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**Committee on Resiliency and Waterfront**

Hon. Justin Brannan, Chair

**Committee on Parks and Recreation**

Hon. Peter Koo, Chair

**October 20, 2021**

**Oversight - Green Infrastructure, Urban Flooding and Combined Sewer Overflows**

**Int. No. 67:** By Council Members Brannan, Yeger and Adams

**Title:** A Local Law to amend the administrative code of the city of New York, in relation to placing liability on the city for overtaxed sewer lines and requiring the city to develop a plan to mitigate and prevent sewer backups

**Administrative Code:** Amends by adding new sections 7-213 and 24-531

**Int. No. 383:** By Council Members Ulrich, Brannan, Holden, Cornegy and Adams

**Title:** A Local Law to amend the administrative code of the city of New York, in relation to an annual report on drainage infrastructure

**Administrative Code:** Amends by adding a new section 24-531

**Int. No. 1618:** By Council Members Koo, Brannan, Levin, Reynoso and Adams

**Title:** A Local Law to amend the administrative code of the city of New York, in relation to requiring the department of environmental protection to report on its progress toward decreasing the presence of sewage and stormwater contaminants in the city waterways and various strategies to achieve those goals, and providing for the expiration and repeal of such requirement

**Administrative Code:** Amends by adding a new section 24-531

**Proposed Int. No. 1845-A** By The Public Advocate (Mr. Williams) and Council Members Brannan, Menchaca and Miller

**Title:** A Local Law to amend the administrative code of the city of New York, in relation to a sunset provision in legislation on filing semiannual reports on catch basin cleanups and maintenance

**Administrative Code:** Amends by adding a new subdivision f to section 24-503

**Int. No. 2168:** By Council Members Brannan, Koslowitz and Gennaro

**Title:** A Local Law to amend the administrative code of the city of New York, in relation to creating a water meter database

**Administrative Code:** Amends by adding a new section 24-368

**Int. No. 2425:** By Council Members Salamanca, Vallone, Yeger, Holden, Dinowitz, Rosenthal, Cabrera, Levin, Ampry-Samuel, Koslowitz, Adams, Cumbo, Ayala and Ulrich

**Title:** A Local Law to amend the New York city charter, in relation to requiring borough commissioners in the department of environmental protection

**New York City Charter:** Amends by adding a new section 1405

**Preconsidered Int. No. \_\_:** By Council Members Brannan and Gennaro

**Title:** A Local Law to amend the administrative code of the city of New York, in relation to requiring the department of environmental protection to establish a program to provide financial assistance for the purchase and installation of backwater valves

**Administrative Code:** Amends by adding a new section 24-532

1. **Introduction**

On October 20, 2021, the Committee on Environmental Protection, chaired by Council Member James F. Gennaro, the Committee on Resiliency and Waterfronts, chaired by Council Member Justin Brannan, and the Committee on Parks and Recreation, chaired by Council Member Peter Koo, will hold a joint oversight hearing titled “Green Infrastructure, Urban Flooding and Combined Sewer Overflows.” The Committees will also hear several legislative items including: Int. No. 67, in relation to placing liability on the city for overtaxed sewer lines and requiring the city to develop a plan to mitigate and prevent sewer backups; Int. No. 383, in relation to an annual report on drainage infrastructure; Int. No. 1618, in relation to requiring the department of environmental protection to report on its progress toward decreasing the presence of sewage and stormwater contaminants in the city waterways and various strategies to achieve those goals, and providing for the expiration and repeal of such requirements; Proposed Int. No. 1845-A, in relation to a sunset provision in legislation on filing semiannual reports on catch basin cleanups and maintenance; Int. No. 2168, in relation to creating a water meter database; Int. No. 2425, in relation to requiring borough commissioners in the department of environmental protection; and Preconsidered Int. No. \_\_, in relation to requiring the department of environmental protection to establish a program to provide financial assistance for the purchase and installation of backwater valves. Those invited to testify include representatives from the Department of Environmental Protection (DEP), the Mayor’s Office of Climate Resiliency (MOCR), the New York City Department of Parks and Recreation (DPR), various climate, resiliency and environmental advocates, and other interested parties.

1. **Background**

On July 8, 2021, Tropical Storm (TS) Elsa inundated New York City (the City) with rainfall, causing severe flooding along roads, highways and in subway stations, resulting in a temporary suspension of service on several subway lines.[[1]](#footnote-1) TS Elsa was followed by Tropical Storm Henri on August 21, 2021, which was then followed by Tropical Storm Ida on September 1, 2021.[[2]](#footnote-2) TS Ida set record rainfalls in Central Park and caused the National Weather Service to issue a Flash Flood Emergency for New York City.[[3]](#footnote-3) TS Ida caused some roadways to be flooded with so much water that the streets were unpassable to vehicular traffic. In some areas, vehicles were left abandoned or stranded. This hearing seeks to examine what the City is doing to address these flooding issues and explore what more could be done with green infrastructure.

Flooding

A report by the National Oceanic and Atmospheric Administration (NOAA) forecasts that by 2100, "high tide flooding will occur 'every other day' (182 days/year) or more often under the Intermediate Low Scenario within the Northeast and Southeast Atlantic … ."[[4]](#footnote-4) The report also projects that the low and high end estimates of high tide flood frequency along the coast of the Northeast Atlantic “will reach on average about 235 and 365 days/year (with 95 and 100% from tides)” respectively.[[5]](#footnote-5) New York City’s waterfront communities face significant threats from extreme weather events and high tides, and projections show that these communities will experience greater and more frequent damage because of climate-related weather events and sea level rise. Neighborhoods such as Broad Channel, Howard Beach, Hamilton Beach,[[6]](#footnote-6) Rosedale, Far Rockaway, Coney Island, Stapleton, Arrochar, and Midland Beach,[[7]](#footnote-7) where eight New Yorkers drowned in Sandy’s floodwaters,[[8]](#footnote-8) already regularly experience tidal inundation, a trend that will only be exacerbated by continued sea level rise.

