# Raindrops Keep Falling On New York:

# Potential Implications Of a Stormwater Fee In New York City


IBO

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# Executive Summary

Excessive stormwater causes expensive structural damage and pollution that cost localities and their residents valuable resources. Authorities responsible for stormwater management have historically relied on revenues raised from metered water bills. This fee structure may be considered inequitable because water use does not drive a property's contribution to stormwater runoff entering the sewer system and local waterways. Many jurisdictions in the United States have begun to charge stormwater fees based on impervious surface area, which more closely reflects a property's contribution to stormwater runoff. However, only one municipality in New York State, the City of Ithaca, has implemented stormwater fees. At the request of New York State Assembly Member Emily Gallagher, IBO examined the potential implications of stormwater fees if applied to New York City.

IBO applied existing stormwater fees adopted by four other large cities—Baltimore, Philadelphia, Seattle, and Washington, D.C.—to model their potential impact for New York City. If the New York City Water Board (the Water Board) were to consider a stormwater fee, a unique rate structure and rates would be proposed for the city based on revenue requirements to fund the city's water and sewer systems. IBO's study is intended to illustrate major considerations and possible effects of a stormwater fee to help inform discussions around rate structures. Among our key findings:

- Revenue potential greatly varies depending on how the stormwater fee is set. IBO's revenue estimates range from $266 million to $892 million per year, derived by applying the peer city stormwater rates to properties in New York City.
- The rate structures of stormwater fees substantially affect how much each property would be charged. The two most important elements of a rate structure are what the fee is assessed against (impervious land area versus total land area) and whether the fee is set as a flat, tiered, or variable rate. Beyond structural choices, the dollar amount of the fee rate or rates strongly impacts the amount billed to each property and is the main determinant of the total revenue estimates.
- Among residential properties, those located in boroughs outside of Manhattan would likely face the greatest financial burden due to larger average property sizes, lower population density, and lower median incomes.
- For most census tracts, the median fee per household would equal less than one percent of median household income under all peer city rate structures.

IBO also highlights several considerations related to the New York City Municipal Water Finance Authority's (the Water Finance Authority) bond rating—including the self-funded independent governance structure of the New York City water system—that the Water Board would need to account for if it were to pursue implementing a stormwater fee.

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## Introduction

Water-related services are essential for a community's quality of life. These services include delivering clean drinking water to buildings, removing wastewater from buildings, and managing stormwater runoff by maintaining and improving underground infrastructure. Water authorities or local governments are typically responsible for carrying out these services. The increased frequency and severity of rain events in recent years have overwhelmed many municipal sewer systems, damaging both public and private property and leading to negative environmental implications. Environmental advocates in New York State have proposed stormwater fees as a potential solution.[1]

***Impervious Surfaces Increase Stormwater Runoff.*** When rain falls, it either lands on a pervious or impervious surface. Pervious surfaces—like lawns, gardens, and sand—can absorb and retain water (albeit at varying rates) during precipitation events and then gradually release it back into the water cycle. Conversely, impervious surfaces are hard surfaces that prevent water from soaking into the ground, such as roofs, pavement, metal, and wood. Because impervious surfaces cannot soak up water, they generate stormwater runoff. Stormwater runoff is water from precipitation that flows on impervious surfaces until it reaches a pervious surface or drains into a sewer system or waterway.

***Excessive Stormwater Runoff Causes Environmental Damage.*** As stormwater runoff flows across the ground, it collects debris and pollution—including animal waste, oil and grease, pesticides and fertilizers, and other potential pollutants—while also causing flooding, soil erosion, and property damage. To comply with water regulations set by federal and state governments, local governments must invest in stormwater management, which is the process of controlling stormwater runoff that comes from impervious surfaces.

Managing stormwater runoff is particularly difficult for localities with combined sewers, where stormwater and sewage share the same pipes which then feed into a wastewater treatment facility (WWTF). On dry days, sewage leaves a person's home and flows to a wastewater treatment facility where it undergoes 8-10 hours of pollution treatment before being released to a local waterway. ("Wastewater" can mean sewage, stormwater, or a mixture of the two.) On days with heavy precipitation, sewage and stormwater enter the same pipe simultaneously and flow to the WWTF for the same cleaning process before being discharged. However, the mixture of raw sewage, stormwater, and garbage frequently overwhelms the sewer system, leading to a combined sewer overflow (CSO). CSOs occur when wastewater exceeds the WWTF capacity, forcing the facility to dump large quantities of raw untreated sewage and stormwater into local watersheds. New York City has 700 combined sewer outfalls (an outfall is an outlet along the waterfront connecting the city's sewers to the open waters) where overflow can be released.[2]

While 60 percent of New York City is served by combined sewers, approximately 30 to 40 percent is served by a municipal separate storm sewer system (MS4). An MS4 has two distinct pipes, one pipe conveying stormwater from storm drains to local waterways and one pipe conveying sewage to the WWTF.[3] As New York City's sewer system was built over time, the city shifted to building MS4s rather than combined sewers, leaving the city with a mix of the two types of systems.

Through capital improvement projects, jurisdictions can improve their sewer capacity which in turn reduces the problem of CSOs, and better regulates the collection, storage, and movement of stormwater. These projects can come with substantial costs. For example, the New York City Department of Environmental Protection (DEP) is expected to spend $1.6 billion on two CSO retention tanks and associated community infrastructure for the Gowanus Canal, with an anticipated completion date of 2027.[4] (All years refer to city fiscal years unless otherwise stated.) DEP is also working on a $1.5 billion CSO storage tunnel for Flushing Bay, with an anticipated completion date of 2035.[5] These projects are often called grey infrastructure, which feature man-made materials like metal and concrete to make gutters, drains, and retention basins.

The city has roughly 10 grey infrastructure projects in the works with an estimated cost of $6.2 billion with anticipated completion dates stretching from 2024 through 2042.[6]

However, switching all sewer systems to MS4s or installing prolific grey infrastructure would only partially mitigate stormwater damage because runoff still picks up pollution before entering the stormwater drains and being dumped into waterways. The goal of stormwater management is to return clean water to the earth. To this end, green infrastructure is another method of stormwater management which uses natural materials such as plantings, mulch, and sand to capture, filter, and retain stormwater runoff until it can naturally reenter the water cycle, helping prevent CSOs and mitigating stormwater property damage. Examples of green infrastructure include bioswales, which are vegetated ditches that allow for the collection, conveyance, and filtration of stormwater and rain gardens, which are plant beds that capture, temporarily hold, then filter stormwater back into the ground. Climate change is leading to more frequent heavy rain events, creating pressure on local governments to invest more in MS4s, grey, and green capital improvements.

***Stormwater Fees Reflect a Property's Contribution to Stormwater Runoff.*** To cover the costs of stormwater management, most jurisdictions (including most in New York State) either use revenues generated from metered water and sewer bills based on the amount of clean water consumed, from property taxes, or both. Neither water consumption nor property values reflect any correlation to a property's contribution of stormwater runoff, creating a disconnect between the revenue being generated and stormwater management costs. For instance, when metered water revenue is used to pay for stormwater management projects, properties like parking lots that have large impervious surfaces contributing to stormwater runoff, but use little or no metered water, pay almost nothing towards the cost of stormwater management. Similarly, when property taxes are used, parking lots may pay very little for stormwater management because they are less developed and therefore may have lower property taxes assessed. When these properties underpay for their contribution to stormwater runoff, those costs are borne by other properties, creating an inequitable distribution of stormwater management costs.

Thousands of U.S. jurisdictions have moved to charge separate stormwater fees for costs associated with stormwater management, at least 15 of which have populations above one million.[7] Most stormwater fees are calculated using the impervious surface area of a property because they are a proxy to reflect a property's contribution to stormwater runoff. Stormwater fees often provide designated revenues for stormwater management, which enhances transparency and allows for adjustments to stormwater charges based on the needs of the stormwater management system.

## Stormwater Fees in New York

The City of Ithaca is the only municipality in New York State with a general stormwater fee, which it adopted in 2014, although the city's structure for funding their water system is notably different than New York City's structure. While New York City does not have a citywide stormwater fee, on a smaller scale, DEP introduced a pilot program in 2011 for standalone parking lots. This program required lot owners to pay $0.05 per square foot for wastewater services. Because standalone parking lots often don't have water connections on the premises, they would not be paying for the water and sewer system through metered billing, despite their impervious surfaces' contribution to stormwater runoff. Lot owners were given the option to develop green infrastructure to avoid the payment; from 2011 through 2019, no parking lot owners installed green infrastructure.[8]

One concern municipalities may have in implementing a general stormwater fee is the ambiguity surrounding legal authority of localities to implement stormwater fees. (Ithaca's fee has not been challenged in court.) The 2023-2024 legislative session in Albany includes a proposal (A4019/S4169) to address this

ambiguity by explicitly authorizing "local water and sewerage authorities to charge fees for surface runoff."

Beyond legal authority, this analysis addresses three other factors for consideration around the implementation of stormwater fees. First, the structure of such a fee: how rates might be set, and which property features would be used in calculating the fee. Second, whether the rate structure will impact the total water bill (metered, sewage, and stormwater combined) of some properties more heavily than others. Third, whether introducing a new revenue stream into DEP's water bill collection process could alter the Water Finance Authority's credit rating either up or down depending on how it is presented and received by credit rating agencies, which in turn would alter the cost to finance water and sewer projects.

In this paper, IBO examines these three concerns by modeling the impact of a stormwater fee in New York City. First, IBO applies the rate structures used in four peer cities to all property lots in New York City to estimate the total revenue that each fee would generate. This provides a sense of scale for what stormwater fee revenues could mean for New York City's water system, and the variation in revenue amounts depending on the structure of stormwater fees. IBO then studies the distributional effects of stormwater fees on ratepayers' bills across neighborhoods. Lastly, IBO highlights some considerations for how stormwater fees may interact with the rate setting process of the Water Board and the financing of the water and sewer systems through the Water Finance Authority.

