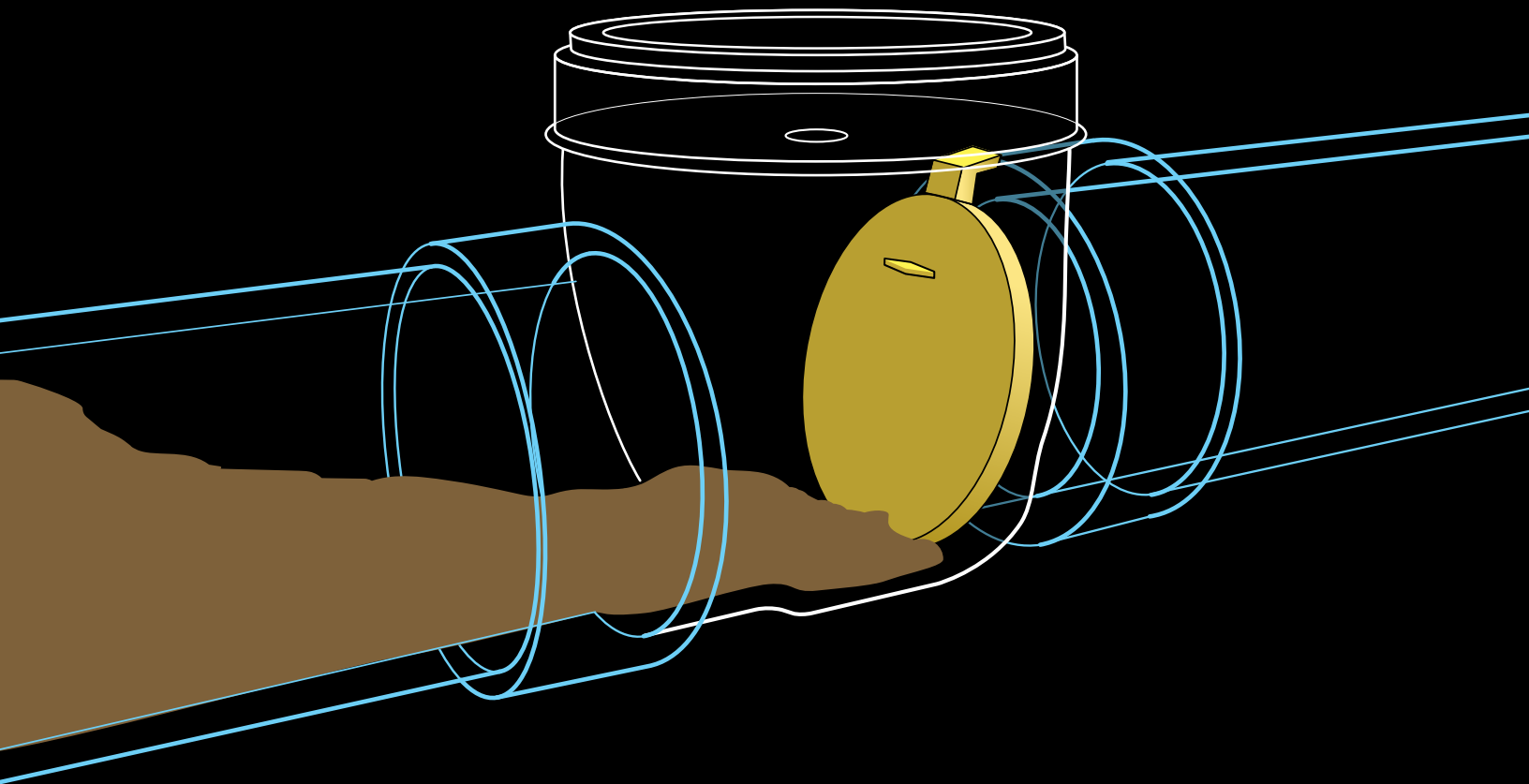


PROTECTING YOUR HOME

TOOLS TO PREVENT BASEMENT SEWER BACKUPS AND AN EVALUATION OF BACKWATER VALVES





December 31, 2024

Sewer extension construction at The Hole, Dumont Street

About DEP

DEP manages New York City's water supply, providing approximately 1 billion gallons of high-quality drinking water each day to nearly 10 million residents, including 8.5 million in New York City. The water is delivered from a watershed that extends more than 125 miles from the city, comprising 19 reservoirs and three controlled lakes. Approximately 7,000 miles of water mains, tunnels and aqueducts bring water to homes and businesses throughout the five boroughs, and 7,500 miles of sewer lines and 96 pump stations take wastewater to 14 in-city treatment plants. DEP also protects the health and safety of New Yorkers by enforcing the Air and Noise Codes and asbestos rules. For more information, visit nyc.gov/dep, and follow us [@nycwater](https://twitter.com/nycwater).



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Executive Summary

DEP is working aggressively across the city to protect New Yorkers from the impacts of extreme rainfall, including basement flooding. Our comprehensive strategy includes increasing sewer capacity, deploying green infrastructure, and proactive sewer cleaning in flood-prone areas. However, stormwater resilience in New York City will require property owners to evaluate and mitigate their property's flood risks.

This report assesses options for homeowners have to reduce one major risk from extreme rainfall: sewer backups (SBUs). SBUs occur when wastewater – sanitary waste, often mixed with stormwater – cannot flow freely into a sewer, causing the water to reverse direction and flow into buildings, often through basement plumbing fixtures. SBUs can cause property damage, result in expensive clean up, and in some cases even pose safety issues for residents.

Historically, the primary cause of SBUs has been blockages in the sewer system caused by improper disposal of things like kitchen grease and wet wipes. Through improved maintenance, DEP has reduced SBUs due to sewer blockages by 75% since 2010. In recent years, however, climate change has now made “wet weather SBUs” caused by extreme rainfall events—when stormwater overwhelms sewer pipes—the most common type. The backups many experienced during Hurricanes Ida in 2021 and the storm of September 29, 2023, highlight the growing risk.