Urban areas are also highly susceptible to pluvial flooding, which is flooding caused by rainfall.[[9]](#footnote-9) Concrete surfaces that exist throughout the City prevent rainfall from infiltrating the ground and increase inland flooding risks. Sea barriers and coastal defenses put in place to protect against coastal storm surge will not solve flooding caused by heavy rainfall events.[[10]](#footnote-10) Timon McPhearson, a member of the New York City Panel on Climate Change (NPCC) and a researcher of urban climate resiliency at the New School stated that “[t]he way we’ve developed New York City has caused the flood problem.”[[11]](#footnote-11)

Disproportionate Impacts of Flooding on Low-Income and Minority Communities

Urban flooding and its disproportionate impact on minority and low-income communities is a major concern as climate change worsens. The most vulnerable residents, those who live in flood-prone areas with little green space to absorb the floodwaters, are often poor and members of minority groups.[[12]](#footnote-12) According to a recent study led by researchers at the University of Arizona, people who are Black, Hispanic or of low-income are more likely to live in areas at high risk from flooding from natural disasters.[[13]](#footnote-13) According to Sam Brody, a flood expert at Texas A&M University, “[u]rban flooding is a growing source of significant economic loss, social disruption and housing inequality.”[[14]](#footnote-14) Storms indiscriminately affect all residents – rich and poor. However, “the capacity to respond to and recover from flooding is much lower in socially vulnerable populations that even in the best of times are struggling to function.”[[15]](#footnote-15) Additionally, more people die from floodwaters than from any other effect of a hurricane, and flood damage is more likely to harm or kill those most vulnerable.[[16]](#footnote-16)

Sea Level Rise

With 520 miles of coastline bordering the ocean, rivers, bays and inlets, New York City is particularly vulnerable to the impacts of sea-level rise, storm surge, and high-tide or sunny-day flooding.[[17]](#footnote-17) According to a Union of Concerned Scientists study , New York State ranks third in the nation for most homes at risk of coastal inundation by the end of the century.[[18]](#footnote-18) The East and Gulf Coasts of the United States are undergoing some of the fastest rates of sea level rise, with coastal flooding rates in 2012 averaging once every three months, up from once every five years in the 1950’s.[[19]](#footnote-19) Nationally, more than 300,000 homes with a collective value of 117.5 billion dollars, and 14,000 commercial properties valued at 18.5 billion dollars are at risk of chronic flooding within the next 30 years.[[20]](#footnote-20) In the State of New York, 15,500 homes representing a population of approximately 42,000 people and valued at approximately 8.5 billion dollars, mostly clustered in Long Island (Hempstead, Babylon), and Queens, risk increased nuisance flooding by 2045.[[21]](#footnote-21) By 2100, 143,000 properties housing approximately 366,000 people, and valued at approximately 98 billion dollars, risk the same fate.[[22]](#footnote-22) The homes at risk by 2045 contributed about 170 million dollars in tax revenue by 2018 figures, and those at risk by 2100 represent 2 billion dollars of tax revenue.[[23]](#footnote-23) The 2,700 homes at risk in Queens by 2045 are largely concentrated in environmental justice communities.[[24]](#footnote-24)

Future Storms and Flooding Events

 Global warming is expected to cause sea level rise and storms to intensify in New York City.[[25]](#footnote-25) A study by climate experts estimates that over the next 300 years, there will be higher seas, larger storm surges, and more frequent, intense hurricanes.[[26]](#footnote-26) In today’s warmer climate, 7.5 foot floods are projected to happen every 25 years as opposed to 7.5 foot floods occurring only a few times per millennium in the past.[[27]](#footnote-27) Predictions state that by 2030, these floods will occur every five years.[[28]](#footnote-28)

 Flooding from rainstorms is not a new phenomenon. However, the frequency and intensity of such events is new.[[29]](#footnote-29) Additionally, such flooding tends to be localized. Hence, low-lying areas that typically experience coastal flooding may not flood during a heavy precipitation event that is concentrated in another area of the City. For example, when Tropical Storm Elsa hit the City on July 8, 2021, the storm caused more than five inches of rain to fall in a few hours, overwhelming storm sewers and drainage systems and causing significant flooding in areas of upper Manhattan and the West Bronx.[[30]](#footnote-30) However, areas around the Gowanus Canal in Brooklyn and Hamilton Beach in Queens, areas that generally experience significant flooding from coastal events, did not flood.[[31]](#footnote-31)

On August 9, 2021, the Intergovernmental Panel on Climate Change (IPCC) issued Working Group I’s part of the Sixth Assessment Report,[[32]](#footnote-32) which included the most current understanding of the climate system and climate change. Co-authored by 234 scientists from around the world, the IPCC Report found that the world is now 2 degrees Fahrenheit warmer than in 1850-1900 and is warming at an unprecedented rate. Further, human influences on the climate are “making extreme weather and climate events – like heat waves, heavy rain, and droughts – more frequent and severe, putting more people, property, and natural resources in harm’s way.”[[33]](#footnote-33) The IPCC Report concluded that until global net zero emissions of greenhouse gases is reached, it shall be impossible to limit warming to any temperature threshold.[[34]](#footnote-34) However, the authors did assert that switching to renewables, using electric vehicles, better insulating homes and businesses, and using and supporting sustainable, climate-smart practices are steps that can and should be taken now.[[35]](#footnote-35)

Additionally, a recent study by NOAA found that coastal communities experienced twice as many high-tide flooding days from May 2020 to April 2021 as they did 20 years ago.[[36]](#footnote-36) William Sweet,[[37]](#footnote-37) an oceanographer at NOAA who has been researching high-tide flooding for more than a decade, stated that “[t]he inflection points . . . are already occurring [in areas such as New York. This is] not a problem a decade from now. It’s a problem *now*, and it’s going to get worse.”[[38]](#footnote-38) To protect against coastal flooding, planners and engineers design for the extreme event. However, when it comes to flooding from precipitation, infrastructure should be designed to be “agile and flexible” because such flooding events are unpredictable.[[39]](#footnote-39)

 The New York City Panel on Climate Change (NPCC), an advisory body formed by local law to regularly review and report on scientific climate data, has suggested that if climate change begins to follow the Antarctic Rapid Ice Melt (ARIM) projections,[[40]](#footnote-40) portions of Coney Island, Red Hook, Howard Beach, the Rockaway Peninsula, the east and west coasts of Staten Island, the Lower Manhattan waterfront and areas around the Gowanus Canal, Newtown Creek and Pelham Bay may be permanently inundated with water by 2080 if coastal protections are not put in place.[[41]](#footnote-41) In the NPCC’s 2019 report, it reviewed existing climate science data and used new methods to determine whether, and in what ways, the City would experience extreme temperatures, heavy downpours, drought, sea level rise, and coastal flooding.[[42]](#footnote-42) The NPCC projects that the City will be subjected to increasing multi-hazard risks, including sea level rise, precipitation and extreme temperature, “some of which may exacerbate the impacts or severity of others.” [[43]](#footnote-43)

