

NYC GREEN INFRASTRUCTURE

2019 Annual Report



NYC
Environmental
Protection

TABLE OF CONTENTS

2019 Annual Report



INTRODUCTION	PG 01
IMPLEMENTATION UPDATE	PG 03
GREEN INFRASTRUCTURE MAINTENANCE	PG 40
RELATED INITIATIVES	PG 42
ADAPTIVE MANAGEMENT	PG 47
LOOKING AHEAD TO 2020	PG 49
EXHIBIT A - PROGRAM SPENDING AND BUDGET	PG 51
EXHIBIT B - COMMUNITY OUTREACH	PG 52
EXHIBIT C - 2015 CONTINGENCY PLAN	PG 54
EXHIBIT D - WHAT IS A "GREENED ACRE"?	PG 55
ACRONYMS	PG 56



Hi!

The New York City Department of Environmental Protection (DEP) is excited to present the 2019 Green Infrastructure Annual Report. The Annual Report provides an update on the NYC Green Infrastructure Program (or the “Program”), including all of the achievements and advancements through 2019, and outlines what is in store for 2020. Previous Annual Reports and the Green Infrastructure Plan can be found on DEP’s green infrastructure [webpage](#). Readers should note that at the time of the publication of this report, the City is faced with significant resource uncertainties due to the COVID-19 pandemic. At this time, DEP is still determining the specific impacts to the projects listed in the following pages.

Green infrastructure provides more than just stormwater management for New Yorkers. While the primary goal of the Program is to reduce combined sewer overflows (CSO) into New York Harbor in a cost-effective way, the distributed projects also provide community and environmental benefits to the City’s neighborhoods and residents. These “co-benefits” include increased urban greening, urban heat island reduction, and more habitat for birds and pollinators around the City.

By retrofitting NYC’s streets, sidewalks and other public property, and incentivizing retrofits on private property, DEP is on its way toward the 2030 CSO reduction goal of 1.67 billion gallons per year. As reported in past years, DEP has successfully installed and continues to install thousands of right-of-way (ROW) rain gardens and other green infrastructure practices in the City’s combined sewer areas, and thousands more green infrastructure practices are in planning and design phases.

The Program staff do more than just design and build projects; they also perform all of the maintenance of green infrastructure constructed in the ROW, conduct research and development on green infrastructure, engage elected

officials and civic stakeholders, track all green infrastructure projects using GreenHUB (see 2018 Annual Report for more details), and lead planning, mapping and data management efforts.

2019 was the biggest year yet for DEP's ROW green infrastructure program area, with the largest number of construction contracts kicking off and continuing through 2020. DEP's ROW green infrastructure toolbox now includes design options such as infiltration basins, which have vastly increased the number of ROW assets that can be constructed throughout the City. With all this concurrent construction work, DEP identified the need to establish a dedicated field team to conduct inspections to ensure that each green infrastructure asset is constructed properly. DEP's presence in the field has also been critical to coordination with other contractors doing street work for utility companies, and ensuring that these other construction activities do not adversely impact the function of DEP's green infrastructure assets.

In addition to the tremendous ROW program progress, DEP also expanded the Green Infrastructure Program into new horizons, incorporating other key initiatives into its portfolio. This includes the Tibbetts Brook daylighting project, which will be DEP's largest green infrastructure project when constructed, and the incorporation of stormwater recovery and reuse and demand management projects.

As of early 2020, the Program has committed over \$800 million in capital funds since fiscal year 2012, and has approximately \$850 million currently budgeted through fiscal year 2030 (see Exhibit A). These future funds are earmarked for ongoing design, construction, and construction management work. Implementation of the Program is undertaken by DEP, the Economic Development Corporation (EDC) and the Department of Design and Construction (DDC) for the ROW program. In addition, our partnerships with the Department of Parks and Rec-

PROGRAM HIGHLIGHTS

1,230

Greened Acres from 2010-2019

10,032

Assets constructed or in construction

reation (DPR), Department of Education (DOE), New York City Housing Authority (NYCHA), School Construction Authority (SCA), New York Police Department (NYPD), New York Fire Department (FDNY), Department of Housing Preservation and Development (HPD), and public libraries facilitate retrofits on public property.

Throughout 2019, DEP staff continued to engage the public through various neighborhood association meetings, classroom activities, private grant program workshops, groundbreaking ceremonies, and public tours (see Exhibit B). This outreach is critical to the success of the Program and also includes hundreds of correspondences and phone conversations with residents and local organizations.

Looking ahead to 2020, DEP has various initiatives planned including construction of green infrastructure on public properties, enforcement of green infrastructure protections, and new programs and rules to expand green infrastructure implementation on private properties.



IMPLEMENTATION PROGRAM UPDATE



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. In 2012, DEP launched area-wide green infrastructure projects, in partnership with the Department of Transportation (DOT) and DPR, and has achieved the vast majority of stormwater management through the installation of rain gardens (formerly called bioswales).

All of the initial Priority CSO area-wide projects are either already constructed, in construction, or in advanced design phases. In addition, DEP selected several East River/Open Waters (EROW) CSO tributary areas in which to build ROW green infrastructure to provide public access and to improve water quality in confined waterways. By and large, this effort has been a tremendous success and has greened many neighborhoods across the City.

2019 was a major year for ROW green infrastructure, with 23 construction contracts bid across the Westchester Creek, Bronx River, Newtown Creek, Flushing Creek, and Jamaica Bay watersheds. Construction work for many of these packages will continue through 2020, with additional construction packages planned to kick off in Coney Island Creek.

DEP's interdisciplinary team made a concerted effort in 2019 to apply lessons learned through construc-

tion and maintenance in prior years and through the 2018 research and development work. For all current and upcoming construction, DEP is implementing an improved and expanded green infrastructure toolbox, which incorporates a number of key design changes and new designs.

DEP's new green infrastructure toolbox addresses issues such as varying field conditions and concerns from the community (see Figure 1 for images and more detailed descriptions). Designs for the new and revised ROW green infrastructure are published in an updated

**Over 9,000
ROW green in-
frastructure
practices are
constructed or
in construction.**

version of the ROW Green Infrastructure Design Standards, available on the DEP [website](#).

In 2020, DEP plans to roll out new informational signage (Figure 2) to educate the public on the role of rain gardens in the community. The signs will be mounted to the tree guards on select rain gardens throughout the City.

Detailed descriptions of the area-wide implementation strategy and the design and construction processes are described in previous Annual Reports. Photos of ROW green infrastructure construction can be found on DEP’s Flickr [webpage](#).

FIGURE 2: RIGHT-OF-WAY RAIN GARDEN INFORMATIONAL SIGNAGE

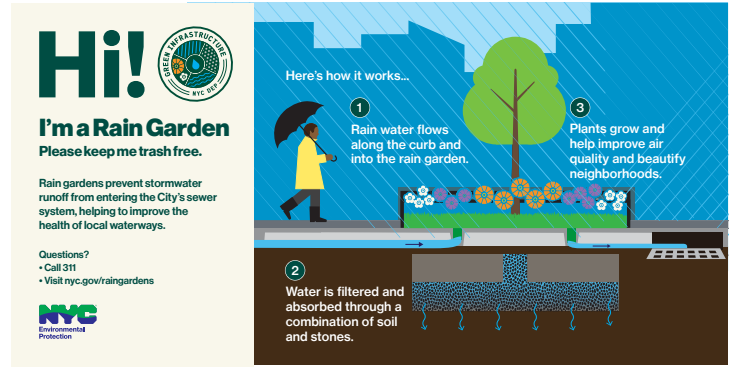


FIGURE 1: RIGHT-OF-WAY GREEN INFRASTRUCTURE TOOLBOX

	<p>The standard rain garden continues to be the most widely implemented type of ROW green infrastructure practice. The latest design improvements include new planting plans, a concrete walking strip, and sediment capture mechanisms to trap debris and reduce erosion.</p>
<p>Rain gardens with “Type D” inlets utilize a catch basin grate in the roadway instead of a curb cut inlet to redirect stormwater runoff into the practice. This reduces debris that flows onto the soil bed and also minimizes soil erosion from high intensity storms.</p>	
	<p>Infiltration Basins are designed to match the existing sidewalk (concrete or grass strip). Although they do not provide the same greening co-benefits as rain gardens, they are the preferred alternative in high-density residential, industrial, or commercial areas where sidewalk space is limited and plants may not thrive.</p>
<p>Permeable pavement installations in the roadway are ideal for neighborhoods with limited opportunity for green infrastructure on sidewalks due to existing trees, driveways, and other siting constraints.</p>	

Note: Constructed assets may differ from above images due to site-specific conditions and changes in design.



CONSTRUCTION MANAGEMENT AND UTILITY COORDINATION

The protection of green infrastructure after its construction is necessary to ensure that the assets provide the long term benefits they were installed to provide. Typical damages DEP staff are seeing in the field arise from land use activities on adjacent properties or from nearby routine and non-routine construction activity. Substances other than stormwater runoff can find their way into the assets and clog voids, which may prevent the system from functioning normally. In other cases, construction equipment or materials are stored too close or within the assets themselves and pose a threat. With thousands of new green infrastructure locations and so much construction activity happening in and around New York City streets, it is important to take a proactive approach in green infrastructure protection by informing the broader contractor community about how to identify green infrastructure and protect it during street or onsite construction work.

During 2019, DEP conducted seven training seminars with contractors, engineers, and supervisors that work with and for Consolidated Edison, National Grid, and DOT, who are performing the majority of the street and sidewalk work in the City. Those meetings highlighted the proper protection measures for all green infrastructure assets and facilitated conversations to address concerns from private utility companies. Following these meetings, DEP updated the previous guidance on green infrastructure protection with new requirements and graphics to provide more clarity

on best practices for damage prevention on the [DEP website](#).

Moving forward, DEP will continue to work with these companies and agency partners to protect green infrastructure assets through an in-house team dedicated to overseeing field conditions through construction and post-construction. More information on this work is detailed in the Construction Management, Inspection, and Enforcement section.



MEDIANS (LARGE RIGHT-OF-WAY)

In 2019, DEP formed an In-House Design team tasked with identifying opportunities for large-scale green infrastructure practices within City-owned medians to target both citywide water quality objectives and inland flooding challenges. In addition to their ability to target a multitude of objectives, large-scale green infrastructure opportunities are also more cost-effective because they manage more stormwater runoff than typical ROW assets and concentrate maintenance needs in central locations.

DEP's In-House Design team is applying its expertise to individually design these large-scale practices and site them to address the unique challenges associated with their specific locations. These practices are different from those in DEP's standard ROW green infrastructure toolbox in that they utilize distribution pipes and larger storage areas to capture and convey larger volumes of stormwater runoff.

To date, the team has identified 19 potential sites for implementation of large-scale green infrastructure and flood mitigation. DEP selected these sites by first identifying all potential medians across the City and then prioritizing the medians based on the following criteria: availability of surface space within the median, feasibility of diverting additional runoff to the median to allow more stormwater capture, and avoidance of utility conflicts. As of spring 2020, four projects have advanced designs. One project is anticipated to be bid in 2020, with three projects bidding in 2021. Figures 3 and 4 show the existing conditions and proposed large-scale green infrastructure implementation at Beach-67 Street in Queens, one of the project sites. The four project sites in advanced designs have the potential to manage approximately 4.6 million gallons of stormwater runoff annually, in addition to improving the neighborhood aesthetics and providing significant benefit to the local community. These initial projects will lay the groundwork for implementation of green infrastructure in locations within the right-of-way that were previously considered unavailable for stormwater capture.

The In-House Design team is an example of how DEP is leveraging in-house staff to save time and resources for design and engineering work.

FIGURE 3: EXISTING CONDITIONS AT BEACH-67 STREET, QUEENS



FIGURE 4: RENDERING OF LARGE-SCALE GREEN INFRASTRUCTURE IMPLEMENTATION FOR BEACH-67 STREET, QUEENS



PUBLIC PROPERTY RETROFITS

In 2019, DEP continued green infrastructure design development with DPR, DOE and SCA, and NYCHA, for public property retrofit projects.

Accomplishments include completion of project designs for over 70 properties. DEP also initiated or continued design development on over 100 additional parks, schools, and NYCHA properties. A large part of this ramp-up in design work was facilitated by the establishment of a new Green Infrastructure Onsite Design Manual. This manual established minimum criteria for siting green infrastructure on public property and streamlined the way in which the design process is coordinated with the respective property owners. It also provides schematics for allowable green infrastructure details for various conditions. The manual can be downloaded from the DEP [website](#).

DOE, on behalf of DEP, coordinated with sixteen schools and began construction activities in the fall of 2019; DOE expects to complete construction in the fall of 2020. Construction at DPR and NYCHA properties is scheduled to begin in the spring of 2020 and ongoing construction of green infrastructure at NYCHA Gowanus Houses is expected to be complet-

ed in 2020. DEP also continues to work with DDC's Public Buildings Unit in order to facilitate retrofits with its client City agencies. Upcoming projects with NYPD, FDNY, and other City agencies are in progress. Construction of the rain garden and green roof project at the DDC-managed Taxi and Limousine Commission property in Queens is planned to start in 2020.

Additional projects were constructed through the partnerships on green infrastructure schoolyards with the Trust for Public Land (TPL) and on playgrounds with DPR's Community Parks Initiative in 2019.

DEP recognizes these agencies for sharing its mission and for facilitating the design and construction of green infrastructure retrofits on public properties. In addition to the water quality benefits, these partnership projects include many co-benefits that will deliver real improvements to New York City's schools, parks, housing, and other City-owned property.

Individual sites in the pipeline for each watershed are listed in the Watershed Section of this report. Photos of constructed projects can be seen on DEP's Flickr [webpage](#).

TABLE 1: PUBLIC PROPERTY RETROFITS BY PROJECT STATUS

Project Status	Parks/ Playgrounds	Public Schools	NYCHA Housing	Other Public	Total
In Construction/ Constructed	39	32	5	1	77
In Design	97	48	28	1	174
Potential	81	94	27	14	216
Total	217	174	60	16	467



TPL GREEN INFRASTRUCTURE PLAYGROUND AT P.S. 184M, MANHATTAN

TIBBETTS BROOK AND VAN CORTLANDT LAKE PARK IMPROVEMENTS

Tibbetts Brook originates in Yonkers and flows through Van Cortlandt Park in the Bronx before discharging into Van Cortlandt Lake. Since the early 1900s, the stream has been diverted from Van Cortlandt Lake through an 8' 0" diameter tunnel that connects to a combined sewer flowing to the Wards Island Wastewater Resource Recovery Facility (WRRF). During wet-weather events, overflow from the combined sewer discharges to the Harlem River at an outfall on W. 192nd St. (referred to as WI-056), which, volumetrically, is one of the largest CSO discharge points in New York City.

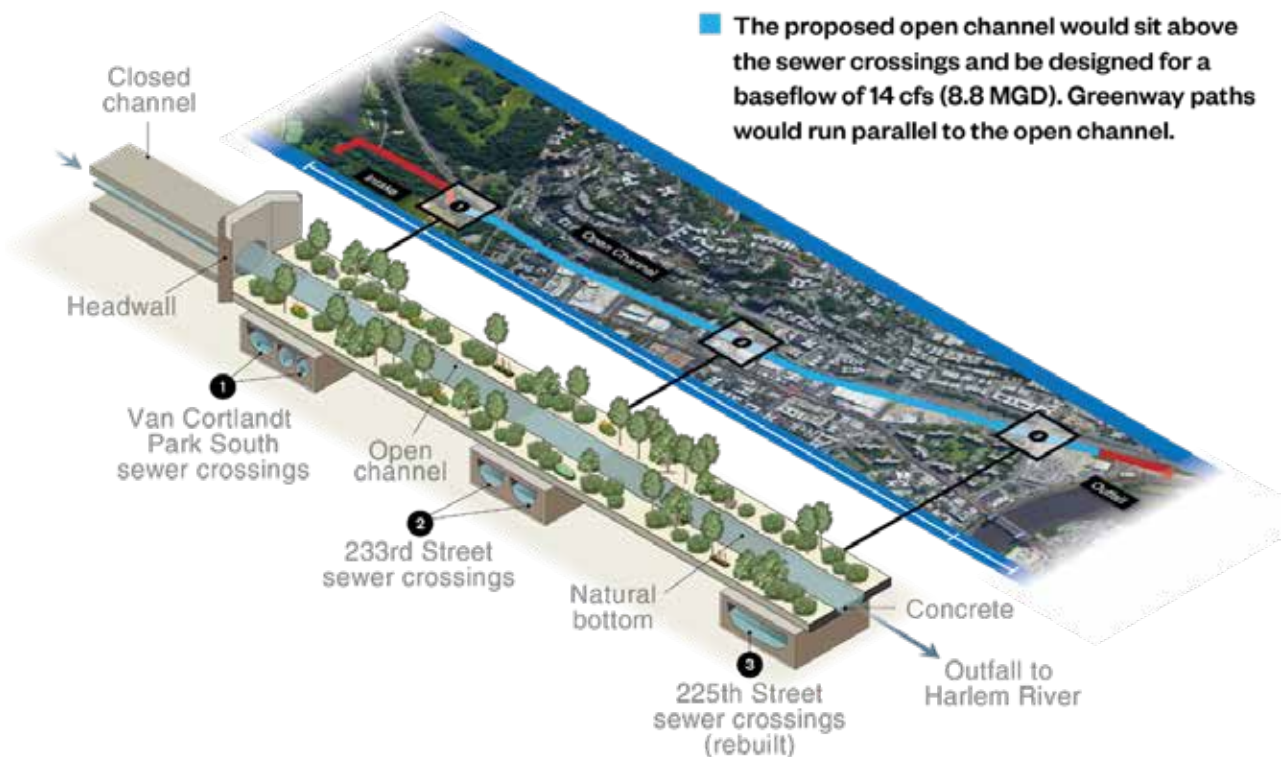
The original route of Tibbetts Brook split into two streams at what is today W. 237th St. One branch ran along what is now Tibbett Avenue and another ran along what is currently a railroad ROW owned by CSX Transportation and the Metropolitan Transportation Authority along the Major Deegan Expressway. With rail service on the ROW discontinued, proposals to daylight Tibbetts Brook through the ROW have existed since the 1990s. In conjunction with the construction of an open channel, or stream daylighting, DEP and DPR propose to create a greenway providing a landscaped bike path and pedestrian walkway, which will be called the Putnam Greenway.

The name pays respect to the New York and Putnam Railroad, the original owner of the ROW. The City has initiated review of property rights and easements necessary for acquisition and has reached out to relevant property owners.

