



CATALYZING GREEN INFRASTRUCTURE ON PRIVATE PROPERTY:

Recommendations for a Green,
Equitable, and Sustainable
New York City



NYU | STERN

Center for
Sustainable Business



NATURAL RESOURCES DEFENSE COUNCIL

August 7, 2017

Vincent Sapienza, Acting Commissioner
New York City Department of Environmental Protection
59-17 Junction Blvd.
Flushing, New York 11373

Dear Acting Commissioner Sapienza:

We are pleased to provide the attached report, “Catalyzing Green Infrastructure on Private Property: Recommendations for a Green, Equitable, and Sustainable New York City,” developed by the Natural Resources Defense Council (NRDC) and the New York University Stern School of Business’ Center for Sustainable Business (NYU Stern CSB).

The undersigned organizations, comprising community-based organizations, environmental advocates, and community development corporations, join NRDC and NYU Stern CSB in urging you to carefully consider these recommendations.

We believe that green infrastructure, including green roofs, rain gardens, rainwater harvesting, trees, infiltration planters, and porous paving, can not only manage stormwater runoff from the City’s vast impermeable surfaces and reduce combined sewer overflows, but also transform New York City. Green infrastructure can benefit community livability by improving water quality, improving air quality, reducing the urban heat island effect, reducing energy use, and creating green jobs. It can also be an essential tool for achieving OneNYC’s goals of a stronger, sustainable, resilient, and equitable city.

As you know, the City of New York has recognized green infrastructure’s value and the Department of Environmental Protection (DEP) has committed to spend at least \$1.5 billion on green infrastructure, in combination with necessary “gray” infrastructure investments, to reduce combined sewer overflows and improve water quality through 2030. Yet, how and where that money is spent remains a major policy decision, which will determine not only whether DEP achieves its clean water goals, but also whether the City realizes green infrastructure’s full potential to improve our communities.

To date, DEP’s Green Infrastructure Program has focused primarily on public property, where it has installed more than 4,000 bioswales in the right of way in multiple neighborhoods in Brooklyn, Queens, and the Bronx. Recognizing that more than 50 percent of the land in targeted areas is privately owned and that DEP cannot meet its goals by focusing exclusively on public property, DEP two years ago turned to NRDC for help to develop a new large-scale grant program to support green infrastructure retrofits on private property.

The attached report is in response to DEP’s request for assistance and is the product of NRDC’s collaboration with NYU Stern CSB, supported by The New York Community Trust, The J.P. Morgan Chase Foundation, the J.M. Kaplan Fund, and the JPB Foundation. The report was developed over 19 months and included a finance consultant working from DEP’s offices, as well as a team engaged in full-time research and outreach, interviewing hundreds of stakeholders at the city, state, and federal level—including many of the organizations signing this letter. The NRDC-NYU team also convened a broad range of experts, from engineers to green roof contractors, to community-based organizations, to landscape architects, and government policymakers, to contribute their perspectives to these recommendations.

As the agency develops a new private property green infrastructure grant program, we hope these recommendations will help DEP succeed in achieving its water quality goals while also contributing to citywide efforts toward stronger, sustainable, resilient, and equitable communities.

We urge you to carefully consider these recommendations. And we all stand ready to help.

Sincerely yours,

The NYU Stern Center for Sustainable Business

Natural Resources Defense Council

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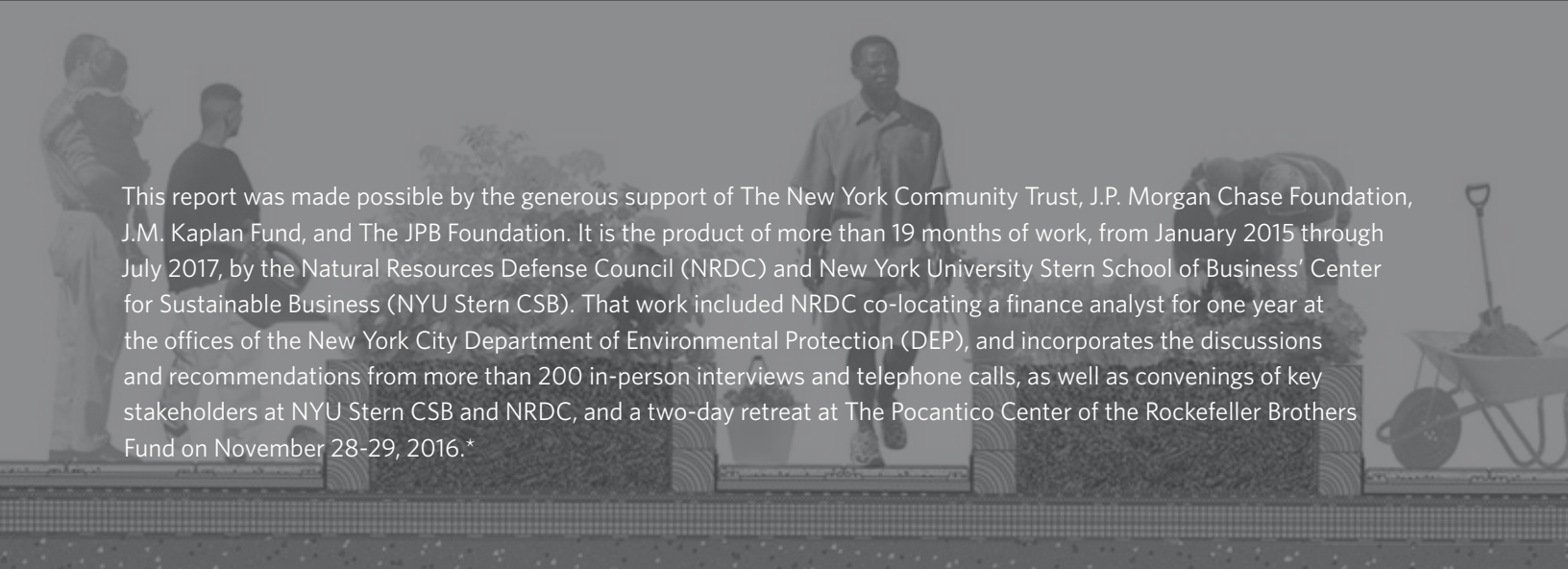
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About NYU Stern CSB

The New York University Stern School of Business' Center for Sustainable Business (NYU Stern CSB) is part of New York University's Stern Business and Society Program. Launched in January 2016, NYU Stern CSB works to ensure current and future business leaders develop the knowledge and skills they need to address environmental and social challenges, so that their businesses can reduce risks; create competitive advantage; develop innovative services, products, and processes; and build value for society and protecting the planet. Visit us at www.stern.nyu.edu/sustainability.



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About NRDC

The Natural Resources Defense Council (NRDC) is an international, nonprofit environmental organization with more than 2.4 million members and online activists. Since 1970, our lawyers, scientists, and other specialists have worked to protect the world's natural resources and public health, and to ensure the rights of all people to clean air, clean water, and undisturbed wild places. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at nrdc.org.



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* As is the case with all materials resulting from meetings held at The Pocantico Center, the views expressed in this report are not necessarily those of the Rockefeller Brothers Fund, its trustees, or its staff.

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DEP cannot do this alone. Integrate green stormwater infrastructure throughout all relevant city agencies, programs, and policies 50

Executive Summary

A little more than 25 years ago, New York City faced a formidable challenge. To protect the drinking water of the eight million people who lived and worked in the Big Apple, it confronted construction costs of nearly \$10 billion and operating costs of \$365 million annually for a new system that would filter the 1.1 billion gallons of water that New Yorkers used every day. But instead of using a more traditional approach involving concrete and pipes—what’s often called “gray infrastructure”—it did something transformational. The City created an extraordinary partnership among government agencies, nonprofit organizations, and watershed farms and businesses—the historic New York City Watershed Protection Program (WPP), which formed the Watershed Agricultural Council (WAC)—to implement what is perhaps the world’s largest planned green infrastructure (GI) system on private property. Green infrastructure includes not just natural landscapes and smart agricultural practices, but also installations well suited to urban environments: green roofs and rain gardens, bioswales, porous pavers, rainwater harvesting systems, and other practices that capture rainwater close to where it falls, before it can overwhelm sewers and trigger raw sewage overflows. By using green infrastructure to protect 1.2 million acres in upstate New York, rather than expensive and energy-consuming filtration facilities, the WPP and WAC have helped to keep the city’s drinking water among the cleanest and safest in the country for nearly three decades.



(Left) Watershed Agricultural Council
www.nycwatershed.org/agriculture/

(Right) Combined sewer overflow site in
New York City. (Courtesy of Matt Greene
via Creative Commons)

Today, New York City faces a similar and equally daunting water challenge: preventing more than 20 billion gallons of sewage and polluted stormwater runoff from flowing into the city’s waterways each year.¹ That’s more water than flows down the Hudson River daily. Sewage and stormwater pollution reduces the quality of life for New Yorkers who want to swim, fish, boat, and recreate safely in and around the city’s waters. Combined sewer overflows (CSOs) and stormwater runoff also destroy

¹ Letter from C. Strickland, NYC DEP, to J. DiMura, NYS DEC, dated Oct. 19, 2011, (presenting technical analysis for 2012 Consent Order), 6, available at http://www.dec.ny.gov/docs/water_pdf/csowp2011.pdf.



Rainwater collection system and pollinator rain garden in Hunts Point at Rocking the Boat. (Courtesy of The HOPE Program and Sustainable South Bronx)

wetlands and natural systems that provide flood protection and wildlife habitat, causing costly damage to our city's climate resiliency at a time when the City is planning to spend billions to improve it.

Much is at stake. Stormwater runoff and sewer overflows are the largest ongoing source of water pollution in New York City, laced as they are with human and pet waste, heavy metals, motor oil, and a range of other toxic pollutants. Over the last three decades, New Yorkers have spurred a remarkable transformation of our city's waterfront. We have new parks, greenways, kayak launches, and marinas lining our shores, as well as thriving industrial working waterfronts, and commercial and residential developments that together bring hundreds of thousands of people to the water's edge. But billions of gallons of untreated sewage still flow each year into waterways such as Flushing Bay, the Bronx River, the Hudson River, the East River, Newtown Creek, and Jamaica Bay, where New Yorkers also kayak, fish, and swim. Because few want to stroll along, paddle in, fish from, or gaze out over an open sewer, a healthy and economically vibrant city depends on healthy waterways. Once again, the City, through its Department of Environmental Protection (DEP), has committed to use green infrastructure on privately- owned property as a part of the solution. The question now is how to make DEP's urban green infrastructure as successful as its upstate counterpart.

Under a Consent Order with New York State Department of Environmental Conservation, which enforces the federal Clean Water Act through a delegation from the United States Environmental Protection Agency, DEP committed in 2012 to a hybrid plan to reduce sewer overflows, using gray infrastructure where it is cost-effective, in combination with green infrastructure that captures storm runoff before it reaches overburdened sewers.² To meet its Consent Order obligations, DEP committed to spend \$1.5 billion on green infrastructure and stimulate another \$900 million in private green infrastructure investment by 2030.³

² NYC Green Infrastructure Plan (DEP 2010), 3-5, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf.

³ See "NYSDEC & NYCDEP Announce Groundbreaking Agreement to Reduce Combined Sewer Overflows Using Green Infrastructure in New York City: \$2.4 Billion in Green Infrastructure and \$1.4 Billion in Gray Infrastructure to Target the City's Most Impaired Waterbodies," March 13, 2012, available at <http://www.dec.ny.gov/press/80919.html>; "DEP Makes More than \$5 million Available to Community Groups, Non-profits, and Property Owners for Green Projects," Sept. 30, 2014, available at http://www.nyc.gov/html/dep/html/press_releases/14-078pr.shtml#.WT8B9Ny1sk.

An investment at the scale that DEP committed to in 2012 can not only make New York City's waterways safer and cleaner, it can also provide substantial additional benefit to residents. With strategic and deliberate choices, these same green infrastructure dollars can also cool and beautify the city, cut carbon pollution, and make New York City more resilient in the face of a changing climate.⁴ These investments can also create jobs and offer a better quality of life in New York City's low-income neighborhoods and communities of color.⁵ (As green infrastructure investments are used to advance OneNYC goals of equity and sustainability, DEP will want to study the extent to which green infrastructure increases property values, in order to implement its program in way that avoids potential unintended consequences related to gentrification and displacement.)

Over the last six years, DEP has focused on building GI on streets, sidewalks, and other public property. But more than 50 percent of the land area that the City has targeted for GI projects is in private hands.⁶ Given the logistical and cost challenges DEP encounters with GI retrofits in the public right-of-way (ROW), motivating private property owners to install GI will be critical to New York City's ability to meet its water quality mandates and to achieve its broader sustainability goals.

More than two years ago, DEP asked the NRDC for advice about how to develop and launch an innovative, large-scale grant program that would spur GI construction on private property. NRDC partnered with NYU Stern CSB, and together we have developed that advice, which is contained in this report.

We recognize that green infrastructure cannot solve all of New York City's CSO and stormwater management challenges. Our objective in providing these recommendations is to help the City of New York and DEP:

- ① create a successful and cost-effective grant program that pays for the construction of GI retrofits on private property;
- ② align DEP's GI grant program with the equity, sustainability, and resiliency goals of New York City as reflected in the OneNYC plan;⁷ and,
- ③ enact cost-effective and fair regulations that stimulate private investment in GI throughout the city.

⁴ For discussion of climate impacts in New York, see One New York: The Plan for a Strong and Just City (2015), 34, available at <http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf>; for discussion of the ancillary benefits provided by green infrastructure, see Garrison, Noah and Hobbs, Karen. Rooftops to Rivers II Green Strategies for Controlling Stormwater and Combined Sewer Overflows (Natural Resources Defense Council 2011), available at <https://www.nrdc.org/resources/rooftops-rivers-ii-green-strategies-controlling-stormwater-and-combined-sewer-overflows>; <https://www.epa.gov/green-infrastructure/getting-more-green-your-stormwater-infrastructure-webcast>; American Society of Landscape Architects Guide to Green Infrastructure, September 3, 2014, available at <https://www.asla.org/ContentDetail.aspx?id=43532>; "The Value of Green Infrastructure," The Center for Neighborhood Technology and American Rivers, 2010, available at <http://americanrivers.org/wp-content/uploads/2016/05/Value-of-Green-Infrastructure.pdf>.

⁵ See McEwan, Brendan, Aubuchon, Tara, et al, Green Infrastructure and Economic Development, Strategies to Foster Opportunity for Marginalized Communities. Massachusetts Institute of Technology Community Innovators Lab (March 2013), available at <https://colab.mit.edu/sites/default/files/gedi-green-infrastructure-economic-development.pdf>.

⁶ NYC Green Infrastructure Plan (DEP 2010), 139, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf.

⁷ One New York: The Plan for a Strong and Just City (2015), available at <http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf>. OneNYC represents a unified vision for a sustainable, resilient, and equitable city, and charts the path for collectively achieving this goal. This plan was developed with cross-cutting interagency collaboration, public engagement, and consultation with leading experts in their respective fields. The Mayor's Office of Sustainability oversaw the development of OneNYC and now shares responsibility with the Mayor's Office of Recovery and Resiliency to ensure its implementation.

Mayor de Blasio announces his “One NYC” plan at The Point, a community center in the Bronx, April 22, 2015.
(Courtesy of Redux Pictures)



To achieve these goals, and to fulfill its Consent Order obligations, DEP will need to engage stakeholders at a nearly unprecedented level. Success will require recruiting property owners, entrepreneurs, and market intermediaries, through a new grant program that is efficient, transparent, reliable, and user-friendly. The program must also provide effective solutions that stimulate broad-based participation from owners of a variety of property types. And DEP should consider, as it spends these dollars, how to direct resources to the neighborhoods that need them most.

The City’s sewer overflow and stormwater runoff challenge is also an enormous opportunity for all New Yorkers. Success is possible only with the same visionary leadership, bold collaboration, and spirit of innovation that has served the City so well in the past. We offer the recommendations in this report—some that can be implemented in the near-term and others that are goals for the long-term—to help DEP meet this challenge. The agency’s success will drive our City’s ability to be more sustainable, equitable, and resilient, for ourselves and for future generations.

RECOMMENDATIONS

1.

Make water and sewer rates more fair and equitable by restructuring them to include a separate stormwater fee, and create a strong stormwater management rule that requires the use of green infrastructure in development projects.

- Base property owners' stormwater-related fees on the amount of stormwater their property creates, rather than, as currently done, on the potable water they use, which bears no relation to stormwater costs. This fee re-alignment can not only create a more fair and practical water rate structure, but can also improve the affordability of water and sewer service for low- and moderate-income New Yorkers.
- Adopt on-site stormwater retention rules for new and redevelopment projects, so that additional development does not increase the City's existing stormwater burdens.

2.

Commit decisively to make green infrastructure on private property a core component of the City's green infrastructure and sustainability efforts.

Clear indications of DEP's commitment such as public statements, long-term budgets, and timelines are needed to spur the private sector and community actors to invest the time and effort to become the strong partners that DEP requires to make its program a success. Additional steps that help demonstrate commitment include:

- Use capital dollars to enable the new private grant program to scale and to ensure long-term funding.
- Develop a plan for long-term operation, maintenance, and monitoring of private green infrastructure.
- Make publicly available the full cost of building *public* green infrastructure to use as a ceiling for what DEP should offer to pay for *private* green infrastructure.

3.

Create a new grant program, which works in combination with a new stormwater fee, to motivate private property owners to retrofit existing properties with green infrastructure.

More than 50 percent of the land targeted for green infrastructure is privately owned, and DEP has recognized that it cannot reach its mandated green infrastructure goals by focusing only on the public right-of-way. To reach those goals, the City needs to motivate private property owners to install green infrastructure on existing development. DEP can achieve this by doing the following:

- a. Provide grants to pay for the construction of cost-effective green infrastructure on private land, learning from DEP's existing, small-scale grant program and the experiences of other cities. To successfully attract property owners citywide, a new program should provide a direct financial benefit to property owners—beyond reimbursing the direct costs for green infrastructure.