### Independent Governance Structure for New York City Water Services

New York City has three entities responsible for the operating and governance of the city's water system—DEP, the Water Finance Authority, and the Water Board. DEP bills and collects the revenue from customers. DEP manages the city's water supply, collects and treats wastewater, upgrades the city's wastewater treatment facilities, and conducts other daily operations that keep the water services functioning. DEP also manages the capital improvement program of the water system. The Water Finance Authority issues bonds for maintaining and upgrading the water and sewer system. The Water Board sets the water and sewer rates to be charged for water consumption.

The Water Board sets rates to generate enough revenue to meet the debt obligations of the Water Finance Authority and the operations and maintenance costs of the system; DEP collects this revenue which is then deposited in a "lockbox" with the Water Board. In this way, revenues and expenditures are part of an independent governance structure that is separate from the city's general fund. The Water Board would be the entity to set a stormwater fee in New York City, and this fee would become part of the revenue stream that funds the water system.

IBO's research is intended to clarify the purpose of a stormwater fee and illustrate the potential impact—both in revenue generation and in fee distribution—of stormwater fees depending on how the rate could be structured. Our research differs from DEP's Sustainable Rate Structure Analysis (SRSA), an ongoing project that DEP initiated in 2020. The SRSA is a holistic rate study of various rate structure options with the goal of better reflecting the current needs of the water and sewer systems after a period of investments and changes to the existing system. It includes a third-party review of water rates (including stormwater charges) in 10 cities, which was published in August 2021. The other major output of the SRSA is a forthcoming report of rate structure recommendations and implementation options, including customer assistance and credit programs. The SRSA is purely for informational purposes; the Water Board, not DEP, sets water rates to pay for the city's water supply and wastewater systems.

## Review of Peer City Stormwater Fees

***Elements of Common Stormwater Fee Structures.*** Jurisdictions can structure stormwater fees to fit the needs of their community. Not all water utilities apply fees based on impervious surface area, but it is the most common metric for setting fees and it also directly ties to a property's contribution to stormwater runoff. IBO limited our study to major cities that have implemented impervious surface-based stormwater fees.

There are three common elements of impervious-based stormwater fee rate structures. These include variable rates, tiered systems, and flat fees.

1. Variable rate stormwater fees apply rates to the amount of impervious or total surface area of a property. To simplify the units, most cities divide the surface area by a baseline amount, sometimes called an Equivalent Residential Unit (ERU), and round before applying the variable rate.
2. Tiered fees charge a set fee for properties within a range of impervious areas, with several ranges to cover all property sizes.
3. Flat fees are one fee for all properties of a specific class (usually residential) regardless of size.

Washington, D.C., Baltimore, and Seattle use a tiered system for single-family residential properties; Philadelphia uses a flat fee for small residential properties (which includes single-family, walk-up, and row houses). All four of these cities use variable rates for commercial and other, larger residential properties (i.e., those not covered by the tiered or flat fees). Washington, D.C. and Baltimore only use impervious surface area as the fee driver. In contrast, Philadelphia and Seattle use both impervious and total surface area in their rates, meaning that both the overall property size and the amount of non-porous surface area contribute to the fee calculations. Figure 1 summarizes which cities use the different rate elements and fee drivers. Appendix A has more detail on each city's rate structure.

## Modeling Stormwater Fees for New York City

IBO used the four peer cities as proxies to model stormwater fees in New York City. IBO created a model using two publicly available datasets. The 2020 DEP Citywide Parcel-Based Impervious Area GIS Study was conducted by DEP to map and measure all surfaces in the city by surface type and property lot, differentiating between impervious, pervious, and semi-pervious surfaces. The Primary Land Use Tax Lot Output (PLUTO) data from the Department of City Planning contains the land use description of each property parcel. (See Appendix B for more details about these data sets and summary statistics). Our model estimates the cost of a stormwater fee for every property parcel in New York City, under the rate structures of the four peer cities.

Figure 1:
**Variation in How Cities Structure Stormwater Fees**

| Rate Structure | Washington, D.C. | Baltimore | Philadelphia | Seattle |
|---|---|---|---|---|
| **Rate Elements:** | | | | |
| Variable Rate | X | X | X | X |
| Tiered Fee | X | X | | X |
| Flat Fee | | | X | |
| **Fee Drivers:** | | | | |
| Impervious Area | X | X | X | X |
| Total Surface Area | | | X | X |

SOURCE: IBO analysis of District of Columbia Water and Sewer Authority, Baltimore City Department of Public Works, Philadelphia Water Department, and Seattle Public Utilities rates

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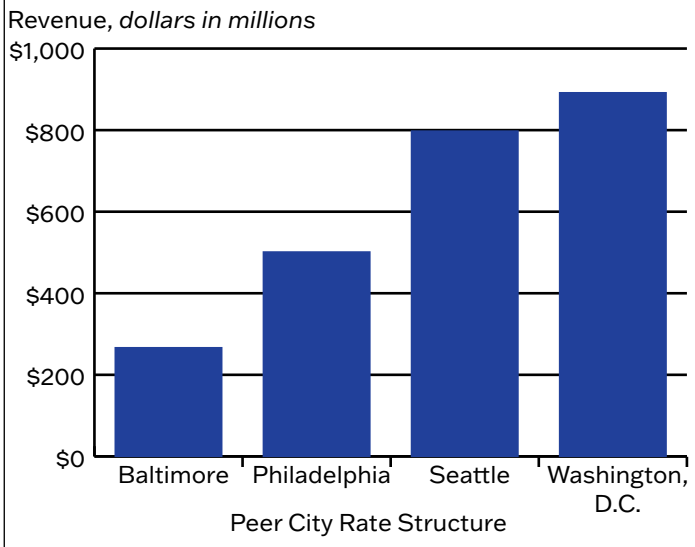
One major model assumption is that public roadways would not be included in the model because they were excluded from DEP's impervious surface study. Whether or not to subject public roadways to stormwater fees is a topic of much discussion when implementing a stormwater fee. For other noteworthy model assumptions, see Appendix C on our methodology.

***Potential Stormwater Fee Generation for New York City.*** The total stormwater revenue estimates vary widely between the four rate structures. Baltimore's rates applied to New York City properties produce the lowest estimate at $267 million per year, while Washington, D.C.'s rates applied to New York City properties produce the largest estimate at $892 million per year, more than triple the Baltimore amount. This demonstrates that the rate amounts make a material difference in the total amount of revenue collected.

**Figure 2:**
**Revenue Projections Depend on Stormwater Rate Amounts**
*Estimated Annual New York City Stormwater Revenue Under Peer City Rate Structures*



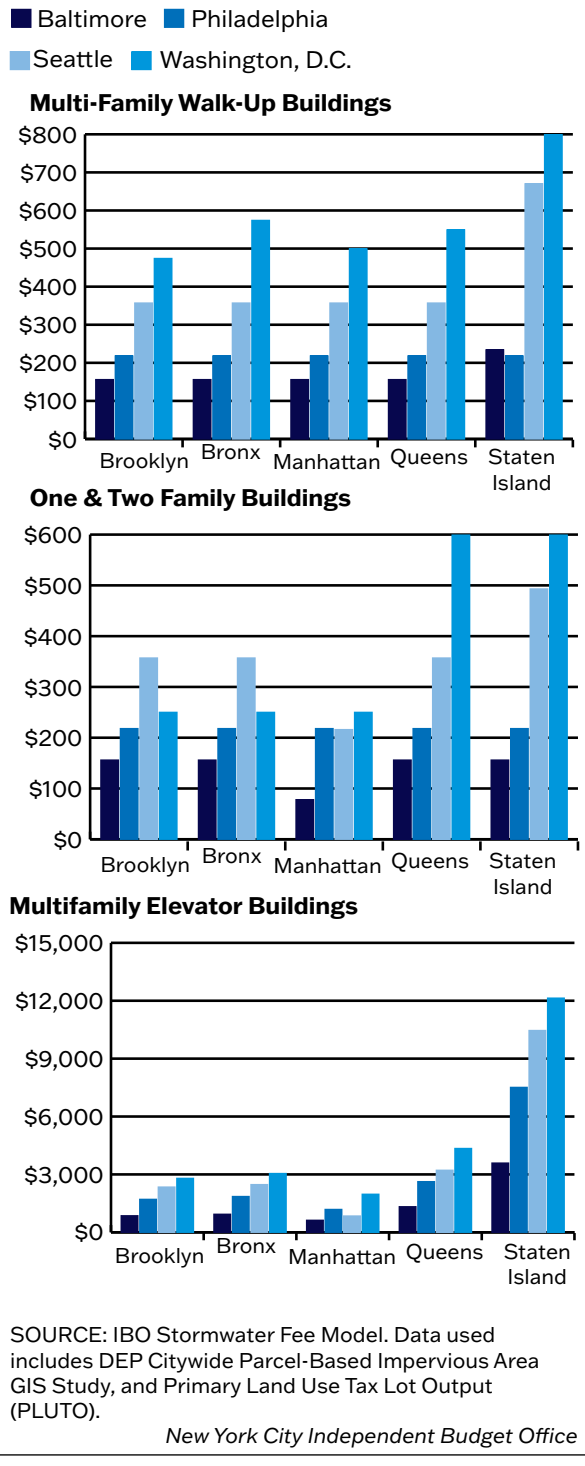

SOURCE: IBO stormwater fee model using DEP Citywide Parcel-Based Impervious Area GIS Study and PLUTO data
*New York City Independent Budget Office*

If New York City (via the Water Board) were to pursue a stormwater fee, the fee rate and structure and thus overall revenue generated would need to reflect the cost of providing service to New York City water and sewer customers. (In 2022, the water system collected about $3.77 billion from water bills.)[9] One of the most important considerations would be making the fee additive or revenue-neutral. An additive fee would be charged on top of existing metered billing rates and produce an additional amount of revenue above the amount earned through metered water bills. There are several ways the water system could spend any additional revenue, including taking on new capital projects to enhance stormwater management infrastructure. Additive fees would have a greater financial burden on property owners in New York City than a revenue-neutral fee.

