

NYC GREEN INFRASTRUCTURE

2024 Annual Report



TABLE OF CONTENTS

2024 Annual Report



INTRODUCTION

PG 01

2024 GI PROGRAM UPDATES

PG 05

GREEN INFRASTRUCTURE MAINTENANCE

PG 19

NYC GI PROGRAM SPENDING AND BUDGET

PG 21

LOOKING AHEAD TO 2025

PG 25

ADAPTIVE MANAGEMENT AND LESSONS LEARNED

PG 29

LINKS TO RESOURCES

PG 32

EXHIBIT A - CSO VOLUME REDUCTION

PG 33

EXHIBIT B - IMPLEMENTATION AREAS

PG 35

ACRONYMS

PG 36



RAIN GARDEN IN THE RIGHT-OF-WAY

Developed over a decade ago to improve Harbor water quality, the NYC Green Infrastructure Program also provides local flood resiliency in our rapidly changing climate. Green infrastructure practices are designed to slow down, absorb, and filter stormwater by capturing it at the source before it can enter the sewer system or contribute to flooding. In 2024, DEP released the 2024 Stormwater Analysis¹, which highlighted the City's challenges with managing stormwater in a changing climate, as well as plans for the future. As part of this effort, DEP's green and grey infrastructure teams are coordinating to develop a stormwater master plan for New York City that will lead to a more resilient system overall. This planning process will take years, but the result will be targeted approaches to capital investments that may include constructing green infrastructure in areas where it could help reduce the risk of surface flooding while longer-term flood reduction projects like grey infrastructure upgrades are planned.

With over 16,000 green infrastructure assets constructed and over \$1 billion encumbered, the NYC Green Infrastructure Program is now the largest of its kind in the nation and continues to expand. Under modified regulatory obligations, DEP is implementing the NYC Green Infrastructure Program citywide, beyond the combined sewer areas, while also incorporating equity into the planning stages for siting assets and applying a broader selection of nature-based solutions. Additionally, DEP has implemented a stormwater rule that requires a retention-first approach to onsite stormwater management for many new construction and redevelopment sites citywide. DEP is committed to spending \$3.5 billion on the NYC Green Infrastructure Program to improve water quality and to support climate change resiliency objectives in adapting to increasing risks of flooding caused by extreme rain events.

CSO Order Objectives

Over the past decade, DEP has developed 11 drainage basin-specific Long Term Control Plans (LTCPs) with federal and state regulators for NYC waterways impacted by combined sewer overflows (CSOs). With the 2012 CSO Consent Order, DEP included the NYC Green Infrastructure Program as part of its regulatory milestones to complement traditional gray in-

¹ 2024 Stormwater Analysis, <https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/2024-stormwater-analysis-report.pdf>

infrastructure investments and committed to reduce CSOs by 1.67 billion gallons annually by 2030 through green infrastructure. DEP has been leading the NYC Green Infrastructure Program in areas served by the combined sewer system (CSS) by constructing green infrastructure practices in the public right-of-way, on City-owned property, on private property through financial incentive programs, and through stormwater regulations. The use of green infrastructure expanded on both public and private properties citywide through updates to stormwater regulations, such as the implementation of the Unified Stormwater Rule in 2022.

In 2023, DEP and the New York State Department of Environmental Conservation (DEC) signed a modification to the Consent Order. Major changes between the 2012 CSO Order and the 2023 Citywide Green Infrastructure Modification (2023 Modification²) include expanding the definition of green infrastructure, extending the NYC Green Infrastructure Program's timeline, updating the Program's certification metrics and interim milestones, and increasing the Program's total funding commitment to include projects citywide. The Program's revised regulatory goal is to reduce CSOs by 1.67 billion gallons per year (BGY) in combined sewer areas by December 2040 and, building on current investments, expend \$3.5 billion on green infrastructure citywide by December 2045.

The modification allows DEP to track green infrastructure constructed in areas served by the municipal separate storm sewer system (MS4) towards the new financial milestones. Prior to the 2023 Modification, DEP had been strategically constructing green infrastructure in MS4

To date, DEP has constructed over 7,000 rain gardens citywide

PROGRAM HIGHLIGHTS

2,853

Managed Acres in CSS Areas

16,321

Assets constructed in CSS Areas

Over 55%

of both CSS and MS4 assets in Environmental Justice Areas

areas as necessary under MS4 permit obligations, as well as through DEP's financial incentives and partnerships, and median projects. Going forward, as part of the Program's regulatory goal under the 2023 Modification to the CSO Order, DEP can consider multiple benefits of green infrastructure for neighborhoods, in addition to CSO volume reduction, such as flood management and water quality improvements.

The definition of green infrastructure in the 2023 Modification includes a wide array of practices at multiple scales that manage stormwater by infiltration, evapotranspiration, capture and reuse, infiltration, and detention. On a local scale, green infrastructure includes site- and neighborhood-specific practices, such as rain gardens. On a larger scale, green infrastructure includes maintaining and restoring ecosystems, such as wetlands, as well as regulated practices built to manage stormwater after construction, and practices to mitigate risks from rain events known as cloudbursts. With the 2023 Modification, DEP now has greater flexibility to capture more parts of the city by targeting areas with green infrastructure practices designed to balance flood risk reduction and water quality improvements while complying with regulatory obligations.

2 2023 Citywide Green Infrastructure Modification, https://extapps.dec.ny.gov/docs/water_pdf/2023nycgiordermod.pdf

Certification Metrics

The metrics DEP uses to certify the NYC Green Infrastructure Program have also been updated in the 2023 Modification. While DEP will still measure progress towards the CSO volume reduction goal by tracking green infrastructure practices constructed in CSS areas of the City, DEP will also now track practices that meet the expanded definition of green infrastructure that are constructed citywide for its funding commitment goals. The new milestone schedule and goals are listed in Table 1.

TABLE 1: 2023 MODIFICATION CUMULATIVE MILESTONES

Milestone	CSO Volume Reduction (MGY) ^a	Funds Encumbered or Expended ^b
December 2025	668	\$1.4 billion encumbered
December 2030	700-800	\$1.8 billion encumbered
December 2035	850-1,220	\$2.8 billion encumbered
December 2040	1,670	\$3.5 billion encumbered
December 2045	--	\$3.5 billion expended

a CSO volume reduction for green infrastructure in combined sewer areas based on average rainfall year of 2008

b Public green infrastructure citywide

DEP reports on CSO volume reduction by first calculating annual stormwater capture volume using practice class-specific Stormwater Capture Equivalency Rates, then converting the stormwater volume to CSO volume reduction by applying Waterbody Drainage Area Specific Equivalency Rates, which represent how much stormwater needs to be managed to reduce the resulting CSO volume in each LTCP waterbody.

The different Stormwater Capture Equivalency Rates illustrate how green infrastructure practices that are retention-based (i.e., designed to manage larger storms, allowing stormwater to infiltrate into the ground) can manage more stormwater than detention-based practices. The varying Waterbody Drainage Area Specific Equivalency Rates are based on models developed for the 2016 Green Infrastructure Performance Metrics Report, where each waterbody receives CSO contributions from one or more watersheds. At a high level, Waterbody Drainage Area Specific Equivalency Rates are a result of a combination of factors that include underlying soil conditions and sewer system hydraulic specifics such as available wet weather flow capacity, travel times from outfalls, as well as the location of the green infrastructure assets within a given watershed. Consequently, constructing green infrastructure in certain waterbody drainage areas such as Flushing Creek or Flushing Bay yields higher CSO reduction credit as compared to others, such as Westchester Creek. The Stormwater Capture Equivalency Rates, Waterbody Drainage Area Specific Equivalency Rates, and the exact calculation for CSO volume reduction are provided in Exhibit A.

In addition to the above milestones, under the 2023 Modification, DEP has agreed to complete the Tibbetts Brook day-lighting project according to the following schedule:

- Notice to Proceed to Construction 24 months after the later of either site acquisition/access or design completion.
- Construction Completion 36 months after Notice to Proceed to Construction but no later than December 2035.

Table 2 on the next page summarizes the progress DEP has made towards the CSO volume reduction goals to date. Geographic locations of constructed green infrastructure practices included in the table below, as well as upcoming projects, can be seen on DEP's interactive online Green Infrastructure Map at www.nyc.gov/dep/gimap.

TABLE 2: CUMULATIVE GREEN INFRASTRUCTURE IN CSS AREAS FROM 2012-2024

Waterbody Drainage Area	Number of Assets	Managed Acres ^a	Stormwater Managed (MGY)	SW to CSO Equivalency Rate (SW MGY/CSO MGY)	CSO Volume Reduced (MGY)
Alley Creek	18	3	3	2.75	1
Bronx River	519	119	62	2.35	26
Coney Island Creek	72	9	5	2.75	2
East River/Open Waters	3,815	802	335	1.87	178
Flushing Bay	947	97	67	1.25	54
Flushing Creek	2,304	294	233	1.91	122
Gowanus Canal	209	36	17	2.75	6
Hutchinson River	224	167	155	1.73	90
Jamaica Bay and Tributaries	6,119	1,055	863	3.67	233
Newtown Creek	1,803	233	155	1.72	90
Westchester Creek	291	39	20	5	4
Total^b	16,321	2,853	1,917	-	807

a Managed Acres = an area equivalent to one acre of impervious surface covered by one-inch of stormwater for distributed ROW assets (rain gardens, infiltration basins, stormwater greenstreets) and tributary drainage area for ROW porous pavement and all other assets.

b Sum may not add up to total due to rounding.

2024 NYC GREEN INFRASTRUCTURE PROGRAM UPDATES

RIGHT-OF-WAY GREEN INFRASTRUCTURE

The public right-of-way (ROW) includes sidewalks, parking lanes, medians, and the roadway. It makes up approximately 30% of the impervious cover in the city and generates stormwater runoff during rain events. The public ROW offers a tremendous opportunity for siting green infrastructure and, as such, has been the largest implementation area of the NYC Green Infrastructure Program thus far. DEP implements areawide ROW green infrastructure projects in partnership with the Department of Transportation (DOT), the Department of Parks and Recreation (Parks), the Department of Design and Construction (DDC), and the Economic Development Corporation (EDC). DEP has also been coordinating with the Office of Environmental Remediation (OER) to source materials. Over the years, rain gardens have used more than 1,300 reclaimed soil tons from the NYC Clean Soil Bank operated by OER. To date, these areawide projects have led to the vast majority of NYC Green Infrastructure Program accomplishments.

