FINANCIAL INNOVATIONS FOR GREEN INFRASTRUCTURE

A Project Finance Perspective on Distributed Stormwater Projects

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INTRODUCTION

AS CITIES AND COUNTIES ACROSS THE country expand efforts to address the challenges stormwater pose to water quality and public health, there is an opportunity to rethink how we design, procure, and finance stormwater infrastructure. Public agencies can dramatically reduce the cost and risk of implementing projects to meet stormwater regulations by partnering with private property owners and developers to collaboratively design, build, finance, and maintain green infrastructure projects. These programs can combine emerging innovations in distributed infrastructure with alternative financing mechanisms to break new ground in pay-for-performance approaches that ensure the public only pays for projects that deliver the promised results over the life of the asset. This paper outlines a range of innovative approaches to green infrastructure procurement and financing and identifies potential challenges and solutions to private financing informed by the author's experience in project finance and public-private partnerships.

THE OPPORTUNITY FOR INNOVATION

In recent years, cities and counties across the U.S. have begun to address the challenge that stormwater poses to water quality, community health, and public budgets. Stormwater is the leading cause of water pollution in the country, and the Environmental Protection Agency has been phasing in stormwater regulations over the past two decades.[1] While many public agencies have established stormwater utilities and implemented stormwater fees, many are just now starting to implement extensive stormwater programs and realizing the full cost of controlling polluted runoff that has resulted from covering vast landscapes with impervious surfaces such as roads and parking lots.

These regulatory mandates present a unique opportunity to embrace innovations that reshape our built environments and fundamentally alter how public agencies design, finance, and deliver infrastructure. The first innovation is in the way we think about infrastructure. Historically, most public agencies have designed centralized, heavily engineered infrastructure systems with a comparatively static view of life-cycle performance and cost. In the context of stormwater this has meant building large tunnels and retention basins to capture large quantities of runoff which, depending on the design and vintage of the infrastructure, may be pumped to a treatment plant when the storm has subsided. Leading cities such as Philadelphia and Washington, D.C. have experimented with decentralized green infrastructure (GI) approaches that instead place rain gardens, green roofs, and other permeable surfaces throughout a developed landscape to capture and infiltrate stormwater at or near where it falls rather than channeling it into a centralized collection system. The early adopters have found that green infrastructure can provide substantial life-cycle cost savings compared to traditional "gray" infrastructure in addition to providing community benefits such as improved air quality, lower summer temperatures, and a more aesthetically pleasing urban environment.

Implementing a green infrastructure program under traditional models leaves significant value on the table

The second innovation - in how public agencies deliver and finance green infrastructure – is the primary focus of this paper. While it is undoubtedly possible to implement a green infrastructure program on public property financed with tax-exempt bonds and delivered through traditional design-bid-build contracts, the decentralized nature of GI projects make them uniquely suited to new forms of financing and delivery that provide game-changing reductions in cost and risk for the public. Implementing a green infrastructure program under traditional models leaves significant value on the table. In addition, much of a city's impervious area is found on private property, meaning that a public-only approach cannot cost-effectively solve the entirety of a city's stormwater challenge.[2] This paper outlines a range of innovative strategies for deploying green

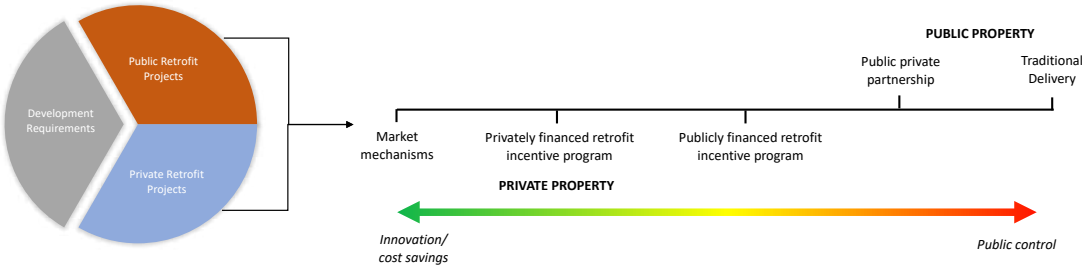
infrastructure on private property in a manner that reduces cost and risk while still achieving public runoff reduction goals.

These financing and delivery innovations have the potential to benefit communities in three key ways. First, implementing green infrastructure on private property is inherently less costly than on public property. Retrofitting streets and other public spaces often involves disruption to traffic, impacts to existing water, wastewater, gas, and electric assets, high labor and overhead costs, and costs of long-term maintenance. Philadelphia has found it can source GI projects on private property for $100,000 per acre or less compared to $250,000-$300,000 per acre in the public right of way.[3] Second, a properly designed GI program can shift Design, Build, Finance, and Maintain (DBFM) risks onto private parties. Rather than directly contracting for projects with contractors and retaining responsibility for change orders and long-term maintenance, public agencies can challenge the private sector to assume these risks and create greater ongoing competition to minimize costs. A wide range of engineers, contractors, financiers, and technology providers will respond to this challenge if the incentives are properly structured. Rather than contracting with a single partner, this approach will develop an ecosystem of firms dedicated to delivering GI projects, bringing down costs over time under privately-financed retrofit incentive programs and reverse auction approaches. Finally, by providing incentives, a public agency can more directly engage property owners and reduce opposition to stormwater fees by giving them a wider range of options and more control over outcomes that meet the public mandate for stormwater remediation.

