



NEW YORK CITY COMPTROLLER
BRAD LANDER

Is New York City Ready for Rain?

An Investigation into the
City's Flash Flood Preparedness

BUREAU OF POLICY AND ORGANIZING

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Executive Summary

Extreme rainfall is now a regular part of New York’s climate reality.

When Hurricane Ida hit New York City on September 1, 2021, the storm laid bare the City’s lack of preparedness for flash flooding. Unprecedented heavy rains overwhelmed the sewer system and caused torrential flooding in our subways, streets, and basements—tragically taking the lives of 13 New Yorkers. This storm marked the first time that the National Weather Service declared a flash flood emergency in New York City.¹

The City has since put forward several plans to address flash flooding. Immediately following Ida, the de Blasio Administration convened an Extreme Weather Response Task Force that issued several commitments for combatting heavy rains in [The New Normal](#). In 2022, the Adams Administration released [Rainfall Ready](#), which outlines actions for the City to take to address intense storms. To implement these plans, the City has been awarded \$311 million of HUD Community Development Block Grant Disaster Recovery (CDBG-DR) [federal funds](#) for disaster relief and long-term recovery from the impacts of Hurricane Ida on communities, housing, and infrastructure.

Two years after Ida, on September 29, 2023, Tropical Storm Ophelia brought yet another major rainstorm that shut down subway lines, damaged homes and hospitals, and flooded the streets. Governor Hochul and Mayor Adams declared a state of emergency and issued a travel advisory.² As much as 8.65 inches of rainfall fell during that 24-hour period.³ Thankfully, no New Yorkers died in this storm, but the City’s response raised concerns about the Administration’s progress in implementing the plans put in place after Ida.

As storms are becoming more frequent and severe, it is critical to assess the City’s readiness and response. This is especially true given that public trust in government’s ability to handle emergencies is plummeting. According to a recent Citizens Budget Commission survey, New Yorkers are deeply dissatisfied with the City’s emergency preparedness generally, and specifically with stormwater and sewer maintenance.⁴

This investigation assesses how well the City prepared for and responded to the storm on September 29, 2023. The report evaluates the City’s storm operations, interagency coordination, public communications, community preparedness, and long-term projects and plans to manage stormwater.

In some areas, the investigation finds progress: for the first time, the City funded community groups to communicate with hard-to-reach populations. In other respects, it finds serious shortcomings: when the storm hit, 63% of the DEP’s 51 catch basin cleaning trucks were out of service, and 97% percent of New Yorkers over 16 years old had not subscribed to the City’s NotifyNYC emergency notifications. Most importantly, the report identifies areas for improvement with an eye toward better preparing our city for the extreme storms to come.

Public Trust in City Emergency Preparedness

Trust in government is declining across the board.⁵ Communities across the city are resoundingly unhappy with how the City of New York prepares for emergencies and manages stormwater. Public attitudes toward the City's emergency and stormwater management have fallen over the last several years. Since the last survey in 2017, satisfaction with the City's emergency preparedness dropped by 25 percentage points, while satisfaction with the City's stormwater drainage and sewer maintenance declined by 14 percentage points.⁶

Emergencies require city governments to effectively communicate guidance to the public. In turn, residents must trust that the City is providing accurate information about safety and risk. The City must build back trust in government institutions. To do that, the City needs to communicate early and honestly with the public about risks and safety guidance for upcoming flash floods, conduct honest and public after-action reporting after emergencies, and strengthen partnerships with communities year-round.

Figure 1. Survey of New Yorkers' feedback on how well the NYC government prepares the city for an emergency

6C. Rate how well NYC government: Prepares the city for an emergency

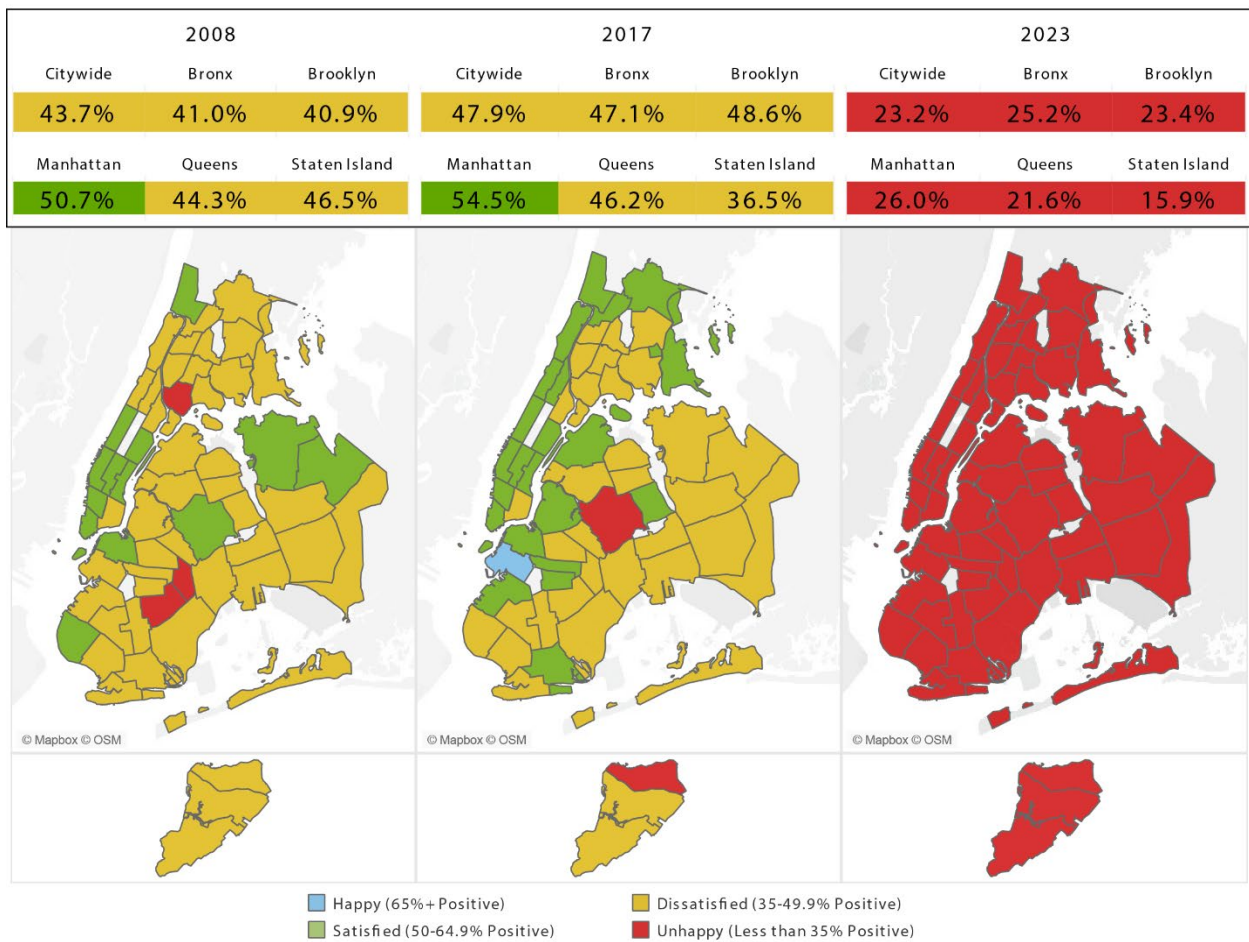


Figure 1: Citizens Budget Commission 2023 NYC Resident Feedback Survey regarding how well NYC government prepares the city for an emergency⁷

Figure 2. Survey of New Yorkers' feedback on stormwater drainage and sewer maintenance

4K. In your neighborhood rate: Storm water drainage and sewer maintenance

2008			2017			2023		
Citywide	Bronx	Brooklyn	Citywide	Bronx	Brooklyn	Citywide	Bronx	Brooklyn
45.8%	43.0%	43.9%	50.5%	50.3%	49.0%	36.9%	36.5%	30.2%
Manhattan	Queens	Staten Island	Manhattan	Queens	Staten Island	Manhattan	Queens	Staten Island
52.4%	45.1%	50.2%	56.9%	49.7%	48.3%	44.6%	37.9%	45.5%

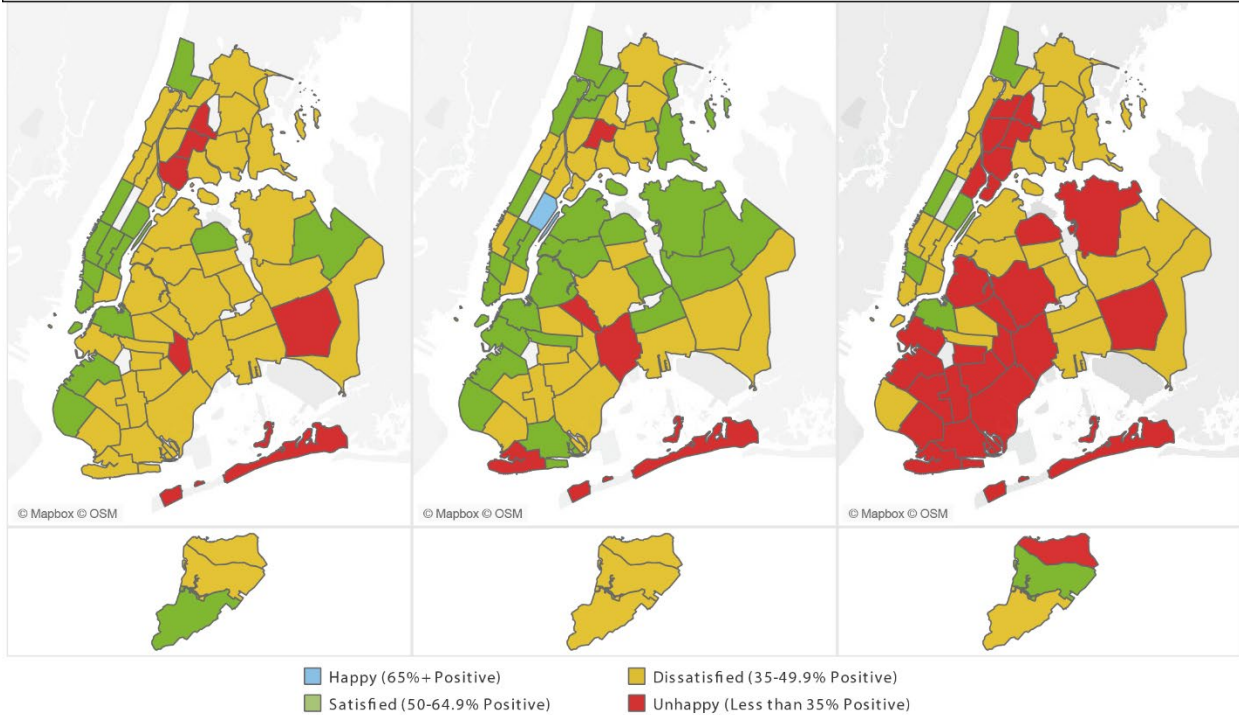


Figure 2: Citizens Budget Commission 2023 NYC Resident Feedback Survey regarding stormwater drainage and sewer maintenance⁸