Figure 5 below shows the approximately 1.5-mile route of the proposed project, including a 1-mile long segment of open channel and two smaller segments of underground pipes, depending on the acquisition of privately-owned easements. The proposed project has two components: 1. Van Cortlandt Lake improvements for additional dynamic storage, and 2. Baseflow daylighting of Tibbetts Brook. Baseflow daylighting could include additional storm flow up to 31 cubic feet per second (CFS), which, in combination with Van Cortlandt Lake improvements, could provide an annual CSO reduction of up to 228 million gallons.

More information on the Tibbetts Brook and Van Cortlandt Lake Park improvements project will be available in the Citywide Open Waters Long Term Control Plan (LTCP), which will be posted on DEP's website later this year.

FIGURE 5: TIBBETTS BROOK AND VAN CORTLANDT LAKE PARK IMPROVEMENTS



STORMWATER RECOVERY & REUSE

DEP is embarking on stormwater recovery and reuse projects in the East River/Open Waters waterbodies that provide a synergistic approach to demand management and CSO reduction goals. In addition to reducing potable demand, these projects also reduce discharge to the combined sewer system (CSS), contributing to the Program's goal to reduce CSOs by 1.67 billion gallons per year (BGY).

Through these projects and others, DEP has been 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 New York City.

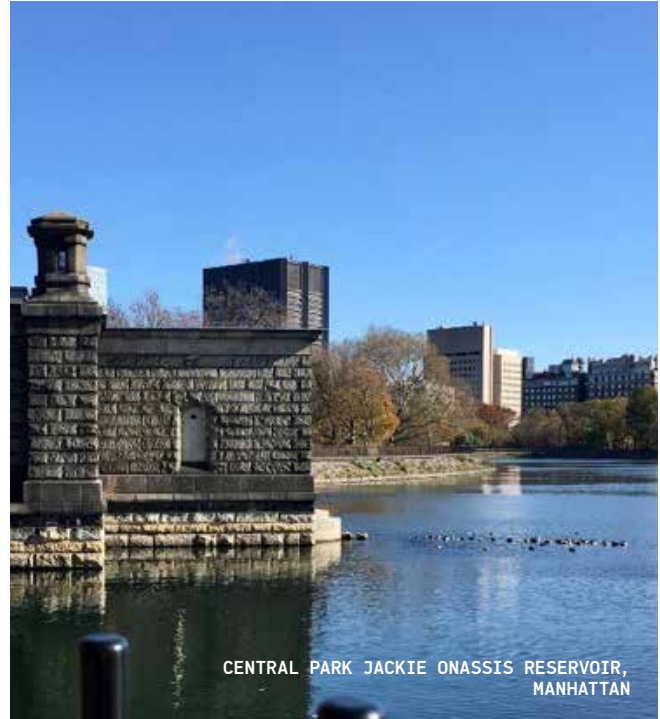
Central Park

In 2019, DEP continued coordinating with Central Park Conservancy (CPC) on the North End Recirculation Project. The project, which will save up to an estimated 0.83 million gallons per day (MGD) of potable water by recirculating stormwater between the Harlem Meer and Jackie Onassis Reservoir, is moving toward the design and permitting phase. This project is the first of its kind in Central Park and one of only a few stormwater recirculation projects in New York City. Due to its complexity, DEP and CPC held several coordination meetings and site visits in 2019. DEP and CPC continue to coordinate on the conceptual design, engineering, and operation and maintenance considerations of this innovative project. DEP is currently working to execute a memorandum of understanding (MOU) with CPC and DPR to transfer funding to DPR. In addition to sizeable potable water savings, this recirculation project is expected to reduce CSOs to the East River during rain events by 4 million gallons per year.

Prospect Park

In 2019, DEP continued 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 summer when evaporation occurs, Prospect Park Lake is supplied with an estimate 1 MGD or more of potable water, to maintain health and aesthetics. In 2019, DEP and PPA held site visits and meetings to discuss design, engineering, and feasibility, and construction of this project is expected to begin in 2020. As an in-

tegrated water management co-benefit of this project, it is expected to reduce CSOs to Gravesend Bay and the Upper Bay during rain events by 12 million gallons per year.



PRIVATE PROPERTY INITIATIVES

Green Infrastructure Grant Program

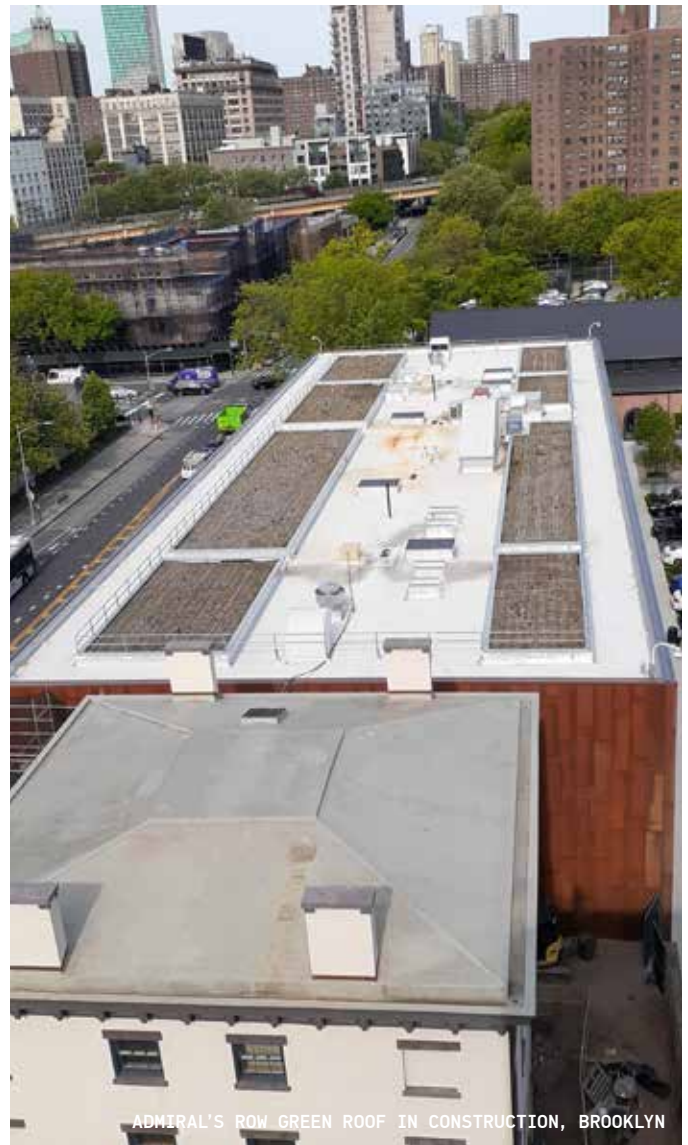
Since its introduction in 2011, the Grant Program has sought to strengthen public-private partnerships and public engagement in regards to the design, construction, and maintenance of green infrastructure on private property throughout New York City. In 2019, the Grant Program’s underlying rules were amended to shift the focus of the Program to green roof retrofits. This shift allows for a clear distinction between the Grant Program and the forthcoming Private Incentive Retrofit Program (see below) by focusing the Grant Program on green roof funding and the new program on larger, site-level green infrastructure opportunities. The shift to retrofits only, meaning green roofs constructed on an existing roof, allows for better alignment with Local Laws 92 and 94 of 2019, which require either green roofs or solar panels on nearly all new construction and reroofing projects in the city. Finally, the focus on green roofs allows DEP to streamline the Grant Program application and design review process, as green roofs tend to have highly standardized feasibility analyses and designs. To date, the Grant Program has committed more than \$13 million for 30 private property owners to build green infrastructure projects. Photos of planned and constructed green infrastructure projects can be found on DEP’s Green Infrastructure Grant Program [webpage](#).

Private Property Retrofit Incentive Program

In November 2018, DEP issued a Request for Proposals (RFP) to select a Program Administrator and initiate a new Private Property Retrofit Incentive program, marking a significant expansion of DEP’s private incentives for green infrastructure. As of May 2020, DEP has selected a Program Administrator and is finalizing the \$53 million contract. The Administrator will be responsible for connecting with private property owners across the city and installing green infrastructure to manage 200 Greened Acres. The program will focus on properties over 50,000 square feet in total lot area in order to maximize the cost effectiveness of the projects. Projects are expected to begin in 2020. (See Exhibit D for a description of “Greened Acres.”)

Community Stormwater Grant

DEP continues to build out the framework for a grant funding opportunity for community groups and other organizations that want to get involved in NYC green infrastructure. Funding categories may include a variety of structural and nonstructural stormwater best management practices such as construction of rain gardens on private property, maintenance of existing green infrastructure, assessment of ROW green infrastructure, educational outreach, and more. The launch of this program is contingent upon securing funding.



2012 Stormwater Performance Standard

New development and redevelopment projects often require a sewer certification from DEP for new sewer connections to confirm the adequacy of the existing sewer to receive flow from the development. Sewer certifications require either a Site Connection Proposal (SCP) or a House Connection Proposal (HCP). DEP tracks the number of new SCPs and HCPs submitted to the Agency that are affected by the 2012 Stormwater Performance Standard (or Stormwater Rule). Since the rule took effect in July 2012, approximately 1,765 sites have been required to meet reduced stormwater release rates of 0.25 CFS or 10% of the allowable flow, whichever is greater.

Approximately 242 assets and 87 Greened Acres, summarized in Table 2 below, have been incorporated into GreenHUB and reported in Table 3. DEP continues to review the site plans for projects regulated by the rule and incorporate them into GreenHUB so that the projects can be tracked in the same manner that DEP's publicly-funded projects are tracked.

DEP is developing new stormwater regulations, referred to as Unified Stormwater Rules, which will supersede the 2012 Stormwater Performance Standard. These new stormwater regulations are discussed on the following pages.

TABLE 2: SUMMARY OF STORMWATER PERFORMANCE STANDARD ASSETS AND GREENED ACRES IN GREENHUB

GI Type	Asset Count	Greened Acres
Subsurface Retention	25	4.1
Green Roof	1	0.1
Other Rooftop System	84	20.6
Detention System	132	62.6
Total	242	87

Unified Stormwater Rules and New NYC Stormwater Design Manual

As reported previously, and in the New York City Stormwater Management Program Plan (SWMPP), DEP developed and launched a Construction and Post-Construction program, pursuant to the City's Municipal Separate Storm Sewer System (MS4) Permit. The Construction and Post-Construction program requires certain new and redevelopment projects to apply for permits and in some cases, implement post-construction stormwater management practices. As part of the development of the new program, DEP saw and heard the need to align NYC stormwater regulations across all drainage areas, not just the MS4 area, and to also integrate DEP's existing site and house connection requirements for new and redevelopment projects into the alignment process.

In January of 2020, City Council introduced an amendment to the 2017 Stormwater Law, Intro. 1851, to expand the Construction and Post-Construction program citywide. The amendment to the 2017 Stormwater Law is the first step and a pre-requisite to proposing the Unified Stormwater Rule. As of the date of this Report, the City Council's rescheduling of the hearing on Intro 1851 is pending, due to the COVID-19 pandemic and restrictions on public hearings.

The next step will be to release draft amendments to the rules governing the Construction and Post-Construction program and House and Site Connections to the City's sewer system (Title 15, chapter 19.1 and chapter 31 of the Rules of the City of New York, respectively).

The Unified Stormwater Rules take into consideration several stormwater-related goals and requirements across the city including:

- Water Quality, MS4 areas – retain and/or treat stormwater to reduce pollutants in runoff
- Water Quality, CSS areas – retain and/or detain stormwater to reduce CSO volume and occurrence
- Sewer Operations – detain or remove stormwater to maintain optimal stormwater quantity and flow rates in the sewer system
- Building/Site Drainage – adequate conveyance of on-site stormwater to reduce local flooding
- Increase in Green Space – alignment with goals of 2019 NYC Climate Mobilization Act

In 2019 and early 2020, DEP held 14 public agency and elected official briefings and five private industry and

stakeholder briefings on the MS4 legislation expansion and forthcoming Unified Stormwater Rules. In spring 2020, DEP held two interagency technical workshops, to take a deeper dive into the requirements of the new regulations and provide agency-specific examples of how implementation will look. Later this year, DEP will hold the same technical workshops for private industry and stakeholder representatives.

As a part of this effort, DEP is drafting a new stormwater design manual, which will merge the New York City Stormwater Design Manual and the 2012 Stormwater Management Design Guidelines to provide a comprehensive guidance and design manual for stormwater management in NYC. The manual builds upon technical guidance provided in the New York State Stormwater Design Manual and lessons learned through the Green Infrastructure Program, incorporating tools and design techniques proven to work in ultra-urban areas.

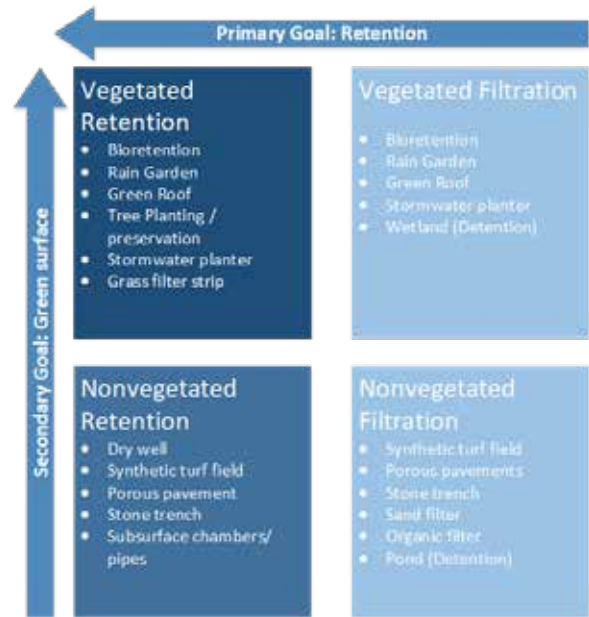
Fundamental to the new design manual and to the approach projects subject to the Construction/Post-construction program will take to design onsite stormwater practices, are stormwater management practice (SMP) hierarchies developed for MS4 and CSS areas. The hierarchies show the order by which different types of practices must be considered for Water Quality Volume (WQv) design storm requirements. The primary and secondary goals for each of the sewer system areas are shown, with the highest priority practices starting in the upper left corner and moving down and over (darker boxes to lighter boxes) from there. In both hierarchies, retention practices are given the highest priority because of their ability to prevent stormwater from entering the City's sewer systems altogether.

Figure 6 shows the MS4 area stormwater management practice hierarchy. Vegetated retention practices are given the highest priority, while vegetated and non-vegetated filtration practices are the least preferred option.

Figure 7 shows the CSS area stormwater management practice hierarchy. The primary difference between the CSS hierarchy and the MS4 hierarchy is that, in CSS areas, vegetated and non-vegetated detention practices are preferred over filtration practices.

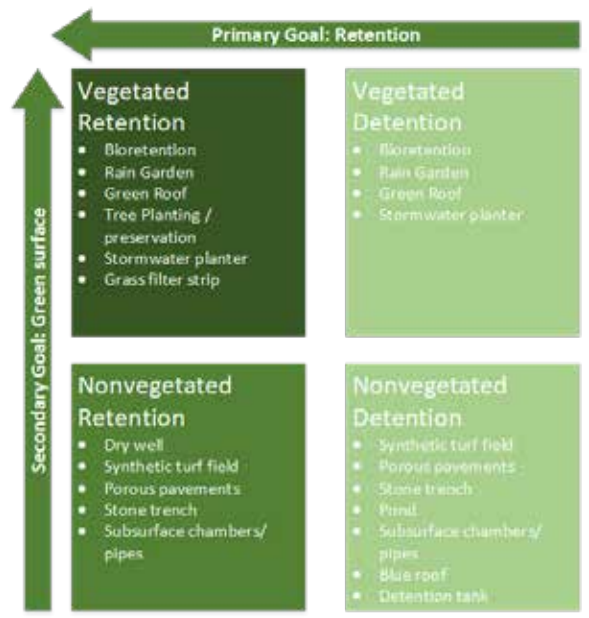
As of the date of this Report, DEP is currently drafting the Unified Stormwater rules, which are expected to be released for public comment later this year, along with the new NYC Stormwater Design Manual.

FIGURE 6: MUNICIPAL SEPARATE STORM SEWER SYSTEM AREA STORMWATER MANAGEMENT PRACTICE HIERARCHY



In both SMP hierarchies, water reuse systems (rain tank, cisterns) are an option at any point.

FIGURE 7: COMBINED SEWER SYSTEM AREA STORMWATER MANAGEMENT PRACTICE HIERARCHY



Construction Management, Inspection, and Enforcement

DEP has constructed or is currently in construction for over 9,000 ROW infrastructure assets throughout the City. Despite these numbers, green infrastructure is still a relatively new field in the construction industry. Many aspects of green infrastructure construction are unique to the way in which these assets function, and DEP identified the need to further the understanding of the personnel involved at all levels – from laborers and site supervisors, to inspectors and construction managers overseeing the construction projects.

In late 2019, DEP held two training sessions for construction managers and contractors working on active and upcoming green infrastructure construction projects. DEP engineers introduced updates to the design standards, presented lessons learned from previous projects, and highlighted components that are critical to the performance of green infrastructure practices.