Porous Pavement

To date, DEP has constructed 77,908 SF of permeable pavement within NYC streets through pilot projects. In 2024, a construction contract for over 100,000 SF of porous pavement in Brooklyn, draining to East River/Open Waters, broke ground. Advertisement of two additional areawide porous pavement construction contracts, comprising of 400,000 SF in Brooklyn, is anticipated for 2025. A fourth contract in Brooklyn with over 100,000 SF is anticipated to complete design in 2026. A contract in the Bronx, aiming to implement 150,000 SF of porous pavement progressed with design.

Hi!



I'm Porous Concrete

Please no dumping, keep me trash and sand free.

Precast Porous Concrete Panels (PPCP) are a kind of permeable pavement. These panels collect stormwater runoff from our streets.

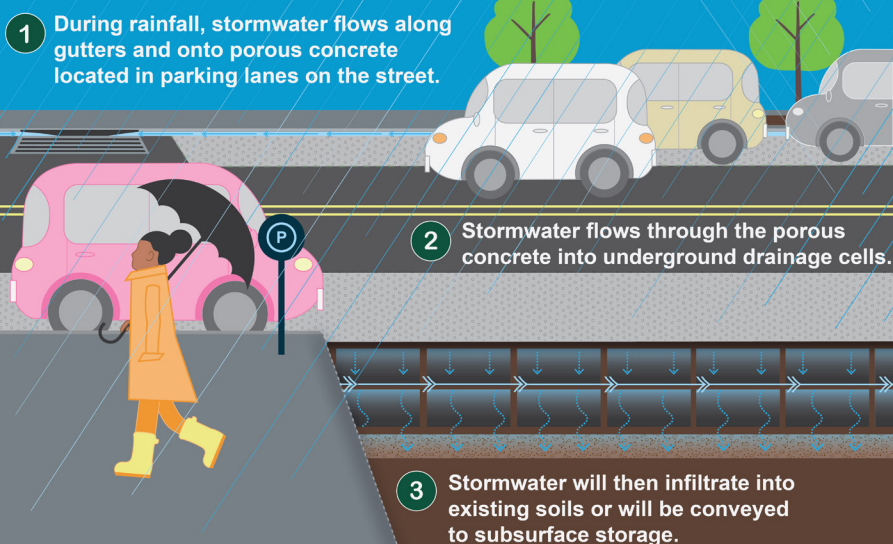
This is vital infrastructure that can help to mitigate flooding and improve water quality by reducing pollution to New York City waterways.

Need to report a flood related issue?

Report issues by dialing 311, downloading the NYC311 app, or on the 311 website at portal.311.nyc.gov



Here's how it works...



DRAFT SIGNAGE FOR RIGHT-OF-WAY POROUS PAVEMENT

1 <https://www.nyc.gov/site/dep/water/rain-gardens.page>

Rain Gardens, Stormwater Greenstreets, and Infiltration Basins

In 2024, DEP continued widescale implementation of green infrastructure in the ROW through three construction contracts, completing construction of over 1,400 rain gardens¹ and infiltration basins combined. DEP continued progress on an additional construction contract, which includes over 600 rain gardens and infiltration basins combined in the Jamaica Bay CSO tributary area. DEP initiated new areawide design contracts in Flushing Bay and East River/Open Waters watersheds, with registration anticipated in summer 2025.

Multi-agency GI Protection and Enforcement Efforts

In 2024, DEP continued field efforts of constructed assets and ongoing protection and coordination measures. There were over 50 green infrastructure locations with conflicts over the last year. DEP coordinated with private utilities and contractors through the GI Utility DEP email address (GIUtility@dep.nyc.gov), NYC Department of Buildings (DOB) through Builders Pavement Plan applications with green infrastructure conflicts to DEP for review, and with DOT to ensure all constructed green infrastructure assets are included on DOT's street-opening permits system. DEP is utilizing this multi-agency approach to proactively address potential negative impacts to green infrastructure and follow through with violations issued by DOT and DEP as needed.

PUBLIC PROPERTY RETROFITS

DEP has been working with key public agency partners since 2011 through its public onsite program to implement green infrastructure retrofits on publicly owned properties. DEP's core public onsite partners are Parks, Department of Education (DOE), School Construction Authority (SCA), and NYC Housing Authority (NYCHA). Additional partners include the Trust for Public Land (TPL), DDC, EDC, and other public agency landowners and their project delivery partners.

In 2024, DEP continued design and construction of agency-specific contracts to retrofit NYCHA, Parks, and school properties, and continued its partnership with TPL for schoolyards. Table 3 on the next page shows the status of public property retrofits in DEP's portfolio. Construction continued for multiple NYCHA, Parks, and school projects that were bid out in 2023. Projects will be constructed over the next few years and additional retrofits are expected to be bid in 2025.

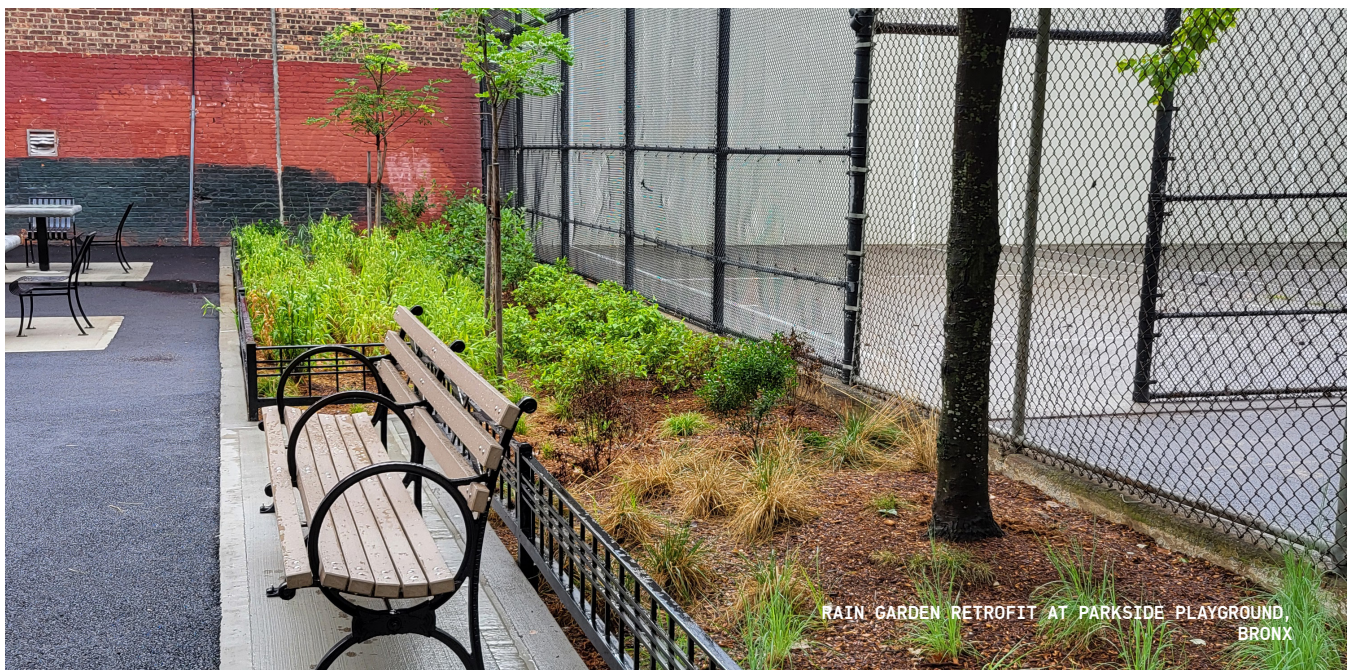


TABLE 3: SUMMARY OF GREEN INFRASTRUCTURE PROJECTS ON PUBLIC PROPERTY (2024)

	Parks and Playgrounds	Public Schools	NYCHA Housing	Other Public
Constructed/In Construction	129	92	37	8
In Design	32	19	10	4

The projects counted in Table 3 consist of different types of practices including surface, subsurface, and green roof practices, with surface and subsurface practice types being further categorizable into infiltrating retention practices or slow-release detention practices depending on the underlying soil properties. The practice types are selected and designed to fit existing site constraints and align with owner-agency programming needs.



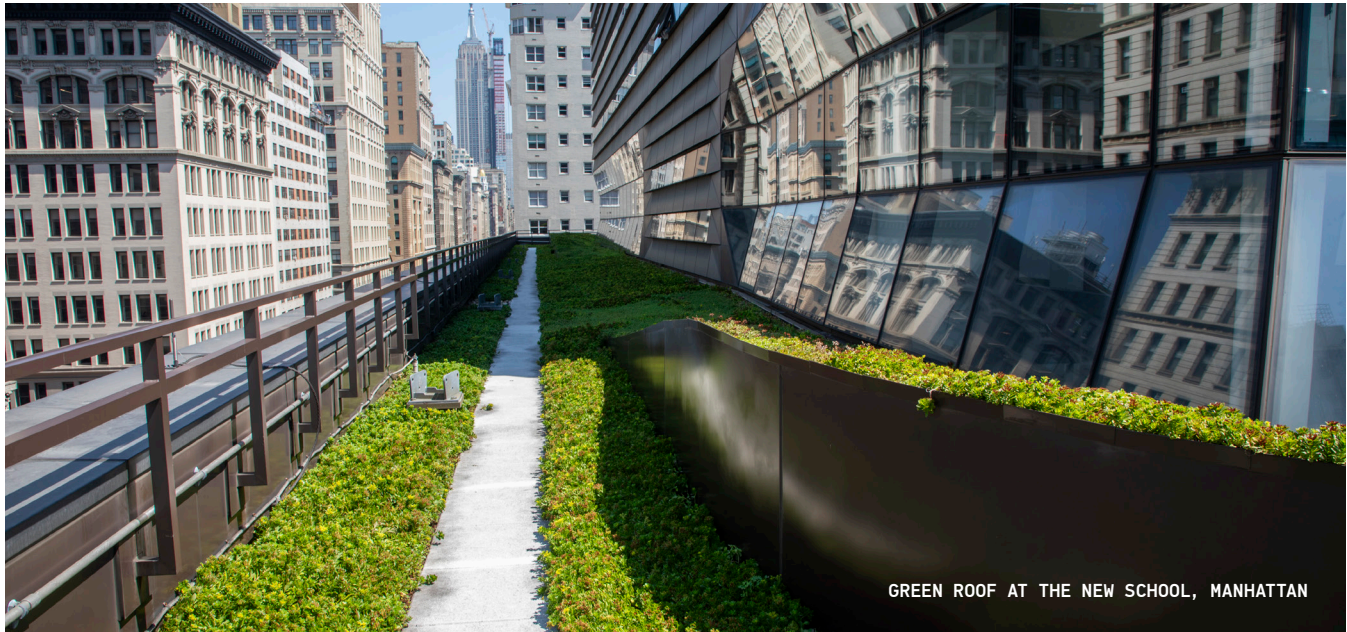
LARGE-SCALE MEDIANS

DEP's in-house design team identifies opportunities for large-scale green infrastructure practices within City-owned medians to target water quality objectives and inland flooding challenges. The large-scale street median designs prioritize the conveyance of stormwater runoff into practices that facilitate stormwater capture, retention, and detention, dependent upon soil conditions. The projects include converting impervious areas to a softscape with plant species that are adapted and suitable for the site's specific soil conditions in lieu of concrete or asphalt paving materials. Through this work, medians are reconfigured and redesigned to contribute to a vibrant and attractive public realm that promotes a better quality of life and helps protect the city's urban ecology.