A revenue-neutral fee structure would hold steady the water system's total revenue target; the new revenue from stormwater fees would reduce the amount that would need to be generated from metered bills. This would effectively redistribute the costs of stormwater management from properties with high water usage and low impervious surface to those with low water usage and high impervious surface. However, revenue-neutral fees would not create additional revenue for capital stormwater management improvements. Both additive and revenue-neutral fee structures would need to consider potential impacts on the Water Finance Authority's bond rating.

***Impact of Stormwater Fee on Water Bills.*** IBO estimated stormwater fees for New York City properties at the median impervious surface area by peer city rate structure, borough, and land use type. Rather than propose a specific structure for the city based on the water system's financial needs—which the Sustainable Rate Structure Analysis from DEP will do—IBO sought to illustrate how different stormwater fee structures used by other major cities would look if applied to New York City to provide a sense of scale and demonstrate the variety of fee-setting options. This analysis allowed IBO to determine the fee drivers that most affect which properties and areas are assessed the highest stormwater fees. Figures 3 through 5 analyze residential properties. For residential land use types, we find that in most boroughs, the Washington, D.C. rate structure produces the greatest estimated stormwater fee. Baltimore's structure results in the lowest fees.

Figures 3-5:
**IBO-Estimated Median Annual Stormwater Fees For Residential Properties**




SOURCE: IBO Stormwater Fee Model. Data used includes DEP Citywide Parcel-Based Impervious Area GIS Study, and Primary Land Use Tax Lot Output (PLUTO).

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While Washington, D.C. and Seattle both use a tiered fee structure for residential properties, Washington, D.C. based their tiered system on impervious surface of a property while Seattle based their tiered system on total square footage of a property. When applied to New York City, this makes the Seattle-based fee higher in some property types and boroughs than those of Washington, D.C., and lower in others. This means that using impervious surface rather than gross area as the fee driver makes a difference in how the financial burden of stormwater fees are distributed. Using gross area may punish properties that are large but have little impervious surface. However, proponents of using gross area might argue that even pervious surfaces can ultimately contribute to stormwater runoff once they reach their retention capacity. Moreover, gross area is easier to measure than impervious surface because the latter requires assigning a type or class to each surface which likely takes a city more time and money to collect.

Philadelphia's flat fee for small residential properties (which excludes multi-family elevator buildings) benefits larger properties and harms smaller properties. This is apparent in Figures 3 and 4 when comparing the Philadelphia rates (which are flat) to the Baltimore rates (which are tiered); Philadelphia's fee is more expensive than Baltimore for the median one- & two-family homes in Manhattan, but cheaper for the median multi-family walk-up buildings in Staten Island. While flat fees may seem less equitable, they are presumably easier to apply because they only require the property type without any data on surface areas.

Some of the differences in median fees result from differences in the average property across land use types and boroughs, rather than rate structure elements. Among the boroughs, Staten Island typically has the highest fees under all residential land use types and rate structures, while Manhattan has the lowest. This is reflective of the typical parcel size differences between boroughs; Staten Island has a larger average parcel size than Manhattan. Stormwater fees based on impervious surface only focus on what is the ground-level footprint on a property parcel, and do not factor in the height or density of buildings.

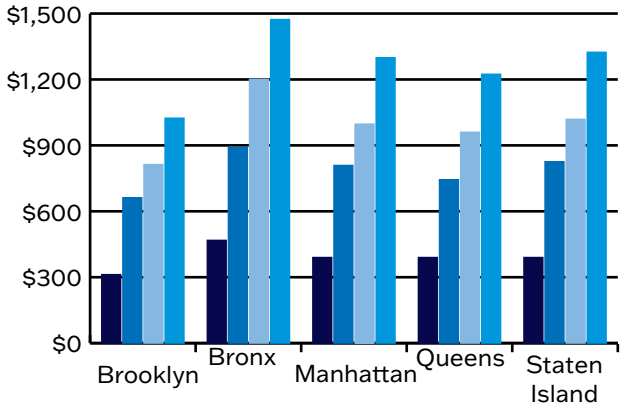
Finally, "One & Two Family Buildings" and "Multi-Family Walk-Ups" have very similar median fees (maxing out at around $800 annually), while the median fees for "Multi-Family Elevator Buildings" are typically much

Figures 6-11:

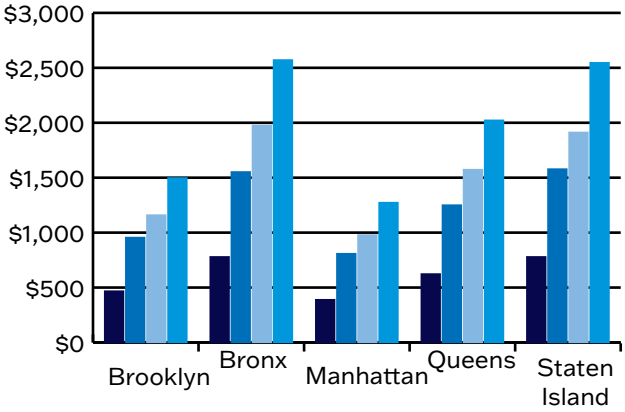
## IBO-Estimated Median Annual Stormwater Fees For Non-Residential Properties

Baltimore Philadelphia Seattle Washington, D.C.

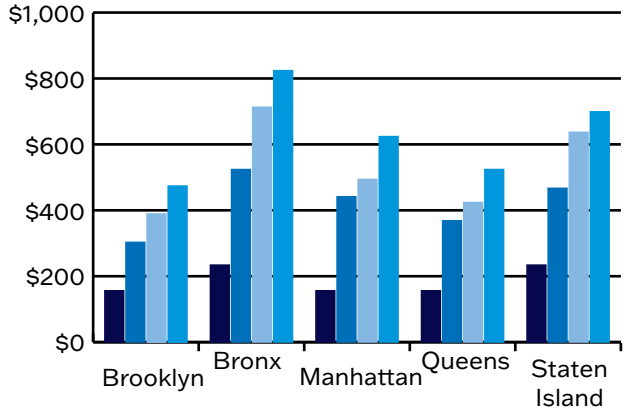
### Commercial & Office Buildings



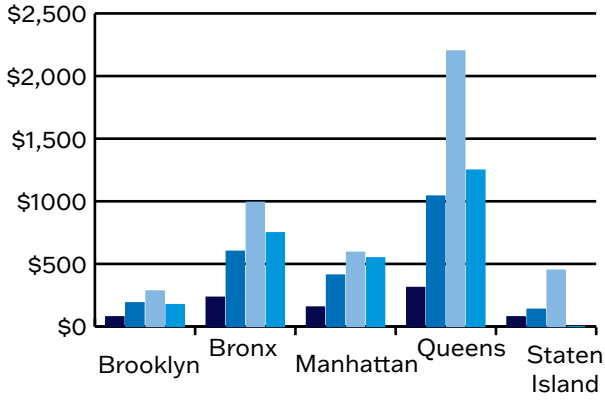

### Industrial & Manufacturing



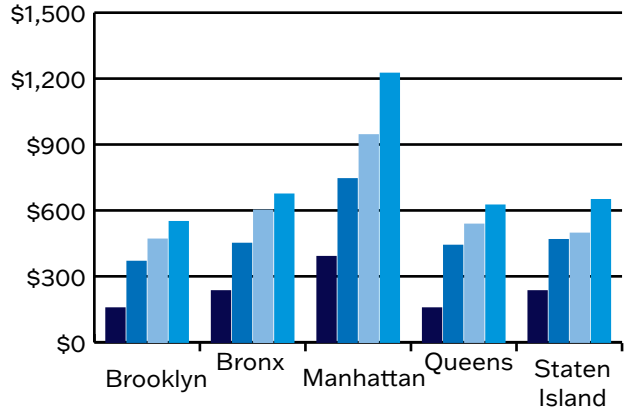

### Mixed Residential & Commercial Buildings



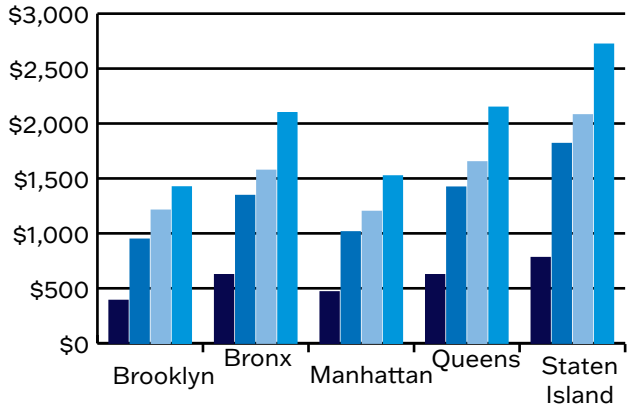

### Open Space & Outdoor Recreation




### Parking Facilities




### Public Facilities & Institutions




SOURCE: IBO stormwater fee model using DEP Citywide Parcel-Based Impervious Area GIS Study and PLUTO data

