

THE NEW NORMAL: COMBATING STORM-RELATED EXTREME WEATHER IN NEW YORK CITY



NYC

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Executive Summary

On the night of Wednesday, September 1, 2021, Hurricane Ida reached New York City. By the time the storm hit our city, Ida had been technically downgraded to a “post-tropical cyclone” – a reassurance in name only. To any New Yorker who experienced Ida’s severity and intensity, it was a frightening lesson in our new reality: one in which even so-called “remnants” of storms, traveling from thousands of miles away, can be as ferocious and dangerous as those aimed directly at our city. For the first time in history, the National Weather Service (NWS) declared a flash flood emergency in New York City. The storm shattered the record for the most single-hour rainfall in our city, set only two weeks earlier by another extreme storm, Hurricane Henri. It flooded streets, subways, and homes. Most tragically, Ida took the lives of 13 New Yorkers.

Less than a decade ago, New Yorkers watched Hurricane Sandy, billed as a “once-in-a-lifetime” storm, devastate our city and the entire Northeast. In 2017, we saw Hurricane Harvey batter Louisiana and Texas, becoming the costliest tropical storm in recorded history – and then watched only weeks later as Hurricane Maria claimed the lives of nearly 3,000 in Puerto Rico. Increasingly, these extreme weather events are the new normal: part of an undeniable climate crisis that stretches across our entire nation, from droughts in the Southwest to raging wildfires on the West Coast. Climate change isn’t a far-off threat. It is here, it is real, and it is taking lives. It poses a grave threat to our people and our city, and its costs will not be borne equally. Just as COVID-19 disproportionately impacted communities with existing social, economic, and health vulnerabilities, the climate crisis has fallen hardest on low-income New Yorkers and communities of color. These communities have experienced decades of disinvestment – and this moment demands prioritized investments to protect them.

Climate change is a public health, environmental and racial justice priority in New York City. For the past eight years, we have responded more aggressively than any major city in the nation to tackle the threat of climate change and protect our people. We have implemented the New York City Green New Deal – investing \$14 billion to ensure a 30% reduction in emissions by 2030, and expanding renewable energy use throughout our city. We have partnered with the U.S. Army Corps of Engineers on initiatives like the Rockaways Atlantic Shorefront Resiliency Project to protect shoreline communities most vulnerable to storms. And we have reimagined our city’s coastline through efforts like the Lower Manhattan Coastal Resiliency Projects, working to create a continuous line of protection against rising sea levels and storms. In the wake of Ida, it is clear we must go even further – and we will. It is also clear that this cannot be a fight for New York City alone. We will continue to call on support from partners at the state and federal level.

Key takeaways from this report include:

- 1. We will educate, train, and acclimate New Yorkers to this new reality.** The most impactful step we can take immediately is making sure New Yorkers understand the new world we are living in. This report details the ways we will educate people, especially in vulnerable areas, long before storms arrive; enhance training for first responders in new facets of emergency response; and acclimate all New Yorkers to a world where we must regularly prepare for extreme and dangerous storms.
- 2. We will plan for the worst-case scenario in every instance.** In the lead-up to extreme storms, we will act more aggressively than ever before to alert New Yorkers to the maximum possible impact. This will mean earlier warnings, more evacuations, and more travel bans — all coordinated by a new senior position at City Hall, the Extreme Weather Coordinator. As we have seen with blizzards, these City actions set the

stage and drive sharp changes in behavior: encouraging more New Yorkers to stay off the roads, prepare their homes, and evacuate as needed.

- 3. We will continue to upgrade storm modeling, tracking, and alert systems.** We cannot rely on antiquated tools to protect our city from modern storms. This report details a plan to build state-of-the-art storm modeling, a new tiered alert system tailored to at-risk areas, and a modern tracking system that will monitor dangerous weather throughout the tri-state area and beyond. Federal funding in this area will be crucial.
- 4. We will broaden protection for inland communities, not only our coastlines.** Traditional concern over flooding has focused mainly on coastlines, which have been devastated by storms including Hurricane Sandy. Extreme weather events like Ida represent a new world, where even those far inland are at significant risk. This report includes measures to respond to the growing threat these communities face.
- 5. We will act immediately to protect basement and cellar occupants.** Too many basement units in New York City are unsafe and vulnerable to extreme weather, and therefore cannot be immediately legalized. Yet we also recognize the role these units play in housing over 100,000 New Yorkers. A long-term solution will require many years, billions of dollars, and a complete re-imagining of this issue citywide. We must put an emphasis on what we can do right now to protect these residents. This report details an immediate plan to identify all basement dwellers citywide, educate them through community voices they trust (in the style of the City’s historically-successful 2020 Census door-to-door canvassing), and help them put an evacuation plan in place long before a storm comes.
- 6. We will continue to prioritize investments in low-income neighborhoods, immigrant communities, and communities of color.** The de Blasio Administration has made racial and economic justice a priority since Day 1 – bringing opportunity and fairness across the five boroughs, and investing significant resources to build climate resiliency in Black, Brown, immigrant, and low-income communities. Just like the COVID-19 pandemic, climate change is a racial and economic justice issue. We will continue to invest in these communities and support them post-disaster – from urgent needs to ongoing access to mental and physical health care, understanding the significant toll of the storm on people’s livelihoods.
- 7. We will re-imagine our sewage and drainage system, and rapidly increase green infrastructure and cloudburst solutions.** We face a massive challenge: the City’s 7,400 miles of sewer pipes were largely designed a century ago, for a very different climate than the extreme one we now face. Completely recalibrating our sewers for storms like Ida would require a decades-long, potentially \$100-billion investment dependent on federal funding. The city’s ongoing \$2 billion system upgrade in Southeast Queens highlights the serious investment required for a single neighborhood. We must begin the conversations around these long-term upgrades, from incremental progress to a transformative redesign. Yet as detailed in this report, we will also make a series of immediate, achievable upgrades to our system and supplement them with creative drainage solutions using parks, playgrounds, and other public space.
- 8. New York City’s response can reach even further with funding and support from State and Federal government.** The de Blasio Administration will act immediately and assertively to protect our city. We will invest resources to educate vulnerable communities, upgrade our infrastructure, and communicate this very real threat to all New Yorkers. Yet over the long term, our response can be transformational with the help of our partners at the State and Federal level – from the billions required to transform our sewer

system to partnership on innovative cloudburst strategies and Bluebelts. Extreme storms are an existential threat to us all, and long-term solutions will require every level of government in common cause.

The de Blasio Administration will update New Yorkers on the progress of these initiatives consistently through the end of the administration, with more details to come in each of three upcoming monthly reports.

As of this report's publication, a first step for key funding has been proposed in Congress. The proposal includes support for: an Emergency Watershed Protection Program; U.S. Army Corps construction efforts against floods and emergencies; low-interest loans to help homeowners, small businesses, and non-profits; repairs to roads and bridges; and a long-term disaster relief fund. We support this legislation as a critical immediate step. We also continue to call for further resiliency and extreme weather investments in the nation's largest city – ones that will bolster our economy, our communities, and our future. Together, we can and must turn New York City into a global model of resiliency in the fight against climate change. Lives depend on it.

Extreme Weather Response Task Force



On Friday, September 3, Mayor de Blasio announced the convening of a new Extreme Weather Response Task Force to explore the City’s response to extreme weather events and address a rapidly changing reality in which extreme storms like Hurricane Ida are increasingly common. Over the past 30 days, senior leaders across key City agencies involved in extreme weather response came together, along with outside experts on climate change and resiliency, to compile a new set of protocols and policies that will protect our city. Individual teams within the Task Force tackled different areas of preparedness and response, and their recommendations are included in this report.

The Task Force addressed areas including:

- Short-term infrastructure
- Long-term infrastructure
- Basement apartments
- Homeowner and landlord investments
- Flood insurance and outreach
- Preparation and emergency planning
- Subway flooding

- Challenges for both commercial and residential renters
- Messaging and communications strategy to New Yorkers

The Task Force was comprised of leaders across the following agencies:

- Office of the Mayor, including:
 - Mayor
 - Every Deputy Mayor in City Hall
- New York City Emergency Management (NYCEM)
- Department of Buildings (DOB)
- Department of Environmental Protection (DEP)
- Office of Management and Budget (OMB)
- Department of Sanitation (DSNY)
- Department of Small Business Services (SBS)
- Police Department of New York City (NYPD)
- Fire Department of New York City (FDNY)
- Department of Health and Mental Hygiene (DOHMH)
- Department of City Planning (DCP)
- Department of Transportation (DOT)
- Department of Design and Construction (DDC)
- Department of Housing Preservation & Development (HPD)
- Mayor's Office of Food Policy (MOFP)
- Mayor's Office of Climate Resiliency (MOCR)
- Mayor's Office of Housing Recovery Operations (HRO)
- Mayor's Office of the Chief Technology Officer (CTO)
- Mayor's Community Affairs Unit (CAU)
- Mayor's Public Engagement Unit (PEU)
- Mayor's Office of Immigrant Affairs (MOIA)

The Task Force also consulted and engaged external experts and advocates from a wide variety of relevant fields, including:

- Emergency Management
- Environmental Justice
- Resiliency
- Government
- Health

This report contains the assessments, strategic thinking, and recommendations of the Task Force.

Summary of Key Pre-Ida Extreme Rainfall Initiatives

While Ida offered the starkest reminder yet of the growing dangers of extreme rainfall, the City and its agencies have already taken extensive steps to address this challenge. This has been a particular area of focus for the de Blasio Administration over the past eight years – both in deepening the work of previous administrations and building innovative new solutions to upgrade the sewer and water capture system. The Department of Environmental Protection (DEP) is the lead agency for this work.

Each year, DEP invests hundreds of millions of dollars to upgrade the entire City’s drainage system, which serves both inland and coastal areas. They are also investing heavily in nature-based solutions – including constructing more than 70 Bluebelts across Staten Island over the past two decades, ecologically rich and cost-effective drainage systems that handle runoff precipitation. In addition, over the past several years, the Department has also built more than 11,000 curbside rain gardens, infiltration basins, and implemented best practices in green infrastructure. Innovative stormwater capture projects using what we refer to as “cloudburst” design are ongoing at NYCHA housing developments – projects designed for large volume events to absorb water where possible and store excess water safely until the event passes.

These are only a few of the examples of projects either completed or already underway – yet Ida and extreme storms of its kind are a reminder we must go even further to protect our city from this growing threat. On the following pages, you will see both expansions of these efforts, as well as brand-new projects to complement these initiatives and protect New Yorkers.

Summary of Key New Initiatives & Timeline

Project	Agency Owner	Start	Completion
Response #1: Immediate enhancements to extreme weather communications.			
1. Extreme Weather Coordinator in Mayor's Office	Mayors Office (MO)	<i>Immediate</i>	<i>Complete</i>
2. Increased mandatory evacuations	MO/NYCEM	<i>Immediate</i>	<i>Ongoing</i>
3. Increased travel bans	MO/NYCEM	<i>Immediate</i>	<i>Ongoing</i>
4. Warning signage	DOT/NYCEM	<i>Immediate</i>	<i>July 2022</i>
5. Updating Early warning system	MO/NYCEM	<i>Immediate</i>	<i>Complete</i>
Improved communication to homeowners:			
6. Creating Basement-specific messaging and alerts	NYCEM	<i>Immediate</i>	<i>Complete</i>
7. Flooding guidance in DEP communications	DEP	<i>January 2022</i>	<i>Ongoing</i>
8. Developing field-validated current day stormwater flood maps	DEP/MOCR	<i>Immediate</i>	<i>May 2022</i>
9. Expanding Flood Risk and Flood Insurance Awareness in Inland Areas.	HPD/MOCR	<i>2022</i>	<i>Ongoing</i>
10. Restarting FloodHelpNY in-home resiliency audits and financial counseling programs/retrofits for 1-4 family homes	HPD/MOCR	<i>2022</i>	<i>Ongoing</i>
11. Restarting vulnerable multifamily building resiliency audits under FloodHelpNY	HPD/MOCR	<i>2022</i>	<i>2024</i>

12. Spreading the word on Zoning for Coastal Flood Resiliency (ZCFR) law.	DCP	<i>Immediate</i>	<i>Ongoing</i>
Improved communication in vulnerable communities:			
13. “Rainboots on the Ground”	NYCEM	<i>2022</i>	<i>2025</i>
Improved communication and support for small business owners & commercial property owners:			
14. Increasing communication pre and post event	NYCEM/SBS	<i>Immediate</i>	<i>Ongoing</i>
15. Expanding SBS Business PREP (BPREP) citywide	SBS	<i>March 2022</i>	<i>Ongoing</i>
16. Expanding Small Business Emergency Grant fund	SBS	<i>March 2022</i>	<i>Ongoing</i>
Response #2: Immediate enhancements to storm analysis & data initiatives.			
1. Expand the Flood Sensor Network citywide.	MOCR	<i>Immediate</i>	<i>2026</i>
2. Enable real-time crisis information via drone data collection	NYCEM	<i>Immediate</i>	<i>Ongoing</i>
3. Citywide map of combined flood risk and model of all flooding hazards.	DEP/MOCR	<i>Immediate</i>	<i>2023</i>
4. Partner with private weather forecasting service	NYCEM	<i>Immediate</i>	<i>October 2021</i>
5. Develop a Coastal Flood Vulnerability Index.	MOCR	<i>Immediate</i>	<i>2023</i>
6. Improve projections of future extreme precipitation	MOCR	<i>Immediate</i>	<i>2023</i>