In 2024, three green street median projects were constructed in Queens Village. These medians capture stormwater from major roadways in the vicinity of Martin Van Buren High School. Five additional projects are in design and 10 are in the early planning stages.

DEP was awarded \$5,000,000 from the NYS Environmental Facilities Corporation in 2022 to retrofit three existing medians in Queens at Springfield Boulevard between Lucas Street and Merrick Boulevard, Union Turnpike between Metropolitan Avenue and 71st Road and Frances Lewis Boulevard between 21st Road and 20th Avenue. Designs for these medians have been finalized and are expected to go into construction in the summer of 2025.

PRIVATE PROPERTY INITIATIVES



GREEN ROOF AT THE NEW SCHOOL, MANHATTAN

DEP provides financial incentives for installing green infrastructure on private property through the Green Infrastructure Grant Program and the Resilient NYC Partners Program. Through the Grant Program, DEP funds design and construction costs for green roof retrofits. Through Resilient NYC Partners, DEP funds site-level retrofit drainage improvements such as sub-surface storage, porous pavement, and rain gardens for properties with large areas of impervious surface. Projects funded through these public-private partnerships help make NYC more sustainable and resilient.

Green Infrastructure Grant Program

Since its introduction in 2011, the Green Infrastructure Grant Program² has sought to strengthen public-private partnerships and public engagement regarding the design, construction, and maintenance of green infrastructure on private property in NYC. To date, DEP has committed more than \$13 million for 32 private property owners to build green infrastructure through the Green Infrastructure Grant Program. DEP hosts quarterly virtual webinars that cover funding eligibility requirements and application tips.

In 2024, DEP updated the Green Infrastructure Grant Program reimbursement schedule. The new reimbursement table decreases the minimum required green roof vegetated area from 5,000 SF to 3,500

SF to allow more properties to be able to participate. Additionally, the Grant Program’s reimbursement rates were increased to reflect rising construction costs. The updated table also removes the stipulation that after 20,000 SF, reimbursement is reduced to 50% of the rate shown in the table.

TABLE 4: NEW REIMBURSEMENT RATES FOR GREEN ROOF PROJECTS

Soil Depth (in)	Green Roof Area ≥ 3,500 (sf)
1.5 - 1.99	\$15
2.0 - 2.99	\$20
3.0 - 3.99	\$35
4.0 +	\$40

DEP has actively promoted the program through various outreach efforts, including delivering presentations to community groups and green roof contractors, participating in tabling events, engaging directly with eligible property owners and distributing program flyers through door-to-door canvassing. Currently two properties are actively working on applications.

2 <https://www.nyc.gov/site/dep/water/green-infrastructure-grant-program.page>

Resilient NYC Partners

Resilient NYC Partners³ funds the design and construction of site-level green infrastructure practices such as subsurface storage, permeable pavements, and rain gardens on properties with 50,000 SF or more of site-level impervious area. The program provides an opportunity for large property owners to improve their property by addressing drainage issues such as localized flooding, resurfacing parking lots, and adding more greenery, all while helping the City to manage stormwater.

In 2024, DEP completed construction on six separate projects at four properties. In Queens, subsurface storage systems were installed to manage stormwater and mitigate flooding at the T. Mina supply yard and outside Flushing Hospital's critical emergency room entrance. In Brooklyn, subsurface storage systems were installed to manage stormwater at Pratt Institute,

and an array of green infrastructure practices including subsurface storage, permeable pavers, and a rain garden were installed at Green-Wood Cemetery. Across all of these projects, DEP worked closely with property owners to determine where flooding tended to occur on site and designed solutions tailored to each property's unique conditions and needs. In total, these projects will manage 4.03 million gallons of stormwater annually.

Additionally, construction began in December 2024 on a multi-phase project to install subsurface storage systems and a rain garden across three parking areas at H+H Jacobi Medical Center in the Bronx. These installations will help the hospital address chronic flooding challenges and enhance the hospital's stormwater resiliency.



PERMEABLE PAVERS AND SUBSURFACE STORAGE AT
GREEN-WOOD CEMETERY, BROOKLYN

3 <https://www.nyc.gov/site/dep/whats-new/resilient-nyc-partners.page>

Resilient NYC Partners in 2024

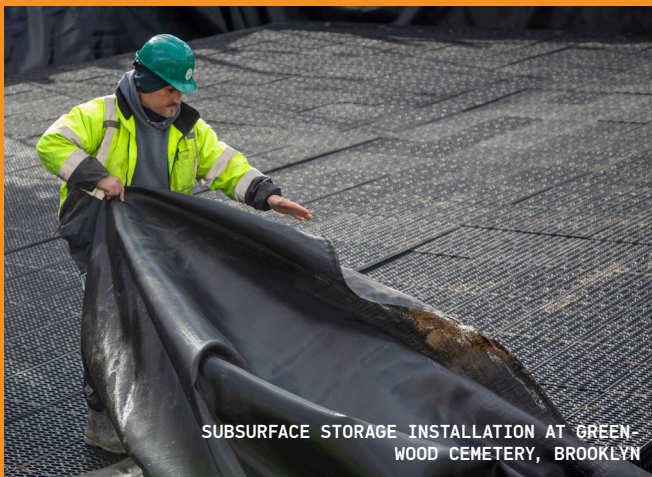
The private property incentive program Resilient NYC Partners continues to gain momentum with the support of DEP's program partner Arcadis. In 2024, the program completed six stormwater management practices total, installed at T. Mina Supply and Flushing Hospital in Queens, and Green-Wood Cemetery and Pratt Institute in Brooklyn. Together, these projects will manage approximately 4 MGY.



RAIN GARDEN AT GREEN-WOOD CEMETERY, BROOKLYN



PERMEABLE PAVERS AT GREEN-WOOD CEMETERY, BROOKLYN



SUBSURFACE STORAGE INSTALLATION AT GREEN-WOOD CEMETERY, BROOKLYN



SUBSURFACE STORAGE AT FLUSHING HOSPITAL, QUEENS



SUBSURFACE STORAGE AT T. MINA SUPPLY, QUEENS



SUBSURFACE STORAGE AT PRATT INSTITUTE, BROOKLYN

STORMWATER REGULATIONS

Stormwater regulations are a core part of DEP’s work to improve water quality and enhance sewer operations. With the promulgation of the Unified Stormwater Rule⁴ in 2022, DEP updated and aligned its water quality and sewer operation objectives. The Unified Stormwater Rule provides a comprehensive, citywide stormwater management policy for both public and private development.

2012 Stormwater Performance Standard

From 2012 to 2022, when the Unified Stormwater Rule was promulgated, new development and redevelopment projects that required sewer certification complied with a stormwater performance standard to limit flow from lots to ensure adequate capacity in the sewer system (2012 Stormwater Rule). Because of the inherent delay between receiving a permit for construction and completing construction of a development or redevelopment project, there are projects that received a site connection permit or house connection permit prior to the Unified Stormwater Rule that may still be under construction. Therefore, stormwater management practices associated with the 2012 Stormwater Rule will likely continue to be counted in future reports for the time being.

DEP is analyzing records starting from 2012 to determine whether there are assets and managed acres that were not previously reported. Table 5 provides a breakdown of the types of stormwater management assets, employed by applicants affected by the 2012 Stormwater Rule, that have been tracked and verified by DEP.

Unified Stormwater Rule

In 2022, DEP promulgated the Unified Stormwater Rule, which included amendments to Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York to update DEP’s site and house connection requirements and the Stormwater Construction and Maintenance Permitting Program (i.e., Stormwater Permitting). Under the Unified Stormwater Rule, stormwater regulations for citywide sewer operations and water quality objectives have been integrated and enhanced. Some projects are covered by both requirements.

In combined sewersheds, the Unified Stormwater Rule will lead to a reduction in CSO volume as lots redevelop over time. The benefits from the new rule will contribute to the NYC Green Infrastructure Program’s CSO reduction goal and continue beyond it, helping to institutionalize green infrastructure in new developments across NYC.

TABLE 5: 2012 STORMWATER PERFORMANCE STANDARD ASSETS AND MANAGED ACRES IN GREENHUB^a (2012-2024)

GI Type	Asset Count CSS	Managed Acres CSS	Asset Count MS4	Managed Acres MS4
Subsurface Retention	31	15	3	2
Green Roof	3	1	0	0
Other Rooftop System	826	155	34	10
Drywell	305	43	235	55
Multiple GI Components	239	169	19	12
Rain Garden	4	2	1	0.03
Detention System	815	406	111	16
Stone Trench	0	0	1	0.05
Total	2,223	791	405	96

a GreenHUB is DEP’s internal green infrastructure tracking system. Details on publicly funded green infrastructure assets are viewable on the NYC Green Infrastructure Public Map and downloadable through NYC Open Data. Regulated assets reported in this section are primarily on private property and not included in the publicly accessible data.

4 <https://www.nyc.gov/site/dep/water/unified-stormwater-rule.page>

5 <https://www.nyc.gov/site/dep/water/stormwater-permits.page>

Post-construction stormwater practices with Stormwater Maintenance Permits under the Stormwater Permitting Program, as well as practices built under the updated site/house connection requirements, are tracked in GreenHUB and summarized in Table 6 below. Most Unified Stormwater Rule assets in GreenHUB as of this report are site/house connection permits due to the lag time in projects receiving Maintenance Permits under the Stormwater Permitting program. Right-of-way green infrastructure assets that are under construction or constructed as well as constructed green infrastructure assets on private property are also included on DEP's green infrastructure public map as regulated projects.