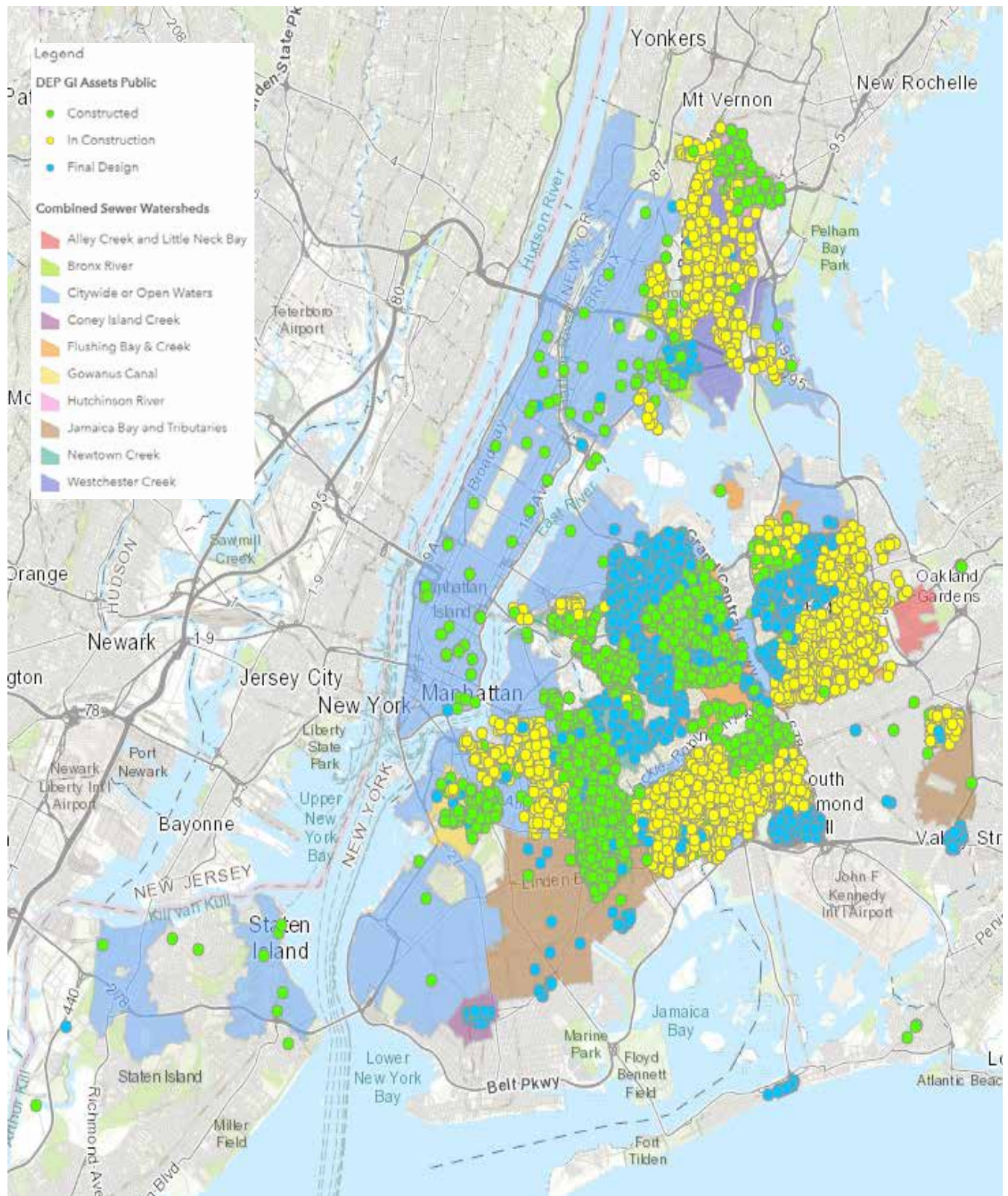
Additionally, the sheer magnitude of this many distributed practices has not come without a few encounters with other agencies and utilities doing construction in the streets and sidewalks, as well as local businesses operating nearby any of the practices. DEP created a new team dedicated to construction oversight, inspection, and enforcement. The team's goal is to confirm that green infrastructure assets are built as designed and functioning properly. The team will also enforce violations for causing damage to assets or discharging prohibited substances into the practices.

The team's inspectors work closely with project managers to discuss the results of their inspections and provide relevant feedback with the aim of ensuring that decisions made in the field are consistent with the program's standards and specifications. DEP's green infrastructure maintenance staff also provide valuable information to this new team by serving as a separate set of eyes on the fully constructed assets. DEP's increased presence in the field will be an opportunity for the program to evaluate the effectiveness of current practices and identify areas for improvement.

In 2020, the team will continue to inspect sites under construction as well as bring more staff onboard. The team will also begin enforcement activities to protect green infrastructure. Staff from this team will play a critical role in the construction of all the public property retrofit projects that are in the pipeline as well.



GREEN INFRASTRUCTURE PROGRAM MAP



View the complete map at nyc.gov/dep/gimap

Watersheds by the Numbers

PROGRESS TOWARD 1.67 BILLION GALLONS PER YEAR OF CSO REDUCTION

DEP's Performance Metrics Report (PMR) submitted to the Department of Environmental Conservation (DEC) on June 30, 2016 and approved on July 5, 2017, showed that DEP can achieve 507 million gallons per year (MGY) of CSO reductions with the 2015 target, primarily from retention green infrastructure assets. DEP is ultimately working toward a reduction of 1.67 BGY by 2030 through green infrastructure implementation. While some of the projects included in the 507 MGY reduction are still underway and are part of the 2015 Contingency Plan (see Exhibit C), DEP was on track to achieving the 507 MGY by the end of 2020 before the COVID-19 pandemic. Specific pandemic-related schedule delays are yet to be determined (TBD), as indicated in the table in Exhibit C. However, many of the projects are in the ground and already providing CSO reduction benefits. Table 3 below shows all assets either constructed or in construction as of the publication of this report.

For the 2020 milestone, DEP continues to make significant progress to design and build green infrastructure and expects to submit a contingency plan by June 30, 2021, as per the CSO Consent Order.¹

TABLE 3: STORMWATER MANAGED AND EQUIVALENT GREENED ACRES, 2010-2019

Watershed	Total Assets ²	Total Equivalent Greened Acres
Alley Creek	0	0
Bronx River	474	59
Coney Island Creek	2	1
Flushing Bay	764	78
Flushing Creek	1,654	165
Gowanus Canal	116	13
Hutchinson River	213	42
Jamaica Bay	4,224	514
Newtown Creek	1,476	141
Westchester Creek	226	21
Total Watershed	9,149	1,035
East River/Open Waters	883	195
Total Citywide³	10,032	1,230

Note: The Annual Report and its contents, including this table, provide yearly updates for public consumption and transparency for our stakeholder community. It should not be interpreted as a milestone compliance document. The Program's compliance with the Consent Order is based on milestone certifications submitted to DEC at five year intervals. For the milestone submittal schedule, see the Order [here](#). In addition, assets and Greened Acres may increase or decrease in any given year due to rejections during construction, termination of construction contracts or other unforeseen circumstances.

¹ DEC # CO2-2000107-8, as modified).

² Assets constructed or in construction in 2020.

³ Sum may not add up to total due to rounding.

WATERSHED GREENED ACRES BREAKDOWN

10,032 green infrastructure assets and 1,230 Greened Acres can be difficult metrics for readers to visualize. The figures below are meant to help illustrate where the Greened Acres are being constructed and what the practices generating the Greened Acres are. Readers should note that these graphics represent a one time snapshot and that actual numbers may change due to unexpected field conditions encountered during construction.

The graphics cover these four 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
- Private – implemented through incentives provided by DEP or through stormwater regulations

Figure 8 shows how many Greened Acres have been implemented or are being implemented in each of the implementation areas. The figure provides an additional breakout for the Private program area to differentiate between incentivized and regulated green infrastructure. As shown, the majority of the Greened Acres, over 80% of those reported out, are being implemented through the ROW program. As described in the PRIVATE PROPERTY INITIATIVES section, DEP is still inputting Private regulated sites into GreenHUB and this number will continue to increase over the next reporting cycles.

Figure 9 shows the breakdown of Greened Acres by green infrastructure type for each of the primary Program implementation areas. The figure shows that rain gardens make up almost 70% of the green infrastructure assets constructed in the ROW, while Onsite implementation is fairly evenly distributed between multiple green infrastructure components (i.e., more than one type of practice was implemented in order to form a larger system), subsurface retention, permeable pavement and bioretention practices. Table 2 in the PRIVATE PROPERTY INITIATIVES section gives a full breakdown of green infrastructure types implemented in Private regulated sites, which are primarily detention practices.

FIGURE 8: BREAKDOWN OF GREENED ACRES BY PROGRAM AREAS

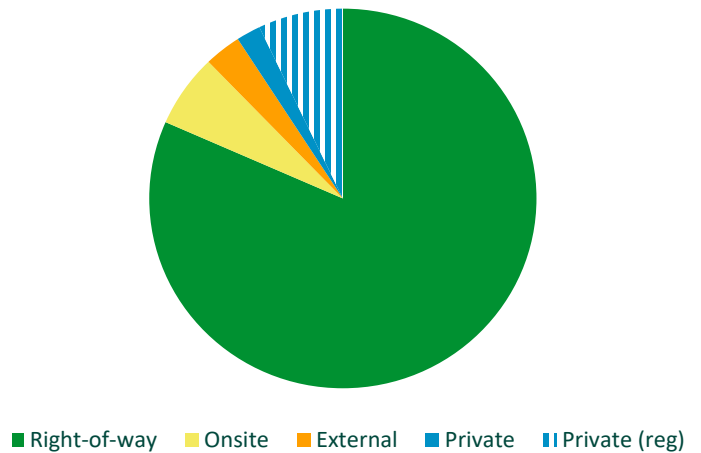
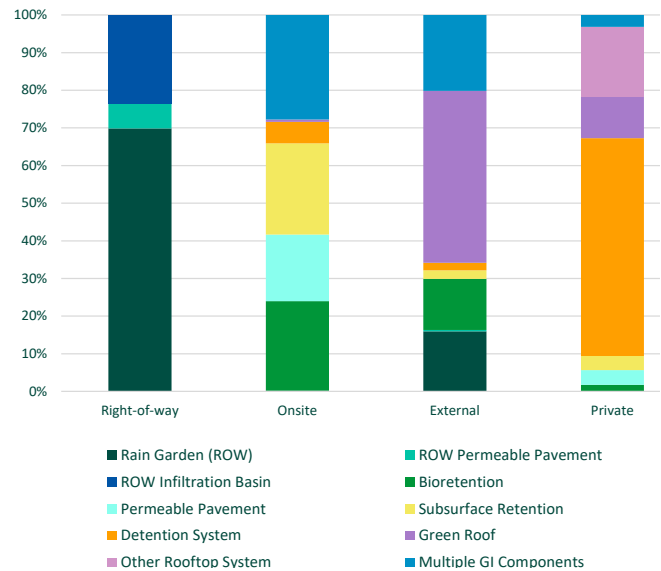


FIGURE 9: BREAKDOWN OF PROGRAM AREA GREENED ACRES BY GREEN INFRASTRUCTURE TYPE



Green Infrastructure Watershed Maps

DEP is again presenting the green infrastructure implementation and planning updates at a watershed level in order to show stakeholders the magnitude and scale of the work completed and planned in each of the City's watersheds to reduce CSOs and provide the co-benefits resulting from green infrastructure projects.

HOW DOES DEP IDENTIFY POTENTIAL PROJECTS WITHIN A WATERSHED?

The watershed maps illustrate DEP's area-wide approach to evaluating green infrastructure opportunities block-by-block and site-by-site in each watershed, starting with the Priority CSO watersheds. Once this area-wide survey is completed, DEP implements green infrastructure at each feasible location through ROW and public property retrofits, private property initiatives or other strategic partnerships. These maps also include green infrastructure and ecosystem restoration projects that DEP is undertaking in non-combined sewer areas as part of other City initiatives.

The 2019 accomplishments provide a quick visual representation of all the work in each watershed that "rolls up" to the Program-wide information presented in Table 3. Each page also includes a list of all upcoming projects that DEP is working hard to bring to reality. The result is a comprehensive, watershed-by-watershed snapshot of DEP's current and projected Program.

As previously described, all of the green infrastructure assets that are constructed and in construction are tracked and counted. Each asset contributes to the overarching goals of the Program to reduce CSO volume and provide co-benefits for New Yorkers. DEP expects to achieve 1.67 billion gallons of CSO volume reduction per year by 2030.

THE MAPS SHOW PROJECTS IN SEPARATELY SEWERED AREAS OF THE CITY. ARE THESE PROJECTS COUNTED IN TABLE 3 AND IN THE WATERSHED ACHIEVEMENTS?

The green infrastructure projects that DEP is installing in the separately sewered areas of the City are shown in the maps in order to provide a full picture of green infrastructure implementation in each of the watersheds. They are not counted toward CSO volume reduction and not included in Table 3 or the watershed achievement numbers.

NOW THAT DEP IS TRACKING THE SITE CONNECTION PERMITS IN GREENHUB, ARE THOSE PROJECTS SHOWN IN THE MAP?

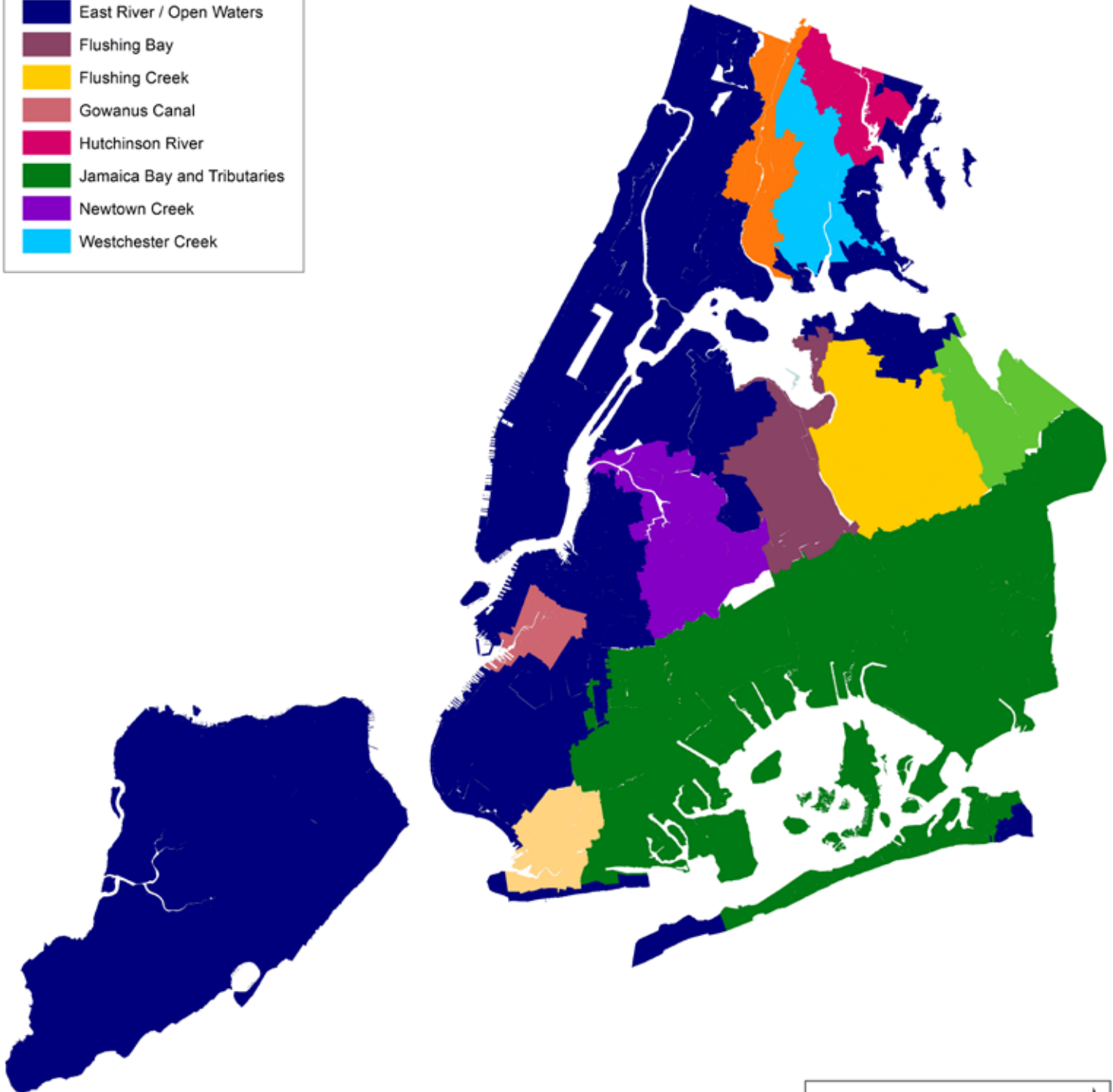
Green infrastructure on private property that was not installed through the Green Infrastructure Grant Program, including SCPs, are not mapped at this time. However, the assets are counted in Table 3 and in the watershed achievements, as they are a part of DEP's efforts to achieve 1.67 billion gallons of CSO volume reduction per year by 2030.



RAIN GARDEN TREE GUARD, QUEENS

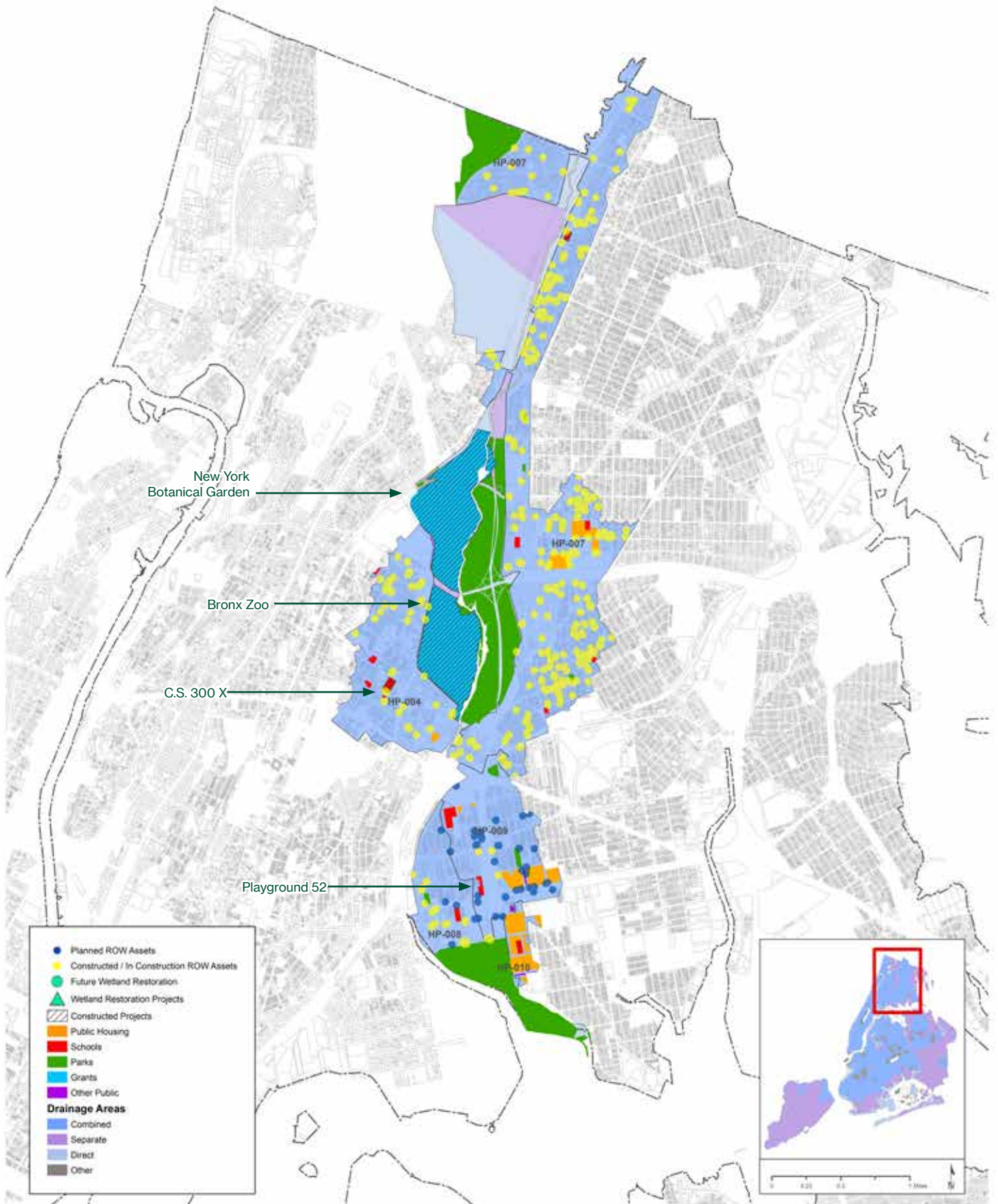
WATERSHED MAP KEY

Watersheds	
	Alley Creek
	Bronx River
	Coney Island Creek
	East River / Open Waters
	Flushing Bay
	Flushing Creek
	Gowanus Canal
	Hutchinson River
	Jamaica Bay and Tributaries
	Newtown Creek
	Westchester Creek



