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# Climate Change: How Bad Will it Be, and What Must be Done?

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# NYC's Climate Challenge



# We must prepare for a range of climate hazards



**COASTAL STORMS**

**3x**  
more likely  
100 year  
flood by  
2050

MORE FREQUENT,  
MORE DESTRUCTIVE  
HURRICANES



**SEA LEVEL RISE**

Up to  
**30 in**  
SLR by  
2050s

INCREASED  
TIDAL FLOODING +  
GROUNDWATER  
TABLE RISE



**PRECIPITATION**

Up to  
**5**  
rain days > 2"  
by 2050s

FLOODING IN NON-  
COASTAL AREAS



**TEMPERATURE**

# of days  
above 90°F  
**TRIPLE**  
by 2050s

LONGER, MORE  
DANGEROUS HEAT  
WAVES

# EXTREME HEAT IS THE DEADLIEST NATURAL HAZARD IN NYC

- Densely developed cities are up to 22°F hotter than surrounding areas
- In an average year, extreme heat in NYC causes...
  - 13 heat stroke deaths
  - 450 heat-related ER visits
  - 115 excess deaths from natural causes worsened by heat exposure
- Extreme heat disproportionately impacts our most vulnerable residents, such as elderly and low-income New Yorkers



An elderly woman faints from heat on the Upper East Side.  
2011, NY Daily News/Marcus Santos

**...and will increasingly add complexity to agencies' missions into the future.**

**Keys to raise roads before climate change puts them underwater. It'll be expensive.**

*Miami Herald*

**Climate Migrants Might Reach One Billion by 2050**

*United Nations*

How the climate emergency could lead to a mental health crisis

*The Guardian*

# The climate crisis is impacting City agencies today...



**DANGEROUSLY HOT TEMPERATURE**  
are expected 8/5/2018 – 8/8/2018.

**Be safe!**

- Children, seniors, and people with chronic medical conditions are most vulnerable.
- To prevent heat-related illness, **drink plenty of water, avoid strenuous physical activity, and limit outdoor activities** to early morning and late evening hours.
- **Stay out of the sun, if possible. Wear sunscreen (at least SPF 30), a hat, and lightweight, light-colored, loose clothing** while you are outside.
- **To conserve energy**, limit use of washers, turn off air conditioners when not home, and turn off lights and other electronics when not in use.
- Cooling centers are open across the city. To find one, visit [nyc.gov](http://nyc.gov) or call 311.
- Please check on family, friends, and neighbors to make sure they stay safe and cool.
- **Call 911 for emergencies.**
- For updates on the weather, please listen to radio and television news broadcasts, and visit [nyc.gov/oem](http://nyc.gov/oem).

**NYCHA is open 24/7**  
Use MyNYCHA ([nyc.gov/mynycha](http://nyc.gov/mynycha)) or call the Customer Contact Center (CCC) at 718-707-7771.

# NYC's approach focuses on both reducing emissions and adaptation to changes underway.



## **CARBON MITIGATION**

### *Examples*

- 2050 carbon neutral goal
- Climate Mobilization Act
- Fossil-free energy sources



## **CLIMATE ADAPTATION**

### *Examples*

- Flood protection projects
- Guidelines for resilient design
- Local climate monitoring

# Other offices are involved in this effort in a variety of capacities.



- **Climate Policy and Programs**  
Delivering *OneNYC*, pursuing divestment of the City's pension funds, and facilitating global network relationships



- **NYC Emergency Management**  
Planning, communicating, and mitigating event-based risk



- **Office of Housing Recovery**  
Overseeing Build It Back and other Sandy recovery programs



# WE ARE BUILDING A MORE RESILIENT AND VIBRANT NYC

The Mayor's Office of Resiliency (MOR) strives to adapt New York City to the unprecedented challenge of climate change, creating a more resilient, equitable, and vibrant city for the New Yorkers of today and generations to come.