Key Findings

Storm Operations

- **The City proactively activated the Flash Flood Emergency Plan the day before the storm arrived.** The Flash Flood Emergency Plan outlines the decisions and actions that City agencies should take before, during, and after a flash flood. The City began monitoring the storm on September 22, 2023, a week in advance. As the weather forecast became more severe over the week, NYCEM activated the Emergency Flash Flood Plan at 8:30 am on Thursday, September 28, 2023. Once the Emergency Flash Flood Plan was activated, NYCEM initiated coordination calls with key operational and first responder agencies. However, this proactive approach was not as effectively extended to public communications.
- **DEP has improved its ability to identify flood-prone locations to inform priority catch basin inspections and cleaning.** DEP has begun to incorporate many new data sources to identify where flooding is happening in real-time, with flood sensor data, 311 flooding complaints, field reports from other agencies, video feed from DOT's live traffic cameras, and social media posts to paint a more comprehensive picture of flooding issues. DEP uses these data to inform where to deploy emergency crews to fix urgent issues.
- **63% of DEP's 51 catch basin cleaning trucks were out of service during the storm, leaving only 19 trucks to cover all five boroughs.** Catch basin cleaning is one of the City's best tools to prevent localized flooding before heavy rains. DEP only had a third of its fleet available to clean catch basins at the time of the storm. By the end of 2023, the portion of trucks out of service rose to 77%. The costs to maintain this fleet, which is currently operated by DEP but maintained by DSNY, is steadily rising. DEP estimates that it will cost \$1.25 million each year to maintain its trucks by 2027. All of DEP's catch basin cleaning trucks are older than their expected useful lives. DEP has developed a list of 964 priority catch basins for urgent inspection and cleaning before a flash flood emergency (out of 153,000 total across the city), but inspected fewer than half of those locations before this storm landed.

Interagency Storm Coordination

- **The Mayor had not appointed an Extreme Weather Coordinator at the time of the storm.** After Hurricane Ida, then-Mayor Bill de Blasio established the role of Extreme Weather Coordinator, to coordinate across City agencies and ensure clear public communications. As reported at the time, when Tropical Storm Ophelia hit more than 18 months into his term, Mayor Adams had yet to identify a new Extreme Weather Coordinator.
- **City Hall recently indicated that Chief of Staff Camille Joseph Varlack has been designated as Extreme Weather Coordinator.** When this investigation commenced in October 2023, the Administration had not publicly announced a Weather Emergency Coordinator. In March 2024, City Hall informed the Comptroller's office that Camille

Varlack, Chief of Staff to the Mayor, had been assigned to this role. In addition to real-time coordination, she is also responsible for conducting after-action reviews to correct weaknesses in the City's emergency management, as well as organizing and leading tabletop exercises as practice run-throughs of emergency scenarios. However, to date there has been no public announcement of her appointment, and it is unclear what, if any, communication has been provided to City agencies.

Emergency Communications to the Public

- **Broad and high-profile public communications were not issued until after the storm was already well-underway.** Despite the fact that the City had proactively implemented the Flash Flood Emergency Plan the day before, broad and high-profile public communications only picked up after flash flooding had already begun to impact commutes, homes, and critical facilities. The Mayor's first press conference occurred on September 29 at 11:40 am, nearly three hours after heavy rains and flooding began. NYC Public Schools first posted on X (Twitter) on September 29 at 12:35 pm, and it only updated its website with guidance on school dismissal and after-school activities at 2:30 pm. NYCHA's robocalls occurred later that day at 4:45 pm, 9 hours after the flooding was well underway.
- **Only 2.7% of New Yorkers over 16 years old received NotifyNYC emergency alerts for the flash flooding on September 29.** NotifyNYC, the City's primary way to broadcast emergency notifications, is an opt-in service, and the vast majority of New Yorkers have not enrolled.
- **NYCEM's new basement notification list only includes 2,378 subscribers, less than 1% of the estimated number of basement residents in NYC.** People who live in basement apartments are especially vulnerable to flash floods. Basement residents are an especially hard-to-reach population because many basement apartments are not formally permitted, and many speak languages other than English. To date, the Administration has not implemented sufficient efforts to engage basement residents.

Community Preparedness

- **For the first time, NYCEM paid community networks, who are more effective at connecting with hard-to-reach New Yorkers, to amplify emergency notifications.** Community organizations are often better equipped to connect with harder-to-reach New Yorkers than government itself. Neighbors turn to trusted groups for information, essential services, and safe gathering spaces. Such groups may also specifically serve specific communities, such as immigrants, non-English speakers, older adults, or people with disabilities. To expand the reach of emergency notifications, NYCEM funded 20 partners in its Strengthening Communities program to share emergency alerts with their networks. On average, community partners received \$3,915 to conduct this emergency outreach. In total, this effort resulted in over 800 phone calls, 169 emails to 58,625 recipients, and 381 text messages to 13,216 recipients. However, as with other public

communications, NYCEM activated these community groups at 10:30 am on September 29, two hours after heavy rains had begun.

- **The City offered flood protection equipment and some assistance services for New Yorkers in flood-prone neighborhoods throughout the year leading up to the storm.** In 2023, DEP held flood preparedness events to distribute 4,000 flood barriers, 7,500 rain barrels, 500 sump pumps, and 500 flood sensors to New Yorkers in flood-prone neighborhoods. The City has also restarted FloodHelpNY, a program intended to provide resiliency audits, financial counseling, and retrofit assistance for homeowners after a storm. However, to date the program has focused on marketing and education campaigns. Additional federal funding is intended go toward restarting the resiliency audits and insurance counseling parts of the program.

Stormwater Infrastructure Improvements

- **A majority of DEP’s stormwater infrastructure projects are delayed and over-budget.** A review of the capital plan shows that half of DEP’s \$10.3 billion stormwater investments are not anticipated to be complete until the next decade. Based on 356 projects that the Comptroller’s Office matched to the City’s Capital Commitment Plan and Financial Management System, a majority of projects are both delayed and over-budget. Two-thirds of projects are over-budget, with an average budget overrun of 310%. Three-fifths of projects are delayed, with an average delay of 23.5 months.
- **DEP can install new catch basin designs that would reduce lead time and labor to clean catch basins for a modest \$22.5 million.** Modern catch basin designs can reduce trash and debris clogging, and therefore reduce the time needed to clean catch basins. DEP has estimated that it would cost \$22.5 million annually to retrofit catch basins with this new design. Retrofits would include improve street-level drainage hardware and full catch basin replacements.
- **8.5% of DEP’s capital budget is for emergency sewer repairs.** DEP’s 10-year capital plan, which is intended to provide long-term funding for infrastructure improvements, includes \$875 million for emergency reconstruction of sewers. While it is prudent for DEP to budget for emergency repairs that will likely be necessary, this high level of need for emergency repairs is evidence of a system that is far from a state of good repair.

Recommendations

Improve public outreach in general, and specifically to at-risk communities

1. The City should expand emergency communications beyond the limited number of New Yorkers who currently receive NotifyNYC, and communicate flood risks to the public earlier.
2. NYCEM should expand Strengthening Communities to reach more diverse at-risk New Yorkers.

Build community capacity for emergency preparedness

3. NYCEM should establish baseline funding for annual emergency activations of community networks.
4. NYCEM should formalize the role of community-led emergency canvassing into City's emergency protocols.

Promptly improve catch basin cleaning procedures

5. DEP should replace its aging catch basin cleaning trucks and take over maintenance of its catch basin cleaning truck fleet, as well as establish new protocols to ensure that trucks are well-maintained to be deployed whenever a storm hits.
6. OMB should fund and the City should promptly implement DEP to retrofit catch basins across the city.

Implement capital process reforms to accelerate stormwater capital projects

7. MTA, DOT, and DEP should dramatically expand subway flood protection improvements.
8. DEP should improve stormwater infrastructure assessments to maintain a state of good repair.
9. The State legislature and City Administration should implement capital process reforms to pick up the pace of completing stormwater projects, including state legislation to authorize New York City the ability to utilize proven alternative delivery methods for its infrastructure projects, and Administration reforms to pick up the pace of completing stormwater projects.
10. The Adam's Administration should improve the City's Capital Project Dashboard to better track and improve the delivery of stormwater capital projects.

Continue to strengthen coordination of storm operations

11. The City should develop a shared interagency tracking and data sharing tool to better coordinate storm operations.

Overview of Flash Flooding Event

While many media outlets referred to the storm Tropical Storm Ophelia, the storm did not meet the National Weather Service criteria of a “remnant storm” when it arrived in New York City.⁹ Nevertheless, the rainfall on September 29 was extreme by historic standards. This section reviews the timeline of events leading up to the storm, the rate and duration of the rainfall, and the locations and impacts of the flash flooding that resulted.