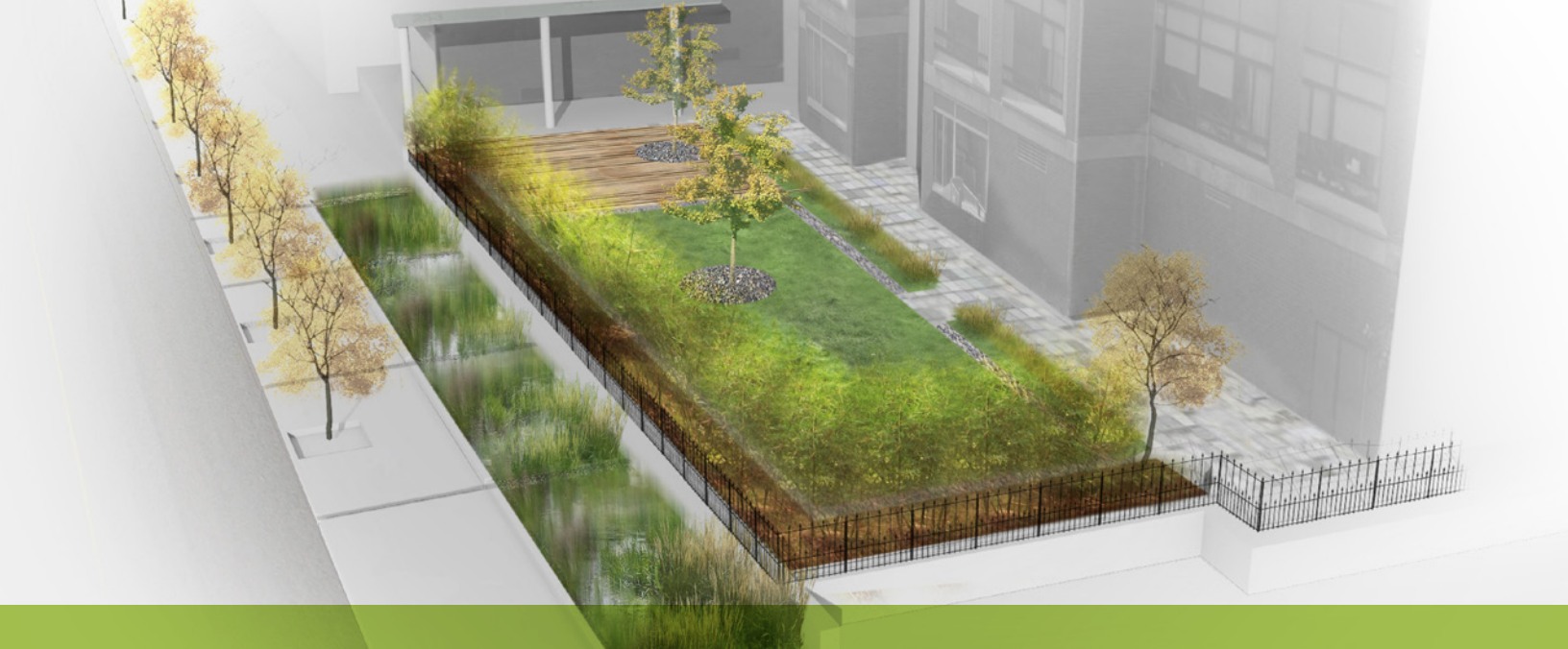
(continued)

- b.** Design the program to be as transparent, simple and flexible as possible for property owners.
 - Encourage project bundlers to bring multiple green infrastructure projects to DEP.
 - Guarantee payments for pre-development costs and facilitate project financing, so property owners are not burdened with out-of-pocket costs.
- c.** Engage a third-party to administer the new program by hiring a professional program manager, partnering with another city agency or quasi-public agency, or creating a new not-for-profit organization. Contract with the third-party on a pay-for-performance basis to help ensure effective use of DEP funds and ensure that the third-party takes on some of the risk of program execution.
- d.** Bring community-based organizations (CBOs) into the program as important partners to help the program succeed and help achieve OneNYC goals.
 - Partner with CBOs from program design through implementation, and institutionalize their role through a new formal advisory body.
 - Integrate equity metrics, environmental justice considerations, and climate change vulnerability indicators when prioritizing where DEP grant funds are spent.
 - Ensure that CBOs have the support they need to play diverse roles in the new grant program.
- e.** Look to affordable housing as an opportunity for green infrastructure to support both clean water goals and broader OneNYC goals.
 - Partner with HPD in the near-term and use DEP capital funds to build GI on affordable housing at a large scale.
 - Leverage state and federal programs that promote sustainable and green housing.
 - Consider marketing to Housing Development Fund Corporation co-ops, which offer opportunities for green infrastructure.

4.

DEP cannot do this alone. Integrate green stormwater infrastructure throughout all relevant city agencies, programs, and policies.

- Integrate green infrastructure into all OneNYC building initiatives, taking advantage of the capacities of existing city-supported entities focused on making energy-related improvements in buildings.
- Enhance the Cool Neighborhoods NYC Initiative by including green infrastructure installations with new DEP support.
- Bundle green roofs with solar power.

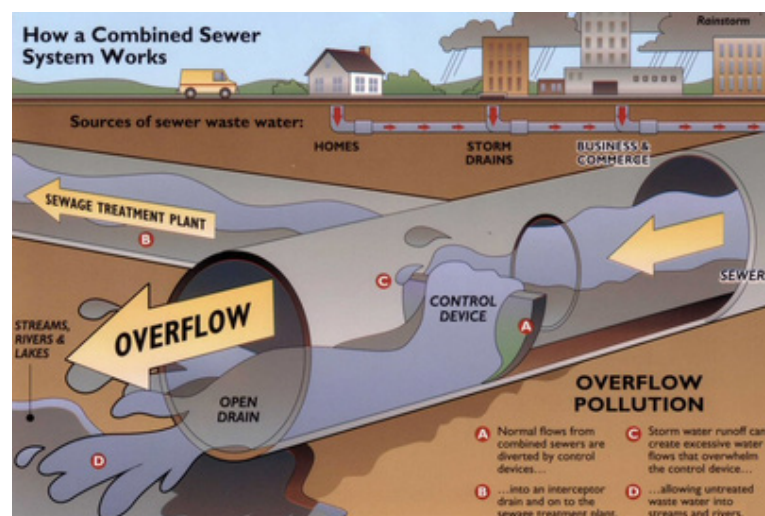


Introduction

(Above) Two Bridges Tower, 82 Rutgers Slip, NY, NY. (Courtesy of Susannah C. Drake, Principal, dlandstudio)

Americans have come a long way in our battle for clean water. As we celebrate the 45th anniversary of the Clean Water Act of 1972, our rivers no longer catch fire. The flagrant dumping of toxic industrial sludge and other contaminants into nearby rivers, oceans, or creeks, common throughout the 19th century and well into the 1960s, has largely halted.

Today, most New Yorkers can worry less about ongoing water pollution from industrial manufacturing. And thanks to fourteen sewage treatment plants, raw sewage does not flow around-the-clock, every day, into our waterways. Indeed, because of the Clean Water Act, DEP has invested billions of dollars in improving wastewater treatment. As a result, New York City now enjoys the cleanest waterways it has seen in generations. New Yorkers are working to resuscitate oyster beds in our harbors and the occasional humpback whale has been found feeding in our rivers.⁸



(Courtesy of New York State Department of Environmental Conservation)

⁸ See Rogers, Katie, "A Whale Takes Up Residence in the Hudson River" (NY Times, Nov 22, 2016), available at https://www.nytimes.com/2016/11/22/nyregion/humpback-whale-hudson-river-manchattan.html?_r=0.



In part because of this important progress, another water quality danger has come into focus. As urban development and sprawl has reduced green space, and as undeveloped land is built upon and paved over, New York City's land can no longer absorb the rain. In fact, the surface area of New York City today is now more than 72 percent impervious. That causes rain to run off roofs and roads, and down sidewalks and gutters, collecting pollutants that include pet and human waste, motor oil, heavy metals, and a range of other toxic pollutants. That runoff then joins up underground with the City's sewage system, which carries the waste from millions of toilets and sinks. Frequently, during rain storms, our aging sewers and wastewater treatment plants are overwhelmed and in the parts of the city served by combined sewers, a noxious brew of sewage and polluted runoff is dumped directly into Jamaica Bay, Flushing Bay, the Hudson, Bronx, and East Rivers, and many other waterbodies without any filtration or treatment.⁹ More than 20 billion gallons of raw sewage pour from more than 422 outfalls in the five boroughs each year, limiting New Yorkers' enjoyment of our local rivers.¹⁰ And this combined sewer overflow (CSO) problem will only worsen as climate change brings more frequent and more extreme weather events.¹¹

The green infrastructure alternative

In recent years, New York has joined other leading cities in re-thinking traditional approaches to reduce the amount of raw sewage and stormwater pollution that flows into local waterways. These cities see spending billions of public dollars exclusively on underground pipe-and-cement gray infrastructure projects as increasingly outmoded. Instead, they realize that a "green" approach to stormwater management can be more beneficial and cost-effective than purely "gray" traditional approaches. While gray approaches aim to move rainwater as quickly as possible away from the site where it falls, green approaches manage stormwater at or near the site where the rain falls, often reducing infrastructure costs (and providing ancillary or "co-benefits"), and solving the problem where it begins.

Vegetated green infrastructure practices, such as street trees, rain gardens, and green roofs, are designed to capture runoff and allow it to be held onsite, infiltrated back into the ground, or evapo-transpired back into the atmosphere through vegetation. Managing stormwater at or near where it falls, particularly using vegetation, is appealing to cities, because these strategies can help not only to manage stormwater but also to improve communities by reducing the urban heat island effect, improving air quality, providing bio-habitat and sequestering carbon. Other GI practices, such as permeable pavers and rainwater capture and re-use, are not vegetated but can work to reduce localized flood risk and cut potable water use, thereby reducing

⁹ New York City is served by two sewer systems. Almost two-thirds of the City is served by a "combined" sewer and the remaining third is served by a "separate" sewer system. Separate stormwater sewer systems collect only stormwater and transmit it with little or no treatment to a receiving waterbody, where stormwater and the pollutants it has accumulated are released. Combined sewer systems collect stormwater and convey it in the same pipes that are used to collect wastewater, sending the mixture to a municipal wastewater treatment plant. During rainfall events, combined systems, unable to handle the tremendous increase in volume, commonly overflow at designated locations, dumping a blend of stormwater and wastewater into waterways. Garrison, Noah and Hobbs, Karen, *Rooftops to Rivers II: Green Strategies for Controlling Stormwater and Combined Sewer Overflows* (Natural Resources Defense Council 2011), 8, available at <https://www.nrdc.org/sites/default/files/rooftopstoriversII.pdf>.

¹⁰ A Gathering Storm - Wastewater Infrastructure in Crisis, (New York State Department of Environmental Conservation), available at http://www.dec.ny.gov/docs/water_pdf/gatheringstorm.pdf; NYC Green Infrastructure Plan (DEP 2010), 15, 23-24, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf. The scourge of polluted stormwater runoff is not unique to New York City. Each year, more than ten trillion gallons of polluted water flow into our waterways nationwide, making stormwater runoff one of the primary threats to clean water in our nation today. See Garrison, Noah, and Hobbs, Karen, *Rooftops to Rivers II*, 4, available at <https://www.nrdc.org/sites/default/files/rooftopstoriversII-update.pdf>.

¹¹ OneNYC, 34, available at <http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf>. Extreme weather events will also increase the likelihood of toxic exposure due to flooding in industrial areas along the waterfront, threatening the health of residents and workers. Bautista, Eddie, Harnhardt, Eva, Osorio, Juan Camilo, and Dwyer, Natasha, "New York City Environmental Justice Alliance Waterfront Justice Project." *Local Environment* 20, no. 6 (2015): 664-682.

costs for families and businesses. When green infrastructure's many co-benefits are quantified, cities have found that combining green approaches with cost-effective gray infrastructure can lower long-term city infrastructure costs.¹²

New York City's challenge

As New York City works to reduce sewer overflows and stormwater pollution and to comply with Clean Water Act requirements, it faces a challenge: More than 150,000 acres of its land mass—72 percent of its total area—is covered by impervious asphalt and concrete.

Under the terms of its 2012 modified CSO Order on Consent (the Consent Order) with the New York State Department of Environmental Conservation, which enforces the federal Clean Water Act through a delegation from the United States Environmental Protection Agency, New York City committed to use green infrastructure to manage, by 2030, the first inch of storm runoff from 10 percent of the impervious area within the City's combined sewersheds.¹³ To meet this goal of greening nearly 8,000 acres, the City's Green Infrastructure Plan, on which the Consent Order's green infrastructure commitments were based, committed to spend \$1.5 billion on GI and to stimulate another \$900 million in private GI investments.¹⁴ New York City also reports more recently that it is considering implementing GI citywide and has "initiated a strategic planning effort to evaluate green infrastructure opportunities at the watershed scale, including both combined and separate sewer areas."¹⁵

Shifting to green infrastructure on private property

Since the beginning of its green infrastructure program, most of DEP's GI work has been in the right-of-way (ROW)—primarily in the form of "bioswales." Essentially enhanced tree pits that the City builds on public sidewalks and public street medians, bioswales manage runoff from surrounding sidewalks and streets. The ROW is a common green infrastructure location for many cities because public agencies have some measure of control over this land—and because these areas represent significant land mass. In New York City, the ROW represents roughly 28 percent of the city's impervious surfaces.¹⁶

¹² NYC Green Infrastructure Plan (DEP 2010), 8, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf. For a good example of a triple bottom line analysis comparing green and gray stormwater management options, see A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds (Stratus Consulting 2009), available at https://www.epa.gov/sites/production/files/2015-10/documents/gi_philadelphia_bottomline.pdf.

¹³ The Consent Order does not strictly require DEP to meet these targets. Rather, it provides DEP an opportunity to propose gray infrastructure in place of some or all of this green infrastructure. NYC 2012 Consent Order, 11, Part IV.B.2.3 available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/CO2-20110512-25.pdf. As described below, DEP has fallen well short of its green infrastructure targets to date. After missing its targets, DEP suggested that those targets should be reconsidered and, potentially, reduced. NYC DEP Green Infrastructure Contingency Plan, June 27, 2016, 1, 4, and 5, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi-contingency-plan-2016.pdf.

¹⁴ NYC Green Infrastructure Plan (DEP 2010), 11, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf; See "NYSDEC & NYCDEP Announce Groundbreaking Agreement to Reduce Combined Sewer Overflows Using Green Infrastructure in New York City: \$2.4 Billion in Green Infrastructure and \$1.4 Billion in Gray Infrastructure to Target the City's Most Impaired Waterbodies," March 13, 2012, available at <http://www.dec.ny.gov/press/80919.html>; "DEP Makes More than \$5 Million Available to Community Groups, Non-profits, and Property Owners for Green Projects," Sept. 30, 2014, available at http://www.nyc.gov/html/dep/html/press_releases/14-078pr.shtml#.WT8B9Ny1s1k.

¹⁵ See NYC Green Infrastructure 2016 Annual Report (DEP 2017), 1, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf.

¹⁶ NYC Green Infrastructure Plan (DEP 2010), 60, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf.

DEP has made substantial progress in greening the ROW over the last six years, having built or put into construction more than 4,000 bioswales across several watersheds.¹⁷ Not all streets and sidewalks are suitable for green infrastructure, however, so this strategy alone will not allow DEP to meet its GI targets. A host of impediments, such as utility lines and subway infrastructure on and under New York City's streets and sidewalks have, so far, led DEP to screen out a large majority of the ROW sites evaluated for GI.¹⁸ Resulting in part from the cost and challenges of relying nearly entirely on public ROW GI, DEP reported only 437 acres of impervious area managed with GI by the end of 2015, only 37 percent of its Consent Order target of 1,181 acres by that date.¹⁹



(Left) (Courtesy of NYC Department of Environmental Protection)

(Right) Bioswale Atlantic Avenue and Dean St. (Courtesy of NYC Water, NYC Department of Environmental Protection)

Because of these challenges, DEP has indicated a desire to expand the focus of its GI program to include more robust efforts on private property.²⁰ Given that more than 50 percent of the impervious land in DEP's targeted areas is privately owned, DEP has recognized that it cannot attain its 8,000-greened-acre Consent Order goal without developing a strategy to systematically site GI on private property.²¹

GI siting on private land can be notably easier, as private parcels often have fewer site constraints, and construction costs on private properties can be lower, relative to public-property projects. Although Philadelphia is a city with very different characteristics from New York, its experience with private property GI grant programs is illustrative.²²

¹⁷ Green Infrastructure Performance Metrics Report (DEP June 2016), ES-1-2, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi-performance-metrics-report-2016.pdf; NYC Green Infrastructure 2016 Annual Report (DEP 2017), 18, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf.

¹⁸ NYC Green Infrastructure 2013 Annual Report (DEP 2014), 12, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2014.pdf.

¹⁹ NYC Green Infrastructure 2015 Annual Report (DEP 2016), 11, Table 3, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2016.pdf.

²⁰ NYC Green Infrastructure 2016 Annual Report (DEP 2017), 1, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf.

²¹ Green Infrastructure Contingency Plan (NYC DEP Consent Order submission to NYS DEC, June 27, 2016), available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi-contingency-plan-2016.pdf.

²² See Philadelphia Stormwater Incentives Grant Manual, available at <http://www.phila.gov/water/wu/Stormwater%20Grant%20Resources/StormwaterGrantsManual.pdf>; see also Valderrama, Alisa, Levine, Larry, et al., Creating Clean Water Cash Flows, (Natural Resources Defense Council 2013), available at <https://www.nrdc.org/sites/default/files/green-infrastructure-pa-report.pdf>.

THE PHILADELPHIA STORY

A city succeeds in motivating private property owners to voluntarily green their property



Rendering of Philadelphia's green future (Courtesy of Philadelphia Water Department).

Under the terms of the city's Consent Order, the Philadelphia Water Department (PWD) has committed to green approximately 10,000 acres over a 25-year period—nearly one-third of the land area within the city's combined sewershed. Realizing that many low-cost greened acre opportunities exist on private property, PWD has motivated property owners to install GI by providing stormwater grants, as well as providing credits against a stormwater fee. (PWD has also relied on local stormwater regulations to secure greened acres on private properties undergoing redevelopment. See Box below for details.) To date, PWD has greened approximately 840 acres of impervious area, and 235 of those acres have been achieved through voluntary projects on private property motivated by PWD's grant program and stormwater fee credit system.²³

THE FEE: In 2010, Philadelphia began converting from a stormwater fee that was based on potable water consumption to a fee based on impervious surface area. That conversion was completed in phases over a four-year period; by 2013, the Philadelphia stormwater fee was fully parcel-based. Owners who install green infrastructure are eligible for up to an 80 percent reduction of their stormwater fee.

THE GRANT: Philadelphia's grant programs cover the upfront costs of stormwater management opportunities on private land. These grants cover nearly all the costs of typical GI retrofits—between \$100,000 to \$150,000 per acre of impervious area managed. A successful applicant will agree to install GI and to maintain the GI practice on behalf of the City for a 45-year period in exchange for the grant dollars.²⁴

Philadelphia's voluntary retrofit program uses the combined grant program and parcel-based stormwater fee and discount to create a type of pay-for-performance contract, whereby the City pays the upfront cost of the retrofit and the owner continues to receive discount on his or her stormwater fee as long as they maintain the green infrastructure installation for which the City paid.²⁵ These private property GI retrofits have proven to be very cost-effective: PWD estimated in 2013 that it can spend \$250,000 to green a publicly-owned or controlled acre, whereas an independent analysis done in coordination with the PWD found that a greened acre on private property can cost the City less than \$100,000.²⁶

²³ Philadelphia Water Department Development Services Committee presentation, Thursday, May 4, 2017, slides 7-10, on file with authors.

²⁴ Philadelphia Water Department and Philadelphia Industrial Development Corporation Stormwater Grants Manual, 22, available at http://www.pidcphila.com/images/uploads/product/Stormwater_Grants_Manual.9.14.15.pdf.

²⁵ See City of Philadelphia, Stormwater Grants, available at <http://www.phila.gov/water/wu/stormwater/Pages/Grants.aspx>. For more detail on Philadelphia's Greened Acre Retrofit Program, see Valderrama, Alisa and Davis, Paul, Wanted: Greened Acres, (Natural Resources Defense Council 2014), available at <https://www.nrdc.org/resources/wanted-green-acres-how-philadelphias-greened-acre-retrofit-program-catalyzing-low-cost>.

²⁶ See Valderrama, Alisa, Levine, Larry, et al., Creating Clean Water Cash Flows, (Natural Resources Defense Council 2013), available at <https://www.nrdc.org/sites/default/files/green-infrastructure-pa-report.pdf>.