7. Modeling and mapping initiatives based on Ida to increase readiness	MOCR	<i>Immediate</i>	<i>2022</i>
Response #3: Immediate enhancements to city and household infrastructure.			
Citywide			
1. Accelerating the short-term Stormwater Resiliency Plan (various projects)	MOCR	<i>Immediate</i>	<i>2021</i>
2. Accelerating “high-level” storm sewer upgrades	DEP	<i>Immediate</i>	<i>2023</i>
3. Expanding the porous pavement program	DEP	<i>2022</i>	<i>2024</i>
4. Increasing catch basin inspection frequency in commercial areas	DEP	<i>2021</i>	<i>Ongoing</i>
5. Deployable barriers in non-drainage areas	DEP	<i>2021</i>	<i>Ongoing</i>
6. 20 additional Trust for Public Land Playgrounds	SCA	<i>2021</i>	<i>2025</i>
7. Expanding NYCHA’s Green Infrastructure (GI) program to 7 additional campuses.	NYCHA	<i>2021</i>	<i>2031</i>
8. Accelerating additional GI projects citywide	DDC/DEP	<i>Immediate</i>	<i>Ongoing</i>
9. Creating a Stormwater Project Delivery Task Force	DDC/DEP	<i>Immediate</i>	<i>Ongoing</i>
10. Investigating the impact of all climate hazards on the City’s social infrastructure	MOCR	<i>Immediate</i>	<i>2023</i>

Household			
1. Studying expanding backwater valve installations to prevent sewer backups into private properties	MOCR/DEP	<i>Immediate</i>	<i>2022</i>
2. Offering residents sandbags pre-storm	DOT	<i>Immediate</i>	<i>Ongoing</i>
Response #4: Keeping New Yorkers in basements and cellars safe			
1. Creating a database of subgrade spaces Citywide	MOCR	<i>Immediate</i>	<i>May 2022</i>
2. Providing enhanced communications to basement occupants, immediately	NYCEM	<i>Immediate</i>	<i>Ongoing</i>
3. Enhancing NYPD/FDNY first responder readiness for basement evacuations	FDNY/PD	<i>October 2021</i>	<i>Ongoing</i>
5. Contracting trusted CBOs to reach at-risk residents door-to-door.	NYCEM	<i>2022</i>	<i>2025</i>
6. Finding drainage solutions for community driveways.	DEP	<i>October 2021</i>	<i>2022</i>
7. Build a comprehensive Basement Apartment Conversion program.	HPD	<i>Immediate</i>	<i>Ongoing</i>
8. Working group to consider regulatory changes and programmatic support	MO	<i>Immediate</i>	<i>Ongoing</i>
Response #5: Long-term infrastructure improvements			
1. Improving our legacy sewer system for the future (various projects)	DEP	<i>Immediate</i>	<i>Ongoing</i>

2. Continuing the integration of Bluebelts (various projects)	DEP	<i>Immediate</i>	<i>Ongoing</i>
3. Tibbets Brook stream daylighting	DEP	<i>2023</i>	<i>2025</i>
4. Accelerating the long-term Stormwater Resiliency Plan (various projects)	MOCR	<i>Immediate</i>	<i>2025</i>
6. Providing transformational, neighborhood-scale stormwater strategies to “cloudburst” neighborhoods (various projects).	DEP	<i>Immediate</i>	<i>2025</i>
7. Implementing the East Harlem Cloudburst Resiliency Project.	NYCHA/DEP	<i>Immediate</i>	<i>2024</i>
8. Implementing the Wetlands Management Framework (various projects)	DPR	<i>Immediate</i>	<i>2025</i>
9. Adding stormwater green infrastructure in New York City parks.	DPR	<i>Immediate</i>	<i>2025</i>
10. Investigating the impacts of sea level rise and extreme weather on housing stock.	MOCR	<i>Immediate</i>	<i>2023</i>
11. Updating building, electrical, plumbing, and zoning codes to address intense precipitation risks and coastal flooding.	MOCR/DCP/DOB	<i>Immediate</i>	<i>2025</i>
12. Evaluating stormwater fees.	DEP	<i>Immediate</i>	<i>2022</i>
Response #6: Working with partners in government			
1. Formalizing an MTA Taskforce	DEP/DOT/MTA	<i>Immediate</i>	<i>Ongoing</i>

Ida: City Preparedness & Impact



New York City Emergency Management (NYCEM) began tracking Hurricane Ida on Thursday, August 26, when it was then known as Tropical Depression 9 and anticipated to strike the Gulf Coast. The agency's Watch Command consulted the National Weather Service (NWS) multiple times per day to monitor the weather, and specifically this storm.

Based on multiple consultations with the NWS, NYCEM activated the citywide Flash Flood Emergency Plan on August 30. Activating this plan set off cascading directives for various City agencies and partners, as they implemented their portion of the plan to deal with the potential for excessive rainfall and rapid flooding. Outside partners include the National Weather Service, the Metropolitan Transportation Authority (MTA), the Port Authority of New York and New Jersey (Port Authority), and utility companies including Con Edison, PSEG, and National Grid.

Over the course of the next two days, NYCEM continued to lead preparation for the storm through the Flash Flood Emergency Plan, including: multiple daily briefings with NWS; targeted catch basin cleaning and maintenance in over 1,000 hotspots across the city, in addition to every highway catch basin; issuing travel advisories and amplifying public messaging across all channels; and notifying agency partners to be on alert for downed trees and flooding conditions from the field.

Wednesday, September 1

On the morning of September 1, NYCEM Commissioner John Scrivani participated in the Mayor’s daily briefing to prepare New Yorkers, then appeared on local radio and television. NYCEM’s press office issued a travel advisory, which was amplified and distributed across many channels and to key stakeholders across the city, including elected officials, community boards, and private sector partners. An Advance Warning System message was also sent to providers who work with individuals with disabilities and access and functional needs.

In the hours before and during the storm, NYCEM issued 30 NotifyNYC messages informing New Yorkers of:

- The forecast
- Flood and tornado warnings
- Service disruptions
- Road closures and other impacts of the storm

On September 1, NWS also pushed five Wireless Emergency Alerts (WEAs) in English and Spanish to all cell phones in New York City:

9/1/2021	7:34 PM	WEA	Flash Flood Warning (Considerable) for all of SI
9/1/2021	8:41 PM	WEA	Flash Flood Emergency (Catastrophic) Warning for all of SI
9/1/2021	8:59 PM	WEA	Flash Flood Warning (Considerable) for all of BK, BX, MN, QN
9/1/2021	9:06 PM	WEA	Tornado Warning for the BX & Northern MN
9/1/2021	9:28 PM	WEA	Flash Flood Emergency Warning (Catastrophic) for all of BK, BX, MN, QN

At 11:45 PM on September 1, the Mayor declared a State of Emergency and issued a travel ban, both amplified via social media and NotifyNYC.

These WEAs, State of Emergency declaration, and travel ban came too late – a challenge shared by governments and weather agencies across the tri-state area and beyond. This new moment, in which intense and life-threatening extreme storms can quickly strengthen, calls for a new set of rules. This report contains immediate, fundamental changes to emergency communications and protocols that will reach New Yorkers earlier and alert them to the severity of a storm.

Impact on New York City

The remnants of Ida caused record flooding throughout New York City and took the lives of 13 individuals. Flooding extended to major roadways and into the public transit system, shutting down travel across the City. As of September 16, the City has received over 4,000 reports of damage to single-family homes, and per data from Federal Emergency Management Agency (FEMA), the initial damage estimate to New York City is \$38 million – a preliminary figure that will rise far higher when damage to citywide infrastructure is taken into account in the coming months.

Ida's rainfall intensity was something that our city had never experienced before. Its peak of 3.15 inches of precipitation per hour was far beyond the 1.5-2 inches per hour capacity of our sewer system. With no room left in sewers, heavy rainfall accumulated on streets, causing major flooding. This resulted in substantially more flooding than what the city experienced a little more than a week earlier, when Tropical Storm Henri delivered about 7 inches of total rain, but more evenly spread over a period of several hours.

Most residential damage in single-family homes (1-4 units) is from flooding in sub- or at-grade space (e.g., basements, ground floors). These damaged properties are located across the city, though concentrated in Queens, Brooklyn, the Bronx, and Staten Island, with many in lower-income and immigrant communities with a high percentage of at-risk populations. Unlike some prior storms, the impacts were notably felt inland rather than in the coastal areas, with the flooding caused by rainfall rather than storm surge.

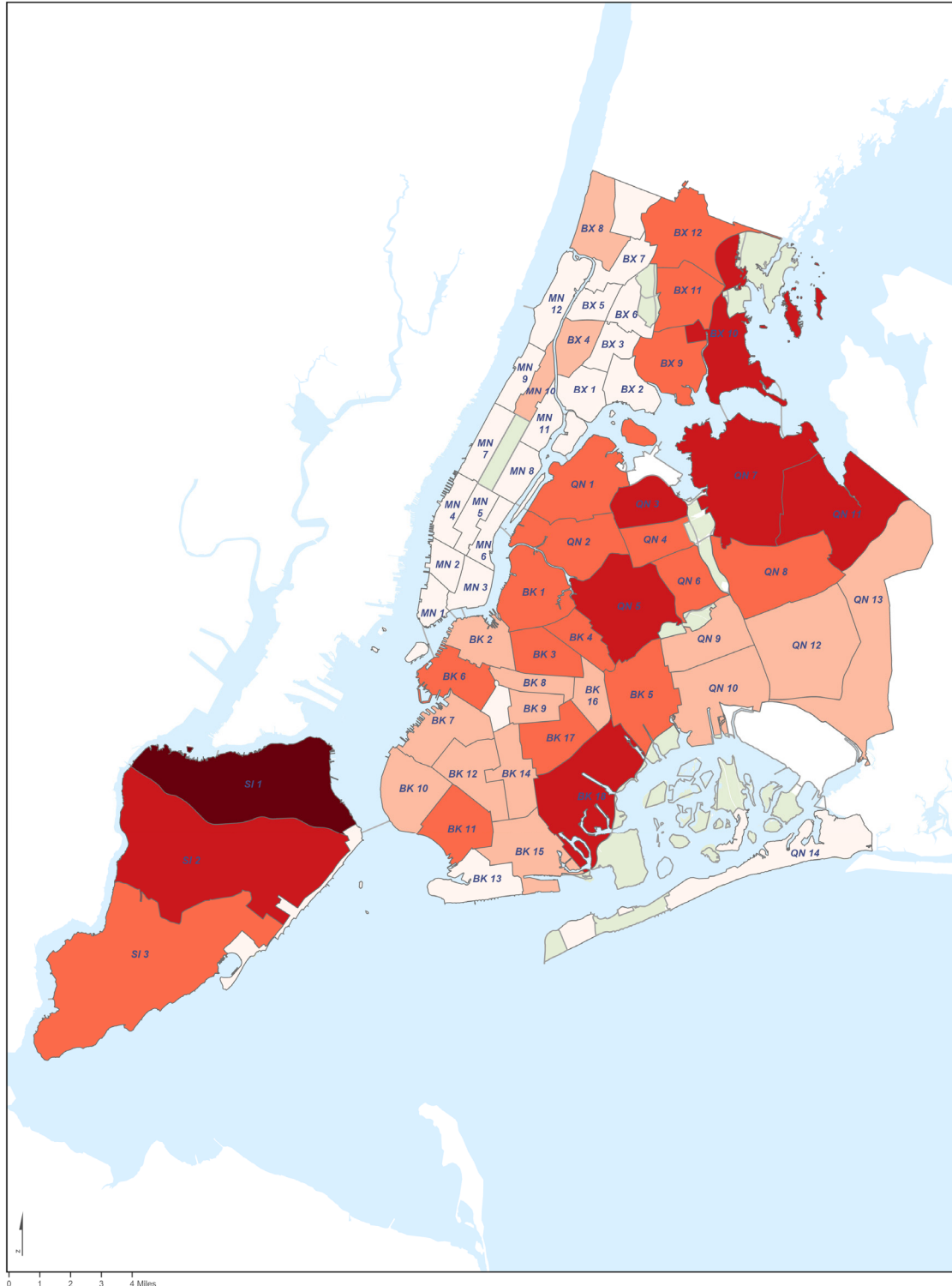


PTC Ida: Most Impacted Community Districts

Source: 311; DEP; DOE; NYCEM EOC; NYCEM GIS / GIS Track-it #123147

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Produced: 17 SEP 2021 14:00



Building Impact Reports by Community District

- ≤73
- ≤172
- ≤304
- ≤524
- ≤932
- No Data

Building impact report was generated using the following information:
 311 damage survey calls (pre 9/6 2200hrs; self-reported)
 311 Mold complaints (self-reported)
 DEP SBU flood complaints
 DOE flood reports
 DEP dewatering requests (generators)
 DEP basement dewatering requests