TABLE 6: SUMMARY OF 2022-2024 UNIFIED STORMWATER RULE ASSETS AND MANAGED ACRES IN GREENHUB

GI Type	Asset Count CSS	Managed Acres CSS	Asset Count MS4	Managed Acres MS4
Subsurface Retention	3	0.36	3	1.12
Green Roof	1	0.02	0	0
Other Rooftop System	273	13	8	0.49
Drywell	434	29	305	27
Multiple GI Components	200	29	12	3
Detention System	133	18	22	2
Rain Garden/Bioretenion	3	1	4	0.08
Filtration Practice	0	0	1	5
Engineered Soil Tree Pit	1	0.01	0	0
Porous Pavement	0	0	1	0.21
Stone Trench	3	1	3	0.65
Filtration Practice	-	-	1	5
Total^a	1,051	91	360	45

a Sums may not add up to total due to rounding.

Because of the delay between submission to DEP of an application for a project under the Stormwater Permitting program and the completion of the project, many of the anticipated stormwater management practices that will be built under the Unified Stormwater Rule are still being constructed and are expected to be a larger part of DEP's reporting in the future, as the program continues and as green infrastructure continues to be required for development and redevelopment.

Since the Unified Stormwater Rule took effect, more than half of the vegetated stormwater management practices (SMPs) under construction will be in the MS4 area with the majority of these SMPs providing retention capabilities. This is because the Stormwater Permitting Program prioritizes vegetation and retention through the SMP Hierarchy included in the NYC DEP Stormwater Manual. In MS4 areas, if a project disturbs greater than 20,000 SF, discharges to an impaired waterbody, and increases the impervious area on site, then it must meet no net increase requirements. An impaired waterbody is one that does not meet water quality standards due to several pollutants of concern including pathogens, nutrients, and trash. NNI requirements can be met by implementing both SMPs and best management practices (BMPs), such as inspecting and cleaning onsite catch basins. In the MS4, about half of the area managed by post-construction stormwater management practices will also be sup-

⁶ This green infrastructure information is based on the data available at the time.

plemented with additional benefits to impaired waterbodies provided by the NNI requirements. The waterbodies receiving the most benefit from no net increase requirements include Jamaica Bay Eastern and its tributaries, Flushing Creek/Bay, and Bergen Basin

Figure 1 illustrates the breakdown of projects submitted through the Stormwater Permitting program with active construction permits that are anticipated to have SMPs, or green infrastructure, in CSS and/or MS4 areas. Including the projects depicted in Figure 1, over 590 project applications that do or are likely to require SMPs in either CSS or MS4 areas have been submitted since the implementation of the DEP online Stormwater Permitting and Tracking system in 2019. Figure 2 shows the general distribution of these projects across the LTCP waterbodies for those served completely or partially by CSS. Active construction projects that include post-construction SMPs are anticipated to provide approximately 50 MGY in CSO volume reduction.

FIGURE 1: SUMMARY OF ACTIVE STORMWATER CONSTRUCTION PERMIT POST-CONSTRUCTION SMPs IN CSS AND MS4 AREAS

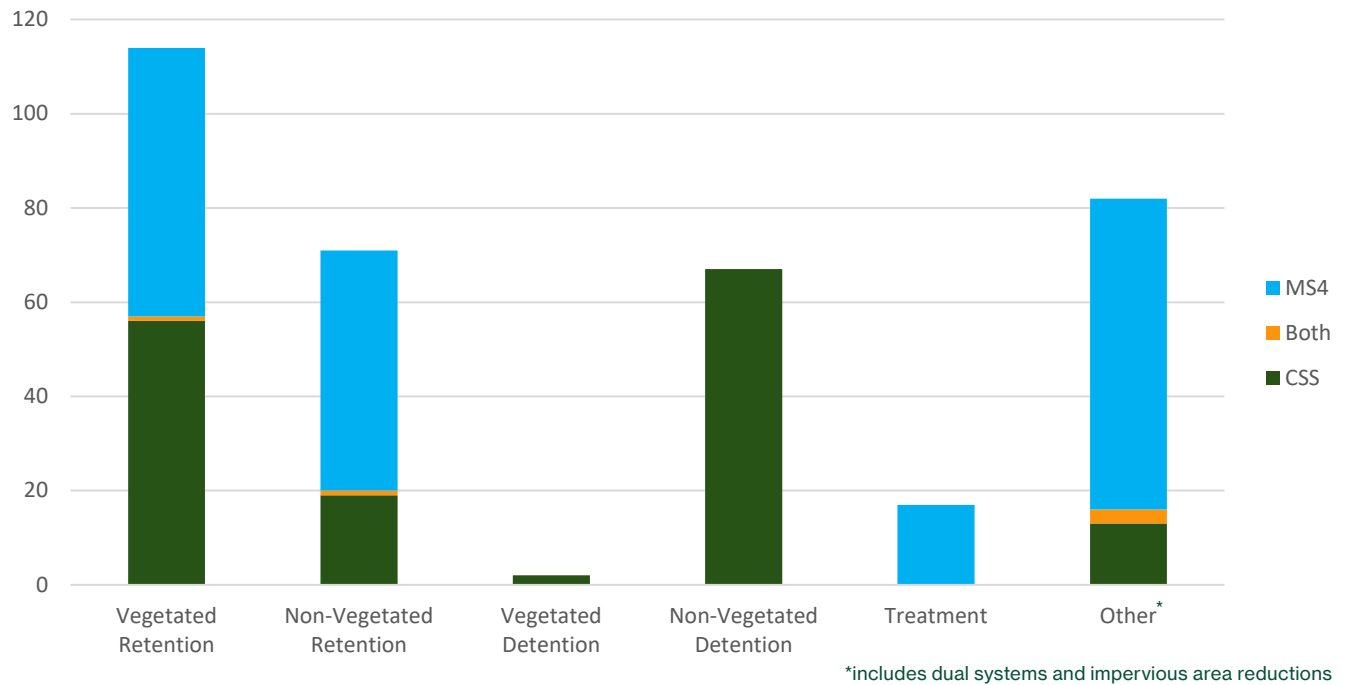
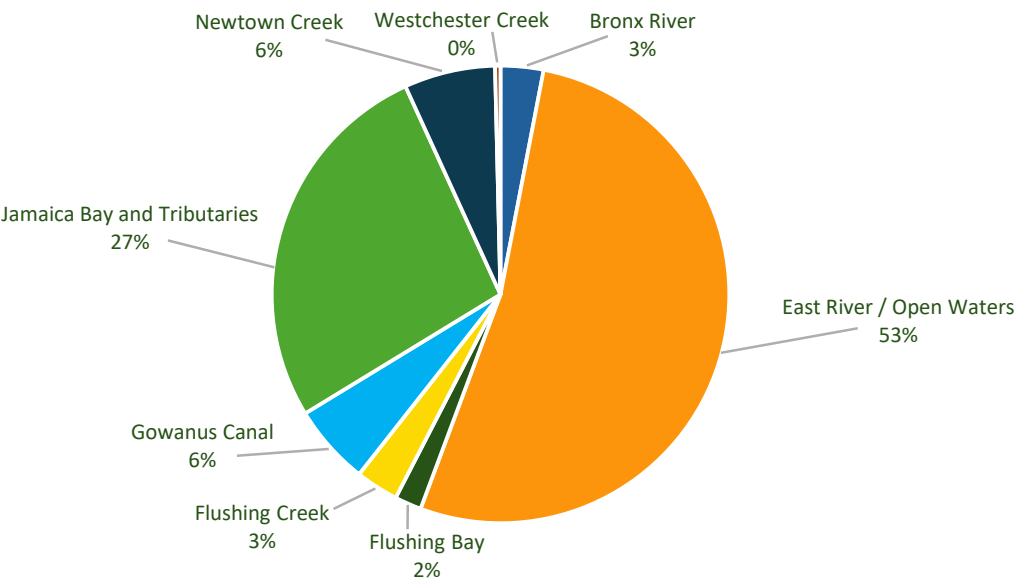


FIGURE 2: SUMMARY OF UPCOMING STORMWATER CONSTRUCTION PERMIT POST-CONSTRUCTION SMPs IN CSS BY WATERBODY



DAYLIGHTING

Tibbetts Brook originates in Yonkers and flows through Van Cortlandt Park in the Bronx before discharging into Hester and Piero's Mill Pond (formerly Van Cortlandt Lake). Since the early 1900s, the brook has been diverted as it leaves Van Cortlandt Lake into an 8 ft diameter tunnel that connects to a combined sewer flowing to the Wards Island Wastewater Resource Recovery Facility. During wet-weather events, overflow from the combined sewer discharges to the Harlem River at an outfall on W 192nd St, which, volumetrically, is one of the largest CSO discharge points in NYC.

Daylighting will restore the historical connection of Tibbetts Brook from Hester and Piero's Mill Pond in Van Cortlandt Park to the Harlem River via a new water

conveyance system consisting of an open channel stream in Van Cortlandt Park and the former railroad right-of-way and a closed conduit through the Metro North property, reducing flows to the CSS. On a parallel path, DEP is collaborating with Parks to build a new public greenway between Van Cortlandt Park and W. 230th St, intended to be part of the Empire State Trail. The City is planning to implement this project in two phases: Phase 1 will focus on lake improvements at Hester and Piero's Mill Pond; Phase 2 will focus on daylighting Tibbetts Brook, including re-routing flow from its current path through the sewer into a new channel and on a parallel path, constructing the greenway.



INVASIVE SPECIES REMOVAL COMPLETED IN FOREGROUND AND IN PROGRESS IN BACKGROUND FOR TIBBETTS BROOK DAYLIGHTING PROJECT PHASE 1, HESTER AND PIERO'S MILL POND, BRONX



Final Design for the Tibbetts Brook Daylighting project is continuing. In 2024, DEP made several key achievements:

- Advanced interagency coordination and design development, with final design of daylighting and greenway and specification submitted for final review.
- Finalized \$11.2M purchase and acquisition of former rail line property from CSX Transportation for daylighting and greenway construction.
- Held meetings with the Tibbetts Advisory Group to provide critical updates on project milestones and integrate stakeholder feedback as part of final design development.
- Final Design submitted for Public Design Commission (PDC) review.
- DEP continued to work to acquire an easement from Metro North for conduit to bring Tibbetts Brook flow to Harlem River.
- A Construction Manager for Phase 2 was selected through DEP's procurement process and joined the project team in late 2024.
- Began work on Phase 1 in August 2024. Field activities for invasives control and disposal were conducted through the summer and fall. In early Spring 2025, invasive control will resume and construction on the living shoreline will begin. Invasives control will continue through 2026.
- Received \$10M in funding through New York State Environmental Facilities Corporation Green Resiliency Grant to offset construction costs.