# MOR is leading the City's climate change adaptation strategy

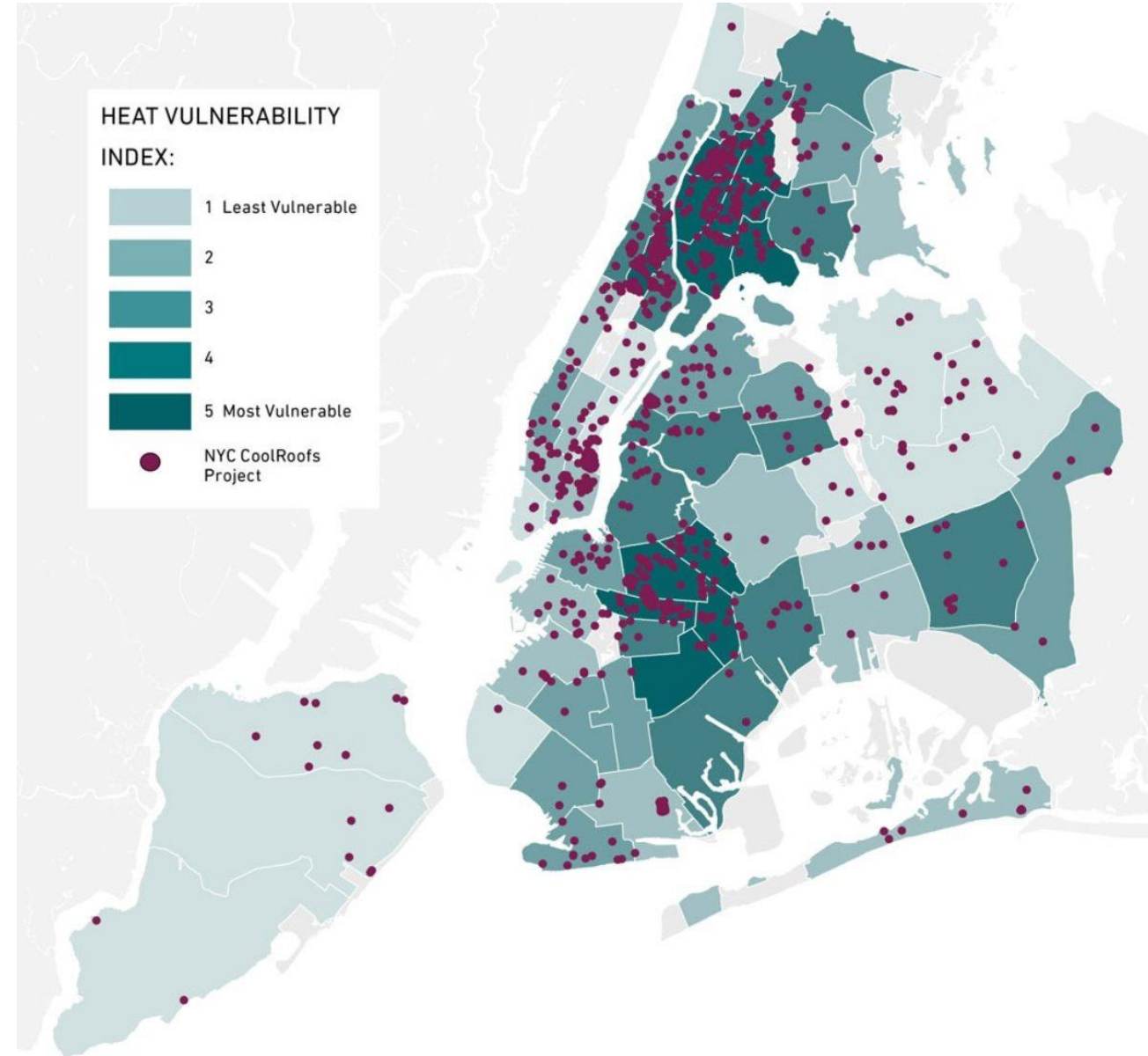
1. **Mitigating Risks:** *Upgrades to the physical environment to promote resiliency and mitigate climate impacts*
2. **Empowering Residents & Businesses:** *Capacity building to enable individuals, community groups, civic organizations and businesses to prepare for climate change*
3. **Building a Climate-Ready Government:** *Policy, regulatory, and governance reforms to streamline the planning, execution and management of resiliency actions*
4. **Advancing and Applying Climate Science:** *Interpret and apply latest climate models and develop adaptation strategies*