The impacts of sea level rise on the City’s built environment would most directly appear through coastal storm flooding, regular tidal flooding, or land inundation.[[44]](#footnote-44) Under the ARIM scenario, which projects 114 inches (9.5 feet) of sea level rise by 2100, the permanent loss of land to inundation would occur by 2100 in some low-lying areas.[[45]](#footnote-45) However, the more likely scenarios are the middle range projections (25th to 75th percentile) that, while projecting significantly less sea level rise than the ARIM scenario, still mean that the City could face monthly tidal flooding of some areas by the 2050’s.[[46]](#footnote-46) NOAA projects that in the 2030’s there will be 20-40 flood days, and by the 2050’s there will be 50-135 flood days annually for The Battery area in Lower Manhattan.[[47]](#footnote-47) This means that, in the future, over the course of a third of the year, Lower Manhattan may suffer from tidal flooding.[[48]](#footnote-48)

Rain Events and New York City’s Sewage Infrastructure

New York City’s sewage infrastructure encompasses over 6,400 miles of mains, with an approximate average age of 91 years.[[49]](#footnote-49) The City is served by 14 wastewater treatment plants,[[50]](#footnote-50) that have a total combined treatment capacity of approximately 1.8 billion gallons per day.[[51]](#footnote-51)  Approximately 60% of New York City is served by a combined sewer system, which routes wastewater and stormwater runoff to treatment plants for processing prior to discharge into local waterways,[[52]](#footnote-52) and approximately 40% is served by municipal separate storm sewer systems (referred to as MS4), comprised of separate lines that route wastewater to treatment plants, and discharge stormwater runoff directly into local waterways.[[53]](#footnote-53)

While the City’s sewage system is designed to meet engineering assumptions that a rainfall event intensity of 1.75” of rain per hour will occur approximately once every five years,[[54]](#footnote-54) one-tenth of an inch of precipitation per hour is enough to overwhelm wastewater treatment plants and trigger a mixture of raw sewage and storm-water to overflow into local waterways, known as a combined sewage overflow event.[[55]](#footnote-55) During extremely heavy rain events like Tropical Storm Ida, overwhelmed wastewater infrastructure in neighborhoods served by the combined sewage system can cause a backup that results in a mix of stormwater and raw sewage directly into low-lying streets and residents’ homes.[[56]](#footnote-56) In addition to the increased frequency of heavy rain events due to climate change,[[57]](#footnote-57) the fact that that an estimated 72% of the City’s built environment is comprised of impervious surfaces, or surfaces that prevent the natural infiltration of rainwater into the ground[[58]](#footnote-58) will continue to present challenges for the City’s wastewater infrastructure.[[59]](#footnote-59) Furthermore, because MS4 stormwater conveyance mains and combined sewer overflow pipes generally terminate in low-lying waterfront areas, storm surge events and coastal inundation can also significantly reduce the efficacy of the City’s drainage infrastructure.[[60]](#footnote-60)

 There have also been chronic issues with poor maintenance and the upkeep of catch basins across the City.[[61]](#footnote-61) While DEP has been more proactive in maintaining the system with digital tools and innovative practices,[[62]](#footnote-62) it operates the system pursuant to a New York State Department of Environmental Conservation SPDES (“State Pollution Discharge Elimination System”) permit.[[63]](#footnote-63) The SPDES permit mandates that the system be properly operated and maintained in accordance with the terms of the permit.[[64]](#footnote-64) If the system is not properly maintained, people are exposed to sewage backups in basements, streets and yards.[[65]](#footnote-65)

According to the United States Environmental Protection Agency (“EPA”), the system has not been properly maintained. The EPA found that New York City experienced an excessive number of sewage backups between 2011 and 2015—more than 17,000, with numerous instances of repeat backups in the same locations, due to capacity issues in addition to backups related to inadequate maintenance.[[66]](#footnote-66)

There has been a chronic, long-standing flooding problem in Southeast (SE) Queens affecting over 400,000 City residents.[[67]](#footnote-67) The area had more 3-1-1 flooding and sewer backup complaints than any other area of the City and certain neighborhoods, including Rosedale, Springfield Gardens, St. Albans, Jamaica, Queens Village and the Rockaways, experienced recurring flooding conditions.[[68]](#footnote-68) In these neighborhoods, water regularly floods streets, buildings, businesses and homes.[[69]](#footnote-69) See map of malfunctioning catch basins.



Map of malfunctioning catch basins identified pursuant to Local Law 48 of 2015 showing the highest concentration of malfunctioning basins as being in in eastern and southern Queens.

In 2015, the Council enacted Local Law 48 of 2015,[[70]](#footnote-70) which required that DEP clean its catch basins at least once a year and repair broken catch basins within nine days after the receipt of a complaint.[[71]](#footnote-71) Previously DEP had been inspecting its catch basins once every three years.[[72]](#footnote-72) While DEP, in its 2020 State of the Sewers Report, placed 63% of the cause for sewage backups on the presence of grease,[[73]](#footnote-73) the first mandated report pursuant to Local Law 48 of 2015 identified thousands of catch basins that were broken and had resulted in sewage backups and flooding.[[74]](#footnote-74)

**EPA Compliance Order**

On August 31, 2016 the EPA issued an administrative compliance order pursuant to the Clean Water Act ("Order"), under Section 309(a) of the Act, 3 U.S.C. §1319(a), alleging that DEP violated the Clean Water Act by having failed to comply with the operation and maintenance terms and conditions of the fourteen permits ("Permits") issued by the New York State Department of Environmental Conservation, as a authorized by EPA.[[75]](#footnote-75) Five years later, problems with the sewage infrastructure abound and DEP has made it clear that the infrastructure cannot accommodate the increased precipitation anticipated for the future.[[76]](#footnote-76)

Sewage Infrastructure and Environmental Justice Concerns

 According to Eddie Bautista, Executive Director of the New York City Environmental Justice Alliance, the City’s largest combined sewage overflow outlets are located in communities of color.[[77]](#footnote-77) With projections estimating that the number of days in which the City will experience rainfall in excess of four inches will increase as much as 67% in this decade compared to the period between 1971 and 2000,[[78]](#footnote-78) and coastal sea level rise accelerating along the eastern coast of the United States,[[79]](#footnote-79) these communities are particularly vulnerable to flooding during heavy rain and storm surge events. During TS Ida, 11 of the 13 lives lost in New York City were residents of basement apartments who drowned when their homes flooded.[[80]](#footnote-80) Unregulated basement apartments are often the most accessible option for new immigrants and low income New Yorkers due to their lower cost and less stringent tenant vetting procedures.[[81]](#footnote-81)