Upon completion, this project is anticipated to reduce combined sewer overflows to the Harlem River at 215-220 MGY.

CLOUDBURST

A cloudburst, as seen in 2021 during Hurricane Ida, is a sudden, heavy downpour that occurs in a short amount of time and may lead to flooding, property damage, disruptions to critical infrastructure, and pollution of NYC's waterways. Cloudburst management⁷ implements a combination of methods that absorb, store, and transfer stormwater to reduce flooding. Using gray infrastructure (e.g., drainage pipes and underground storage tanks) and green infrastructure (e.g., rain gardens and porous pavement), cloudburst management can minimize damage by reducing the strain on the municipal sewer system. DEP is designing cloudburst projects capable of capturing greater quantities of stormwater than traditional green infrastructure projects. In addition to managing localized flooding, these cloudburst projects will also help DEP meet its stormwater management water quality goals to reduce CSOs in CSS areas and to reduce the risk of polluted stormwater discharging to local waterways in MS4 areas.

Site-specific Projects

DEP and NYCHA collaborated on two pilot projects to manage cloudburst events onsite at South Jamaica Houses in Queens and Clinton Houses in Manhattan. These pilot projects are designed to combat these

high-intensity rain events. The South Jamaica Houses project broke ground in 2024 and the design for the Clinton Houses project was completed in Fall 2024. NYCHA has continued to advance cloudburst strategies across its portfolio, completing design at Jefferson Houses in Manhattan and kicking off design for cloudburst infrastructure at four additional developments with high vulnerability to flooding.

In Southeast Queens, DEP is working with Parks on two cloudburst projects that are currently in procurement for construction: Archie Spigner Park, in the neighborhood of St. Albans, and Rufus King Park. These projects are designed to improve drainage conditions in the park and on select adjacent streets where possible. DEP expects construction at these parks will begin in late 2025.

Additionally, in the neighborhood of St. Albans, DDC and DOT have partnered with DEP on a roadway improvement project to address frequent flooding issues near the intersection of 177th Street and 112th Ave. The proposed cloudburst design for this project involves a combination of green infrastructure in the right of way and includes roadway changes that will also improve roadway safety for pedestrians and vehicles.



⁷ <https://www.nyc.gov/site/dep/environment/cloudburst.page>

Neighborhood Hubs

In January 2023, Mayor Eric Adams' administration announced an expansion of the cloudburst program from the project level to the neighborhood level. With the support of \$367 million in City capital funds between DEP, DOT, and Parks, areas called hubs are slated for specially designed, built, and engineered infrastructure projects as an important component of a larger multi-layered strategy for neighborhood-level resiliency. The first four hub sites are in Corona and Kissena in Queens, Parkchester/Morris Park in the Bronx, and East New York in Brooklyn. DEP selected these sites by identifying inland flooding hotspots and clustering them based on the sewer network, then analyzing where surface-level intervention, such as porous pavement, could have a meaningful impact on flooding. Once the hubs were identified, DEP prioritized the locations based on physical vulnerability, social vulnerability, operational feasibility, and capital project synergies.

In 2024, DEP advanced the design for all four hubs and conducted more than 30 targeted outreach events within communities to integrate local knowledge on flooding and feedback on community preferences for open space amenities in tandem with design develop-

ment. Final design for the four initial hubs is anticipated in late 2025.

A fifth hub, Brownsville, was in the planning phase in 2024, with design expected to begin in 2025. Both the design and construction will be managed by DDC. More than two dozen additional locations are also being evaluated for inclusion as a future hub.

STAY CONNECTED WITH DEP NEWSLETTERS

Get the latest updates from DEP by subscribing to newsletters of your choice. DEP newsletters cover topics such as cloudburst design projects, stormwater management updates, procurement opportunities, agency press releases, and more.

To sign up, visit:

<https://www.nyc.gov/site/dep/about/newsletters.page>

SPECIAL PROJECTS

Stormwater Reuse

DEP is embarking on stormwater reduction and reuse projects in the East River/Open Waters waterbodies that provide a synergistic approach to demand management and CSO reduction goals in line with DEP's One Water NYC⁸ initiative, a holistic approach to water management emphasizing the perspective that all water has value, and the benefit of every drop should be maximized within the water system. In addition to reducing potable demand, these projects also reduce discharge to the CSS, contributing to the NYC Green Infrastructure Program's goal to reduce CSOs. Through these projects and others in the pipeline, DEP is actively working to reduce flows to sewers and wastewater facilities through water conservation and reuse, as part of an integrated approach to water resources management in NYC.

Central Park

Central Park Conservancy and DEP have partnered with Parks to construct a system to capture and recirculate water in Central Park's northern waterbodies. These waterbodies – the Pool, Loch, and Harlem Meer – are currently fed by City water. City water flows by gravity from the Pool to the Loch and Meer and overflows to the CSS at the outflow of the Meer. By replacing City water with stormwater, this project will reduce potable water demand and reduce combined sewer overflows to the East River. In addition, recirculation will improve the water quality of the Park's northern waterbodies. Recirculating this stormwater will save up to an estimated 0.48 million gallons per day (MGD) of potable water and relieve system stress during potential water supply shortages. It is anticipated that this project will reduce CSO discharge by up to 3.8 MGY,

8 <https://www.nyc.gov/site/dep/whats-new/one-water.page>

addressing capacity constraints on the wastewater and stormwater infrastructure.

Central Park design is underway and will continue through 2025. To help fund this, Parks was awarded a New York State Green Resiliency Grant and is currently coordinating with Central Park Conservancy and the New York State Environmental Facilities Corporation to finalize the grant agreement. Contingent upon receiving the necessary permits and approvals, construction would begin in October 2025.

Prospect Park

Since 2020, DEP has been coordinating with Prospect Park Alliance (PPA) to replace an existing service line

valve in Prospect Park to achieve an estimated demand savings of 0.8 MGD. The service line supplies potable water to Prospect Park Lake and during rain events, PPA staff discharge water from the lake into the CSS to avoid flooding the park. Additionally, during the summer when evaporation occurs, Prospect Park Lake is supplied with an estimated 1 MGD or more of potable water, to maintain health and aesthetics. This valve replacement is also expected to reduce CSOs during rain events to Gravesend Bay and the Upper Bay by 12 MG. Design for this project is complete and construction is currently underway.



BLUEBELTS

Bluebelts are ecologically rich, nature-based stormwater management practices that augment DEP's storm sewer network. They incorporate natural and engineered water features such as streams, ponds, and wetlands, to convey, store, filter, and attenuate stormwater flows. These systems, like other types of green infrastructure, help to reduce urban flooding and improve the health of local waterways while also providing open green space for communities and diverse habitat for wildlife. With the 2023 Modification, Bluebelts now meet DEP's regulatory definition of green infrastructure. To date, DEP has constructed 96 Bluebelt assets in MS4 areas.

While the majority of these Bluebelts have been built in Staten Island, DEP is continuing to expand Bluebelt projects to flood-vulnerable areas throughout the city as part of a Citywide Bluebelt Expansion program. DEP is currently preparing the encumbered costs data of Bluebelt projects for DEC review. Going forward, new Bluebelt project encumbered costs will be included in DEP certification metrics, as well as stormwater volume captured if a project is constructed in a CSS area.

Bluebelt projects can now be viewed on DEP's interactive online Green Infrastructure Map⁹.

⁹ www.nyc.gov/dep/gimap

GREEN INFRASTRUCTURE MAINTENANCE



The Green Infrastructure Maintenance unit continued to grow significantly in 2024, expanding the types of maintenance being managed in-house, incorporating the use of specialized equipment, and further improving operational efficiencies.

Utilization of new data collection tools and technologies, first deployed in 2022, have helped the Green Infrastructure Maintenance unit develop a more targeted approach to maintenance and inspections, allowing for increased accuracy and efficiency, even as the number of assets maintained has risen sharply. Supplemental maintenance contracts initiated in 2022 have also been extremely important in supporting the work of the Green Infrastructure Maintenance unit.

In Spring 2024, the Green Infrastructure Maintenance unit began an initiative to restore and enhance rain gardens by replacing gravel strips, regrading gardens, and

providing supplemental planting. These improvements targeted 138 rain gardens and were completed in Fall 2024.

Staff and volunteers planted 3,500 additional plants, seeded 2,000 rain gardens, and conducted pruning at 4,000 assets. Part of the long-term management of rain gardens will require continued assessments and investment of resources to ensure that the vegetation will thrive in their surrounding conditions.

The number of infiltration basins being maintained by the Green Infrastructure Maintenance unit rose steeply in 2024, with staff now maintaining and cleaning 3,762 infiltration basins. The staff are utilizing specialized vacuuming and jet washing equipment, which were originally field trialed in 2023, and which have greatly enhanced the efficiency of cleaning and maintenance operations.

WORKFORCE DEVELOPMENT

As the NYC Green Infrastructure Program continues to expand in both scale and scope, DEP has been conducting research into existing workforce development frameworks and is now gearing up to launch its own pilot program for green infrastructure maintenance training, in order to adapt to the Program's increasing maintenance needs across the city.

In 2024, DEP released a Request for Proposals for a workforce development pilot program in the green infrastructure/water management industry space that will utilize partnerships with local non-profits working with vulnerable and underserved communities in NYC. Through these strategic partnerships, DEP will facilitate an educational training pilot program designed to prepare participants for careers in green infrastructure maintenance and the broader water industry space, combining education and professional training with the necessary experience of hands-on green infrastructure field work. This on-the-job maintenance training, combined with soft skills training support, will help DEP develop a workforce pipeline to feed NYC's growing need for green infrastructure and water industry professionals. DEP anticipates that the pilot training program will kick off in 2025.

STEWARDSHIP AND PUBLIC ENGAGEMENT

In 2024, DEP hosted 58 rain garden community engagement events, interacting with over 300 members of the public across these events. At the end of 2024, over 280 rain gardens were stewarded by local residents and community groups through the DEP Rain Garden Stewardship Program. DEP encourages the public to engage in the Green Infrastructure Program by signing up for stewardship activation through the stewardship email, gistewardship@dep.nyc.gov, or by reporting through 311 any rain garden-related issues or requests.

VOLUNTEER WITH DEP

If you would like to volunteer to help care for rain gardens in your neighborhood, please email GiStewardship@dep.nyc.gov to request more information.

To learn more about the Rain Garden Stewardship Program, visit the DEP rain gardens webpage¹.

PUBLIC ONSITE MAINTENANCE

DEP works closely with agency partners to ensure that green infrastructure practices built on public properties will function over the long term by continually assessing designs for maintenance and supporting agency partners through budgeting and contracting services.