DEP has stated the following goals for a new and more ambitious private property GI grant program:

Secure a third party to provide external administration rather than DEP in-house management

Manage at least 1,000 impervious acres with GI over 15-20 years

Develop program management solutions that will:

- drive scalable adoption of GI on private property;
 - effectively market the new program;
 - efficiently engage contractors;
 - drive down the costs of GI over time;
-

Ensure the program can be taken to scale through:

- a customer-oriented approach;
- low transaction costs for private property owners; and,
- low transaction costs for installers²⁹

Innovating with a new private property grant program

DEP is aware that cost-effective green infrastructure retrofit opportunities exist on privately-owned property in New York City and has worked to incentivize voluntary GI retrofits on private land, albeit with only modest success. Its existing Green Infrastructure Grant Program (GIGP) has been operating since 2011 and covers many of the costs associated with individual GI retrofit projects. Although the existing grant program has successfully brought positive attention to the benefits of GI, participation has been very limited. In the six years since the program's launch, only \$15 million has been committed to 34 projects²⁷—a small amount compared with the overall projected green infrastructure capital budget of \$1.5 billion.²⁸



Queens College Rain Garden (Courtesy of NYC Department of Environmental Protection)

DEP's existing GIGP is administratively burdensome and costly both for the City and for property owners. For this reason, it tends to be a better fit for larger institutions and nonprofit organizations, such as hospitals, universities, and private schools that have sustainability goals in their mission. Unfortunately, neither of New York's two other programs designed to incentivize GI retrofits on private property—the Green Roof Tax Abatement and the Parking Lot Stormwater Charge Pilot—have spurred development of many GI projects.³⁰

²⁷ NYC Green Infrastructure 2016 Annual Report (DEP 2017), 13, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf.

²⁸ DEP has encumbered (through capital allocations committed to funded contracts) a little more than \$410 million for GI since 2011 and projects that it will spend an additional \$1,021,496,986 in its current 10-year capital plan. NYC Green Infrastructure 2016 Annual Report (DEP 2017), 5, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf.

²⁹ See the NYC Green Infrastructure 2015 Annual Report (DEP 2016), 6, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2016.pdf.

³⁰ "Taking Private Green Infrastructure to Scale," DEP PowerPoint, November 29, 2016, at slide 9, on file with authors.

DEP reports that its approach to green infrastructure continues to evolve. The agency has expressed a desire to incorporate the lessons learned from its initial GIGP and to stimulate voluntary GI retrofits on private property on a much larger scale, through a new green infrastructure grant program.³¹ (Although DEP refers to the new program as an “incentive” program, for purposes of clarity in this report we refer to the new program as a “grant” program.)

Toward this end, DEP issued a Request for Information (RFI) on September 19, 2016, which sought responses from interested parties about how such a new private property grant program could be most effectively created and managed.³²

More than 100 organizations were represented in the RFI responses, including program administration firms, engineering and design firms, community-based organizations, affordable and low-income property advocates, environmental organizations, and consulting firms. These responses confirmed that the new program must be customer-friendly, be effectively marketed, and have the lowest-possible transaction costs for program participants. The responses also indicated that the program must drive down GI costs over time, and function in tandem with other core City goals including resiliency, community empowerment and equity, and job creation.³³ Every respondent indicated that, in order to meet these goals, the new program should include community-based organizations as key partners.

NRDC and NYU Stern CSB support

The Natural Resources Defense Council (NRDC) placed a finance analyst at DEP offices and, in partnership with The Center for Sustainable Business at New York University’s Stern School of Business (NYU Stern CSB), conducted extensive interviews and market analyses, and held stakeholder meetings to assist DEP in its effort to create the type of innovative and scalable private property green infrastructure retrofit program that New York City needs. Our aim in drafting this report is to provide a set of recommendations that can not only assist DEP and its partners in developing and implementing the new program, but can also galvanize a broad range of stakeholders around a new vision for the future of stormwater management in New York City.

³¹ For a more detailed overview of the legal and administrative issues associated with a green infrastructure grant program in New York City, see Justin Gundlach, Putting Green Infrastructure on Private Property in New York City, 28 *Env’tl. L.* in N.Y. 140 (forthcoming, Sept. 2017), available at <http://columbiaclimatelaw.com/files/2017/06/Gundlach-2017-05-GI-in-NYC.pdf>.

³² See excerpts from DEP’s September 2016 Request for Information, available in Appendix I.

³³ DEP summarized the key takeaways from the RFI responses as follows:

- Project aggregation is essential to reduce transaction costs and speed up implementation schedules;
- Leveraging private capital is difficult without regulatory or policy changes to New York City’s stormwater programs, but opportunities to identify bridge financing exist and are important for success;
- Community organizations can fulfill a number of roles in a private property incentive program;
- Targeted outreach strategies for different groups – designers, installers, property owners, etc. — are critical;
- Upfront incentive rates in market-friendly units allow for more certainty and easier decision-making for property owners;
- Ease-of-use elements, such as standardized designs, market-friendly contracts/applications, technical guidance, etc., will increase participation; and,
- Program-management structures may need to be adjusted based on lot size and property type targeted and green infrastructure practices implemented.



RECOMMENDATION 1

Make water and sewer rates more fair and equitable by restructuring them to include a separate stormwater fee, and create a strong stormwater management rule that requires the use of green infrastructure in development projects.

(Above) Caesura in Brooklyn, NY (under construction), features green roofs with native plants, porous paving, cisterns, and hydrodynamic separator.
(Courtesy of Jonathan Rose Companies)

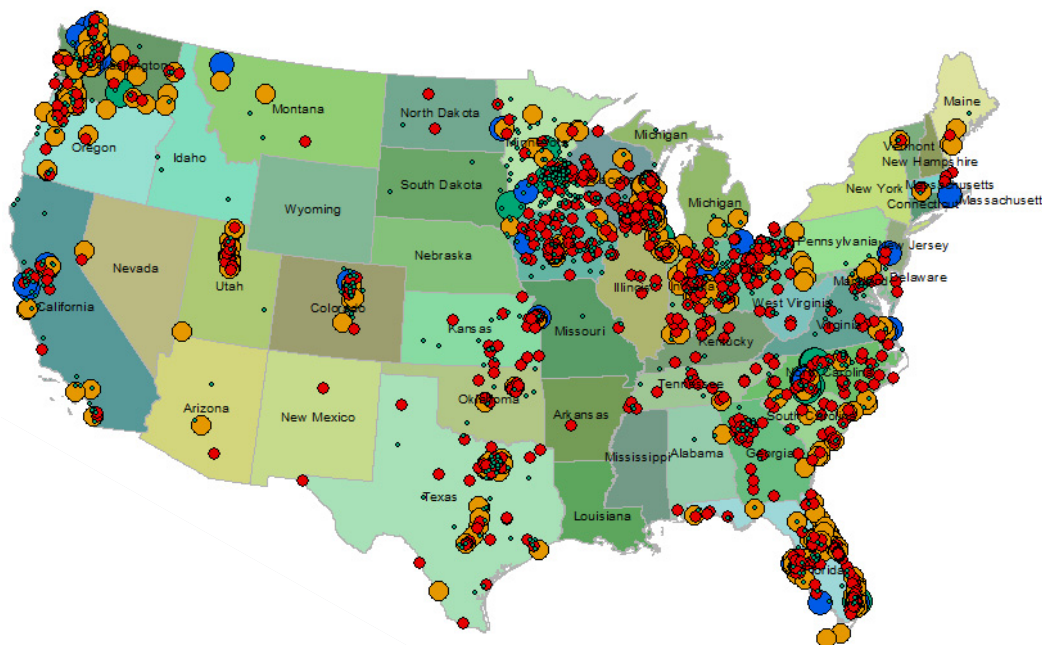
Now is indisputably the time to introduce an effective new private grant program to accelerate the greening of New York City. But a new grant program is not a stand-alone solution. Instead, successfully catalyzing green infrastructure construction on private property will require both government incentives and government regulations—carrots and sticks. Just as DEP has stated its intention to plan and launch a new large-scale green infrastructure private grant program, DEP must move rapidly to adopt a new stormwater fee and new stormwater rules that follow best practices from around the country, while structuring the fee in a way that improves affordability of water and sewer service for low-and middle-income New Yorkers. Knowing that new regulations are on the horizon will also drive private property participation in the grant program during the rule-making process.

Assess stormwater management costs to private property owners based on the amount of stormwater generated by each individual property

More than 1,400 cities and other municipalities have adopted stormwater fees that are paid by property owners.³⁴ The new fees do not increase revenue to the municipality but, rather, assess the costs more fairly to ratepayers. These fees range in structure and form, but most link the size of the fee to the amount of stormwater a property generates. All well-designed fees share several common purposes: to educate property

³⁴ "Harvesting the Value of Water: Stormwater, Green Infrastructure, and Real Estate" (Urban Land Institute, May 2017), 54, available at <https://americas.uli.org/wp-content/uploads/sites/125/ULI-Documents/HarvestingtheValueofWater.pdf>

Map of municipalities with stormwater fees. (Source: Western Kentucky Stormwater Utility Survey 2016, 5, figure 3).



A stormwater fee based on impervious area can fairly distribute stormwater costs

Different types of property vary in their water use and in the stormwater they create. For example, a commercial site containing a parking lot and a big box store or a warehouse creates a large amount of stormwater because it is nearly entirely covered in asphalt and other impervious surfaces. Such a site also uses very little potable water. If the property pays a stormwater fee that is pegged to potable water use, it will pay far less than its fair share of what it costs to the city to manage the stormwater from that site.

owners about the impact and public costs of stormwater runoff, to provide a dedicated revenue stream to pay for a city's stormwater management costs, to distribute the burden of those costs so that owners who create the most runoff pay their fair share (and those who generate less runoff do not pay more than their fair share), and to motivate voluntary stormwater retrofits on private property that reduce the overall burden on the public sewer system (and on ratepayers as a whole), as described in more detail below.

Currently, New York City property owners receive a water bill with only two components: a potable water charge and a "storm and sewer" charge. The potable water charge is based on the amount of water used, and the storm and sewer charge is set at a flat rate of 159 percent of the property's potable water charge.³⁵ The volume of potable water used on a property, however, bears no relation to the amount of stormwater that a parcel creates. To align with best practices around the country, we suggest that a future bill from DEP should be broken into three components: water, wastewater, and stormwater. The newly broken-out stormwater charge would allocate fees for stormwater based not on water use, but on a property's impervious area. Impervious area—unlike water usage—is directly correlated to the amount of runoff a property adds to the public sewer system. Therefore, such a fee structure would be a more equitable way to apportion stormwater management costs across the city's privately owned land. The easiest way to implement this approach is to use geospatial technology to capture parcel size and impervious square footage data from private properties and use that information to set a rate that will be charged monthly on a square-foot basis.³⁶

³⁵ New York City Water Board Water and Wastewater Rate Schedule (Effective July 1, 2015). Certain parking lots that do not have a water utility connection, however, are currently charged for stormwater management based on their impervious area. *Id.*

³⁶ The fee structure need not be uniform across all property types. For example, many cities create a simple tiered rate structure for single-family residential properties and use parcel-specific data on impervious area for commercial properties. See Stormwater Utility Survey (Black and Veatch 2016), 20-21, available at <https://pages.bv.com/rs/916-IZV-611/images/2016-Stormwater-Utility-Survey.pdf>.

Water/Sewer & Stormwater Bill

Please pay **\$40.49** by December 12, 2014

Questions?
www.phila.gov/revenue
(215) 686-6880 Monday-Friday, 8am-5pm

Customer Name: Jane Doe
Service Address: 318 Bayview Terrace, Philadelphia PA 19128
Bill Date: November 20, 2014 (Bill Period: Oct 17, 2014 - Nov 19, 2014)

Account Number: 090-12345-00316-001
Bill Number: B042803459
Includes Payments Through: November 20, 2014

Your Account

Balance at last bill \$30.43
You last paid on 11/01/14 - thank you -\$30.43
Unpaid balance \$0.00

This Bill
Usage Charge (4 CCFs, see below for details) \$28.85
Service Charge \$13.91
Stormwater Charge \$14.15
Senior Citizen Discount -\$13.52
Total Account Balance \$40.49
Please pay now \$40.49

eCollect
If your check is returned unpaid for insufficient or uncollected funds, (1) you authorize eCollect, LLC to make a one-time electronic funds transfer from your account to collect a fee of \$20 and (2) eCollect, LLC may represent your check electronically to your depository institution for payment.

Payment Types
Pay by phone (877) 309-3709; credit card or e-check at www.phila.gov. Select water bill from pay menu options.

See back for more information and contact details →

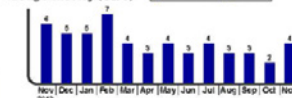
Your Water Usage

Meter Readings

Meter: 0147838 ERT: 0001890488 Service: D1R

November 19, 2014 actual reading 750
October 17, 2014 actual reading 748
Total CCFs used 4
Approximate gallons used per day 90

Usage History (CCFs)



Example of a water bill that shows a separate stormwater fee. (Courtesy of Philadelphia Water Department)

If designed properly, this rate structure would tend to decrease total water and sewer costs for owners and tenants of affordable housing, serving the City's equity goals. Many low-income residents in New York City live in multi-family buildings. These properties use a large volume of water but have relatively small impervious areas and, therefore, tend to pay far more than their fair share for stormwater under the current fee structure. A stormwater fee would shift a greater share of the City's stormwater management costs away from those multi-family buildings and onto other property types with large impervious area and low water usage, which currently pay far less than their fair share towards the City's stormwater management costs. To develop an appropriate stormwater fee structure and implementation (or "phase-in") schedule, DEP should model the impact of alternative rate structure scenarios on low- and moderate- income New Yorkers and adopt a rate design that supports the City's equity goals for all New Yorkers.

Once parcel-based fees are in place, the City can help motivate property owners to retrofit their properties with green infrastructure by offering discounts on the stormwater fee for owners who reduce impervious area or otherwise manage stormwater onsite, thereby reducing costs to DEP and all ratepayers.³⁷ While parcel-based fees are essential, it is important to note that experience from other cities indicates that a discount on the stormwater fees *alone* is unlikely to motivate private property owners to install GI. Instead, cities succeed when they create GI grant programs that cover all or a substantial fraction of the upfront costs of a GI retrofit—and couple those grants with ongoing stormwater fee discounts for grant recipients. These ongoing fee discounts can, in turn, compensate owners for ongoing maintenance of new GI installations—a model that is working well in Philadelphia.³⁸

Implementation of a stormwater fee is most likely to be successful when preceded by extensive stakeholder outreach, making the case to ratepayers and community leaders that the fee is rational and fair. DEP should meet early in the fee development process with local community-based organizations, faith-based and other non-profit organizations that own land, other not-for-profit groups, and private property owners, who may have concerns about the fee impact, so their interests are all fairly represented.

As New York City has watched its stormwater management costs increase over time, DEP has identified the benefits of a stormwater fee, including to "provide a dedicated revenue stream for stormwater expenditures; create public awareness around stormwater issues; and encourage source controls."³⁹ But in the six years since DEP publicly emphasized the benefits of a stormwater fee, DEP has not adopted one. Nor

³⁷ The practice of offering discounts on stormwater fees to owners who voluntarily retrofit is increasingly commonplace. In a survey of stormwater agencies nationwide, 77 percent used an impervious-area-based fee structure and 49 percent of the agencies surveyed offered fee discounts to property owners who reduced their impervious area. See Stormwater Utility Survey (Black and Veatch 2016), 20, 27, available at <https://pages.bv.com/rs/916-IZV-611/images/2016-Stormwater-Utility-Survey.pdf>.

³⁸ Philadelphia Water Department Development Services Committee presentation, Thursday, May 4, 2017, slides 7-10, on file with authors. Valderrama, Alisa and Davis, Paul, Wanted: Greened Acres (Natural Resources Defense Council 2014), 7, available at <https://www.nrdc.org/sites/default/files/philadelphia-green-infrastructure-retrofits-IB.pdf>.

³⁹ NYC Green Infrastructure Plan (DEP 2010), 59, available at http://www.nyc.gov/html/dep/html/stormwater/nyc_green_infrastructure_plan.shtml.

Effective onsite stormwater rules can be a crucial component of stormwater management

The Philadelphia Water Department relies on three sources of greened acres to comply with its Green City Clean Waters goals: 1) city-funded retrofits of public property, 2) voluntary retrofits on private property supported by grants and other incentives, and 3) new development and redevelopment projects that comply with stormwater regulations requiring retention of the first 1.5 inches of runoff in any storm.⁴⁰ PWD's binding target, under its own CSO consent order, is to green nearly 10,000 acres of impervious area in the city over a 25-year period. PWD has actively tracked greened acres resulting from onsite stormwater management rules.

At the year five benchmark, a total of 840 greened acres had been completed through a combination of all three sources and 423 acres—just about half—came from projects that were required to manage stormwater resulting from PWD's onsite regulations.⁴¹ Moving forward, PWD will continue to rely heavily on its onsite stormwater regulations, projecting that greened acres obtained on new and re-development sites will comprise 25 percent of the total greened acres required at its consent order 10-year benchmark.⁴²

does it appear to have resolved concerns about potential legal challenges, political implications, or limitations on DEP's existing technological capacity. Nonetheless, the more than 1,400 municipalities nationwide that now levy stormwater fees on property owners, provide New York many models that it can use to design and implement an equitable stormwater fee.⁴³

Require on-site retention (or runoff reduction) for all new development and redevelopment projects that disturb 5,000 or more square feet of land

New construction, redevelopment, and major renovations provide the lowest-cost opportunity to incorporate GI into a dense urban environment like New York City. For this reason, many cities have implemented local ordinances or regulations that mandate that a specified amount of stormwater be managed onsite as a condition of approving a construction permit.⁴⁴ These rules ensure that newly developed or re-developed property does not add to the city's existing stormwater burden and, in the case of redevelopment, that it reduces the existing burden. These rules provide the added benefit of creating GI at no direct cost to water ratepayers.

New York City already has on-site stormwater rules, but they are inconsistent across the city and do not effectively drive the use of green infrastructure. In those parts of the city served by a separate sewer system, projects covered by the rule must capture stormwater onsite, but only a tiny fraction of all projects are covered because the rule applies only when at least one acre of land will be disturbed. In portions of the city served by a combined sewer system (and therefore covered by the City's green infrastructure Consent Order), smaller projects are covered. But these rules only require so-called detention systems, which capture stormwater only temporarily, then release it slowly into the municipal system after a storm event. These rules have not driven the use of green infrastructure.⁴⁵ Moreover, DEP is only now beginning to track the stormwater capture it has attained through the detention rule, after not doing so for at least the first five years of its green infrastructure program.⁴⁶

⁴⁰ Philadelphia's Stormwater Regulations require on-site stormwater management for development projects that meet the threshold 15,000 square foot (5,000 in certain watersheds) of earth disturbance. Other types of construction activities may also trigger portions of the Stormwater Regulations, including demolition and voluntary stormwater retrofit projects. Philadelphia Stormwater Management Guidance Manual (Version 3.0 July 2015), Chapter 2, 12, available at https://www.pwdplanreview.org/upload/manual_pdfs/PWD-SMGM-v3-20150701.pdf.

⁴¹ Philadelphia Water Department Development Services Committee presentation, Thursday, May 4, 2017, slides 7-10, on file with authors.

⁴² Id.