To better understand SBUs, DEP conducted an analysis of citywide vulnerability to wet weather SBUs and evaluated tools like backwater valves for mitigation. Key findings include:

- **“Wet-weather SBUs” are now the majority:** These SBUs are caused by intense rainfall that exceeds the capacity of the city's pipes and climate change is making them more frequent.
- **About 74,000 properties may be vulnerable to SBUs:** During a 1.75 inch per hour rainfall event (a rainfall event likely to occur about once every five years), about 74,000 properties are vulnerable to SBUs due to overtaxed sewers. Of this group, about 59,000 are one- or two- family homes.
- **Backwater Valves can work, but have significant drawbacks:** Homeowners can use backwater valves (BWVs) to reduce the risk of SBUs. When water begins to flow the wrong way down a sewer connection pipe toward a home, a BWV will swing shut and block the backflow. BWVs have many limitations, including restricting use of indoor plumbing when activated and requiring regular maintenance. BWVs require coordination between residents of basement living spaces and upper floors, making them less practical for multifamily properties. A misused or poorly maintained BWV will cause SBUs, rather than prevent them.

Executive Summary continued

- **Fixture plugs are a simpler, cost-effective alternative to BWVs:** Temporary fixture plugs that a resident can put into toilets and drainpipes are a straightforward and affordable way to prevent backflow during heavy rainfall. Unlike BWVs, they require no installation or maintenance and are easy to use. Temporary fixture plugs do not block the use of any other plumbing fixtures, although they must be installed manually. Nonetheless, they may be the best defense for many at-risk homes.
- **Nearly one in three SBUs are caused by internal plumbing issues:** Buildings should ensure stormwater outlets (e.g., rooftop downspouts, sump pumps, and foundation drainpipes) are not connected to the property's sewer line.

As the result of this study, DEP will expand public outreach through initiatives like the NYC Accelerator and Rainfall Ready Campaign. DEP is also committed to pursuing grant-funded programs for providing fixture plugs and BWVs to residents. Managing stormwater is a shared responsibility that requires action from both the City and private property owners. Empowering homeowners and residents to put in place property-level protections from SBUs is a critical component to NYC's climate resilience efforts.



Local Law Report Requirements

Local Law 1 of 2023 requires the City to evaluate the benefits of backwater valves to mitigate damage caused by sewer backups (SBUs) from the public sewer system during severe weather events. This report also provides information to educate homeowners and enable them to take proactive measures to avoid or lessen damage from SBUs.

Sewer backup into basement

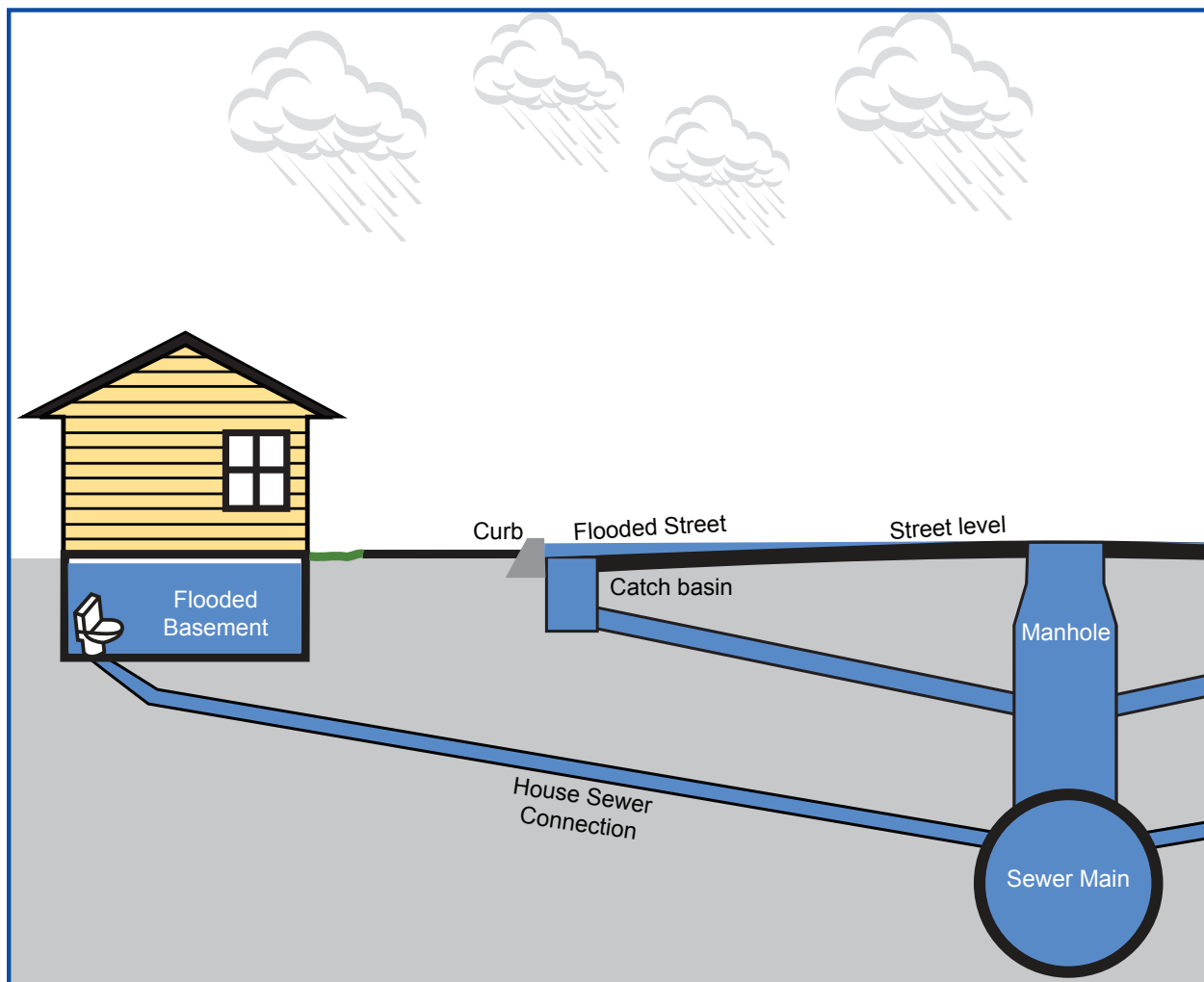
What is an SBU?

An SBU occurs when wastewater (sanitary waste and stormwater) cannot flow through a sewer. If the water cannot flow forward, it will reverse direction and work its way up sewer connections and into buildings, usually into basements through plumbing fixtures such as floor drains.