PRIVATE PROPERTY PROJECTS

Maintenance for green infrastructure projects installed on private properties is governed by a number of factors, such as the unique needs of individual projects and respective program requirements, including, but not limited to: maintenance agreements specified alongside the funding requirements for DEP's green infrastructure financial programs; the requirements listed in the Maintenance Permits for the Stormwater Permitting projects; and Chapter 31 of the Rules of the City of New York for Site/House Connection Proposal projects.

¹ <https://www.nyc.gov/site/dep/water/rain-gardens.page>

NYC GREEN INFRASTRUCTURE PROGRAM SPENDING AND BUDGET

As a result of the 2023 Modification, DEP has new financial milestones for green infrastructure across the city. The first milestone is to certify \$1.4B encumbered by December 31, 2025. Expenditures that are eligible for meeting the \$3.5 billion funding obligation include project design, construction, and land acquisition for projects that meet the regulatory definition of green infrastructure, including those that are part of resiliency and ecological restoration programs. Eligible expenditures for green infrastructure practices include those in both CSS and MS4 areas, those constructed by City agencies, including DEP, for compliance with the MS4 Permit, and those installed to comply with the 2022 Unified Stormwater Rule or the 2012 Stormwater Rule that would not otherwise be required by a New York State Construction General Permit. Federal, state, or other grant funding that the City obtains to construct green infrastructure projects is also eligible towards the \$3.5B expenditure obligation.

TABLE 7: CUMULATIVE CITYWIDE GREEN INFRASTRUCTURE FINANCIAL MILESTONES

Milestone	Funds Encumbered or Expended
December 2025	\$1.4 billion encumbered
December 2030	\$1.8 billion encumbered
December 2035	\$2.8 billion encumbered
December 2040	\$3.5 billion encumbered
December 2045	\$3.5 billion expended

DEP plans to categorize projects as traditional CSO green infrastructure or expanded definition green infrastructure for its financial reporting:

- Traditional CSO green infrastructure includes projects with CSO volume reduction as the main driver that are located in the combined sewered area. These are projects DEP has considered green infrastructure for regulatory reporting since the 2012 Consent Order, including areawide ROW and onsite in the combined areas.
- Expanded definition green infrastructure includes projects with multipurpose drivers that may result in CSO volume reduction and could be located in the combined sewered area, MS4, or shoreline. These are projects that are newly considered green infrastructure for DEP's regulatory reporting under the 2023 CSO Consent Order Modification, including cloudburst management projects, stormwater reuse, wetlands, and Bluebelts.

For financial milestones, DEP plans to certify the total amount encumbered on traditional CSO green infrastructure and expanded definition green infrastructure.

GI SPENDING AND BUDGET

Capital Encumbrances and Budget

Capital funding covers costs such as site selection, design, construction, construction management for green infrastructure projects, and that funding registered into contracts is known as encumbered capital funding. Table 8 shows the encumbered capital funding for green infrastructure. The Capital Budget is a budgeting document that outlines the Program's projected capital commitments over ten years, as shown in Table 9.

TABLE 8: CAPITAL ENCUMBRANCE (FY12-25)

Fiscal Year	Traditional CSO GI	Expanded Definition GI
FY12	\$9,015,345	-
FY13	\$15,202,880	-
FY14	\$152,935,548	-
FY15	\$58,041,000	-
FY16	\$114,976,273	-
FY17	\$118,115,069	-
FY18	\$69,811,175	-
FY19	\$203,035,478	-
FY20	\$160,754,308	-
FY21	\$169,294,738	-
FY22	\$58,929,787	-
FY23	\$127,201,264	\$40,000,000
FY24	\$18,750,337	\$55,676,623
FY25 ^a	\$32,353,546	\$920,916
Total	\$1,308,416,748	\$96,597,539
Grand Total	\$1,405,014,287	

a FY25 encumbered as of 4/7/25

TABLE 9: 10-YEAR CAPITAL IMPROVEMENT PROGRAM BUDGET (FY25-35)

Fiscal Year	Approved FY26 Preliminary Capital Improvement Program
FY25 ^a	\$125,909,538
FY26-35	\$1,300,706,000
Total	\$1,426,615,538
Grand Total^b	\$2,831,629,825

a FY25 remaining as of 4/7/25

b Program Grand Total is based on the total encumbered and the Approved FY26 January Capital Improvement Plan (FY26-FY35)

Expense Expenditures and Budget

The Program's expense expenditures and budget covers operational costs, such as maintenance of green infrastructure, office and field staff, materials, equipment, and other non-capitally eligible programmatic needs including research and development. The private incentive program Resilient NYC Partners is also expense funded. The majority of expenditures are related to traditional CSO green infrastructure, but the Resilient NYC Partners program does fund projects in MS4 areas. As such, DEP is reporting citywide expenditures. Tables 10 and 11 show expense expenditures and budget.

TABLE 10: EXPENSE EXPENDITURES - OTHER THAN PERSONNEL SERVICES (OTPS) - (FY12-24)

Fiscal Year	Citywide GI
FY12	\$60,265
FY13	\$2,039,773
FY14	\$1,989,918
FY15	\$2,006,620
FY16	\$2,234,715
FY17	\$4,134,828
FY18	\$4,300,363
FY19	\$4,752,478
FY20	\$3,169,903
FY21	\$2,214,366
FY22	\$3,878,877
FY23	\$4,744,003
FY24	\$7,205,333
Total	\$42,731,442

TABLE 11: EXPENSE BUDGET-OTHER THAN PERSONNEL SERVICES (OTPS) - (PLANNED FOR FY25-26)

Fiscal Year	OTPS Budget (as of FY26 Preliminary Plan)
FY25	\$21,700,632
FY26	\$21,700,632
Total	\$43,401,264
Grand Total^a	\$86,132,706

a Program Grand Total is based on the total OTPS expenditures, the FY25 Adopted Budget and the FY26 Preliminary Plan

External Funding Sources

The table below represents DEP's efforts to explore federal and state grant funding opportunities, as well as funding awarded, from 2021 to 2024. DEP has targeted grant funding primarily for the design and construction of cloudburst and median projects. With the 2023 Modification, DEP will include grant amounts received and encumbered from external funding sources as part of DEP's financial milestones. Funding is not reflected in the Funds Awarded column in the table below until an award letter is received by DEP.

TABLE 12: GRANT OPPORTUNITIES CONSIDERED BETWEEN 2021 AND 2024^a

	Sum of Funds Requested	Sum of Funds Awarded
FEDERAL	\$426,127,643	\$76,098,340
EPA State and Tribal Assistance Grants	\$1,150,000	\$1,150,000
FEMA Building Resilient Infrastructure and Communities	\$211,527,643	\$14,407,793
FEMA Hazard Mitigation Grant Program	\$6,650,000	\$6,650,000
HUD Community Development Block Grant Disaster Recovery	\$300,000	\$300,000
HUD Community Development Block Grant Disaster Recovery Ida - Round 1	\$30,000,000	\$30,000,000
HUD Community Development Block Grant Disaster Recovery Ida - Round 2	\$44,500,000	\$23,590,547
NFWF National Coastal Resilience Fund	\$1,000,000	-
NOAA Climate Resilience Regional Challenge	\$11,000,000	-
US Senate Committee on Environment and Public Works Water Resources Development Act	\$120,000,000	-
STATE	\$43,900,000	\$28,000,000
EFC Green Innovation Grant Program	\$6,000,000	\$6,000,000
EFC Green Resiliency Grant Program	\$20,000,000	\$20,000,000
EFC Water Quality Improvement Project Program	\$17,900,000	\$2,000,000
Grand Total	\$470,027,643	\$104,098,340

a Funding described in this table may be subject to change

LOOKING AHEAD TO 2025



01 2025 MILESTONE CERTIFICATION

Under the 2023 Modification, DEP must certify the completion of its 2025 milestones for CSO volume reduction and financial encumbrances by December 31, 2025. DEP is updating the internal procedure for regularly verifying the status of certifiable assets in GreenHUB. This additional effort is part of the City’s due diligence in being able to certify information for the upcoming milestone.

Certification	2025 Milestone
CSO Volume Reduction	668 million gallons per year (only CSS area)
Funds Encumbered	\$1.4 billion encumbered (citywide)

02 STORMWATER MASTER PLAN

The green and grey infrastructure teams at DEP will continue coordinating on the development of a stormwater master plan. The stormwater master planning process will leverage existing DEP resources, while also seeking additional resources, to help in better understanding of the sewer system, future flooding scenarios, and opportunities for infrastructure investment using a combination of sewers, green infrastructure, cloud-burst management, and Bluebelts. The planning process will take years but will guide DEP infrastructure investments in stormwater management for the more extreme weather we will continue to experience due to climate change.

03 NEW MS4 GI OPPORTUNITY ANALYSIS

With the approval of the Jamaica Bay Long-term Control Plan (LTCP) for combined sewer overflows, Bergen and Thurston Basin are now considered waterbodies, like Coney Island, where the stormwater pollution contributions from the city-owned separate storm sewers require the city to do more to manage the quality of that stormwater, including conducting an opportunity analysis for green infrastructure. In Bergen Basin, DEP identified potential opportunities at a desktop level for parkland green infrastructure. In Thurston Basin, DEP identified a potential cloudburst management opportunity in Montbellier. DEP will report on progress of these green infrastructure opportunities in the MS4 Annual Report.

04 GI GRANT PROGRAM OUTREACH

Now that DEP has updated the reimbursement table for the Green Infrastructure Grant Program to account for inflation, amongst other factors, DEP will target its outreach on the program to condo associations, green roof developers, property owners in the MS4 areas of Coney Island, Bergen Basin and Thurston Basin, property owners in areas where there is a risk of surface flooding, and past applicants who were not able to participate in the program due to the previous reimbursement rate.

05 NEW RIGHT-OF-WAY AREAWIDE CONTRACTS

Design contracts in Flushing Bay and East River/Open Waters (EROW) watersheds will begin design in 2025, evaluating over 1,300 acres in Flushing Bay and 1,700 acres in EROW watersheds utilizing the best standard green infrastructure approach for site specific conditions. Through this hybrid implementation approach, these areas are anticipated to be saturated with green infrastructure assets, including an estimated 1,000 sidewalk assets, like rain gardens and infiltration basins, and 100,000 SF of porous pavement.

06 SEEKING NEW RESILIENT NYC PARTNERS

To continue Resilient NYC Partner's momentum in 2024, DEP is coordinating with several new potential partners. Negotiations are actively underway with the goal of installing green infrastructure retrofits across diverse property portfolios throughout the city. Through participation in this program, these program partners will not only help alleviate drainage issues on their properties, but also establish themselves as leaders in the City's resiliency efforts.