Forecast & Emergency Plan Activation

Flash flooding can be difficult to predict with accuracy.¹⁰ Early forecasts predicted rainy weather several days ahead of time, but it was not until the night before the storm hit that weather reports began to forecast intense levels of rainfall.¹¹

The City began consulting with the National Weather Service on Friday, September 22, one week prior to the storm.¹² As of the morning of Thursday, September 28, the forecast anticipated 2-3 inches of total rain, falling at 1 inch per hour.¹³ As the weather forecast became increasingly dire, the City activated the Citywide Flash Flood Emergency Plan at 8:30 am on Thursday, September 28, 2024—roughly 24 hours before severe rain began. The Flash Flood Emergency Plan outlines the decisions and actions that City agencies should take before, during, and after a flash flood. The plan describes the roles and responsibilities of different agencies and a series of operational steps to prepare for and respond to the emergency.

Once the Emergency Flash Flood Plan was activated, NYCEM initiated coordination calls with key operational and first responder agencies. NYCEM opened its Emergency Operations Center at 6:00 am the morning of the storm. NYCEM convened City, State, federal entities to coordinate the City’s emergency response including: NYC DEP, DOT, DSNY, FDNY, NYPD, Parks, Public Schools, Mayor’s Community Affairs Unit, New York State Department of Homeland Security and Emergency Services, MTA, Port Authority of New York and New Jersey, National Weather Service, American Red Cross, ConEd, and PSEG. DEP, DSNY, and DOT field staff began inspecting and cleaning priority catch basins. First responders prepared to conduct rescue and logistics operations.¹⁴

By the evening of September 28, the National Weather Service updated its forecast up to 5 inches of rain in some locations, falling at 2 inches per hour.¹⁵ The updated forecast warned of possible flash flooding.¹⁶ New York City’s sewer system is only designed to manage 1.75 inches of rain per hour. The forecast predicted that rainfall would exceed the sewer capacity, causing water to pour into low-lying areas like subways, basements, and low spots on streets and sidewalks.

Rate and duration of rainfall

Rainfall began at around 2:00 am on September 29. By 8:00 am, the City began to experience heavy downpours. At 9:00 am, peak rainfall exceeded 3 inches per hour in central and northern Brooklyn. In Coney Island, heavy rain coincided with high tide, increasing the flood risk. By 10:00 am, Manhattan, Brooklyn, the Bronx, eastern Queens all saw rainfall of more than 1.5 inches per hour.¹⁷

The September 29 storm resulted in as much as 8.65 inches of total rainfall in some parts of the City. The amount of rain nearly matched the 8.8 inches of total rainfall during Hurricane Ida in 2021. However, the rate of rainfall was much more intense during Ida, which saw a peak rainfall of 4.4 inches per hour and more than 2 hours of rainfall exceeding 1.75 inches.¹⁸ In comparison, the September 29 storm had a peak rainfall of 3.09 inches per hour.¹⁹ Even still, the September 29 storm is considered a once-in-a-hundred-year storm, which means that there is a 1% annual chance of a storm of this size occurring.²⁰

In comparison to Hurricane Ida where heavy rains fell uniformly across the City, the precipitation on September 29 was more concentrated.²¹ Heavy rains persisted for more than an hour in southern Brooklyn and along the East River from DUMBO and up through Lower East Side to Astoria and East Harlem. Central Queens and most of Staten Island did not experience rains exceeding 1.75 inches per hour.²² Even when forecasts predict significant rain, the exact locations of heaviest precipitation are nearly impossible to forecast and can vary widely across the city.²³

Figure 3: Comparison of Heavy Rainfall between Ida and Ophelia

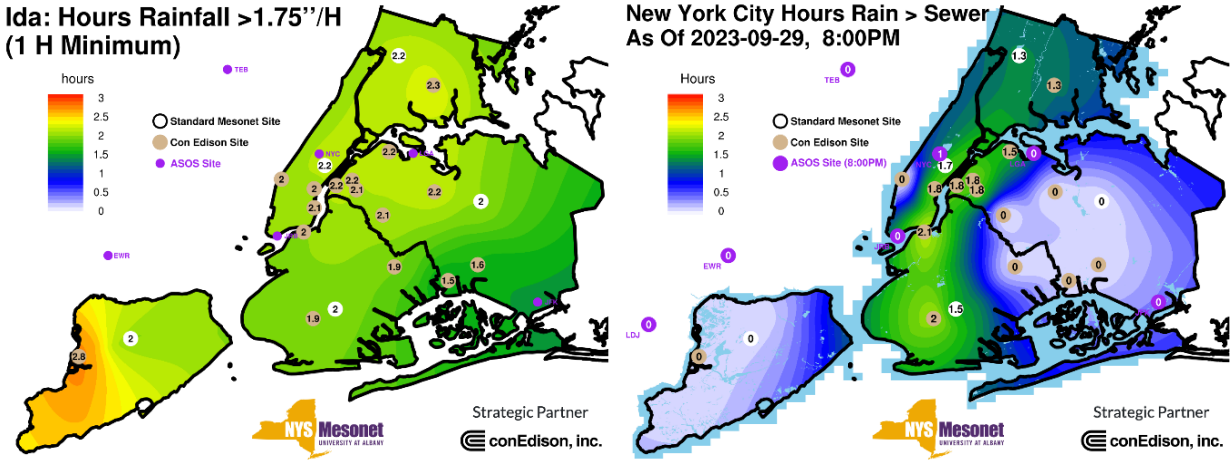


Figure 3: Created by the NY State Weather Risk Communication Center, using data compiled from UAlbany's NYS Mesonet and Con Edison Micronet

Locations of flooding

Flash flooding occurs when the volume of rainfall exceeds the capacity of the local sewer infrastructure to drain it. This means that flooding does not always match where rainfall is most severe, and can also occur in places with poor drainage.

On September 29, residents reported flooding incidents to 311 all across the city. Based on 311 complaints and flood sensors, flooding was concentrated across a few neighborhoods in Brooklyn, Queens, and Staten Island. Real-time FloodNet sensors recorded major flooding, defined as flood depth exceeding 24 inches, at locations in Gowanus, south Williamsburg, and Midland Beach.²⁴ Neighborhoods with the most concentrated 311 flooding complaints included Seagate, Bath Beach, Kensington/Flatbush, Park Slope, and Williamsburg in Brooklyn and Lindenwood on the Brooklyn-Queens border.

Figure 4: Map of 311 Complaints on September 29

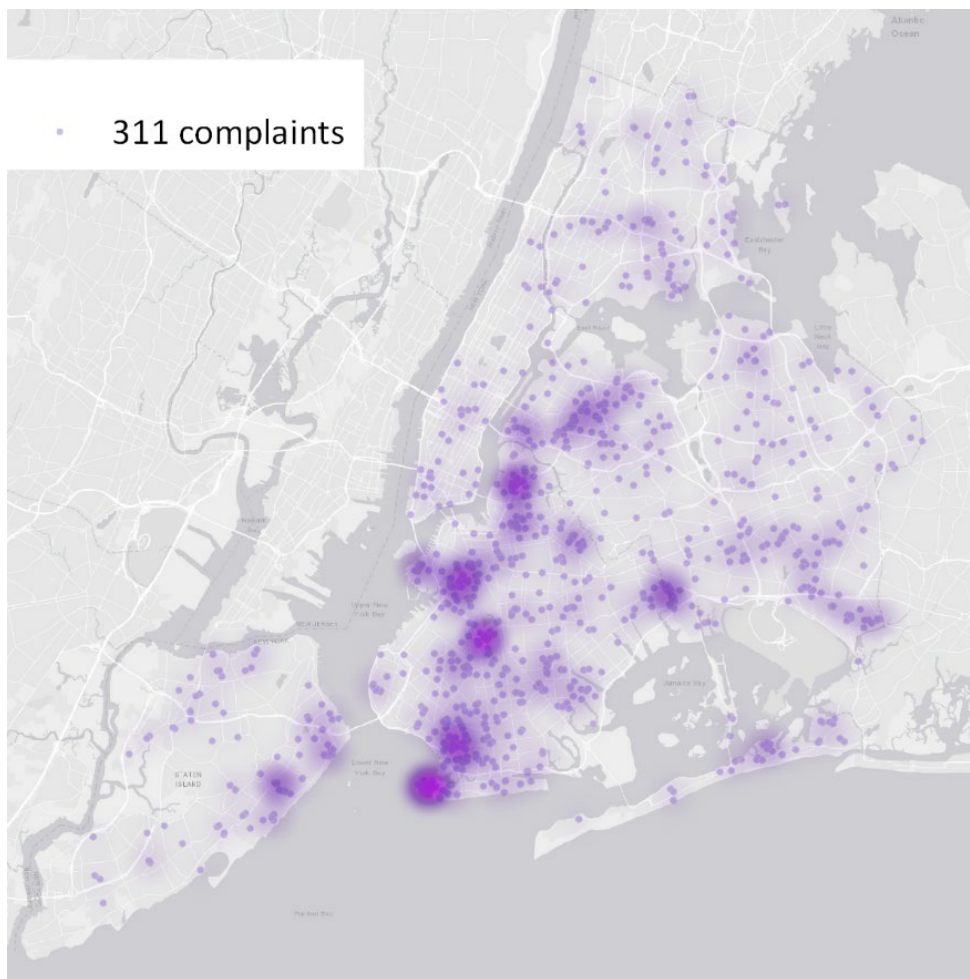


Figure 4: Office of the NYC Comptroller

Areas with the most recorded flooding mostly tracked the areas with significant rainfall. However, parts of southern Queens and coastal Staten Island saw significant flooding despite not receiving intense rainfall, pointing to the inadequacy of stormwater infrastructure in these neighborhoods.