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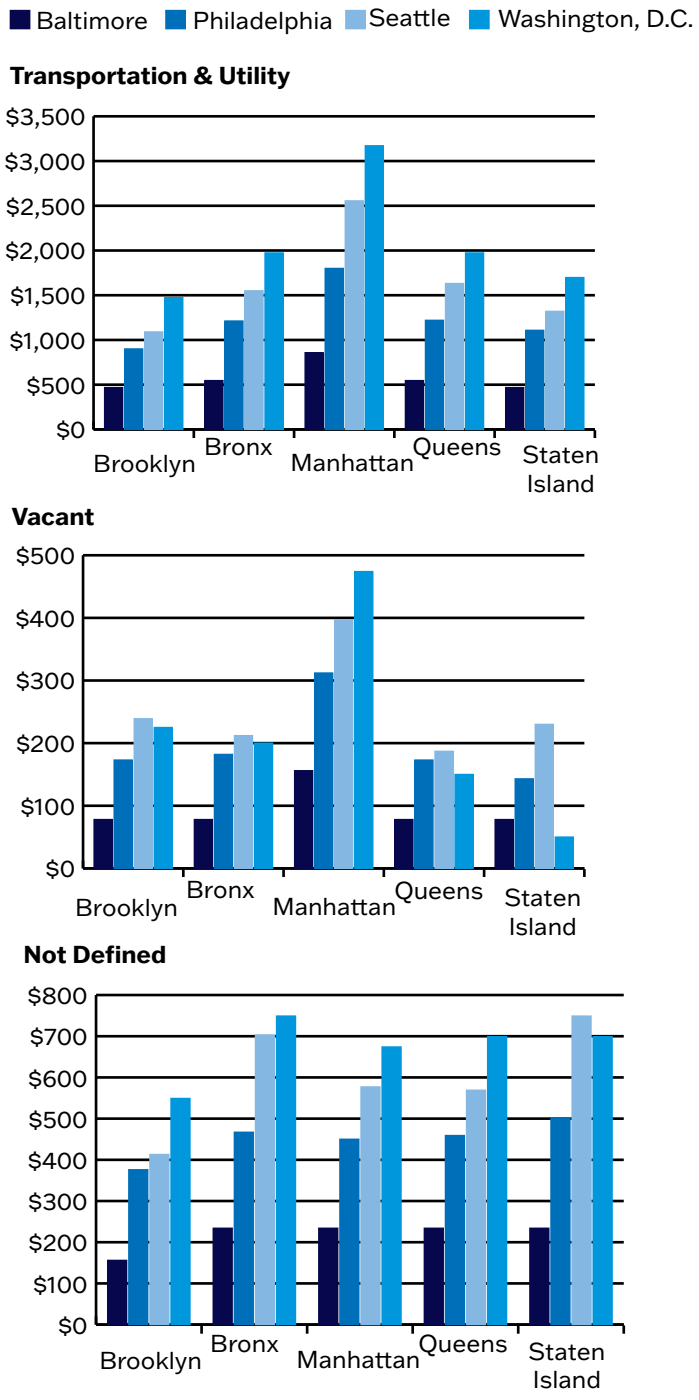
Figures 12-14
**IBO-Estimated Median Annual Stormwater Fees For Non-Residential Properties**




SOURCE: IBO stormwater fee model using DEP Citywide Parcel-Based Impervious Area GIS Study and PLUTO data
*New York City Independent Budget Office*

higher (reaching as high as $12,000 annually). This is especially true for multi-family elevator buildings in Staten Island, which appear to be driven by the larger average footprint of these buildings and the more likely existence of on-site outdoor parking facilities. Note that our model applies stormwater fees to an entire property parcel, not individual units within a property (for example, multi-family buildings could split the charge across all residential units of the property). We analyze the fees based on number of residences in the next section of this report.

Among the non-residential property types, IBO again finds that using impervious surface versus gross area as the fee driver makes a difference in how the financial burden of stormwater fees are distributed. For instance, while the Washington, D.C. based fees are typically higher than those of Seattle, there are several examples where the Seattle rates produce higher fees because they are based on gross rather than impervious area (see Figures 9, 13, and 14).

While rate structure influences which property types and areas of the city are charged the highest fees, rate amounts drive the magnitude of both individual stormwater fees by property and the total revenue collected by the jurisdiction. Despite exceptions mentioned in the previous paragraph, in most boroughs and land use types, the stormwater fee estimates go from highest to lowest in this order: Washington, D.C., Seattle, Philadelphia, and Baltimore. This pattern matches that of the total revenue estimates and reflects the rate amounts of each peer city stormwater fee, rather than the rate structures.

Like residential properties, the differences across land use types and boroughs relate more to differences in property sizes rather than the stormwater fee rate structures. The highest estimated fees for overall land use types are "Industrial & Manufacturing," "Public Facilities and Institutions," and "Transportation and Utility." The lowest overall fees are in the land use types "Vacant Land," "Mixed Residential & Commercial," and "Parking Facilities." This reflects the relative size of these property parcels.

***Financial Burden Analysis of Stormwater Fee.*** To assess the distributional implications of a stormwater fee, IBO calculated the economic burden of the estimated stormwater fees on residential properties. The PLUTO dataset contains the number of residential units on each property. Median incomes by census tract were pulled from the U.S. Census Bureau's American Community Survey. We divided the estimated stormwater fee for each peer city rate structure by the number of residential units, then calculated the median stormwater fee per residential unit as a percentage of median household income for each census tract. This shows the share of an annualized stormwater fee relative to a household's annual income. (Property owners of rental buildings rather than renters generally pay water and sewer bills; the incidence of how any additional charges get reflected into rents is beyond the scope of this analysis.) Unlike how fees are assessed—on a per property parcel level—this financial burden analysis calculates the fee distributed across all residential units on a property, on the assumption that costs associated with a property would be shouldered equally by all units. The results of this analysis are mapped in Figure 15. IBO's financial burden analysis is limited to residential properties because there is not enough income data on non-residential properties to assess the relative burden of these estimated stormwater fees.

The first major finding from this analysis is that for most census tracts, the median fee per household equals less than one percent of median household income under all peer city rate structures. The second finding is that the burden is consistently greater in boroughs other than Manhattan. This is likely driven by the larger average parcel size, lower density of residential units with fewer high-rises, and lower median income in Bronx, Brooklyn, Queens, and Staten Island census tracts. To address this concern, some cities have used discounts for low-income residents. We briefly discuss some examples in the conclusion of this report.

## Considerations for Stormwater Fees on the Water Finance Authority's Bonds

***How Stormwater Fees May Be Viewed by Credit Rating Agencies.*** Strong bond ratings enable governments to issue debt more easily and at lower interest rates. The Water Finance Authority issues bonds to finance the capital needs of the water and sewer system. Presently, bonds are backed by revenues generated mainly from metered water and sewer billing, and the Water Finance Authority is well-regarded by rating agencies because they have confidence in these revenues.[10]

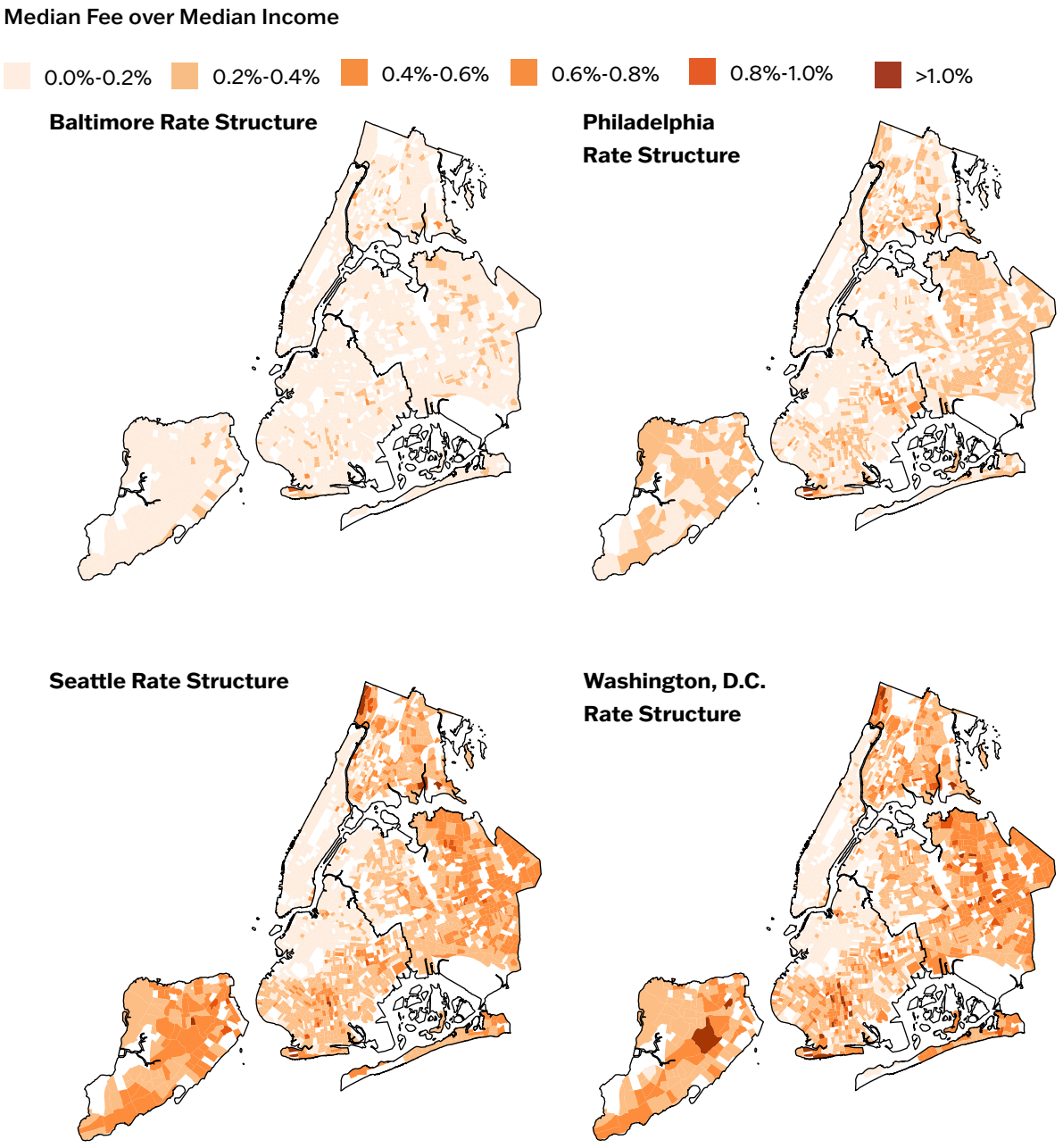
Bond ratings are largely reflective of the level of confidence that bondholders and rating agencies have that the issuer (the Water Finance Authority) will consistently collect sufficient revenues to cover debt service costs. A stormwater fee in New York City would introduce a new revenue stream into the water system, which comes with some level of uncertainty. New sources of revenue are generally seen positively by rating agencies because they can diversify some risk of a single revenue stream and increase total revenues (if the fee is additive rather than revenue-neutral). Stormwater fees could create more revenue stability than metered bills (so long as the new fees are dedicated), because city water usage has declined over time as water conservation efforts have ramped up.