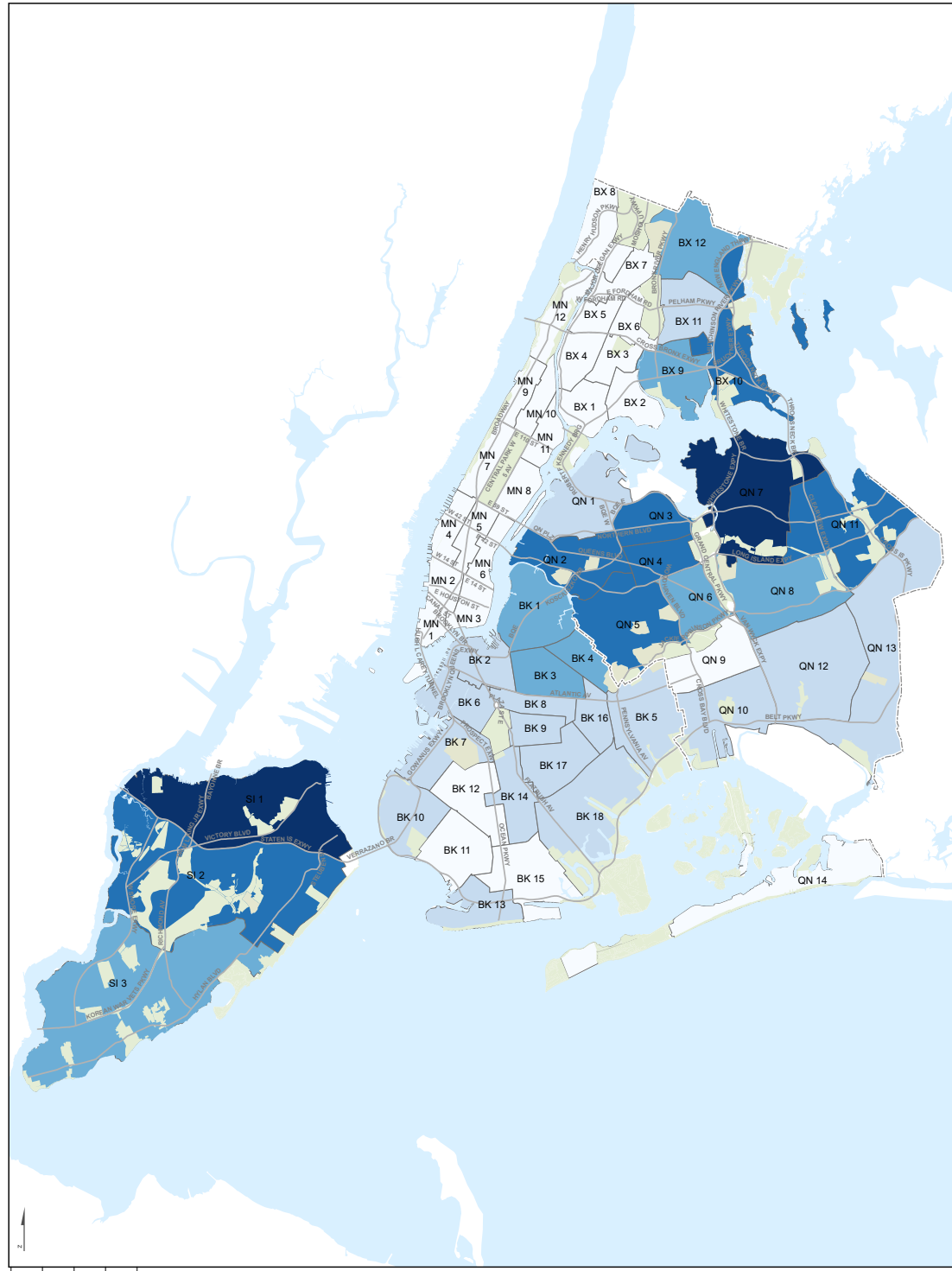


TS Ida: 311 DSNY Tonnage by Community District

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Source: NYCEM GIS, DSNY / GIS Track-It #123147

Produced: 11 SEP 2021 11:30



DSNY Tonnage by Community District
Tonnage (as of 9/11)

- ≤73
- ≤218
- ≤461
- ≤756
- ≤1543



Impact on the Tri-State Area

New York City was far from alone in facing extreme impact from Ida. Across the tri-state area, cities and localities saw similar devastation: destroyed homes, flooding across highways and roads, and lost lives. Remnants of Ida killed more than 40 people across New York, New Jersey, Pennsylvania, and Connecticut, and left more than 150,000 homes without power. States of emergency remained in effect for days following the storm. Examples of impact included:

- In southern New Jersey, an EF-3 tornado rising from the remnants of Ida reached peak winds of 150 miles per hour and destroyed dozens of homes.
- In Lehigh Valley, Pennsylvania, river and stream flooding continued to occur through Wednesday, September 1, with up to 8 inches reported in some areas.
- In Passaic, New Jersey, the Passaic River breached its banks, displacing fish and other wildlife into the middle of streets.
- In Newark, New Jersey, Ida brought 3.24 inches of rainfall in a single hour between 8 PM and 9 PM – shattering the previous hourly record set in 2006 by nearly an inch

Broken rainfall records, devastation across communities, and tragic loss of life – all these impacts are reminders that our region and nation are confronting a new reality with extreme weather, both in scale and frequency. Ida has underscored the need for collaboration and planning across city and state lines, along with significant aid and resources from the State and Federal government, to prepare for these extreme events and protect our communities.



Ida: Emergency Response & Post- Storm Efforts



During the storm and in its immediate aftermath, City agencies along with state and federal partners moved swiftly to help our communities recover and rebuild – an effort that is ongoing nearly one month later. Agencies worked collaboratively to clean up the city, provide disaster relief services to New Yorkers in need, and begin the recovery process. Below is a look at key aspects of the emergency response and post-storm recovery efforts.

Rescues & Towing

The sudden, extreme rain flooded streets and placed many New Yorkers in harm's way. NYPD officers assisted New Yorkers in highly challenging situations, conducting 166 total rescues, including 69 water rescues, and helping remove more than 800 passengers from MTA trains. The FDNY also played a central role in emergency response operations, conducting more than 500 rescues in flooded roadways, submerged cars, subway stations, and buildings across the five boroughs. During the storm, FDNY performed de-watering operations in key buildings across the city, including the Richmond University Medical Center on Staten Island. Before and during the height of the storm, FDNY positioned five high-water vehicles in vulnerable areas, which proved invaluable to multiple rescue operations.

Ida's extreme flooding also resulted in damage to cars across the city, many in low-lying areas. The NYPD worked with private towing companies to move more than 1,000 vehicles.

Damage Assessment

NYCEM activated the Damage Assessment Task Force and its Damage Assessment Tool to allow New Yorkers to report damage to their homes and properties through 311. DOB and HPD responded to incidents, complaints, and referrals from agencies regarding storm damage. This prompted nearly 4,000 damage inspections by both agencies during the first week following Ida. As a result of these inspections, DOB determined 116 structures were not safe to occupy in whole or in part. DOB also referred homeowners to other agencies as needed. DOB and HPD have temporarily suspended the issuance of fines for illegal conversions and vacates in order to prioritize storm response – and will continue doing so when performing inspections related to storm impact through the end of the year.

NYPD sent patrol teams and PEU activated canvassers to check on residents and assess impact and needs. These damage assessments determined if there was structural damage to homes, flooded basements, or other impacts. This early self-reporting helped pinpoint where damage occurred in the city.

In addition, NYCEM used the data collected to coordinate with FEMA and the New York State Division of Homeland Security and Emergency Services (DHSES) to conduct joint preliminary damage assessments, which resulted in a Presidential Major Disaster Declaration in all five boroughs for Public Assistance and every borough but Manhattan for Individual Assistance. These programs allow FEMA to help fund the emergency response and the repair and recovery for the impacted residents. Per FEMA data, the initial citywide damage from Ida is \$38 million – a figure that will greatly rise in the coming months as damage to citywide infrastructure is fully evaluated. This figure also excludes private insurance claims.





Outreach & Canvassing

PEU has launched a large-scale canvassing operation, including going door-to-door to people's homes, texting, and making phone calls to inform New Yorkers of services and resources available to them. Outreach teams brought together PEU canvassers and an additional 200 canvassers from the City's COVID-19 Test & Trace Corps and City agencies.

As of this report, their combined and ongoing efforts have resulted in:

- A phone program that has made 486,399 calls to New Yorkers in affected areas, resulting in 34,447 live conversations in the hardest-hit neighborhoods
- A text outreach campaign to over 200,000 households in impacted zip codes
- A door-knocking program that has reached 29,536 households, resulting in 4,859 live conversations in the hardest-hit neighborhoods
- Assistance to 732 New Yorkers filling out a FEMA application
- Assistance to 80 households signing up for the GetFood relief program

This practice should and will be codified for future Administrations. There is no substitute for local, community-based responses in preparation for storms and other extreme weather.

Cleanup, Debris & Suspensions

Many homes, businesses, and buildings experienced flooding and damage from this extreme rain event, most of which occurred in basements and other below street level areas. As a result, the City mobilized multiple operations and resources to assist with the cleanup effort.

DSNY launched an aggressive debris cleanup effort, including:

- Adding supplementary trucks to routes to pick up storm-damaged debris from residents
- Conducting debris removal operations on an around-the-clock basis, returning to storm-affected neighborhoods and blocks repeatedly as homeowners and residents continued to clear out their flooded homes
- Deploying dumpsters in the areas with the highest concentration of damage

To ease the burden of scheduling bulk pick up, DSNY waived rules regarding trash set-out so residents could bring their trash to the curb at any time, rather than wait for their regular collection schedule. It also suspended enforcement of sidewalk cleaning regulations, and in coordination with DOT suspended Alternate Side Parking for seven days, from September 2 to 8, allowing those with damage to focus on recovery. Ultimately, DSNY collected more than 18,600 tons of debris.

Additionally, an Emergency Executive Order issued by Mayor de Blasio authorized the recently formed City Cleanup Corps (CCC) to enter homes in targeted areas and assist residents with debris removal. Since the authorization, CCC has gone into the neighborhoods hardest hit by Ida and helped lead a rapid clean-up effort – removing an estimated 71,600 trash bags of debris to keep streets clean, and bringing a sense of relief to households trying to return to normal.

Service Centers

In coordination with State and Federal agencies, NYCEM coordinated the opening of service centers in each borough. The service centers – staffed by City agencies, nonprofit partners, the State, and FEMA – enable affected residents to receive a wide range of resources and information, including but not limited to: shelter needs; social service benefits available; mental health care; food distribution; damage assessment guidance; dewatering information; American Red Cross assistance (e.g., clean-up kits, cash cards); and cleaning and debris management assistance to homes and businesses. Service centers will remain open as long as there is a need and have already seen more than 3,000 households to date. All services have been available online through www.nyc.gov/Ida, which has seen over 66,000 visits as of September 19.

Inspections for Homeowners

DOB performed nearly 4,000 inspections in response to reports of damage from members of the public through the Damage Assessment Tool, accessed through 311. Inspections were conducted expeditiously to determine if structures were damaged. As a result of these inspections, DOB determined that 116 structures were not safe to occupy in whole or in part. In addition to conducting inspections of self-reported damage, DOB responded to 311 complaints and referrals from other agencies regarding damage.

DOB is also an ongoing participant in the service centers established in every borough to assist members of the public with issues related to damaged structures, conducting repairs, and guidance regarding the filing of permits.

Home Repair Assistance Programs

Beginning September 28th, the City will put plumbers and electricians on retainer to prioritize Ida-affected homes for critical repairs to make homes safe. Homeowners can use the city's list to ensure priority service. All work will be paid for by the homeowner using their own or FEMA funds. Additionally, the city will also work to reimburse homeowners for costs for critical repairs above the amount they received from FEMA.

Housing Maintenance Code Enforcement for Tenants

HPD has inspected premises involved in approximately 5,000 complaints from tenants reporting damage to hot water systems, roof damage, leaks and mold (not all of which were necessarily Ida-related). In addition to notifying owners to correct any conditions identified as needing repair, HPD is conducting emergency repairs on immediately hazardous conditions where necessary so that tenants in multi-family buildings can remain in their apartments.