New York City’s Stormwater Flood Plan

Local Law 172 of 2018 requires New York City to produce maps showing flood vulnerability linked to the anticipated effects of climate change, to update these maps at least every four years, and to publish a long-term flood vulnerability plan to prevent or mitigate such flooding.[[82]](#footnote-82) Published in May of 2021, the current iteration of the stormwater resiliency plan notes that the City is expected to experience 25% more rainfall by the end of the century, and sets forth four goals intended to optimize emergency response to rainfall events and to ensure that City investments take climate risk into consideration.[[83]](#footnote-83) The goals include public outreach regarding flood vulnerability from extreme rain, updated flash flood response procedures prioritizing response in areas known to be vulnerable, advancing policies that reduce urban flooding and conducting research pertaining to future risk and leveraging stormwater investments to address future flood risk from rain and sea level rise.[[84]](#footnote-84)

In May of 2021, New York City released preliminary stormwater flood maps, aimed at helping City residents understand their local risk of rainfall based flooding.[[85]](#footnote-85) Residents in high-risk areas are encouraged to make emergency evacuation plans, learn the safest route from their location to high ground, and stay informed via the Notify NYC system or calling 311.[[86]](#footnote-86) The preliminary stormwater map shows wide swaths of extreme flood risk across Queens, northeast Bronx, South Brooklyn, and waterfront neighborhoods in Staten Island, in the event of a storm projected to drop 3.5 inches of rain in one hour.[[87]](#footnote-87) To mitigate the risks of flooding during intense rain events, the City has employed a strategy of deploying both gray infrastructure resources aimed at keeping stormwater out of sewers and reducing flooding, as well as green infrastructure assets such as rain gardens and bluebelt networks aimed at allowing more rainwater to infiltrate naturally into the ground before reaching the sewage system.[[88]](#footnote-88) To this end, the City has constructed new high level storm sewers, expanded bluebelt networks in Queens and the Bronx after successful implementation in Staten Island, designed 10,000 distributed green infrastructure assets, issued new stormwater retention and detention guidelines for new and redeveloped properties aimed at restricting the volume and rate of stormwater draining into sewer systems, incentivized grant funding for green roofs and large scale retrofit programs, and planned approximately two billion dollars of comprehensive drainage system improvements in southeast Queens, which currently lacks fully built out storm sewer infrastructure.

Green Infrastructure

Green infrastructure,[[89]](#footnote-89) which includes rain gardens, bioswales, green roofs, permeable pavement, urban tree canopies and green streets,[[90]](#footnote-90) are techniques that help absorb and filter runoff, floodwaters and heavy precipitation. In 2010, the City released a Green Infrastructure Plan to improve water quality and manage stormwater runoff through a mixture of green and gray infrastructure[[91]](#footnote-91) techniques. The Green Infrastructure Plan focused on five key components: (1) build cost-effective gray infrastructure; (2) optimize the existing wastewater system; (3) control runoff from 10% of impervious surfaces through green infrastructure; (4) institutionalize adaptive management, model impacts, measure CSOs, and monitor water quality; and (5) engage and enlist stakeholders.[[92]](#footnote-92) Since 2010, DEP “has built more than 11,000 curbside rain gardens, infiltration basins, and implemented best practices in green infrastructure.”[[93]](#footnote-93)

In Staten Island, the City has constructed over 70 bluebelts[[94]](#footnote-94) and has begun to expand the program into Queens and the Bronx.[[95]](#footnote-95) Bluebelts are “ecologically rich and cost-effective drainage systems” typically comprised of streams, ponds and wetlands to convey, store and filter runoff, precipitation and stormwater.[[96]](#footnote-96) DEP and the NYC Department of Design and Construction are currently engaged in a $121 million expansion of the Mid-Island’s New Creek Bluebelt in Staten Island. The project will be completed in three phases from the end of 2021 through 2023 and will total 94 acres and drain a watershed area approximately 2,249 acres in size. It will also include the installation of approximately 5,500 linear feet of new storm sewers, replacement of approximately 1,200 feet of sanitary sewers and installation of approximately 870 feet of new sanitary sewers.[[97]](#footnote-97)

The City is also engaged in cloudburst stormwater management strategies. Cloudbursts are extreme amounts of rain in a short period of time.[[98]](#footnote-98) The City’s cloudburst stormwater management strategies combine gray and green infrastructure and are designed to absorb water and store the excess water safely until the event passes.[[99]](#footnote-99)

In 2015, the City partnered with Copenhagen to learn from and emulate some Danish techniques to deal with flooding from cloudbursts.[[100]](#footnote-100) “Officials from both cities decided they needed open space that can, in effect, absorb water like sponges, or at least slow runoff gushing through populated areas during or after a storm. Finding such spaces is a tall order in urban areas, but “sponges” help to keep water out of the sewer system when sewers are overwhelmed in a storm.”[[101]](#footnote-101) Creating sponge areas is also less expensive than expanding or building bigger sewers. Some techniques include adding green space or replacing asphalt or hardened surfaces with grass. Other techniques include creating areas that can be flooded during intense rain events, including basketball courts or playgrounds.

In 2016, the City began a cloudburst study in Southeast Queens with one pilot program at the South Jamaica Houses and a second pilot project in St. Albans.[[102]](#footnote-102) During a hearing before the Committee on Transportation, Committee on Environmental Protection and Committee on Resiliency and Waterfronts, Jainey Bavishi, Director of MOCR, stated that MOCR “look[s] forward to working with DEP to expand cloudburst design beyond the pilot areas.”[[103]](#footnote-103)

Green Infrastructure and the Parks Department

Green infrastructure projects have also been integral in DPR’s efforts to develop a more sustainable parks system and aid in the mitigation of stormwater runoff and other climate change consequences. One crucial aspect of green infrastructure, though often overlooked, is the City’s tree stock. The City’s 700,000 street trees (out of a total of a 7 million) intercept over 1 billion gallons of stormwater every year, while reducing CO2 emissions by over 600,000 tons.[[104]](#footnote-104) The annual value of the stormwater, energy, and pollution benefits provided by street trees has been valued at approximately $109M.[[105]](#footnote-105) DPR manages over 50% of the City’s tree canopy and according to the agency, has invested significantly in new plantings for trees throughout the entire City.[[106]](#footnote-106) For example, through the Cool Neighborhoods initiative, DPR intends to focus on planting more trees in parts of the City that have traditionally been underserved and overlooked.[[107]](#footnote-107) Prior to that, through the New York City Million Trees initiative, 220,000 street trees were planted, with the rest of the million trees planted either in parks or on private property.[[108]](#footnote-108)