SBU's are divided into two categories: wet weather and dry weather. These two types typically have different causes and are managed in different ways.

Wet Weather SBU's

"Wet weather SBU's" can occur when excessive amounts of stormwater inundate the sewer system. About 60% of New York City's sewer system is combined, meaning that the same sewer pipe carries sanitary waste along with stormwater. During intense rainstorms, the amount of stormwater may exceed the capacity of the pipes, overwhelming the system. In this situation, water (storm and sanitary) will come up from manholes and catch basins and back up into basement sewer connections in buildings.





Dry Weather SBUs

Dry weather SBUs are not caused by weather events but usually by blockages in the system — often from things like grease and wet-wipes, among other things. DEP has successfully reduced dry weather SBUs through a comprehensive strategy including public information campaigns, strategic infrastructure investments, and more frequent inspections and cleaning of sewers. Since 2010, DEP has reduced dry weather SBUs by almost 75%.

Grease and other items flushed or poured down the drain cause blockages in the sewer system. Over time, the grease and flushed items build up within the sewers creating “fatbergs,” which prevent water from flowing through sewers. When wastewater cannot move forward, it backs up, causing SBUs. Grease in pipes caused 40% of the SBUs that DEP investigated in 2023.

Property-Level Causes

Not all backups are caused by an issue with the DEP-managed public sewer system. Nearly 1 in 3 SBU complaints investigated by DEP crews are found to be internal to the building or in the building’s sewer connection. Ensuring that a property’s own plumbing system is working properly is critical to minimizing SBUs.



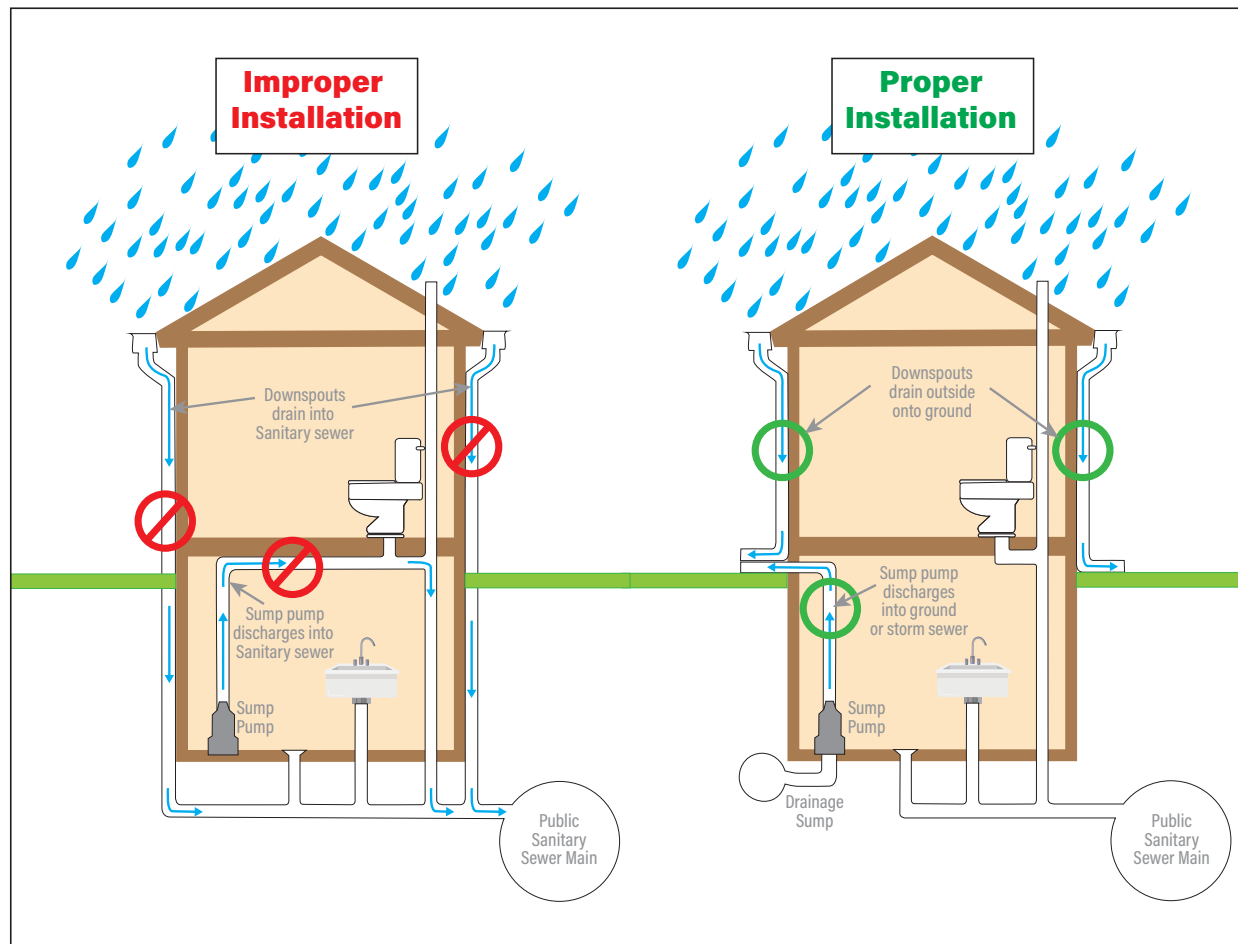
Pouring grease down drains and flushing anything other than toilet paper can – and probably will – cause clogs in internal plumbing, which can lead to backups and other damage.

Wet weather SBUs can also originate within properties, especially if stormwater outlets are connected to the property sewer line. If a rooftop downspout, foundation drainpipe, sump pump, floor drain, yard or stairwell drain, or similar pipe is connected to the sewer line, high pressure from flowing rainwater can force water back up through the pipes in that building, creating an SBU even when the sewer in the street is flowing correctly.

To learn more about SBUs and their prevention, please visit our NYC DEP website links:

[Sewer Backup - DEP \(nyc.gov\)](https://www.nyc.gov/stormwater/sewer-backup)

[Trash it. Don't Flush it.](#)



DEP Has Significantly Reduced Dry-Weather SBUs

SBUs have been significantly reduced in the last decade, particularly because of DEP's work to reduce dry weather SBUs by 75%. However, significant rain events over the last three years have caused an overall increase in annual SBUs since 2021. For the last three years, wet weather SBUs have outnumbered dry weather ones.