# Advancing and Applying Climate Science:

Interpret and apply latest climate models and develop adaptation strategies

- Developed the Heat Vulnerability Index
- Installed indoor/outdoor temperature monitoring network
- Used LiDAR technology to create precise citywide elevation maps
- Completing studies on intense rainfall and wind
- Developing a first-of-its-kind future flood risk map



# Advancing and Applying Climate Science: New York City Panel on Climate Change (NPCC)

- Established by Local Law 42 of 2012
- Advisory board composed of climate change scientists appointed by the Mayor
- Reports every three years
- 2019 Report's key findings
  - Trends in annual temps and precip are in line with the NPCC2 projections for the 2020s
  - Developed new SLR scenario, Antarctic Rapid Ice Melt (ARIM) for the 2080s & 2100
  - New maps showing monthly tidal flooding



# Advancing and Applying Climate Science: NYC FEMA Flood Insurance Rate Map Appeal

## APPEAL OF FEMA'S PRELIMINARY FLOOD INSURANCE RATE MAPS FOR NEW YORK CITY

June 26, 2015

Submitted to FEMA Region II



By the City of New York

Mayor's Office of Recovery and Resiliency

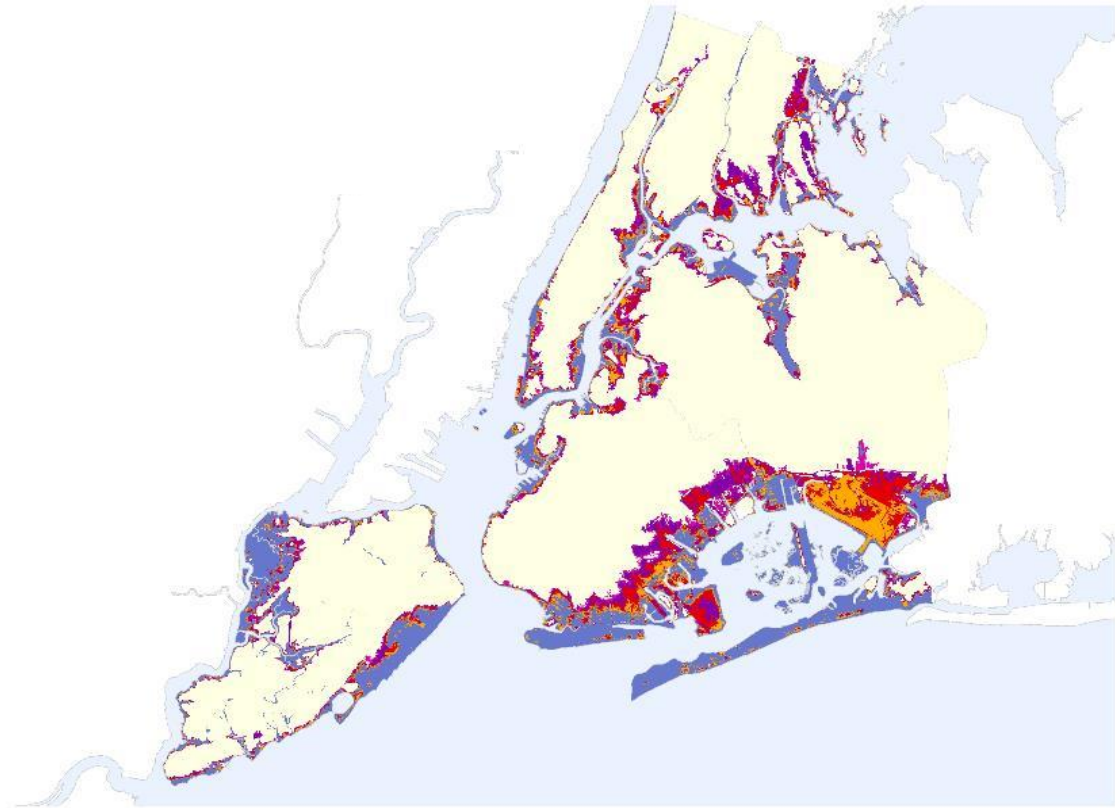


- MOR is working with FEMA to revise the City's Flood Maps with more precise analysis and data
- Expect two products in 3-4 years:
  - Revised *current* risk
    - Insurance
  - Innovative *future* condition flood map that reflects impacts of sea level rise
    - Building Code and Land Use

# Future 100-Year Floodplains

Climate change leads to expanded vulnerability as sea levels continue to rise.

Projected floodplains for the 2020s, 2050s, 2080s, 2100



Source: FEMA; CUNY Institute for Sustainable Cities

FEMA 2013 Preliminary FIRMs 100-year Floodplain  
 Projected 2020s 100-year Floodplain  
 Projected 2050s 100-year Floodplain

Projected 2080s 100-year Floodplain  
 Projected 2100 100-year Floodplain

100-year Floodplain*				
	2007 FIRMs	2013 PFIRMs	2050s Projected	Change (%) 2013 - 2050
Residents	218,000	400,000	808,900	102%
Jobs	214,000	290,800	555,700	91%
Buildings	36,000	71,500	118,000	65%
1-4 Family	26,000	57,400	89,000	55%
Floor Area (Sq Ft.)	377M	534M	855M	42%