Impacts of flooding

The flash floods on September 29 were fortunately not deadly. Yet, the City still experienced significant damages and disruptions. FDNY high-axle units responded to 8 incidents and rescued 11 people. FDNY additionally rescued four basement residents and removed 19 occupied vehicles from flood waters.²⁵ Forty-nine City-owned buildings and 560 schools sustained flooding.²⁶ Woodhull Hospital had to be fully evacuated after flooding required the facility to disconnect its electricity supply. The hospital moved all 116 patients to other H+H facilities, starting in the evening of September 29 and completed by midnight the following day.²⁷

The City's transportation networks were severely impacted, especially as heavy rains occurred during the morning commute. The day before the storm, MTA Emergency Management also activated its Incident Management System, established communications with both the City and State, and initiated storm preparations by positioning crews, pumps, and emergency response equipment, clearing drains in flood-prone locations, and covering key vents.²⁸

The subway system experienced significant disruption during the storm. Flooding occurred at 45 subway stations and eight subway yards across Brooklyn, Manhattan, and the Bronx. Eleven subway lines were suspended or saw severe disruptions. All Metro-North service was shut down at 9:00 am; hourly service was not restored until 4:30 pm on the Hudson and New Haven lines and 6:00 pm on the Harlem line. MTA also suspended parts of the LIRR Far Rockaway and Long Branch lines. NYC Transit pumped four million gallons of water out of the subway system as rain fell throughout the day.²⁹

Many streets across the city also flooded. Major roadways, such as the Major Deegan Expressway, FDR Drive, Grand Central Parkway, Belt Parkway and 4th Ave in Brooklyn were shut down. Vehicles were stuck on flooded portions of the Cross Island Parkway. The Bronx River overflowed, flooding the adjacent Bronx River Parkway from 1:30 pm until 6:30 am the following morning.³⁰

Risk mitigation firm Aon estimated the storm caused \$100 million in total economic losses across the New York City metro region.³¹

Figure 5: Flooded Metro-North Yard



Figure 5: Flooded Mott Haven Yard, Metro-North Railroad³²

Evaluation of the City's Preparation and Response to the Storm

This report assesses how well the City managed the flash flooding emergency by reviewing the City's performance against three post-Ida plans:

- [The New Normal](#), a blueprint to prepare for and respond to extreme weather. Developed by an Extreme Weather Response Task Force, this report was released in September 2021 a month after Hurricane Ida. The City committed \$2.7 billion to support the report recommendations.
- [Rainfall Ready](#), an action plan released in July 2022 that outlines steps for the City and New Yorkers to take to address extreme rainfall.
- [Ida Action Plan](#), which identifies needs for relief and recovery for neighborhoods and infrastructure impacted by Hurricane Ida. The Ida Action Plan identifies how the City will spend \$311 million of HUD Community Development Block Grant Disaster Recovery funding to address those needs.

These plans span two mayoral administrations and include many shared recommendations. Together, the plans outline several City commitments to improve communications, operations, planning, and infrastructure to manage heavy rains.

Interagency Storm Coordination

Background Information & Commitments

Hurricane Ida caught the City flat-footed in 2021. *The New Normal* recommended that the City designate an Extreme Weather Coordinator in the Mayor's Office to oversee urgent, centralized decision-making during emergencies. In the immediate aftermath of Hurricane Ida, the City established the role of Extreme Weather Coordinator, to coordinate across City agencies and insure clear public communications. A month after Ida, then-Mayor Bill de Blasio appointed Deputy Mayor for Administration Emma Wolfe as the Extreme Weather Coordinator.³³

Assessment of the City's Interagency Storm Coordination

The Mayor had not appointed an Extreme Weather Coordinator at the time of the storm. When the storm hit on September 29, more than 18 months into his term, Mayor Adams had yet to identify a new Extreme Weather Coordinator.^{34, 35}

City Hall recently indicated that Chief of Staff Camille Joseph Varlack has been designated as the City’s Extreme Weather Coordinator. When this investigation began, the Adams Administration still had not designated an Extreme Weather Coordinator.³⁶ In March 2024, the administration responded to a request for information from the Comptroller’s Office for this investigation that Camille Joseph Varlack, Chief of Staff to the Mayor, had been appointed to this position.³⁷ In this role, she is expected to coordinate across City agencies and provide clear, urgent communications to the public. She is also responsible for conducting after-action reviews to correct weaknesses in the City’s emergency management, as well as organizing and leading tabletop drills and exercises as practice run-throughs of emergency scenarios. She has also begun to improve channels of communication across agencies for better real-time coordination. However, to date there has been no public announcement of her appointment, and it is unclear when she assumed this role.

Storm Operations

Background Information & Commitments

Catch basins, the connection from street-level storm grates into the sewers, are essential for draining rainfall from the streets. Catch basins do not properly carry the stormwater into sewers when they are clogged with trash and debris. Clogged catch basins can result in flooding of nearby areas.

DEP has developed a data-driven approach to identify catch basins that are most often blocked by debris. The agency sends inspectors to regularly check the 153,000 catch basins citywide and track data on whether locations needed to be cleared or cleaned. DEP prioritizes catch basins for inspection and cleaning based on type of catch basin, past inspection findings, and 311 complaints.³⁸ Approximately 15,000 catch basins in commercial areas, where trash and debris are more common, are inspected every six months. Other locations are prioritized for inspections every one, two, or three years.³⁹ The current inspection schedule was initiated in July 2022 and will be reevaluated every three years.⁴⁰ Based on these inspections, DEP keeps an updated list of priority catch basin locations for emergency inspections and if necessary, clearing debris, when a flash flood emergency is activated.

When a storm is forecast, DEP typically uses data from its routine inspections and prioritization to choose locations to check for and clear debris. These emergency pre-storm catch basin operations are split among DEP, DSNY, and DOT. When inspections or clearing operations find more substantial blockages, agencies send work orders for more involved cleaning to DEP. However, DEP has a limited view into the on-site work performed by its partner agencies.

During a storm, DEP sends crew to clean and inspect catch basins to respond to complaints from the public or other operational agencies.

Agencies have differing catch basin cleaning capacities. DEP uses specialized trucks with a claw-like arm to clean the inside of catch basins below the street level.⁴¹ Because of these trucks, DEP is the only agency with capacity to clean catch basin interiors below the grate.⁴² DSNY currently

operates and maintains these trucks on behalf of DEP.⁴³ Other agencies only remove debris and litter at the surface of the catch basins.

After Hurricane Ida, the City committed to improving several aspects of its storm operations:

- Inspecting and cleaning chronically flooded catch basins more frequently before storms and collecting better data to monitor and respond to flooding.
- Installing 500 FloodNet sensors throughout the City by 2026 and using traffic camera feeds to quickly identify and respond to street flooding.

Assessment of the City's Storm Operations

The City has improved its ability to identify priority flood-prone locations to inform catch basin inspections and cleaning.

Since Hurricane Ida, the City has used data from DEP's work order system to update locations with known flood risks. DEP has also begun to incorporate many new data sources to identify where flooding is happening in real-time. Sixty-three real-time FloodNet sensors were active during the September 29 storm.⁴⁴ Of these, 26 recorded flooding. The sensor at Carroll Street and 4th Avenue in Gowanus, Brooklyn measured the highest flood depth of 36 inches on September 29.⁴⁵ By March 2024, there were 83 total sensors installed in flood-prone areas.⁴⁶ The flood sensors now allow DEP and the public to see [real-time and historic information](#) about where, when, and how long areas have flooded.⁴⁷ DEP has plans to install sensors at 393 additional locations.⁴⁸

In addition to FloodNet data, the agency now compiles reports of flooding from 311 flooding complaints, reports from other agencies, video feed from DOT's live traffic cameras, and social media posts to paint a more comprehensive picture of flooding issues. The agency has developed a data mining tool to collect flooding information with location data posted to X (Twitter), Facebook, and Snapchat.⁴⁹ DEP combines these data into an integrated dashboard to inform where to deploy emergency crews to fix urgent issues. DEP has used this dashboard to prioritize issues that pose immediate safety hazards such as flooding on roads, missing manhole covers, and sewer backups.

As of September 29, DEP identified 964 priority catch basins across 169 locations. This list included 142 catch basins that the MTA identified as high-priority locations after Hurricane Ida. As of 2024, DEP amended its list to include 1,104 catch basins across 190 locations.⁵⁰ The City indicated that DEP, DSNY, and DOT crews collectively inspected catch basins at 195 locations in advance of the September 29 storm.⁵¹

Agencies collectively cleaned the most catch basins in central and eastern Queens and across Staten Island. Those areas did not correspond to locations with the most rainfall during the September 29 storm. DEP, DSNY, and DOT catch basin operations also overlapped in several neighborhoods, such as Midland Beach, Maspeth, and Auburndale. It was not clear whether the agencies intentionally coordinated those cleanings, or whether the agencies could have divided their efforts across the City more efficiently.