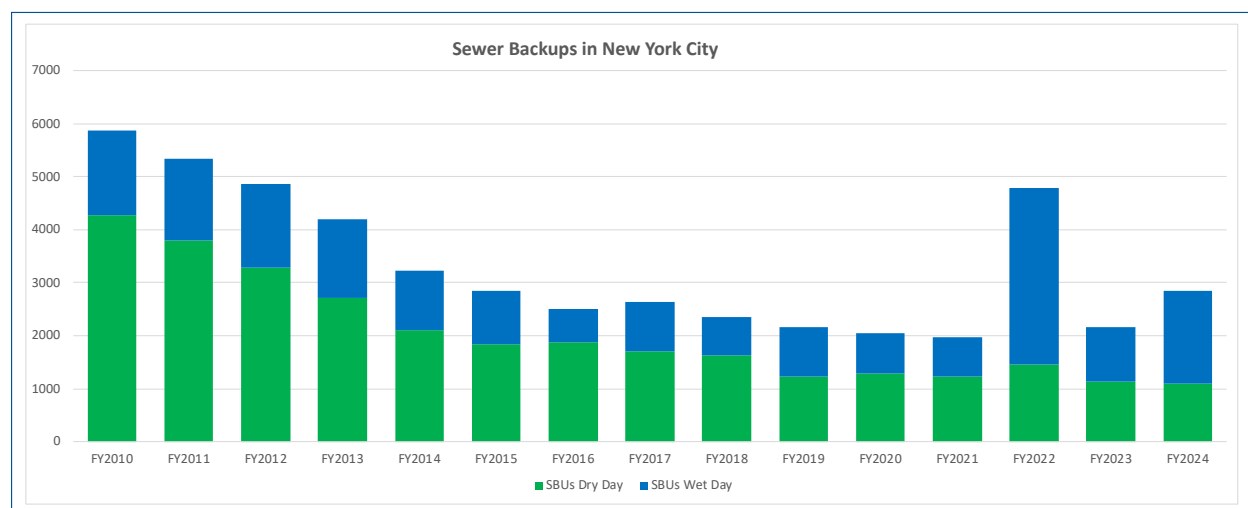


Figure 1. Despite overall decreasing SBUs, New Yorkers faced increased wet weather SBUs tied to extreme rainfall events

Climate Change Is Causing More Wet-Weather SBUs

From fiscal years 2016 through 2021, fewer than 1,000 wet weather SBUs occurred annually. However, during fiscal years 2022 and 2024, NYC experienced an increase in the frequency of extreme storms, including Hurricane Henri, Hurricane Ida, and the storm of September 29, 2023.¹

As a result, in recent years, wet weather SBUs have made up the majority of all SBUs.



¹ Note: City fiscal years are from July 1- June 30. Storms in August or September fall into the fiscal year that corresponds with the following calendar year. For example, Hurricanes Henri and Ida (August and September 2021) occurred in FY 2022.

Backwater Valve Assessment

Backwater valves may offer additional protection against SBUs, but they are not appropriate for all properties, may be a burden to maintain, and can cause SBUs if not used or maintained properly.

A backwater valve is designed to stop sewage from flowing into a home. If the sewer line is surcharged or blocked and water begins to flow toward the home, a flap will swing upwards to close the valve. When the pressure on the flap subsides, it will lower, allowing normal flow to resume.

One critical note is that when the flap is closed, water cannot flow in either direction through the pipe. This means that any wastewater generated in the home – from showers, dishwashers, or toilets – will stay in the pipe until the flap can open. If enough wastewater is generated during this period, an SBU can occur.

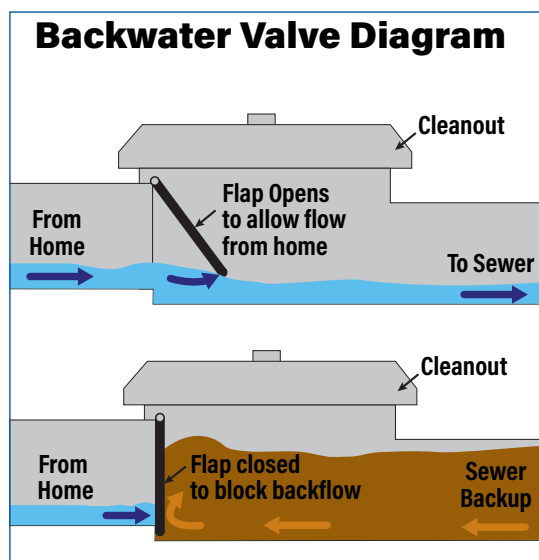


Figure 2: Backwater valves may effectively prevent SBUs for some homes.

Drawbacks of Backwater Valves

Drawbacks of Backwater Valves If They Are Not Used Carefully and Maintained Regularly

While properly maintained backwater valves should provide protection against sewage and stormwater entering the home, there are some significant drawbacks to their use:

1. **Regular Maintenance Required:** A backwater valve requires routine maintenance to clean out the valve and to test the swing of the flap. If this maintenance is not performed, the valve could fail during a storm event and lead to an SBU. Appendix C contains general information on proper maintenance of a backwater valve.
2. **Restricted Plumbing Use When Valve is Closed:** During an extreme storm event that causes the flap on the valve to activate, flows from within the home no longer have a pathway to exit to the sewer (e.g., dishwashers, sinks, toilets and showers). If you continue to use household water fixtures while the backwater valve is in the closed position, you will likely flood your basement from flows generated from within the home. You **MUST** keep an eye on the valve during the storm event to understand its position.
3. **Tenant Plumbing Use Coordination:** If you live in a multi-family home with multiple floors and housing units and a backwater valve is installed, every tenant in the house must coordinate on the use of indoor plumbing fixtures when the backwater valve activates in a storm.

Additionally, backwater valves only reduce the risk of flooding from SBUs. They do not reduce the risk of flood water entering the home through other avenues such as doors or windows or from groundwater entering the home through cracks in basement walls and foundations.

Backwater Valves Are Not Equally Effective for All Properties

Backwater valves are most effective on properties that have subgrade drain elevations (below the nearby sewer manhole) and are in areas with combined sewers.