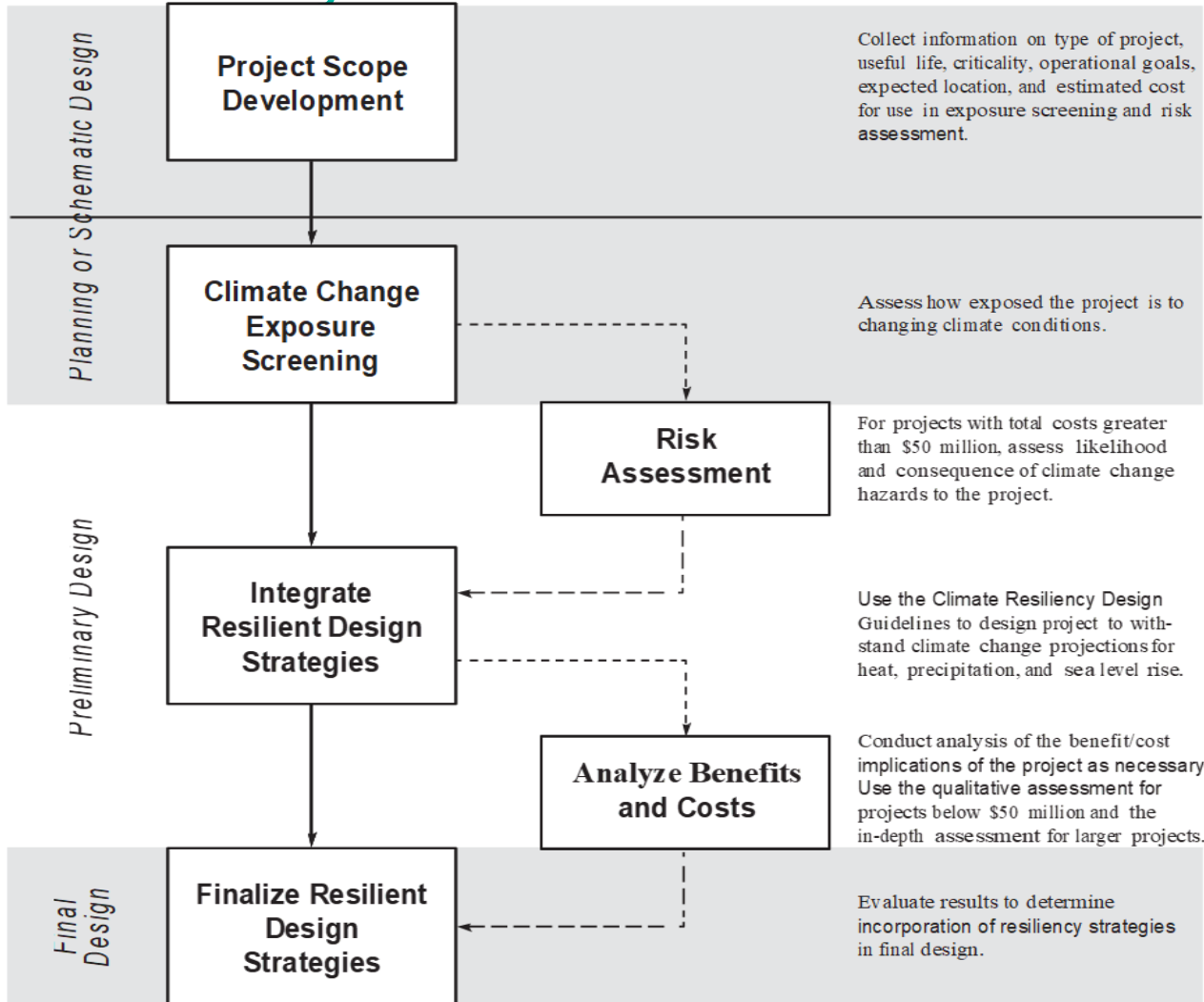
\* Numbers are rounded for clarity

**Over 171,000 buildings and 1.2 million New Yorkers projected to live in the floodplain by 2100.**

## **Empowering Residents and Businesses:** Capacity building to enable individuals, community groups, civic organizations and businesses to prepare for climate change

- **Provided \$7.5M to over 500 small businesses to** increase their resiliency and emergency preparedness
- **Increased flood insurance enrollment by 59%** among New Yorkers in the floodplain
- **Launched Be a Buddy and trained home health aides to** protect most vulnerable residents from extreme heat impacts
- **Strengthened connections with community-based and faith-based organizations to** prepare for and respond to extreme weather events

# Building a climate-ready government: Policy, regulatory, and governance reforms to streamline the plan and management of resiliency actions



- **Secured over \$15B** in state and federal funding
- **Updated building code** to require more flood resilient standard
- **Updated zoning code** to limit density in areas at risk of chronic flooding
- **Released the Climate Resiliency Design Guidelines**, giving engineers, architects, and planners the tools they need to design climate-smart buildings and infrastructure

Figure 14 - Example of how resilient design fits into a capital project development process