Alternatively, the properties whose water bills increase due to the implementation of a stormwater fee, however, may potentially be less likely to pay their bill at all. Increased delinquencies could have a negative impact on the bond rating if the total revenue collected is lower than expected.

Until there is a track record of collections and an understanding of stormwater fees by rating agencies, bondholders, and ratepayers, it is unclear how any of these parties might react in the early stages. One strategy to mitigate these concerns is to phase the stormwater fee in over time coupled with education and outreach. Philadelphia phased in their stormwater fee over a four-year period; Seattle used a five-year period.[11] Although not a peer city for the basis of our research—because they are in the early phases of implementation—San Franciso is currently in the process of phasing in their stormwater fee over a period of eight-years.[12]

Figure 15

**Median IBO-Estimated Stormwater Fees per Unit of Residence as a Percentage of Median Income By Census Tract**




SOURCE: IBO stormwater fee model using DEP Citywide Parcel-Based Impervious Area GIS Study and PLUTO data

*New York City Independent Budget Office*

Because multiple jurisdictions across the country have enacted stormwater fees, IBO sought to identify if any notable changes to bond ratings ensued after the introduction of a stormwater fee. IBO reviewed the water authority or water department bond ratings for other large jurisdictions before and after they had enacted a stormwater fee, for the period from 2012 through 2021. (See Appendix C for more details.) Although we found no discernable direct impact of stormwater fees on credit ratings, many municipalities do not finance their water systems as New York City does, but rather rely on direct government appropriations or reserve funds to pay for some or most of the water system financing rather than billed collections. Because water bills are less central to the revenue which backs bonds in these other jurisdictions, adding a stormwater fee to water bills may have a more minimal impact for their ratings.

***New York City's Water System Operates Under an Independent Governance Structure.*** Unlike many other water systems, the Water Finance Authority operates almost entirely as a closed system—annual revenues must be matched by outlays on the maintenance or improvement of the water and sewer systems. If a stormwater fee generated additional revenues, there are a handful of ways this money could be spent: accelerating existing capital projects or adding new projects to the capital pipeline, especially as they relate to stormwater and sewer management; increasing the carryforward balance of debt; lowering current metered water rates or introducing smaller increases to metered water rates in the future; cash defeasance for existing bonds (setting the money aside to pay for future debt service costs); increasing pay-as-you-go capital projects (financing capital projects through current revenues rather than debt), among others.

The one way in which revenue from the water system could be captured by the City of New York's general fund (and therefore used on any city expenditure) would be through requesting from the Water Board the rental payment to the city as specified in the water system lease. The city may request rental payments for use of the water and sewer system from the Water Finance Authority, up to a formula-driven amount. In 2024, the maximum rental payment would be $283 million.[13] The city has not requested a rental payment for 2023 or 2024, although it did ask for $128 million in 2020 and $137 million in 2021, citing the Covid-19 pandemic impact on city revenues. Prior to the pandemic, the last year the city charged a rental payment was 2013. During this period, city revenues were strong, and it is popular with ratepayers to keep meter water rate increases minimal. With recent budgetary constraints, the Adams administration may be tempted to reinstate a partial or full rental payment, which would require more revenues—either through metered billing or a potential stormwater fee—to be generated by the rates set by the Water Board.

## Conclusion

***Structuring a Stormwater Fee for New York City.*** In this report, IBO analyzed the revenue implications of a stormwater fee for New York City. We are not recommending one structure be picked over another, nor that any of these structures are best suited for New York City. Rather, our findings provide insight on the impacts of stormwater fees depending on how the rate structure and magnitude of stormwater fees is set.

First, our total revenue estimates from applying four major city's stormwater fees to New York City vary greatly based on the magnitude of the rates, ranging from $267 million to $892 million per year. The rate structures of stormwater fees substantially affect how much each property is charged, the two most important elements being the fee driver (impervious versus gross area) and the type of structure (flat, tiered, or variable). The dollar amount of the rate structure also strongly impacts the amount billed to each property and is the main determinant of IBO's total revenue estimates.

IBO used the rate structures of four peer cities in our model because no New York City entity has proposed a specific stormwater rate structure to date. If the city is interested in a stormwater fee, further research is needed to determine the optimal rate structure to meet the revenue needs of the water system while avoiding overly burdensome increases in water bills. As noted earlier, DEP has been conducting a

Sustainable Rate Structure Analysis (SRSA) since August 2020, with results expected by the end of calendar year 2023. The SRSA report is expected to provide rate structure recommendations and implementation options, although only the Water Board, and not DEP, has the authority to directly implement a specific rate structure.

***Stormwater Credits and Discounts***. IBO's financial burden analysis revealed that among residential properties, properties in boroughs outside of Manhattan are likely to experience a higher burden due to larger properties, lower density, and lower median incomes by census tract. This burden could be mitigated by discounts or credits.

While generating revenue is a component of stormwater fees, to get at the underlying issues of stormwater management, municipalities also want to encourage ratepayers to construct green infrastructure on their property to limit stormwater runoff and pollution. Green infrastructure includes green roofs, which can reduce runoff volumes; permeable pavements such as pervious asphalt and concrete; rain gardens and planter boxes, which can support runoff detention and ground water recharge; and street trees, which can reduce runoff quantity.

Stormwater credit programs reduce a ratepayer's stormwater bill if they adhere to the guidelines that are set out by the locality, often by converting impervious surfaces into pervious green infrastructure. Although most communities with stormwater fees have credits in place, rules differ for each jurisdiction. In Philadelphia for example, stormwater credits are only given to non-residential (commercial properties, parking lots, industrial properties) and multi-family properties because they have a larger footprint and a better ability to implement green infrastructure.[14] How property owners in these cities use credit or abatement programs, and their impact on alleviating potential financial burdens, is outside the scope of this analysis.

While offering stormwater credits gives ratepayers the ability to reduce their bill, installing green infrastructure can be costly. A rough estimate for the national average cost of installing a green roof is $22,000; the national average cost of installing permeable concrete is $8,000; and installing rain gardens can cost between $4 and $35 per square foot.[15, 16,17] Even when properties can afford green infrastructure, it is often just cheaper to pay the stormwater fee, making it difficult to incentivize green infrastructure.

Mindful of potential financial burdens, jurisdictions with stormwater fees have also introduced discounts and credits for low-income residents, seniors, and residents living with disabilities. For instance, residents of King County, Washington who live in unincorporated areas of the county and have a family income at or below 200 percent of the federal poverty level are eligible for a 50 percent discount on their annual stormwater fee; residents receiving property tax breaks for persons over age 62 or living with a disability are eligible to receive a full waiver of stormwater fees.[18] Notably, this discount program for King County, Washington (which contains Seattle) does not apply to the City of Seattle stormwater rates. The other three peer cities used in IBO's main analysis (Washington, D.C., Baltimore, and Philadelphia) do not have income-based discount or credit programs.

New York City's DEP already has the Home Water Assistance Program—an initiative to make water and sewer bills more affordable for low-income homeowners.[19] Further research on credits and discounts for stormwater fees is needed to address concerns around affordability and the creation of green infrastructure.

## Appendix A: Structure of Peer City Stormwater Fees

All rates presented below are the stormwater fee rates for each peer city as best aligned to New York City's fiscal year 2023.

### Baltimore, MD

Baltimore's stormwater fee uses a tiered fee for single-family homes, and a variable rate for all other properties. Since 2013, Baltimore has charged a stormwater fee based on the amount of impervious area on a property. The stormwater fee is a monthly line item on a ratepayer's water bill. Although Baltimore's sewer system was built as a combined sewer system, after an extensive upgrade, most of the city is now served primarily by separate sewers. The stormwater fee is collected by the Department of Public Works.

Figure 16:
**Baltimore Stormwater Rates for Single-Family Residential Properties**

| Impervious Surface Area (sqft) | Flat Monthly Rate |
|---|---|
| <820 | $4.33 |
| 820-1,500 | 6.50 |
| >1,500 | 13.00 |

SOURCE: Baltimore City Department of Public Works
*New York City Independent Budget Office*

Single-family properties are charged one of three rates on a tiered system as shown in Figure 16.

Figure 17:
**Baltimore Stormwater Rates for for All Properties Other Than Single-Family Residences**

| Fee Drivers | Variable Monthly Rate |
|---|---|
| Rate Per ERU<br>1,050 Impervious sqft) | $6.50 |

SOURCE: Baltimore City Department of Public Works
*New York City Independent Budget Office*

Non-single-family properties are billed based on Equivalent Residential Units (ERUs). One ERU in Baltimore equals 1,050 impervious square feet, and properties are rounded to the nearest multiple of 1,050. If a property has 20,000 square feet of impervious surface, that property has 19 ERUs. With a monthly rate of $6.50 per ERU, a property owner with 19 ERUs would have a monthly stormwater bill of $123.50.

### Philadelphia, PA

Philadelphia's current stormwater fee structure has been in effect since 2010. Philadelphia is the only city IBO studied that uses a flat fee for small residential properties; it uses a variable rate for all other properties, like the other three cities. Prior to the current fee structure, rates were determined based on metered water consumption; therefore, ratepayers with the highest water usage paid the highest service charges. The city's sewer system is about 60 percent combined and 40 percent separate sewers, a similar breakdown to New York City. The stormwater fee is collected by the Philadelphia Water Department.