1. Subgrade drains

When a City sewer is overwhelmed, water levels in the sewer can reach the top of the manhole cover. If the water level in the sewer manhole is higher than the basement drains and fixtures, water can back up into drains and plumbing fixtures such as toilets and bathtubs. The elevation of fixtures is a key driver: buildings that have drains and plumbing fixtures below street level are at risk, and the lower they are, the more at risk they are. As shown in Figure 3 below, a home that is elevated could have basement fixtures that are above street level, while a home with a downward sloping driveway likely has a basement that is at greater risk.

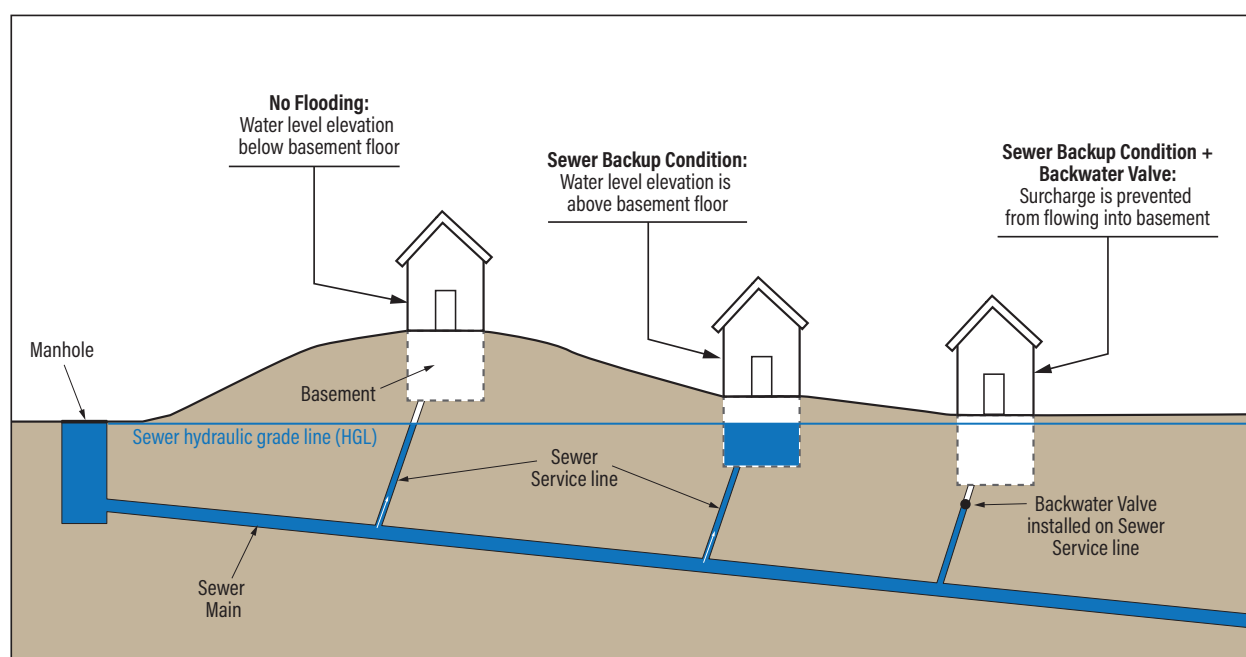


Figure 3. Sewer backups are most likely to occur during rain events in homes with subgrade basements.

2. Combined sewer areas

The frequency and intensity of wet weather SBUs can be affected by the size and type of sewers in the area.² SBUs are less common in areas with separate storm and sanitary sewers because stormwater does not enter the sanitary sewer and does not impact the volume. Sewers are not the same size city-wide. Decades ago, they were built to different standards in different boroughs. Almost none are designed to manage New York's new climate of increased precipitation, which is why the system has been overtaxed more frequently in recent years. Areas that have the smallest sewers are more likely to be overwhelmed more quickly.

² Section 715.1 of the NYC 2022 Plumbing Code currently requires installation of backwater valves in buildings located within designated flood hazard areas that are subject to risk of overflow. While other areas of the City may experience SBUs, there are no Code requirements to install backwater valves outside of those specified flood hazard areas. See NYC Building Code Appendix G for code requirements for buildings in flood hazard areas: [2022BC_AppendixG_FloodResistantWBwm.pdf \(nyc.gov\)](#)

DEP conducted a study to determine areas in the City most vulnerable to SBUs and what types of buildings within those neighborhoods would most benefit from SBU mitigation measures. The analysis (at current sea level rise conditions), estimated that approximately 74,000 properties throughout the city are potentially vulnerable to SBUs during a 1.75 inch per hour rainfall event. About 59,000 are 1- or 2-family homes; and about 500 of those 1- or 2-family homes have filed wet weather SBU complaints due to overtaxed sewers in the last five years (see Appendix F).

Simpler Alternatives: Fixture plugs may be cheaper and more effective for some homes

The pitfalls of backwater valves described above have made some homeowners dissatisfied with backwater valves or reluctant to install backwater valves or have steered them toward simpler installations to help protect their homes from SBUs.

To reduce the possibility of SBUs, homeowners can take steps to seal areas where sewage can backflow into the basement during periods of excessive rains or flooding. There are affordable products readily available on the market that can be used to temporarily seal plumbing fixture drains. When heavy rainfall is forecast, homeowners can use these plugs to block basement showers, bathtubs, sinks, washing machines, floor drains, and toilets, all of which can be potential inlets for sewage into a home. Plug types include:

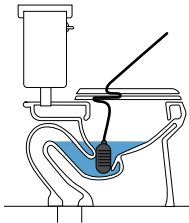

Type	Description	Application	Cost (size dependent)
Test ball /Air- or Water-Inflatable Plugs 	<p>The ball is inserted into the pipe and inflated with air to the prescribed air pressure or with water (depending on type). Once inflated, the ball will not allow water to flow in either direction.</p> <p>There are inflatable plugs on the market made specifically for toilets. They are often referred to as a "Toilet Bung" or "Toilet Stopper."</p>	Shower, Sink and Toilet	\$40-\$140
Twist Expansion Plug 	<p>The twist plug is inserted into the pipe and the wing nut is twisted until the plug is tight.</p> <p>Before purchasing a drain plug, measure the diameter of the drainpipe to ensure purchase of the correct size plug for each application. Consult a plumber on suitable plug usage.</p>	Floor Drain, Shower, Sink and Toilet	\$3-\$18

Table 1. Plugs may help homeowners prevent SBUs

Looking Ahead: DEP continues to work with customers to prevent SBUs and protect their homes

The most important thing the City must do to reduce the incidence of wet weather SBUs is to upgrade the City's infrastructure to ensure that it can handle the more intense rainstorms that climate change is bringing.