In sum, the stormwater sector is primed to lead a fundamental shift in infrastructure procurement and financing in the U.S. Public agencies can shift a significant portion of regulatory compliance risk to private parties at a lower cost, freeing up revenue to implement more projects or lower stormwater rates. There are undoubtedly challenges that need to be resolved, and the following sections outline both the available strategies and the financing considerations that will make or break this opportunity.

GREEN INFRASTRUCTURE DELIVERY & FINANCING OPTIONS

There are three primary approaches to delivering green infrastructure: Stormwater retention requirements for new development or redevelopment projects, retrofits to public property, and retrofits to private property. This paper focuses on procurement and financing of retrofit projects, primarily on private property. While not an exhaustive list, there are five broad categories available to public agencies for procuring GI retrofit projects. These approaches, explained in detail below, are not mutually exclusive and can be used in combination to improve water quality throughout a developed watershed.



Traditional Delivery

In traditional project delivery, a public agency defines a set of public projects and selects a private company best qualified to complete the work at the lowest cost. The most common procurement method is design-bid-build under which the public agency first hires a firm to design and engineer a project. Contractors then bid on delivering the completed design under a separate contract. In recent decades, design-build procurements have become more common under which an integrated private sector team is selected to design and build the project under a single contract. This allows the private sector team to better integrate the two phases of project delivery and limit the risk of cost overruns due to gaps between the prime contract and multiple sub-contracts. Under traditional delivery, the public agency typically finances projects with tax exempt bonds and retains the risk for maintaining the assets over time.

While most infrastructure in the U.S. – including gray and green stormwater infrastructure - has been delivered under design-bid-build or design-build approaches, there are reasons that communities have increasingly looked toward alternatives that allow them to better manage cost overruns and long-term operations and maintenance. A broad body of peer-reviewed literature has found significant cost and schedule overruns for projects delivered under traditional procurement approaches. For more complex projects, cost overruns of 20-30% are typical with significantly higher overages possible.[4]

Public Private Partnership (P3)

Under P3 delivery, a public agency defines a set of publicly-owned projects and solicits responses from integrated teams to design, build, finance, operate, and maintain the assets. P3 contracts place most responsibility for cost overruns and long-term (typically 30-40 years) operations and maintenance on the private partner and their sub-contractors. An integrated contract encourages upfront life-cycle decision-making and contractually defines long-term maintenance responsibilities. If the private partner fails to meet the contract terms, there are typically escalating penalties ranging from liquidated damages to cancellation of the contract and loss of any equity invested.

There are several examples of P3 implementation for stormwater programs most notably in Prince George's County, Maryland. The County, which is required to retrofit 15,000 acres of impervious surfaces by 2025 according to its Municipal Separate Storm Sewer System (MS4) permit, entered into a P3 contract with a third party in 2015 to retrofit 2,000 acres with an option for an additional 2,000 acres if the approach demonstrates value. Recently, the City of Chester, Pennsylvania, also entered into a $50 MM P3 contract for delivery, financing, and maintenance of green infrastructure projects throughout the community.

While P3s can reduce cost and risk for public agencies, integrating private property owners into a stormwater program provide even greater potential for cost reduction and performance improvement. The following sections outline three approaches to delivering stormwater retrofits on private property.

Publicly-financed retrofit incentive program

Under publicly-financed green infrastructure retrofit programs, public agencies solicit projects from private property owners and directly pay the capital costs of project implementation out of public funds. Depending on the size of the program and the stormwater utility, these projects can be financed using tax exempt debt or paid out of stormwater utility revenues. Typically, the agency reimburses private parties for successfully delivered projects up to a certain cost per acre threshold. In most cases, the property owner is then responsible for ongoing maintenance according to predetermined performance metrics. The public agency could retain responsibility for maintenance, although there would need to be an access agreement for public workers to access the private property and perform maintenance in that case.

Philadelphia has implemented the most extensive private property retrofit programs to date, including the Stormwater Management Incentive Program (SMIP) in 2012 targeted at individual property owners and the Greened Acre Retrofit Program (GARP) in 2014 targeted at third parties that aggregate and deliver multiple GI projects under a single agreement. While SMIP was successful and achieved cost savings relative to projects built in the public right of way, participation was limited in part due in part to the involvement required by property owners and the limits the program placed on bundling projects.[5] GARP requires a minimum project size of 10 acres and creates a competitive subsidy program by implementing a per acre cost ceiling. The city pays the capital cost of successfully completed projects and, upon project completion, property owners receive a discount on their stormwater bill of up to 80% which provides a financial incentive to participate and a funding stream for maintenance. New York City recently solicited bids for GI projects under a similar program.