Sewer & Catch Basin Cleaning

As they do before every major storm, DSNY, DEP, and DOT cleaned 1,000 catch basins in hot spots and every catch basin on highways. While the clogged catch basins did not further exacerbate the issues caused by immense rainfall during Ida, DEP has inspected and conducted rigorous enhanced cleaning of catch basins throughout the city following the storm, including going to known problem areas identified by (or post) Ida.

Relief Services, including:

- **Basement Pumping**

Many homes experienced flooding in their basements or cellars from the storm. Water entered these premises from street runoff; overtopped rivers/streams, primarily in the Bronx; groundwater infiltration, primarily in Queens; and water coming up through plumbing fixtures in basements, as water seeks its own level. Property owners with standing water were offered pumping support via the City's Dewatering Task Force, coordinated by NYCEM and DEP. Less than 100 homes and businesses requested this service as many New Yorkers used pumps they already owned.

- **Emergency Sheltering (Hotels)**

HPD and NYCEM have connected displaced residents with the American Red Cross for emergency hotel services, extending the stay for weeks beyond the usual three days for people displaced due to a fire or vacate. As of publication of this report, 298 households and 842 New Yorkers have received hoteling following the storm.

- **Food Trucks & GetFood**

NYCEM provided emergency food for residents affected by the storm in coordination with the DSNY, the Department of Social Services (DSS), Department of Parks and Recreation (Parks), and the MOFP. In order to reach those in need, the City leveraged the COVID-19 home delivery GetFood program, and also placed food trucks and distributed prepared meals in impacted communities. A total of 257,764 meals have been distributed as of September 24.

Support for Small Businesses

SBS rapidly supported small businesses hit by the storm by activating its emergency response protocols, including:

- Sending its Emergency Response Unit (ERU) door-to-door to: visually assess the impact of Ida; help businesses record and report damage; manage communication from first responders and enforcement agencies; and expedite government and utility processes.
- Working daily with community partners, including Business Improvement Districts (BIDs), Chambers of Commerce, industry associations, elected officials, and others to ensure efforts were coordinated and comprehensive.
- Providing one-on-one support, technical assistance, and information to business owners and communities through its Small Business Hotline (1-888-SBS-4NYC).
- Connecting businesses to legal support for commercial leases.

Support for Immigrants

Like the climate crisis as a whole, Ida's impact was disproportionately felt by low-income and immigrant communities in our city. This includes an estimated 5,100 undocumented immigrants who have been affected by Ida, from property damage to a total loss of living quarters. Immigrants face a more challenging path to qualify for FEMA's Individual Assistance (IA), including undocumented immigrants who are ineligible for relief.

Led by MOIA, the City has launched immediate support for these communities, including:

- Contracting community-based organizations (CBOs) to support with relief efforts –including organizations already providing COVID-19 relief, the New York Immigration Coalition, and the Excluded Worker Fund
- Providing a legal training on the FEMA application for CBOs
- Creating a direct relief fund, in coordination with the State, for immigrants affected by Ida who are ineligible for FEMA assistance

Permit Fee Waivers (Emergency Executive Order)

On September 7, Mayor de Blasio signed Emergency Executive Order 235, directing DOB and DEP to waive fees associated with various permits or applications needed by property owners for storm damage repair. The Emergency Executive Order recognizes that as part of the recovery after Ida, property owners will require permits, filings, inspections, and applications associated with the repair work.

To assist property owners, DEP waived fees associated with asbestos abatement. DEP also waived the protocol which, under normal circumstances, requires individuals to submit their permit for asbestos abatement seven days in advance of the start of work – allowing teams to begin work immediately. Finally, DOB waived fees relating to electrical permits, construction document filing fees, permit filing fees, and special fees.

Coordination of Information & Agency Actions

NYCEM activated its Emergency Operations Center (EOC) on September 1, which remains activated as of this report. The EOC exists as a locus for information-sharing and interagency coordination for the partners to address immediate concerns, maintain situational awareness, and prepare for future needs. The EOC works across agency partners to track data and manage operations related to the response of Ida.

Coordination with FEMA

Finally, as part of the Presidential Major Disaster Declaration, FEMA will provide assistance to New York City through multiple programs. This includes funding to help repair and restore damaged facilities, reimburse the City for emergency protective work, and support those in need. Insurance is the first line of protection for a homeowner or renter to cover losses from an emergency. When underinsured or uninsured losses occur, residents can seek FEMA assistance.

FEMA Benefit	Eligibility	Description
Public Assistance	Government and some private nonprofits	Covers costs for debris removal, life-saving emergency protective measures, and restoring public infrastructure
Individual Assistance – Rental	Homeowners and renters	Financial assistance to rent alternate temporary housing if displaced
Individual Assistance – Home Repair	Homeowners	Financial assistance to make the damaged home safe, sanitary, or functional
Individual Assistance – Other Needs	Homeowners and renters	Financial assistance for uninsured disaster-caused expenses (e.g., repair or replacement of personal property and vehicles)
Individual Assistance – Clean and Sanitize Assistance	Homeowners and renters	One-time payment up to \$300 to clean, sanitize, remove carpet, etc.
Individual Assistance – Legal	Homeowners and renters	Free help with disaster-related legal issues

The City is working closely with FEMA and New York State to recoup costs incurred for the response to the storm and repairing all damage. Impacted residents can receive additional assistance by registering with FEMA online or at a Disaster Recovery Center, co-located with the City’s service centers. Based on the individual’s circumstances, FEMA can provide aid with housing, damaged household items, and under- or uninsured losses.

A New Playbook: Immediate Actions to Enhance Emergency Preparedness & Response

Ida was likely the most destructive extreme rainfall event in the city's recorded history. Yet it is far from the last of its kind. The New York City Panel on Climate Change (NPCC) anticipates that by the end of the century, the city could experience as much as 25 percent more annual rainfall than today, and 1.5 times as many days with more than one inch of rain. The intensity of rainfall is also increasing, with more rain falling in a shorter amount of time. These types of high intensity "cloudburst" rain events – sudden, heavy downpours where a high volume of rainfall occurs in a short amount of time – can exceed the capacity of New York City's sewer system.

New York City must make immediate investments to prepare for the impacts of extreme weather, while focusing on marginalized communities which continue to be disproportionately harmed by climate change. The City will implement immediate changes that fall into the three categories below: enhancing our analysis of dangerous storms; enhancing our communication and preparedness citywide, including tailored messaging to both homeowners and commercial property owners; and making immediate enhancements to our infrastructure.

1. Immediate enhancements to extreme weather communications.

We are in a new moment. We must take every kind of extreme weather communication the City has traditionally done and supercharge it – using every tool at our disposal to more aggressively prepare, warn, and protect communities in harm's way from extreme weather events. New Yorkers will immediately see the following tools put in place:

- **Implementing an Extreme Weather Coordinator in the Mayor's Office.** As storms like Ida become the new normal, we face a climate in which all kinds of extreme weather — from hurricanes to blizzards to extreme heat — are more common, more dangerous, and more likely to quickly intensify. This moment calls for a new kind of response, with full coordination across city agencies and clear, urgent communications to New Yorkers. These efforts will now be overseen by a central leader at City Hall, who will work closely with NYCEM and other frontline agencies to lead and organize extreme weather response. This Emergency Weather Coordinator will be designated by the Mayor. Starting immediately, the Deputy Mayor for Administration will be the first to serve in this role.
- **Increased mandatory evacuations.** Whenever the forecast indicates a high degree of likelihood of considerable or catastrophic Flash Flooding, NYCEM will work with the Mayor's Office to preemptively declare a State of Emergency and issue a mandatory evacuation of basement apartments, with a goal of issuing the evacuation at least six hours in advance, or as early as possible. The language will tell residents of basement apartments and employees working below grade that they must move to a higher floor in their building and, if they are unable to move to a higher floor in their building, that they should proceed to facilities that the City will identify in each neighborhood based on the forthcoming HPD survey of basement apartment locations. These locations will likely be police stations, fire stations, EMS stations, CBOs, and other existing locations that are open and staffed 24x7. The public will be alerted to these emergency orders via mayoral press conference, press release, Notify NYC, and Wireless Emergency Alert (WEA) and supplemented, to the extent possible, by door-to-door canvassers. The issuance of a mandatory evacuation will also activate the city's emergency shelter network.

- **Increased travel bans.** Whenever the forecast indicates a high degree of likelihood of considerable or catastrophic Flash Flooding, NYCCEM will work with the Mayor’s Office to preemptively declare a State of Emergency and issue a travel ban. Depending on the specifics of the forecast, the travel ban may (a) restrict vehicles from the road, similar to winter weather travel bans OR (b) be a full shelter-in-place where New Yorkers are directed to remain indoors for the pendency of the order and not walk on sidewalks, use subways, etc. The public will be alerted to these emergency orders via mayoral press conference, press release, Notify NYC, and WEA.
- **Warning signage to drivers at 100 flood-prone roadways citywide by next July.** DOT will add permanent signage at major roadways that often flood during storms. The signage will warn drivers that an upcoming stretch of roadway is prone to flooding in the event of bad weather, and urge them to avoid the area. By July 1, 2022, the beginning of the next hurricane season, DOT will have added signage at 100 flood-prone locations.

NYCCEM will also immediately enhance its communications with a more aggressive early warning system. The system will be scaled to storm severity and tailored for residents living in a basement or at ground level. It will start with notifications that urge residents to “prepare,” and scale up by informing them they must “move to higher ground” or “evacuate.” Messaging and actions will be tied to both NWS products and existing plan triggers. NYCCEM will incorporate lower thresholds for more specific and frequent outreach and messaging to the public. For example:

- The NYC Flash Flood Plan is activated when the forecast calls for rainfall rates of one inch per hour for an hour. When this occurs, NYCCEM will release a travel advisory with enhanced preparedness messaging, including advising those in basement apartments to move to higher ground, which will be amplified to the public and all partners.
- 36-48 hours prior to a potential event, NWS may issue a Flash Flood Watch, indicating ~50% confidence that a system may have impacts to the region. Previously, this would only trigger a NotifyNYC notification with basic information regarding the hazards (e.g., highway flooding) and preparedness action (e.g., prepare for power outages). Now, revised messages will include direction for people who live in a basement or at ground level to prepare to move to higher ground.
- As forecaster confidence increases and Flash Flood Warnings are issued, instructions for people who live in basement apartments will be scaled up to “Move to high ground” (Flash Flood Warning) to “Evacuate now” (Flash Flood Warning labeled Considerable or Catastrophic, rare and for events of unusual severity).
- Travel bans will be considered for any level of a Flash Flood Watch.
- Wireless Emergency Alert (WEA) messages will include messaging for basement evacuation and travel bans.
- Mayoral press actions will also be tied to these thresholds (e.g., social media and daily press conference for Watches with moderate confidence, television and radio for Warnings with increased confidence.)

In collaboration with the local NWS, NYCEM will monitor the National Weather Prediction Center excessive rain products, which have a longer lead time ahead of a weather event.

- A “Prepare” Notify NYC may be sent out for forecasts with 10-20% confidence.
- A “Prepare” Notify NYC will be sent out for forecasts with 20-50% confidence.
- A Hazardous Travel Advisory would be considered.
- A “Move to High Ground” Notify NYC will be issued for forecasts with over 50% confidence. A travel ban is also likely at this level.

HAZARDOUS PRECIPITATION TRIGGERS & ACTIONS

HAZARDOUS WEATHER OUTLOOK INDICATING 30% CHANCE OF FLASH FLOODING

3-7 DAYS

- Constantly and actively monitor the weather, consult the National Weather Service and other forecasters 2x/day.

FLASH FLOOD WATCH INDICATING 50% CHANCE OF FLASH FLOODING

48-72 HRS

- Constantly and actively monitor the weather, consult with the National Weather Service and other forecasters 2x/day.
- Convene readiness meetings with all flash flood response agencies
- Activate the Flash Flood Emergency Plan, directing agencies to prepare for flash flooding conditions.
- Issue Notify NYC messaging to prepare New Yorkers including basement messaging.
- Draft State of Emergency, Travel Ban, and (Hazardous) Travel Advisory language and prepare for immediate issuance if forecast worsens.
- Consider ordering basement evacuation if flooding is expected to be considerable or catastrophic.
- Consider early issuance of a travel advisory.

FLASH FLOOD WARNING INDICATING 60% TO 70% CHANCE OF FLASH FLOODING

12-24 HRS

- Continually monitoring of weather forecast, high resolution models, and radar.
- Continue readiness meetings with all flash flood response agencies.
- Issue Notify NYC messaging, with basement messaging, to prepare New Yorkers and suggest potential basement evacuations.
- Order citywide basement evacuations if weather conditions are forecasted to be considerable or catastrophic.
- Issue (Hazardous) Travel Advisory.
- Declare State of Emergency and order travel ban if weather conditions are forecasted to be considerable or catastrophic.

