

# Hazard Mitigation Plan Overview

## November 13, 2013



Photo Credit: [www.airpano.com](http://www.airpano.com).



**NYC** PLANNING  
DEPARTMENT OF CITY PLANNING CITY OF NEW YORK

**NYC** Hazard  
Mitigation  
Plan 2014

# Agenda

## New York City Hazard Mitigation Plan Update

- What is hazard mitigation?
- Planning Process
- Hazard Risk Assessment
  - Coastal Storms
  - Flooding
  - Infrastructure Failures
- Mitigation Strategy
  - Mitigation Action Types
  - Examples of Mitigation Strategies
- Timeline
- Q & A

# What Is Hazard Mitigation?

## New York City Hazard Mitigation Plan Update

- Actions that reduce or eliminate the long-term risk to people and property from a hazard event.
- Often a neglected fourth step, it breaks the typical response, recovery, and repeated damages cycle.

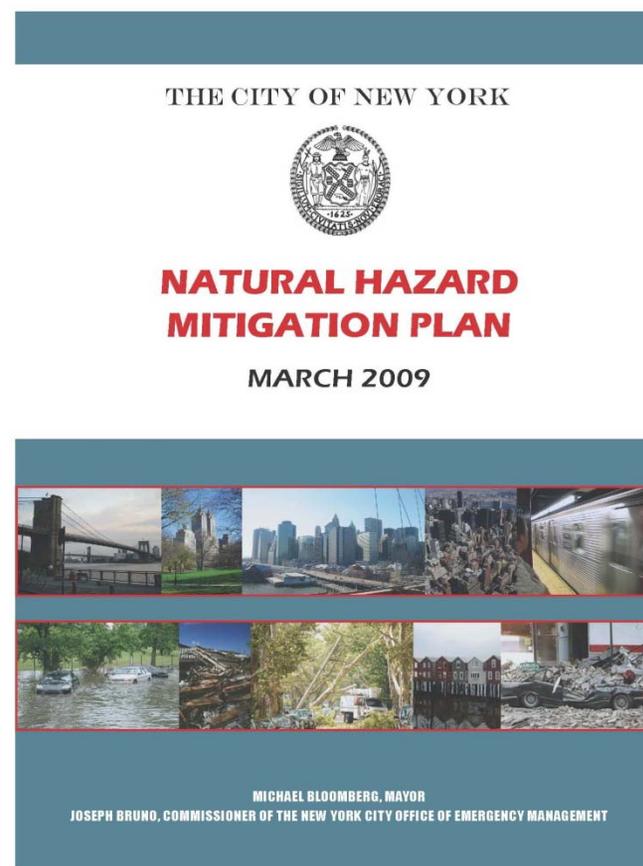


# The Disaster Mitigation Act of 2000

## New York City Hazard Mitigation Plan Update

Local and State jurisdictions must have a FEMA-approved mitigation plan to receive FEMA Hazard Mitigation funds.

- Must be updated every five years.
- NYC's first FEMA-approved mitigation plan was adopted in 2009.
- Target update for Spring 2014.



# Who is Involved?

## New York City Hazard Mitigation Plan Update

### Planning Team

OEM and DCP in coordination with OLTPS.

### Steering Committee

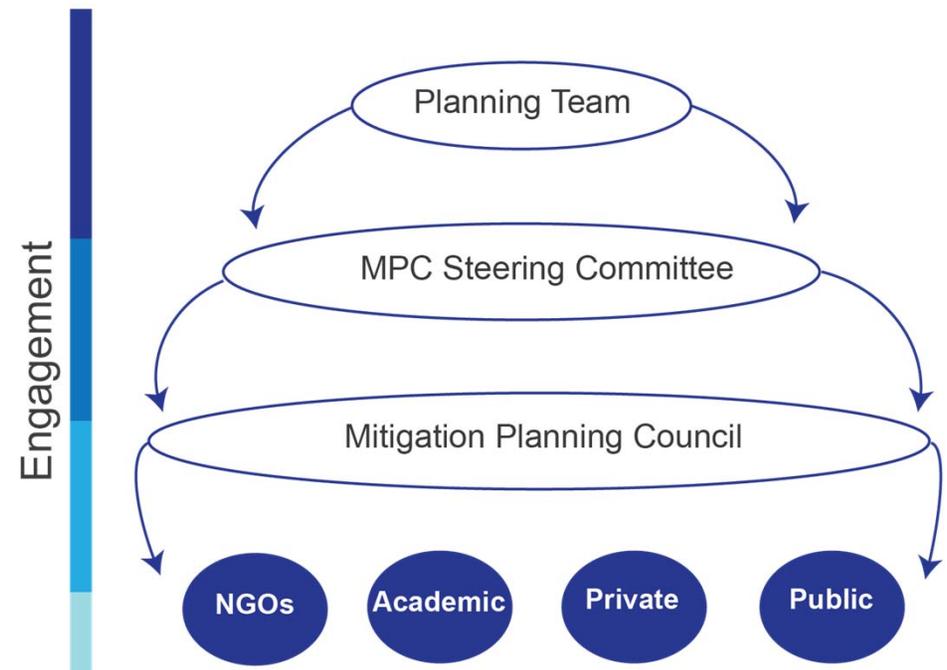
Core group of 13 agencies that provide guidance and subject matter expertise on strategic decisions for developing and implementing the plan.

### Mitigation Planning Council (MPC)

Multi-disciplinary group of 38 stakeholders that have an overall interest in reducing the impact of hazards on the natural, social, and built environment.

### Additional Stakeholder Outreach

The planning team will also organize community meetings to garner support and input from the public.

