupling of SWAN + ADCIRC

Solves the action balance equation:

$$\frac{\partial N}{\partial t} + \nabla_{\vec{x}} \cdot \left[\left(\vec{c}_g + \vec{U} \right) N \right] + \frac{\partial c_\theta N}{\partial \theta} + \frac{\partial c_\sigma N}{\partial \sigma} = \frac{S_{tot}}{\sigma}$$ SWAN

- Models use same unstructured mesh; Information passed dynamically
- SWAN is as accurate as WAM and STWAVE
- Coupled model is efficient to 1000s of computational cores



Communication is optimized for high-performance computing:

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Discuss Opportunities for Collaboration

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CAPE MAY COUNTY, NJ | APRIL 2018

KNOW YOUR RISK

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program helps strengthen communities to take actions to reduce their hazard risk, enhances local planning, improves outreach through risk communication, and increases local resilience to natural hazards. Included below are key community highlights.

97,265
POPULATION BASED ON 2010 CENSUS

$399,906,680
TOTAL CLAIMS PAID SINCE 1978

206.4
COASTAL MILES STUDIED *

NFIP PARTICIPANT

33,397
NUMBER OF FLOOD INSURANCE POLICIES IN FORCE

HAZARD MITIGATION PLAN EXPIRATION DATE
6/9/2021

7
NUMBER OF APPEALS RESOLVED OR NOT ACCEPTED DUE TO INSUFFICIENT INFORMATION

27,745
NUMBER OF INSURANCE CLAIMS RECORDED

12,566,842,400
FLOOD INSURANCE COVERAGE

Proposed Mitigation Actions:

1. Upgrade existing revetment wall, provide additional road protection to CR-619, and elevate sections of road.
2. Work with County GIS to leverage recent Light Detection and Ranging (LiDAR) elevation data to identify areas that need to be bermed to prevent back bay flooding.
3. Develop and implement a program to install dikes and other barriers to protect communities from back bay flooding.

KEEPING CAPE MAY SAFE: Your Risk MAP Timeline

YOU ARE HERE

- **Reanalysis Kick-off Meeting April 2018**
- **Study Update Meetings 2018-2019**
- **Flood Risk Review Meeting 2020**
- **Preliminary Maps 2021**
- **Consultation Coordination Officer Meeting, Open House, Appeal Period 2021**
- **Letter of Final Determination and Effective FIRMs 2022**

**Numbers and dates are subject to change*

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Reanalysis Outreach Timeline: 2018 - 2022

Reanalysis Kick-off Meeting #1
April 2018

Study Update Meetings #2 to #4
2018-2019

Flood Risk Review Meeting #5
2020

Preliminary Maps
2021

CCO & Open House
2021

Appeal Period
2021

FEMA issues LFD

"Letter of Final Determination"
To communities and publishes the BFEs in the Federal Register

Communities have 6 months to adopt the study before the data becomes "effective". *Failure to adopt results in suspension from NFIP*

FIRMs
2022

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Local Knowledge & Data Availability