The “Greenstreets” program was a major effort implemented by DPR and NYC Department of Transportation (DOT) between 1996 and 2010, where the agencies partnered to add green space to various rights of way.[[109]](#footnote-109) The program was created to change unused road areas into green spaces that beautify neighborhoods, improve air quality, reduce air temperatures, and calm traffic.[[110]](#footnote-110) Since its beginning, over 2,500 greenstreets have been built citywide.[[111]](#footnote-111) In 2010, the Greenstreets program was merged with the City’s Green Infrastructure Program.[[112]](#footnote-112) Since then, DOT has converted underutilized street space into pedestrian plazas, with the benefit of moving such streets into the public realm and reducing impervious surfaces where possible to increase green space and better collect stormwater.[[113]](#footnote-113) Over 74 of such plazas have been created.[[114]](#footnote-114) Though the program was merged into the broader Green Infrastructure Program, DPR will still construct greenstreets, but only if it comes with independent and full funding.[[115]](#footnote-115) Additionally, greenstreet requests are now rated to determine whether it should be constructed based on its location within a priority sewershed, its capacity to capture stormwater, its alignment with other City agency infrastructural improvements or goals, its complexity of maintenance, and its capacity to promote ecological connectivity by linking separated green spaces into a greater whole.[[116]](#footnote-116)  Finally, any fully funded request that comes with a maintenance commitment will be rated with a higher score.[[117]](#footnote-117)

When DEP, in partnership with DOT and DPR, launched area-wide green infrastructure projects in 2012, it achieved the majority of stormwater management through the installation of Right-of-Way (ROW) practices such as rain gardens and infiltration basins.[[118]](#footnote-118) DPR, in coordination with DEP, determines the locations of Stormwater Greenstreets (SGS) and Right-of-Way Bioswales (ROWB) according to hydraulic analysis, site surveys, existing conditions and DOT traffic safety standards.[[119]](#footnote-119) Soil borings and soil permeability tests are also performed at each location to determine whether the subsoil is suitable to help collect stormwater.[[120]](#footnote-120) Once a construction schedule is in place for a SGS or ROWB, DPR’s process is to notify neighborhoods of upcoming project locations by sending postcards and by reaching out to local Community Boards.[[121]](#footnote-121)

DPR’s Parks Without Borders (PWB) program, has helped to better integrate various parks into their neighborhoods, in part by expanding park green features into areas that previously lacked such features.[[122]](#footnote-122) Specifically, under PWB, DPR identifies parks where fencing and barrier vegetation can be removed or reduced in order to make the natural beauty of parks more visible from their surrounding communities and neighborhoods.[[123]](#footnote-123) DPR also engages with DOT and other relevant agencies to green various intersections, extend park amenities to adjacent sidewalks and pedestrian plazas and to identify new opportunities to make use of typically underused public spaces to add various green features.[[124]](#footnote-124) Some advocates have found PWB to be promising and have called for its expansion by calling for more traffic calming measures to be used on park gateway streets and increased integration between park boundaries and the right-of-way.[[125]](#footnote-125)

The Green Infrastructure Program, has also spurred a variety of green infrastructure construction projects in numerous parks and playgrounds. In 2020, a total of 238 green infrastructure projects were occurring in parks and playgrounds, with 40 having been constructed or in the process of construction, 101 in the design stage and 97 in the early planning stages.[[126]](#footnote-126) Some of the larger scale projects include the following:

* DEP, along with the Department of Education and the School Construction Authority, partnered with the Trust for Public Land (TPL) to re-develop a playground in P.S. 306/M.S. 331 in the Bronx. The playground will be fitted with various green infrastructure features such as shade trees, plantings of other vegetation, permeable pavers and a synthetic turf field that is expected to capture 2 million gallons of rainwater a year.[[127]](#footnote-127) Additional school design projects that began in 2020 in partnership with TPL, included 11 large athletic field campuses, and 5 other large schoolyards.[[128]](#footnote-128) TPL’s playground construction effort was one of the Green Infrastructure Program’s first partnerships and since it started in 2013, 23 playgrounds have been constructed, with 38 in the design and planning stages.[[129]](#footnote-129)
* In 2020, project design was commenced by DEP in coordination with DPR and the Central Park Conservancy (CPC) on the North End Recirculation Project. The project is expected to save up to approximately 0.83 Millions of Gallons per Day (MGD) of potable water by recirculating stormwater between the Central Park’s northern waterbodies, including the Harlem Meer.[[130]](#footnote-130) Additionally, the project is expected to provide other benefits such as CSO reduction of up to 3 million gallons per year in the East River and improved water quality in waterbodies located in the park’s northern end.[[131]](#footnote-131)
* In 2020, DEP continued its efforts with the Prospect Park Alliance (PPA) to replace an existing service line valve in Prospect Park to save an estimated 0.8 MGD of potable water.[[132]](#footnote-132) The service line supplies potable water to Prospect Park Lake and during rain events, PPA staff have to discharge water from the lake into the sewer system to avoid flooding the park.[[133]](#footnote-133) Once the project is completed, the replaced service line is expected to reduce CSOs during rain events.[[134]](#footnote-134)

**III. Legislation**

**Int. No. 67** would make the city liable to homeowners for claims filed against the city for water damage or loss due to capacity-related sewer backups, i.e., over taxation of the system. The proposed bill would also require the city to develop a sewer backup mitigation plan. This local law would take effect 120 days after it becomes law; provided, however, that the comptroller and the commissioner of environmental protection shall take all actions necessary for its implementation, including the promulgation of rules, before such date.

**Int. No. 383** would require the Department of Environmental Protection (DEP) to issue an annual report on the condition of critical water drainage infrastructure within the city. The bill would further require a description of all outages that occurred in the prior year – detailing the length and severity of the outage, as well as the steps taken to resolve it. This local law would take effect immediately.

**Int. No. 1618** would require the DEP to annually study and report on the presence of contaminants from combined sewage overflows in New York City’s waterways, and DEP progress toward milestones noted in the sewer overflow long term control plan. The study and report shall be completed and submitted to the Mayor and the Speaker by July 1 of each year. The bill would also require the DEP to develop an integrated watershed management plan, for each waterway that is the subject of a combined sewer overflow long term control plan. The integrated watershed management plans shall be published by July 1 of each year, until such plans are completed for each such waterway. The bill would require the commissioner to convene an advisory group quarterly to receive an update on substantive findings and analysis and to provide advice.