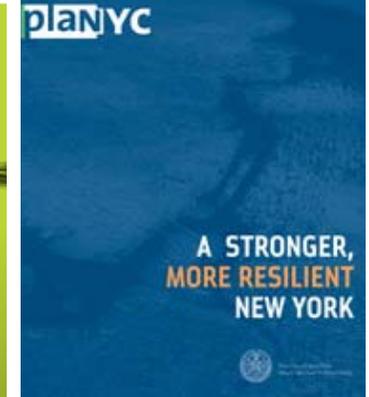
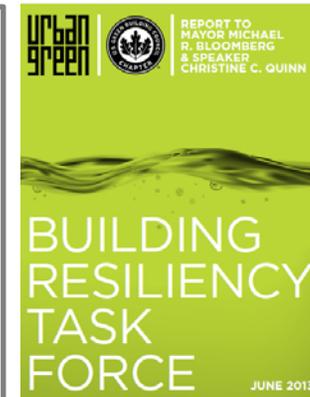
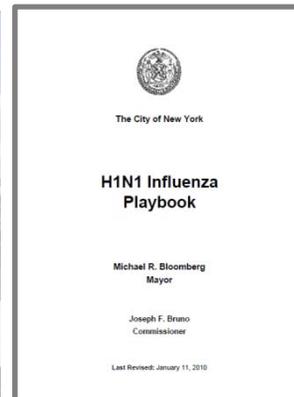
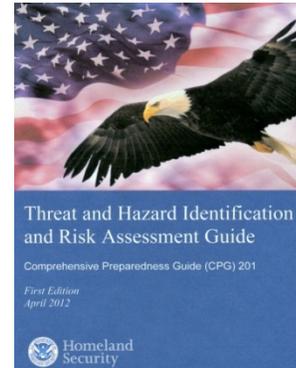


# How Does This Relate To Other City Initiatives?

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The Hazard Mitigation Plan will build out implementation strategies identified in previous reports and city initiatives.

Leveraging these efforts, the plan will serve as a nexus for multi-agency approaches to reducing the impacts of hazards.



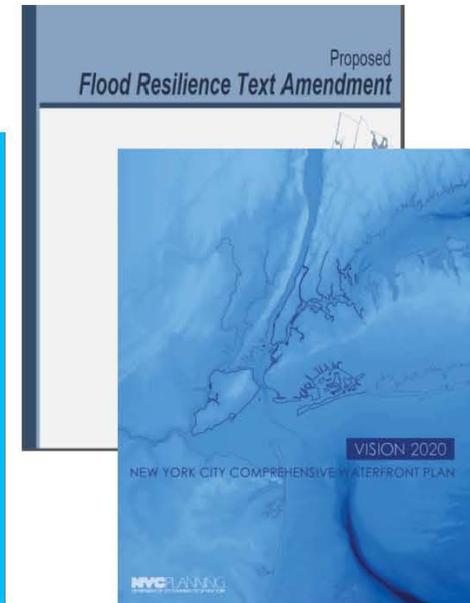
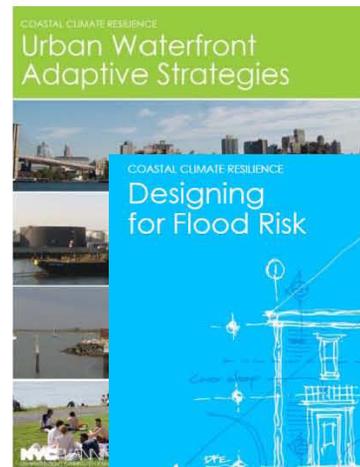
# Interagency Partnership with DCP

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### Recent Climate Resilience Efforts:



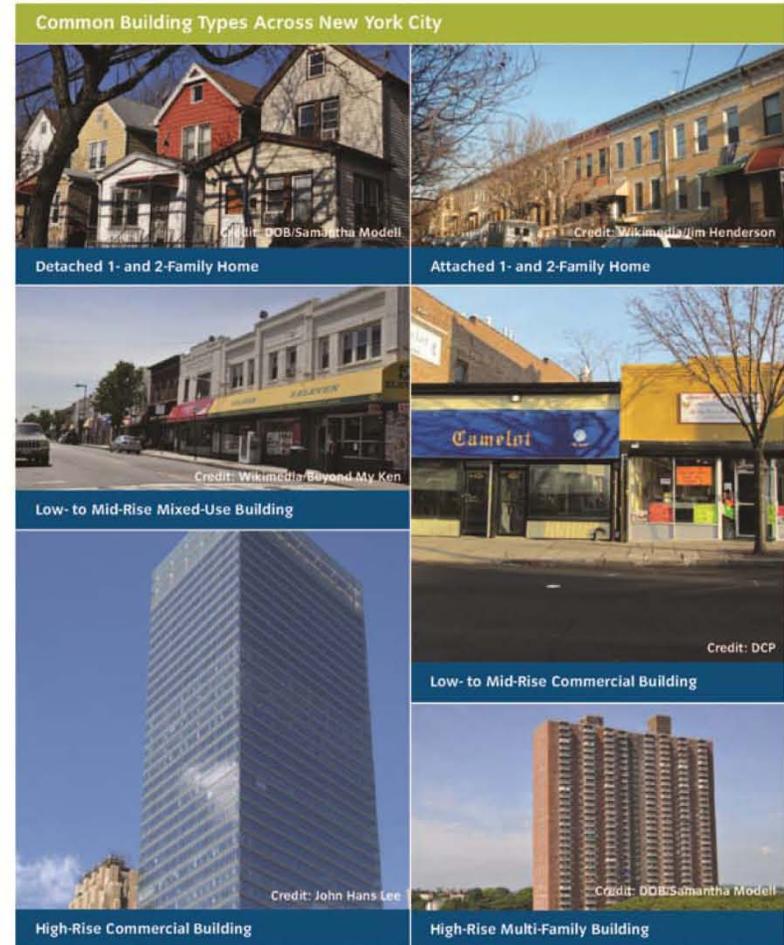
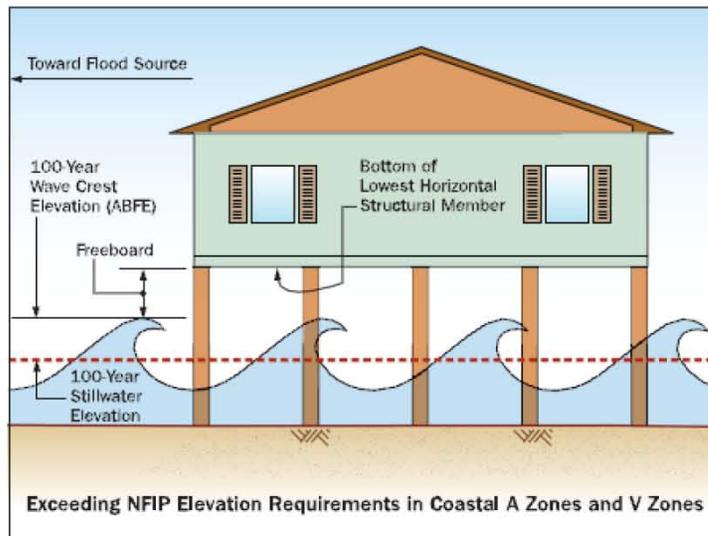
AND