⁴³ Some stormwater charges have been challenged as an unlawful tax and beyond the legal authority of a water utility that can charge a fee for service. If a fee is structured properly, however, it can typically avoid running afoul of these legal challenges. Various reports have identified the general legal considerations and ways that other cities have addressed them. The National Association of Clean Water Agencies provides analysis on the types of legal issues affecting stormwater funding programs. See *Navigating Litigation Floodwaters: Legal Considerations for Funding Municipal Stormwater Programs*, (NACWA 2015), available at <http://stormwater.wef.org/wp-content/uploads/2015/01/NACWAs-Navigating-Litigation-Floodwaters.pdf>. See also *Guidance Manual for Municipal Stormwater Funding*, ES-3, available at www.epa.gov/sites/production/files/2015-10/documents/guidance-manual-version-2x-2_0.pdf.

⁴⁴ "Harvesting the Value of Water: Stormwater, Green Infrastructure, and Real Estate" (Urban Land Institute May 2017), 47-48, available at <https://americas.uli.org/wp-content/uploads/sites/125/ULI-Documents/HarvestingtheValueofWater.pdf>.

⁴⁵ NYC Green Infrastructure 2015 Annual Report (DEP 2016), 11, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2016.pdf.

⁴⁶ NYC Green Infrastructure 2016 Annual Report (DEP 2017), 15-16, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf. For example, DEP's June 2016 "GI Contingency Plan" claims credit towards GI milestones only for publicly-funded projects, and describes an approach to meeting the next set of milestones that also relies only on publicly-funded projects. See DEP's GI Contingency Plan; NYC Green Infrastructure 2015 Annual Report (DEP 2016), 11, FN 5, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2016.pdf; and the 2016 Green Infrastructure Performance Metrics Report (DEP June 2016), 303, FN 10 available at: http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi-performance-metrics-report-2016.pdf.



A preferable standard, which is more effective at reducing sewage overflows and stormwater pollution and consistent with best practices around the country, would be to require retention wherever feasible, using green infrastructure to keep stormwater onsite and reduce the volume (not simply the rate) of runoff. Such an approach can be applied citywide, and applied to sites as small as 5,000 square feet (about one-eighth of an acre), as is done in other states and cities.⁴⁷

DEP has initiated a multi-year study to determine the appropriate size threshold—some amount under one acre—for a new stormwater retention rule that would apply in the separately sewered areas. Several years ago, DEP stated that, when it develops this new rule for the separately sewered areas, it would revisit the adequacy of the rules for the combined sewer area.⁴⁸ Thus, DEP has an important opportunity to establish more effective, consistent stormwater regulations citywide to drive the use of green infrastructure. DEP should conduct an inclusive process for developing these rules, bringing commercial property developers, community groups, and affordable property stakeholders together to ensure that their interests are represented. In addition to size threshold, DEP should conduct modeling and analysis to understand any equity impacts of a proposed new rule.

DEP also needs systems to track the amount of runoff captured by new and re-development projects, and ensure long-term maintenance of those GI assets so that the City can claim credit towards its green infrastructure and CSO reduction targets, as other cities do.⁴⁹

⁴⁷ For example, Washington, D.C.'s retention requirements apply to development and redevelopment that disturb more than 5,000 square feet of soil (about 0.1 acre), as well as to substantial renovations to large buildings. 21 D.C. Regs. §§ 516, 599. In California, the statewide general permit for small MS4s provides that projects that create and/or replace at least 5,000 square feet of impervious area must use green infrastructure to manage a specified amount of runoff (e.g., the 85th percentile storm), and requires projects that create and/or replace 2,500 to 5,000 square feet of impervious area to use at least some green infrastructure measures. California Statewide Phase II MS4 General Permit at 48, 49 (see definition of "regulated projects"), available at http://www.swrcb.ca.gov/water_issues/programs/stormwater/docs/phsii2012_5th/order_final.pdf; The state of Maryland's stormwater management regulations, which require the use of green infrastructure to the maximum extent practicable to mimic natural hydrologic runoff characteristics, apply to developments disturbing over 5,000 square feet of land area as well. Code Md. Regs. 26.17.02.05(B)(2).

⁴⁸ See Guidelines for the Design and Construction of Stormwater Management Systems (DEP 2012), 6, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/stormwater_guidelines_2012_final.pdf.

⁴⁹ PWD's five-year compliance report includes an appendix listing every single project with greened acres counted under its stormwater rule, and the number of acres for each. See Green City Clean Waters Evaluation and Adaptation Plan, Appendix A Table 3, available at http://phillywatersheds.org/doc/Year5_EAPCombinedAppendices_website.pdf. (The main body of that report is available at http://phillywatersheds.org/doc/Year5_EAPBody_website.pdf.)



RECOMMENDATION 2

Commit decisively to make green infrastructure on private property a core component of the City's green infrastructure and sustainability efforts.

(Above) Rendering of Via Verde, Bronx, NY
(Courtesy of Jonathan Rose Companies)

To harness the interest and power of New York City property owners, community groups, and the business community, DEP must demonstrate its commitment to green infrastructure on private property. Without clear and unmistakable indications of DEP's commitment, such as public statements, long-term budgets and timelines, and plans for long-term operations and maintenance, private sector and community actors will not spend the time, the money, nor the effort necessary to become the strong partners that DEP needs to make its program a success.

In its overall GI program, DEP committed to spend \$1.5 billion on GI for both public and private property throughout the combined sewer areas by 2030 and earmarked \$923 million for GI in the current 10-year capital budget.⁵⁰ For a new private property grant program to succeed, similarly concrete and ambitious goals and timelines should be created and made public.

DEP took an important first step when it articulated a set of general goals for a new private property grant program and issued a Request for Information in September 2016, requesting the views of prospective third-party administrators and other stakeholders on how the agency could manage a private property GI program. In that RFI, DEP stated that it aimed to deliver 1,000 greened acres on private property over 15-20 years through a private property grant program.⁵¹ This goal communicated to the market that DEP planned to allocate in excess of \$225 million for private property

⁵⁰ See "NYSDEC & NYCDEP Announce Groundbreaking Agreement to Reduce Combined Sewer Overflows Using Green Infrastructure in New York City: \$2.4 Billion in Green Infrastructure and \$1.4 Billion in Gray Infrastructure to Target the City's Most Impaired Waterbodies," March 13, 2012, available at <http://www.dec.ny.gov/press/80919.html>; NYC Green Infrastructure 2016 Annual Report (DEP 2017), 5, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf.

⁵¹ See Appendix I for RFI excerpts.

green infrastructure.⁵² Given that DEP has stated its commitment to green 8,000 acres by 2030, DEP's 1,000-acre goal should only be a starting point.

The City's Clean Heat program serves as a good model for how New York can demonstrate a commitment to drive action by private property owners. Designed to phase out the use of dirty No. 6 and No. 4 heating oil, the Clean Heat program set clear obligations and timelines for private property owners to stop using dirty oils.⁵³ With City support, the private sector undertook more than 6,000 heating oil conversions by 2015, reducing fine particulate pollution from buildings by more than 65 percent.⁵⁴ DEP must similarly set clear goals and timelines for its private property GI program. Doing so will not only catalyze installation of GI on private property around the city, but will also create a yardstick against which DEP and other stakeholders can evaluate the program's success.

Make a full and public accounting of the costs to build green infrastructure on public property to determine what DEP should pay for green infrastructure on private property

Whatever the price that the City currently pays to green an acre of impervious area on public land, in order to save money for ratepayers, the City could set a *lower* price that it would be willing to pay for GI on private land. The average lifecycle cost per unit for public property GI projects should form the baseline from which DEP can rationally begin to calculate how much it should pay for comparable units of GI on private property.

A full-cost accounting for DEP's public property retrofits should include the costs of site analysis and testing, design and engineering work, construction, and long-term operations and maintenance. It should also include the costs of managing staff and related contracts, DEP finance, procurement, and legal staff time, and other overhead costs borne by the agency. We urge that DEP release information regarding its public GI construction costs, including explanatory material. Providing a transparent basis for these prices can also help private market actors develop innovative ideas for the city and best position themselves to respond to the City's offered price.

Use capital dollars to take the new private grant program to scale

Generally speaking, the City has two types of municipal funds available for stormwater management: expense dollars and capital dollars. Expense funds are allocated on an annual basis, cannot be guaranteed from one year to the next, and are typically used for short-term expenses. Capital funds are funds raised through the sale of municipal bonds and are the funding source used by government to pay for assets that have relatively longer useful lives, the value and cost of which can spread across many years. Projects funded with capital dollars, however, must comply with various legal and tax requirements.

⁵² DEP's most used GI practice on public land is a right of way bioswale (ROWB), for which DEP reports an average construction cost of \$25,000 (NYC Green Infrastructure Annual Report 2013 (DEP 2014), 19, table 6). It appears that DEP's lowest public cost to green one acre is \$225,000 or more. (The largest ROWB captures 3,000 gallons of stormwater ("City Announces Major Expansion of Nationally Recognized Green Infrastructure Program to Further Improve the Health of Local Waterways," DEP Press Release, Nov. 10, 2014, available at http://www.nyc.gov/html/dep/html/press_releases/14-089pr.shtml#), requiring 9-10 ROWBs to manage the stormwater on one impervious acre.)

⁵³ See Department of Environmental Protection Promulgation of Amendments to Chapter 2 of Title 15 of the Rules of the City of New York Rules Governing the Emissions from the Use of #4 and #6 Fuel Oil in Heat and Hot Water Boilers and Burners, available at http://www.nyc.gov/html/dep/pdf/air/heating_oil_rule.pdf.

⁵⁴ New York City Clean Heat webpage, available at <https://www.nycleanheat.org/content/program-progress>.



Stormwater Planters, 1203 Fulton Avenue, Bronx, New York
 Property owner: Community Assisted Tenant Controlled Housing (CATCH)
 Design & Engineering: eDesign Dynamics
 Project Lead: NYC Soil & Water Conservation District (Courtesy of NYC Soil & Water Conservation District)

DEP currently plans to use expense funds for a new grant program. But, capital funding will be required to fund a long-term, large-scale program. Additionally, from a procedural perspective, DEP's use of capital dollars for the new GI grant program will demonstrate the agency's commitment to the program at a larger scale than does the use of a much more modest and unpredictable expense fund budget.

Plan for long-term operation, maintenance, and monitoring to demonstrate a commitment to GI on private land

One of the most challenging, yet critical elements of an effective private grant program will be developing a robust plan for the ongoing monitoring and operation and maintenance (O&M) of green infrastructure to ensure GI's long-term performance. New York City recognizes this challenge and has conditioned its grants under the current GIGP on the private owner's obligation to ensure ongoing operation and long-term maintenance of the GI installation. DEP should do the same in the new incentive program. DEP should also aim to establish a cost-effective monitoring process to evaluate performance of private property GI on an ongoing basis and to inform future GI designs. We provide additional suggestions concerning long-term private property GI maintenance in Recommendation 3a and 3c.

As noted previously, a stormwater fee discount could provide an important incentive to motivate the owner to maintain the GI installation. Without such a fee in place, rebates on water bills, direct payments to property owners, or other incentives such as tax credits can be used to provide an incentive. Under any program design, however, these incentives should match the expected useful lifetime of the installation to ensure the GI is being maintained. The key is for DEP to plan for and to ensure that O&M is carried out for GI built with public dollars on private land.

Beyond the contract with the private property owner, the City can take additional steps to ensure long-term performance of the GI installations. For example, it can require contractors who build DEP-funded GI on private land to provide extended warranties or construction-performance bonds. Such requirements create incentives for quality construction. The City can also require designers to provide estimates of O&M expenses upfront, so property owners can have a better understanding of the lifetime cost of the asset and their maintenance obligations.

Conversely, if the property owner does not uphold his or her commitment to maintain the GI, the City must be willing to enforce its rights. By way of example, in its operations and maintenance contract for green infrastructure grant program participants, the Philadelphia Water Department requires the property owner to operate and maintain the PWD-funded GI for 45 years. If the building is sold during that time, the obligation passes to subsequent owners. During that 45-year period, the City will have access to inspect and monitor the GI and, if the City finds that the



Intervine employees maintaining green roof at 555 5th Avenue. (Courtesy of The HOPE Program and Sustainable South Bronx)

property owner has failed to maintain the GI, the City may enter the property and take whatever steps are necessary to correct the deficiencies and charge the costs to the property owner. Additional Philadelphia Water Department maintenance and enforcement provisions can be found in Appendix II.

If structured and financed correctly, the O&M and monitoring/inspection jobs flowing from a large-scale green infrastructure grant program could be a source of green jobs that are much-needed in the city's low-income communities and communities of color. As described further in Recommendation 3d, these are local jobs that, were the program to reach full-scale, could be long-term full-time positions.

DRAWING LEGEND

1. Precast concrete pavers walkways
2. Pre-seeded Green roof planning trays
3. Reused round tree planters
4. New fixed planters and seag
5. Cooling tower green screen
6. Green screen – Visual and Wind Screen
7. Lower Roof
8. Building Entrance
9. Stair Bulkhead



RECOMMENDATION 3

Create a new grant program, which works in combination with a new stormwater fee, to motivate private property owners to retrofit existing properties with green infrastructure.

“We can’t just set the table, we have to yank property owners to the table and be matchmakers.”

– Philadelphia Water Department staff

While an impervious-area-based stormwater fee and stronger stormwater rules for redevelopment projects are critical, they will not alone catalyze private property green infrastructure citywide. A large-scale citywide new DEP grant program is necessary in order to reach properties that are not likely to undergo redevelopment in the foreseeable future, and to provide a sufficient financial incentive for owners of those properties to install green infrastructure retrofits. The new program will need to incorporate lessons learned from DEP’s initial pilot grant program (the GIGP), as well as consider the lessons from successful private GI grant programs in other cities.

Problems with the current grant program include contracting requirements that make participation impossible for many property owners; high transaction costs; high administrative burdens; DEP’s limited capacity to engage in widespread education and marketing efforts for the program; and, the lengthy process involved in reimbursing property owners.⁵⁵

DEP will need to structure the new grant program to make participating in it as easy and attractive as possible. DEP will want to create a program that supports aggregation or “project bundling” to achieve scale. And, in the transition period, before an impervious-area based stormwater fee is in place, DEP will need to provide direct economic incentives for property owners to participate. Only an easy-to-use program that provides clear economic benefits to property owners will result in widespread greening on a citywide scale.

(Above) Green roof, Montefiore Medical Center, 3450 Wayne Ave., Bronx, New York.

⁵⁵ DEP presentation at Pocantico, November 29, 2016, on file with the authors.

RECOMMENDATION 3a:

Provide a direct financial benefit to private property owners—beyond reimbursing the direct cost for green infrastructure—to jumpstart the program

“How do we incentivize the private sector?”

– DEP deputy commissioner

Some cutting edge real estate developers and building managers recognize the benefits of green infrastructure and know that GI can increase the value of their real estate assets. The majority of the real estate market, however, does not. Thus, while a number of case studies show that green infrastructure drives stronger demand for occupancy, increases rental and leasing rates, and adds new revenue streams through amenity space rentals and fees, these cases and the cutting-edge real estate sub-market cannot be relied upon to drive enough demand for DEP’s full-scale program.⁵⁶ Similarly, the fraction of owners motivated by a sense of environmental stewardship does not represent a large enough market to ensure program success. Of the 34 GI projects funded by the current GIGP, 28 have been installed by not-for-profit organizations, leaving only six projects over six years built on more typical privately-owned properties.⁵⁷

“Show me the business case to do this with DEP. It’s gotta pencil out. Something has to be in it for the owner.”

– New York City
real estate developer

Therefore, to motivate more private property owners to participate in a grant program, DEP will need not only to cover the costs of installing green infrastructure through a new grant program, but it will also need to provide a direct financial benefit—beyond paying for the baseline cost of the green infrastructure installation—to property owners who participate in the program. The optimal way to provide such benefit is to charge impervious area-based fees for stormwater and to offer a fee discount to property owners who retrofit with green infrastructure (as discussed in Recommendation 1 above).

Unless and until DEP develops a stormwater fee and discount system, however, DEP will need to find alternative ways to provide direct financial benefits sufficient to motivate property owners to participate in a grant program. Available options include paying for GI on a unit-cost basis, paying property owners to maintain the GI asset once installed, and making on-bill financing and repayment available for costs related to GI installation.

Pay a unit price per square foot of impervious area managed or per gallon of stormwater managed

DEP’s current GIGP reimburses line-item costs for specific work that the agency deems to directly manage stormwater. A new GI grant program could provide a potential financial benefit to property owners if the program instead paid for GI on a unit price basis—a set price for each square foot of impervious area managed or each gallon of stormwater managed. A unit price provides a clear value that both property owners and GI installers can use to determine whether a project is worth undertaking.

⁵⁶ See Riggs, Trisha, How Green Infrastructure Manages Stormwater, Enhances Property Values (Urban Land Institute 2017), available at <https://urbanland.uli.org/sustainability/harvesting-value-water-green-infrastructure-manages-stormwater-enhances-property-values/>; Clements and Henderson, Getting the Green Out (NRDC 2015) available at <https://www.nrdc.org/sites/default/files/promoting-green-infrastructure-report.pdf>; Clements and St. Juliana, The Green Edge (NRDC 2014), available at <https://www.nrdc.org/sites/default/files/commercial-value-green-infrastructure-report.pdf>.

⁵⁷ NYC Green Infrastructure 2015 Annual Report (DEP 2016), 25, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2016.pdf.

Under a fixed unit-price approach, property owners and GI installers will be incentivized to participate because they can use the fixed unit-price to develop a plan for GI that provides value to them given the unit-price offered. A further advantage of structuring payments using a unit price methodology is that it may facilitate property owners' usage of DEP funds in conjunction with their own funds for improvements on their properties that would enable the installation of GI. For example, while DEP's current program does not fund roofing upgrades required to bring a roof into good repair, a unit-cost methodology could do so. Enabling these types of pre-requisite repairs is essential to green roof construction on a large scale throughout the city because a substantial percentage of New York City's roofs—two-thirds by one estimate—must be reinforced and/or repaired before owners can install rooftop solar or a green roof.⁵⁸

In setting unit prices, careful consideration is needed to ensure that the City gets the GI practices that bring sustainability and resiliency co-benefits, rather than getting only the lowest-cost projects, which may not always provide co-benefits. One solution that could drive cost reduction and still provide co-benefits would be to have a two-tier pricing system; with one tier set for the lowest-dollar cost projects and another, higher-priced tier for projects that bring sustainability co-benefits to the City, such as reduced summer temperatures, improved aesthetics, or improved air quality.⁵⁹ Alternatively, the City could motivate a range of GI projects by offering to pay up to a certain amount per square foot of impervious area managed with a green roof, another amount per square foot of impervious area managed with a rain garden, and other unit prices for other GI types.

Another unit-cost approach would offer a single unit price per square foot or acre of impervious area or stormwater gallon managed, irrespective of type of green infrastructure. This is the model currently used in Philadelphia, where PWD offers a set price it will pay for a greened acre no matter what GI type is used.⁶⁰

A full and public accounting of the costs to build green infrastructure on public property, as described in Recommendation 2, can help determine a ceiling for the unit costs DEP should be willing to pay for green infrastructure on private property.

A rain garden managing stormwater from the parking lot at Popi's Diner, a recipient of a Greened Acre Retrofit Program grant in Philadelphia. (Courtesy of Philadelphia Water Department)



⁵⁸ Fully 67 percent of New York City properties interested installing rooftop solar cannot afford the necessary roof repairs. Similar repairs will be needed for green roofs. Interview with Solar One staff, March 29, 2017.

⁵⁹ Philadelphia is currently considering a new structure by which the City will offer to pay more per greened acre for projects that use vegetation and thereby provide additional ancillary benefits. Interview with Philadelphia Water Department staff, February 6, 2017.