This legislation would also require the DEP commissioner to publish a report identifying all technically feasible opportunities to develop green infrastructure on public and private lands and structures within the sewersheds draining to each respective waterway. Further, the DEP commissioner would publish a study evaluating the effectiveness of its current regulations for reducing the volume and rate of stormwater discharge from developed land and establishing a method to be used by the department to track the combined sewage overflow and stormwater pollution reductions achieved by implementing such standards. Finally, the bill would require a study on chlorination treatments for raw sewage.

The DEP commissioner would also be required to hold a public meeting to present the reports and allow a public comment period before finalizing any plans or recommendations. This local law would take effect immediately and would remain in effect until two years after the completion of the DEP’s combined sewer overflow long term control plan projects or February 1, 2050, whichever is later, at which time it shall expire and be deemed repealed.

**Proposed Int. No. 1845-A** would extend the expired requirements of Local Law 48 of 2015 to impose on DEP that catch basins are inspected at least once every year and are repaired or unclogged at least five days after inspection or the receipt of a complaint about a clogged or malfunctioning catch basin. The legislation would require quarterly reports and remove the sunset provision that was in Local Law 48 of 2015. This local law would take effect immediately.

**Int. No. 2168** would require the Commissioner of DEP to create a searchable online database through which anyone who registers and pays a periodic subscription fee may access information relating to water meters. Such information will include, but not be limited to, water meter billing data and balances, consumption usage and technical information about the water meter. This local law would take effect 120 days after it becomes law, except that the Commissioner of DEP may take such measures as are necessary for the implementation of this local law, including the promulgation of rules, before such date.

**Int. No. 2425** would require the Commissioner of DEP to assign to each borough a Borough Commissioner, who would oversee DEP programs, personnel, and facilities within the borough and regularly inform the Commissioner of DEP regarding such programs, personnel, and facilities. The Borough Commissioners would also consult when appropriate with the relevant Borough President and Community Boards. This local law would take effect 90 days after it becomes law.

**Preconsidered Int. No. \_\_** would require DEP to establish a program that would provide financial assistance to reduce the cost of purchasing and installing backwater valves. This local law would take effect 120 days after it becomes law.

**IV. Conclusion**

During today’s hearing, the Committees hope to hear testimony from representatives of the relevant City agencies and offices about their current resiliency efforts, including expanding green infrastructure, reducing combined sewage overflows, and helping prepare City infrastructure and private building owners to prevent damage from urban flooding. The Committees are also seeking comments on the legislation being heard, Int. No. 67, Int. No. 383, Int. No. 1618, Proposed Int. No. 1845-A, Int. No. 2168, Int. No. 2425, and Preconsidered Int. No. \_\_. The Committee also seeks feedback from the general public on how the City has responded to flooding in their communities.

Int. No. 67

By Council Members Brannan, Yeger and Adams

..Title

A Local Law to amend the administrative code of the city of New York, in relation to placing liability on the city for overtaxed sewer lines and requiring the city to develop a plan to mitigate and prevent sewer backups

..Body

Be it enacted by the Council as follows:

Section 1. Chapter 2 of title 7 of the administrative code of the city of New York is amended by adding a new section 7-213 to read as follows:

§ 7-213 Claims for property damage due to capacity-related sewer backups. a. Definitions. For purposes of this section, the term “capacity-related sewer backup” means a sewer backup caused by overtaxed sewers due to a natural occurrence such as a heavy rainfall or snowmelt.

b. The city is liable to real property owners for real or personal property damage caused by a capacity-related sewer backup.

§ 2. Chapter 5 of title 24 of the administrative code of the city of New York is amended by adding a new section 24-531 to read as follows:

§ 24-531 Sewer backup mitigation plan. a. By July 1, 2018, the commissioner of environmental protection shall submit to the mayor and the council, and post on the department’s website, an operation and maintenance plan for the city’s sewer system.

b. The plan shall include, at a minimum, the following:

1. Sewer backup prevention and response measures;

2. A sewer backup benchmark for the annual reduction of sewer backups, based on the procedures and standards outlined in the United States environmental protection agency administrative compliance order dated August 31, 2016, and a detailed description of any other methodology used to develop the benchmark;

3. Proposed targeted reductions in sewer backups in the portions of the sewer system most heavily impacted by sewer backups;

4. An implementation schedule for the next five years, which will demonstrate that the department has continuously achieved the annual sewer backup benchmark;

5. Measures that will be implemented beyond the initial five-year period to ensure that sewer backups are adequately responded to and fully addressed and that adequate measures are taken to prevent sewer backups with the ultimate goal of elimination of sewer backups system-wide;

6. A general cleaning and maintenance schedule for the sewer system; and

7. The number of full-time department employees dedicated to sewer system maintenance and cleaning and the number of contractors and contract dollars allocated for sewer system maintenance each year for the next five years.

§ 3. This local law takes effect 120 days after it becomes law; provided, however, that the comptroller and the commissioner of environmental protection shall take all actions necessary for its implementation, including the promulgation of rules, before such date.

MMB

LS # 4419

1/9/18; 2:09 pm

Int. No. 383

By Council Members Ulrich, Brannan, Holden, Cornegy and Adams..Title

A Local Law to amend the administrative code of the city of New York, in relation to an annual report on drainage infrastructure

..Body

Be it enacted by the Council as follows:

Section 1. Chapter 5 of title 24 of the administrative code of the city of New York is amended by adding a new section 24-531 to read as follows:

§ 24-531 Annual report on drainage infrastructure. Each year, on or before February 1, the commissioner of environmental protection shall submit a report to the mayor and the speaker on the condition of municipal drainage infrastructure. Such report shall include a description of the current operational condition of all treatment locations, wastewater pump stations, sewer regulators and other critical drainage infrastructure and, for every instance in the prior year where infrastructure was either out of service or operating at a reduced capacity, a description of the affected infrastructure, the length of the disruption, whether such disruption was partial or full, the cause of the disruption and a description of any actions, whether conducted or planned, in response.

§ 2. This local law takes effect immediately.