BRONX RIVER WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



BRONX RIVER WATERSHED

2010-2019 ACCOMPLISHMENTS

474 Assets Constructed and In Construction

74.5M Annual Gallons of Stormwater Managed*

59 Equivalent Greened Acres

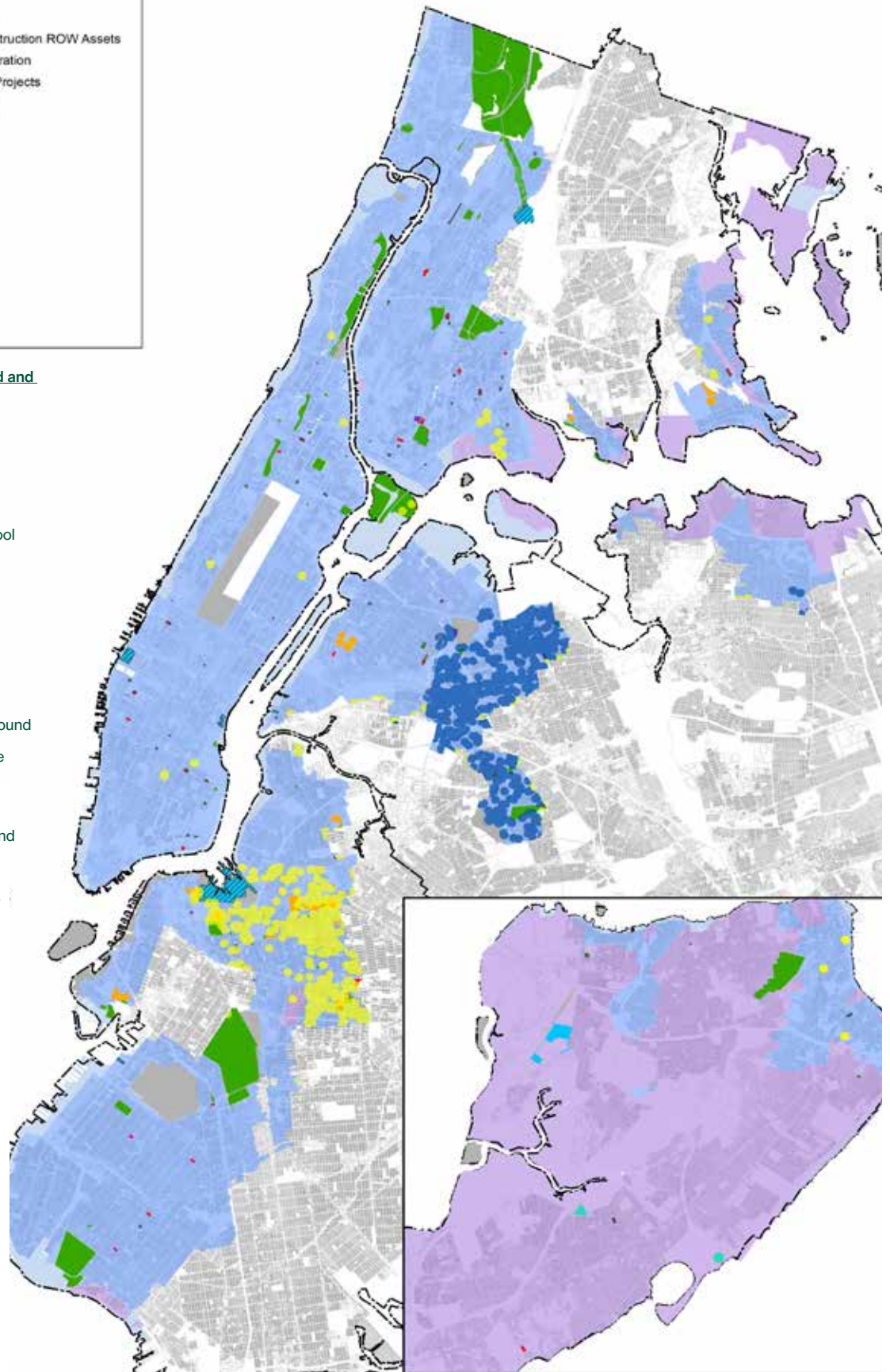
* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

UPCOMING PUBLIC & GRANT PROJECTS**

- 1010 East 178th St
- 43rd Precinct
- Haviland Playground
- Parkside Playground
- Bronx Park
- Watson Gleason Playground
- Bronx River Addition
- Clason Point Gardens
- Colgate Close Park
- I.S. 123 X
- I.S. 45 Annex
- James Monroe Educational Campus
- Mary Mitchell
- Matthews Muliner Playground
- Noble Playground
- P.S. 107 X
- P.S. 57 X
- P.S. 64 X
- P.S. 83 X
- P.S. 89 X
- P.S. 92 X
- P.S. 96 X
- Pelham Parkway
- Sack Wern
- Sotomayor Houses
- Soundview Houses
- Soundview Park

EAST RIVER / OPEN WATERS

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



Public & Grant Projects Constructed and In Construction:

- 399 Sands St.
- Admiral's Row
- Arrochar Playground
- Astoria Heights Playground
- ATCO
- Ballet Tech
- Banana Kelly
- Bishop Loughlin Memorial School
- Bloomingdale Playground
- Brooklyn Navy Yard
- Carmansville Playground
- Citylights
- DeMatti Playground
- Forest House
- Grandview Playground
- Henry M. Jackson Playground
- Hunts Point Playground
- I.S. 227 Q
- I.S. 339 / 313 X (X147)
- James Weldon Johnson Playground
- Javits Center Green Roof
- Lenox Hill Neighborhood House
- Levy Playground
- Lt. Joseph Petrosino Park
- M.S. 354 K
- M.S. 366 X
- Martin Luther King Jr. Playground
- McDonald Playground
- New York Botanic Garden
- NYRP - Paradise on Earth
- NYU Langone Medical Center - Alumni Hall
- Osborne Association
- P.S. 111 M
- P.S. 15 M
- P.S. 154 M
- P.S. 19 M Asher Levy School
- P.S. 33 M
- P.S. 361 M
- P.S. 84 Q
- Playground 103 CIII
- Playground 52
- Plimpton Playground
- Pratt Institute
- Ranaqua Park
- Related Companies (The Abington)
- Salmar
- Saw Mill Playground
- SoBRO: Jasmine Court
- SoBRO: Venture Center
- Sol Lain Playground
- St. Luke and St. Matthew
- St. Nicholas Playground North
- Stockton Playground / P.S. 297
- Ten Eyck Playground / P.S. 196
- The New School
- UA Local 1 - Plumbers
- Van Alst Playground
- William C. Bryant H.S.



EAST RIVER / OPEN WATERS

2010-2019 ACCOMPLISHMENTS

883

Assets Constructed and In Construction

244.3M

Annual Gallons of Stormwater Managed*

195

Equivalent Greened Acres

* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

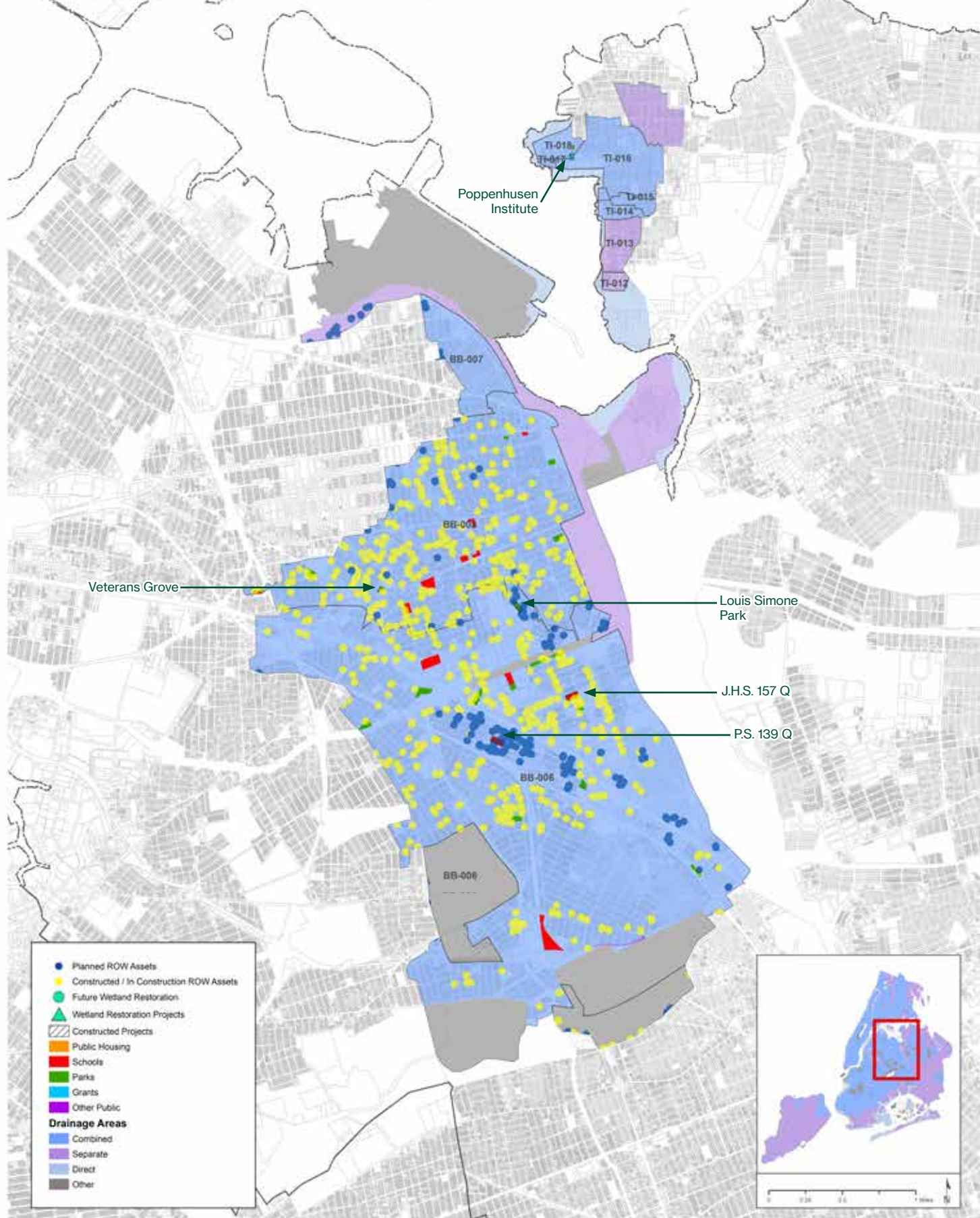
UPCOMING PUBLIC & GRANT PROJECTS**

- 115th Precinct Off Street Parking
- 40th Precinct
- 5-Boro Parking Lot
- 79th Precinct
- Albany
- Albert J. Parham Playground
- Alice Kornegay Triangle Playground
- Asser Levy Recreation Center and Pool
- Aurum Condominium
- Bailey Playground
- Bedford Stuyvesant Restoration
- Bowne Park
- Magenta Playground
- Greenwood Playground
- Bushwick Pool Building
- Chelsea Recreation Center
- Claremont Park
- Colonel Charles Young Playground
- Cooper Park
- Corporate Commons Three
- Crotona Park Boathouse
- Dry Dock Pool Building
- Dyker Playground
- Elmhurst Park Decorative Fountain
- Engine 207
- Epiphany Playground
- Farragut
- Fort Greene Park
- Gertrude Ederle Recreation Center
- Golconda Playground
- Greenpoint Public Library
- Hansborough Recreation Center
- Highbridge Recreation Center
- I.S. 220 K
- I.S. 390 - The School of Integrated Learning
- I.S. 7 R
- J.H.S. 227 K
- Juniper Valley Park Field House
- Kingsbridge Heights Community Center
- La Central Building A
- Lafayette Gardens
- Laguardia Landing Lights
- M.S. 223 K
- M.S. 224 X (X139)
- M.S. 267 X (X158)
- M.S. 306 X
- M.S. 584 X (X162)
- Mafera Park
- Marble Hill Playground
- Marcy
- Median: 1320 Grant Av
- Median: 82nd St and 23rd Av
- Median: Bergen Av and East 152nd St
- Median: Dawson St and Intervale Av
- Median: East 141st St and Brook Av
- Median: East 159th St and Melrose Av
- Median: East 161st St and Elton Av
- Montefiore (Moses)
- Morningside Park
- Mosholu Parkway
- NYC Lab School
- PS. 111 Q
- PS. 130 K
- PS. 180 M
- PS. 184 / 137 M
- PS. 204 K
- PS. 221 Q
- PS. 243 K - Weeksville School
- PS. 297 K - Abraham Stockton
- PS. 368 / I.S. 33
- PS. 58 Q
- PS. 59 K - William Floyd
- PS. 66 X
- Parade Grounds Recreation Center
- Patrick O'Rourke Playground
- Pelham Fritz Recreation Center
- Peter Minuit Playground
- Poe Park Visitor Center
- Potomac Playground
- East Elmhurst Playground
- Ravenswood
- Raymond Bush Playground
- Recreation Center 54
- Renaissance Playground
- Sedgewick & Dickenson
- Seton Park
- Sheltering Arms Poolhouse
- Silver Lake Park transverse road
- Spuyten Duyvil Playground
- St. James Recreation Center
- St. John's Recreation Center
- St. Mary's Recreation Center
- St. Michael's Playground
- St. Nicholas Park
- Star Spangled Playground
- Sumner
- Sunset Park Recreation Center
- Taaffe Playground
- Thomas Jefferson Park
- Taxi and Limousine Commission Woodside Facility Renovation
- Tompkins
- Tony Dapolito Recreation Center
- Two Bridges Neighborhood Council
- Van Cortlandt Park
- Whitman
- Williamsbridge Oval
- Windsor Terrace Public Library

** Not counted toward stormwater managed or greened acres above. Subject to change based on feasibility and/or other project constraints.

FLUSHING BAY WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



FLUSHING BAY WATERSHED

2010-2019 ACCOMPLISHMENTS

764 Assets Constructed and In Construction

97.9M Annual Gallons of Stormwater Managed*

78 Equivalent Greened Acres

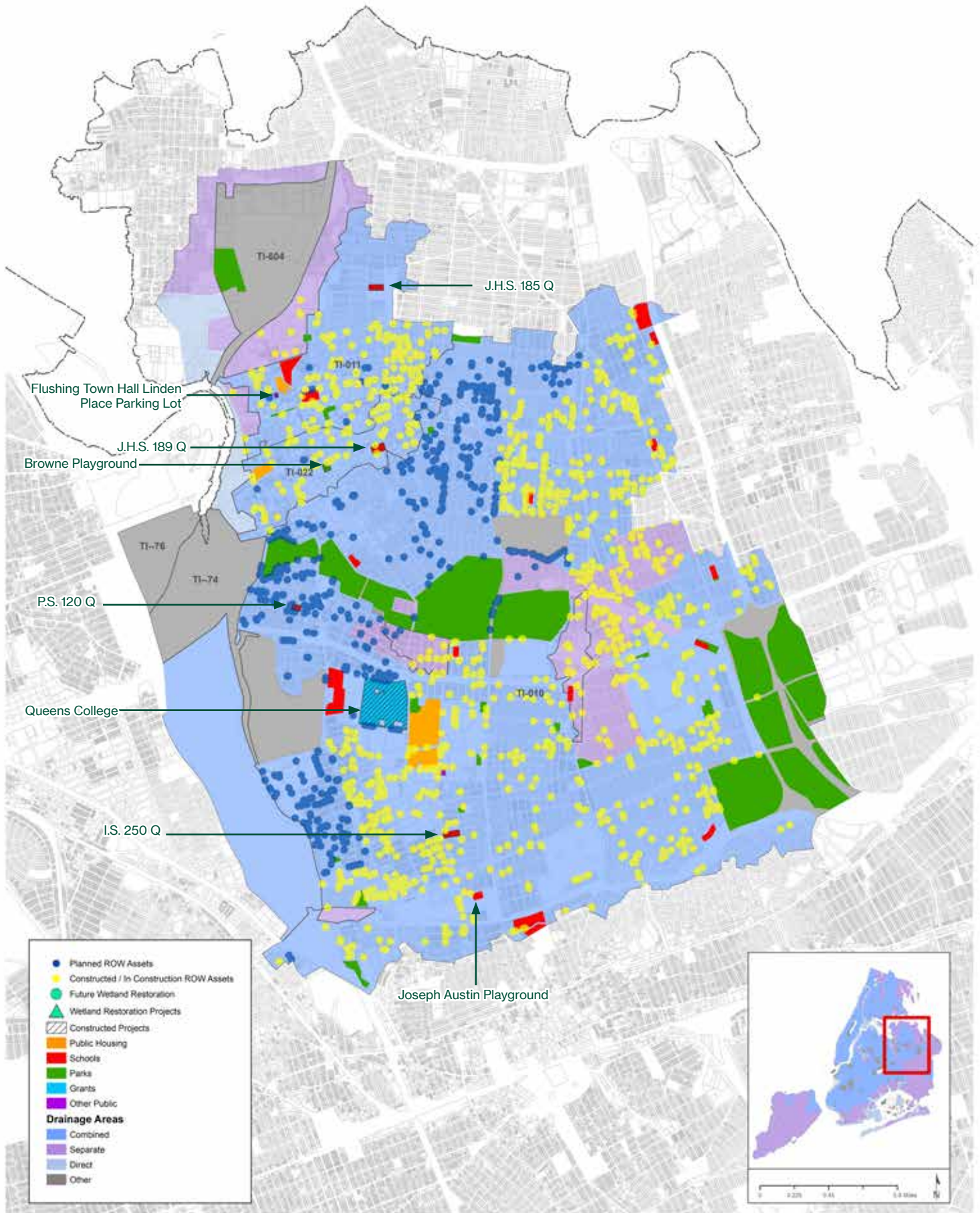
* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