Figure 6: Locations of Catch Basin Cleaning by Agency

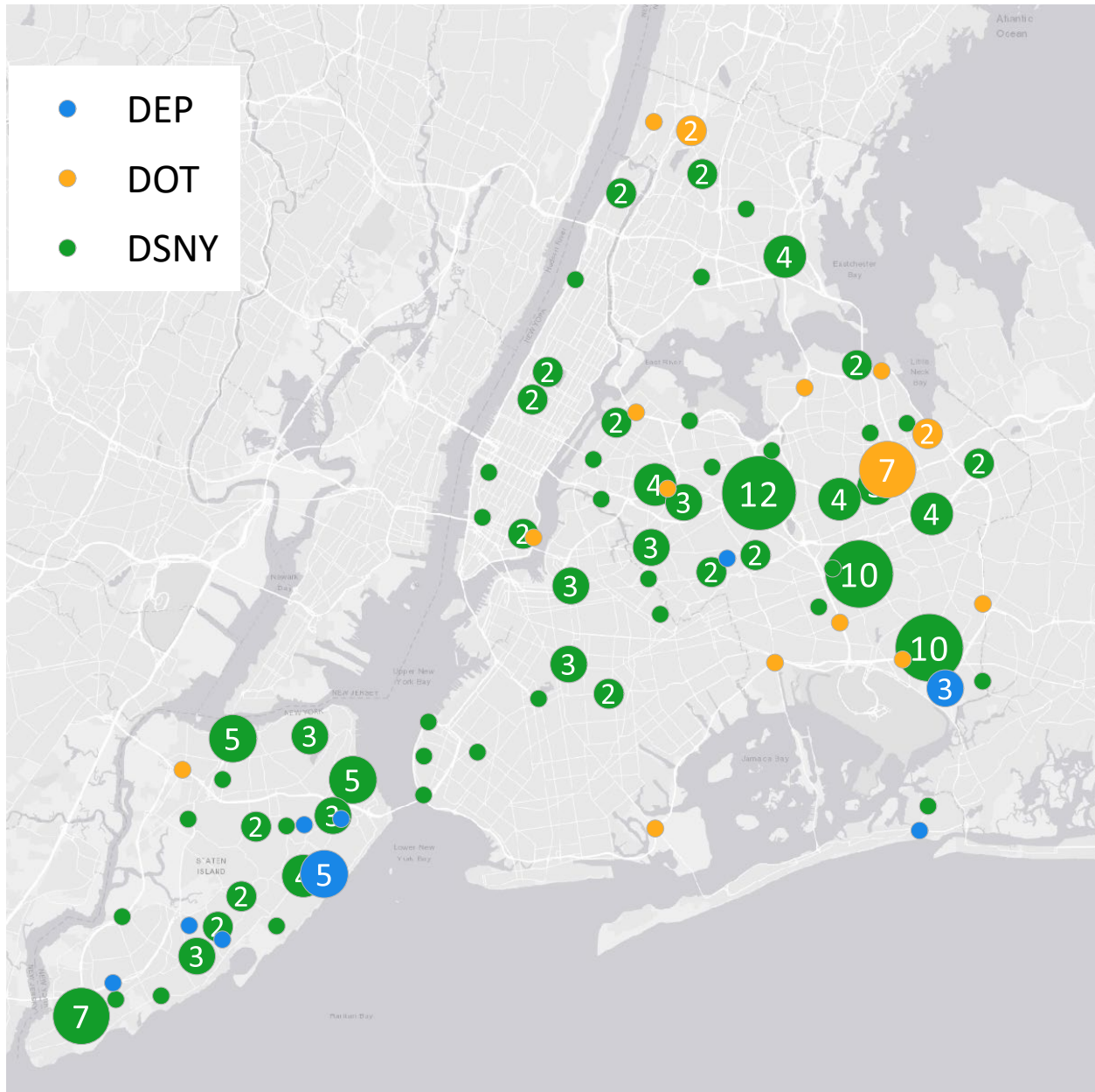


Figure 6: Office of the NYC Comptroller, based on data provided by the City⁵²

Nearly two-thirds of its catch basin cleaning trucks were out of service at the time of the storm.

Although the City was able to inspect catch basins at many priority locations, 63% of DEP’s 51 specialized trucks for below-grade catch basin cleaning were out of service during the storm.⁵³ This is consistent with the average out-of-service rate for 2023. By the end of 2023, the number of out-of-service trucks rose to 76.1%.⁵⁴ Although DEP previously managed its own fleet of these specialized trucks, DEP and DSNY merged their heavy-duty fleet a decade ago. DSNY is currently responsible for maintaining the catch basin cleaning truck fleet on behalf of DEP.

Meanwhile, the catch basin trucks that remain in use require ever more maintenance. The cost of truck maintenance increased 8% between 2022 and 2023. DEP expects fleet maintenance costs to exceed \$1 million annually by 2025 and grow to \$1.25 million by 2027.⁵⁵ DEP has 51 catch basin trucks that have aged past their expected useful lives of 8-10 years. DEP has budgeted \$15.4 million to replace 32 of these 51 trucks. The first 13 trucks will be delivered in July 2024.⁵⁶ DEP anticipates the next 19 trucks to be delivered by winter 2025. No timeline was provided to replace the remaining 18 trucks.

Emergency Communications to the Public

Background Information & Commitments

The City primarily relies upon opt-in or enrollment-based communications to share public messaging for extreme weather.

[NotifyNYC](#) is the City's primary channel for emergency communications with the public. New Yorkers can opt into certain types of NotifyNYC messages, from emergency alerts to mass transit disruptions to public school notifications.

The City also posts updates to social media, including X (Twitter), Instagram, Facebook, and LinkedIn. Digital communications are only posted in English, except for NotifyNYC and NYC Public Schools messages posted on X.⁵⁷ The Mayor can also share information through press conferences.

Outside of traditional, social, and digital media, the only way New Yorkers who do not subscribe to NYCEM's list receive notifications is through [wireless emergency alerts](#) (WEAs). WEAs are short emergency messages automatically broadcast to cell phones in a specific area about immediate threats and public safety. WEAs can be sent by authorized officials at federal, state, and local levels of government. FEMA oversees the national communications system used to issue WEAs,



DEP field operations staff operating specialized catch basin cleaning truck. Photo: DEP

but it is up to authorized local elected officials to make decisions about when and what to broadcast.⁵⁸

The de Blasio administration made several commitments improve public communications on extreme weather to be implemented immediately following Ida. These commitments were reiterated in subsequent plans released under the Adams administration.

- Enhance early warning systems and signage
- Increase-emergency communications before, during, and after storms to communicate risks and safety guidance
- Keep basement residents safe
 - Issue basement-specific alerts and messaging
 - Provide enhanced communications to basement residents
 - Contract trusted community organizations to reach at-risk residents door-to-door
 - Create a database of subgrade spaces

Assessment of City's Emergency Communications

Most of the City's public communications were issued after the storm was already well-underway.

Flash flooding can occur quickly, with as little as 90 minutes of advanced notice to prepare for heavy rains. Fortunately, the City had more advanced notice to prepare for this storm. However, according to a timeline provided by the City, many important public communications occurred after the flash flooding had already begun to impact commutes, homes, and critical facilities.⁵⁹ For instance, the Mayor's press conference occurred on September 29 at 11:40 am, nearly three hours after heavy rains and flooding began.⁶⁰ NYCHA's robocalls occurred later that day at 4:45 pm, 9 hours after the flooding was well underway.⁶¹ The Department of Education's (DOE) guidance on school operations also came late. While DOE was in communication internally with principals and school staff, NYC Public Schools did not directly communicate any information about the weather with school families in advance of the storm.⁶² Instead, NYC Public Schools posted on X on September 29 at 12:35 pm. It then updated its website at 2:38 pm with guidance on school dismissal and after school activities.⁶³ Because this information came late in school day, many parents were not sure what to do at Friday morning drop-off. Parents were confused about whether school would be in session that day and described their kids arriving at school with wet shoes and socks due to unavoidable flooding on their morning commutes.

The reach of the City's emergency notifications is woefully limited, particularly for people facing the greatest vulnerabilities to flash flooding including people with disabilities and New Yorkers living in basement units.

Only 2.7% of New Yorkers over 16 years of age (185,895 people) received NotifyNYC emergency alerts for the flash flood event on September 29.⁶⁴ The recipient list is significantly lower than the total 1.2 million of overall NotifyNYC subscribers. NYCEM, DOHMH, NYC H+H, NYCHA, NYC Public Schools, and DEP also posted storm information to social media throughout the day.

The majority of New Yorkers who were not subscribed to NotifyNYC received two WEAs issued by the National Weather Service (NWS). NWS issued the first one at 9:22 am for Brooklyn, Manhattan, and Queens, and a second at 12:57 pm for Bronx and Manhattan.

NYCHA residents were the only new Yorkers reported to receive robocalls. NYCHA issued the robocalls in four languages: English (117,687 people), Spanish (25,892 people), Chinese (5,959 people), and Russian (1,081 people).⁶⁵ The 150,619 total robocall recipients equal 85% of NYCHA's 177,569 apartment units.⁶⁶

In fulfillment of the City's commitment to increase outreach and flood mitigation strategies for people living in basement units, NYCEM created a new NotifyNYC subscription group for basement-specific notifications and warning phone calls at any time of day.⁶⁷

NYCEM issued a basement preparedness message at 5:10 pm the night before the storm, as well as at 9:34 am the morning of the storm.⁶⁸ The City did not report issuing any basement-specific phone calls. Enrollment in the basement resident listserv remains extremely low: only 2,378 people subscribe to NYCEM's basement notifications.⁶⁹ While basement residents are a particularly hard-to-reach population because many basement units are not formally registered or permitted, estimates put the total number of basement residents between 300,000-500,000.⁷⁰ At best, the number of subscribers to NYCEM's basement notifications still only makes up less than 1% of the estimated number of basement residents. The City did not report any contracts with community groups to reach more basement residents.

NYCEM also now includes messaging for basement residents in its general alerts. Figure 6 shows an example of an alert sent the day before the storm.⁷¹ While the messaging is directed to basement residents, NYCEM does not provide any specific guidance about where or how to "move to higher ground" safely.⁷²

Although there were fortunately no deaths during the September 29 storm, there were dangerous conditions for basement residents: FDNY rescued four people trapped in basements with several feet of water from three locations in Brooklyn and Staten Island.⁷³

Figure 7: NotifyNYC Alert Sent on September 28

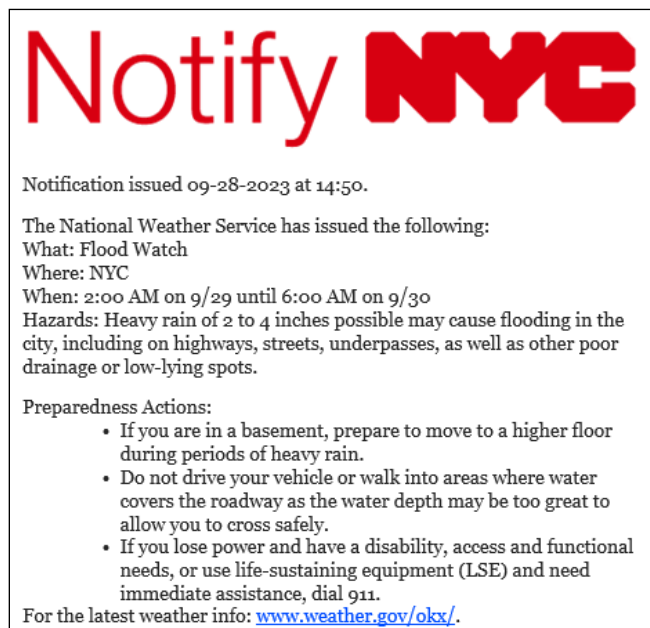


Figure 7: NYC Emergency Management NotifyNYC Alert sent on September 28, 2023

NYCEM uses an Advance Warning System (AWS) to share emergency information to agencies and service providers that support people with disabilities and functional needs. According to the AWS website, 1,035 organizations subscribe to AWS.⁷⁴ NYCEM issued two AWS alerts in advance of Tropical Storm Ophelia on Friday, September 22 and Thursday, September 28.⁷⁵ The latter alert included a safety tip to “Check on friends, relatives, and neighbors, especially older adults and people with disabilities, access and nyc.gov/NotifyNYC, or health conditions [sic]. Help them to prepare if needed.”⁷⁶ Neither alert provided any other guidance or information about precautions that people with disabilities or functional needs should take to prepare for the storm.