BJR

LS 654

LS 2899 / Int. 636-2015

12/27/17 5:45PM

Int. No. 1618

By Council Members Koo, Brannan, Levin, Reynoso and Adams..Title

A Local Law to amend the administrative code of the city of New York, in relation to requiring the department of environmental protection to report on its progress toward decreasing the presence of sewage and stormwater contaminants in the city waterways and various strategies to achieve those goals, and providing for the expiration and repeal of such requirement

..Body

Be it enacted by the Council as follows:

Section 1. Chapter 5 of title 24 of the administrative code of the city of New York is amended by adding a new section 24-531 to read as follows:

§ 24-531 Studies of city sewage pollution. a. The commissioner of environmental protection shall annually complete a study on sewage and stormwater contaminants in the city's waterways, and shall prepare and file with the mayor and the council and post on the department’s website a report disclosing the results of each such study, including but not necessarily limited to:

1. The current condition of the waterways of the city with respect to the presence of

contaminants from combined sewage overflows, frequencies and volumes of discharges from each combined sewage overflow during the preceding year, and the proportional impact of discharges on environmental justice communities;

 2. The progress made by the department of environmental protection toward reaching the milestones, projected reductions in combined sewage overflow volume and frequency, projected pollutant load reductions, and projected water quality improvements included in each combined sewer overflow long term control plan required under state or federal permits or enforcement orders; and

3. For each waterway that is the subject of a combined sewage overflow long term control plan, the five sewage contaminants discharged from city outfalls that are the most frequent cause or contributor during the preceding year to violations of the water quality standards set forth in part 703 of title 6 of the New York codes, rules and regulations or the United States environmental protection agency’s 2012 recreational water quality standards.

b. The commissioner shall complete each study and submit the report required by subdivision a by July 1 of each year.

c. The commissioner shall develop and file with the mayor and the council and post on the department’s website, for each waterway that is the subject of a combined sewer overflow long term control plan, an integrated watershed management plan, following the guidelines in the United States environmental protection agency’s 2008 Handbook for Developing Watershed Plans to Restore and Protect Our Waters. The objectives of each plan shall include, but need not be limited to, year-round compliance throughout each water body, including at all locations where people may come into contact with the water through recreational activities, with water quality standards no less stringent than the United States environmental protection agency’s 2012 recreational water quality criteria, or the most recent update to such criteria. The department shall publish one integrated watershed plan for a waterway that is subject to a combined sewer overflow long term control plan but lacks an integrated watershed plan, on July 1 of each year, beginning July 1, 2020, until such plans are completed for each such waterway.

d. For the development of each plan required under subdivision c of this section, the commissioner shall convene an advisory group quarterly to receive an update on substantive findings and analysis and to provide advice. The advisory group shall be composed of no fewer than five members, including:

1. A representative appointed by the borough president of each respective borough adjoining the waterway that is the subject of the respective plan;

2. One member representing a New York city-based organization with at least five years of experience researching and advocating to address the differential effects of environmental degradation on economically disadvantaged communities;

3. Two members representing environmental organizations with at least five years of experience researching and advocating to address urban sewage pollution issues; and

4. One representative affiliated at a college or university with experience in water quality or hydrology.

d. The commissioner shall develop and file with the mayor and the council and post on its website, for each waterway that is the subject of a combined sewage overflow long term control plan, a report identifying all technically feasible opportunities to develop green infrastructure on public and private lands and structures within the sewersheds draining to each respective waterway, including projects that rely on public funding, private funding, or a combination thereof, and the potential for green infrastructure assets to maximize health, quality of life, and economic benefits to environmental justice communities. For the purposes of this paragraph, the term “green infrastructure” refers to methods to divert stormwater away from the sewer system and direct it to areas where it can be infiltrated, evapotranspired, reused, or detained, including, but not limited to, green roofs, trees and tree boxes, blue roofs, permeable pavement, rain barrels and cisterns, rain gardens, vegetated swales, wetlands, infiltration planters, and vegetated sidewalk swales and median strips. The department shall publish a report for a waterway that is subject to a combined sewage overflow long term control plan but lacks a report on such technically feasible opportunities for green infrastructure, on July 1 of each year, beginning July 1, 2020, until such reports are completed for each such waterway.

f. The commissioner shall complete a study evaluating the effectiveness of its current regulations for reducing the volume and rate of stormwater discharge from developed land and establishing a method to be used by the department to track the combined sewage overflow and stormwater pollution reductions achieved by implementing such standards. The commissioner shall submit such study to the mayor and the council and shall post on the department’s website a report and recommendations for adopting on-site stormwater retention standards for new development and redevelopment projects in the combined sewage areas and separate sewage areas of the city and for tracking the combined sewage overflow and stormwater pollution reductions that would be achieved by implementing such new standards. The commissioner shall complete the study and submit the report and recommendations by July 1, 2021.

g. The commissioner shall complete a study on chlorination treatments for raw sewage and develop and submit to the mayor and the council and post on the department’s website a report evaluating, for each location in the city where a combined sewage overflow long term control plan includes chlorination:

1. Anticipated designs for chlorination methods and types and levels of chemicals;

2. The effectiveness of such designs at treating or neutralizing pathogens and other pollutants; and

3. Potential adverse impacts of the use and discharges of chlorination chemicals and chlorination chemical byproducts and the extent to which anticipated designs will be able to avoid adverse impacts.

h. The report required by subdivision g shall consider the experiences of other wastewater treatment utilities with chlorination treatments for combined sewer overflows. The commissioner shall complete the study and submit the report by July 1, 2020.

i. The commissioner shall:

1. Publish a draft of each report, plan or set of recommendations required by subdivisions a, c, d, e, f and g, on the department’s website 90 days before finalization;

2. Hold a public meeting to present the draft report and answer questions from the public; and

3. Allow the public to submit comments on such draft report for 45 days.

j. As part of each report, plan or set of recommendations required by subdivisions a, c, d, e, f and g, the commissioner shall:

1.Include an assessment of public comments, including a copy of all such comments and summary of any unwritten comments offered at the meetings of any relevant advisory group or any relevant public meeting;

2. A summary and an analysis of the issues raised in such comments;

3. Responses to any questions included in such comments;

4. A statement of the reasons why any significant modifications recommended in such comments were not incorporated into the report; and

5. A description of any changes made to the report as a result of such comments.

§ 2. This local law takes effect immediately and remains in effect until 2 years after the completion of the department of environmental protection's combined sewer overflow long term control plan projects or February 1, 2050, whichever is later, at which time it shall expire and be deemed repealed.