# Learning from Hurricane Sandy

## New York City Hazard Mitigation Plan Update

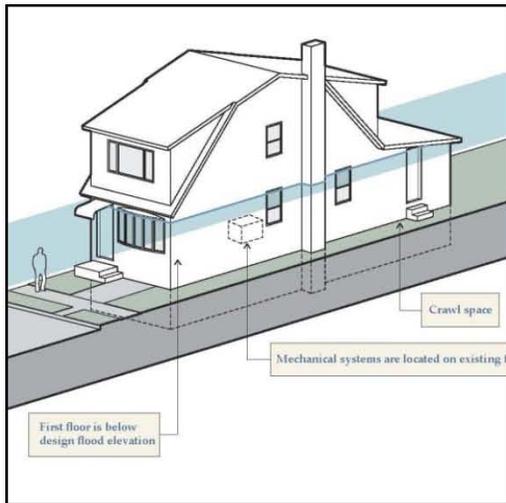
Existing Best practices in flood resistant Construction are not easily applied to the diversity of NYC's building types



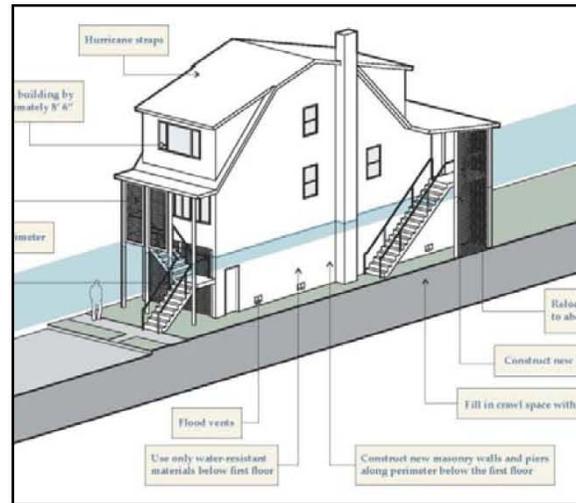
# Flood Resilience Design Manual

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- To give guidance on flood protection strategies that are appropriate to New York's diverse typologies
- Work closely with FEMA and other professionals in design and construction to evaluate alternative strategies and the costs and benefits