FLASH FLOOD WARNING INDICATING 80% CHANCE OF FLASH FLOODING

1-3 HRS

- Continue real-time monitoring of weather forecast, high resolution models, and radar.
- Issue additional Notify NYC messaging with basement messaging and other weather-related impacts.
- Order basement evacuations based on worsening weather forecast or observed impacts.
- Declare State of Emergency and order Travel Bans if impacts are severe.

NYC Emergency Management will continually monitor the forecast as long as a potential threat exists. The timeline above may be adjusted based on forecast guidance from the local National Weather Service office, the Weather Prediction Center, and other forecast sources.



Improved communication for homeowners:

- **Providing basement-specific messaging and alerts through NYCEM.** The City will update regular NYCEM guidance immediately with information tailored to homeowners with basement apartments. This information will be available in a variety of formats and languages online, available at any time.

Before and during extreme storms, previous City emergency plans did not include evacuations of inland basements for flooding risks. These emergency plans will now call for inland basement evacuations. NYCEM will also implement new citywide flash flood messaging – alerting any New Yorker who may be at or below ground level (or has renters, family, or friends in these units) with increasing urgency to move to higher ground. These changes are one step in a larger strategy to protect basement units and dwellers, found in more detail later in this report.

- **Including flooding guidance in DEP communications.** The City will additionally provide specific flooding guidance in DEP bill inserts starting in January 2022, reaching homeowners with key information and instructions.
- **Developing field-validated current day stormwater flood maps.** By May 2022, the City will make baseline flooding maps available so that property owners can take protective measures.
- **Expanding Flood Risk and Flood Insurance Awareness in Inland Areas.** While past extreme events like Hurricane Sandy devastated our coastline, Ida made clear that we are in a new moment where inland neighborhoods face a growing danger. The City must help re-educate New Yorkers living inland on this new danger, and part of that is protecting property owners and renters against financial devastation in the event of a flood disaster.

Understanding the real limitations some face around getting insurance, the City will take significant steps to help more know their options. HPD and MOCR will work with partners at FEMA and the Center for New York City Neighborhoods (CNYCN) to overhaul targeting of the flood insurance outreach campaign, FloodHelpNY.org, to now reach inland communities as well. This site is a resource for flood insurance and flood risk mitigation strategies customized for owners and renters in 1-4 family buildings. In part because of this resource, New York City consistently retains higher flood insurance enrollments than other areas in the state. Property owners in New York City with flood insurance received an average payment of \$68,000 after Hurricane Sandy. In contrast, those without insurance received an average of \$3,685 in FEMA Individual Assistance.

- **For 1-4 family buildings: Restarting FloodHelpNY in-home resiliency audits and financial counseling programs, and subsidizing cost-effective flood retrofits.** Originally funded through Sandy disaster recovery programs and operated by CNYCN, FloodHelpNY offered highly effective in-home engineering inspections and financial counseling sessions for property owners in certain flood prone neighborhoods impacted by Sandy. While funding for these programs has since concluded, the City will now restart these audits and programs – including subsidizing cost-effective flood retrofits for 1-4 family buildings, which will stabilize the existing housing stock in flood-prone areas. This initiative will be augmented by the backwater valve study described below.
- **For large, vulnerable multifamily buildings: Restarting FloodHelpNY building audits and operational trainings, and subsidizing cost-effective flood retrofits.** After Sandy, Enterprise Community Partners developed physical building assessments and training programs for building staff

and supervisors, all targeted to managing building operations for climate risks and extreme weather. Several vulnerable NYCHA and Mitchell Lama multifamily buildings did not receive benefits under the post-Sandy Build It Back program and still have flood retrofit programs pending. The City will restart these trainings, and subsidize flood retrofits in the most vulnerable buildings.

- **Spreading the word on Zoning for Coastal Flood Resiliency (ZCFR) law.** While Ida showed the increasing danger faced by inland communities, we must continue to help homeowners on our shorelines build resiliency. ZCFR, adopted by the City Council in May 2021, makes it easier for New Yorkers to protect their homes against coastal flooding and rising sea levels. It allows residents in the City’s floodplain to:

- Relocate their basement spaces above grade – without making residents choose between losing a portion of their home or basement unit to retrofitting
- Use generators, batteries, and other energy storage systems on their properties without encountering zoning constraints

Finally, ZCFR set up a framework to allow the City to fast-track the post-disaster recovery process in certain cases through a zoning text amendment – lifting zoning constraints on a temporary basis. These provisions can help New Yorkers as they recover from Ida, and the City will conduct targeted outreach to ensure homeowners are aware of their options.

Improved communication in vulnerable communities:

- **“Rainboots on the Ground.”**

NYCEM is in the process of growing a Citywide Strengthening Communities program that will maintain partnership with over 60 networks of CBOs over the next three years. Similar to the City’s historically successful 2020 Census effort, in which community organizations canvassed door-to-door to drive awareness and action, the City will contract and train CBO teams to conduct door-to-door canvassing of at-risk apartments across the city, especially basement units. They will highlight the impending threat, advise of evacuation, and provide the closest refuge location.

Improved communication and support for small business owners & commercial property owners:

- **Before and after extreme weather events:**

Pre-Weather Event: City agencies, led by SBS, will deeply engage with small businesses and help them prepare for this new reality. The City will lead an effort to educate storefront owners on flood preparation — such as elevating sensitive equipment and inventory – that play a crucial role in helping a business survive. In coordination with NYCEM, SBS will also share critical information related to extreme weather, commercial leases, and business interruption.

Post-Weather Event: SBS will conduct outreach citywide, sharing best practices on insurance documentation, Federal, State and City resources, and mediation/legal services.

- **Expanding SBS Business PREP (BPREP) citywide to help small businesses better prepare for emergencies.**

Created after Hurricane Sandy, the SBS Business Preparedness and Resiliency Program (BPREP) helps small businesses prepare for emergencies and enhance the resiliency of their operations, assets, and physical space. The program offers emergency preparedness workshops and webinars, on-site risk assessments, and online resources on best practices. Certified experts in resiliency and emergency preparedness are available to consult one-on-one with small business owners to help them reduce loss and maintain control during any disruption. The City will fund an expansion of this program in March 2022 to reach an additional 2,040 businesses citywide.

- **Expanding the City's Small Business Emergency Grant Fund.**

The City will fund grants up to \$5,000 for businesses affected by emergency weather and other disasters. Previous federal funding severely limited how money could be used and which businesses could apply. This new commitment by the City will ensure that more funds are available to more businesses, with less paperwork and delay, starting in March 2022. To facilitate this, the City will also create a new public rule to allow for speedy and effective deployment of financial support for small businesses in the event of an emergency.

2. Immediate enhancements to storm analysis & data initiatives.

The City's ability to prepare and respond to future extreme weather events hinges on how well we can determine the extent and magnitude of flood impacts, as well as our modeling of stormwater infrastructure capacity. We will make significant investments to:

- **Expand the Flood Sensor Network citywide.** MOCR, working in partnership with the Office of the CTO, DEP, NYCEM, DOT, and NWS, will expand the City's nascent flood sensor network to provide real-time depth data in high-risk locations. There is significant potential in integrating this data into real-time situational awareness, alerts, future forecasting, and long-term planning. For example, this data can:
 - Feed into an early warning system throughout the city, informing road closures or travel bans
 - Create electronic and variable signage to notify drivers of potential roadway hazards, reminding travelers to plan ahead or use an alternate route
 - Alert communities on emergency preparedness and response, including real-time mitigation measures like sandbags and removal of valuables from basements.
 - Identify areas that most urgently need post-storm assistance
 - Validate existing flood models and better hone predictions
 - Inform long-term stormwater resiliency planning
- **Enable real-time crisis information via drone data collection.** NYCEM will begin conducting post-storm assessments using drones to send real-time information back to the City's emergency response agencies, allowing agencies to understand on-the-ground conditions immediately. This information can

inform emergency response decisions and post-storm actions, such as determining where to send first responders after initial deployment and prioritizing areas for cleanup and repair.

- **Integrate flood maps and improve citywide models of combined flood risk.** Extreme rainfall, higher seas, and higher water tables can have a compound effect. Current flood maps and models depict these climate-related hazards separately. Future flood risk cannot accurately be mapped or modeled without a precise and up-to-date depiction of present-day flood risk under existing conditions. A comprehensive map including coastal flooding, stormwater and groundwater modeling is needed. The City will create an integrated map to visualize the cumulative or compound effect of weather and climate hazards.

To improve those maps, we will also integrate stormwater, coastal flood, and groundwater models. Key questions include where and when surface inundation occurs, the performance of outfall tide gates, and the need for pumping and/or storage. This model will approach all these questions through data analysis, and will take into account current and future tidal elevation, as well as the infrastructure already in place (e.g., pipe sizes, layouts). The resulting framework will help the City and private partners identify key infrastructure investments that need to be made, and help City agencies determine the most effective use of City resources.

- **Hire a private weather meteorology & forecasting company to supplement NWS.** NYCEM is in the process of hiring a private weather forecasting vendor, which will: provide a “second opinion” on what the City hears from NWS; build local forecasting down to the neighborhood level; proactively alert the City of any potential triggers being reached; and develop custom forecasts/products on demand, with access to data and models NWS does not have. A solicitation for bids has already been issued, and provided bids are received, NYCEM will select a vendor the week of this report.
- **Develop a Coastal Flood Vulnerability Index.** The Heat Vulnerability Index used by the NYC Department of Health and Mental Hygiene is an essential tool that helps the City protect communities from the Urban Heat Island Effect through increased and accessible information, resource allocation, outreach, and services in vulnerable neighborhoods. A similar tool for coastal flood vulnerability would integrate information about coastal climate hazards with data on vulnerable populations to help guide resource allocation, outreach, and services to priority neighborhoods. MOCR, in coordination with relevant agencies, will develop a Coastal Vulnerability Index.
- **Improve future projections of extreme precipitation.** The Stormwater Resiliency Plan, released in May 2021, outlines the City’s approach to managing the risk of extreme rainfall. The plan addresses emergency response as well as accounting for increasing rainfall in our infrastructure, and laid out 17 initiatives for reducing risk to extreme precipitation over 10 years. However, the record-breaking rainfall events that have occurred just this summer since the Plan’s release have demonstrated the need to accelerate its implementation. The City has accelerated these 17 initiatives, which have been captured as dedicated commitments in other areas of this report. Additional immediate actions include:

To ultimately develop and/or improve future IDF curves, the City will develop climate modeling and engineering analysis of future precipitation and produce future probability curves. We expect that preliminary IDF curves will be completed by mid-2022, which can begin to inform planning, with final projections to follow in mid-2023. Engineers will then use these projections to develop technical specifications on the intensity, duration, and frequency of different rainfall scenarios.

Finally, the City will undertake specific modeling initiatives to improve readiness, including:

- Bringing in data from the high-water marks of Ida, as well as flood sensors to map the extent of Ida's flooding
- Using flood depth data, along with the City stormwater maps, to help the City improve its stormwater models and understand flooding vulnerabilities
- Improving stormwater models by calibrating the results to known flood extents and depths experienced during Hurricane Ida. With the improved stormwater models, we will update the extreme and moderate stormwater maps and add a baseline stormwater map. Finally, we will model additional rainfall scenarios and implementation strategies to improve emergency response and inform stormwater investments.

3. Immediate enhancements to city and household infrastructure.

CITYWIDE

- **Accelerating the short-term Stormwater Resiliency Plan.** The Stormwater Resiliency Plan, released in May 2021, outlines the City's approach to managing the risk of extreme rainfall. The plan addresses emergency response as well as accounting for increasing rainfall in our infrastructure, and laid out 17 initiatives for reducing risk to extreme precipitation over 10 years. However, the record-breaking rainfall events that have occurred just this summer since the Plan's release have demonstrated the need to accelerate its implementation. The City has accelerated these 17 initiatives, which have been captured as dedicated commitments in other areas of this report. Additional immediate actions include:
 - Expand pre-storm mitigation areas as part of the Flash Flood Emergency Plan informed by the Stormwater Flood Maps in 2021, and analyze locations of critical facilities and assets for exposure to extreme rainfall by 2022
 - Establish a framework to identify the most vulnerable "cloudburst" neighborhoods by the end of 2021 that considers equity factors, existing green space, location of existing infrastructure and historic waterways.

The City will also continue to advance the longer-term priorities of the Stormwater Resiliency Plan, as detailed later and throughout this report.