⁶⁰ Philadelphia Stormwater Management Incentives Grant Manual (July 2015), 7, available at http://www.pidcphila.com/images/uploads/product/Stormwater_Grants_Manual.9.14.15.pdf.

Compensate owners for the costs of long-term GI maintenance

DEP must plan and budget for long-term maintenance of GI on private property, as discussed in Recommendation 2. This need for DEP to ensure long-term maintenance gives rise to another option for DEP to convey benefit to property owners. For example, DEP could budget, as part of the ongoing program administration costs, some financial compensation for property owners to maintain the GI once it is installed on private land. DEP could contract with a third party to provide these services to owners who are receiving DEP grant dollars or find a way to compensate property owners directly for the expense of long-term maintenance through, for example, a credit on the property owner's water bill.

The Philadelphia Water Department green infrastructure grant programs are again instructive here. Philadelphia property owners who voluntarily retrofit their properties and install green infrastructure practices are eligible for a discount on their stormwater fees of up to 80 percent. This discount is often more than enough cash savings to pay for the long-term maintenance of the green infrastructure. The discount thereby enables the property owners not only to afford to pay long-term maintenance, but also to obtain a direct financial benefit from participating in PWD's grant program.⁶¹ Until DEP institutes a stormwater fee, it could similarly offer to pay private property owners enough to cover the cost of GI maintenance, as well as provide a small, ongoing direct financial benefit.

On-bill financing of GI-related costs

On-bill financing refers to a loan made to a utility customer by the utility or program administrator. That loan is repaid through installments on a property owner's utility bill. On-bill financing is typically used to provide access to lower-cost capital than would otherwise be available to utility customers. Here, on-bill financing could provide value to property owners if it enabled low-cost financing for property upgrades related to participation in a DEP GI program. On-bill financing provides access to lower-cost financing by using a property owner's history of timely utility bill payment and the credit rating of the water utility itself to enhance the credit of property owners. There is precedent for DEP using on-bill repayment: DEP currently provides on-bill payments for third-party products in its Water and Sewer Service Line Protection Program.⁶²



(Courtesy of the Philadelphia Water Department)

As described above, many roofs require some form of maintenance or repair prior to the installing a green roof. For example, if DEP does not provide grant funds for these roofing repairs, property owners will need to self-finance these improvements. Through on-bill financing, property owners could gain access to financing for such improvements. This would not only enable their participation in a GI program, but increase the value of their property.

⁶¹ Valderrama, Alisa and Davis, Paul, *Wanted: Greened Acres* (NRDC 2014), 7, available at <https://www.nrdc.org/sites/default/files/philadelphia-green-infrastructure-retrofits-1B.pdf>.

⁶² DEP's Water and Sewer Service Line Protection Program is a voluntary program designed to protect New York City homeowners from the unexpected costs of service line repairs. The protection program charges participating customers a monthly fee for the protection service. The monthly fee appears as a line item on participating customers' water bills. See DEP website "Water and Sewer Service Line Protection Program in Partnership with American Water Resources," available at http://www.nyc.gov/html/dep/html/service_line_protection/index.shtml.

RECOMMENDATION 3b:

Design the program to be transparent, simple, and flexible for property owners

“Design the program for Neanderthals. Keep things as simple as possible. Property owners and managers have tons on their plate and make a decision to spend time on a GI grant program at the expense of other investment opportunities.”

—New York City
real estate developer

A voluntary DEP GI program is in stiff competition for a property owner’s attention. To attract a property owner’s time and focus, a quick and relatively simple means of engagement is required alongside a strong economic case. Given the high real estate values in many cities—and in New York City in particular—whatever value green infrastructure might bring is often tiny compared to the value of the property on which GI is sited. As a result, for a GI grant program to succeed, an agreement to host and maintain GI installations on a property cannot constrain the sale of or negatively impact the value of the underlying real estate. The program must be as easy as possible for applicants and operate seamlessly with property owners’ priorities, as well as with standard property financing and contractual obligations. Clear marketing materials, with a transparent and straightforward application process, are also necessary. These must be followed by efficient project management throughout the project.⁶³ Additional recommendations for improving the customer experience and attracting program participation are set forth in Appendix IV.

Provide attractive contractual terms to private property owners in a new grant program

Among the top reasons that the current grant program has struggled to attract applicants are the obligations that DEP imposes currently when it uses capital funds. For example, the current program requires that property owners agree to a restrictive declaration and other obligations that can complicate a property’s sale, refinancing, or repurposing. Given these restrictions, very few owners have participated—or could be expected to participate.

As discussed in Recommendation 2, DEP will have to use capital dollars to take any private grant program to scale. To address the problems described above, DEP should initiate discussions with the City’s Office of Management and Budget, bond counsel, and the Corporation Counsel (the City’s law department) and seek a balance that protects DEP’s interests while offering terms that will be agreeable to property owners.⁶⁴ The City has demonstrated flexibility in using capital funds to pay for green infrastructure on private land for the Waterfront Agricultural Council (WAC), as discussed in Recommendation 3c below.

In the near term, including a buy-out option in the DEP-property owner contract would provide a clear cost and process for the property owner to exit its contract with DEP. Consistent with the restrictions on the use of capital dollars, a buy-out option would help make property owners more comfortable signing a long-term agreement. We provide several suggestions for structuring a buyout clause in Appendix III.

⁶³ Proof of the damage that even the most basic obstacles can pose is illustrated by a comparison of participation rates for energy efficiency programs in California and Texas. The two nearly identical programs provided customers an online application to sign up for automatic money-saving energy efficiency programs. . In Texas, 42 percent of customers signed up for the program while in California, only 3 percent did. The two main differences that drove this dramatic reduction in applicants in California were: (1) California applicants were required to provide their utility account numbers for the application; (2) California applications were required to fill in one additional form with a required “wet” (non-electronic) signature. How to Boost Enrollment in Your BYOT Demand Response Program, Energy Hub, 2016, on file with authors.

⁶⁴ DEP already uses capital dollars for its current GIGP. NYC Green Infrastructure 2016 Annual Report (DEP 2017), 5, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf. Other city agencies have also funded green infrastructure assets with capital dollars. NYC Parks and the Million Trees NYC program, for instance, fund tree planting with capital dollars. Interview with NYC Parks Department staff, December 11, 2016.



Encourage project bundlers to bring multiple GI projects to DEP

One primary weakness in the existing GIGP program to date is that it does not encourage project bundling or any aggregation of GI projects by a third party into a portfolio for DEP funding. Under the existing GIGP, each project application is submitted on a stand-alone basis. The new green infrastructure grant program should explicitly provide mechanisms for third-party bundlers or aggregators to market the grant program to property owners and bring portfolios of projects to DEP on behalf of property owners.

PWD's Greened Acre Retrofit Program (GARP) provides a good example of how a GI grant program can be structured to encourage aggregation and to reduce the burdens on prospective participating property owners. By allowing either owners or third parties to submit GARP applications on behalf of owners, GARP puts project aggregators (typically design/engineering firms) in the driver's seat, enabling them to seek out cost-effective private property GI projects and bundle together portfolios that, with the owners' agreement, they can submit directly to PWD for funding. Although the GARP has shown only mixed results in terms of economies of scale achieved by the bundling of projects, its key innovation has been enabling project aggregators to seek out ideal projects, knock on owners' doors, educate owners about the opportunity presented by GARP, and shepherd applications through the PWD grant process. The process works well because the aggregator-led application process requires minimal participation from the property owners.

Once GARP projects are greenlit, once the projects are greenlit for funding, the aggregators typically earn a profit from managing the construction or from entering into long-term maintenance contracts with property owners. The property owner benefits from the lower stormwater fees and any ancillary benefits the GI provides, while PWD benefits from a greened acre that is substantially cheaper than what is available in the ROW.

Guarantee project timelines

For property owners, delays in construction can mean lost revenues and higher costs. That is why the new grant program must provide a guaranteed response time for each step in the program. Certainty regarding timelines is critical because GI costs can be substantially reduced by installing GI at the same time that other work is being done on a property. Without guaranteed timelines for all application reviews and sign-offs, applicants will be unable to coordinate work streams, thereby driving up construction and projects costs, costs that will ultimately be passed on to DEP and ratepayers. As an example of how quickly cities can move, Washington D.C.'s Department of Energy and Environment (DOEE) processes and approves an application to its GI grant program within three weeks of its submission.⁶⁵

Provide property owners flexible, cost-effective reimbursement for GI stormwater management systems

If, in a new program, DEP continues only to reimburse specific design and construction costs, rather than paying a unit cost per greened acre or stormwater gallon managed, as recommended above, then it will be important to reconsider what qualifies as reimbursable project costs. DEP should consider broadening the parameters of the green infrastructure system costs it will reimburse in the new private property grant

⁶⁵ Interview with DOEE staff, June 30, 2017.

program, consistent with the law. It can be penny wise and pound foolish to deny funding for minor property upgrades that may not manage stormwater directly but are integral to a stormwater management system on a private parcel. This is particularly true when total project costs are less than the costs for equivalent stormwater capture in the ROW. See the box below for an illustrative example involving green roofs.

(Above) Rendering of Via Verde, Bronx, NY
(Courtesy of Jonathan Rose Companies)



Take advantage of NYC's green roof opportunities

2,700 acres

of impervious surface area on privately-owned buildings with large, flat, structurally sufficient roofs that could be retrofitted with GI—**more than one-third of DEP's total GI acreage target.**

In a city as dense as New York City, building rooftops can offer excellent opportunities for siting green stormwater infrastructure. In fact, New York City contains more than one million buildings with a total of 38,256 acres of rooftop area.⁶⁶ Among these structures, the low hanging fruit that present cost-effective GI possibilities are the 5,227 privately owned buildings with flat roofs sized greater than 10,000 square feet, that were built between 1900 and 1970 when the building code required a high, load-bearing capacity.⁶⁷ In aggregate, buildings with all four features—large, privately owned, flat, structurally sufficient roofs—represent a total of more than 2,700 acres of impervious surface area—more than one-third of DEP's total GI acreage target. If retrofitted with GI, these properties alone could be capable of managing billions of gallons of stormwater runoff every year. But even roofs that are considered to be low-hanging fruit can require minor upgrades or repairs before a green roof can be installed.

While DEP is legally limited to paying for only costs related to stormwater capture, greater flexibility in paying for low-cost building improvements that are a pre-requisite to green roof installation could be viewed as “related to stormwater capture” and produce both wider program participation and yield cost-effective stormwater management results. For example, DEP will currently pay for a 0.4 mm thick waterproof rubber membrane as part of a green roof system, but it will not pay for a new roof, which can often entail that same waterproof liner, but only 0.4 mm thicker, at 0.8 mm. Paying for a slightly thicker and more expensive rubber roof would likely stimulate participation from a far larger swath of property owners, who will be attracted not only to the green roof DEP would be offering, but also to a thicker roof membrane that would be equivalent to a new roof.

⁶⁶ Ackerman, Kubi, “The Potential for Urban Agriculture in New York City” (Urban Design Lab, The Earth Institute, Columbia University 2012), 40, available at http://urbandesignlab.columbia.edu/files/2015/04/4_urban_agriculture_nyc.pdf.

⁶⁷ Id.

How the Philadelphia Water Department uses a dual-party check system to help eliminate out-of-pocket expenses for property owners

The Philadelphia Water Department, through its third-party program administrator, the Philadelphia Industrial Development Corporation (PIDC), provides participating property owners a dual-party check that eliminates the need for owners to fund work out-of-pocket while waiting for reimbursements. Similar to a traditional reimbursement, PIDC waits to receive an invoice for green infrastructure costs from the property owner. Upon receipt of the invoice, PIDC confirms with PWD and other required parties that the invoiced work has indeed been completed to its satisfaction, at which point PIDC issues a check to the property owner that can be directly signed over to the contractor(s) who did the work and are awaiting payment. As a result, the property owner never needs to go out-of-pocket while waiting for City reimbursement.



Guarantee payments for pre-development costs, facilitate project financing, and consider a dual-party check system so property owners are not burdened with out-of-pocket costs

To date, DEP's GIGP requires prospective grant applicants to pay significant costs for pre-development work with no guarantee of reimbursement. The pre-development phase of a project includes all the work needed prior to project construction, including customer outreach, marketing, desktop site analysis and site visits, and any costs incurred to create a preliminary design for the project. The current GIGP structure is challenging because many applicants cannot afford these costs or are not willing to spend the money without a guarantee of project approval and repayment. Moreover, once an application has been approved, the program applicant must continue to use his or her own funding to initiate project construction and wait for reimbursement by DEP through a lengthy and often opaque review of individual line items. As DEP and other cities have learned, this type of process is very unattractive to applicants because of the cash demands and financial risk.⁶⁸

To remove these upfront-cost barriers, DEP could fully fund pre-development and other upfront costs throughout the project lifecycle through a process similar to the one it uses for the Watershed Agricultural Council (described in Recommendation 3c below), or the New York City Brownfields Incentive Grant Program. Alternatively, the agency could look to the process developed by the Connecticut Green Bank.

The New York City Brownfields Incentive Grant Program offers grant funding in two phases. The first grant phase occurs at the pre-development stage; the grant covers the costs of project scoping and assessment. The second grant phase is used for project construction.⁶⁹ In the Connecticut Green Bank program, as described in more detail below, the Bank pays for certain pre-development work itself to ensure a robust pipeline of qualified properties. Once this initial analysis is completed and a project meets required thresholds, the Bank funds the ongoing pre-development work with the knowledge that its internal pre-development assessment provides a strong indicator that the project will be a good fit for the program.

DEP may determine that it can only fund the new grant program on a reimbursement basis. If so, in addition to considering a dual-party check system, we recommend that, as a number of RFI respondents proposed, DEP enable some form of bridge financing or other financing. This would allow a third party to finance upfront costs and thereby ensure that property owners are not required to pay for them out-of-pocket. The exact form of financing will depend on the ultimate structure and scale of the DEP program. There are a number of principles that DEP should consider as it moves forward with its program design. For example, ensuring that DEP-funded GI projects will be financeable will require DEP to set specific transparent metrics and standards for project and application acceptance, construction, inspection, and successful completion, as well as clear reimbursement rules that can be independently underwritten by a financial institution. The Connecticut Green Bank, widely recognized as a highly successful funder of distributed infrastructure projects, has developed a financing solution similar to what could work for the new DEP GI program. As outlined below, the Bank has developed a process to fund projects at no upfront cost to participants while ensuring that its funds are spent as cost-effectively as possible.

⁶⁸ The Philadelphia Water Department is implementing a series of changes to its Greened Acre Retrofit Program to minimize pre-development costs to program participants. Interview with PWD staff, November 29, 2016.

⁶⁹ Pre-Development Grants can be used for project investigation, technical assistance, and other pre-development costs. The second phase, Development Grants, can be used for job training and site work. NYC Office of Environmental Remediation Brownfield Incentive Grants, available at <http://www.nyc.gov/html/oei/html/brownfield-incentive-grants/grant-types.shtml>.

Funding distributed infrastructure at no upfront cost to owners—best practices from the Connecticut Green Bank

To fund pre-development costs, the Connecticut Green Bank splits its pre-development process into four phases: 1. Desktop analysis; 2. Site visit; 3. Full audit; 4. Full project design.⁷⁰

In the first two phases of pre-development, the Green Bank conducts the necessary work at no cost to property owners. These analyses can normally cost as much as a few thousand dollars each and the results provide the Green Bank with the information it needs to decide whether to move forward with a project. Once the first two steps of pre-development work are done and the full audit phase begins, the property owner must commit to moving forward with their project if the continued pre-development analysis determines that the project meets the Green Bank's selection criteria. At the end of the full pre-development process, one of three situations occur:

SITUATION	IMPLICATIONS	FREQUENCY
Project does not meet Bank criteria	CT Green Bank pays all predevelopment costs and accounts for them as part of the cost of finding good projects	Rarely occurs
Project meets criteria and moves forward	CT Green Bank wraps all costs into successfully financed project	Most frequent case
Project meets criteria, but property owner chooses not to move forward	Property owner pays for all audit and design predevelopment costs	Rarely occurs

This process has allowed the Green Bank to move more prospective projects into their pipeline and to appropriately allocate project risk between the Bank and applicants.

Connecticut Green Bank working capital program

To fund construction of Connecticut Green Bank projects without the owner or project developer needing to pay upfront, the Bank has developed a simple working capital program for pre-approved contractors that is run in partnership with Webster Bank, a regional bank active in Connecticut, Rhode Island, Massachusetts, and New York. Contractor pre-approval helps ensure that contractors have the proper training and certification, reducing risk and allowing for proper risk-adjusted financing.

Although the Connecticut Green Bank contracts directly with property owners for its projects, Webster Bank facilitates the development process by providing construction financing for approved Green Bank projects through short-term loans to contractors. These loans are guaranteed by the Green Bank. (Webster funds the contractors rather than the individual property owners to reduce property owners' administrative burdens.)

Contractors are given a maximum amount of funding to draw down over a certain period of time in conjunction with expected needs. Disbursement against this line of credit must be approved by the Green Bank, which confirms to Webster Bank that the funds requested are being drawn against purchase orders or approved designs and budgets. This process ensures that funds are properly used, and makes the funding available to contractors when needed. It also frees the contractor or property owner from using their own funds for construction. Interest rates for this type of structure can range from 1.5 percent to 2.5 percent over prime.

⁷⁰ Interview with Connecticut Green Bank staff, April 24, 2017.

RECOMMENDATION 3c

Engage a third party to run the new grant program

“A third party administrator can be a great facilitator and matchmaker.”

— Community Development Corporation staff

New York City has had great success using third-party administrators (TPAs) to manage key aspects of private-property-facing programs in other sectors, including energy efficiency and heating oil conversions. A TPA can bring needed capacity and expertise, keep costs down, and help ensure the program serves OneNYC goals. While we recognize that DEP sees the benefits that a TPA could bring and has taken some early steps to retain a TPA through an initial RFI, we want to underscore the importance of working with a TPA and the reasons to do so, as well as provide some suggestions as to how the relationship between DEP and the TPA could be most successfully structured.⁷¹

A TPA could help drive success in promoting GI on private property across a range of program functions: It could ensure ease of use by program participants; reduce DEP’s financial and execution risks; and take on the property owner relationship management roles. As it assesses its options for securing a third-party administrator, DEP can consider at least three models:

- securing a professional manager (as was done with the Clean Heat Program), something DEP indicated it intended to do in its September 2016 RFI;
- partnering with another City agency or quasi-governmental organization such as the New York City Economic Development Corporation (EDC), to administer the program; or,
- creating a new not-for-profit organization to administer the program (see the WAC model described below).

No matter which model DEP decides is best, the agency will need to coordinate closely with the TPA on all aspects of program design to ensure that processes, standards, and requirements will work for DEP, the TPA, and property owners alike. DEP should also seek a TPA with demonstrated experience at effective community engagement, as well as a track record of working successfully with community-based organizations. Principles of environmental justice and equity, not simply stormwater management goals, should inform program development. DEP must also be prepared to pay the TPA for the full range of program functions, including: dedicated staffing, outreach, engagement with community organizations, marketing, customer acquisition, application management, payment disbursement, and post-construction audit. To ensure the most efficient use of ratepayer dollars, DEP payments to the TPA should be structured on a pay-for-performance basis.

⁷¹ See excerpts from DEP’s September 2016 Request for Information, available in Appendix I.