EXISTING HOUSE



POTENTIAL RETROFIT

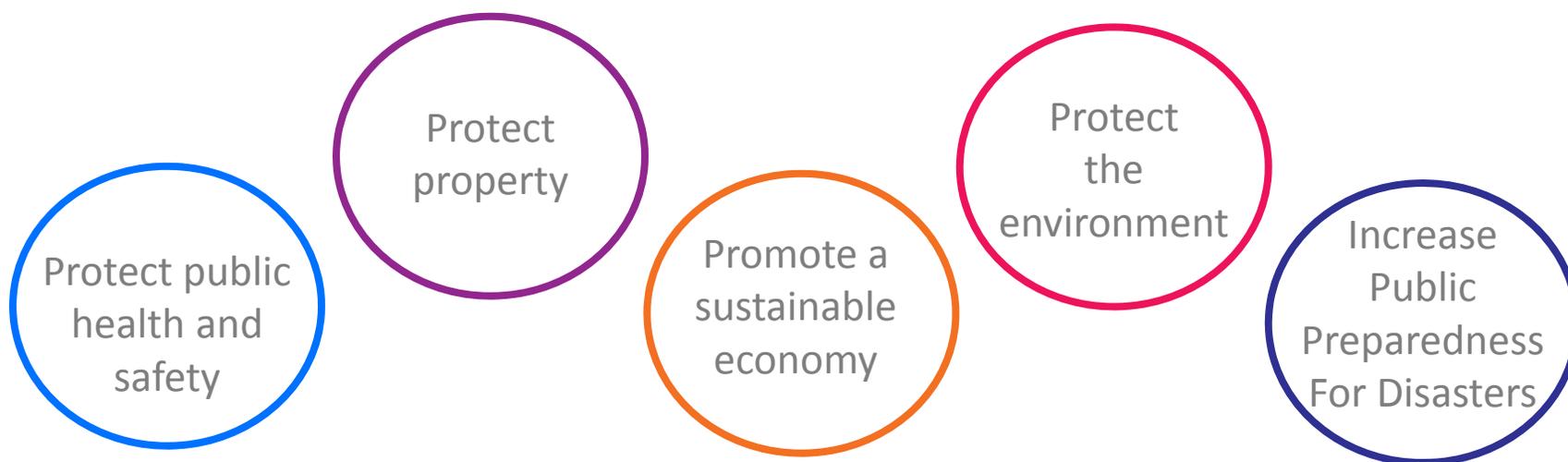


COST AND BENEFIT ANALYSIS

# Goals and Objectives

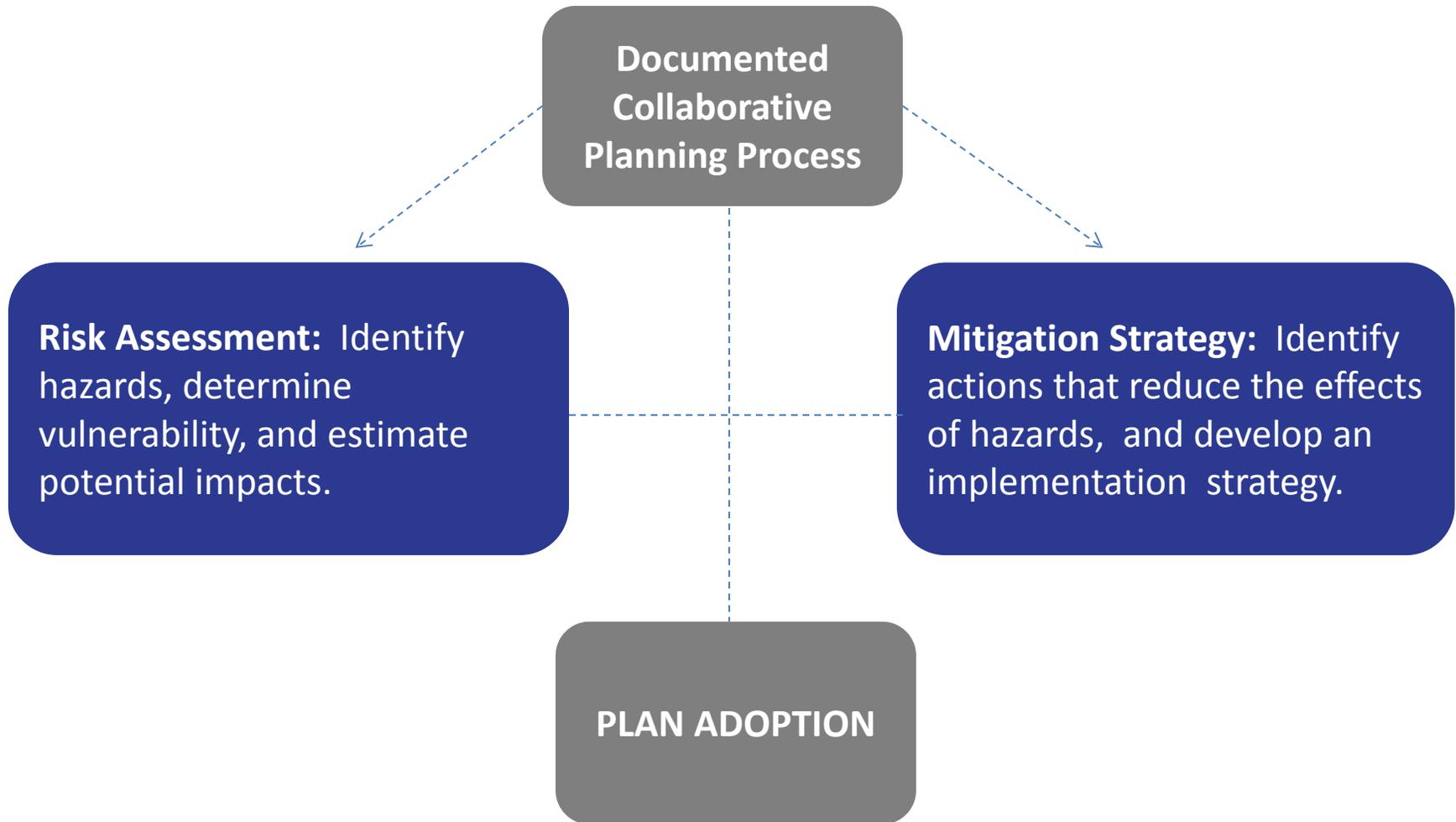
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Establish overarching goals for long-term risk identification and reduction for all hazards.



# Plan Components

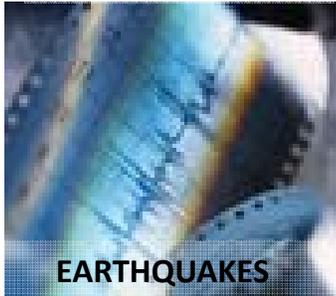
## New York City Hazard Mitigation Plan Update



# Hazard Profiles: Final Hazard Selection

## New York City Hazard Mitigation Plan Update

### Natural Hazards



### Non-natural



# Hazard Profiles: Risk Assessment

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**Risk Assessment:** Identify hazards, determine vulnerability, and estimate potential impacts.

### Hazard Description

Severity

Probability

Location

Historic Occurrences

### Vulnerability Assessment

Social

Built

Natural

Future

# Hazard Profiles: Hazard Description

## New York City Hazard Mitigation Plan Update

Hazard Description



A description of the natural or non-natural hazard that can affect New York City.