Coastal Data Currently Being Reviewed

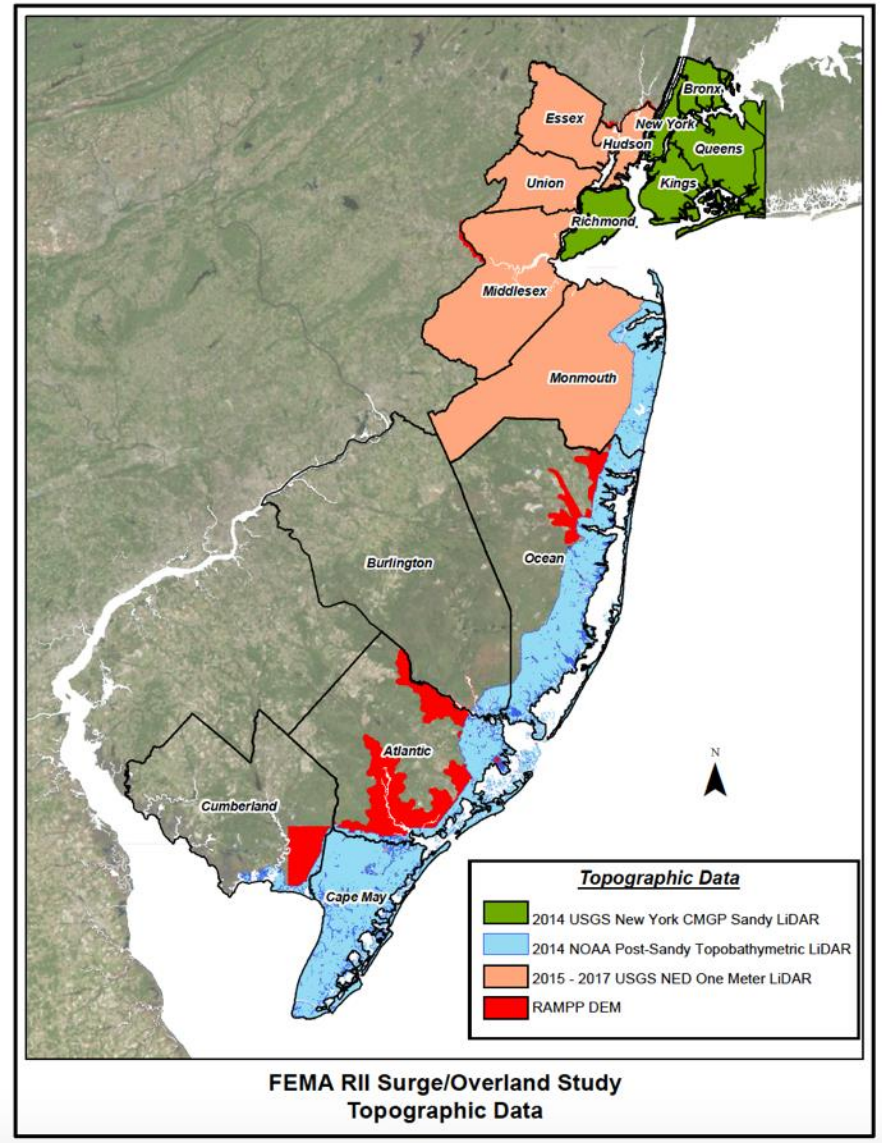
- FEMA Pre and Post-Appeal Data
- FEMA Hazard Mitigation Grant Program Projects
- USACE NACCS
- USACE Beach Nourishment
- USACE Enterprise Coastal Inventory Database
- USACE Coastal Systems Portfolio Initiative (CSPI)
- ASPBA/WCU Beach Nourishment Database
- NJDEP Shoreline Features
- NJDEP Coastal Engineering Projects
- NYC Coastal Protection Project
- NYC Waterfront Facilities Maintenance Management System

Local Knowledge & Data Availability

Topo/Bathy Data Currently Being Reviewed

- 2014 USGS New York CMGP Sandy LiDAR*
- 2014 NOAA Post-Sandy Topobathymetric LiDAR*
- 2015-2017 USGS NED One Meter LiDAR*
- Stockton University Beach Profiles
- NOS Surveys
- USACE Hydrographic Surveys
- ENC (Electronic Nautical Chart Data)

**Topographic data currently expected to be utilized for the storm surge modeling*



FEMA RII Surge/Overland Study
Topographic Data

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Local Knowledge & Data Availability

Coastal Structures

- Seawalls, revetments, beach nourishment, protection structures
- Specifications or as-built drawings
- Historical flood performance
- Repairs, maintenance, or reconstruction

Local Knowledge & Data Availability

Current Flood Studies

- Surge field visit May 2018 and wave height field visit summer/fall 2018

Historic Flood Hazard Information

- Erosion hazard data
- Areas subject to wave hazard and overtopping
- Information on existing or anticipated development or mitigation
- Specifications or as-built drawings
- Historical flood performance
- Repairs, maintenance, or reconstruction

Stakeholder Ideas

Development and Mitigation Group Discussion

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Next Steps for the Community

- Recommend other community staff
- Suggest additional stakeholders
- Notify FEMA of any contact information changes

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Contacts

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Outreach	Community Engagement and Risk Communication – Resilience Action Partners	Amber Greene amber.greene@ogilvy.com	(646) 522-9271
		Thomas Song thomas.song@mbakerintl.com	(914) 343-6696

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Questions & Discussion

Challenges, Innovation, The way forward