The Watershed Agricultural Council model can help inform DEP's new private property GI grant program



(Courtesy of Watershed Agricultural Council)

DEP has already demonstrated that it can work with a third-party program administrator to disburse hundreds of millions of dollars in grant funding to design, build, and maintain distributed green infrastructure on privately owned property.⁷² As part of the historic New York City Watershed Protection Program, upstate landowners founded the Watershed Agricultural Council (WAC) in 1993 to pay for and administer the installation of green infrastructure on private land, rather than the costlier filtration systems that would otherwise be needed to keep drinking water clean for millions of New Yorkers. As we show below, the WAC presents a particularly relevant model for some elements of DEP's new private property green infrastructure incentive program.

The WAC is not DEP-run. Rather, it is an independent Section 501(c)(3) not-for-profit organization. The voluntary, incentive-based Watershed Agricultural Program it administers is fully funded by DEP. A Council of Directors, guided by an advisory committee, oversees the Council programs, which are administered by office and field staff.⁷³

WAC GI programs help farmers prevent agricultural runoff from polluting New York City's water supply. DEP funding also supports all of WAC's administrative and marketing costs as it reaches out to farmers and encourages them to participate in the program. While participation in the WAC is voluntary, today, more than 90 percent of the farmers in upstate watersheds receive WAC-administered DEP funding.

WAC-funded retrofits on private land upstate provide direct GI benefits but can also provide related improvements to farms. For example, DEP dollars can cover the costs involved in designing, building, and maintaining a covered barn to help manage manure, fencing to keep animals out of waterways, and an array of techniques to spread manure. Moreover, once the WAC-funded projects are complete, participating farmers are often eligible for additional cash revenue sources, such as the Conservation Reserve Enhancement Program (CREP), whereby the federal government provides payments to farmers for providing ecosystem services.

The WAC demonstrates that when green infrastructure techniques on private land are the most cost-effective option for DEP to reach its goals, DEP can fund a long-term program run by a third party to get those projects built. The WAC model also shows that DEP can use a TPA to:

- pay for the design and construction of assets on private property;
- pay for the long-term maintenance of those assets;
- pay for improvements to private property that provide a service to DEP while also enabling private owners to obtain financial benefits; and,
- pay an independent third party to market and manage a grant-disbursement program.

⁷² Interview with WAC staff May 16, 2017. See also Watershed Agricultural Council Annual Report (2016), available at http://www.nycwatershed.org/pdfs/2016_AnnualReport.pdf.

⁷³ The WAC Board of Directors is comprised mainly of local farmers and landowners save for one representative from the City, who is appointed by the Commissioner of the NYC Department of Environmental Protection.



WAC providing farmer education.
(Courtesy of Watershed Agricultural Council)

A TPA can best run a “customer-friendly” program

A well-chosen third-party administrator can manage cumbersome City administrative requirements on behalf of private property owners, build in-house capacity more effectively, and streamline program operations, thereby making a TPA best-suited to administer a City-funded program to catalyze the development of GI on private property.

DEP’s GIGP, for instance, currently requires small, individual property owners to carry out many of the same burdensome contractual and application processes that were originally designed for multi-million-dollar multi-year contracts with large engineering firms. In the context of GI grant applications, that means, for example, that a small property owner must develop a comprehensive health and safety plan for the installation of something as small as a rain garden. While each individual requirement may not, in itself, be prohibitively time-consuming, the administrative tasks required in the current GIGP can mean hundreds of hours of work over months or years.

A TPA can help eliminate some of these extra burdens by serving as DEP’s contracting party for the entire private property grant program. The TPA would be positioned to absorb and manage many of the reporting requirements and administrative obligations required by the City.

A TPA is also well-positioned to implement a customer-centric program in ways that would be difficult for DEP. The skills needed to launch a successful program include marketing and sales, private financing, contracting, and retail customer management. Many of these skills are outside a public water agency’s expertise, and developing them in-house does not make sense for DEP. But a TPA with a good track record can nimbly obtain and deploy these skills and strategies, while ensuring that public dollars are well-spent.

A TPA can also be more effective than a City agency if the program needs to quickly reallocate its budget, or adjust implementation methodology as needed to expedite a program’s development. A TPA can much more efficiently scale a program up and ensure success.

Having staff who can dedicate their time fully to a grant program is also a key requirement for efficient and effective interactions with property owners. While other cities have managed their green infrastructure grant programs in-house, typically the programs have not operated at the scale needed in New York and these other cities have spent many years developing their internal staff and expertise to build successful programs.

A pay-for-performance contract with a TPA can help ensure effective use of DEP funds

The terms “pay-for-performance” and “pay for success” connote a contracting structure that is partially or wholly driven by the success of the contracted party in meeting performance goals.⁷⁴ DEP’s payments to the TPA could be conditioned on factors such as square feet of impervious area managed, meeting participation goals for certain target property types or properties in priority areas, jobs created, or any metric that DEP, the TPA, and other stakeholders agree can be reasonably achieved and measured. While we advocate for performance-based contracting, we acknowledge that no TPA will be willing take on the entire risk of this program, but rather must negotiate with DEP to properly allocate risk and reward. An opportunity for public review and comment on the DEP-TPA contract may be beneficial to this process.

A performance-based contract can provide additional assurances not only to DEP, but also to state and federal regulators, as well as to community groups and other stakeholders interested in ensuring social and environmental outcomes.

⁷⁴ See Results-Driven Contracting: An Overview (Harvard Kennedy School Government Performance Lab 2016), available at http://govlab.hks.harvard.edu/files/siblab/files/results-driven_contracting_an_overview_0.pdf?m=1456763365.

RECOMMENDATION 3d

Partner with community-based organizations that can help a new program succeed and help achieve OneNYC goals

Community-based organizations (CBOs) provide an exceptional partnership opportunity for DEP and its third party administrator in any new green infrastructure private grant program. CBOs are nonprofit groups that work at a local level to address the social and economic needs for residents in a defined community, such as environmental justice organizations and community development corporations. CBOs can contribute to program success by playing roles in each stage of a project's development.

Intervine employees installing a green roof at ABC Carpet and Home, Bronx, New York (Courtesy of Intervine, a division of The Hope Program and Sustainable South Bronx)



As OneNYC makes clear, the City is committed to ensuring that all New York City capital planning and investment focus on economic, social, and environmental impact⁷⁵ and “mak[ing] equity an explicit guiding principle... [in all of its] planning, policymaking, and governing.”⁷⁶ OneNYC defines equity as an “economy that offers well-paying jobs and opportunities for all New Yorkers to live with dignity and security,” as well as providing “fairness and equal access to assets, services, resources, and opportunities so that all New Yorkers can reach their full potential.”⁷⁷

Here, with DEP deciding how and where it spends \$1.5 billion in public funds, within the parameters of DEP’s GI water quality goals, equity principles suggest prioritizing those communities that have historically borne disproportionate environmental burdens. Community partnership throughout the new GI grant program’s development and implementation process can help guarantee that low-income communities and communities of color, low-income property owners, and small businesses are able to participate in and benefit from the new program.

⁷⁵ OneNYC at 47, 53, 102, available at <https://onenyc.cityofnewyork.us/>.

⁷⁶ Id. at 5.

⁷⁷ Id. at 6, 14.



David and Joyce Dinkins Gardens, 263 West 153rd Street, New York, New York.
(Courtesy of Jonathan Rose Companies)

Equitably distributing green infrastructure assures that GI's social, economic, and environmental benefits are enjoyed by all New Yorkers. Moreover, partnering with community-based organizations can make DEP's programs more successful, because CBOs have deep local connections and a unique ability to build support for green infrastructure.⁷⁸ CBOs are also well-suited to act as trusted conduits to property owners. CBOs are better able to leverage their networks to originate projects at lower cost than if DEP, lacking these community relationships, were to attempt to manage this process internally. Many CBOs have a track record of environmental justice advocacy or environmental stewardship that results in strong mission alignment with the goals of DEP and the green infrastructure program.

Community-driven green infrastructure in Onondaga County, New York

Faced in 1998 with an all-gray, \$560 million stormwater management plan that focused on constructing regional stormwater treatment facilities in underserved communities, a well-organized community in Onondaga County, New York—a county which includes the City of Syracuse and its suburbs—pushed back. Onondaga County Executive Joanie Mahoney engaged the community to reimagine stormwater management planning. As a result, Onondaga became the first municipality in the United States with a CSO consent order that mandates the use of green infrastructure as an acceptable control strategy for reducing CSO volume. The County's goal today is to green a total of 470 acres and manage upwards of 6.1 billion gallons of CSO effluent a year. Community groups, along with strong County leadership, saw this commitment not only as a path to meet water quality goals, but also to advance community, social, and economic benefits. Together, they launched the *Save the Rain* program in 2009, with a comprehensive public outreach campaign, including GI education at a neighborhood level, within the public school system, and via website and social media.⁷⁸ GI design charrettes, public meetings and workshops were also conducted, with community organizations often leading these processes.

Celebrated by the US EPA in 2011 as one of the country's top ten leaders in green infrastructure,⁷⁹ Onondaga County has also pioneered grant support for green infrastructure on private property. The County's Green Improvement Fund has completed more than 88 projects since 2010, capturing approximately 40 million gallons of stormwater runoff from private property, investing \$10 million in the city of Syracuse alone.⁸⁰

⁷⁸ See STEW-MAP: The Stewardship Mapping and Assessment Project, a database and set of interactive maps created by the USDA Forest Service, Northern Research Station NYC Urban Field Station, which show where and how hundreds of local citizen and environmental groups are working in New York City to benefit the sustainability of their local environments. A new civic capacity map will be available in winter 2017 and might be a valuable tool to identify community groups for partnership in the new grant program. www.nrs.fs.fed.us/nyc/focus/stewardship_mapping/.

⁷⁹ Save The Rain, Onondaga County website, available at <http://savetherain.us/about/>.

⁸⁰ "EPA recognizes Onondaga County, Syracuse as top 10 green community," Syracuse.com, available at http://www.syracuse.com/news/index.ssf/2011/04/epa_recognized_onondaga_county.html.

⁸¹ Save the Rain, Onondaga County website, available at <http://savetherain.us/green-improvement-fund-gif/>.

CBOs are already engaging formally and informally with DEP. For example, CBOs served on DEP's Green Infrastructure Steering Committee. Some groups responded to DEP's Request for Information, while others joined public meetings that DEP has hosted to share the agency's goals and to learn the interests and needs of CBOs for a new private GI program. To build on this foundation, we offer some observations and recommendations below that incorporate the views shared by CBOs at convenings led by DEP, NYU Stern, and NRDC.

Partner with communities from program design through implementation, and institutionalize their role through a new formal advisory body

Community-based and nonprofit organizations, particularly those with a commitment to sustainability, resilience, and/or environmental justice, can help DEP and its third-party administrator to understand:

- aspects of a green infrastructure grant program that are most important to communities;
- roles for CBOs in a new program; and,
- what capacity, technical assistance, and financial resources provided by DEP would help CBOs to participate fully in any pilot and grant program

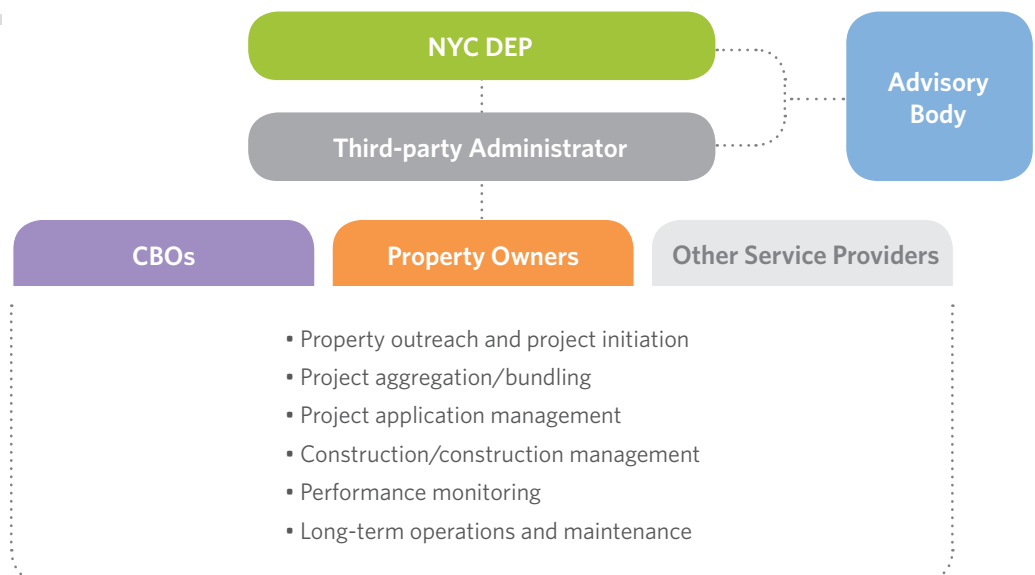
Community engagement at the program planning stage will also help DEP coordinate private green infrastructure investments, so DEP can build on existing community plans and environmental justice projects, as we discuss below. Moreover, working with CBOs at an early program stage can help leverage resources from philanthropy and impact capital, providing further opportunity to scope, test, and scale effective strategies.

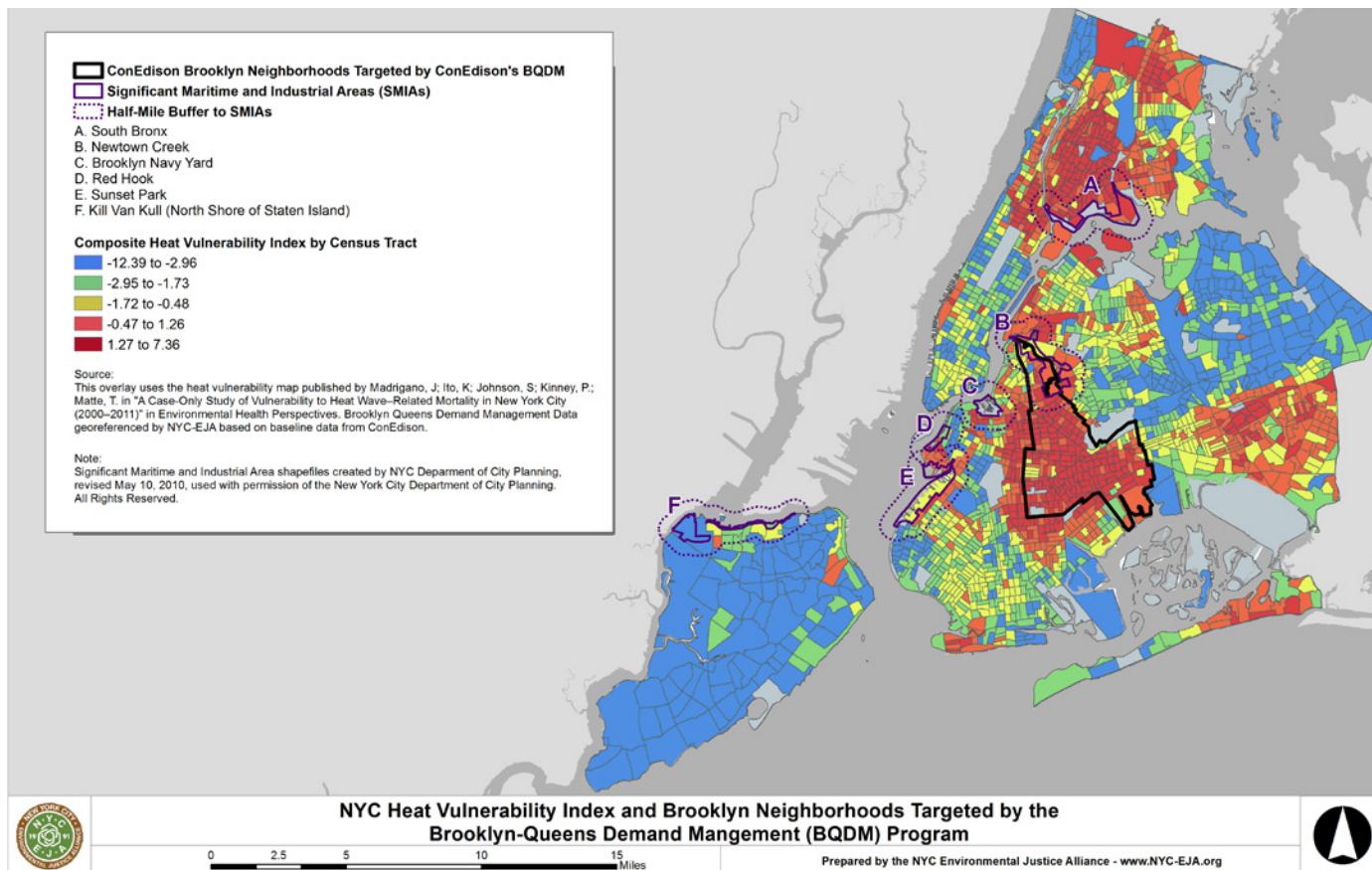
To be truly effective, however, community engagement must be ongoing. This can be facilitated by DEP's creation and support of a new advisory body dedicated to the new grant program, and made up of community representatives, technical experts, property owners, and public sector staff. The body should meet on a regular basis with DEP and its third party administrator, and function long-term to institutionalize a community voice in ongoing program management.

"Without an inclusive, long-term decision making process with multiple opportunities for community oversight . . . [any] plans, which seek to protect the most vulnerable communities from climate change impacts, will always fall short of this goal."

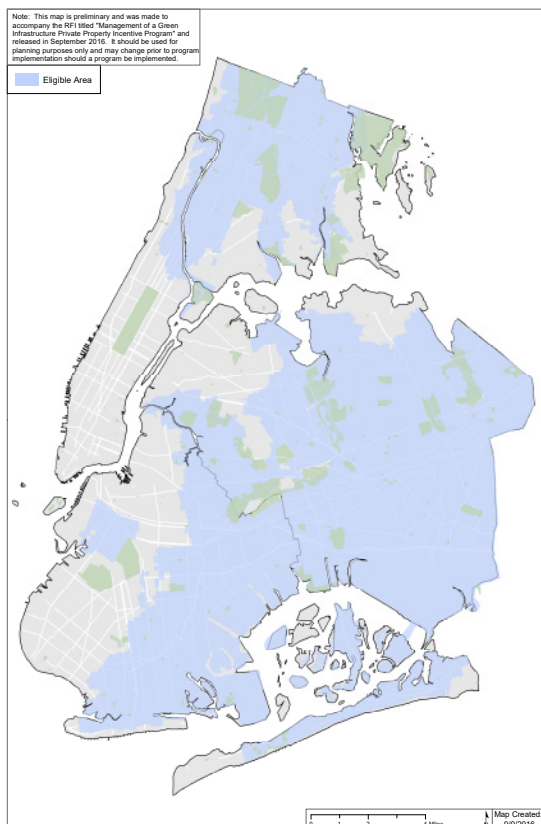
— NYC Environmental Justice Alliance 2017 Climate Justice Agenda

Possible Roles in a New Private Property Grant Program





NYC Eligibility Map for Proposed Private Property Incentive Program



Integrate equity metrics, environmental justice considerations, and climate change vulnerability indicators in prioritizing where DEP grant funds are spent

The NYC Environmental Justice Alliance (NYC-EJA) championed integrating environmental justice considerations and metrics in its 2016 and 2017 NYC Climate Justice Agenda⁸² and this goal was also emphasized in OneNYC.⁸³ As priorities are established in consultation with communities, within the parameters of DEP's water quality goals, the following are important considerations:

- **coastal protection** that green infrastructure provides and its capacity to **complement existing and planned coastal protection and flood risk reduction projects** to climate-vulnerable communities threatened by extreme weather events, storm surge, and flooding;
- the ability of sustainable stormwater infrastructure to mitigate storm-surge-related **toxics exposure** for industrial waterfront communities especially in New York City's Significant Maritime and Industrial Areas (SMIAs);

⁸² See NYC Environmental Justice Alliance 2016 Climate Justice Agenda, available at http://nyc-eja.org/public/publications/NYC_ClimateJusticeAgenda.pdf, and NYC Environmental Justice Alliance 2017 Climate Justice Agenda, available at http://sndbx2.perceptua.com/wp-content/uploads/2017/04/NYCEJA_CJA_StateofEmergency_April2017_Final.pdf.