Severity



Determine the strength or magnitude of the hazard.

Probability



Determine the likelihood of the hazard occurring.

Location



Identify the geographic areas within New York City that are affected by the hazard.

Historic Occurrences



Identify previous occurrences of the hazard event.

# Hazard Profiles: Vulnerability Assessment

## New York City Hazard Mitigation Plan Update

Social



Determine hazard's impact on the general public including special needs populations.

Built



Determine structural vulnerabilities and potential loss estimates.\* (HAZUS for some profiles)

Natural



Identify impacts of hazards on the natural environment.

Future



Describe how population growth, aging infrastructure, and climate change affect the impacts of the hazard.

# Hazard Profiles: Coastal Storms

## New York City Hazard Mitigation Plan Update

### Hazard Description

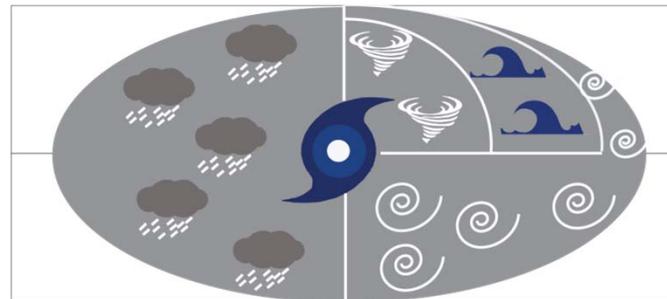
New York's dense population and high concentration of development make it one of the most vulnerable cities to damage from coastal storms

**Tropical cyclones:** Tropical depressions, tropical storms, hurricanes, occur most often Aug-Oct.

**Nor'easters:** Occur most often during fall, winter, early spring

### Four Hazards associated with Hurricanes

These hazards can occur anywhere in the storm, but the figure illustrates where the impacts are most significant.



Tornadoes - right front quadrant



Storm Surge - along the path, extending across the right front quadrant



Winds - right semicircle



Heavy Rain - left semicircle



# Hazard Profiles: Coastal Storms

## New York City Hazard Mitigation Plan Update

### Severity



- Tropical cyclones: Storm designation and category dependent on wind speed. Other important factors include central pressure, size, forward speed and bearing.
- Nor'easters: No universal measurement scale, although past studies have classified based on a combination of quantitative and qualitative criteria

### Probability



- Hurricanes: Recurrence interval = 19 years
- Major hurricanes: Recurrence interval = 74 years
- Nor'easters: Typically occur annually, although severe storms are less common