Areas exist throughout the City, predominantly in the Bronx, Brooklyn, and Queens, that have older combined sewers not built to the current DEP sewer design standard. These design standards themselves will also need to evolve, as they were developed before the impacts of climate change and may no longer suffice.

As outlined in DEP's 2024 Stormwater Analysis, citywide sewer upgrades will require expansion or separation of sewer systems; installation of green infrastructure such as bluebelts; and retention of more stormwater on private property. These efforts will be long-term projects that will likely take 20 years or more to complete and cost roughly \$30 billion.



Sewer extension project

While we make the necessary investments in our infrastructure, DEP will work to continue to reduce the number of SBUs and to provide customers with information so that they can protect their homes from SBUs. Our work will include the following:

Continue to Take Preventative Actions

DEP will continue its proactive and rigorous sewer inspection, analysis, and cleaning program as outlined in our Plan to Prevent Confirmed Sewer Backups. The Plan details the steps DEP takes to manage SBUs and reduce their occurrence, including resolving SBU complaints and educating all New Yorkers about actions they can take to prevent improper disposal of grease and wipes into the sewer system, a primary cause of SBUs.

Seek and Apply for Funding Grants for Backwater Valves and Other Retrofits

DEP has submitted a FEMA Hazard Mitigation Grant Program (HMGP) application to the NY State Division of Homeland Security and Emergency Services (DHSES) for funding to support a backwater valve installation pilot program in NYC. The DHSES 2024 HMGP notice of funding set award prioritization criteria for Brooklyn. To increase the likelihood of award, DEP proposed, as the pilot project area, the top five Brooklyn neighborhood tabulation areas (NTAs), as ranked per the study's prioritization analysis, and within those NTAs, 1- and 2-family homes at which a backwater valve would be effective against SBUs and whose owners would most benefit from financial assistance for backwater valve installation. If DHSES awards grant funding for this pilot program, DEP anticipates that approximately 124 high-risk 1- and 2-family homes in the defined project area will receive reimbursement for eligible costs to hire a contractor to install a backwater valve.

If funding is awarded, the implementation and execution of the pilot installation program will provide data on the reliability and effectiveness of backwater valves to prevent SBUs due to stormwater and will inform best practices for expanding the backwater valve installation program.

Conduct Surveys and Testing to Compare the Effectiveness of Backwater Valves and Fixture Plugs

DEP will conduct surveys of licensed plumbers and homeowners who have installed backwater valves so that we can better understand the long-term performance of backwater valves and customer satisfaction with backwater valves. We will also visit several properties with installations and conduct valve inspections to assess failure rates.

We will conduct testing to determine the effectiveness of various plugs under laboratory conditions and will publish the results on our website to help New Yorkers evaluate their options.

Expand Public Education and Outreach Campaign

There are currently several City resources providing education on how New Yorkers can become more flood-safe. FloodHelpNY, a website run in partnership with NY State and the Center for New York City Neighborhoods, provides information and resources about flood risk, flood insurance, and flood retrofits.

DEP's Rainfall Ready Campaign provides education and information to residents and homeowners about flood risk and provides resources to help them protect their properties. Rainfall Ready outlines the responsibilities New Yorkers and City government share to keep New Yorkers safe and minimize property damage during intense storms, while larger scale stormwater infrastructure is being designed and built in certain areas of the city. DEP Homeowner's Guide for Rain Event Preparedness is a great reference providing a comprehensive overview of actions homeowners can take to protect their homes from stormwater flooding and SBUs.

Since 2022, DEP has been conducting direct outreach to property owners who could experience nuisance or substantial flooding and has been offering hands-on workshops and forums to help homeowners understand simple, cost-effective steps that they can take to protect their properties from stormwater related flooding. Informed by the Backwater Valve Study's SBU risk analysis and neighborhood prioritization, additional education, outreach, and resources related to preventing SBUs will be directed to those areas with probable SBU risk.

Provide Assistance through the NYC Accelerator

Managed by the Mayor's Office of Climate and Environmental Justice, the NYC Accelerator is a service that provides homeowners and building owners with advice tailored to their properties on what they can do to respond to climate change, and what type of assistance may be available. Until now, the NYC Accelerator has focused on energy efficiency and decarbonization. The next phase of the Accelerator will expand the Accelerator's services to address climate resilience, including prevention of flooding and SBUs. The NYC Accelerator expects to begin offering climate resiliency services in 2026.



Appendix A: Definitions

- **Backwater Valve (BWV)** – a device that is installed on the property's sewer line that allows water and wastewater to flow in only one direction
- **Plumbing Fixture** – toilet, sink, shower, laundry machine, floor drain, etc.
- **Main Sewer** – the main sewer pipe that conveys wastewater from properties to the wastewater resource recovery facility.
- **Sanitary Sewer Lateral** – the pipe that carries wastewater/sewage from your home (toilet, sink, shower, laundry machine, floor drain, etc.) to the public sanitary sewer main.
- **Sewer Backup (SBU)** – occurs when wastewater is unable to move through the sewer system and backs up into a building. An SBU may be caused by a blockage or break in the sewer system, or by an intense storm that overwhelms the system.
- **Sewer Backup (SBU) complaint** – A customer service request (CSR) by a property owner or other individual alleging that a problem with a City sewer is impacting the property and causing an SBU.
- **Confirmed SBU** – DEP deems an SBU "confirmed" when a backup complaint, upon field investigation, is determined to be associated with a condition in DEP's sewer system. Such conditions include surcharging, temporary overtaxing, blockages, and collapses.
- **Unconfirmed SBU** – DEP deems an SBU "unconfirmed" when DEP determines, upon field investigation, that a backup complaint exhibits none of the characteristics of a Confirmed SBU. In such situations, the SBU is found to be associated with an internal condition, a problem with the private sewer connection, or otherwise unfounded.