UPCOMING PUBLIC & GRANT PROJECTS**

- Annadale Playground/P.S. 175
- Barrier Playground
- Corona Golf Playground
- Crowley Playground
- Ehrenreich-Austin Playground
- Frank D. O'Connor Playground
- Hoffman Park
- Lost Battalion Hall Recreation Center
- Louis Armstrong Community Center
- Louis Armstrong Playground
- Metropolitan Avenue Campus
- Newtown H.S.
- Newtown H.S. Athletic Field
- P.S. 206 Q
- P.S. 307 Q
- P.S. 315 Q
- P.S. 330 Q
- P.S. 744 Q
- P.S./I.S. 311 Q
- Playground 115
- Horace Harding Playground
- Real Good Park
- Russell Sage Playground/J.H.S. 190 Q
- The Painter's Playground/P.S. 174

FLUSHING CREEK WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



FLUSHING CREEK WATERSHED

2010-2019 ACCOMPLISHMENTS

1,654 Assets Constructed and In Construction

207.1M Annual Gallons of Stormwater Managed*

165 Equivalent Greened Acres

* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

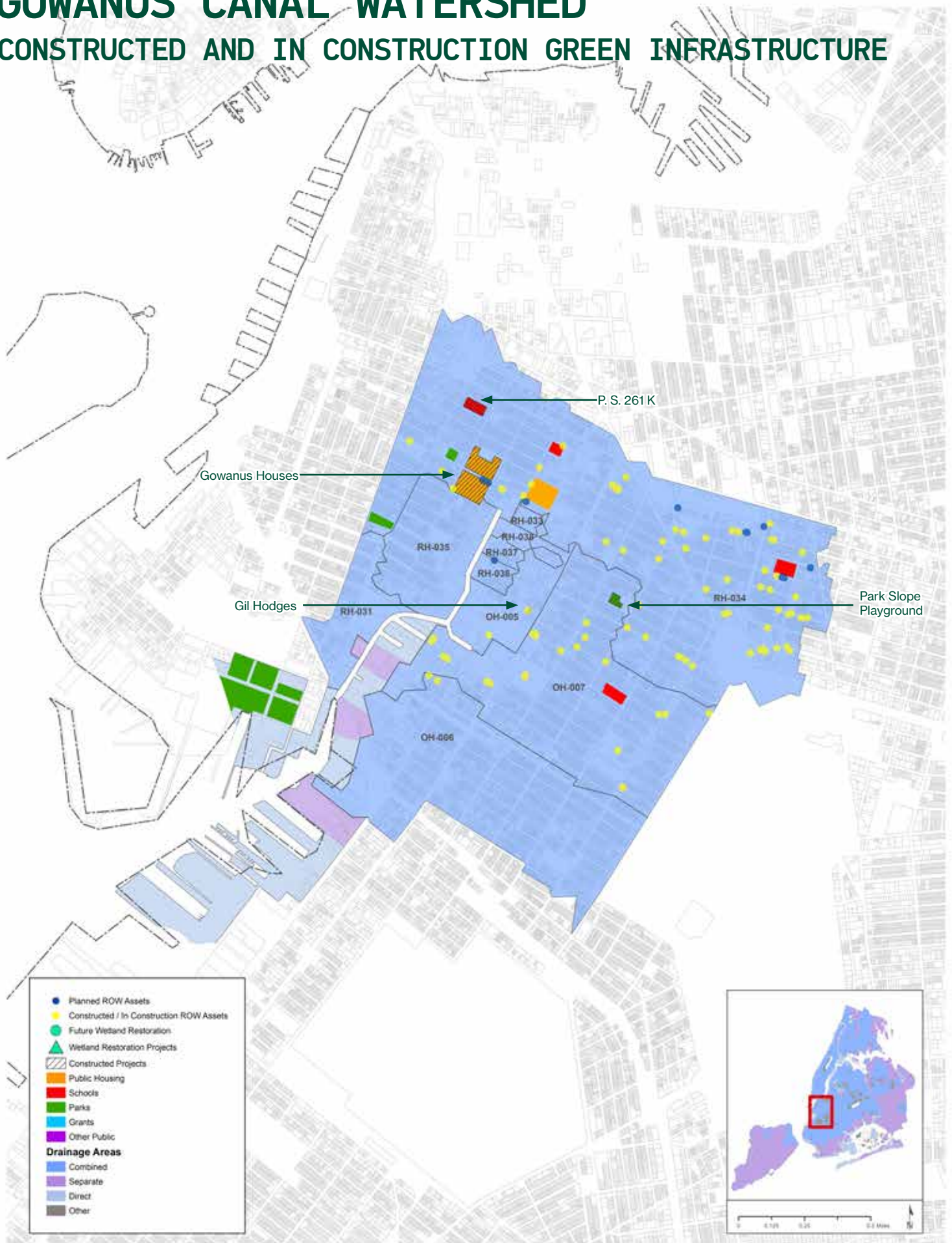
UPCOMING PUBLIC & GRANT PROJECTS**

- 107th Precinct
- Bayside Fields
- Bayside H.S. Athletic Field
- Bland Houses
- Cedar Grove Playground
- Colden Playground
- College Point Fields
- Cunningham Park
- Daniel Carter Beard Mall
- Emerald Playground
- Farm Playground
- Flushing Greens
- Flushing H.S.
- Flushing H.S. Athletic Field (Levitts Field)
- Francis Lewis Playground
- Fresh Meadows Park
- Fresh Meadows Playground
- Holy Cow Playground
- Hoover - Manton Playgrounds
- I.S. 237 Q
- J.H.S. 216 Q
- Jamaica H.S.
- John Bowne H.S.
- Judge Moses Weinstein Playground
- Kissena Corridor Park
- Kissena Park
- Latimer Gardens
- Margaret I. Carman Green - Weeping Beech
- Murray Hill Playground
- P.S. 107 Q
- P.S. 130 Q
- P.S. 159 Q
- P.S. 162 Q
- P.S. 163 Q
- P.S. 178 Q
- P.S. 179 Q
- Plaut Triangle
- Playground Seventy Five
- Pomonok Houses
- Pomonok Playground
- Queens Academy H.S.
- Queens College Dining Hall
- Queens Gateway to Health Sciences Secondary School
- Electric Playground
- Kissena Park
- Queens Valley Playground
- Saul Weprin Playground

** Not counted toward stormwater managed or greened acres above. Subject to change based on feasibility and/or other project constraints.

GOWANUS CANAL WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



GOWANUS CANAL WATERSHED

2010-2019 ACCOMPLISHMENTS

116 Assets Constructed and In Construction

16.6M Annual Gallons of Stormwater Managed*

13 Equivalent Greened Acres

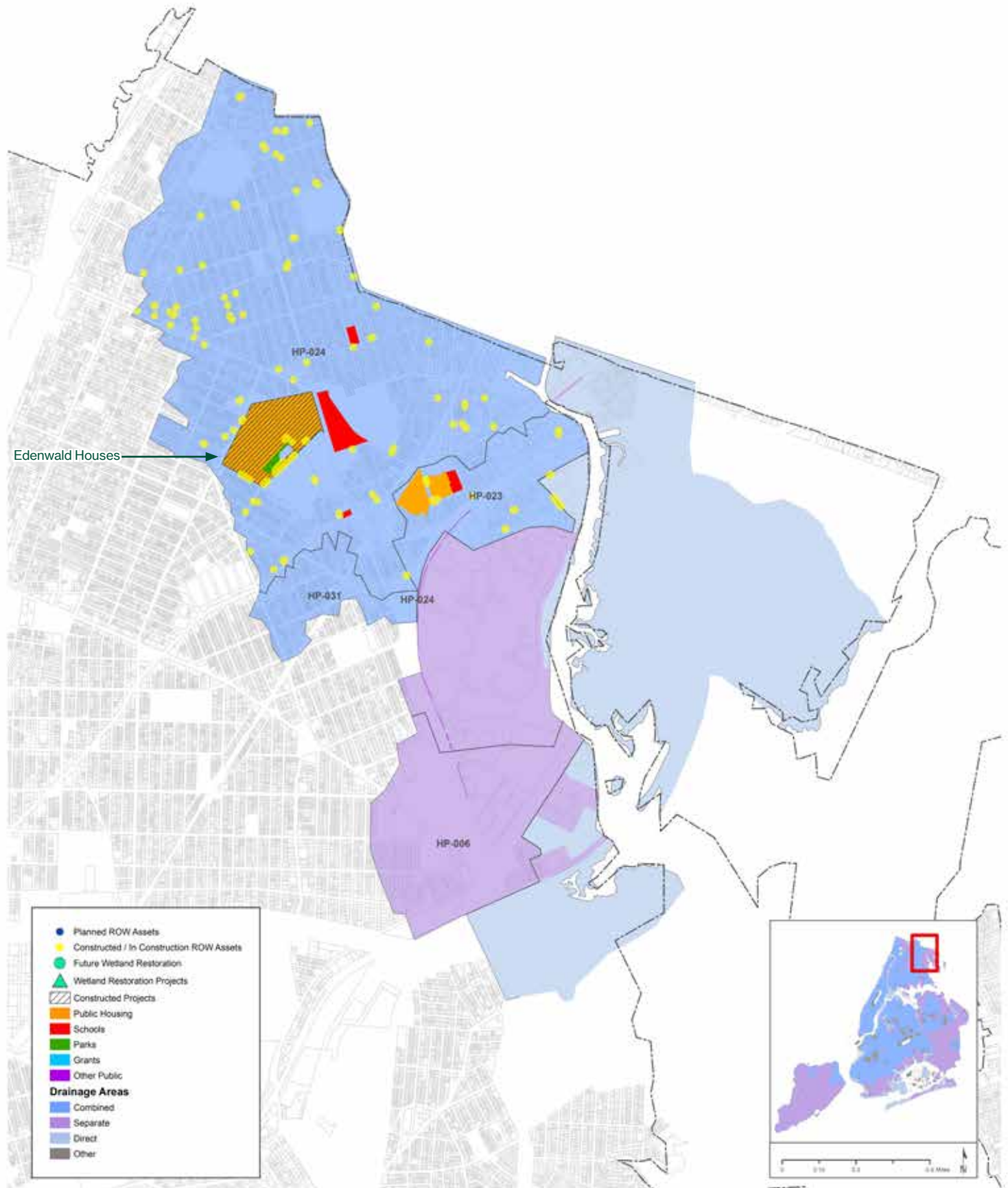
* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

UPCOMING PUBLIC & GRANT PROJECTS**

- Boerum Park
- Carroll Park
- P.S. 321K
- P.S. 38 K
- P.S. 47 / P.S. 38 K
- P.S. 9 K
- Prospect Park Shops
- Red Hook Recreation Center
- Redhook East & West
- Wyckoff Gardens

HUTCHINSON RIVER WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



HUTCHINSON RIVER WATERSHED

2010-2019 ACCOMPLISHMENTS

213 Assets Constructed and In Construction

52.5M Annual Gallons of Stormwater Managed*

42 Equivalent Greened Acres

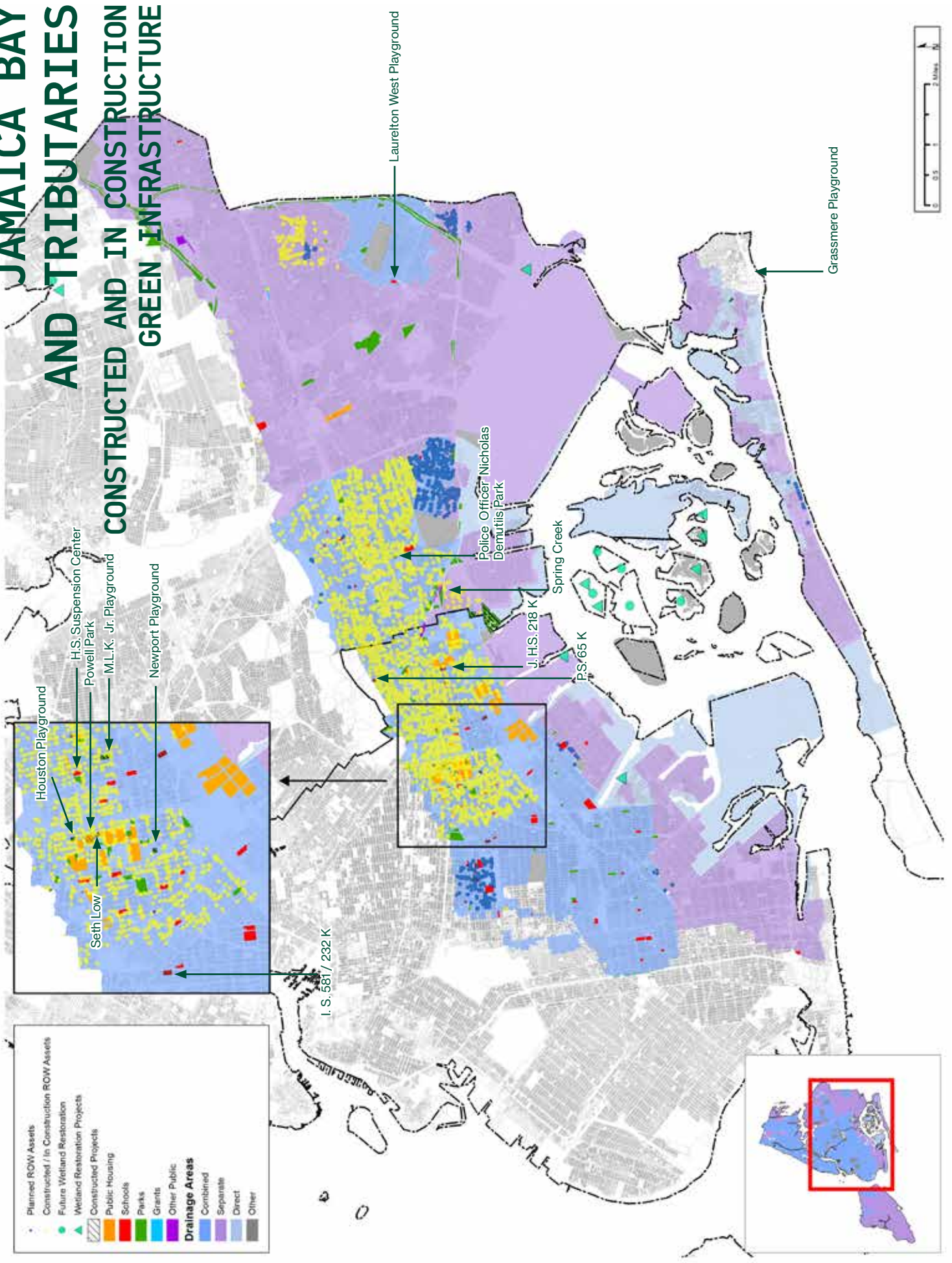
* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

UPCOMING PUBLIC & GRANT PROJECTS**

- Boston Secor Houses
- Edenwald Playground
- P.S. 111 X
- P.S. 68 X
- P.S. 93 X
- P.S./I.S. 189 X
- Stars & Stripes Playground
- The Willie Ella Paschal Bowman Campus