Community Preparedness

Background Information & Commitments

Community organizations are often more effective at connecting with harder-to-reach New Yorkers than government. Neighbors turn to these groups for trusted information, essential services in times of need, and safe physical spaces to gather and organize. Such groups may also specifically serve specific communities, such as immigrants, non-English speakers, older adults, or people with disabilities who may not have positive experiences with government. Community groups’ deep ties to constituents and neighbors can make all the difference in spreading the word about emergency information and life-safety tips.

[Strengthening Communities](#) is NYCEM’s primary program to engage community groups in preparedness. Strengthening Communities provides community networks with \$40,000 each to

build emergency preparedness plans over the course of five months.⁷⁷ NYCEM helps participants to map service providers, create plans for managing donations and volunteers, and compile community resources that would be useful during disasters. Some participants are established organizations while others are informal networks.

In *The New Normal* (2021), the City set a target of maintaining 60 Strengthening Communities partnerships by 2025.⁷⁸ In *Rainfall Ready*, the City committed to adding seven new community groups in its Strengthening Communities Program in 2022.⁷⁹ The City proposed \$9 million to expand Strengthening Communities to Ida-impacted neighborhoods in the HUD CDBG-DR Ida Action Plan. New networks will each receive grants of \$40,000 to develop community preparedness plans.⁸⁰ Returning networks will receive \$10,000 to update their plans and participate in ongoing emergency preparedness trainings and exercises.⁸¹

Assessment of City's Community Preparedness

For the first time, NYCEM paid community networks to notify New Yorkers about the flash flooding emergency, amplifying the reach of emergency alerts to diverse New Yorkers.

As of September 2023, 36 community networks were participating in Strengthening Communities.⁸²

The September 29 storm marked the first time that NYCEM funded community groups to spread awareness about flood risk.⁸³ This program implements a recommendation from the NYC Comptroller's 2022 report, [Social Cohesion as a Climate Strategy](#).

At 10:30 am on the day of the storm, NYCEM emailed Strengthening Communities partners inviting them to share emergency information.⁸⁴ The opportunity was optional but made available to all Strengthening Communities groups. Participants translated and shared official City notifications to their networks. In total, the digital canvassing resulted in over 800 phone calls, 169 emails to 58,625 recipients, and 381 text messages to 13,216 recipients.⁸⁵

Twenty of the 36 total Strengthening Communities partners participated in the emergency outreach: Raising Health (formerly AMPHS), Yemeni Merchants Association, Muslim Community Network, Far Rockaway Nonprofit Arverne Coalition, Project New Yorker, APNA, Southern Brooklyn COAD, United Sikhs, South Bronx Emergency Network, East Bronx COAD – LTWorks, Gambian Youth Organization, East Harlem COAD, NAACP Mid-Manhattan, LES Ready, Staten Island COAD, Staten Island Urban Center, NHS Queens, Red Hook Initiative, and Woodside on the Move.⁸⁶

According to NYCEM, emergency activations are part of the expectations for participating in Strengthening Communities. However, the funding for the digital canvassing was separate from the \$40,000 grants that participants receive for being part of the program.

NYCEM offered up to \$4,400 for the emergency outreach.⁸⁷ Community networks were paid based on the types of actions they took, such as posting notifications to social media, texting and phone banking, and sending email blasts. On average, community networks received \$3,915 for their digital canvassing efforts on September 29, 2023.⁸⁸

Community groups welcomed the opportunity to be paid for outreach efforts. However, some groups voiced frustration that NYCEM only reached out to them after it was already heavily raining. Some also expressed the need for more funding during both emergencies and blue-sky days.⁸⁹

Flash Flooding Resources for New Yorkers

Background Information & Commitments

The City's post-Ida plans included several commitments for providing tangible resources to tenants and homeowners to address flash flooding. These recommendations ranged from giveaways of flood protection equipment to new programs for recovery assistance. For instance, the City committed to providing deployable flood barriers and flood alarms directly to New Yorkers. In addition, the City pledged to re-start FloodHelpNY, a program intended to provide resiliency audits, financial counseling, and retrofit assistance for homeowners after a storm.

Assessment of the City's Provision of Flash Flooding Resources

The City offered flood protection equipment and assistance services for New Yorkers in flood-prone neighborhoods throughout the year leading up to the storm.

In 2023, DEP held flood preparedness events to distribute 4,000 flood barriers, 7,500 rain barrels, 500 sump pumps, and 500 flood sensors to New Yorkers in flood-prone neighborhoods.⁹⁰ By coincidence, DEP held one such giveaway the day before the storm in Coney Island. The City also distributed flood alarms to basement residents so that they can evacuate and take precautions when a flood comes.⁹¹ The City did not disclose the number of flood alarms distributed. In the days immediately following the storm, DEP attempted to distribute sump pumps to 26 homes referred to the agency by elected officials, but were only able to give away five.⁹² DEP has stated that it intends to hold giveaway events again in the coming year.⁹³

The City has also restarted FloodHelpNY, though to date the program has focused on marketing and education campaigns. In 2022-2023, FEMA funded FloodHelpNY to produce ads on ferries, buses, and digital spaces, as well as develop education materials and action kits for local libraries in multiple languages.⁹⁴ The HUD CDBG-DR Ida Action Plan includes \$2.5 million to restart the resiliency audits and insurance counseling parts of the program.⁹⁵

Stormwater Infrastructure Improvements

Background Information & Commitments

The City's aging sewer system is not designed to meet today's extreme weather. Stormwater infrastructure projects can be complex to design and construct. Many of them take several years to complete. The City committed to accelerating infrastructure projects that will improve stormwater management across the City. Such projects include sewer replacements, new high-level storm sewers, Bluebelts, Cloudburst projects, rain gardens, and porous pavements. *The New Normal* included \$2.7 billion to speed up the construction of these initiatives. The HUD CDBG-DR Ida Action Plan also included significant funding to expand green infrastructure, build flood protection in Red Hook, and repair damaged NYCHA buildings. In total, the City now has \$10.3 billion of planned stormwater investments in the 10-Year Capital Plan to improve the capacity of the storm sewer system and increase green infrastructure throughout the City.

In addition to investments in City-owned infrastructure, the City also committed to formalizing a task force between MTA, DOT, and DEP to address subway flooding. As a largely underground system, the subway is especially vulnerable to stormwater flooding. The subway drainage system connects to DEP's citywide sewer network. When heavy rains overwhelm DEP's sewer system, floodwaters in the subways have nowhere to flow and back up into the tracks and stations. Clogged catch basins and siphons further worsen subway flooding. At the street level, when floodwaters on the streets rise above the sidewalks, water pours into the subway system through station entrances, vents, grates, and other openings. During intense periods of rainfall when the subways receive large volumes of stormwater, MTA cannot pump the water out of its system as fast as it is entering.

Assessment of the City's Progress on Stormwater Infrastructure Improvements

A majority of DEP's stormwater infrastructure projects are delayed and over-budget.

There is no evidence that the City has meaningfully accelerated critical stormwater infrastructure projects. A review of the capital plan shows that half of DEP's \$10.3 billion stormwater investments are not anticipated to be complete before the end of decade, with timelines stretching beyond 2030.

The Comptroller's Office matched 356 DEP-identified stormwater capital projects to public documents released in the Fall 2024 Capital Commitment Plan and Comptroller records pulled from the City's Financial Management System. Of those, only 4% of projects have accelerated start dates. The majority of projects are both delayed and over-budget. 61% of projects are delayed, with an average delay of 23.5 months. Nearly half of project delays were attributed to unforeseen site/field conditions, while the remainder were delayed due to changes in scope/design and budgetary constraints. In total, 69% of the 356 analyzed projects are facing significant cost overruns. On average, over-budget projects are anticipated to cost an average of

310% more than initially budgeted. Delays due to unforeseen site/field conditions was a major driver for the most significant budget overruns: projects delayed due to unforeseen conditions resulted in an average budget overage of 421%.