The current fee structure for single-family and small multi-family homes is a flat rate regardless of impervious surface area.

Non-single-family properties are charged based on both the gross area and impervious area of a property. Gross area is considered the total area within the legal boundaries of the property, less any public right of ways.[20] Philadelphia also divides gross area and impervious surface by 500 square feet (rounded up) to get the amount of billing units.

Figure 18:
**Philadelphia Stormwater Rates for Small Residential Properties**
**Single-Family, Row Homes, Twins**

| Residential Properties | Flat Monthly Rate |
|---|---|
| Small Residential (All sizes) | $18.16 |

SOURCE: Philadelphia Water Department
*New York City Independent Budget Office*

For example, under the Philadelphia structure, if a property has 40,000 square feet of gross area, they have 80 billing units. Those 80 billing units are

Figure 19:
**Philadelphia Stormwater Rates for All Properties Other Than Small Residences**

| Fee Drivers | Monthly Rate |
|---|---|
| Gross Area Rate (per 500 sqft) | $0.72 |
| Impervious Surface Area (per 500 sqft) | 5.41 |
| Billing & Collection Fee | 2.45 |

SOURCE: Philadelphia Water Department
NOTES: For non-residential properties with less than 5,000 square feet of Gross Area, the Impervious Area is imputed as either 25 percent of Gross Area for undeveloped properties, or 85 percent of Gross Area for developed properties. Also, all non-residential properties are charged a minimum monthly fee of $18.72.
*New York City Indpendent Budget Office*

Figure 20:
**Seattle Stormwater Rates for Single-Family Properties Up To 9,999 sqft**

| Property Size (Total sqft) | Flat Annual Rate |
|---|---|
| <2,000 | $216.23 |
| 2,000-2,999 | 356.90 |
| 3,000-4,999 | 493.22 |
| 5,000-6,999 | 669.75 |
| 7,000-9,999 | 844.75 |

SOURCE: Seattle Utilities
*New York City Independent Budget Office*

Figure 21:
**Seattle Stormwater Rates for Properties Other Than Single-Family Properties Greater Than 9,999 sqft**

| Percentage Impervious | Annual Rate Per 1,000 sqft |
|---|---|
| Undeveloped (0-15% Impervious) | $56.83 |
| Light (16-35% Impervious) | 84.33 |
| Regular (36-65% Impervious) | 119.48 |
| Heavy (66-85% Impervious) | 157.85 |
| Very Heavy (86-100% Impervious) | 188.24 |

SOURCE: Seattle Utilities
*New York City Independent Budget Office*

then multiplied by the monthly rate of 0.72 to get a gross area charge of $57.60. If the same property has 20,000 square feet of impervious surface area, they have 40 billing units. The 40 billing units are multiplied by the monthly rate of $5.41 to get an impervious surface area charge of $216.40. Once you total the charges together, plus the $2.45 billing and collection fee, this property owner would have a monthly stormwater charge of $276.45.

## Seattle, WA

Seattle's stormwater fee uses a tiered fee for single-family homes, and a variable rate for all other properties. Unlike the other studied cities, Seattle ratepayers are charged an annual drainage fee which shows up on the King County property tax statements. Based on a 2007 stormwater rate study, Seattle updated their stormwater structure in a five-year rollout process.[21] Most sewers in the city are separate sewers. Combined sewers exist only in older neighborhoods in Seattle. The stormwater fee is collected by Seattle Public Utilities.

Single-family properties smaller than 10,000 square feet are given tiered drainage rates based on the size of the property.

All other properties, including single-family homes 10,000 square feet and larger, are assigned rate categories (i.e., undeveloped, light, regular, heavy, very heavy) based on how much impervious surface is on a property. Each rate category is multiplied by the parcel area (in 1000's square feet) to calculate the annual rate. For example, a property with 20,000 square feet of total surface area (impervious plus pervious) in the underdeveloped category would have 20 billing units. With an annual rate of $56.83, this property owner would have an annual fee of $1,136.

## Washington, D.C.

In 2009, Washington, D.C. implemented an Impervious Area Charge based on ERUs. Prior to this, residents paid a volumetric sewer fee to cover sewer and wastewater services. As of 2023, Washington, D.C. property owners pay two separate impervious area charges through their water bills. The Department of Energy and Environment collects the city's stormwater fee ($2.67 per ERU) which funds green infrastructure projects. The District of Columbia Water and Sewer Authority charges the Clean Rivers Impervious Area Charge ($18.14 per ERU) which funds an initiative to reduce combined sewer overflows.[22] Washington, D.C.'s stormwater fee uses a tiered fee for single-family homes, and a variable

Figure 22:
**Washington, D.C. Stormwater Rates for Single-Family Residential Properties**

| Impervious Surface Area (sqft) | Number of ERUs | Flat Monthly Rate |
|---|---|---|
| 100-600 | 0.6 | $12.49 |
| 700-2,000 | 1.0 | 20.81 |
| 2,100-3,000 | 2.4 | 49.94 |
| 3,100-7,000 | 3.8 | 79.08 |
| 7,100-11,000 | 8.6 | 178.97 |
| >11,000 | 13.5 | 280.94 |

SOURCE: Washington, D.C. Department of Energy and Environment & DC Water
*New York City Independent Budget Office*

Figure 23:
**Washington, D.C. Stormwater Rates for All Properties Other Than Single-Family Residences**

| Fee Drivers | Monthly Rate |
|---|---|
| Rate Per ERU (1,000 Impervious sqft) | $2.67 |
| Clean Rivers Impervious Area Charge per ERU (1,000 impervious sqft) | 18.14 |

SOURCES: Washington, D.C. Department of Energy and Environment & DC Water
New York City Independent Budget Office

rate for all other properties. Over 60 percent of the Washington, D.C.'s sewer system is a separate sewer while the remaining portion of it is combined.

ERUs on single-family properties are assessed by the amount of impervious surface on a residential property, as shown in Figure 22.

The stormwater fee and the Clean Rivers Impervious Area Charge are separate line items, but both are driven by ERUs. If a commercial property has 20,000 square feet of impervious surface, the property has 20 ERUs. A property owner with 20 ERUs would have a monthly stormwater bill of $53.40 and a monthly Clean Rivers Impervious Area Charge of $362.80 bringing the overall bill to $416.20.

# Appendix B: Data

IBO created a model with two publicly available datasets. Our model estimates the cost of a stormwater fee for every property parcel in New York City, under the rate structures of the four peer cities.

## DEP Citywide Parcel-Based Impervious Area GIS Study

In 2020, DEP published a survey of all properties in New York City, mapping the total amount of impervious, pervious, semi-pervious and open water areas on each property using Geographical Information Systems (GIS). Each property parcel is identified by borough-block-lot (BBL) number. Every square foot of each parcel is labeled as one of 19 classes (e.g., grass, concrete, gravel, sand, water, etc.), each of which is associated with one grade: "Impervious", "Pervious", "Semi-pervious", or "Open water". This dataset was used in our stormwater model to apply the stormwater rates based on the square footage of the impervious surface area and in some cases the total surface area (the sum of impervious, pervious, and semi-pervious; open water was excluded).

## Primary Land Use Tax Lot Output (PLUTO)

The Department of City Planning's PLUTO dataset contains "extensive land use and geographic data at the tax lot level." Specifically, we assign each property parcel a land use type because the rate structures we used in our model all distinguish between at least two types of property (residential vs. commercial, single-family homes vs. all others, etc.). The PLUTO data has these land use types by BBL, which allowed IBO to assign a property type to almost every parcel in DEP's Surface Area Dataset. IBO used the most recent PLUTO dataset available at the time of analysis (updated in June 2023) because 2023 stormwater rates were used from peer cities in our model, and the land use type of most BBLs has not changed since 2020, allowing IBO to match most BBLs in DEP's dataset with a land use type from the PLUTO data.

The 11 land use categories include: One & Two Family Buildings; Multi-Family Walk-Up Buildings; Multi-Family Elevator Buildings; Mixed Residential & Commercial Buildings; Commercial & Office Buildings; Industrial & Manufacturing; Transportation & Utility; Public Facilities & Institutions; Open Space & Outdoor Recreation; Parking Facilities; and Vacant Land. "Not Defined" properties either were not labelled or did not exist in the PLUTO data, and they only represent 1.7 percent of total impervious surface, making their impact small. IBO kept these parcels in the data and treated them like commercial properties when applying stormwater rates to them.

## American Community Survey Median Household Income Data

To perform our financial burden analysis, IBO downloaded median household income data by census tract from the U.S. Census Bureau's American Community Survey. IBO chose to use the 2017-2021 5-year estimates, which has more observations than the 1-year estimates, making it statistically more reliable.

## Observations from Summary Statistics of Data Sets

***Distribution of Land Use Types and Impervious Surface Areas.*** The most common land use type is "One & Two Family Buildings," with over 564,000 parcels, or 66 percent of the total parcels in the city. However, these properties have the third smallest median impervious surface area at 2,079 impervious square feet. The largest median impervious area is Multi-Family Elevator Buildings with over 10,700 impervious square feet, but only representing about 1.5 percent of all parcels in the city. The number of lots and median impervious surface area for all land use types are shown in Figure 24.