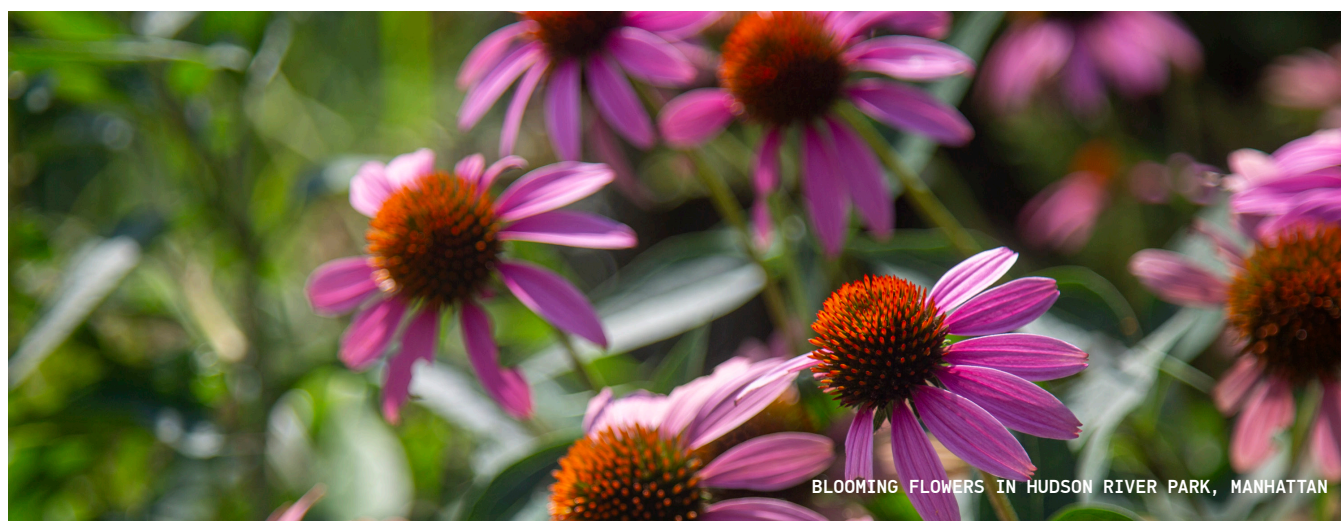
07 STORMWATER PERMITTING WEBINARS

DEP will continue to update information on the DEP webpage as it relates to Stormwater Permitting, which includes providing templates for documents needed for the permit. DEP also hosts monthly workshop webinars to explain eligibility requirements and guide users through the stormwater permitting process. Registration opens up a month in advance for each workshop. DEP is also requesting information from developers and those going through the permitting process. If you'd like DEP to host a webinar on a specific topic, please fill out the survey (<https://dep.wufoo.com/forms/zr8ip6112p87z/>) to let us know what topics you'd like to learn more about related to Stormwater Permits.

ACTIVE PROJECTS TOWARDS THE NEXT CSO MILESTONE

TABLE 13: LIST OF ACTIVE PROJECTS TOWARDS THE NEXT CSO ORDER MILESTONE (2030)

Waterbody Drainage Area	Project	Current Status
East River/Open Waters (EROW)	OH-015 Areawide ROW-Phase 1	Advanced design
EROW	OH-015 Areawide ROW-Phase 2	In construction
EROW	OH-015 Areawide ROW-Phase 3	Advanced design
EROW	TI-03/23 Areawide ROW	In construction
EROW	Tibbetts Brook Daylighting	In design
Jamaica Bay	CI-005 Areawide ROW-Phase 1	In construction
Jamaica Bay	CI-005 Areawide ROW-Phase 2	In construction
Jamaica Bay	CI-005 Areawide ROW-Phase 3	In construction
Coney Island Creek, EROW, Gowanus, Jamaica Bay	Expanded Public Onsite-GI-CONS-01	In construction
Alley Creek, EROW, Gowanus, Jamaica Bay	Expanded Public Onsite-GI-CONS-02	In construction
EROW	Clinton Houses	In design
EROW	Central Park Stormwater Recovery and Reuse	In design
EROW	Prospect Park Stormwater Recovery and Reuse	In construction procurement
Various	Resilient NYC Partners – Phase 1	Ongoing
Various	Public Onsite GI-H-CONS-1	In construction
Various	Public Onsite GI-H-CONS-2	In construction
Various	Expanded Public Onsite-GI-CONS-03	In construction
Various	Expanded Public Onsite-GI-CONS-04	Designs complete
Various	Expanded Public Onsite-GI-CONS-05/5A	In construction procurement
Various	Expanded Public Onsite-GI-CONS-06	Designs complete
Various	Expanded Public Onsite-GI-CONS-07	Designs complete



BLOOMING FLOWERS IN HUDSON RIVER PARK, MANHATTAN

OTHER PLANNED PROJECTS

DEP continues to seek public-private partnerships through its financial incentive programs, such as Resilient NYC Partners and the Green Infrastructure Grant Program. DEP's stormwater regulations will also continue the implementation of green infrastructure citywide through development and redevelopment projects. DEP is exploring the following projects through early planning and feasibility studies to evaluate the potential to include such projects to meet the 2023 Modification milestones:

- New areawide contracts in new neighborhoods within East River/Open Waters watershed, as well as revisiting Gowanus to implement additional ROW green infrastructure
- Public property retrofits through continued partnerships with public property owner agencies
- Additional cloudburst projects
- Additional daylighting opportunities, such as potentially diverting stormwater from the sewer system and redirecting it to Oakland Ravine and Lake
- Onsite reuse projects
- Bluebelts expansion



ADAPTIVE MANAGEMENT AND LESSONS LEARNED

Since the start of the NYC Green Infrastructure Program, DEP has been conducting various studies to enhance understanding of the benefits of green infrastructure, optimize project development and designs, evaluate cost-benefit beyond stormwater management, and plan for long-term maintenance needs. To meet this wide spectrum of objectives, DEP has undertaken monitoring techniques including sensors installed in place capturing real-time data, simulated runoff testing at constructed green infrastructure locations, small scale laboratory-type setups in semi-controlled environments, and modeling studies at various spatial scales calibrated with field data wherever possible.

Research in 2024 focused on in-depth analyses of the

stormwater capacity of retention practices, building upon previously collected data. DEP conducted field tests utilizing water level sensors and flow meters to collect data necessary to develop detailed representative models of typical installations. Using these models, DEP is able to assess how specific design features affect the dynamics of how water enters and moves vertically through retention practices. DEP, in partnership with City DOT, also continues to evaluate permeable pavement installations in the roadway. In 2024, DEP and DOT continued working with DSNY towards the development of a maintenance program. DSNY provided valuable insight during equipment demonstrations to assess various considerations such as operational logistics, maneuverability, and equipment maintenance needs.

FLOODNET

Since 2022, DEP has been collaborating with research partners and other City agencies to support the development and implementation of an innovative real-time sensor network called FloodNet, which provides valuable data on the presence, depth, and frequency of street flooding throughout NYC. To date, 242 of these sensors have been installed across NYC in priority locations identified by City agencies and through community outreach, particularly in neighborhoods vulnerable to high tides, storm surge, and stormwater runoff. The surface flooding data collected by these sensors will allow DEP to better understand the frequency, severity, and impact of flooding in NYC, to inform planning decisions, as well as operations and outreach efforts related to stormwater flooding.



A FLOODNET SENSOR INSTALLED ON A SIGNPOST

ECOLOGICAL SERVICES AND WETLAND RESTORATION

Wetlands, which are transitional lands between aquatic and terrestrial ecosystems, provide many ecological, economic, and cultural benefits. They attenuate flooding, help maintain stream flow, provide erosion control and water filtration, and are important natural habitats for fish and other wildlife. Communities also benefit from wetlands through opportunities for recreation, aesthetic appreciation, and environmental education. Building on the inclusion of wetlands and other ecological systems in the 2023 Modification's expanded definition of green infrastructure, DEP plans to look for more opportunities for wetland expansion and other ecological water quality solutions on top of the projects already committed to in the approved LTCPs.

Tidal wetlands have been found to effectively reduce microorganisms within the aquatic environment. Fecal Indicator Bacteria (FIB), which consists of total coliforms, *Escherichia coli* (*E. coli*), and *Enterococcus*, are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. DEP has initiated a study at Alley Creek as part of the Alley Creek LTCP to determine the efficacy of wetlands at specifically reducing environmental FIB.

Within a tidal environment, marshes can dissipate tidal flow energies approximately one order of magnitude when the flows encounter the vegetated marsh surface and flow velocity continues to decrease as vegetation density increases. These tidal patterns have important implications concerning the assessment of water quality parameters associated with FIB because they may provide a method to remove suspended bacteria and deposit them within marshes.

DEP is evaluating tidal wetlands and their ability to mitigate pathogens in aquatic environments. Fecal-indicator bacteria (FIB), which consists of total coliforms, *E. coli*, and *Enterococcus*, are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. DEP has initiated a study to determine the efficacy of tidal wetlands and salt marsh vegetation for specifically reducing environmental fecal-indicator bacteria. Within a tidal environment, these salt marshes can dissipate tidal flow energies by approximately one order of magnitude when the flows encounter the vegetated marsh surface and flow velocity continues to decrease as vegetation density increases.



DEP STAFF COLLECTING WATER SAMPLES AT ALLEY CREEK, QUEENS

The single marsh system case study will use a one-acre tidal marsh in Alley Creek, Queens, completed by DEP in 2019, which will provide a better controlled environment for monitoring and local data collection. The goal is to determine the appropriate spatial configuration of wetland and tidal channels for maximum water quality benefits. Water quality instrumentation was initially installed in autumn 2022 for calibration then a comprehensive water and sediment grab sampling program began in spring 2023 that continued into autumn 2024. Preliminary results have shown this tidal wetland can help mitigate CSO pathogens while improving overall water quality and additional monitoring for this case study will continue into 2025.

DEP is planning to include wetland restoration projects in future updates to DEP's interactive online Green Infrastructure Map.

Ribbed Mussels

DEP is conducting a multi-objective research study to mitigate the influence of pathogens derived from CSO

events in marine surface waters. This consists of deploying sub-tidal ribbed mussel populations in Bergen Basin, a tributary of Jamaica Bay, as a pilot to evaluate their effectiveness in providing pathogen filtration information to be utilized within other tributaries of Jamaica Bay and suitable water bodies. In the beginning of this project, a literature review indicated that native ribbed mussels (*Geukensia demissa*) are capable of filtering out particles as small as bacteria (less than 2 microns at varying levels of efficiency) from the water column.