Figure 8: Stormwater Capital Projects by Schedule and Budget

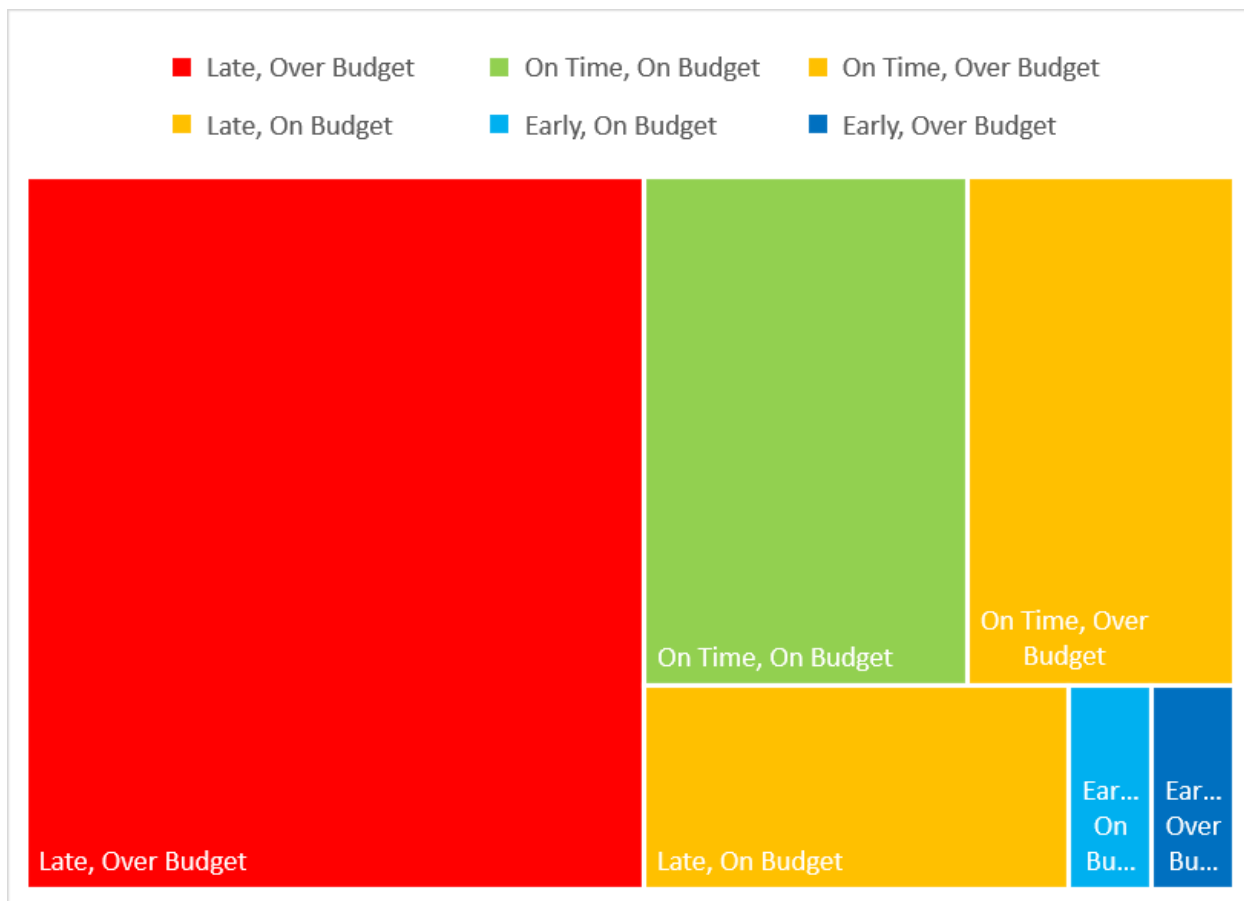


Figure 8: Office of the NYC Comptroller

Moreover, many of DEP’s planned capital projects remain undefined. \$2.86 billion of the total \$10 billion designated for stormwater capital projects are for undefined “proposed outyear projects.”⁹⁶ DEP has stated that the agency intends to allocate funding into specific projects as they are scoped. Currently, DEP anticipates budgeting 29 projects from this pot of funding in FY 2025, with a hundred more projects in earlier planning stages.

DEP shared steps that it has recently taken to shorten the time it takes to complete early-stage planning work and initiate projects, including the completion of a citywide sewer model and the addition of new capacity to its Bureau of Water and Sewer Operations engineering planning team that has doubled its project plan output in recent months. Since these projects are still in initial phases, the impact of these measures on overall project completion timelines is not yet clear.⁹⁷

DEP has a 100% capital commitment rate, which represents the portion of an agency’s planned commitments that were allocated in a given fiscal year.⁹⁸ DEP has increased its capital budget by

\$800 million since Fiscal Year 2022, with a current total of \$2.4 billion in new contracts. This commitment is \$500 million higher than DEP's 10-year capital budget average.

DEP recommends cloudburst projects—larger areas designed to store, absorb, or transfer stormwater—as a way to more quickly provide protection from extreme rainfall. These projects could be implemented relatively quickly, compared to larger sewer construction projects, because DEP has a set of locations ready to begin designs in Central Harlem, East Elmhurst/Jackson Heights, Homecrest, and Montbellier. No funding is currently committed for these projects; DEP estimates it would need \$390 million to advance three such projects.⁹⁹

DEP can install new catch basin designs that would reduce lead time and labor to clean catch basins for a modest \$22.5 million.

Catch basin inspections and cleanings before and during a storm requires a lot of lead time and labor. DEP has stated that modern street grate designs can reduce clogging from trash and debris, thereby reducing the labor and time needed to clean catch basins.¹⁰⁰

DEP has yet not completed any full catch basin replacements yet, but is planning to start replacing 1,500 catch basins in 2026.¹⁰¹ This represents less than 1% of DEP's total catch basins. DEP requires roughly \$15,000 per catch basin replacement and \$500 per hardware upgrade. The agency reports that it would cost \$22.5 million annually to retrofit all of the catch basins across the city.¹⁰²

8.5% of DEP's water and sewer capital budget is for emergency sewer repairs.

DEP's 10-year capital plan includes \$875 million for emergency reconstruction and repairs of sewers for its Bureau of Water and Sewer Operations (BWSO).¹⁰³ While there no standard best practice for what portion of an agency's budget should be allocated for emergency repairs, significant spending on emergency repair work indicates that more investments are needed for DEP to maintain a state of good repair for its sewer system.

A recent [audit](#) by the NYC Comptroller found that the City is failing to accurately identify its infrastructure repair needs. The annual Asset Inventory Management System (AIMS), managed by the NYC Office of Management and Budget, is supposed to provide a comprehensive condition assessment of the City's infrastructure. Not only is the AIMS report unreliable, it also completely omits underground infrastructure. This means that the entire sewer system is left out of the citywide annual inspection process.

DEP shared several strategies that it uses to maintain its sewer system. DEP addresses sewer issues in response to 311 complaints. DEP also sets up monitoring for places that experience frequent sewer backups, and performs routine cleaning and degreasing of fat, oil, or grease buildups that block sewer flows. Lastly, DEP sometimes proactively replaces sewer pipes as part of existing DOT street reconstruction projects.¹⁰⁴ Despite these efforts, the costs of emergency sewer repairs remains high.

The City has undertaken some effective, though ad-hoc, tactical interventions to address subway flooding for priority locations identified by the MTA.

Since Hurricane Ida, the City and MTA have established a taskforce with MTA, DOT, and DEP to work together to address subway flooding. The Taskforce has held 21 field meetings, 39 online meetings, and 45 site meetings.¹⁰⁵

The taskforce has taken several steps to reduce subway flooding. To date, MTA, DEP, and DOT have completed stormwater protections at 28 stations, representing 6% of total MTA stations.¹⁰⁶ An additional 44 projects identified through the post-Ida task force were underway as of October 2023¹⁰⁷ MTA has also identified future upgrades at 32 subway pump rooms serving 20 locations impacted by one or more recent storms.¹⁰⁸

MTA has independently upgraded its hydraulic systems and installed backflow preventors that stop stormwater from pouring back into the subway system. MTA has also sealed and caulked its tunnels and utility corridors to prevent unnecessary seepage. MTA has also focused on elevating openings, like vents and station entrances, to reduce the amount of stormwater that enters the subway system below. To date, MTA has focused these efforts on stations that have previously flooded. MTA raised subway vents and constructed station entrance steps. Based on past flooding, MTA has identified a list of priority locations for DOT to mill the roadway, which entails grinding off the top layer of asphalt of a street to increase the height of a curb so that stormwater cannot easily rise above the level of the sidewalk. MTA has also identified a list of priority locations for DEP to clean clogged siphons and upgrade drainage capacity. Both DOT and DEP have taken initial steps to address flooding those locations.¹⁰⁹

DEP is not funded for programmatic cleaning of siphons near MTA subways. The agency reports it would need \$4 million annually to fund this siphon cleaning.¹¹⁰

While these relatively small actions can go a long way in reducing subway flooding, they have been largely reactive and focused on locations that have previously flooded. However, rainfall patterns can change dramatically from storm to storm. For example, the stations that experienced the worst flooding during Hurricane Ida in 2021 differed from the most affected stations during the September 29 storm.

Recommendations to Improve NYC's Flash Flood Preparedness

Improve outreach to at-risk communities

1. **The City should expand emergency communications beyond the limited number of New Yorkers who currently receive NotifyNYC, and communicate flood risks to the public earlier.**

Very few New Yorkers subscribe to NotifyNYC. Cross-posting alerts to social media can only go so far to reach everyday New Yorkers. NYCEM should set public targets for to dramatically expand NotifyNYC enrollment and invest resources to increase subscribers. At the same time, the City should identify other strategies to reach a wider audience. In addition, the City's alerts and guidance to the public are most useful when they are issued earlier so that New Yorkers can plan accordingly. Important public communications about safety precautions, school closures, press conferences, guidance for basement residents, and other notifications should be made with enough time for people to prepare before the storm arrives.

2. **NYCEM should expand Strengthening Communities to reach more diverse at-risk New Yorkers.** Climate change worsens existing social inequities. The City cannot afford to be reactive and wait for communities to suffer after a disaster before it steps up efforts to protect at-risk New Yorkers.

NYCEM's recent efforts to reach basement residents is certainly a helpful start. However, the low enrollment in NYCEM's basement notifications is a clear sign that NYCEM must do more. NYCEM should fund trusted community organizations to deepen outreach to basement residents. Outreach should target owners and renters of basement units so that both parties understand rights, risks, and safety tips during flash floods, regardless of immigration or housing status. With input from community groups, NYCEM should provide more specific and detailed guidance about types of places people should seek when moving to higher ground. NYCEM can also pair emergency outreach with material support. For instance, the outreach team should also directly provide basement residents with flood alarms and backflow preventors. The City should also advertise flood safety information in public spaces, especially in neighborhoods with a lot of basement apartments. These actions follow the recommendation in the Comptroller's 2021 report, [Bringing Basement Apartments Into the Light](#).

NYCEM's engagement should not stop at basement residents. The [2023 National Climate Assessment](#) identifies many communities that face higher risks of harm from climate change. These communities include people with disabilities; Black, indigenous, and people of color; unhoused people; and LGBTQ+ people.¹¹¹ People with intersecting

marginalized identities face even higher health and economic disparities and have a more difficult time accessing services.

While the current list of Strengthening Communities partners spans geographies and communities, there is room for improvement. NYCEM should intentionally expand Strengthening Community partners with groups that serve the communities mentioned above. Work with those groups to develop tailored messaging and resources on blue sky days and equip them to jump into action during emergencies.