***Most of New York City Is Impervious Surface Area.*** Approximately 60 percent of the land in DEP's study is considered impervious, highlighting that New York City has a great deal of impervious surfaces that

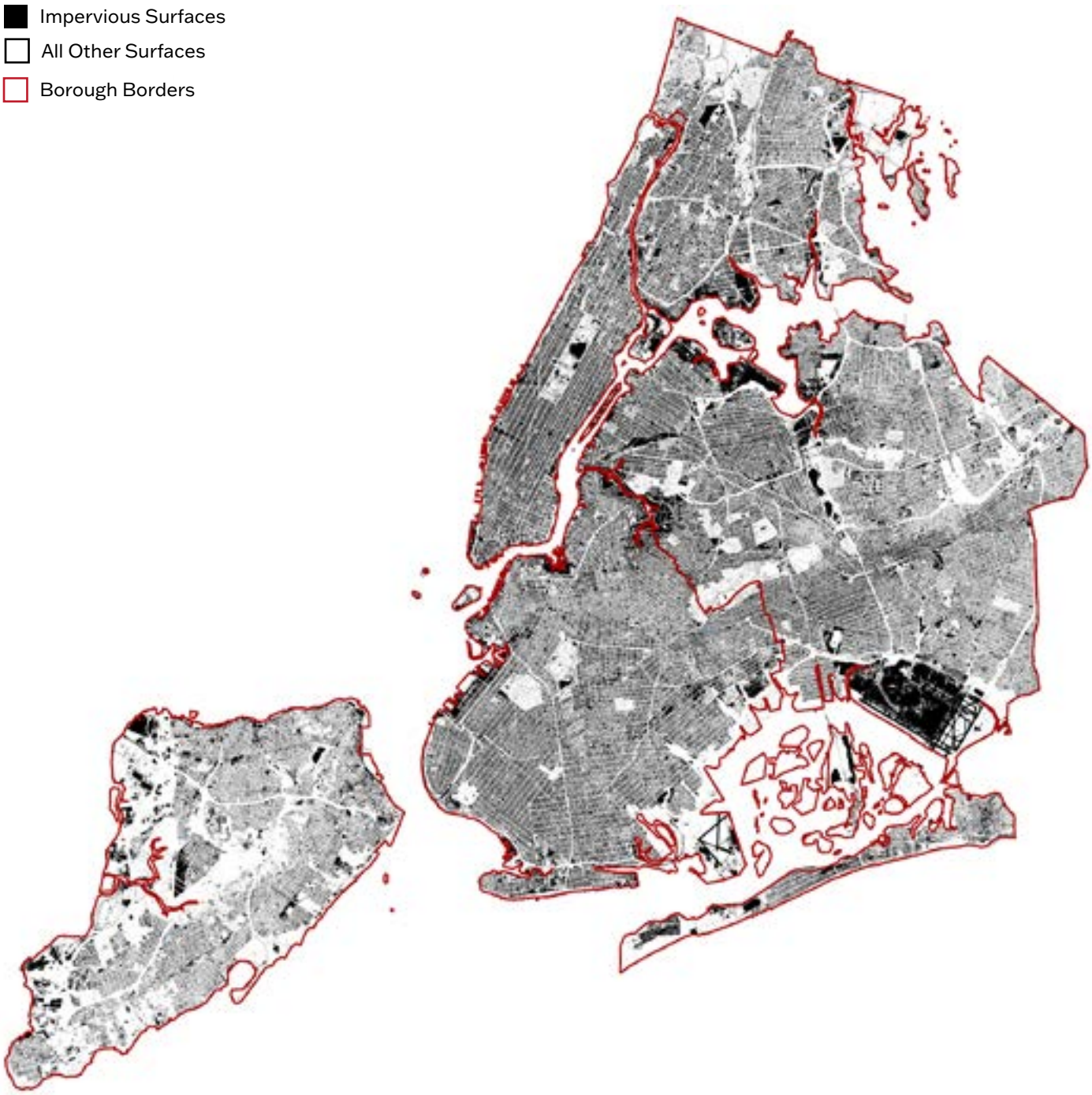
contribute to stormwater runoff. This is the issue that stormwater fees attempt to address by charging ratepayers for their property's contribution to stormwater runoff. Figure 25 presents all impervious surfaces in DEP's surface area data. Impervious surfaces are shaded black. White surfaces are either pervious, semi-pervious, or public roadways (which DEP did not include in its study). The darker the shading, the more concentrated the impervious surface areas; lighter gray indicates that there are pervious or semi-pervious surfaces interspersed. By charging parcels based on their impervious surface area, the city would hope to discourage impervious surfaces by making properties internalize the cost (or part of the cost) of their contribution to stormwater damage and management costs.

Figure 24:
**Summary Statistics for Merged DEP and PLUTO Data**

| Property Type (defined by PLUTO) | Number of Lots | Median Impervious Land Area (sqft) |
|---|---|---|
| One & Two Family Buildings | 564,879 | 2,079 |
| Multi-Family Walk-Up Buildings | 130,797 | 2,127 |
| Mixed Residential & Commercial Buildings | 55,174 | 2,143 |
| Vacant Land | 24,227 | 660 |
| Commercial & Office Buildings | 21,239 | 5,070 |
| Multi-Family Elevator Buildings | 12,668 | 10,704 |
| Public Facilities & Institutions | 12,054 | 7,146 |
| Parking Facilities | 9,501 | 2,531 |
| Industrial & Manufacturing | 9,479 | 7,718 |
| Transportation & Utility | 6,051 | 7,325 |
| Not Defined | 5,654 | 2,517 |
| Open Space & Outdoor Recreation | 4,671 | 1,238 |
| **Total** | **856,394** | |

SOURCE: IBO analysis of DEP Citywide Parcel-Based Impervious Area GIS Study and PLUTO data.
*New York City Independent Budget Office*

Figure 25
**Map of Impervious Surface Areas in New York City**




SOURCE: 2020 DEP Impervious Area Study
NOTE: "All Other Surfaces" includes surfaces labeld "Pervious" or "Semi-Pervious" in the 2020 DEP Impervious Area Study, and surfaces excluded from the DEP Impervious Area Study, most notably including public roadways.
*New York City Independent Budget Office*

# Appendix C: Methodology

## Stormwater Model

As stated previously, IBO created a model that calculates the approximate stormwater fee for each New York City property parcel under the 2023 rate structures of the four peer cities we researched: Baltimore, Philadelphia, Seattle, and Washington, D.C.

With DEP's surface area dataset, we transformed the data to present one row for every property parcel with columns for impervious, pervious, semi-pervious areas, along with a total area column (the sum of impervious, pervious, and semi-pervious). Next, IBO used the PLUTO data to assign a land use type to each parcel. The PLUTO data was unable to match about 65 million impervious square feet of DEP's surface area data, or 1.7 percent of the total impervious surface area across the city. IBO determined this difference was immaterial to the total analysis; moreover, these parcels are still included in the model, they just default to commercial property rates. With this merged dataset, IBO applied the stormwater rate structures of the four peer cities to all parcels in the dataset. This model was used as the basis for this report.

IBO's analysis begins with the total estimated revenue from a stormwater fee under each of the four peer city's rate structures. We aggregated the estimated stormwater fees for each property parcel in our model. Note that the model presents the estimated bill for each parcel; IBO was not able to estimate the likely collection rate for this theoretical fee.

There is great variation in the amount of impervious surface within and across the different land use types. There are also differences seen among the boroughs. These factors contribute to great variation in our estimates of the stormwater fees for each parcel. To present this variation, we show the estimated stormwater fees under the four peer city rate structures for the median impervious surface area under each land use description and borough (for the exact fee estimates, see the dataset in Appendix D). While using the median impervious surface area does not account for variation within land use types, IBO chose to use median impervious surface for ease of interpretation. We separately analyze residential and non-residential ratepayers.

## Noteworthy Model Assumptions

Our model includes several noteworthy assumptions. Several were made because of data limitations, while others reflect deliberate decisions made by IBO to make our model as realistic as possible in the research timeframe. These assumptions include:

- The fee is presented as if it was implemented in full in the present year, using today's dollars. Most cities have phased in their stormwater fees over time, but IBO was interested in the fully phased-in rates of the four peer cities.
- IBO's model is presented for all amounts to be billed to properties. We are not able to comment on the collectability of these stormwater fees.
- While certain organizations, such as daycare centers and hospitals, may be eligible for water and sewer exemptions, IBO did not exclude such properties in our revenue estimates.[23] Organizations must apply for the exemption and IBO cannot predict whether stormwater fees would similarly be eligible for exemption, nor how many properties would apply.
- Public roadways are not included in the IBO model because they were excluded in DEP's impervious surface study. Whether or not to subject public roadways to stormwater fees is a topic of much discussion.
- All "semi-pervious" surface areas were treated as "pervious" in the model because other cities do not mention "semi-pervious" surfaces in their rate structures. Moreover, semi-pervious surfaces make up

only 4 percent of the total surface areas in DEP's dataset, suggesting that treating these surfaces as impervious would not have a substantial impact on the total stormwater fee estimates.
- To calculate total surface area, IBO removed the "open water" grade because those were typically located in large bodies of water including the East River, Hudson River, and the bays surrounding New York City, which IBO does not expect to be charged stormwater fees. We did include the class "water" which has the grade "Impervious" because this included small bodies of water within a property, which are typically considered impervious because they can overflow when it rains and contribute to stormwater runoff.
- The PLUTO land use type of "One & Two Family Buildings" was used when a city's rate structure specified "single-family homes" because the PLUTO dataset does not differentiate between one and two family homes.
- "Multi-Family Elevator Buildings" under the Philadelphia rate structure were treated as "Condominiums," which are charged the same rates as non-residential properties, instead of "Residential" properties. This is because Philadelphia defines residential properties as "single-family homes, row houses, and twins."
- "Mixed Residential and Commercial Buildings" are treated as non-residential in all four rate structures.
- Seattle charges have a few alternative lower rates for properties deemed "low impact," but our model omits this additional rate structure.

## Financial Burden Analysis

Stormwater fees are intended to better match ratepayers with their contribution to stormwater runoff within a municipality's water system. By charging water bills based on a property's impervious surface area, properties become responsible for their contribution to stormwater runoff. In the absence of a stormwater fee, funds from metered water bills are used to manage stormwater damage, which is often inequitable because properties that use little or no metered water but have large impervious surfaces (parking lots, for example) contribute a lot to stormwater runoff but pay very little for the damage it causes. Stormwater fees aim to mitigate this discontinuity.