JAMAICA BAY AND TRIBUTARIES

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



JAMAICA BAY AND TRIBUTARIES

2010-2019 ACCOMPLISHMENTS

4,224 Assets Constructed and In Construction

645.3M Annual Gallons of Stormwater Managed*

514 Equivalent Greened Acres

* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

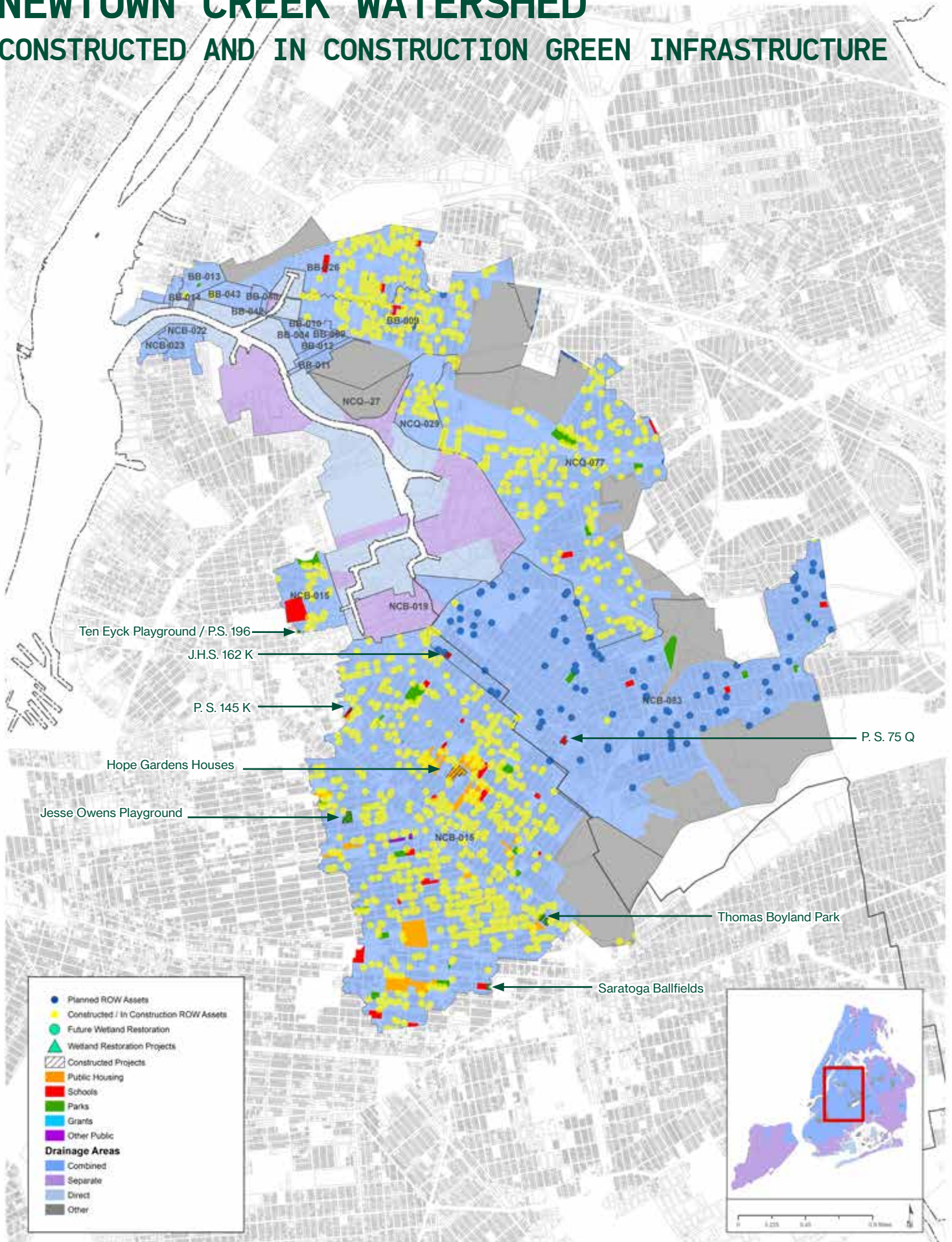
UPCOMING PUBLIC & GRANT PROJECTS**

- 71st Precinct
- 73rd Precinct Off Street Parking C
- Amersfort Park
- Andries Playground
- Beach 67th Street
- Belmont Playground / P.S. 214
- Belmont Sutter
- Betsy Head Park Building
- Boulevard Houses
- Boys and Girls H.S. Athletic Field (Old)
- Breukelen
- Brownsville
- Brownsville Playground
- Brownsville Recreation Center
- Cambria Playground
- Canarsie H.S.
- Carter G. Woodson Children's Park
- Centreville Playground
- Chester Playground
- City Line Park
- Cypress Hills
- Delphin H. Greene Playground
- Detective Keith Williams Park
- District #18 CEC
- Dr. Richard Green Playground
- East New York City Line
- East NY Voc. H.S. of Transit Tech K
- East Springfield Playground
- Edward R. Murrow H.S.
- Elton Playground
- Engine 283
- Fiorentino Plaza
- Fox Playground (Brooklyn)
- Fraser Square
- Garvey (Group A) Houses
- Gemini Fields
- George W. Wingate H.S.
- Glenmore Plaza
- Grace Playground
- H.S. for Construction Trades, Engineering, and Architecture
- Hamilton Metz Field
- Harold Schneiderman Playground
- Highland Park (Brooklyn)
- Highland Park (Queens)
- Hillside Ave and Winchester Blvd
- Howard Ave
- Howard Houses
- Howard Playground
- Howard Pool Building
- Hughes Apartments
- I.S. 2 K
- I.S. 252 K
- I.S. 285 K
- I.S. 292 K
- I.S. 323 K
- I.S. 391 K
- I.S. 59 Q
- Jerome Playground
- John Adams H.S.
- Linden Houses
- Linwood Playground
- Livonia Park
- Marc And Jason's Playground
- Maurice A Fitzgerald Playground
- Median: N/S Conduit from 83rd St to 88th St
- Median: N/S Conduit from Grant Av to Sutter Av
- Nehemiah Park
- Ocean Hill Playground
- P.S. 100 Q
- P.S. 108 Q
- P.S. 115 K
- P.S. 119 K
- P.S. 13 K
- P.S. 156 / I.S. 392 K
- P.S. 165 K
- P.S. 183 / 446 K
- P.S. 191 K
- P.S. 193 K
- P.S. 199 K
- P.S. 203 K
- P.S. 22 K
- P.S. 221 K
- P.S. 262 Q
- P.S. 268 K
- P.S. 269 K
- P.S. 273 Q
- P.S. 308 K
- P.S. 315 / 152 K
- P.S. 328 K
- P.S. 329 K
- P.S. 51 Q
- P.S. 56 Q
- P.S. 62 Q
- P.S. 66 K
- P.S. 72 K
- P.S. 91 K
- P.S. 96 Q
- P.S. 99 K
- Paerdegat Park
- Passages Academy
- Pennsylvania-Wortman Ave Houses
- Phil "Scooter" Rizzuto Park
- Pink Houses
- Pink Playground
- Power Playground
- London Planetree Playground
- Tudor Park
- Railroad Park
- Railroad Playground
- Reid Apartments
- Remsen Playground
- Richmond Hill H.S.
- Robert E. Venable Park
- Roy Wilkins Recreation Center
- Samuel J. Tilden Educational Campus
- Seth Low Houses
- South Jamaica Houses I & II
- South Shore Educational Campus
- Sutter Ballfields
- The Ozone Park Educational Campus
- Thomas Jefferson H.S.
- Tilden Houses
- Van Dyke I
- Van Dyke II
- Van Dyke Playground
- Vito Locascio Field
- Wilson Playground
- Wingate Park
- Woodruff Playground

** Not counted toward stormwater managed or greened acres above. Subject to change based on feasibility and/or other project constraints.

NEWTOWN CREEK WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



NEWTOWN CREEK WATERSHED

2010-2019 ACCOMPLISHMENTS

1,476 Assets Constructed and In Construction

177.5M Annual Gallons of Stormwater Managed*

141 Equivalent Greened Acres

* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

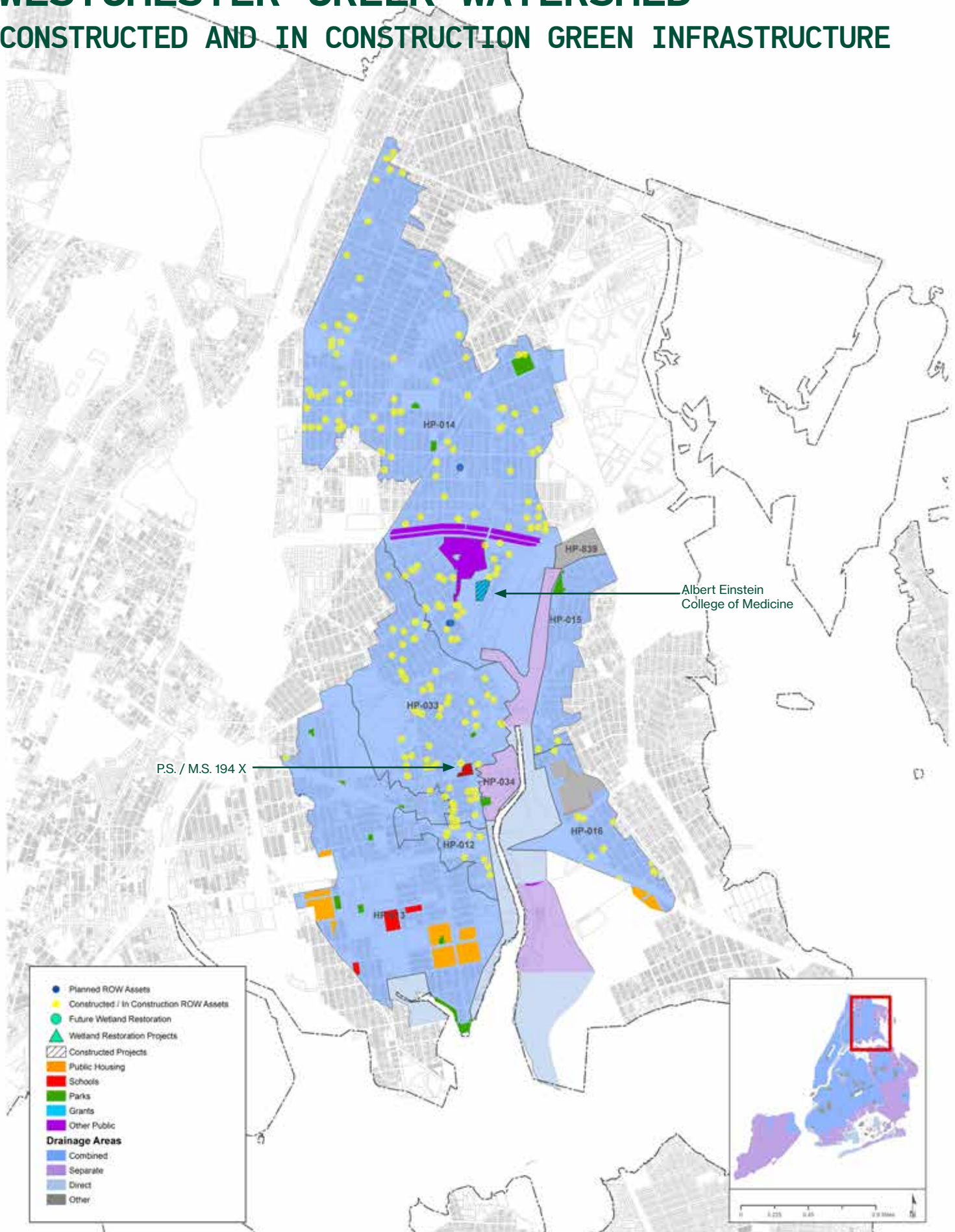
UPCOMING PUBLIC & GRANT PROJECTS**

- 81st Precinct Off Street Parking
- 83rd Precinct Off Street Parking E
- Arrow Community Center
- Boys and Girls H.S.
- Brevoort Houses
- Bridge and Tunnel Park
- Classon Playground
- Oracle Playground
- Willoughby Playground
- Bushwick II
- Bushwick Playground
- Charter School of Excellence
- Cooper Park
- El Shabazz Playground
- Eleanor Roosevelt Playground
- Engine 222
- Evergreen Playground
- Fermi Playground
- Frank Principe Park
- Frontera Park
- Grand Street Campus
- I.S. 291 K
- I.S. 394 K
- I.S. 73 Q
- I.S. 119/Pinocchio Playground
- Jackie Robinson Playground
- Kingsborough Houses
- La Guardia Community College
- Lafayette Playground
- Maria Hernandez Park
- Metropolitan Pool and Fitness Center
- Middle Village Playground
- Ocean Hill Apartments
- P.S. 123 K
- P.S. 150 Q
- P.S. 151 K
- P.S. 153 Q
- P.S. 178 K
- P.S. 199 Q
- P.S. 28 K
- P.S. 309 K
- P.S. 376A K
- P.S. 377 K
- P.S. 45 AX
- P.S. 5 K
- P.S. 75 K
- P.S. 86 K
- P.S. 87 Q
- P.S. 88 Q
- P.S. 91 Q
- Queens Vocational and Technical H.S.
- Reiff Playground
- Roosevelt I Houses
- Roosevelt II Houses
- Rosemary's Playground
- Saratoga Houses
- South Pacific Playground
- Stuyvesant Gardens I
- Tiger Playground
- "Uncle" Vito E. Maranzano Glendale Playground
- Weeksville Playground
- Woods Playground

** Not counted toward stormwater managed or greened acres above. Subject to change based on feasibility and/or other project constraints.

WESTCHESTER CREEK WATERSHED

CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



WESTCHESTER CREEK WATERSHED

2010-2019 ACCOMPLISHMENTS

226

Assets Constructed and In Construction

26.7M

Annual Gallons of Stormwater
Managed*

21

Equivalent Greened Acres

* Annual gallons of stormwater managed = asset capacity (cf/1 in rainfall event)*46.25 (in/yr) (typical annual rainfall)*7.48 (gal/cf)

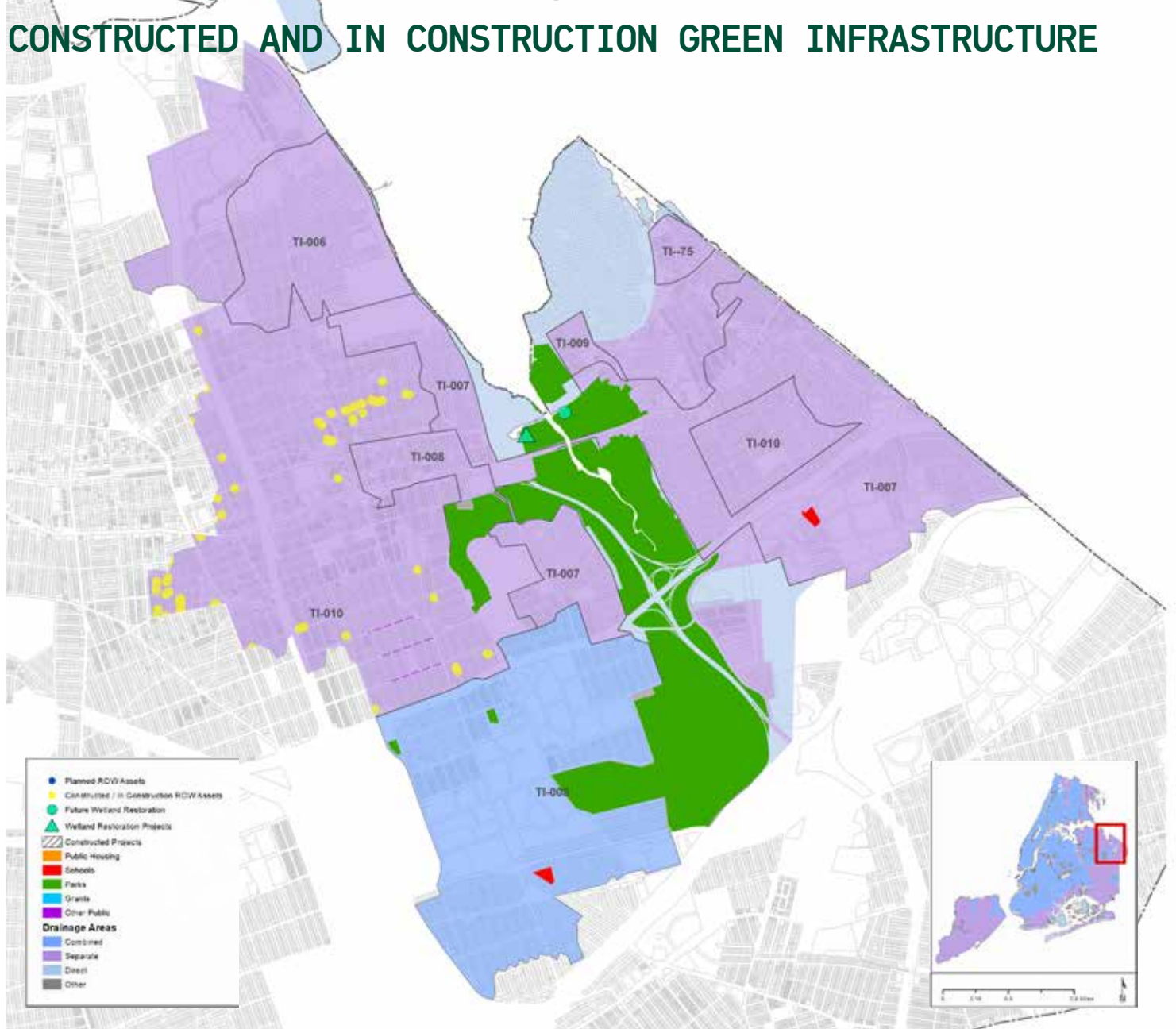
UPCOMING PUBLIC & GRANT PROJECTS**

- 49th Precinct
- Adlai E. Stevenson Educational Campus
- Allerton Playground
- Space Time Playground
- Castle Hill
- Castle Hill Little League Field
- Castle Hill Park
- Chief Dennis L. Devlin Park
- Colucci Playground
- Eastchester Playground
- Haffen Park
- Median: Balcom Av and Barkley Av near Cross Bronx Exp
- Monroe
- P.S. 138 X
- P.S. 69 X
- Randall Playground
- Story Playground
- Taylor Playground
- The Pearly Gates
- Throggs Neck Houses
- Virginia Playground

** Not counted toward stormwater managed or greened acres above. Subject to change based on feasibility and/or other project constraints.

ALLEY CREEK WATERSHED

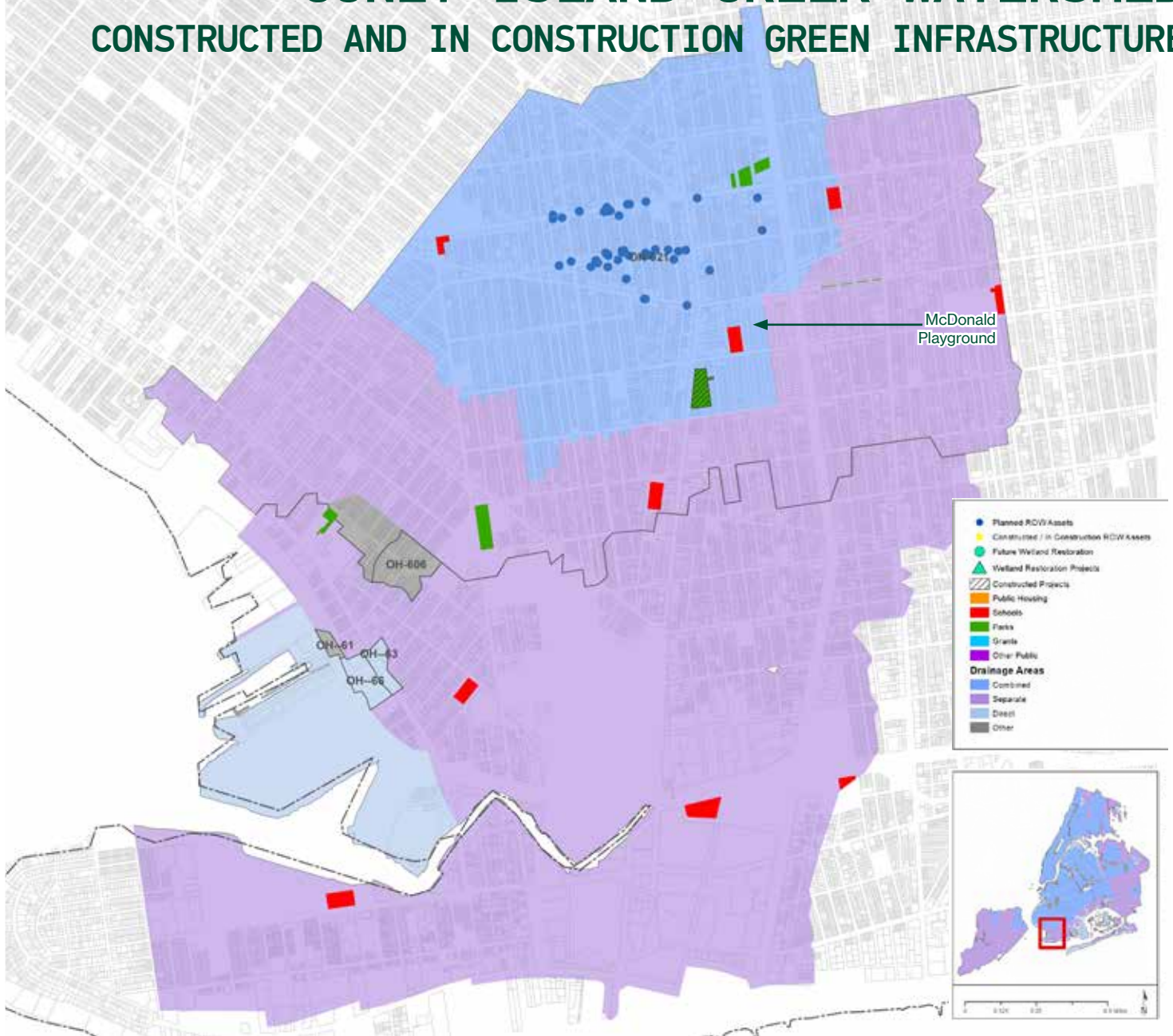
CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



The Alley Creek and Little Neck Bay watershed is served by the Tallman Island WRRF and contains a complex wastewater and stormwater system comprised of combined and separately sewered areas as well as direct drainage. The annual wet weather discharge volume to the watershed is predominately stormwater and direct drainage runoff. DEP has completed a 5 million gallon Alley Creek CSO retention facility that has been in operation since 2011, reducing overflows by 132 MGY. Accordingly, the watershed has not been considered a priority for ROW green infrastructure implementation in the combined sewer areas. However, DEP is pursuing retrofit opportunities on several public properties for green infrastructure implementation. Through DEP’s partnership with TPL, green infrastructure was constructed in the separate sewer area of the watershed, at P.S. 221. There are 6 upcoming projects: Alley Park, Alley Pond Park, Oakland Gardens, P.S. 188, Seven Gables Playground and Tall Oak Playground.