Expanded engagement must come with more tailored and specific guidance. It is not enough to encourage organizations serving at-risk constituents to sign up for generic alerts, nor it is enough to include tell basement residents to move to high ground in NotifyNYC alerts. NYCEM should develop more detailed resources specific to different at-risk communities. To do this, NYCEM should work with leaders across all marginalized communities to identify their unique needs during flash floods, and develop materials accordingly.

Build community capacity for emergency preparedness

3. **NYCEM should establish baseline funding for annual emergency activations of community networks.** Paid community canvassing increased the reach of emergency notifications, and should continue as a permanent program. Based on the information that NYCEM provided, it cost \$88,000 to pay 20 community networks to conduct emergency outreach on September 29. A permanent community emergency activation program should expand the number of participating groups, as well as cover a range of climate emergencies. *The New Normal* set a goal to expand Strengthening Communities to 60 networks by 2025. And, according to the New York City Panel on Climate Change,¹ NYC should expect to see 6 heatwaves and 4 days with rainfall exceeding 2 inches each year in the 2030s.¹¹² Based on these estimates, by FY2025 the City should budget \$2.6 million each for 60 groups to conduct emergency outreach 10 times per year.
4. **NYCEM should formalize the role of community-led emergency canvassing into City's emergency protocols.** Whenever possible given the weather forecasting, NYCEM should activate community groups in emergencies earlier in the process. Many community partners are small and need time and resources to mobilize staff and volunteers. NYCEM should incorporate the community emergency canvassing into its emergency protocols. This step will ensure that activations are not treated as an afterthought, but as a critical part of the City's emergency response.

¹ These figures are based on a medium-high estimate (75th percentile) of climate projections for the 2030s.

Promptly improve catch basin cleaning procedures

5. **DEP should replace its aging catch basin cleaning trucks and take over maintenance of its catch basin cleaning truck fleet.** DEP cannot effectively prepare for flash flooding when a majority of its specialized catch basin cleaning trucks are in disrepair. The City should first budget funding to replace the remainder of the 18 catch basin trucks that are expected to reach the end of their useful lives in the coming years. Secondly, these trucks should be moved back under DEP control instead of relying on DSNY to maintain the fleet. The City should also fully fund DEP for the repair costs for existing catch basin cleaning trucks based on the estimates provided by DEP: \$1 million by 2025 and \$1.25 by 2026. DEP must establish new protocols to ensure that its trucks are well-maintained and ready to be deployed whenever a storm hits.
6. **DEP should be funded to retrofit catch basin across the city with new modern designs that reduce clogging.** The process for inspecting and cleaning catch basins requires a lot of labor and lead time. The City will not always have a full day to prepare for an incoming storm. Even with more advanced notice, the City cannot feasibly inspect and clean every catch basin that requires attention. The City should allocate \$22.5 million annually to implement retrofits that will make it easier to manage pre-storm preparations. The new catch basin designs will not only reduce flooding, they will also simplify the City's pre-storm operations to allow the City to more efficiently use its limited resources before a storm.

Implement capital process reforms to accelerate stormwater capital projects

7. **MTA, DOT, and DEP should dramatically expand subway flood protection improvements.** Challenges in flash flood forecasting makes it difficult to accurately predict where heavy rains will fall next. The MTA Taskforce's completed and ongoing projects are a useful start to address subway flooding, but only accounts for a small portion of MTA stations. MTA, DOT, and DEP must significantly expand the number of projects to reduce subway flooding. The taskforce should develop a shared data-driven approach to identify a suite of solutions that the three agencies can jointly implement.
8. **DEP should improve stormwater infrastructure assessments to maintain a state of good repair.** In addition to building new stormwater projects, the City should invest in maintaining the existing sewer system. Properly investing in infrastructure maintenance will reduce the amount of emergency sewer repairs needed. In order to maintain a well-functioning sewer system, the City must understand the current conditions of its sewer network and the cost it will take to repair any deteriorated infrastructure. Equally importantly, the City must invest in maintaining a state of good repair for sewer infrastructure.

9. **The State legislature and City Administration should implement capital process reforms to pick up the pace of completing stormwater projects.** In 2022, then-First Deputy Mayor Lorraine Grillo convened a taskforce to identify improvements to every step in the capital process, from project initiation to construction. The taskforce included experts from City agencies (including the NYC Comptroller’s Office), construction contractors, designers and engineers, and labor leaders. The City has made some progress to implement the taskforce recommendations and the Comptroller’s was proud to join their advocacy to won legislative victories on e-bidding, wrap-up insurance, and a host of measures to increase M/WBE participation and promote equity in procurement. But significant reforms are still needed for the City to be able to meaningfully accelerate critical stormwater projects. Most notably, the City should prioritize addressing State legislation to authorize progressive design-build authority, particularly for resiliency and stormwater projects.
10. **The Adams Administration should improve the City’s Capital Project Dashboard to better manage stormwater capital project delivery.** The City cannot accelerate the pace of its infrastructure projects without a clear understanding of whether and why projects become delayed or run over budget. In October 2023, the City launched a new [Capital Projects Dashboard](#) to track the cost, status, and expected completion date for all capital projects. Unfortunately, the dashboard fails to include key information about changes to project costs and timelines. The City should fix the dashboard to include basic information about whether a project is on-time and on-budget so that it can use this information to improve infrastructure delivery going forward.

Continue to Improve Coordination of Storm Operations

11. **The City should develop a shared interagency tracking and data sharing tool to better coordinate storm operations.** While the City stated that operational agencies maintain open lines of communication during emergencies, agencies do not have a good way to jointly track their actions in real-time. The City should develop a tool that allows agencies to track which agencies have completed catch basins inspection and cleanings before a storm, identify emergency actions to address during a storm, and share real-time data across the City. The lessons learned from storms should be continuously integrated into the City’s storm operations, stormwater maps, and other emergency protocols.

Conclusion

When Hurricane Ida hit in 2021, it was a wakeup call for just how unprepared New York City was for intense rains. Since then, the City made many improvements in the way that it manages flash flooding emergencies. The Flash Flood Emergency Plan, first released in 2009, is the most activated of all emergency plans.¹¹³ As the climate change accelerates, this plan will likely be activated many more times. It is critical for the City to take stock of how it can better prepare for and respond to flash flood emergencies.

The City has made meaningful advancements in flash flooding preparedness: NYCEM has improved its forecasting capabilities and taken steps to reach basement residents who are especially vulnerable to flash floods. DEP has improved its stormwater analytics. The City has secured federal and local funds for stormwater improvements.

Yet the City still has much more to do improve its preparedness for flash floods. Catch basin clearing must be dramatically improved, both by having the specialized trucks in service, and by modernizing the drains to reduce clogging. NYCEM must double down to provide targeted outreach to more diverse New Yorkers facing significant flood risks so that no one gets left behind. The City must meaningfully invest in our aging stormwater equipment and infrastructure, and accelerate the timeline on which these critical projects are implemented.

The City must build its adaptive capacity so that each time a storm comes, we can incorporate lessons learned into our emergency protocols, stormwater models, infrastructure designs, and recovery and resilience programs. That is how public trust can be restored, systems improved, harm reduced, and lives spared in the storms to come.

Methodology

To evaluate the City’s readiness and preparation for flash flooding, the Comptroller’s Office catalogued commitments made by the City in *New Normal*, *Rainfall Ready*, and *Ida Action Plan*. The Comptroller’s Office requested specific information from the City to demonstrate agencies’ actions since Hurricane Ida to update their protocols. Such requests included information on the status of programs and records of activities in advance of and during the flash flooding on September 29. The Comptroller’s Office also conducted in-depth interviews with leadership and staff from NYCEM, DEP, DOE, MTA, and the Mayor’s Office and community organizations that participated in the digital canvass.

In response to a request for information, DEP provided the locations where DEP, DSNY, and DOT inspected and cleared catch basins in advance of and during the storm and priority street or highway flooding locations which the agency was monitoring through the storm. These locations were geocoded through Geosupport and Google Maps then mapped.

Locations of flood complaints to 311 were drawn from NYC OpenData.¹¹⁴ The subset of complaints were those reported on September 29, 2024, of any type with a description including the term “flood” (“Street Flooding (SJ)”, “Flooding on Street”, “Catch Basin Clogged/Flooding (Use Comments) (SC)”, “Highway Flooding (SH)”, “Flooding on Highway”). A heatmap was created to show geographic concentrations of complaints, showing the total number of complaints within a 1-mile radius.

DEP provided the Comptroller’s Office with a list of 493 unique capital projects across 739 budget codes the agency identified as pertaining to climate infrastructure. The Comptroller’s Office relied on data derived from two previously completed analyses of capital projects to evaluate DEP’s timeliness on emergency preparedness initiatives: the New York City Comptroller Division of Budget’s December 2022 [New York by the Numbers](#) and the Office of the New York State Comptroller’s (OSC) April 2024 report [“A Review of NYC Capital Project Delivery”](#).

The OSC report relied on the Capital Project Detail Data report maintained by the city Office of Management & Budget. The report, divided into a Milestones and Dollars dataset on NYC Open Data, was last published in October 2023 and has since been discontinued. To compute project delays, the OSC calculated the difference in months between the original start date and the most recently published start date for each “task” (a subdivision of project) for a capital project, and averaged the delay in months. A project was deemed “over budget” if the cost of planned commitments exceeded the first planned commitment as recorded in the Dollars dataset.

For its report, the NYC Comptroller’s Budget Division (Budget) created an archive of each Capital Commitment Plan (CCP) published by the city, recording the first unique plan in which a capital project appeared. The Budget dataset was filtered to include only completed or ongoing projects; projects with little or no spending were excluded from analysis. Because the data in the CCP are less granular than those used by OSC, Budget recorded projects as delayed if the start date was more than one year later than the first published start date. As with the OSC report, projects

were deemed over budget if the planned commitments exceeded the first planned commitment as recorded in the CCP.

For this report, the Comptroller's Office matched the data in the above reports to the data provided by DEP by Project ID; where there were multiple matches, preference was given to the more current information in the OSC data. 355 of 493 projects matched to at least one database; many of the non-matches either had no discernible spending in the ten year plan period, or were large omnibus projects with start dates far in the future. Budget's annualized delays were converted to months.

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