Appendix B: Frequently Asked Questions

1. Who is responsible for maintaining the backwater valve device after it is installed?

If you have a backwater valve installed on your property, you are responsible for maintaining it. Please refer to the valve manufacturer's guidelines for maintenance requirements. Typically, this maintenance involves checking the device regularly and performing a simple procedure annually, or, if needed, twice per year. If you sell your property, you should disclose to potential buyers the presence of a backwater valve on the property because maintenance of the device becomes the new owner's responsibility following a sale.

2. What should I do when my backwater valve is activated?

When your backwater valve is activated, it means that the valve has blocked the flow of liquids to the sewer, essentially sealing the property off from the public sewer. In this situation, it is important to refrain from excessive use of appliances and any other devices with flushing capabilities. Such excessive use may lead to an internal backup as your property is sealed off.

3. How do I report a SBU in my home?

If you experience an SBU, please report it immediately to 311 so that the Department of Environmental Protection can record and investigate/verify the incident.

4. Why do gutter downspouts need to be disconnected from the sewer system (and relocated) as part of the installation process?

In most houses, the downspouts lead directly into the sewer system. If the downspouts are not disconnected as part of the installation process, the house can easily become flooded when the backwater valve is activated. If the downspouts are still connected to the sewer system, the water from the downspouts will have nowhere to go and will cause a backup into your home.

5. How do I get a backwater valve installed? How much does it cost?

A licensed plumber must be called to install a backwater valve. The cost for a licensed plumber to install a backwater valve typically ranges from \$4,000 to \$15,000, and it can take between 2 and 8 hours to install, depending on the access to and location of the house's sewer connection. Although a backwater valve can be installed outside of the home (depending on the pipe's slope and elevation), it is recommended that backwater valves be installed inside the home's basement to allow for easier access for maintenance and to allow the homeowner to check on whether the valve has been activated during a severe weather event. If a backwater valve is installed, it is also necessary to disconnect gutter downspouts from the sewer system.

Appendix C: Backwater Valve General Maintenance

Backwater Valve General Maintenance Instructions

The following backwater valve maintenance suggestions are based on general backwater valve information. Your backwater valve may vary due to manufacturer differences and the size of the sewer line in which it is installed. Backwater valves typically have a one-year manufacturer's warranty; if homeowners experience any issues with their valves within that warranty, DEP suggests reaching out to the manufacturer directly. It is recommended that the homeowner consider having a contractor maintain and clean this device at least annually, if the homeowner is unable to perform the cleaning. After installation of the valve, it is recommended that the homeowner inspect the valve at three-month intervals. The homeowner can determine a more accurate interval depending upon frequency of usage of the valve.

1. Always follow the manufacturer's recommendations provided by the contractor for maintenance as your best guide.
2. The backwater valve should be inspected and cleaned at least annually.
3. During the time that the backwater valve assembly is disassembled from your drainage pit and/or branch of sanitary plumbing, you will not have any backflow protection. For this reason, you should not disassemble the backwater valve during or immediately after heavy rains or during times of melting snow runoff.
4. Make sure that no one is using your plumbing facilities when you are servicing your backwater valve.
5. Sewer gas may be present. Be sure to use adequate ventilation.
6. Suggested cleaning materials:
 - a. A bucket containing warm water with dish detergent or similar cleaning solution.
 - b. A long-handled brush
 - c. Rags
 - d. Long rubber gloves
 - e. Eye protection
 - f. Suitable clothing

Appendix C: (continued)

7. Suggested disassembly procedure:

- a. Locate and remove the cover from the backwater valve access pit.
- b. Reach down into the access pit and slowly loosen the lid.
- c. After verifying that water is not coming out from the loosened lid, the lid can be removed.
- d. Place the lid in the bucket of cleaning solution.
- e. Reach in and lift up on the backside of the flapper to remove it from the valve housing pivot point.
- f. Using the long-handled brush, scrub the flat vertical surface area of the valve housing where the "O" ring on the flapper makes contact.
- g. Clean the threads where the flapper access lid screws into the valve housing body and starting from the top, scrub all surfaces with clean water. Clean the flapper and the "O" ring.
- h. Make sure that the flapper is seated in the pivot point, carefully screw the cover down until firmly seated. Tighten as needed.
- i. Replace the backwater valve access sleeve cover.

Appendix D: Hiring a Certified Plumber to Investigate the benefits of backwater valve for your home