- **Accelerating "high-level" storm sewer upgrades.** The City's current sewer system is limited to 1.75 inches of rain per hour. Completely redesigning the system to prepare for intense storms in the future and accommodate double that amount (3.5 inches of rain per hour) would be a significant undertaking. It would require: doubling the size of 7,400 miles of sewers; significantly enlarging 490 regulator chambers; doubling the capacity of 95 pumping stations; and making the shoot connections from all 148,000 catch basins larger. The estimated cost for this project would be \$100 billion, and would hinge on receiving significant Federal funding.

We can and must examine these kinds of long-term redesigns, as well as more incremental measures. In the meantime, we can immediately begin adding supplementary "high-level" storm sewers just below the street

level that can play a significant role in alleviating flooding. The City will accelerate projects in College Point and Southeast Queens to install these sewers.

- **Adding 50 acres of porous pavement in the East Bronx.** Porous pavement is another method for preventing rainfall from overburdening sewers. This concrete pavement is designed with small holes to allow rainfall to soak in, rather than running off onto streets and into catch basins. DOT and DEP have successfully led a pilot program, and now will expand porous pavement to vulnerable areas in the East Bronx — turning approximately 50 acres of roadway into porous pavement, thereby reducing millions of gallons of runoff annually into the sewer system.
- **Increasing catch basin inspection frequency in commercial areas.** While flooding during Ida was due to the immense volume of rain, not clogged catch basins, regular catch basin cleaning is a key way to reduce flooding due to storms. The primary cause of blocked catch basins is street litter, which often occurs along heavily-trafficked commercial avenues and boulevards. The City will inspect these basins at least twice per year and clean them when needed.
- **Empowering residents with deployable barriers in non-drainage areas.** The City will purchase barriers that offer mitigation for nuisance flooding for homes that experience flooding in non-drainage areas (e.g., private streets.) Commercial products like flood control buckets and flood bags are easy to install and will not require engineering or technical skills by homeowners to operate.
- **Implementing Trust for Public Land Stormwater Management Playgrounds.** This partnership between the School Construction Authority (SCA) and DEP funds the Trust for Public Land (TPL) to reconstruct school playgrounds with green infrastructure solutions. These “greening” practices include site-appropriate features that absorb, delay, and treat stormwater, including: permeable pavement; green roofs; bioswales; and rainwater catchment systems. These playgrounds help manage runoff, mitigate flooding and pollution downstream, and provide green spaces that make our city more livable and resilient. These playgrounds have a strong track record: in the 49 green infrastructure playgrounds implemented to date, 40.9 million gallons of stormwater per year have been captured. The City will work with TPL to implement 20 sites over the next 4 years and will explore expanding the partnership to NYCHA playgrounds over the next year.
- **Expanding NYCHA’s Green Infrastructure (GI) program.** NYCHA has already made significant resiliency investments in partnership with DEP, and now has the opportunity to implement innovative stormwater management solutions on their campuses — from cloudburst strategies to rain gardens to permeable pavement. The City will fund efforts for seven sites, prioritized from those with Ida impacts.
- **Accelerating additional GI projects citywide.** Green Infrastructure assets include a variety of innovative interventions, like rain gardens and permeable pavement to manage stormwater runoff by absorption and other methods to divert wet weather runoff before it enters the City’s sewer system. The GI program is typically area-wide, enabling it to have an impact in a relatively broad geographic area.

Current projects focus on parts of southern Brooklyn in the Owl’s Head wastewater treatment plant drainage area; Westchester Creek and Bronx River Watersheds in the South Bronx; and parts of Southeast Queens. DDC will apply the recently-authorized design-build construction method to the entire existing Green Infrastructure program pipeline to shave approximately two years from a typical project schedule.

- **Creating a Stormwater Project Delivery Task Force.** DDC’s Blueprint for Construction Excellence demonstrated that efficient project delivery requires constant oversight and interagency collaboration to streamline burdensome bureaucratic processes. In order to reprioritize and quickly deliver on an extreme flood area plan, DDC, DEP and its oversight will convene a standing Task Force to address delays caused by typical design processes, environmental assessments, permitting, land-use, and federal clean water requirements.
- **Investigating the impact of all climate hazards on the City’s social infrastructure.** Libraries, senior centers, recreation and community centers, and shelters provide trusted communal space and critical services to millions of New Yorkers each year, and thousands during extreme weather events. Years of underinvestment have left these structures – as well as the communities and specific populations they serve – vulnerable to intensifying climate impacts. MOCR will convene a Citywide Taskforce, comprised of Public Libraries, Parks, the Department for the Aging (DFTA), DOHMH, DHS, HHC, and ACS to analyze and develop recommendations about how critical assets and programs can be upgraded, repaired, and increase overall climate resiliency. Specifically, the recommendations should focus on how City assets can serve as cooling centers, provide public programming and community space to residents, and provide temporary housing for vulnerable populations, including people in correctional facilities. All recommendations will be made by 2023 and updated regularly.

HOUSEHOLD

- **Expanding backwater valve installations to the most vulnerable residential topologies to prevent sewer backups into private properties.** Backwater valves reduce the likelihood of raw sewage backups into basements. This fall, MOCR, with the support of NYCEM, DEP, HPD, and DOB, will conduct a study to find the neighborhoods across the city that can benefit most from backwater valve installations – depending on building type, where the neighborhood is in the sewer network, and flood risk. Once that study is completed, the City will identify a specific number of buildings in 5 priority neighborhoods to conduct outreach and offer installations. These installations will be completed before the next hurricane season.
- **Providing sandbags to residents citywide ahead of storms.** Sandbags offer a simple but effective way to prevent or reduce flood water damage, acting as a wall that can form the first layer of defense or re-route water around, instead of through, buildings. DOT is immediately procuring 10,000 sandbags to gauge interest and need citywide for residents in 1-4 family homes. We will continue to scale up to eventually 100,000 to support these at-risk residents, and will have distribution sites across all five boroughs ahead of storms.

A New Playbook: Keeping New Yorkers in Basements and Cellars Safe.



While the immediate actions outlined previously will play a critical role to protect all New Yorkers against extreme weather events, the City must also address a challenge made tragically apparent during Ida: protecting occupants of basement and cellar units. 11 of the 13 New Yorkers who lost their lives during the storm were in basement or cellar units across our City.

Background

The City estimates that at least 100,000 New Yorkers live in 50,000 or more illegal basement apartments. The majority of the illegal basement apartments are in Queens, Brooklyn, and the Bronx. These units present an incredibly complex challenge. Most basement apartments were built without City oversight and are unsafe because ceilings are too low; egress is limited; there is insufficient light, air, and ventilation; they are located too close to fuel storage and boilers; and they have dangerously improper electrical systems. Because of those dangers, immediate legalization of every basement unit isn't safe for New Yorkers. Yet because of the need for affordable housing, basement apartments remain an important part of the city's housing stock.

In 2019, as part of ongoing efforts to grow the stock of affordable housing, the City launched a Basement Conversion Pilot Program to explore the feasibility of converting basements in East New York into legal and safe apartments. Some code requirements were eased for participants in this closely monitored pilot program, with the hope of learning as much as possible about how to safely convert them to legal apartments. Requirements were changed, for example, for ceiling height, natural light, means of egress, and sprinklers. The pilot also allowed for waivers of DOB and DEP fees, and HPD launched a technical assistance and financing program to assist owners in the Pilot program. Owners of eligible buildings in Community Board 5 that

met the physical and financial criteria were selected to participate. The program, which is still underway, is demonstrating just how difficult and costly converting basements in East New York into legal apartments will be.

Just over 100 homeowners completed the detailed home assessment for the pilot out of the nearly 8,000 potentially eligible homeowners contacted to discuss the program. Additionally, the ground beneath East New York is particularly hard to excavate, a process that is often required to make basement ceilings at least 7'6" tall. Excavation costs contributed to overall high costs for converting basements in the East New York pilot, with most conversions estimated to cost \$275,000 to \$375,000. It's possible, however, that the pilot is not representative of the city, and there is a pathway to basement conversions in other areas that will be less difficult and costly.

Immediate Steps

This is an incredibly complex problem, and there is no overnight answer that will make the 100,000 people in illegal basement apartments safe from flooding and other risks. Yet change must occur – and the City will begin that process immediately by:

1. Creating a database of subgrade spaces Citywide.

Resolving this issue in a way that protects every New Yorker will take time. The City's first step will be to work across relevant agencies to create a database of subgrade spaces, including those that may be used as basement apartments, so that the City can quickly and proactively alert property owners and tenants of potential flood risk. Work on this database will begin immediately and will be completed by May 1, 2022, ahead of next hurricane season.

2. Providing enhanced communications to basement occupants, immediately.

As detailed in the previous section, all NYCEM guidance will be updated with information tailored to homeowners with basement apartments. Using our database, we will conduct communications outreach to these occupants.

3. Enhancing NYPD/FDNY first responder readiness for basement evacuations.

The NYPD will begin annual drills of basement evacuations in October 2021, ensuring that its first responders are prepared with a detailed plan to aid those needing to evacuate. It will also change policies and procedures to focus on the growing threat of inland flooding, as well as coastal flooding. Additionally, FDNY will enhance its preparation for basement and inland flooding, which supplements the Department's existing storm preparation. This includes an active review of department facilities to assess the need for hardening infrastructure against flash flooding. It also includes updating department flood maps to better anticipate the possibility of flash flooding. This will enable FDNY to more efficiently pre-position resources and improve emergency responses and evacuations in flash floods, including basements and subterranean spaces.

4. Contracting trusted CBOs to reach at-risk residents door-to-door.

As referenced earlier in the report, NYCEM is already in the process of building a program to partner with over 60 networks of community organizations. Similar to the City's historically successful door-to-door canvassing around the 2020 Census effort, which leaned heavily on CBOs known and trusted in their neighborhoods, we will again contract and train these canvassers to go door-to-door in high-risk basement

apartments throughout the city. Canvassers will highlight the impending threat, advise of evacuation, and provide the closest refuge location for residents.

5. Finding drainage solutions for community driveways.

Several community driveways, which are below-grade alleys behind residential streets that provide access to basement-level garages, are in low-lying areas that were significantly flooded during Ida. Over the past few decades, many of these garages have been converted into living spaces. DEP has since been working with property owners to connect their driveway dry wells to nearby city sewers. Construction is expected to begin on the first set of driveways in East Elmhurst on October 4, and work will soon begin on 40 additional driveways in 5 low-lying areas. All will be completed in the next 6 months, in advance of the 2022 hurricane season.

6. Build a comprehensive Basement Apartment Conversion program.

The City will also aggressively build a program that expands basement conversions to additional New York City neighborhoods, working with homeowners to make basements safer. Much of the work to navigate between existing conditions and legal basement apartments has already been done for the initial pilot. To move the conversion issue forward, the City must assess both where the pilot can be expanded to provide a more representative estimate of cost and other barriers to conversion, and where in the city conversions could occur with the lowest flood risk.

Additionally, the City will engage a working group to consider further regulatory changes and programmatic support that could facilitate the safe conversion of basement apartments.

A New Playbook: Long-Term Infrastructure Improvements



In addition to the immediate steps detailed in this report, the City must also address larger, structural issues – ones that get at the root of the challenge with extreme weather and provide long-term strategies to protect our communities. These include:

1. Improving our legacy sewer system for the future.

The City’s 7,400 miles of sewer pipes were largely designed a century ago and are performing to that historic standard. However, it is clear the climate of the future will be different than the past. There are improvements that the City can make now that will start to prepare the drainage system for the future, including:

- Incorporating projected future rainfalls into DEP’s drainage planning by 2025. DEP’s drainage planning will evaluate the proposed sewer systems performance for the projected future rainfall to see if off-line storage systems can be developed as part of the plan.
- Supplementing the existing sewer system with a variety of tools, including high-level storm sewers, storm sewer extensions, green infrastructure and cloudburst solutions, retention basins, permeable pavement, and Bluebelts.
- Investing to support areas that face unique risks. For example, many areas in Southeast Queens are particularly vulnerable to rainfall-based flooding. To address this vulnerability, DEP, along with DOT and DDC, are currently engaged in a massive, \$2.24 billion buildout of the sewer system there to alleviate flooding and improve the quality of life for residents and businesses.

- Accelerating the entire sewer replacement cycle by 61%.
- Continuing to invest hundreds of millions of dollars each year to upgrade the entire City’s drainage system, which serves both inland and coastal areas. DEP’s 4-year capital plan includes new investments, on top of existing investments, of \$2.1 billion for new and replacement hard pipes (including Bluebelts) and \$350 million for green alternatives.
- Assessing adaptation strategies for sewer outfalls along the shoreline to account for sea-level rise. Assessment to be completed by 2023 and incorporated into capital planning.
- Investing in DEP upgrades to storm sewer outfalls. Outfalls are the very end of sewer pipes at the point of discharge into local waterways. These upgrades will support stormwater conveyance as sea levels rise.
- Adding capacity to the system to improve water quality in the harbor, which will help reduce quality of life complaints, meet the economic growth needs of the city and ensure the long-term capacity of our infrastructure. DEP will do so by rehabilitating current sewers, constructing storm, sanitary and hi-level storm sewers, and constructing Bluebelts.