Starting in 2018, DEP has conducted laboratory trials that tested and confirmed the ability of ribbed mussels to filter *E. coli*, and *Enterococcus* that are commonly found in the water after CSO events. The literature review, and laboratory-based trials, including microcosm and mesocosm simulations, were all completed by 2022. Field trials began in Bergen Basin in spring 2023 and continued through autumn 2024 with multiple key findings emerging from this phase of the study that will be used to inform future planning.



LINKS TO RESOURCES

Green Infrastructure Homepage

- <https://www.nyc.gov/site/dep/water/green-infrastructure.page>
- The documents **Standard Designs and Guidelines for Green Infrastructure (Right-of-Way)**, **Right-of-Way Green Infrastructure Protection During Construction Presentation**, and **Green Infrastructure Onsite Design Manual - Version 2** can all be accessed via the Green Infrastructure homepage.

Municipal Separate Storm Sewer System (MS4)

- <https://www.nyc.gov/site/dep/water/municipal-separate-storm-sewer-system.page>

Stormwater Permitting Webinars: Past Presentations

- <https://www.nyc.gov/site/dep/water/stormwater-permits.page>
- The presentations **Guidance on Construction Close-out Process**, **Guidance on Geotechnical Investigations for SMP Selection and Design**, **Qualified Inspector Guidance**, and **Green Roof Design for NYC Stormwater Permitting** can all be accessed via the Stormwater Permits webpage.

2023 CSO Consent Order Green Infrastructure Modification

- https://extapps.dec.ny.gov/docs/water_pdf/2023nycgiordermod.pdf

Green Infrastructure Grant Program (GIGP)

- <https://www.nyc.gov/site/dep/water/green-infrastructure-grant-program.page>

Resilient NYC Partners Program (RNYCP)

- <https://www1.nyc.gov/site/dep/whats-new/resilient-nyc-partners.page>

NYC Stormwater Manual

- <https://www.nyc.gov/site/dep/water/unified-stormwater-rule.page>

DEP's Flickr Webpage

- <https://www.flickr.com/photos/nycwater>

FloodNet

- <https://www.floodnet.nyc/>

EXHIBIT A - TRACKING AND VERIFICATION OF CSO VOLUME REDUCTION UNDER 2023 MODIFICATION

CSO VOLUME REDUCTION CALCULATION

DEP calculates CSO volume reduction by applying the green infrastructure practice class or program specific Stormwater Capture Equivalency Rates in Table 1 to each constructed asset to determine the amount of stormwater captured. DEP then converts the calculated stormwater capture volume to CSO volume reduction using the Waterbody Drainage Area Specific Equivalency Rates for stormwater capture to CSO volume reduction in Table 2, as illustrated by the formula below.

Formula for Calculating CSO Volume Reduction

$$\text{CSO Volume Reduction (MGY CSO)} = \frac{A \text{ (acres)} \times \text{SW ER (MGY SW / acre)}}{\text{SW / CSO ER (MGY SW / MGY CSO)}}$$

Where:

A = Greened Acre for Right-of-Way retention practices (rain gardens, infiltration basins, and stormwater green streets only) and tributary area (acres) for all other green infrastructure program areas

SW ER = Green Infrastructure Practice or Program Specific Stormwater Capture Equivalency Rate

SW / CSO ER = Waterbody Drainage Area Specific Equivalency Rate

TABLE A1: GREEN INFRASTRUCTURE PRACTICE OR PROGRAM SPECIFIC STORMWATER CAPTURE EQUIVALENCY RATES

Green Infrastructure Practice Class or Program	Retention or Detention	Equivalency rate ^a (SW MGY/unit ^b)
Right-of-Way Rain Gardens and Stormwater Greenstreets	Retention	0.86
Right-of-Way Infiltration Basins	Retention	0.91
Right-of-Way Porous Pavement	Retention	0.96
Public/Private/External Onsite and Large-scale Median Projects	Retention	0.95
Public/Private/External Onsite and Large-scale Median Projects	Detention	0.68
Green Roofs without Orifice Control	Detention	0.35
2012 Stormwater Rule	Detention	0.13
2022 Unified Stormwater Rule ^c	Retention	0.97
2022 Unified Stormwater Rule	Detention	0.68
Green Roofs with Orifice Control	Detention	0.68
Cloudburst Practices	--	SW Equivalency Rates will be selected from Right-of-Way and Public Onsite program areas based on assets implemented
Special Projects Not Specified Elsewhere	--	Modeled

- a The technical basis for these equivalency rates is documented in a Green Infrastructure Equivalency Rate Technical Memorandum, per Appendix F of the 2023 CSO Consent Order.
- b For purposes of these Equivalency Rates, "Unit" shall be defined as Greened Acre for Right-of-Way retention practices (rain gardens, infiltration basins, and stormwater green streets only) and tributary area (acres) for all other green infrastructure program areas. "Greened Acre" is an area equivalent to one acre of impervious surface covered by one inch of stormwater.
- c The 2022 Unified Stormwater Rule or other city legislation/rule or regulation can be used to fulfill the 1.67 BGY CSO volume reduction milestone.

TABLE A2: WATERBODY DRAINAGE AREA SPECIFIC STORMWATER CAPTURE TO CSO VOLUME REDUCTION EQUIVALENCY RATES

Waterbody Drainage Area	Equivalency Rate ^a (SW MGY/CSO MGY)
Alley Creek	2.75
Jamaica Bay and Tributaries	3.67
Bronx River	2.35
Coney Island Creek	2.75
Hutchinson River	1.73
East River / Open Waters	1.87
Flushing Bay	1.25
Flushing Creek	1.91
Gowanus Canal	2.75
Newtown Creek	1.72
Westchester Creek	5

- a DEC calculated equivalency rates based on data provided by DEP on June 14, 2016 for the 2016 Performance Metric Report. DEC selected equivalency rates for Alley Creek and Coney Island Creek drainage areas to represent a value closest to the mid-point of the range of calculated equivalency rates for the other drainage areas.

EXHIBIT B - NYC GREEN INFRASTRUCTURE PROGRAM IMPLEMENTATION AREAS

DEP tracks projects through these five primary Green Infrastructure Program implementation areas:

- **Right-of-Way** – primarily funded by DEP and implemented within City streets and sidewalks
- **Onsite** – primarily funded by DEP and implemented within publicly owned property, such as schools, parks, and public housing
- **External** – not funded by DEP and may be implemented in the ROW or within public or private property
- **Incentives** – implemented on private property through incentives provided by DEP
- **Regulations** – implemented through DEP stormwater regulations

The figures below illustrate the implementation areas where different types of green infrastructure practices are being constructed across CSS and MS4 areas. Readers should note that these graphics represent a one-time snapshot and that actual numbers will change as the Green Infrastructure Program progresses.

FIGURE B1: BREAKDOWN OF MANAGED ACRES (CSS + MS4) BY PROGRAM AREA

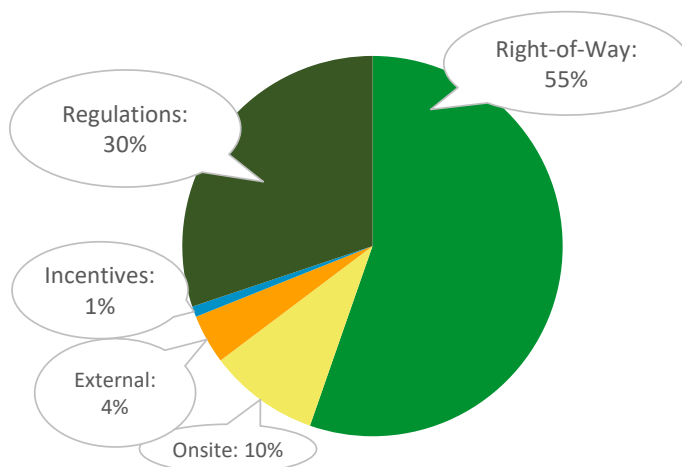
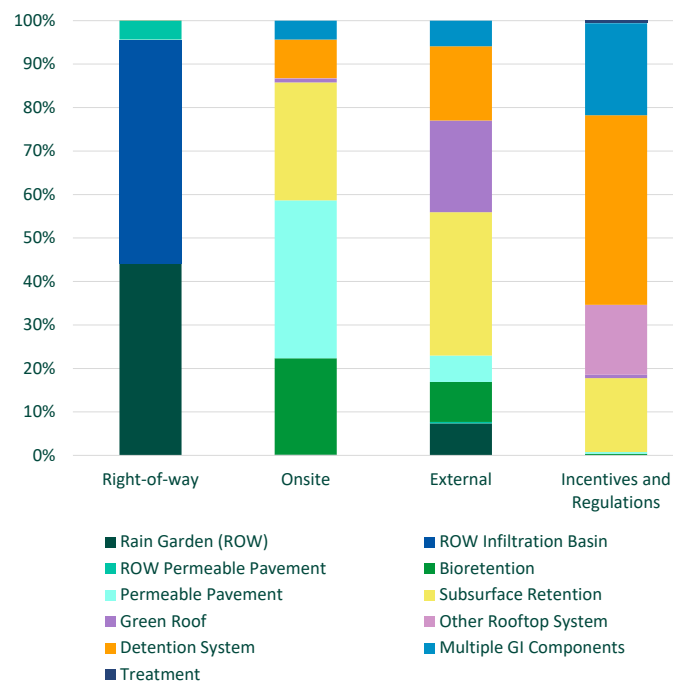


FIGURE B2: BREAKDOWN OF PROGRAM AREA MANAGED ACRES (CSS + MS4) BY GREEN INFRASTRUCTURE TYPE



ACRONYMS

BGY billion gallons per year
CSO combined sewer overflow
CSS combined sewer system
DDC Department of Design and Construction
DEC Department of Environmental Conservation
DOE Department of Education
DOT Department of Transportation
DPR/Parks Department of Parks and Recreation/Parks
EDC Economic Development Corporation
EROW East River/Open Waters
FIB Fecal Indicator Bacteria
LTCP Long-Term Control Plan
MGD million gallons per day
MGY million gallons per year
MS4 Municipal Separate Storm Sewer System
NYC New York City
NYCHA New York City Housing Authority
NYS New York State
OER Office of Environmental Remediation
PPA Prospect Park Alliance
ROW right-of-way
SCA School Construction Authority
SMP stormwater management practice
TPL Trust for Public Land



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nyc.gov/dep/greeninfrastructure