In addition, there have been efforts to restore and build wetlands in Alley Creek for water quality improvements and ecological habitat benefits. The Alley Creek wetland is an enormous natural resource in northern Queens, and DEP expanded it by adding 1.5 acres. DEP also designed a “treatment wetland” in Alley Creek to target pollutant load reductions and to better quantify water quality and environmental improvements of wetland expansions in the receiving waters. DEP is collaborating with Jamaica Bay Science and Resiliency Institute and researchers from Queens College on this study (see RELATED INITIATIVES).

CONEY ISLAND CREEK WATERSHED CONSTRUCTED AND IN CONSTRUCTION GREEN INFRASTRUCTURE



The Coney Island Creek watershed is an urban tributary to Gravesend Bay, which itself is tributary to the Lower New York Bay. Water quality in Coney Island Creek is influenced by multiple sources, including stormwater discharges, dry-weather sources and CSOs. The annual wet weather discharge volume to the watershed is predominately stormwater and direct drainage runoff.

DEP has completed pump station upgrades which have been operational since 2014, reducing overflows by 68% from 245 MGY to 75 MGY. Accordingly, the watershed had not been considered a priority for ROW green infrastructure implementation in the combined sewer areas in the early years of the program. However, DEP is continuing efforts to apply an integrated approach for stormwater management. DEP is currently investigating green infrastructure opportunities at public schools in the combined sewer areas, and a few public properties as part of the City's MS4 Stormwater Management Program. There are 13 upcoming projects: Avenue R Mall, Bath Playground, Brooklyn Parkland Retrofits Col. David Marcus Playground, P.S. 95K (Gravesend), P.S. 212, I.S. 234, P.S. 238, Mark Twain Intermediate School, I.S. 303 (Rachel Carson H.S.), William E. Grady CTE H.S., Lucretia Marcigliano Campus, P.S. 215, and Scarangelia Park. There are also planned green infrastructure projects funded through the New York Rising program (see RELATED INITIATIVES).



BEFORE (TOP) AND AFTER (BOTTOM)
TPL GREEN INFRASTRUCTURE PLAYGROUND AT P.S. 221Q, QUEENS

GREEN INFRASTRUCTURE MAINTENANCE



GREENHOUSE AT MAINTENANCE FACILITY, BROOKLYN

RIGHT-OF-WAY MAINTENANCE

The rain garden maintenance crews provide maintenance for the thousands of constructed green infrastructure practices in the ROW. Planning for hiring and training is paced with new construction and transition of assets from contractor guarantee to full maintenance by DEP staff, so that DEP’s maintenance program grows as the number of new rain gardens increases. Table 4 below shows the growth of the team since 2014. DEP has two maintenance facilities, one in Brooklyn and one in the Bronx, to eliminate excess travel time and to improve the overall efficiency of the teams. A satellite facility in Brooklyn is under development, and another facility in Queens is in the planning phase.

The maintenance crews perform a variety of tasks to keep the rain gardens functional and attractive. To ensure performance, the teams typically remove weeds, prune, and replace dead plants as well as remove sediment

from inlets, outlets, stone columns and soil to make sure stormwater flows into and within the rain garden properly. For appearance, the teams remove litter and trim plants. These actions keep the curb appeal of the rain gardens and preserve sight lines to keep pedestrians and vehicles safe. Although the amount of maintenance each rain garden needs varies by size, neighborhood (commercial or residential areas), and season, every rain garden is visited about once a week.

New staff is trained using the ROW Green Infrastructure Operations and Maintenance Manual, along with on-the-job-training provided by current crew leaders and supervisors. Additional training is offered for select staff to undergo horticulture and plant care training or certifications through a continued partnership with the New York Botanical Garden.

TABLE 4: DEP ROW GREEN INFRASTRUCTURE MAINTENANCE STAFFING BY YEAR

Total Headcount Per Calendar Year*					
2014	2015	2016	2017	2018	2019
15	23	25	62	103	104

* Total Headcount includes both full-time and seasonal titles.

To manage the operations of the rain gardens, crew leaders conduct evaluations before beginning site maintenance. Maintenance data allows program managers to understand where and how frequently rain gardens are being maintained, the type of work being done, the level of effort required, and any reoccurring issues. By understanding the level of effort required to keep rain gardens in good condition, managers can allocate resources as needed. These evaluations also allow the maintenance team to resolve larger issues like damage from construction or utility work that cannot be corrected through routine maintenance alone.

If the public witnesses any issues with a particular rain garden between maintenance visits, they can call 311 as indicated on the blue “rain garden” decals on each rain garden. Staff at the City’s 311 call centers are trained to process rain garden-related requests. The public can also use 311 online to report a broken tree guard, trash, or flooding. Through 311, public requests are directed to DEP’s maintenance staff and the response is tracked.



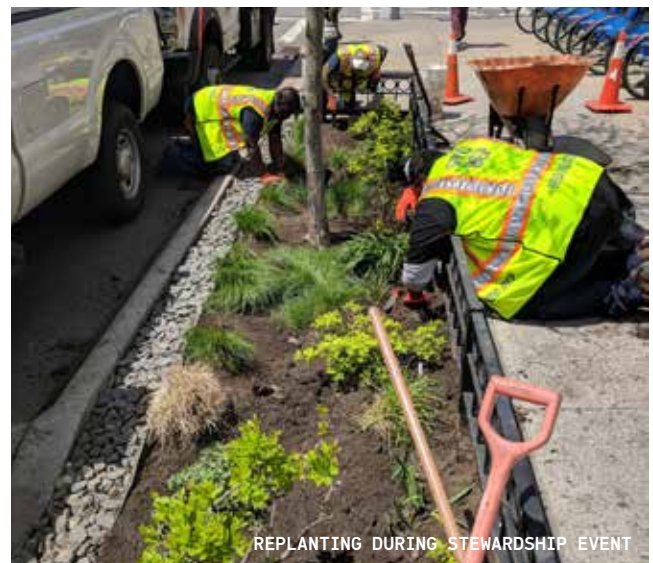
RAIN GARDEN MAINTENANCE STAFF IN THE FIELD

PUBLIC PROPERTY RETROFITS MAINTENANCE

DEP and its partners have ensured that all other green infrastructure will be maintained over the long term. DEP has accepted maintenance responsibility for green infrastructure implemented within developments owned by NYCHA. DOE’s Division of School Facilities has agreed to incorporate the maintenance of green infrastructure practices into their typical schoolyard tasks. Similarly, DPR has incorporated green infrastructure maintenance into the borough maintenance and operations crew responsibilities. DEP has committed to an ongoing and open dialogue with all of our partnering agencies to provide support, adjust designs, and consider other changes to implementation of practices as the Program grows.

STEWARDSHIP

In 2019, the Green Infrastructure Maintenance Rain Garden Stewardship Program accomplished the following: produced a rain garden stewardship maintenance manual as well as additional brochures and literature; developed a stewardship training protocol and trained over 25 individual stewards; developed mechanisms for managing and tracking stewards, volunteers, and tools; and established an online presence via the DEP website. In 2019, over 305 volunteer hours were provided by stewards in 9 participating neighborhoods, including 13 outreach events and community planting days.



REPLANTING DURING STEWARDSHIP EVENT

RELATED INITIATIVES



NYC STORMWATER MANAGEMENT PROGRAM (SWMP)

The NYC Stormwater Management Program (SWMP) consists of the City's measures to reduce the pollution potential of stormwater discharging into and from the MS4 areas. The City developed and implements the SWMP in compliance with its MS4 permit. Fourteen City agencies are responsible for implementing the SWMP in the MS4 area, which comprises approximately 30% of NYC. There are three SWMP programs that include green infrastructure requirements: Construction and Post-Construction, Pollution Prevention/Good Housekeeping for Municipal Facilities and Operations (PPGH), and Special Conditions for Impaired Waters.

As described earlier, the Construction and Post-Construction program requires certain new and redevelopment projects to apply for permits. Projects required to implement post-construction stormwater management practices are encouraged to follow NYC's preferred hierarchy, which prioritizes on-site vegetated infiltration options such as rain gardens. More information on MS4 Construction Permits is available on DEP's [website](#).

As part of the PPGH program, agencies use standardized criteria to evaluate the feasibility of implementing green infrastructure during planned municipal upgrades in the MS4 area. An agency will include green infrastructure in any planned municipal upgrade project (defined as a capital project in excess of \$2M) for which the agency determines that installation of green infrastructure is

feasible and cost-effective.

The "Special Conditions for Impaired Waters" section of the permit requires the City to evaluate green infrastructure opportunities in MS4 areas that meet certain criteria; only Coney Island Creek meets those criteria at this time. DEP evaluated school and park sites in the Coney Island Creek MS4 area for green infrastructure feasibility and is proceeding with the design of green infrastructure practices at four schools and one park. The green infrastructure practices will be designed to accommodate a 90th percentile storm (1.5" of rainfall).

More information on the City's SWMP activities is provided in the 2019 MS4 Annual Report.

The rules for MS4 construction permitting became effective on June 1, 2019.

SOUTHEAST QUEENS AND THE CLOUDBURST PILOT PROJECTS

Flooding has been a problem in Southeast Queens for over 70 years. Increasing rainfall, loss of permeable surfaces, and reduced groundwater use have worsened conditions. Over the past ten years, Community Boards 12 and 13 have had more flooding complaints than any other area of New York City. In OneNYC, Mayor De Blasio identified alleviating flooding in Southeast Queens as a priority initiative. DEP's 10 Year Capital Budget allocates \$1.5 billion over the next decade to plan and begin full sewer build-out and to provide short term relief wherever possible. Full build-out requires approximately 450 miles of new storm sewers, upgrades to 260 miles of sanitary sewers, and 30 miles of combined sewers to be completed over many years. DEP is additionally partnering with other City agencies to implement green infrastructure in the ROW and on public properties as another tool to reduce localized flooding.

To complement storm sewer and green infrastructure work in Southeast Queens, DEP is also implementing pilot projects identified as part of a study to assess risks, prioritize responses, develop neighborhood-based solutions, and assess costs and benefits for managing extreme rain events, or "cloudbursts." The Cloudburst Resiliency Planning Study adapted an approach developed

in Copenhagen to manage large volumes of stormwater using streets and open space, and has created a unique learning exchange between Copenhagen and New York City. By modeling the flow of floodwater over the local topography, the study determines opportunities to slow and safely convey water to minimize damages and maximize co-benefits to the community. DEP is initiating design of two cloudburst pilot projects in Southeast Queens, one in the St. Albans neighborhood and another at NYCHA's South Jamaica Houses, which will maximize stormwater capture for up to 2.3 inches of rainfall per hour for climate resiliency.

In addition to the cloudburst pilots, DEP kicked off construction in Southeast Queens for Enhanced Bioretention practices, which are designed specifically for treating stormwater runoff (as opposed to the ROW rain garden, which is designed primarily for stormwater capture). These pilot green infrastructure practices are expected to be constructed in 2020, followed by a monitoring program. Findings from this monitoring are anticipated to be incorporated into the City's SWMP program.



DEP is partnering with other City agencies to reduce localized flooding.

PARKING LOT STORMWATER FEE PILOT

First initiated in 2011, DEP's Parking Lot Stormwater Pilot Program generates revenue for operation and maintenance of the City's wastewater system. The program applies a stormwater discharge fee to stand-alone parking lots that contribute runoff to the City's wastewater system, but do not receive (or pay for) City water service. Effective July 1, 2019, DEP's stormwater charge is currently \$0.0678 per square foot. On July 1, 2019, DEP billed 501 accounts for \$315,253.15. Parking lot owners who implement green infrastructure practices are exempt from the stormwater discharge fee. To date, no parking lot owners have implemented green infrastructure practices to become exempt from the stormwater discharge fee.

JAMAICA BAY LONG-TERM CONTROL PLAN

DEP's June 2018 Jamaica Bay and Tributaries Long-Term Control Plan (LTCP) outlined DEP's plan for water quality improvements through the expansion of green infrastructure, wetland creation, ribbed mussel colony creation, and environmental dredging in Bergen and Thurston Basins.

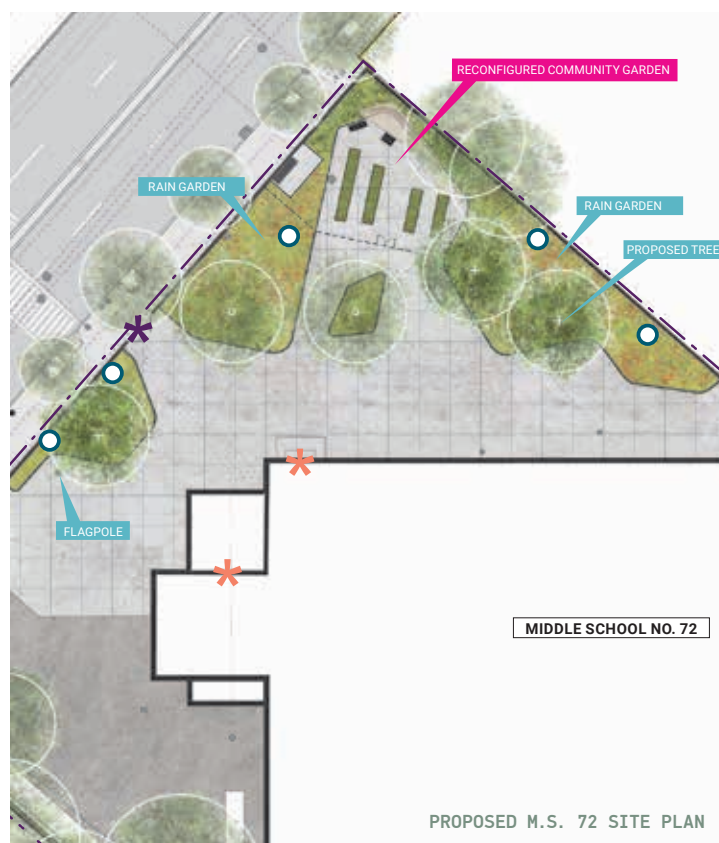
The Recommended Plan will result in 379 Greened Acres in Bergen and Thurston Basins, seven acres of ribbed mussel colonies, and 50 acres of wetland restoration; all of which will provide increased co-benefits for the watershed in the form of improved air quality, carbon footprint reduction, reduced urban heat island effect, habitat creation, and water quality improvements. The complete LTCP can be found on DEP's [website](#). As of the date of this Report, the Jamaica Bay LTCP is still under review by DEC.

NEW YORK RISING

DEP, in partnership with the Mayor's Office, has been working with the New York Rising Community Reconstruction Program (NYRCR) and the Governor's Office of Storm Recovery (GOSR) on a series of projects in neighborhoods heavily impacted by Hurricane Sandy and Irene. NYRCR's role is to facilitate rebuilding and revitalization assistance and work with local agencies to help implement projects. The projects include the planning and design of green infrastructure within the boundaries of six NYRCR Planning Areas:

- Gravesend / Bensonhurst
- Southeast Brooklyn Waterfront
- Canarsie
- Rockaway West
- Idlewild Watershed

These projects are limited by the grant funds allocated for each planning area, which has limited the scope to mostly rain gardens in the ROW and one project at M.S. 72 in Queens. All construction for this project is planned for 2021, with the rain gardens scheduled to start construction in February.



ECOLOGICAL SERVICES AND WETLAND RESTORATION

In the academic and wetland restoration communities, there have been recent attention and studies on the ability of wetlands to sequester pathogens, improve water quality, and reduce nutrient levels. With this knowledge, natural and constructed wetlands have been widely utilized for water quality enhancement. Within a tidal environment, marshes are able to dissipate tidal flow energies approximately one order of magnitude when the flows encounter 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 Fecal Indicator Bacteria (FIB) because they may provide a method to remove suspended bacteria and deposit them within marshes. This flooding and ebbing of salt marsh habitats can increase the mortality, and subsequently decrease negative impacts, of FIB by sequestering these bacteria within the marsh sediments and increasing the ultraviolet light exposure, which kills FIB.

In Alley Creek, DEP has completed a 1-acre tidal marsh that will provide the opportunity for monitoring and data collection of various spatial configurations of wetland and tidal channels to achieve maximum water quality benefits. This project was completed in June 2019.

The Alley Creek project has the potential to provide meaningful local data on the water quality improvements for nutrient and pathogen removal and ecological benefits related to wetland restoration. The existing marshes within Alley Creek can provide an opportunity to examine how natural and anthropogenic sources of FIB can be sequestered and differentiated within wetland systems. The Alley Creek Pilot Wetland FIB sampling program will include 37 water column sampling events and 37 sediment sampling events over two full growing seasons and one winter season. Monitoring of the pilot tidal wetland will begin after one full growing season in order for the marsh soils to stabilize and plantings to become fully established (approximately July 2020).

This monitoring effort is anticipated to be undertaken by researchers from the Science and Resiliency Institute at Jamaica Bay (SRIJB), along with researchers from Queens College. They will conduct a monitoring program to assess the performance of the constructed Alley



Creek Marsh for improving water quality and reducing pathogens. The three main objectives of the monitoring are:

1. Determine the capacity of the marsh to remove pathogens and nutrients from the water column;
2. Determine the effect of the marsh on nutrient fluxes; and
3. Determine the impact of the marsh on local dissolved oxygen concentration.

Table 5 summarizes the total acres of tidal wetland restoration resulting from DEP funded or cost shared projects to date.

TABLE 5: TIDAL WETLANDS RESTORED OR FUNDED BY DEP

Sites Completed	Acres
Elders East (cost share)	38
Paerdegat	8
Idlewild	5
Powell's Cove	1
Hendrix Creek (cost share)	2
Elders West (cost share)	34
Yellow Bar (cost share)	42
Black Wall (cost share)	20.5
Ruler's Bar (cost share)	9.8
Brookfield	3.5
Alley Creek	8
Alley Creek Marsh	1.5
Total Installed	173.3
Future Sites	Acres
Oakwood Beach (cost share)	35
Additional Jamaica Bay Marsh Islands (cost share)	20
Total Planned	55



ADAPTIVE MANAGEMENT



RESEARCH AND DEVELOPMENT PROGRAM

DEP's \$10 million comprehensive Research and Development (R&D) Program collects crucial performance and co-benefit data for a variety of green infrastructure practices. Work completed under the R&D Program supports the Green Infrastructure Program as well as the development and execution of LTCPs by reviewing performance over time, ensuring performance-based maintenance and operations, and conducting cost-benefit analyses of various green infrastructure designs.