2. Continuing the integration of Bluebelts.

Bluebelts are ecologically rich and cost-effective drainage systems that naturally handle the runoff precipitation that falls on our streets and sidewalks. These projects preserve natural drainage corridors including streams, ponds, and wetlands, and enhance them to perform their functions of conveying, storing, and filtering runoff precipitation or stormwater. In addition to reducing urban flooding and improving the health of local waterways, Bluebelts provide open green space for their communities and diverse habitat for wildlife since they are not constricted by closed pipes or underground infrastructure like traditional storm sewers. As New York City prepares for rising sea levels and heavier rains due to climate change, Bluebelts offer a natural and effective solution for stable and sound stormwater management.

Currently, the city has nearly 75 separate Bluebelts integrated into the drainage system on Staten Island – a number that continues to grow as part of the expansion of the Mid-Island New Creek Bluebelt. The City will continue to look for opportunities across all boroughs to invest in these projects, as the Bluebelt concept expands beyond the typical in-stream or in-wetland solutions used successfully in Staten Island. Bluebelts could receive significant Federal funding under the proposed Emergency Watershed Protection Program legislation.

3. Using other innovative processes like stream daylighting.

Stream daylighting is a process by which buried rivers and sewers are uncovered and routed above ground again. This can be an extremely useful tool in areas like Van Cortlandt Park in the Bronx. Decades ago, a system was installed to allow the lake to drain into city sewers. Yet this method has reduced sewer capacity that could otherwise be used for neighborhood drainage during a storm – an issue that was made clear during Ida when parts of the Major Deegan Expressway flooded with multiple feet of water. The City is constructing a Tibbetts Brook project that will re-route the lake overflow into a man-made brook that will empty into the Harlem River, rather than into the sewer system.

4. Accelerating the long-term Stormwater Resiliency Plan.

Immediate actions are included as part of the City’s “short-term” plan and throughout this report. Additional long-term initiative acceleration includes:

- Developing and adopting future rainfall intensity projections by mid-2022; this will be led by MOCR, NPCC, and DEP.
- Developing and implementing a new drainage standard, where hydraulically feasible, using new intensity projections that account for climate change in the planning and design of future drainage investments, including Long-Term Control plans by 2023. DEP will also propose expansion of on-site retention systems through the City Administrative Procedures Act by 2023.

5. Providing transformational, neighborhood-scale stormwater strategies to “cloudburst” neighborhoods.

A “cloudburst” refers to a sudden, heavy downpour where a high volume of rainfall occurs in a short amount of time. In 2017, DEP performed a Cloudburst Planning Study in partnership with MOCR and other City agencies that identified preliminary sites for cloudburst design strategies. Cloudburst stormwater management strategies are a mix of gray infrastructure, which are structures such as dams and roads, and green infrastructure, which are natural systems like forests and wetlands.

These cloudburst strategies are designed for extreme events – helping absorb water where possible and storing excess water safely until the event passes, while providing amenities and open space. This takes pressure off the sewer system where this water would traditionally flow. By the end of 2021, DEP will select 10 at-risk neighborhoods for implementation of cloudburst design strategies in partnership with MOCR, NYCHA, DOT, Parks, and other City agencies. Initial neighborhoods for consideration include areas in Southeast and Central Queens, Northern Staten Island, and the Southeast Bronx. All priority cloudburst neighborhoods will begin work the first quarter of 2022, and the first four neighborhoods will be completed in 2025. The City will aggressively pursue Federal & State funding support for the remainder.

A comprehensive strategy will be developed for each neighborhood to identify stormwater flow paths in at-risk areas, considering both physical vulnerability (topography, subsurface conditions, land use, recent and historic complaint and damages data, etc.) and socioeconomic factors (income, demographics, access to existing green space). DEP will develop community outreach strategies to create awareness of these neighborhood strategies and identify opportunities for implementation. Neighborhood strategies will outline a variety of mitigation techniques:

- In the short term, the first “line of defense” will be water retention in streets and open spaces to reduce volume along these flow path by implementing green infrastructure including porous pavements, infiltration basins, and rain gardens along streets and medians.
- The second “line of defense” will be storage along the flow paths and in at-risk areas. This will be a hybrid green-gray approach that will re-route on-site and street runoff to detention- and retention-based features.
- Recognizing that not all flooding can be mitigated, neighborhood strategies will explore housing and building-level mitigations (for example, flood retrofits, backflow prevention, re-grading, roof leak repairs, and acquisitions).

- Innovative technologies that consider the whole water cycle, including stormwater capture and wastewater reuse, will also be used to create capacity in the sewer system. These technologies are currently being implemented throughout the city to divert flows from sewers and treat it for beneficial purposes such as irrigation and other non-potable uses such as maintaining water levels in ponds/lakes in parks.
- Other partners such as CUNY (e.g., Brooklyn College, York College), MTA (e.g., diverting pumped water from sewer) will also be considered, along with expanding stormwater capture and reuse projects on private land through public-private collaborations.

At NYCHA’s South Jamaica Houses in Southeast Queens, DEP will implement a “Water Square” inspired by Rotterdam by restoring a basketball court and lowering it below the surface, creating space to store stormwater below and above the court. This project will provide storage of 300,000 gallons of stormwater during high intensity rain events. This project will begin in 2022 and be completed by 2023.

At Central Park, DEP is leading efforts to recirculate stormwater in the park’s northern waterbodies that will reduce flow from the Harlem Meer to the combined sewer on 5th Avenue by an estimated 150 million gallons per year and increase system capacity. At Prospect Park, DEP is also leading a valve replacement project that will allow lake levels to be lowered to reduce flow to the combined sewer before high intensity rain events to create additional capacity. In addition, DEP is utilizing a public-private partnership approach to provide grants and bill discounts to private property owners for wastewater and stormwater capture and recycling — including \$13 million in grants to 33 private properties, and up to \$10/gallon for certain water recirculation projects that reduce potable water use. More opportunities like these will be identified through the cloudburst neighborhoods efforts.

6. Implementing the East Harlem Cloudburst Resiliency Project.

While Manhattan experienced less impact from remnants of Ida than other boroughs, the City will continue to advance key resiliency initiatives here. NYCHA and DEP will advance a project to reduce extreme precipitation risk at Clinton Houses in East Harlem, identified through the Vision Plan for a Resilient East Harlem (published in 2020). This project will utilize green infrastructure and “cloudburst” infrastructure to supplement the existing drainage system. NYCHA and NYC Parks will work with DEP to look for additional feasible locations. This project will be completed in 2024.

7. Implementing the Wetlands Management Framework.

NYC Parks’ Wetlands Management Framework outlines a comprehensive approach to managing the city’s streams, freshwater wetlands, and coastal wetlands. The framework calls for investments in wetlands and stream restoration and management as well as funding for land acquisition for conservation, ensuring wetlands and streams have adjacent natural land for storm-related flooding, and for marsh migration when sea-levels rise. Its implementation will protect against storms and flooding, store flood waters, improve air and water quality, cool the city, and store carbon.

Priority wetland restorations include:

- Hammond Cove Shoreline Restoration in the Bronx. This project will improve the condition of fringe marsh at the small inlet of Hammond Cove, in the Throgs Neck neighborhood of the Bronx. Salt marsh restoration projects improve coastal wetland health and resiliency. Restoration and enhancement strategies

include sediment placement, excavation of historic fill to create new marsh and expand marsh migration opportunities, and re-construction of eroded marshes and erosion protection at the water's edge. This project will help increase the resiliency of degraded wetlands and absorb stormwater from landside flooding, as well as provide storm surge wave attenuation and reduce erosion during coastal flooding.

- Hurricane Sandy buy-out properties in Ramblersville, Queens. Salt marsh restoration will occur across multiple lots in Ramblersville/Howard Beach where houses were demolished and property is being transferred to NYC Parks directly or through transfer in other neighborhoods. These projects will restore former house lots located in a residential neighborhood to healthy marsh and adjacent upland that can help absorb street runoff and help store and detain flood flows from the land side as well as daily inundation from tidal creeks in this low-lying area. This project is estimated to be completed by 2025.
- Harlem River Shoreline Restoration at Bridge Park South in the Bronx. This project will result in stable, re-vegetated shoreline along several hundred feet of the Harlem River that were not included in the current phase of design and Bridge Park south restoration. The shoreline is impacted by outfalls that get backed up during coastal flooding and cause overflow and erosion of the shoreline, as well as drainage from the bridges to the north and south of the park. This project is estimated to be completed by 2025.

8. Adding stormwater green infrastructure in New York City parks.

The City will retrofit parks to reduce impervious area and direct stormwater to rain gardens and vegetated bioretention systems to help reduce park and street flooding at six sites across the Bronx, Queens, and Staten Island. As observed during Ida at Van Cortlandt Lake, existing infrastructure cannot manage the increasing pace and intensity of heavy rain events.

Green infrastructure installations will mitigate stormwater impacts such as in-park and adjacent street flooding, as well as impacts to downstream waterbodies (such as erosion, nutrient and pollutant loading) during major storms and everyday high intensity rain events. These systems can also be sized to accommodate larger storms, and their benefits for the city's wetlands, lakes, and streams will build up by slowing down and filtering flows on more typical storms. Six priority sites in Staten Island, Queens and the Bronx are expected to be completed by 2025.

Additionally, Parks will explore lowering the water levels in lakes to divert water. Parks will coordinate with DEP in these instances to identify how much water to pump down.

9. Investigating the impacts of sea level rise and extreme weather on housing stock.

Chronic floods and extreme temperatures will significantly impact the city's housing stock and transform fundamental components of urban neighborhoods. The Mayor's Office will lead key City agencies such as HPD, DEP, EDC, DCP, and DOB to assess with residents, building managers, developers, lenders, and community organizations the climate risks facing neighborhoods – with a particular focus on the needs of renters, property owners, Low-to-Moderate-Income (LMI) residents, and communities of color.

After identifying the risks and needs of the city's housing stock, the City will produce recommendations for climate adaptation including: the development of new and augmented programs to: reduce risk exposure; increase risk awareness; provide retrofit assistance; develop buyout assistance; explore climate

migration opportunities; identify post-disaster housing recovery needs; and consider regional housing and transportation mobility needs from coastal neighborhoods.

10. Updating building, electrical, plumbing, and zoning codes to address intense precipitation risks and coastal flooding.

The City's Building Code contains rigorous flood resilient design requirements within the coastal floodplain, but not in inland flood prone areas. DOB, DCP and MOCR will identify building and zoning code strategies that promote flood resilience in upland locations subject to increasing stormwater floods and continue to improve regulations governing coastal flood risk.

Proposed code changes for existing buildings could include:

- Requiring exterior damp/waterproofing of basement, slabs, and seal penetrations
- Requiring backwater valves
- Requiring sump pump installation
- Increasing mandatory permeable surface requirements
- Requiring installation/relocation of electrical service from basements and cellars
- Requiring the addition of an escape window
- Requiring the installation of a water alarm
- Requiring installation of flood shields

Retrofitting existing buildings to withstand future weather extremes will be expensive. While the city's building code must keep pace with safety standards, the City will also pursue multiple financing tools and incentives, some of which require authorization by the state legislature as described below.

Proposed code changes for new buildings could include:

- Requiring exterior damp/waterproofing of basement, slabs, and seal penetrations
- Requiring backwater valves
- Requiring sump pump installation
- Increasing stormwater detention capacity and increasing design flow of stormwater design
- Increasing mandatory permeable surface requirements
- Requiring installation/relocation of electrical service from basements and cellars
- Requiring installation of vapor intrusion barrier

- Requiring installation of a water alarm
- Requiring a foundation with a French drain

In addition, DOB, DCP, and MOCR will work with the City Council to integrate sea level rise into the City's building code, as described later in this report.

11. Evaluating stormwater fees.

The City will evaluate the benefit of charging a fee to owners of properties with large paved surfaces of asphalt and/or concrete, which generate significant stormwater runoff. Such fees will disincentivize non-porous surfaces and reduce local flooding.

Common Cause: Working With Partners in Government



Solving a crisis of this magnitude requires coordination and cooperation across city and state lines – City government working with partners from the New York City Council, New York State, and the Federal government. As New York City recovers from Ida and combats extreme storms and weather, we are grateful for the support of FEMA and will continue to count on their partnership and funding towards city repairs and future mitigation.