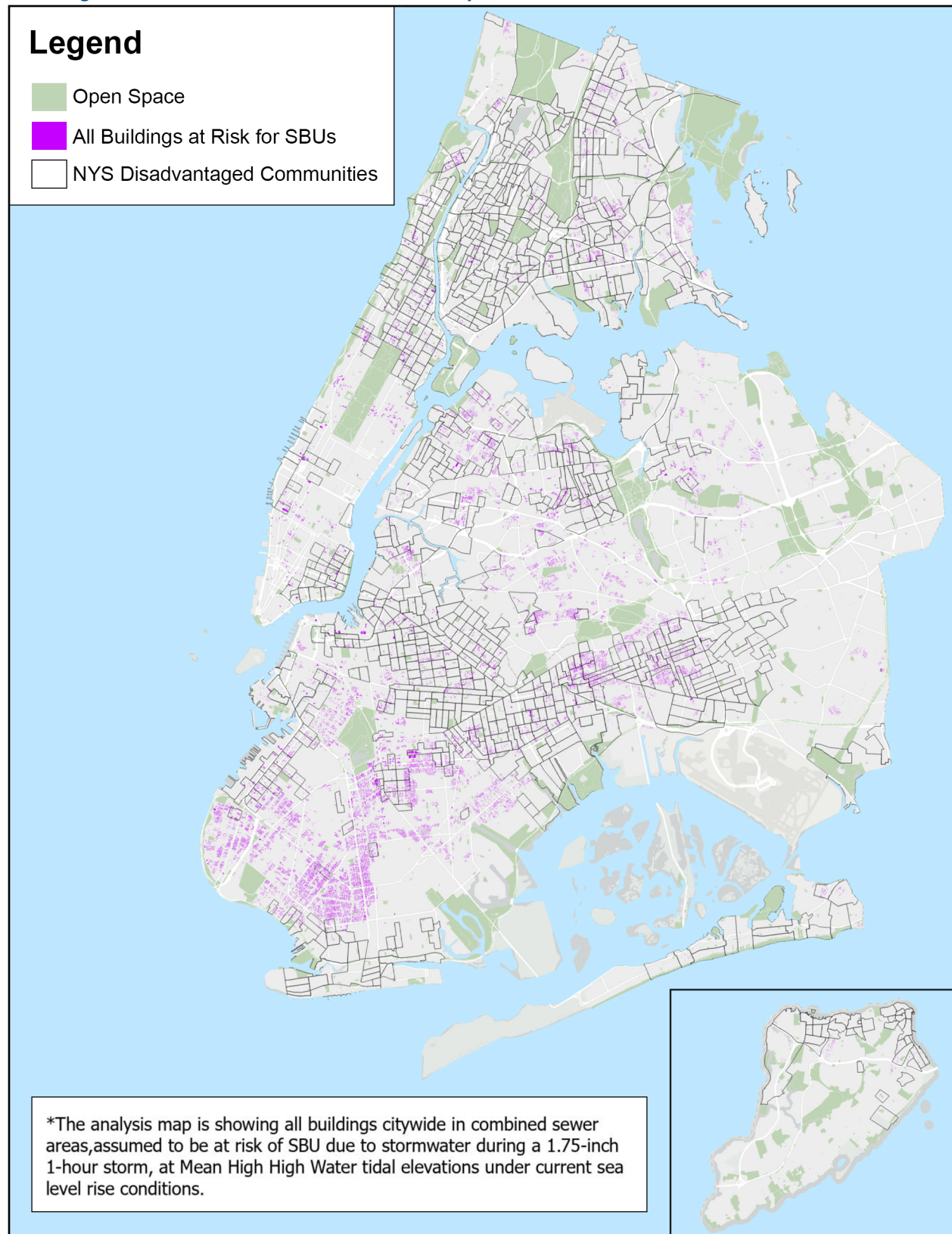
1. Contact a NYC licensed plumber
 - a. Check the NYC DOB website for active list of licensed plumbers.
 - b. Inquire about plumber's license, experience in NYC or respective neighborhood, any certifications, and references from similar projects.
 - c. Request multiple quotes for best price, if desired.
2. Plumber performs pre-inspection to confirm property is suitable for backwater valve installation and provides quote.
 - a. Plumber will inspect the sewer line to determine if the home has appropriate elevations relative to the city sewer for a backwater valve to be effective; where the backwater valve device should be located; and whether there are any deficiencies, such as broken pipe sections, that must be corrected.
 - b. If property has a downspout connected to the sewer lateral, request that the plumber include downspout disconnection and relocation in their quote.
3. Contracted plumber files for necessary permit.
 - a. For internal (within the house) backwater valve installations, a NYC Department of Building permit must be filed by the licensed plumber.
 - b. For external (on the property, outside the house) backwater valve installations, a NYC Department of Environmental Protection permit must be filed by the licensed plumber.
4. Plumber installs the backwater valve. Installation of backwater valves generally includes:
 - a. Excavating the area where the valve is to be installed;
 - b. Flushing/cleaning out the sewer line;
 - c. Installing the backwater valve device;
 - d. Installing a cap or cover over the device to allow for future inspections and maintenance; and
 - e. Disconnecting and relocating any downspout, as needed.

Appendix E: Data Sources for SBU Vulnerability Study

Data Sources	Analyses
Sewer Backup (SBU) Complaints DEP verified 311 complaints received from 2018 to 2022	Identified buildings affected by SBU or manhole overflow-related complaints caused by overtaxed sewers
Hurricane Ida SBU Damage Data 11 complaints received from 9/1/2021 to 9/7/2021 collated by NYC DOB	Identified buildings affected by SBU, indoor sewage, and plumbing-related complaints
Flooding Complaints DEP verified 311 complaints received between 2018 to 2022	Identified buildings affected by surface flooding and clogged catch basin related complaints caused by overtaxed sewers
Hurricane Ida High Water Mark (HWM) Survey USGS photographic documentation of water depth in subgrade floor	Identified buildings noted to have experienced flooding from Hurricane Ida
Stormwater Sewer Model Data Modeled sewer water level results for the 5 year/1 hour, 5 year/6 hour, 10 year/1 hour, and 10 year/6 hour storm events, with and without predicted 2050 sea level rise (2.5'), from the DEP Stormwater Resiliency (SWR) models	Compared building subgrade floor elevations to the water level elevation of the nearest modeled sewer node within combined sewer network
Coastal Storm Surge Flood Data Rasters of 100-year coastal storm surge from FEMA with and without predicted 2050 sea level rise (2.5')	Compared building subgrade floor elevations to the coastal storm surge still-water elevation
Sewer Network GIS Data GIS layers containing sewer location, system type, and catch basin connection data	Calculated length of feet of sewer network acting as combined sewers
NYC's Stormwater Flood Map Data Modeled surface flooding extents for the 5 year-1 hour, 5 year-6 hour, 10 year-1 hour, and 10 year-6 hour storm events, with and without predicted 2050 sea level rise (2.5'), from the DEP Stormwater Resiliency (SWR) models	Calculated flood extents and flood depths using the Flood Risk Calculator (FRC)* method Buildings with at least 10% of building footprint in the flood extent were considered within the floodplain
Coastal Storm Surge Flood Data Rasters of 100-year coastal storm surge from FEMA with and without predicted 2050 sea level rise (2.5')	Flood depth was calculated as the median (stormwater) or maximum (coastal) water surface elevation across the footprint minus the first-floor elevation

Appendix F: Backwater Valve Study Analysis Map

Building's Risk Assessment for Sewer back-ups



Appendix G: Resources and References

[Flood Prevention - DEP \(nyc.gov\)](#)

[NYC Government Publication | State of the sewers 2023, performance metrics, fiscal year 2023 \(July 1, 2022, through June 30, 2023\) | ID: fn1072374 | Government Publications Portal](#)

[Sewer System Management Plan \(nyc.gov\)](#)

[NYC Flood Zones | Flood Risk | FloodHelpNY.org](#)

[Climate-Risk-and-Equity-Advancing-Knowledge-Toward-a-Sustainable-Future.pdf \(cityofnewyork.us\)](#)

[Executive Summary - NYC Mayor's Office of Climate and Environmental Justice \(cityofnewyork.us\)](#)

[Climate-Risk-and-Equity-Advancing-Knowledge-Toward-a-Sustainable-Future.pdf \(cityofnewyork.us\)](#)



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