However, there are other factors to consider when analyzing the distributional implications of a stormwater fee. For example, low-income households and communities often have fewer resources to convert surface areas from impervious to pervious, which may preclude them from lowering their stormwater fee.

To assess the distributional implications of a stormwater fee, IBO calculated the economic burden of the estimated stormwater fees on residential properties. For each residential property, IBO divided the estimated stormwater fee by the total residential units within the property to estimate the stormwater fee per residential unit, identified the median property for each census tract, and finally divided by the census tract's median household income. This provides the cost of the stormwater fee as a percentage of income for each census tract. IBO's financial burden analysis is limited to residential properties (specifically "One & Two Family Homes," "Multi-Family Walk-Up Buildings, and "Multi-Family Elevator Buildings") because there is not enough data on commercial properties to assess the relative burden of these estimated stormwater fees.

To mitigate this concern, some cities include credit or discount options for certain under-resourced properties and neighborhoods as discussed in the report's conclusion. These factors, among others, make it complicated to design an optimal stormwater fee. Any municipality that considers implementing one should investigate all options carefully.

## Bond Rating Analysis

Municipal bonds are debt securities issued by governments (federal, state, and local) and governmental entities (authorities) to finance capital projects or to fund day-to-day operations. Rating agencies

such as Fitch, Moody's and S&P assign credit ratings based on the economy, debt structure, financial condition, demographic factors, and management practices of the governing body.[24] These ratings reflect the municipality's ability to collect the revenues necessary to pay back the debt. Strong bond ratings enable governments to issue debt more easily in the future and have lower interest rates. The Water Finance Authority currently has a strong S&P AA+ rating, Fitch AA+ rating, and Moody's Aa1 rating, all with stable outlooks.

To gain insight regarding the potential effect on bond ratings caused by the introduction of stormwater fees, IBO analyzed the bond ratings for several jurisdictions' water systems that enacted a stormwater fee from 2012 through 2021. Using the Western Kentucky University Stormwater Utility Survey, IBO gathered the adoption year of stormwater fees for the following: Contra Costa County Water District (California), Polk County Water and Sewer (Florida), Chesterfield County Water and Sewer (Virginia), Tucson Water Department (Arizona), and Corpus Christi Water Department (Texas). These entities were chosen because they have established stormwater fees roughly within the last decade and have a sizeable number of ratepayers. These entities serve between 320,000 and 725,000 ratepayers. (New York City has approximately 837,000 ratepayers.) Lastly, all these entities are rated on the Fitch Rating scale making for an even comparison.

For each entity, IBO reviewed the bond rating at the time of stormwater adoption, the bond rating two years post adoption, and the current bond rating. The peer cities were not used for this exercise because of limited data from the rating agency about credit rating trends pre- and post-adoption. Note that every entity's bond rating is the product of many factors unique to the jurisdiction, therefore while this analysis is informative, there is no perfect proxy for how the Water Finance Authority bond rating would be altered, if at all, with the introduction of a stormwater fee.

Out of the five water districts and water departments investigated, only Contra Costa County Water District had a decrease in their bond rating after stormwater fee adoption, however, it is not clear that this was due to the stormwater fee. Moreover, their most recent 2023 rating increased back to an AA+, the rating it held before stormwater fees. Conversely, Polk County Water and Sewer saw their bond rating increase five years after implementation to an AA+. The remaining entities have had their ratings remain stable since implementing a stormwater fee. Although IBO examined bond ratings elsewhere, it is clear that various factors—revenue collection, water, sewer, and stormwater rate structures, the share of revenues that stems from ratepayer billing, and reserves—are considered when bond ratings are determined, making it challenging to attribute changes in bond ratings to stormwater fees. Instead, IBO conducted this research to identify either a concerning downward trend or specific cases of large drops in bond ratings after stormwater fee adoption, and none were found.

Figure 26:
**Analysis of Bond Rating Before and After Stormwater Fee Adoption in Major Cities**

| Entity Name | Year of Adoption | Year of Adoption Bond Rating | Two Year Post Bond Rating | Current Bond Rating |
|---|---|---|---|---|
| Contra Costa County Water District | 2012 | AA+ | AA ↓ | AA+ ↑ |
| Polk County Water and Sewer | 2012 | AA- | AA- ■ | AA+ ↑ |
| Chesterfield County Water and Sewer | 2016 | AAA | AAA ■ | AAA ■ |
| Tucson Water Department | 2019 | AA | AA ■ | AA ■ |
| Corpus Christi Water Department | 2021 | AA- | AA- ■ | AA- ■ |

SOURCE: IBO historical analysis of the Fitch Rating scale for Contra Costa County Water District, Polk County Water and Sewer, Chesterfield County Water and Sewer, Tucson Water Department, and Corpus Christi Water Department
New York City Independent Budget Office

## Glossary

**Cloudburst**: A sudden storm event that produces enough water to create dangerous stormwater runoff and potentially overflow the sewer system.

**Combined Sewer Overflow**: During intense rainfalls, combined sewers receive more water than a treatment facility can handle due to stormwater and wastewater entering a facility simultaneously. At a certain point, the treatment facility cannot process all the water, so pressure valves end up releasing untreated water into the city's waterways (i.e., East River, Harlem River, Newtown Creek, etc.)

**Impervious Surface:** Hard ground surfaces that block water from soaking into the ground, such as roofs, driveways, and parking lots.

**Municipal Separate Storm Sewer System (MS4)**: An MS4 is a sewer system that collects stormwater and wastewater in different pipes. In this system, stormwater gets carried out to the watershed while wastewater gets treated at a water facility before entering the watershed. Because the water systems are separated, combined sewer overflow does not occur so untreated wastewater is never released into the watershed.

**New York City Department of Environmental Protection (DEP):** DEP is tasked with protecting public health and the environment by supplying clean drinking water, treating wastewater, and reducing air, noise, and hazardous materials pollution. DEP also manages 14 wastewater resource recovery facilities located in the city and seven wastewater recovery facilities in the upstate watershed.

**New York City Municipal Water Finance Authority (Water Finance Authority)**: The Water Finance Authority was created as a public benefit corporation in 1984 with the purpose of issuing bonds, notes, and other financing mechanisms to fund capital projects for the city's water and sewer system.

**New York City Water Board (Water Board)**: The Water Board has the duty of setting water and sewer rates annually with the purpose of funding the water and sewer system's operating and capital needs, which includes the salaries and benefits of city employees and major capital improvement projects.

**Pervious Surface:** Ground surfaces like lawns, gardens, and planting beds, that can retain water during a precipitation event then gradually release it back into the water cycle.

**Stormwater:** Water from rain and snow events.

**Stormwater Detention Area:** Areas where stormwater is temporarily held instead of contributing to stormwater runoff. After the storm surge ends, water in the detention area is gradually reintroduced to the water cycle, avoiding system overflows.

**Stormwater Fee:** A monthly or annual fee often based on the amount of impervious surface area of a property. Governments charge stormwater fees to produce a stable source of revenue for managing stormwater costs.

**Stormwater Runoff:** Water from rain events that travels across impervious surfaces before being stored in a stormwater detention location or being released in waterways (such as rivers and other bodies of water).

**Sustainable Rate Structure Analysis (SRSA):** The SRSA is a rate structure study carried out by DEP to analyze water and wastewater rate structure options, customer assistance, and credit programs. The SRSA, expected to be released by the end of 2023, will provide recommendations and implementation options for DEP to achieve a more predictable, equitable, and sustainable revenue stream.

**Wastewater:** A generic term to reference a combination of sewage and stormwater.

## Endnotes

[1]For examples, see: Levine, Larry, "Equitable Water Rates for New York City: Charging for Stormwater." Natural Resources Defense Council. July 24, 2019; SWIM Stormwater Infrastructure Matters, "Stormwater Finance."
[2]New York City Department of Environmental Protection, "Combined Sewer Overflows."
[3]New York City Department of Environmental Protection, "NYC Sewer System Story Map."
[4]City of New York "Mayor Adams, EPA Break Ground on $1.6 Billion Project to Protect Gowanus Canal From Sewage Overflow."
[5]City of New York Department of Environmental Protection, "Combined Sewer Overflow Long Term Control Plan for Citywide/Open Waters Report." September 2020.
[6]Ibid.
[7] Western Kentucky University, "Western Kentucky University Stormwater Utility Survey 2022."
[8]City of New York, Green Infrastructure Annual Report.
[9]New York City Municipal Water Finance Authority Water and Sewer System General Resolution Revenue Bonds Fiscal 2024 Series AA offering statement, p. 32.
[10]S&P AA+ rating, Fitch AA+ rating, and Moody's Aa1 rating, all with stable outlooks.
[11]WHYY PBS/NPR Philadelphia, "New stormwater fee structure explained."
[12]City of New York, "Comparative Rate Structure Analysis", August 2021.
[13]New York City Municipal Water Finance Authority Water and Sewer System General Resolution Revenue Bonds Fiscal 2024 Series AA offering statement, p. 32.
[14]Penn State Extension, "What Is a Stormwater Credit?"
[15]HomeAdvisor, "How Much Does a Green Roof Cost?"
[16]HomeAdvisor, "How Much Does Permeable Paving Cost?"
[17]Prince George County Department of the Environment, "Rain Garden Fact Sheet."
[18]King County "Surface Water Management Fee Discount for Low-Income Property Owners."
[19]New York City Department of Environmental Protection, "Home Water Assistance Program."
[20]Philadelphia Water Department, "Non-Residential Stormwater Charge."
[21]New York City Department of Environmental Protection, "BEPA-SRSA Comparative Rate Structure Analysis Final Report."
[22]District of Columbia Department of Energy & Environment, "Stormwater Fee Background."
[23]For more information on the types of organizations currently eligible for exemptions, see DEP's application for water and sewer exemptions.
[24]WM Financial Strategies, "Municipal bond ratings" | (munibondadvisor.com)

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