# Hazard Profiles: Coastal Storms

## New York City Hazard Mitigation Plan Update

Location

### SLOSH ZONES

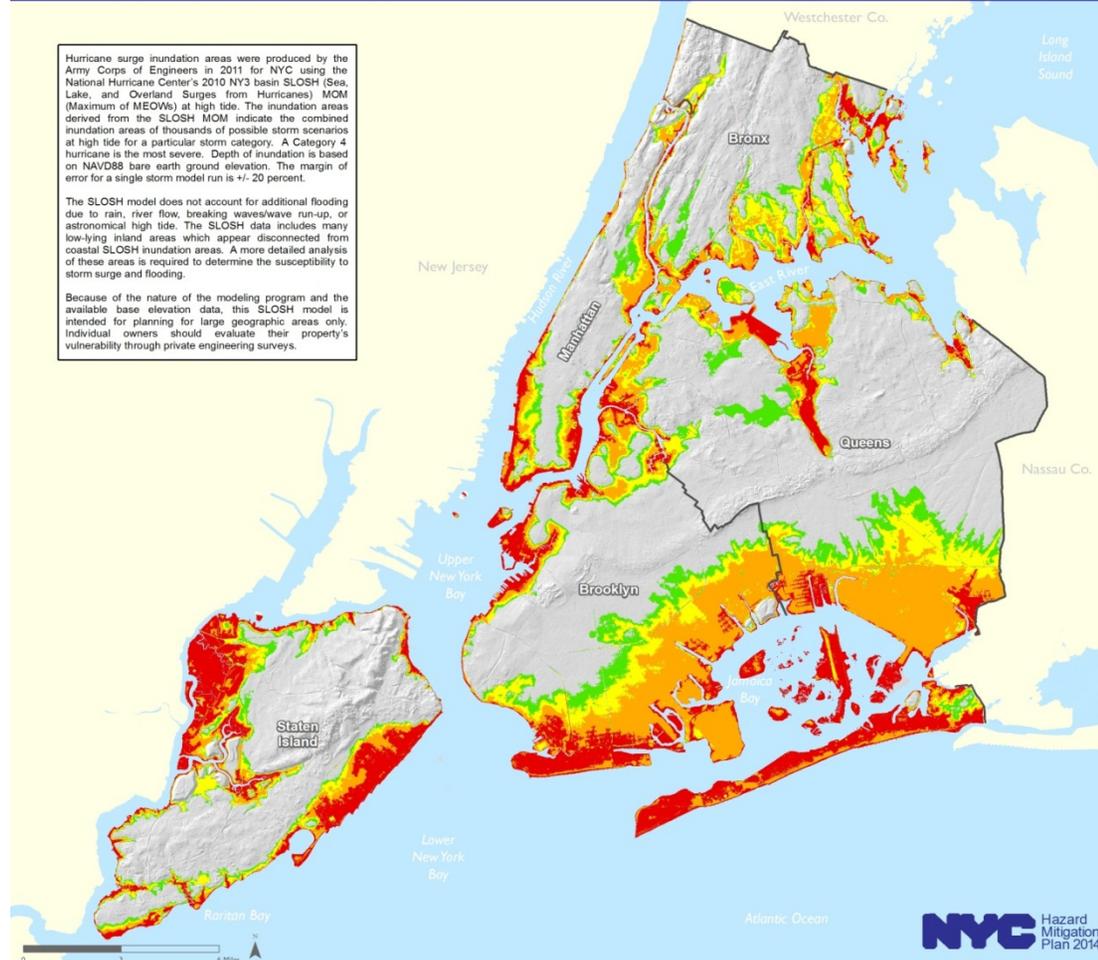
#### Storm Surge Inundation Zones

#### New York City

Hurricane surge inundation areas were produced by the Army Corps of Engineers in 2011 for NYC using the National Hurricane Center's 2010 NY3 basin SLOSH (Sea, Lake, and Overland Surges from Hurricanes) MOM (Maximum of Mean of Maximums) at high tide. The inundation areas derived from the SLOSH MOM indicate the combined inundation areas of thousands of possible storm scenarios at high tide for a particular storm category. A Category 4 hurricane is the most severe. Depth of inundation is based on NAVD88 bare earth ground elevation. The margin of error for a single storm model run is +/- 20 percent.

The SLOSH model does not account for additional flooding due to rain, river flow, breaking waves/wave run-up, or astronomical high tide. The SLOSH data includes many low-lying inland areas which appear disconnected from coastal SLOSH inundation areas. A more detailed analysis of these areas is required to determine the susceptibility to storm surge and flooding.

Because of the nature of the modeling program and the available base elevation data, this SLOSH model is intended for planning for large geographic areas only. Individual owners should evaluate their property's vulnerability through private engineering surveys.



Created: 16 OCT 2013

**NYC** Hazard Mitigation Plan 2014

Data Source: NHC; USACE

■ SLOSH MOM Category 1 
 ■ SLOSH MOM Category 2 
 ■ SLOSH MOM Category 3 
 ■ SLOSH MOM Category 4

# Hazard Profiles: Coastal Storms

## New York City Hazard Mitigation Plan Update

### Historic Occurrences

Notable Hurricanes: Great Hurricane of 1938, Carol (1954), Donna (1960), Agnes (1972), Gloria (1985), Floyd (1999), \*Irene (2011), \*Sandy (2012)

Notable Nor'easters: Ash Wednesday Storm (3/7/1962), 12/21/1992, 1/3/1999, 4/15/2007



# Hazard Profiles: Coastal Storms

## New York City Hazard Mitigation Plan Update

Social



- Roughly 2.5 million people currently live in an area prone to storm surge
- Most at-risk populations are elderly, low-income, non-native and physically or mentally disabled

Built



- Damage dependent on storm severity and building type
- Most at-risk structures are older, combustible low-rise homes in areas subject to storm surge and wave action

Natural



- Impacts include beach erosion, contaminated runoff, new inlet formation and submersion of barrier beaches and wetlands

Future



- Future storms difficult to predict but intense storms are expected to become more frequent with climate change
- Sea level rise will exacerbate coastal flooding from future storms

# Hazard Profiles: Flooding

## New York City Hazard Mitigation Plan Update

Flood Risk Assessment	Scope
I. Hazard Profile  II. Vulnerability Assessment	<ul style="list-style-type: none"><li>• 100-year and 500-year floodplain defined by the June 2013 FEMA Preliminary Work Maps</li><li>• Best available data, consistent with SIRR</li></ul>

# Hazard Profiles: Flooding

## New York City Hazard Mitigation Plan Update

Section	Key Findings
<p>Hazard Profile:</p> <ul style="list-style-type: none"><li>• Hazard Description</li><li>• Severity</li><li>• Probability</li><li>• Location</li><li>• Historic Occurances</li></ul>	<p><b>New - Tidal Flooding:</b> As sea levels rise, the lowest-lying areas of the city will gradually become more vulnerable to regular flooding from daily and monthly high tides. Flooding from high tides even affects portions of the city today.</p> <p>To show tidal flooding today, we used existing frequent flooding data (areas currently subject to shallow coastal flooding) For future tidal flooding, we used the MHHW +SLR projections data.</p>

# Hazard Profiles: Flooding

## New York City Hazard Mitigation Plan Update

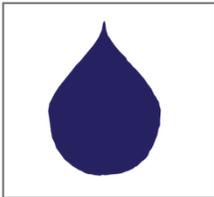
Section	Key Findings
<p>Vulnerability Assessment:</p> <ul style="list-style-type: none"><li>• Social</li><li>• Built</li><li>• Natural</li><li>• Future</li></ul>	<p>We leveraged DCP’s demographic and land use data and applied SIRR analysis to 100 year floodplain, and found:</p> <ul style="list-style-type: none"><li>• Age, income, linguistic isolation, existing health conditions are significant consideration in the 100-year floodplain</li><li>• For example:<ul style="list-style-type: none"><li>• Approximately 15% of those living in the 100-year floodplain are over the age of 65.</li><li>• Almost 40% of all New Yorkers over the age of 65 suffer from a disability and 20% live below the poverty line (\$11,500 for 1-person household)</li></ul></li></ul>

# Hazard Profiles: Infrastructure Failures

## New York City Hazard Mitigation Plan Update



**Transportation:** Roads, retaining walls (collapse), bridges (cracking and rusting), and tunnels (water leaks)



**Water:** Dam (deterioration or failure), water tunnel (leaks), aqueducts (cracks), and water main breaks.



**Energy:** Utility (disruptions), power (outages), steam (pipe explosions), and natural (gas leaks).



**Communications:** Telephone, cellular, internet, and cable disruptions caused weather events and/or power outages.

# Hazard Profiles: Infrastructure Failures

## New York City Hazard Mitigation Plan Update

### Severity



The severity of infrastructure, depends on the size and criticality of the infrastructure impacted. It can range from localized occurrence to a much larger event depending on the type of infrastructure. Time of year also affects severity.