JG

LS # 3207

11/20/2018 11:17 AM

Proposed Int. No. 1845-A

By The Public Advocate (Mr. Williams) and Council Members Brannan, Menchaca and Miller

..Title

A Local Law to amend the administrative code of the city of New York, in relation to a sunset provision in legislation on filing semiannual reports on catch basin cleanups and maintenance

..Body

Be it enacted by the Council as follows:

Section 1. Section 1 of local law number 48 of the year 2015 is amended to read as follows:

Section 1. Section 24-503 of the administrative code of the city of New York is amended by adding a new subdivision f to read as follows:

f. The commissioner of environmental protection shall submit [semiannual] quarterly reports to the mayor and the speaker of the council regarding the inspection, cleanup, maintenance and repair of catch basins, disaggregated by community district. [The first semiannual report shall cover the period from July 1, 2016, through December 31, 2016.]  Such reports shall include the number of catch basins inspected, the number of clogged or malfunctioning catch basins identified, the number of catch basins unclogged or repaired, whether the inspection was in response to a complaint and the response time for the resolution of any complaint. The commissioner of environmental protection shall also ensure that such catch basins are inspected, at a minimum, once every year, and are unclogged or repaired within [nine] five days after an inspection or the receipt of a complaint about a clogged or malfunctioning catch basin. Catch basins not unclogged or repaired within [nine] five days after an inspection or the receipt of a complaint shall be identified in the [semiannual] quarterly report.

§2. Section 2 of local law number 48 of the year 2015 is amended to read as follows:

§2. This local law takes effect July 1, 2016, [and expires and is deemed repealed June 30, 2019,] except that the commissioner of environmental protection shall submit a report in accordance with subdivision f of section 24-503 of the administrative code of the city of New York, as added by section one of this local law, for the period from January 1, [2019], through June 30, [2019] for each year from 2020 forward.

§3. This local law shall take effect immediately, provided, however, that if this local law is enacted subsequent to June 30, 2019, it shall be deemed to have been in full force and effect on June 30, 2019.

SS

LS # 11951

1/10/20

Int. No. 2168

By Council Members Brannan, Koslowitz and Gennaro

..Title

A Local Law to amend the administrative code of the city of New York, in relation to creating a water meter database

..Body

Be it enacted by the Council as follows:

Section 1. Subchapter 4 of chapter 3 of title 24 of the administrative code of the city of New York is amended by adding a new section 24-368 to read as follows:

§ 24-368 Database of water meters. a. Notwithstanding any contrary provision of chapter 5 of title 23, the commissioner of environmental protection shall create and maintain a searchable online database through which members of the public who register and pay a periodic subscription fee, as established by the department, may access information about commercial, residential and industrial water meters and flat-rate accounts. Such database shall be available on or through the city’s website, in a non-proprietary format that permits automated processing, have the ability to produce reports by query, be accessible through an application programming interface and include all non-confidential information maintained in connection with each water meter, including, but not necessarily limited to, the following:

1. Water meter number, as designated by the 8-digit serial number on the meter;

2. Date of every bill issued for the water meter;

3. Value of every water meter reading recorded by the department;

4. Total amount of water used as of the most recent water meter reading;

5. Amount of money the owner of the water meter owes;

6. Average daily flow, in cubic feet, since the most recent water meter reading;

7. Date the water meter was installed;

8. Date the water meter was sealed, if any;

9. Size of the water meter, in cubic feet;

10. Location of the water meter at the property;

11. Department’s description of the water meter;

12. Cumulative late payment charges;

13. Cumulative denial-of-access fees; and

14. Cumulative theft-of-service fees.

b. The database shall continue to include the information required by subdivision a for any water meter that has been replaced.

c. The database shall include the information required by subdivision a starting from January 1, 1996 or the date the water meter was installed, whichever is later.

§ 2. This local law takes effect 120 days after it becomes law, except that the commissioner of environmental protection may take such measures as are necessary for the implementation of this local law, including the promulgation of rules, before such date.

JSA

LS #12969

3/13/2020

Int. No. 2425

By Council Members Salamanca, Vallone, Yeger, Holden, Dinowitz, Rosenthal, Cabrera, Levin, Ampry-Samuel, Koslowitz, Adams, Cumbo, Ayala and Ulrich

..Title

A Local Law to amend the New York city charter, in relation to requiring borough commissioners in the department of environmental protection

..Body

Be it enacted by the Council as follows:

Section 1. Chapter 57 of the New York city charter is amended by adding a new section 1405 to read as follows:

§ 1405. Borough commissioners. a. For each borough, the commissioner of environmental protection shall assign a borough commissioner, who shall:

1. Oversee, under the direction of the commissioner of environmental protection, department programs, personnel, and facilities within the respective borough;

2. Inform the commissioner of environmental protection regularly regarding such programs, personnel, and facilities; and

3. Consult when appropriate with the relevant borough president and community boards.

b. Nothing in this section shall prohibit the commissioner of environmental protection from assigning as borough commissioner under this section an individual who is also assigned to a position in the department under subdivision f of section 2704 or subdivision a of section 2706.

§ 2. This local law takes effect 90 days after it becomes law.

JB

LS #18126

9/27/21

Preconsidered Int. No.

By Council Members Brannan and Gennaro..Title

A Local Law to amend the administrative code of the city of New York, in relation to requiring the department of environmental protection to establish a program to provide financial assistance for the purchase and installation of backwater valves

..Body

Be it enacted by the Council as follows:

Section 1. Chapter 5 of title 24 of the administrative code of the city of New York is amended by adding a new section 24-532 to read as follows:

§ 24-532 Backwater valves. Subject to appropriation, the commissioner shall establish a program to provide financial assistance that would reduce the cost of purchasing and installing a backwater valve, as such term is defined in section 202 of the New York city plumbing code.

§ 2. This local law takes effect 120 days after it becomes law.

NAB

LS #18079/18140

10/1/21 11:50AM

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2. Jesse McKinley, Dana Rubinstein and Jeffery C. Mays, “The Storm Warnings were Dire. Why Couldn’t New York be Protected?” NY Times, September 3, 2021, available at <https://www.nytimes.com/2021/09/03/nyregion/nyc-ida.html>. [↑](#footnote-ref-2)
3. “NYC National Weather Service issues first Flash Flood Emergency; wettest hour ever in Central Park,” Eyewitness News, WABC-TV, September 2, 2021, available at <https://abc7ny.com/flash-flood-emergency-new-jersey-flooding-york-city-hurricane-ida/10993344/>. [↑](#footnote-ref-3)
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10. Casey Crownhart, MIT Technology Review, “How Ida dodged NYC’s flood defenses,” Sept. 3, 2021, available at: <https://www.technologyreview.com/2021/09/03/1034315/ida-dodged-nyc-flood-defenses-climate-change-storm/>. [↑](#footnote-ref-10)
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13. Kyle Mittan, University of Arizona News, “Black and Hispanic People More Likely to Live in High-Risk Flood Zones, Study Finds, October 5, 2020, available at: <https://news.arizona.edu/story/black-and-hispanic-people-more-likely-live-high-risk-flood-zones-study-finds>. [↑](#footnote-ref-13)
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