⁸³ OneNYC at 260-61, available at <https://onenyc.cityofnewyork.us/>.

- prioritization of traditional **environmental justice communities** that have historically been environmentally overburdened;
- the ability of GI to **mitigate heat vulnerability** in communities such as the South Bronx, Central Brooklyn, and other neighborhoods, and to reduce the urban heat island effect;
- the potential for GI to reduce particulate pollution and improve **air quality** in neighborhoods with clustered polluting infrastructure, such as power plants and waste transfer stations; and,
- the possibility of **job creation** for communities that have historically not been provided access to high-road, well-paying, long-term, infrastructure jobs.⁸⁴

Ensure that the program enables diverse roles for CBOs

New York City community groups are well-positioned to play any number of roles in the rollout of what will likely be hundreds of millions of dollars in infrastructure spending. Different community groups will likely take different approaches based on their existing competencies, as well as on how the new DEP grant program can help them improve livelihoods in their priority neighborhoods. Importantly, CBOs should be considered as key partners in all aspects of the program rather than limited to small community-based projects. No matter what the ultimate role for a given CBO may be, DEP will need to provide CBOs with the financial support they need early on so these groups can determine a mode of engagement that will be self-sustaining in the long term.

Potential roles for CBOs include:

- **Taking the lead in outreach, education, marketing, and aggregation**

Community-based organizations are uniquely positioned to leverage existing networks for outreach and recruitment. Community-based organizations are trusted intermediaries in the communities they serve and can play a crucial role in educating local property owners and businesses about the benefits of green infrastructure, and the opportunity to participate in DEP's grant program. CBOs with the interest or capability can go one step further and act as project aggregators through customer identification, education, and engagement, bundling together a portfolio of retrofits that would bring multiple co-benefits to their communities. CBOs could effectively target outreach to small- and medium-sized private property owners and intensively engage small businesses—especially mom-and-pop industrial businesses in the SMIs. To streamline the application process, CBOs might also act as local clearinghouses for applications on behalf of property owners.

- **Managing construction and post-construction approvals**

Community-based organizations can also develop GI projects, retain contractors, and manage construction in targeted neighborhoods. Working with community groups that are already private property owners, such as community development corporations, could prove to be an efficient strategy.

- **Training for construction jobs and constructing green infrastructure projects**

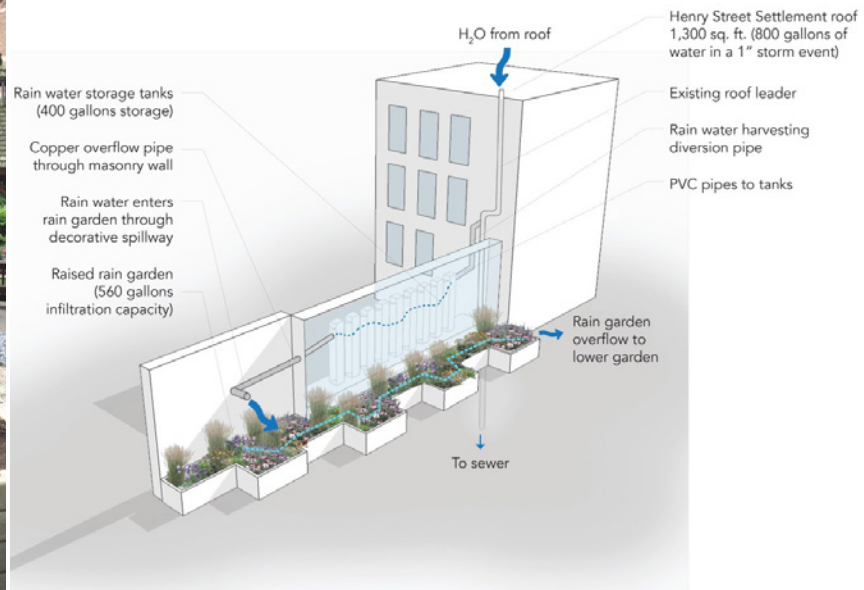
Many green infrastructure construction projects are well suited for job training and workforce development initiatives, providing New Yorkers who face barriers to employment with an opportunity to earn a living wage while gaining on-the-job skills enhancement in design, engineering, and construction.

⁸⁴ See NYC Environmental Justice Alliance 2017 Climate Justice Agenda, available at http://sndbx2.perceptuate.com/wp-content/uploads/2017/04/NYCEJA_CJA_StateofEmergency_April2017_Final.pdf.

- **Maintaining and monitoring to ensure long-term green infrastructure performance**

Whether DEP supports the long-term maintenance costs of the GI funded by the new grant program or simply requires it, CBOs can contract to help provide maintenance of GI projects to ensure that these assets continue to perform their core stormwater management function, while they provide the water, energy, air, and health co-benefits that communities want and need.

The large-scale deployment of GI will bring many new job opportunities. DEP should require high road labor standards, including paying family-sustaining wages to workers, using public sector workers and apprenticeship programs where appropriate, using union labor, and hiring local and disadvantaged residents. A portion of program funds should be set aside to support job training programs with ladders of opportunity and a jobs pipeline.⁸⁵



Porous pavers, rain barrels, rain gardens and conveyance systems at Henry Street Settlement, New York, New York. Design: WE Design Landscape Architecture (Courtesy of WE Design Landscape Architecture.)

Ensure that CBOs have the support they need to become vital partners in the new grant program

With the appropriate technical assistance, resource support, and job training, community-based organizations can play important roles in many aspects of a green infrastructure market. Successfully engaging with the program, however, can require a significant investment because, at present, few CBOs have existing expertise in many of the areas covered by the new DEP GI program. CBOs would likely have little incentive to develop this expertise without support and funding from DEP.

It is therefore critical that DEP and its third-party administrator engage with CBOs to explore the most likely roles CBOs might play and to hear first-hand what resources will be necessary to have CBOs fulfill those roles. Steps may include:

- identifying, enlisting, and supporting organizations that can help provide CBOs with the necessary technical assistance and training to manage projects or maintain GI projects long-term;

⁸⁵ See Climate Works for All, A Platform for Reducing Emissions, Protecting our Communities, and Creating Good Jobs for New Yorkers, (NYC-EJA), available at http://www.nyc-eja.org/public/publications/ClimateWorks_Report_R5_highRes.pdf.

- developing a set of standardized green infrastructure specifications that best meet the needs of communities;
- assessing the level of financial resources needed to support full CBO participation in a range of roles in the private grant program, including funding that CBOs would initially need for full-time staff, insurance, and financial administration;
- developing training to increase CBO capacity to engage in the installation and maintenance of green infrastructure on public property;
- providing financial compensation for the time invested in designing and implementing the new grant program; and
- expanding, consistent with DEP's water goals, eligibility areas to include neighborhoods served by CBOs with an active interest in GI.

Green infrastructure workforce training in Detroit

As it seeks to become “the greenest city in America,” Detroit has embraced green stormwater infrastructure.⁸⁶ The Detroit Water and Sewerage Department (DWSD), is updating the way it charges property owners for stormwater drainage so that it calculates drainage charges based on a property's impervious acreage. The Department has also launched a green infrastructure credits policy that enables property owners to reduce their drainage charges by replacing impervious areas with green stormwater infrastructure, such as bioswales or permeable pavers.

To help build green infrastructure on public and private property, the City wanted to ensure that qualified contractors were available. But decades of disinvestment have decimated Detroit's base of small- and medium-sized landscapers and contractors. To ensure that high-quality green stormwater infrastructure installations are built and that the jobs and economic opportunities created are performed and realized by Detroiters, DWSD partnered with the Detroit Economic Growth Corporation (DEGC) and secured a grant from the Erb Family Foundation to create a green infrastructure contractor training program to be offered free of charge to Detroit-based companies.

Bloomberg Associates, a philanthropic consulting firm working with the City of Detroit on a range of issues, led an iterative process to identify the green infrastructure topics to be covered in the training program, in coordination with a range of stakeholders, including The Greening of Detroit, The Nature Conservancy, Eastside Community Network, and DWSD's Green Infrastructure Program consultant, Tetra Tech. The DEGC contracted with the Detroit Training Center, a local workforce development and training organization, to conduct the curriculum.

As of the first quarter of 2017, 41 contractors and landscapers have completed the training, which includes 40 hours of instruction in green infrastructure. Contractors who have completed the training are placed on a DWSD list that is offered to property owners seeking help with installation of green stormwater infrastructure. The training program serves multiple purposes—making it easier for property owners to construct high-quality green infrastructure, ensuring that new jobs and economic opportunities benefit Detroit residents and businesses, and contributing to well-functioning installations that reduce the flow of stormwater into the City's combined sewer system. The program also demonstrates that in pursuing important stormwater reduction goals, cities can leverage green infrastructure to promote social and economic benefits in the community at large.

RECOMMENDATION 3e

Look to affordable housing as an opportunity for green infrastructure to support both DEP and OneNYC goals

Affordable multifamily housing that is income-regulated and privately owned may provide a great opportunity to install GI.⁸⁷ These properties, which are owned or controlled by both not-for-profit and for-profit entities, represent substantial amounts of impervious area, and targeting them can help DEP meet its GI goals. GI has much to offer owners of affordable housing and tenants, as well, including: improved safety, habitability, and resilience—central OneNYC priorities.⁸⁸

As discussed in Recommendation 2, capital dollars provide a large and long-term source of funds and are the ideal means for DEP to pay for GI retrofits on private land on a large scale. In some respects, affordable property owners may be more amenable than market-rate owners to signing a so-called restrictive covenant, under which they commit to DEP to maintain the GI assets for up to 20 years. Many affordable property owners plan to retain ownership of their buildings over the long term and their properties may be subject to affordable housing use restrictions. Therefore, these owners may also be less concerned about impacts that a restrictive covenant might have on resale. The rules that accompany the use of DEP capital dollars may, however, interfere with an affordable property owner's existing financing agreements and future ability to refinance. For these reasons, while the affordable sector presents a large pool of properties where DEP can use capital funds, we recommend that DEP use expense dollars in the near term to jumpstart collaboration with affordable housing providers and funders and, as discussed in Recommendation 3, work with OMB and bond counsel to develop covenant language that meets DEP's needs while also providing a realistic set of terms for private property owners.

The affordable housing sector also presents distinctive challenges, including limited cash flows and limited access to capital outside of planned recapitalization cycles. Energy efficiency and solar retrofit programs have demonstrated, however, that precisely *because* of their very limited operating margins, affordable owners can potentially be even more motivated than market-rate owners to participate in programs that can improve a building's operating budget by, for example, reducing indoor cooling costs. Moreover, a number of mission-driven organizations understand the co-benefits that GI brings to underserved communities and are often willing to put in the additional time and effort needed to bring GI improvements to affordable properties. DEP should be intentional about expanding GI in affordable housing so as not to encourage displacement—and overall should carefully assess how to implement its program in way that avoids potential unintended consequences related to gentrification.

Reaching affordable property owners will be most successful if DEP can work with affordable housing agencies and funders to coordinate GI grants to coincide with the property's financing cycle (typically every 15 years), so that owners can combine GI with other capital investments. Other program elements, which we have recommended earlier in this report, are particularly important to increasing affordable housing participation, including not requiring owners to provide matching or any

⁸⁷ Affordable housing includes unregulated privately owned property, regulated privately owned property, and publicly-owned property (e.g. New York City Housing Authority). Our discussion and recommendations are focused primarily on income-regulated, privately owned property with a regulatory agreement with a public agency to keep rents at a level affordable to households at various income levels. These properties are operated by private and non-profit partners, and are typically subsidized through a combination of federal, state and city low-cost loans, tax incentives, and/or voucher payments.

⁸⁸ See Housing New York: A 5-Borough, 10-year Plan, 55, available at http://www.nyc.gov/html/housing/assets/downloads/pdf/housing_plan.pdf. See also OneNYC at 72-80, available at <https://onenyc.cityofnewyork.us/>.

out-of-pocket expenses; not requiring that DEP obligations subordinate existing deed restrictions; and compensating owners for long-term operations and maintenance.

Partner with HPD in the near-term and use DEP capital funds to build GI on affordable housing at a large scale



DEP does not have to reinvent the wheel to access affordable housing opportunities. New York City Housing Preservation and Development (HPD) provides an ideal entry point.⁸⁹ Owners of several thousand affordable units come to HPD every year seeking funds to preserve or rehabilitate their properties. These owners and developers represent a key target group for DEP's GI program. Partnering with an agency that owners and developers are familiar with can help DEP reach its long-term stormwater management goals.



There are several ways that DEP can work with HPD to promote GI. Integrating its outreach, education, and marketing with HPD's existing efforts, DEP can get access to a substantial segment of the affordable housing sector, without having to spend time and money on parallel endeavors. DEP could also cover the costs to include an assessment of "green infrastructure potential" as part of HPD and HDC's new integrated property-needs assessment for affordable properties, when a second version is released in 2018. By transferring its capital funds directly to HPD for green infrastructure retrofits, DEP could also add green infrastructure funding to a package of capital upgrades in a property's broader refinancing package. Incorporating a streamlined contracting process that includes any DEP-required contract provisions/restrictions in new HPD contracts would also facilitate participation. Such collaboration will also serve HPD interests, as green infrastructure provides ancillary benefits (such as reduced need for indoor cooling) that can help HPD fulfill its commitment to energy and water efficiency, health improvement, and solar opportunities in buildings it supports.

How the NYC Mayor's Office helps to green affordable housing properties

Both the NYC Retrofit Accelerator and NYC Clean Heat are examples of best practices for engaging and assisting affordable housing in the adoption of cleaner systems. Between the two programs, thousands of affordable housing buildings have been able to make upgrades through a combination of direct outreach, working with owners and managers across entire portfolios of buildings, and collaborating with affordable housing agencies.

The Retrofit Accelerator is tasked with facilitating energy and water efficiency projects in at least 1,500 large buildings within 3 years, including at least 50 affordable properties. In order to reach the affordable property targets, New York City hired the private consulting firm ICF International to help implement the program. ICF has engaged with hundreds of affordable buildings through a combination of direct outreach and close collaboration with local and federal affordable housing agencies including: NYC Housing Preservation Department (HPD), NYC Housing Development Corporation (NYC HDC), NYS Housing Community Renewal (NYS HCR), and U.S. Department of Housing and Urban Development (HUD). Not only does this collaboration help the program reach a diverse array of building owners, it also helps identify those who may be able to incorporate building improvement projects into their primary debt, a critical component for virtually all subsidized affordable housing buildings. A similar approach also drove success in the NYC Clean Heat program. Two-thirds of the affordable housing buildings eligible for NYC Clean Heat converted to cleaner fuels by the end of the program, with a majority converting to the cleanest available heating fuels.

⁸⁹ DEP and HPD have begun initial discussions, but building beyond a handful of projects will require resolving a number of contracting and procurement issues. Interview with HPD staff, June 29, 2017.

Leverage state and federal programs that promote sustainable and green housing

An array of existing federal, state, and local agencies and programs already reach out to affordable housing owners to scope, finance, and install energy-related improvements for affordable properties. Wherever feasible, DEP should work with these housing agencies to incorporate green infrastructure funding into building improvement projects.

The New York State Division of Housing and Community Renewal (NYSDHCR) has systems in place to support low-to moderate-income (LMI) owners in green infrastructure implementation.⁹⁰ DEP might consider a partnership with NYSDHCR to deploy DEP funding for GI. DEP could look to coordinate with NYSDHCR's State Weatherization Assistance Program and/or develop a partnership with NYSDHCR in a model analogous to what is proposed above for HPD/HDC to help them incorporate GI into the projects that the agency is already working to refinance.

At a federal level, the U.S. Environmental Protection Agency (EPA), HUD, and U.S. Department of Transportation have developed the Partnership for Sustainable Communities to help LMI developers reduce risk from climate change and preserve affordable housing.⁹¹ This program has worked in the past to increase funding for the development of green affordable housing and help create healthy communities. Depending on future federal funding, these programs may provide an opportunity for DEP or its TPA to add federal funding to DEP grants to help install GI on affordable housing properties.

Consider marketing to Housing Development Fund Corporation co-ops, which offer opportunities for green infrastructure

Housing Development Fund Corporations (HDFC) co-ops are privately owned low-to moderate-income cooperatives. New York City is home to more than 1,200 HDFC buildings. Most HDFCs are in Manhattan on the Lower East Side and in Harlem, with the balance located in Brooklyn and the Bronx. Some of these co-ops are professionally-managed buildings, while others are self-managed. The low-hanging fruit for the private GI grant program may be the self-managed HDFCs. Those owners, particularly of four and five story buildings that are concentrated in DEP priority watersheds, will be drawn to GI benefits such as reduced localized flooding and improved aesthetics because they reside in the buildings they help manage. Therefore, they may be particularly receptive to DEP's GI grant offering when it coincides with a property's common 15-year refinancing cycle with HPD/HDC.

⁹⁰ See NYS HCR Green Building Reference Manual (2011), 19, available at <http://www.nysdchr.org/Funding/ConsolidatedFunding/GreenBldgCriteriaReferenceManual.pdf>.

⁹¹ See Partnership for Sustainable Communities: An Interagency Partnership HUD – DOT – EPA, available at <https://www.sustainablecommunities.gov/>.



RECOMMENDATION 4

DEP cannot do this alone. Integrate green stormwater infrastructure throughout all relevant city agencies, programs, and policies.

“A one-stop-shop solution provider for all City programs related to existing properties would enable more competition for City funds, better projects, and lower costs. . . . If even the application processes were the same and engineering costs or site visit costs could be amortized across different programs, the City would see a huge increase in value.”

— Respondent to DEP’s Request for InformationAlliance 2017 Climate Justice Agenda

Although DEP is the agency directly accountable for meeting New York City’s water quality standards, the entire City government has a stake in the quality of New York City’s waterways and in affordable water rates. Given the scale at which GI must be built, in addition to the collaborations suggested in recommendation 3 above, DEP must coordinate with other agencies to ensure success. Interagency cooperation is made more urgent given DEP’s Consent Order timelines, its missed milestones, and New York City’s need to reach its OneNYC sustainability, resiliency, and infrastructure goals.