- Steam Pipe Explosion 2007 - localized
- Northeast Blackout in 2003 – city-wide
- Retaining Wall collapse 2005 – Upper Manhattan

### Probability



Based on age and extent of infrastructure and population growth, it is likely we will experience these failures in the future.

# Hazard Profiles: Infrastructure Failures

## New York City Hazard Mitigation Plan Update

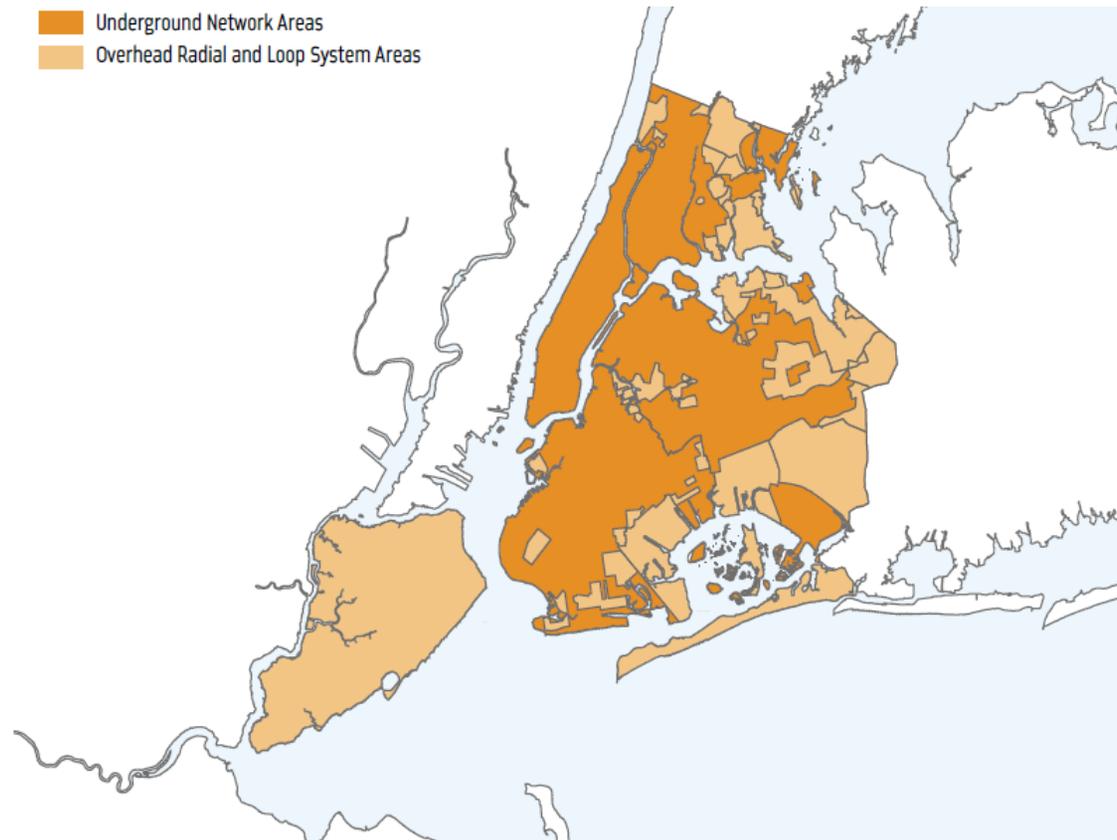
### Location



# Hazard Profiles: Infrastructure Failures

## New York City Hazard Mitigation Plan Update

Location



# Hazard Profiles: Infrastructure Failures

## New York City Hazard Mitigation Plan Update

Social

- Special needs population who rely on utilities
- Injuries and fatalities
- Public Health issues due to utility disruptions

Built

- Collapse of bridges, tunnels, streets, and water pipes
- Property damage
- Signal failures due to power disruptions can cause traffic accidents and subway collisions

Natural

- Air contamination
- Hazardous material spills
- Fires, gas line burners, and downed tress from overhead utility lines

Future

- Age and population growth
- Climate Change and Sea level rise

# Mitigation Actions Overview

## New York City Hazard Mitigation Plan Update

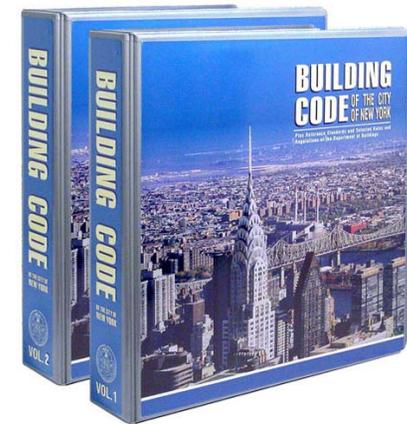


# Hazard Mitigation Strategy

## New York City Hazard Mitigation Plan Update

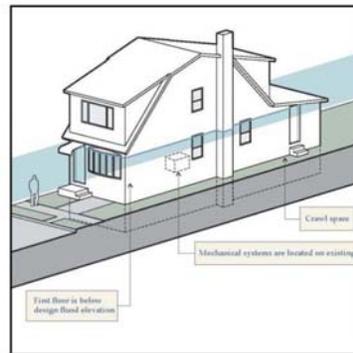
### Prevention

Policies to reduce the impact of hazards, such as zoning, planning, and building codes.