Yet there are also other critical ways we can work together at all levels of government – from new legislation to funding support to allowing our city to protect ourselves in the best way possible. The following are critical steps the City urgently calls for:

CITY COUNCIL

The Task Force has identified two crucial steps the City Council can take, in partnership with City agencies, to immediately improve resiliency and bolster long-term preparedness for extreme weather:

1. Including sea level rise in the building code.

Since Sandy, the City Council and DOB have heightened the level of flood protection required by building code to account for growing risk. However, these incremental improvements do not account for sea level rise or the expanding reach of the floodplain that will put New Yorkers and their property at risk in coming decades. MOCR supports legislation mandating incorporation of sea level rise into Appendix G of the building code through the adoption of future flood risk maps.

2. Codifying a permanent, City-funded Office of Climate Resiliency.

It is time to develop a standalone climate resiliency office through a charter revision to demonstrate a continued commitment to long-term climate adaptation. In light of recent storms and the increase in the frequency and intensity of natural disasters, it is clear that now is the time to elevate this work and address the growing capacity and resources we need to combat the impacts of climate change. The newly chartered office should complete a citywide assessment of climate hazards and resiliency strategies and launch community engagement and resiliency planning processes for the most vulnerable neighborhoods.

NEW YORK STATE

The de Blasio Administration has worked closely and collaboratively with the new Hochul administration, both in response to Ida and on other significant initiatives. We look forward to continuing that work in the coming weeks and months as we build a more resilient New York. The following items represent significant steps we can take together to protect New Yorkers:

1. Formalizing an MTA Taskforce.

In an effort to enhance interagency coordination to address flash flooding in the transit system, the City will renew and formalize a partnership between its agencies and the Metropolitan Transportation Authority (MTA), creating a Flash Flood Task Force in the next month.

Coordination on flood mitigation measures between the MTA and City agencies such as the Department of Environmental Protection (DEP) and Department of Transportation (DOT) has occurred over the years, but with varying frequency. Post-Ida, meetings have already resumed. The Flash Flooding Task Force will optimize interagency coordination with regular meetings to address a host of immediate, short-term and long-term needs to effectively mitigate flooding issues following significant storm events.

The task force will examine measures the City can take to improve infrastructure around subways, as well as examining every possible way the MTA can harden assets and create more protection. It will focus on measures to address water entering underground infrastructure from the street level, the sewer system, and at grade. It will also focus on addressing street flooding that will impede the right-of-way for buses and other vehicles. The task force will identify priority stations to perform joint inspections thereby allowing a better understanding of the root causes of flooding at those particular locations and how physical interventions could be rapidly deployed.

Regular information-sharing will ensure that inspection results that confirm flooding issues related to grading, curb reveal, and lack of catch basins can be addressed through either short-term solutions or longer-term capital projects. In addition, information on projected future flooding locations in inland areas will allow better planning and prioritization of mitigation measures at additional locations. Lastly, the task force will develop ways to enhance communications leading up to, during and after a significant storm event, which will help with rapid response to unexpected conditions that may arise.

2. Advancing legislation for an expansion of the Green Roof Abatement.

Green roofs have vegetation that absorb rainwater, provide insulation, and control storm water runoff to reduce the burden on municipal sewer systems.

The current Green Roof Abatement provides a one-year benefit of \$5.23 per square foot for the installation of a green roof, subject to a cap of \$200,000 per tax lot or the total cost of the property taxes for that year. To qualify, at least 50% of roof space must be covered by a green roof, and the property must meet other eligibility criteria. Properties in certain designated community districts may qualify for a benefit of \$15 per square foot. The City will seek legislation to expand the Green Roof Abatement by:

- Adding 11 community districts in presidentially-declared major disaster areas and other recent significant storm events to the current 15 districts that may take advantage of the enhanced abatement of \$15 per square foot
- Increasing the dollar cap allocated to the abatement from \$1 million to \$10 million to better calibrate the benefit to industry estimates for green roof installation costs
- Allowing the green roof abatement to be granted irrespective of a property's receipt of other property tax exemptions and abatements

Consistent with current procedures, DOB would determine eligibility and approve the application and DOF would administer the benefit by applying the abatement to the subject property's tax bill.

3. Adopting legislative reforms to kick-start housing retrofits.

Amendments to the Private Housing Finance Law (PHV) would enable HPD to assist owners of multi-family and 1-4 family homes with retrofits, resiliency improvements, and/or basement legalization. Currently, HPD's ability to help lower-income homeowners finance repairs is hampered by the statutory limit on loan amounts. Removing this limit would enable HPD to provide a lifeline to distressed homeowners through programs like HomeFix, and open a path to: financing basement conversions, providing lower income homeowners with additional income, and offering tenants more affordable housing options. The City is working to advance a bill package that would amend various aspects of the PHFL, including loan limits, restrictions on eligible borrowers, and uses, which would be necessary to effectively address the financing needs of lower income homeowners and owners of multi-family buildings that house lower income New Yorkers.

4. Advancing legislation for a Flood-Safe Home Improvements Abatement for low-income homeowners.

The City will seek State legislation to create a partial property tax abatement to help low-income homeowners and small building owners to recoup a portion of costs for making capital upgrades to address flooding-related issues.

The Flood-Safe Home Improvements Abatement would reduce property taxes for eligible 1-to-3 family low-income homeowners or owners of buildings with fewer than 10 units for the eligible costs of improvements made to increase flood resiliency. In general, the abatement would cover costs related to making buildings more flood resistant as may be required by the New York City Building Code. Examples of eligible improvements may include new waterproofing, installation of sump pumps, the addition of backwater valves, and other flood mitigation upgrades or repairs.

The benefit would be calculated based on a percentage of the estimated cost for each flood mitigation measure according to a schedule of applicable industry rates. Unused portions of the abatement in year one would be carried forward for up to five years. The Flood-Safe Home Improvement Abatement would be granted irrespective of a property's receipt of other property tax exemptions and abatements.

5. Pushing for the passage and full funding of key resiliency projects.

New York State reauthorized the Environmental Bond Act of 2022 as part of the 2021-2022 State budget, which will provide \$3 billion to reduce pollution, upgrade water and wastewater infrastructure, preserve farmland and open space, create capacity for locally managed flood buyouts, equip municipalities to acquire, manage and steward flood-prone lands towards resilient and sustainable uses that serve community needs, and help communities prepare for flooding, rising seas, and extreme heat. Additionally, Governor Hochul recently suggested increasing the amount of the Environmental Bond Act of 2022 to \$4 billion in light of the recent extreme weather events. The Bond Act will now go to voters for approval on the November 2022 ballot. This is a critical source of funding for stormwater management projects, coastal protection, wetlands restoration and acquisition, and reforestation and tree planting to combat extreme heat.

Additionally, there are billions of dollars in unfunded mandates, including a significant project to reduce sewage overflows into Newtown Creek under the Combined Sewer Overflow Long Term Control Plan. We will continue calling on the State and Federal governments to fully fund such projects.

6. Revising the Multiple Dwelling Law to facilitate legalization of basement apartments.

Currently, if a two-family home with an illegal basement seeks to legalize that apartment, the legalization would trigger provisions of the Multiple Dwelling Law (MDW) that would significantly add to the cost of conversion. As the City expands the Basement Conversion Pilot Program, we will work with New York State to determine whether MDW amendments are appropriate to encourage legalizations. The City and State should also explore the potential of a Basement Conversion tax credit.

7. Mandating Meaningful Flood Risk Disclosures.

While sellers are required to disclose whether the property is in a floodplain, the penalty for non-disclosure is a \$500 credit toward the purchase price at closing. As such, New York's existing flood disclosure law has historically made it difficult for buyers to learn about a property's flood risks. Therefore, the State should amend the New York State Real Property Law to require meaningful enforcement of flood hazard disclosures for real estate transactions. Enforceable disclosures should state whether the property is located in a flood zone, provide any history of flood damages, and whether flood insurance is required on the property. A provision of the amendment should also cover the needs of renters considering a home in the floodplain. Legislation passed in the New York State Senate in 2021 but still needs to pass in the Assembly.

8. Expanding the NYC Property Assessed Clean Energy (PACE) program to include resiliency retrofits.

Given the City's experience with recent extreme weather events and the likelihood of future climate risks, there is an urgent need to fortify existing buildings so they can resist damage, protect occupants, and allow

New Yorkers to quickly return to their homes and workplaces after a shock. Authorizing the use of PACE loans for resiliency improvements will help building owners prepare their buildings for the harsh effects of global climate change. This would require the State to amend Article 5-L of the General Municipal Law to authorize a municipal sustainable energy loan program, also known as PACE, to provide loans to real property owners for the installation of resiliency improvements on existing buildings located within the municipal corporation. Many states allow PACE for both energy efficiency and resiliency improvements, including Alabama, California, and Florida.

While some resiliency improvements may not yield immediate financial returns to a property owner, the National Institute of Building Sciences estimates that resiliency retrofits have a longer-term average benefit of \$11 for every \$1 invested. Resiliency retrofits can reduce financial losses due to property damage and cleanup costs; limit business disruptions and loss; mitigate safety risks to residents; employees and the community; enable swifter returns to business and employment after an event; and may limit liability for damages to others.

FEDERAL GOVERNMENT

The de Blasio Administration has also worked closely and collaboratively with the Biden Administration and federal agencies including FEMA in response to this storm. The following steps, both through legislation and reforms to agency protocols, will be crucial to helping New York City recover and strengthen resiliency:

1. Passing the Ida disaster relief package.

As of the publication of this report, legislation that would provide \$28.6 billion in disaster relief nationwide has been proposed, as part of the continuing resolution to fully fund the Federal government through December 3. This is a critical first step towards making New York City whole. The most tragic consequences of Ida include lives lost and homes made uninhabitable from dangerous flash floods – and the City needs Federal Ida disaster relief to be directed to storm-impacted homeowners and renters living in flood-prone homes. Housing recovery programs would prioritize housing stability and enable storm survivors to reduce their exposure to future flood risks through building retrofits, repairs, housing mobility options (including voluntary buyouts and rehousing assistance), and other strategies. The currently proposed legislation also would provide longer-term investments in our city's infrastructure, including Bluebelt funding and highway repair.

2. Passing the American Families Plan.

The American Families Plan is a landmark piece of Federal legislation that would take significant steps to curb the effects of climate change, both in New York City and nationwide. It would protect critical infrastructure, make new investments to defend vulnerable communities in our city, help the City and agencies maximize the resilience of land and water resources, and further advance us towards clean energy. Its passage would mean key funding for New York City in this the fight against climate change.

3. Incorporating stormwater flood mitigation into the U.S. Environmental Protection Agency’s (EPA) planning framework.

Currently, the EPA’s Integrated Planning Framework does not adequately balance the need to invest in stormwater mitigation for both water quality and flood mitigation – which results in disproportionate spending. Existing EPA regulatory frameworks should incorporate watershed-scale solutions focusing on community benefits, flood mitigation, and climate resiliency rather than water quality alone.

4. Revising the EPA State Revolving Fund (SRF) to include stormwater funding.

After Hurricane Sandy, Congress appropriated \$600 million in SRF zero-interest funds for New York and New Jersey, which led to DEP receiving \$161 million toward the implementation of the Wastewater Resiliency Plan. Given the frequency of these extreme storms, similar funding should be made available on a dedicated, ongoing basis.

5. Easing the permit process for sewer buildouts.

The EPA, as well as NYS DEC, currently have an extensive permitting process along with stringent water quality requirements for sewer buildouts. This has similarly slowed the process of building these critical pieces of infrastructure at a time the City must move quickly. Both entities should ease the permit process to allow the City to more quickly make improvements.

6. Reforming the National Flood Insurance Program (NFIP).

Over the past decade, legislative changes to the National Flood Insurance Act have caused premiums to rise significantly year over year, making flood insurance unaffordable for an increasing number of Americans. The City has long been advocating for significant legislative reforms to the NFIP to increase affordability for low-income households, including by increasing affordability through income-based assistance and enhancing mitigation options.

7. Reforming Federal funding to support resiliency.

FEMA should increase funding for mitigation programs broadly. Specifically, the City supports full funding of the Building Resilient Infrastructure and Communities (BRIC) program, which is designed to be used in advance of a disaster. Increased BRIC investments would save taxpayers money in the long term by substantially lowering the damages and costs associated with future disasters and allow for more proactive planning and preparedness.

Several additional improvements should also be made:

- First, FEMA should allow for factors such as health benefits to be included as part of BRIC’s cost benefit analysis. Currently FEMA uses property values to determine allocations, which means wealthy neighborhoods end up with more funding after a disaster and there is an over-emphasis on loss-aversion versus rebuilding and developing thriving neighborhoods. This reform could be one part of a larger effort to standardize BCA across all Federal resiliency funding to reduce duplication and inefficiencies.

- Second, FEMA should increase the percent of funds eligible to be used for non-project grants (e.g., Planning; Community and Capacity Building). This would enable cities to develop new projects for future funding.

This report was produced by the office of the Deputy Mayor for Administration in collaboration with the City agencies and Mayor's offices presented within.

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