DEP has been collecting and analyzing data on rain gardens and other types of green infrastructure following completion of the Green Infrastructure Monitoring Strategy and Protocols report in June 2016.

Some highlights from the monitoring work conducted during 2019 monitoring season include:

- Findings on urban trees and rainfall interception
 - Bark storage was a larger contributor to stormwater management compared to tree canopy interception for the species selected for the study
 - Some of the study trees were observed to capture more rainfall than other study trees, most likely due to differing bark characteristics across species

- Findings relating to ROW green infrastructure stormwater management capacity
 - Reducing the outlet size can yield additional stormwater capture by creating a higher ponding and storage depth in the practice
 - Lowering the soil bed can encourage more flow through a rain garden, which can lead to more stormwater entering the practice
 - Design modifications to promote more vertical flow from the soil bed to the underlying stone layer may yield additional stormwater capture

Through this R&D Program, DEP also established field protocols to inspect the performance of the new ROW Infiltration Basins. DEP plans to use results from these types of performance inspections to update assumptions made during the design stages.

In 2020, DEP will continue to collect and analyze data on factors that impact green infrastructure including hydraulics, plants and trees, and co-benefits. Findings from this work will be used to improve the design, construction, and maintenance of the Green Infrastructure Program, as was done in previous years.

DEP installed porous concrete and permeable pavers for the Hutchinson River pilot.

PERMEABLE PAVEMENT PILOT – LOCAL LAW 80 (2013)

In 2013, the New York City Council passed Local Law 80 (2013) requiring DEP and DOT to study permeable pavement installations in the City's streets and sidewalks. In 2014, the agencies worked together to identify pilot locations in the Hutchinson River and Flushing Bay watersheds and developed a plan for monitoring. A third pilot area in the Newtown Creek watershed was identified in 2016, and is being pursued in coordination with DDC.

Following the completion of the Flushing Bay porous concrete installations in 2018, DEP conducted post-construction sewer flow monitoring in 2019 and will finalize the data analysis in 2020. For the Hutchinson River pilot, DEP installed several blocks of precast porous concrete and one block utilizing permeable pavers along the gutter lanes. DEP is working with DDC to collect data on infiltration and sewer flow for these installations, through 2020. The Newtown Creek porous asphalt installations are planned for 2020 construction, also to be followed by infiltration and sewer flow monitoring.

Under this Local Law, DOT completed the design work to install permeable sidewalks in three areas in 2019. Construction is planned for 2020, to be followed by monitoring to study pedestrian comfort.

A final report will be prepared by DEP and DOT after post-construction data are collected and analyzed for all study areas.



RAIN GARDEN WITH MONITORING EQUIPMENT



PERMEABLE PAVER INSTALLATION, BRONX

LOOKING AHEAD TO 2020



Note: Due to resource uncertainties created by the COVID-19 pandemic, some of the initiatives listed below may be delayed.

01 2020 GREEN INFRASTRUCTURE CONTINGENCY PLAN

In 2020, DEP will be drafting the Program's 2020 Contingency Plan and seeking stakeholder input. The Contingency Plan, required under the Order, will lay out the path for achieving the 2020 milestone, which will include a combination of publicly-funded projects and achievements stemming from stormwater regulations. DEP sees stakeholders as an important part of this plan to shape the future of the Program.

02 RIGHT-OF-WAY GREEN INFRASTRUCTURE ENFORCEMENT

As of March 2020, and as a result of amendments made to its rules governing the use of the public sewers (Title 15, chapter 19 of the Rules of the City of New York), DEP now has enforcement authority to take action against certain damages inflicted against ROW green infrastructure, such as dumping of prohibited substances. These rule amendments allow these critical assets to be protected in the same way that the City's sewer system is protected and are essential to the longevity of the Program.

03 GREEN INFRASTRUCTURE MAINTENANCE AND WORKFORCE DEVELOPMENT REQUEST FOR INFORMATION

DEP will release a Request for Information (RFI) for strategies for green infrastructure maintenance and workforce development in 2020. The goal of the RFI is to learn from interested and experienced parties how DEP can structure a maintenance program that would both leverage the expertise and skillsets of potential external maintenance partners and maximize the efficiency of DEP's current in-house green infrastructure maintenance regime. DEP is looking forward to working with stakeholders on this ambitious effort.

04 PUBLIC ONSITE CONSTRUCTION

DEP is nearing design completion for green infrastructure retrofits at over 70 parks, housing, and school sites. These designs will be assembled into construction packages that DEP anticipates bidding out starting late 2020. This work marks a major expansion of Program implementation into public onsite territory and is a product of strategic partnerships with DPR, NYCHA, DOE and SCA to bring green infrastructure benefits to publicly owned property.

05 PRIVATE PROPERTY RETROFIT INCENTIVE PROGRAM LAUNCH

In 2020, DEP will launch its Private Property Retrofit Incentive Program, which will be one of the nation's largest and most innovative investments in private property green infrastructure by green stormwater infrastructure programs. The Program utilizes a third party administrator approach with a contract value of \$53 million and a target of 200 Greened Acres in five years (see PRIVATE PROPERTY INITIATIVES for more details).

06 GREEN/SOLAR HYBRID ROOFTOP SYSTEMS

In 2019, Local Laws 92 and 94 of NYC's Climate Mobilization Act were passed, requiring the implementation of either green roofs or solar panels on nearly all new construction and reroofing projects in the city. DEP sees this as an opportunity to evaluate whether hybrid green roof and solar panel systems are a cost-effective way to meet both stormwater management and renewable energy goals on one roof. DEP is currently evaluating four schools in the Coney Island Creek watershed for hybrid green roof and solar panel implementation, with another four schools lined up for additional evaluations.

07 UNIFIED STORMWATER RULES AND NEW STORMWATER DESIGN MANUAL

DEP expects to publish the draft Unified Stormwater Rules in 2020 along with the updated New York City Stormwater Design Manual (see PRIVATE PROPERTY INITIATIVES for more details). The new design manual will provide a comprehensive overview of NYC stormwater regulations and technical guidance for implementation.

08 INLAND FLOODING PLAN

In coordination with the Mayor's Office of Resiliency (MOR), DEP has been working to identify areas of the city vulnerable to increased precipitation. This effort, initiated by Local Law 172 of 2018, will result in an Inland Flooding Plan, to be released in 2020. The Plan will outline steps many City agencies are taking to plan for increased precipitation. Green infrastructure will play an essential role in this Plan, as DEP will lay out a plan for a series of ongoing and new pilot projects including cloudburst efforts and other green infrastructure projects, such as the large-scale ROW projects, with modified storage capabilities to allow for inland flood reduction.

EXHIBIT A - PROGRAM SPENDING AND BUDGET

CAPITAL ENCUMBRANCE, 10-YEAR BUDGET AND EXPENSE BUDGET

TABLE 6: ENCUMBERED CAPITAL FUNDING BY FISCAL YEAR

Fiscal Year	Encumbered Capital Funding
FY12	\$9,015,345
FY13	\$15,202,880
FY14	\$152,935,549
FY15	\$58,041,000
FY16	\$114,976,316
FY17	\$118,115,231
FY18	\$69,811,175
FY19	\$197,939,365
FY20 ¹	\$74,702,000
Total	\$ 810,738,861

TABLE 7: CAPITAL IMPROVEMENT PROGRAM BUDGET, FY 21-30

Fiscal Year	Approved FY 2021 Preliminary Capital Improvement Program
FY20 ²	\$330,825,000
FY21 - FY30	\$522,383,000
Total	\$853,208,00
PROGRAM GRAND TOTAL³	\$1,663,946,861

TABLE 8: EXPENSE BUDGET - OTHER THAN PERSONNEL SERVICES ONLY (OTPS)

Fiscal Year	OTPS Expenditures
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	\$3,789,680
Total	\$20,556,162
Fiscal Year	OTPS Budget, as of FY21 Preliminary Plan
FY20	\$8,986,758
FY21	\$14,856,618
GRAND TOTAL	\$44,399,538

1 FY20 encumbered as of 3/31/2020.

2 FY20 remaining as of 3/31/2020.

3 Program Grand Total is based on the total encumbered and the Approved FY21 Preliminary January Capital Improvement Plan (FY21-30).

EXHIBIT B - COMMUNITY OUTREACH

GREEN INFRASTRUCTURE PUBLIC OUTREACH MEETINGS

TABLE 9: 2019 PUBLIC GREEN INFRASTRUCTURE MEETINGS

Date	Community Member(s)	Type of Outreach	Attendees
January			
31	Stormwater Infrastructure Matters (SWIM) Public Meeting	Presentation	16
February			
27	Gowanus Landowner Convening	Presentation	45
March			
15	Green Infrastructure Grant Workshop	Workshop	24
April			
1	Flushing Creek Public Meeting	Presentation	30
18	East River/Open Waters LTCP Public Meeting	Presentation	50
May			
1	APEC Wetland Symposium	Presentation	45
21	MS4 Draft Annual Report Public Meeting	Meeting	25
June			
12	Green Infrastructure Grant Workshop	Workshop	21
13	Cambria Heights Civic Association (Green Infrastructure Meeting)	Workshop	20
18	Queens Borough President (Green Infrastructure Meeting)	Presentation	20
24	Kingsland Wildflowers Green Roof Event	Panel Discussion	80
July			
2	The Future of Flushing Creek	Presentation	--
15	Clean Streets = Clean Beaches Outreach Event	Tabling Event	--
September			
10	Dyker Heights Civic Association Meeting	Meeting	75
11	Green Infrastructure Grant Workshop	Workshop	42
16	Sunnyside Yards Public Meeting	Presentation	100+
18	Newtown Creek CAG	Meeting	15
26	West Cunningham Park Civic Association	Presentation	45
October			
1	Wayanda Civic Association- Rain Garden Presentation	Meeting	30
2	Citywide & East River/Open Waters-Harlem River Retained Alternatives	Meeting	35
10	Holly Civic Association- Rain Gardens Presentation	Meeting	25
15	Citywide & East River/Open Waters Retained Alternatives	Meeting	56

TABLE 9: 2019 PUBLIC GREEN INFRASTRUCTURE MEETINGS (CONTINUED)

Date	Community Member(s)	Type of Outreach	Attendees
October			
22	Brooklyn Community Board 7- Rain Garden Presentation	Presentation	45
November			
6	Citywide & East River Open Waters- Lower NY Bay Retained Alternatives	Meeting	15
12	Brooklyn Borough Service Cabinet	Presentation	25
12	AM Rozic and SS Liu	Presentation	---
12	Brooklyn Community Board 5	Presentation	10
20	Ozone Tudor Civic Association	Presentation	45
21	Bronx River Service Cabinet	Presentation	25
December			
11	Green Infrastructure Grant Workshop	Workshop	12
18	Brooklyn Community Board 18	Presentation	70

EXHIBIT C - 2015 CONTINGENCY PLAN

The 2015 Contingency Plan submitted on June 27, 2016 and approved by DEC on July 5, 2017, outlined the plan for managing 1,181 impervious equivalent greened acres. The table below is the list of completed or in construction projects that will provide those greened acres and their status.

TABLE 10: STATUS OF GREEN INFRASTRUCTURE 1.5% CONTINGENCY PLAN PROJECTS

Waterbodies	Area-Wide ROW Project	Status as of June 2020		Reported Substantial Construction Completion Date ¹	Actual/Projected Substantial Construction Completion Date as of June 2020 ²
		Number of Bids	Issued/Anticipated Notice to Proceed (NTP) Date		
Flushing Creek	TI-011	Construction Bid 1	June 2016	December 2019	June 2017
		Construction Bid 2	September 2018		June 2020
Newtown Creek	BB Cluster	Construction Bid 1	January 2017	December 2019	March 2019
		Construction Bid 2	August 2019		December 2020
Jamaica Bay	JAM-003	Construction Bid 1	August 2016	December 2019	December 2017
		Construction Bid 2	January 2019		July 2020
		Construction Bid 3	July 2019		June 2020
		Construction Bid 4	TBD		TBD
		Construction Bid 5	December 2019		TBD
EROW/Wallabout	NCB-014	Construction Bid 1	September 2018	December 2020	December 2019
		Construction Bid 2	December 2019		December 2020
EROW/Bowery Bay	BB-005	Construction Bid 1	TBD	December 2020	TBD
		Construction Bid 2	TBD		TBD
Westchester Creek	HP-014/033/016	Construction Bid 1	July 2019	December 2020	July 2020
		Construction Bid 2	July 2019		
Flushing Creek	TI-010	Construction Bid 1	September 2019	December 2020	December 2020
		Construction Bid 2	TBD		TBD
		Construction Bid 3	December 2019		TBD
		Construction Bid 4	December 2019		TBD
		Construction Bid 5	June 2020		TBD
		Construction Bid 6	December 2019		December 2020
Bronx River	HP-007/004/002	Construction Bid 1	November 2019	December 2020	TBD
		Construction Bid 2	November 2019		
Jamaica Bay	26W-005/004	Construction Bid 1	December 2019	December 2020	TBD
		Construction Bid 2	December 2019		
		Construction Bid 3	December 2019		
		Construction Bid 4	December 2019		
		Construction Bid 5	December 2019		

¹ The Anticipated Construction Completion date as reported in the June 27, 2016 Contingency Plan.

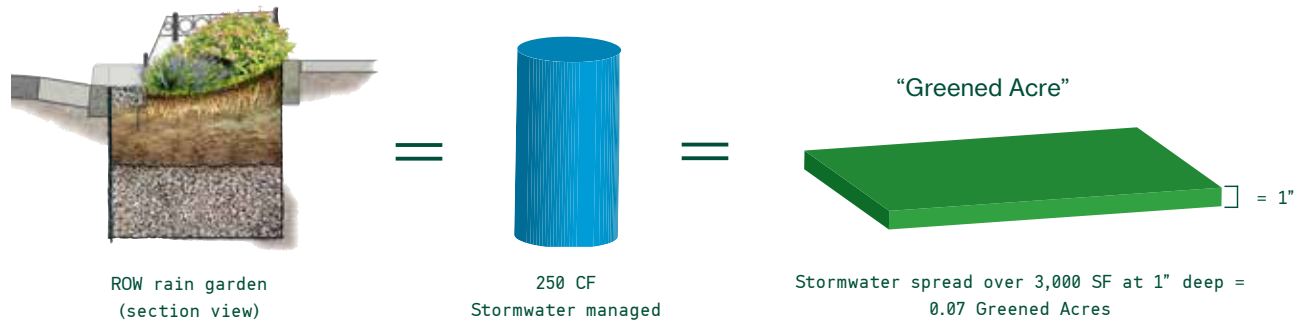
² Projects with TBD in the projected status column are those whose schedules have been significantly impacted by the COVID-19 pandemic and for which DEP is unable to determine a completion date at the time of publishing this report.

EXHIBIT D - WHAT IS A “GREENED ACRE”?

A “greened acre” is another way of saying “equivalent impervious acre” but it’s easier to say and understand. It represents a volume of runoff managed by a green infrastructure practice. If you take that volume and spread it out evenly at a 1” depth over an impervious area – that area represents a “greened acre.” Here are some questions we think our stakeholders might ask:

HOW DO YOU CALCULATE A “GREENED ACRE”?

Let’s use a rain garden on the sidewalk as an example – a particular rain garden might hold 250 cubic feet of runoff. If you spread that volume over an area at 1” deep, its greened acres would be 3,000 square feet, or 0.07 greened acres (GA). Like many other U.S. cities, DEP starts with the water holding capacity of each green infrastructure practice and “backs out” the equivalent impervious area that would be managed if that volume was spread over an area at 1” depth.



WHY CHANGE THE TERMINOLOGY?

DEC approved DEP’s Performance Metrics Report (PMR) in the summer of 2017, thereby establishing the 2030 CSO volume reduction target for the Program. Because the PMR established a relationship between the green infrastructure projects to runoff reduction and actual CSO reduction, it is time to update and more accurately represent the metrics and targets in a volumetric unit. The “greened acre” metric is just that.

Additionally, updating the public and stormwater stakeholders on our CSO volume reduction progress will be much easier going forward. DEP works hard to measure the green infrastructure’s performance, or the volume of stormwater managed, in all types of rain events. Ultimately, that performance data is used to assess CSO volume reductions. Rain events can vary in a typical year – some are short and intense, some are long with less than a few inches over many hours. These variations in precipitation affect the way the green infrastructure practices perform and also dictate how much runoff during that particular rain event will be managed and ultimately the resulting CSO volume reduction.

WILL THE GREEN INFRASTRUCTURE PROGRAM REPORTING CHANGE?

Fundamentally, no. DEP will continue to report on greened acres, annual stormwater volume managed, and funding expended and budgeted (see Exhibit A) in each Annual Report, in accordance with the CSO Order. Additionally, at each milestone DEP will update the CSO volume reductions for all green infrastructure practices implemented by the milestone date. The next milestone is December 2020 and must be certified by June 30, 2021.

ACRONYMS

BGY billion gallons per year	NYS New York State
CFS cubic feet per second	PMR Performance Metrics Report
CPC Central Park Conservancy	PPA Prospect Park Alliance
CSO combined sewer overflow	PPGH Pollution Prevention/Good Housekeeping for Municipal Facilities and Operations
CSS combined sewer system	R&D Research and Development
DDC Department of Design and Construction	RFI Request for Information
DEC Department of Environmental Conservation	RFP Request for Proposals
DOE Department of Education	ROW right-of-way
DOT Department of Transportation	SCA School Construction Authority
DPR Department of Parks and Recreation	SCP Site Connection Proposal
EDC Economic Development Corporation	SMP stormwater management practice
EROW East River/Open Waters	SRIJB Science and Resiliency Institute at Jamaica Bay
FDNY New York Fire Department	SWMP Stormwater Management Program
FIB Fecal Indicator Bacteria	SWMPP Stormwater Management Program Plan
GOSR Governor's Office of Storm Recovery	TBD to be determined
HCP House Connection Proposal	TPL Trust for Public Land
HPD Department of Housing Preservation and Development	WQv Water Quality Volume
LTCP Long-Term Control Plan	WRRF Wastewater Resource Recovery Facility
MGD million gallons per day	
MGY million gallons per year	
MOR Mayor's Office of Resiliency	
MOU memorandum of understanding	
MS4 Municipal Separate Storm Sewer System	
NTP Notice to Proceed	
NYC New York City	
NYCHA New York City Housing Authority	
NYRCR New York Rising Community Reconstruction Program	
NYPD New York Police Department	

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