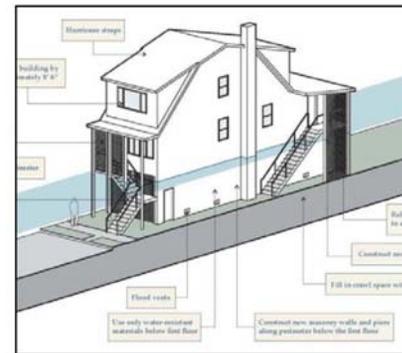


### Property Protection

Modifications of existing buildings to protect them from hazards, such as elevation of electrical equipment.



EXISTING HOUSE



POTENTIAL RETROFIT



COST AND BENEFIT ANALYSIS

# Mitigation Actions Overview

## New York City Hazard Mitigation Plan Update

### Coastal/Natural Resource

Actions that not only reduce the impact of hazards but also preserve and restore natural habitats.



### Emergency Services

Actions that protect people and property during or immediately after a disaster or hazardous event.



# Mitigation Actions Overview

## New York City Hazard Mitigation Plan Update

### Infrastructure Projects

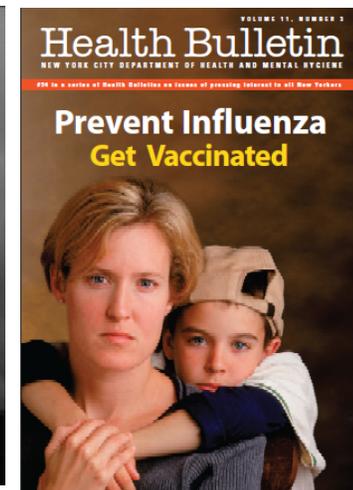
Engineering of structures to reduce the impact of hazards.



Credit: US Army Corps of Engineers

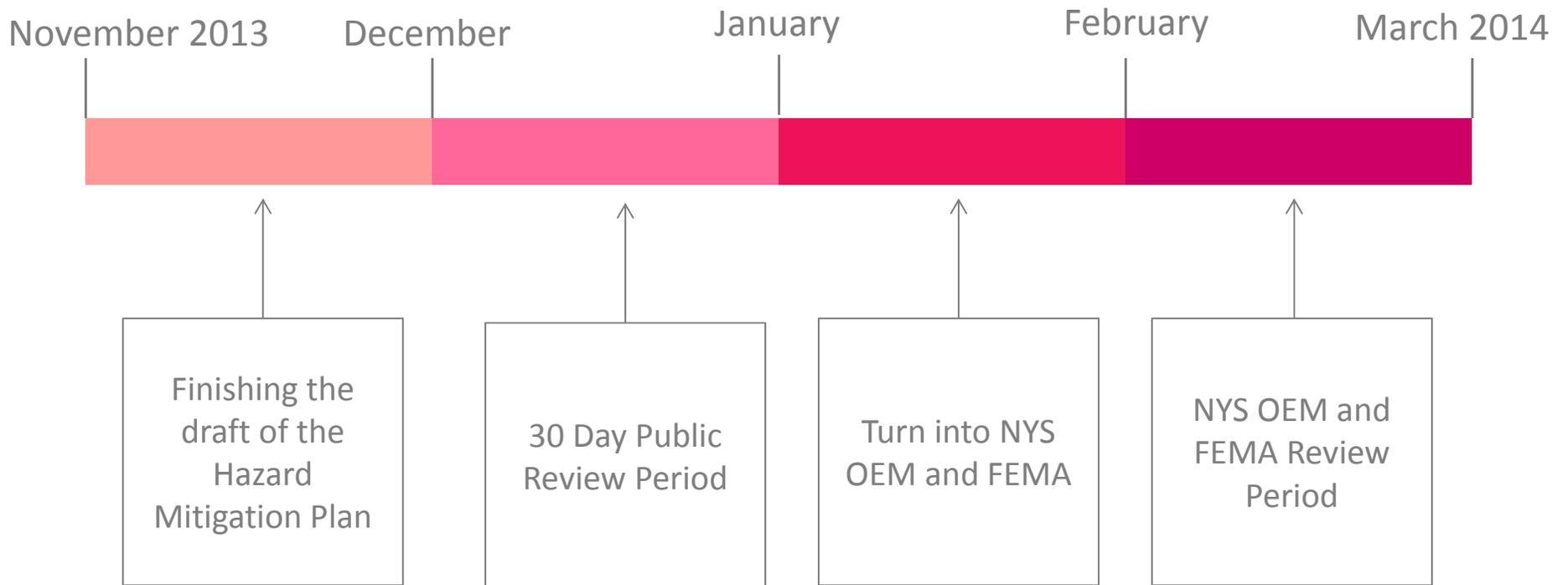
### Public Education and Awareness

Strategies to inform the public, elected officials, and property owners about hazards and ways to mitigate them.



# Hazard Mitigation Plan Timeline

## New York City Hazard Mitigation Plan Update



# Questions

## New York City Hazard Mitigation Plan Update

### For more information

*Access the 2009 HMP:*

[www.nyc.gov/hazardmitigation](http://www.nyc.gov/hazardmitigation)

*FEMA HMP Overview:*

<http://www.fema.gov/hazard-mitigation-planning-overview>

*NYS HMP Overview:*

<http://www.dhSES.ny.gov/oem/mitigation/>

*NYS HMGP Overview:*

<http://stormrecovery.ny.gov/content/hazard-mitigation-grant-program-hmGP-0>

*NYS Draft HMP:*

<http://www.dhSES.ny.gov/oem/mitigation/hm-plan-2013.cfm>

*Questions: Email [mitigation@oem.nyc.gov](mailto:mitigation@oem.nyc.gov)*