## Mitigating Risks: Upgrades to the physical environment to promote resiliency and minimize or eliminate climate impacts

- Lower Manhattan Coastal Resiliency
- East Side Coastal Resiliency
- USACE Staten Island Coastal Risk Management
- Red Hook Integrated Flood Protection System
- Staten Island Bluebelts
- Raised Shorelines - Citywide
- USACE Rockaway Reformulation
- Breezy Point Hazard Mitigation Project
- Hunts Point Resiliency Project
- Interim Flood Protection Measures - Citywide

To name a few...

# Mitigating Risks: Lower Manhattan Coastal Resiliency



# Mitigating Risks: East Side Coastal Resiliency (ESCR)



- Protection against storm surge and SLR for 110,000 people
- \$1.45B and 2.4 mile-long project
  - Elevates East River Park ~8 ft
  - Improves waterfront access
  - Improves park amenities
- Flood protection in 2023 and full completion by 2025

An aerial photograph of the New York City skyline at sunset. The sky is a mix of deep blue and orange, with scattered clouds. The city's skyscrapers are illuminated by the setting sun, creating a warm glow. The Hudson River is visible in the foreground, with a few boats and a bridge in the distance. The overall scene is a panoramic view of the city from a high vantage point.

# THANK YOU

If you have any questions about MOR's work, please feel free to contact me at [tvest@cityhall.nyc.gov](mailto:tvest@cityhall.nyc.gov)