(Above) 22 Caton Place, Brooklyn.
(Courtesy of Hudson Companies)

Add green infrastructure to the Cool Neighborhoods NYC Initiative

The new DEP private grant program could also be coordinated with Cool Neighborhoods NYC, the Mayor's new \$106 million program aimed at combatting extreme heat and protecting against the worst effects of rising temperatures from climate change. That program is focused particularly on heat-vulnerable neighborhoods and communities of color to help mitigate the threat to public health from the urban heat island effect. The new heat mitigation measures in this comprehensive resiliency program currently include planting trees in parks, restoring urban forests, and applying white reflective coating on building roofs. The Cool Neighborhoods NYC plan describes DEP's current green infrastructure plans and the green roof tax credit, but DEP can play a more valuable role in the program. For example, as the City targets 2.7 million square feet of private and public roofs in the heat-vulnerable areas of the South Bronx, Central Brooklyn, and Northern Manhattan, it should consider green roofs as well, as part of its NYC °CoolRoofs efforts. These green roofs, supported by DEP's private grant program, can help provide needed heat relief, while also managing stormwater.⁹²

Integrate green infrastructure into all OneNYC building initiatives

Property owners and managers, as well as the City itself, have much to gain from an organized system that streamlines and standardizes outreach, property owner data, application processes, financing, and other aspects of City-subsidized or mandated building upgrades. Better integration of GI with existing building-related initiatives can also advance key OneNYC goals, reduce program costs, and increase ease of use for property owners.

DEP can also build on lessons from the City's energy retrofit programs. In those programs, the City and State have coordinated to drive best practices including mandated energy disclosures and audits in existing buildings through Local Law 87, and proactive solar and efficiency project development organizations and financing solutions that enable their deployment, including the Building Energy Exchange, Retrofit Accelerator, and New York City Energy Efficiency Corporation.

While these energy-focused organizations play many of the same roles as those needed for water and GI, many of these organizations do not include stormwater in their mission or are not staffed to engage in stormwater-related work. This is a missed opportunity, because there is substantial overlap in energy and water building retrofit initiatives. It may be worthwhile for DEP to provide direct green infrastructure expertise to these organizations, if these organizations are not able to directly hire staff who can focus on integrating green infrastructure into their existing portfolios. Developing energy and water retrofits in tandem can result in substantial cost savings when marketing, education, and outreach, as well as some construction costs, can be shared.

⁹² See "Mayor Announces Program to Help Curb Effects of Extreme Summer Heat," press release, June 14, 2017, available at <http://www1.nyc.gov/office-of-the-mayor/news/411-17/mayor-s-announcement-program-help-curb-effects-extreme-summer-heat>; Cool Neighborhoods NYC: A Comprehensive Approach to Keep Communities Safe in Extreme Heat available at http://www1.nyc.gov/assets/orr/pdf/Cool_Neighborhoods_NYC_Report_FINAL.pdf.

Bundling green roofs with solar power



NYC Parks Five Borough Administrative Building, Randall's Island. (Courtesy of NYC Department of Parks & Recreation)

Many aspects of the rooftop solar and green roof installation processes overlap, creating opportunities for significant cost reductions in jointly-managed programs and renovations. Combined green-solar roof development also offers opportunities to increase solar output for the simple reason that green roofs lower the temperature and solar panels operate more efficiently at lower temperatures, thereby increasing their output and their return on investment. If DEP were to coordinate with the City and State's solar programs and solar installers to co-finance joint solar/green roof projects, the agency could drive increased demand for both solar and GI, and tap into an existing customer pipeline for DEP's GI program.

DEP could also benefit from combining green roofs and solar because of the potential to share customer acquisition costs, from efficiencies related to simultaneous installation, combined financing agreements, and lower overhead and project development costs, as well as from reduced maintenance costs, and lower insurance and warranty costs. Simultaneous installation of solar and green roofs provides the additional benefit of a single construction process, with less time and administrative burden for property owners and less disturbance for tenants. Additional description of the efficiencies of combining solar and GI can be found in the GI and Solar Workflow Diagram in Appendix V.

Conclusion

Managing stormwater is central to New York's future. After decades of investment, New York City waterways are cleaner than they have been in more than a century. Nonetheless, the City's old, centralized pipe-and-cement stormwater systems still cause overflows that dump billions of gallons of sewage and polluted stormwater into our waterways each year.

Much as it did more than 25 years ago with its Watershed Protection Program, the City can now re-imagine its urban stormwater management systems. New York City will always need some gray infrastructure, and can and should continue to build green infrastructure in the public right of way, but DEP and the City can set their sights higher.

New York City is already among the nation's leaders in addressing many environmental challenges of our time. To date, the City has achieved significant success in reducing greenhouse gas emissions from New York's built environment. And, as part of that effort, the City has proven that it can successfully harness the capacity of private property owners to act as agents of change. Toward that end, we urge that stormwater policy be elevated throughout the City, much as energy policy has been for the last decade. We offer these recommendations for a private property green infrastructure program that will continue New York's City leadership and stand the test of time.

APPENDIX I

Excerpts from NYC DEP's Request for Information

(Released September 19, 2016)

Management of a Green Infrastructure Private Property Incentive Program

The New York City Department of Environmental Protection ("DEP") is issuing this Request for Information ("RFI") to identify innovative program management structures to incentivize green infrastructure stormwater management retrofits on private property. With this RFI, the City seeks to identify innovative approaches to managing a program with the goal of implementing cost-effective green infrastructure on private property in New York City including commercial, industrial, and residential properties in the City's combined sewer overflow (CSO) and Municipal Separate Storm Sewer System (MS4) priority areas (see attached map for preliminary eligibility areas). Green infrastructure in this context includes installations such as rain gardens, green roofs, bioswales, porous pavers, stormwater reuse systems, or other installations that manage at least one inch of stormwater runoff from impervious surfaces within a property.

Using green infrastructure to manage runoff from impervious surfaces is a key part of DEP's plan to meet water quality obligations pursuant to the Clean Water Act and improve water quality in the City's waterways. Alongside its stormwater management function, green infrastructure has been shown to improve air quality, reduce the urban heat island effect, improve aesthetics, and provide various other benefits to cities and their citizens. While the City is investing substantially in managing stormwater on publicly owned land, a substantial portion of impervious area in the City is privately-held. Therefore, a focus on private property is an important part of any overall solution, particularly as green infrastructure is a "source control" (i.e., stormwater must be managed where it falls). As an initial target, DEP expects its private property incentive program to manage one inch of stormwater runoff from approximately 1,000 impervious acres over the next 15-20 years.

DEP's current grant program for private property owners, the Green Infrastructure Grant Program, has been managed in-house by DEP and has successfully provided 33 grants to property owners since its inception including rooftop agriculture, rain gardens, and permeable pavement installations.

By procuring a program manager, DEP would expect to substantially expand its green infrastructure incentives aimed at private property owners, who will be the program's customers. The incentives may also be marketed to the construction enterprises who will install the green infrastructure. As shown in other US cities, programs such as these will create a new "market" for green infrastructure construction. Therefore, the program management structure must be able to create marketing campaigns to attract new customers, effectively communicate the nuances of the new "market" to potential customers, ensure cost-effective projects are built through management of contractors, and be responsive to the needs and expectations of the new market as the program grows.

With this RFI, DEP seeks to identify program management solutions that will deliver the following outcomes:

- Drive scalable adoption of green infrastructure installations on various types of private property;
- Effectively market the new incentive program to property owners to ensure desired scale of stormwater management is reached;
- Efficiently solicit and manage the contractors installing the green infrastructure;
- Reduce the costs of green infrastructure through increasing market scale and improving green infrastructure installation best practices; and
- Allow and facilitate the use of cost-effective green infrastructure for stormwater management that could also have co-benefits, including installation of green infrastructure that also provides financeable energy efficiency savings or stormwater reuse savings.

Paramount to success will be the ability of the program manager to concurrently engage substantial numbers of customers while successfully managing multiple projects. Each project will involve frequent customer interactions at every step of the project phase including initiation, planning and implementation.

DEP is open to receiving responses from single entities or from entities that represent joint or multi-ventures that could provide creative solutions to deliver reliable and cost-effective program management. Respondents should be entities involved in program management, community development, consumer marketing and customer acquisition, distributed infrastructure or building upgrade development and asset management, consulting, and entities playing related roles in the environmental, water, or other related industries that have capacity to play a meaningful role in a program at this scale.

Purpose of RFI

The purpose of this RFI is to gather information about the strategies that could be employed to manage an incentive program that would potentially engage thousands of customers, ensuring satisfactory customer uptake, proper green infrastructure implementation, and inspections for these distributed infrastructure assets. Examples of existing green infrastructure program management methods exist in the U.S. and internationally and these methods may be referenced to assess their replicability in New York City.

While the specifics of DEP's new incentive program remain under development, the program's design will draw from lessons learned in other cities that are paying directly for green infrastructure assets to be built and maintained on private property in furtherance of meeting a city's water quality goals. These include examples such as Philadelphia's Greened Acre Retrofit Program, the D.C. Department of Energy & Environment RiverSmart program, and Seattle's RainWise program.

DEP is also interested in how private capital might play a role in this program including, but not limited to bridge financing or the co-financing of green infrastructure assets that provide financial returns, such as water reuse systems and urban agriculture. DEP is also looking to gather information on how to ensure maintenance of the green infrastructure assets as a condition of receiving funds.

In addition, specific outreach strategies to engage community-based organizations or encourage participation of lower-income property owners are also of interest.

Responses must include answers to the following questions:

- 1) What specific tasks would need to be implemented by a program manager to establish a green infrastructure incentive program that would effectively target a variety of property types and land uses?
 - a. What tasks would be handled by a program manager and which tasks would best be outsourced?
- 2) What program management structures could be organized that would drive down the costs to install green infrastructure over time?
- 3) How could the program prioritize potential customers and property owner segments so as to provide the most numerous projects and most square footage of land managed as well as the best opportunities for cost-effective green infrastructure installations? Please explain how the incentive program could attract property owner segments and green infrastructure implementation firms in order to ensure robust uptake of incentive funds.
- 4) What would be the estimated cost to administer the alternative program structures proposed (including the types and number of staff required), both initially and at full-scale over the next 15-20 years? This includes estimated overhead costs and related payment terms, estimated costs per square foot or per green infrastructure per type, costs for inspections as well as costs for legal services and other key services required for the program administration. Additional funding sources should be indicated as well as their potential funding levels and under what terms or to what extent these funds could play a role. Any additional federal, state or local incentives to be leveraged may be indicated as well.
- 5) What would be the estimated timeline for a program manager to begin work under the scenarios described and the expected output in the first year of operation including an estimated number of completed properties/completed square feet of impervious area, and the pipeline for the second year that would be in place by the end of Year 1? Please support your answer by describing: (i) the relevant marketing plan that would provide these estimated results; (ii) the timeline for the application process; and (iii) a comprehensive timeline from a property owner's expression of interest to the completion of the installation. The expected duration of key phases should be indicated as well, such as customer contracting, green infrastructure implementation, inspections and cash flow analysis.
- 6) What specific strategies could be implemented to reduce transaction costs and time for customers, green infrastructure design/installers, and all participants in the program?
- 7) For each program management structure you suggest, please describe plans for how the operations and maintenance of green infrastructure assets would be completed as well as an inspection/audit regime.

Additionally, Respondents are also encouraged to provide answers to the following additional questions:

- 8) What possible methods exist for leveraging private capital for this program?
- 9) What strategies could be implemented to engage local community groups and community-based organizations in order to ensure that lower-income property owners are able to participate in and benefit from the incentive program?
- 10) Are there any additional opportunities or challenges that should be brought to DEP's attention in connection with a new green infrastructure incentive program?
- 11) What possible roles exist for market intermediaries, such as community groups, for example, that can aggregate local projects for the program manager in an efficient manner?

APPENDIX II

How Philadelphia's Greened Acre Retrofit Program (GARP) Ensures Project Performance in its Private Property GI Program

The following excerpts are from the Operations and Maintenance contract that the Philadelphia Water Department uses for green infrastructure grant program participants. The agreement requires the property owner to operate and maintain the Stormwater Management Practice (SMP) for 45 years, and the obligation passes to subsequent owners. During that 45-year period, the City will have access to inspect and monitor the SMP and, in the event that the City finds that the property owner has failed to maintain the SMP, the City may enter the property and take whatever steps are necessary to correct the deficiencies and charge the costs to the property owner.

The full text of the template Operations and Maintenance Agreement is available at the Philadelphia Industrial Development Corporation website http://www.pidcphila.com/images/uploads/product/Stormwater_Grants_Manual.9.14.15.pdf.

7. Failure of Property Owner to Maintain SMP(s)

- (a) Nuisance. Property Owner agrees that failure to adequately maintain the SMP(s) may constitute a public nuisance that is a threat to public health and safety and to the environment.
- (b) City may Perform Maintenance. In addition to any rights the City may have under law or this Agreement, if the City determines that the Property Owner has failed to adequately maintain the SMP(s) as determined by the City, the City may notify the Property Owner in writing of any deficiencies. If Property Owner fails to take action to correct those deficiencies within thirty (30) business days of receipt of such notice, the City and its authorized agents and employees may enter upon the Property and take whatever steps reasonably necessary to correct deficiencies identified and charge the reasonable costs (including administrative costs) thereof to the Property Owner. Where deficiencies cause imminent threat to public health, safety or the environment, the City may take immediate steps necessary to protect public health, safety and/or the environment and charge the costs (including administrative costs) thereof to the Property Owner. When the City charges its costs to the Property Owner pursuant to this Section, such charges shall be due within thirty (30) days of the date the bill is received.
- (c) Right to Lien. In the event the Property Owner fails to reimburse the City within thirty (30) days after receipt of demand under Section 7(b), the City may place a lien on the Property for the entire amount due.

17. Remedies; Enforcement

The Property Owner understands, acknowledges and agrees as follows:

- (a) Enforcement. The City is an interested party to this Agreement and the Property Owner consents to enforcement by the City, administratively or at law or equity, of the restrictions, covenants, obligations and agreements contained herein.
- (b) Injunctions. Monetary damages would not be adequate or sufficient to compensate the City for a breach of any of the restrictions, covenants, obligations and/or agreements of this Agreement. Accordingly, in addition to any other remedies available to the City administratively, at law or equity, under this Agreement or otherwise, the City may obtain a mandatory and/or prohibitory injunction compelling the Property Owner to specifically perform and observe the restrictions, covenants, obligations and agreements contained in this Agreement or to remedy any failure on the part of the Property Owner to perform or observe any such restriction, covenant, obligation or agreement.
- (c) Exclusivity. No right or remedy conferred upon the City in this Agreement is intended to be exclusive of any other right or remedy contained in this Agreement or at law or equity. Every such right or remedy shall be cumulative and shall be in addition to each other right and remedy contained in this Agreement or now or hereafter available to the City at law, in equity, by statute or otherwise.
- (d) Right of Enforcement. This Agreement binds and benefits the Property Owner and the City, and their respective successors and assigns. Only the City has the right to enforce the terms of this Agreement and exercise rights of release, transfer, assignment or other discretionary rights of the City. Owners of lots within the Property do not have the right to enforce the terms of this Agreement against owners of other lots within the Property. This Agreement is valid and enforceable even though or if: it is not appurtenant to an interest in real property; it can be or has been assigned; it is not of a character recognized traditionally in common law; it imposes a negative burden or affirmative obligations upon the owner of the Property; the benefit does not touch nor concern real property; there is no privity of estate or contract; or the City becomes the owner in fee of the Property.
- (e) Remedies Cumulative. The description of City's remedies in this Section 17 does not preclude the City from exercising any other right or remedy that at any time be available to the City under federal, state or local laws or regulations. If the City chooses to exercise one remedy, the City may nevertheless choose to exercise one or more of the other rights or remedies available to the City at the same time or at any other time.

APPENDIX III

Options for Structuring a Buyout Clause in DEP's Contract with Property Owners

City Need: The City must have a certain degree of control over assets that it funds on private property, particularly when using capital funds or developing a larger program that it intends to use toward meeting its regulatory obligations.

Resolution: Cities can and have successfully used easements, restrictive covenants, recordation of long-term operations & maintenance agreements, and other solutions to obtain the required control over the assets they fund on private land. Many property owners would be amenable to long-term covenants so long as there is a specific way to exit the arrangement if necessary. The City should provide the opportunity for owners to exit the agreement at any time for a fair price.

Example: If a property uses DEP grant funds to build a GI asset and is required to sign a 20-year agreement for a GI asset worth \$2,000,000, the contract could include a clause that permits an exit on fair terms to both parties. For example, an exit payment could be structured as follows:

- 1) **A fixed administrative fee:** Such a fee would cover some of the cost of the application process, cancellation process, and cost to find another location for a replacement GI asset. The fee could be a fixed amount based on the estimated costs of engaging a new project.
- 2) **A stranded asset fee:** If DEP expected to receive 20 years of useful life for the GI asset, but will receive less because the property owner has chosen to remove the asset, then DEP is owed the percentage value of that asset that it will not receive and could be paid accordingly. For example, if DEP has provided \$2,000,000 in grant funds for the asset and expects the asset to last 20 years, then each year of the asset's life is "worth" $1/20^{\text{th}}$ or \$100,000 per year. The contractual formula could thus require reimbursement from the cancelling property owner of $1/20^{\text{th}}$ per year that the asset will not be in service as expected. If the property owner cancels in year 15, then he/she would owe \$500,000. If the property owner cancels in year 2, then he/she would owe \$1.8 million. To further deter participants from exiting early, full repayment could be required for exits in the initial years of the contract.

APPENDIX IV

Recommendations for improving the Applicant/Property Owner Experience in DEP's New Grant Program

- A single entity that is a trustworthy broker should be the ultimate source of information on the private property incentive program.
- A dedicated website should be created. It should contain all relevant information, contact details, and links that might be needed so that interested property owners and their agents can access information about the program or apply to it. Included on the website should be:
 - downloadable forms and online forms
 - all application materials
 - application instructions
 - legal documents / easement documents
- The DEP and its TPA should articulate clear rules for program eligibility and eligibility should be characterized in terms that are familiar to most property owners. For example, the DEP/TPA should identify sites using their ZIP codes, rather than the watershed location of a property or the property owner's water bill number.
- The TPA should put forward clear, quantitative selection criteria with minimal room for subjectivity. The TPA should provide examples of successful applications. And, if there are multiple ways or manners to submit a successful application, the TPA should provide at least one successful example of each type.
- The TPA should offer a detailed explanation of the application process, including administrative costs, timelines, contact information, and other basics. This will allow potential participants to become experts on all facets of the program on their own time and at lower cost to DEP, its program administrator, and applicants.
- Electronic signatures should be standard; "wet" signatures should not be required during the application process.

APPENDIX V

GI and Solar Workflow diagram

Develop Customer Profile & Pipeline

- Identifying properties for solar, energy efficiency (EE), and GI require many of the same steps: segmenting building and property types by building ownership; building use; age of the building; and other characteristics
- Solar or EE data collected can help to assess the opportunity for GI

Develop Qualified Leads

- Identify decision-makers for a given property and gauge initial interest
- Conduct preliminary feasibility analyses
- Build customer trust by understanding needs and values.
- Educate relevant parties on upgrade expectations, as well as future contracting and other obligations

Refine Project and Contracting with Owners

- Travel to a property, assess initial assumptions, determine whether any on-the-ground conditions will stop the project
- With sufficient information to determine costs, schedules, and obligations, make a "Go" / "No-go" decision on a project

Installation

- Common materials can be used by both energy and GI projects depending on the specific upgrades
- Shared permitting, planning, construction insurance, and owner supervisory costs
- Shared equipment expenses drives additional cost savings

Ongoing Synergies

- Increased solar electricity production through the use of a sub-solar green roof
- Reduced rooftop replacement costs by solar & green or blue roofing solutions
- Potential to use same crew for certain aspects of long-term maintenance

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FRONT COVER PHOTOS:

*(Left) Rendering of Via Verde, Bronx, NY
(Courtesy of Jonathan Rose Companies)*

*(Right) Kelly Street Green, urban garden,
Bronx NY (Courtesy of NYC Water, NYC
Department of Environmental Protection)*