Privately-Financed Retrofit Incentive Program

The key difference in a privately-financed retrofit incentive program is that the public agency would not pay for the upfront capital cost of the project upon completion but rather over time in the form of stormwater bill credits, availability payments to the private property owner or financier, or a combination of the two.[6] The simplest form of privately-financed incentive program is a stormwater bill credit to property owners that implement on-site retention projects. A property owner could personally finance and undertake a project in order to reduce their stormwater bill. Project developers and financiers could also work with one or more property owners to finance, deliver, and maintain stormwater projects in exchange for an agreed-upon series of payments based on the reduction in a property owner's stormwater bill. In cities with higher stormwater bill credits such as Philadelphia, the economics may be feasible if per acre capital costs are low enough. At $40,000 per acre, the internal rate of return is 7.41% which is more than sufficient to attract debt and equity.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Escalation	1	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.3	1.34	1.38	1.43	1.47	1.51	1.56	1.6	1.65	1.7	1.75	1.81
Revenue	0	3,931	4,049	4,170	4,295	4,424	4,557	4,693	4,834	4,979	5,129	5,282	5,441	5,604	5,772	5,945	6,124	6,308	6,497	6,692	6,892
Operating expenses	0	824	849	874	900	927	955	984	1,013	1,044	1,075	1,107	1,141	1,175	1,210	1,246	1,284	1,322	1,362	1,403	1,445
Op income	0	3,107	3,200	3,296	3,395	3,497	3,601	3,709	3,821	3,935	4,053	4,175	4,300	4,429	4,562	4,699	4,840	4,985	5,135	5,289	5,447
Financing cash flows	-40,000	3,107	3,200	3,296	3,395	3,497	3,601	3,709	3,821	3,935	4,053	4,175	4,300	4,429	4,562	4,699	4,840	4,985	5,135	5,289	5,447
IRR	**7.41%**																				

In practice, stormwater credits often do not provide sufficient cost savings to justify the upfront and ongoing maintenance costs of a green infrastructure project. For this reason, a public agency may provide subsidies beyond the value of the stormwater credit particularly for high value projects that achieve certain public benefits. The Philadelphia SMIP and GARP examples follow this model, whereby the utility subsidizes the upfront capital costs and then provides an ongoing stormwater fee discount so long as the assets are maintained. These models make financial sense for a utility as long as the present value of bill credits and subsidies is less than the cost to the utility of delivering and maintaining public projects that would deliver the same water quality benefits.

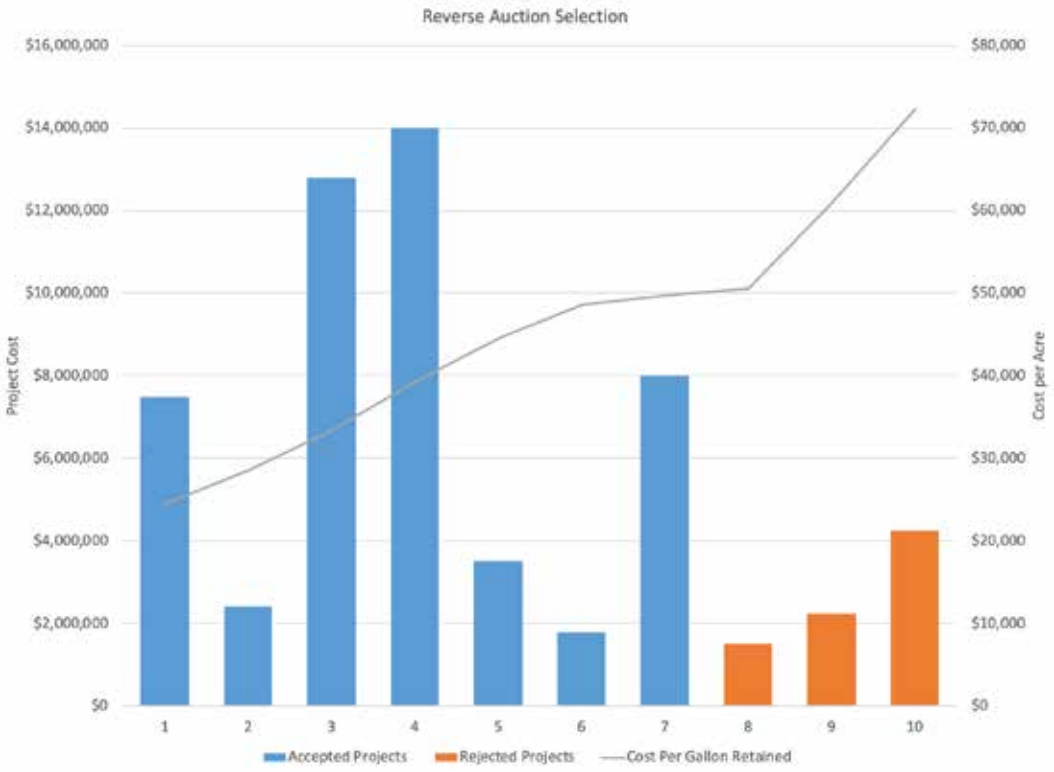
This project financing approach effectively combines the best of the publicly-financed retrofit program with the risk transfer advantages of P3 delivery

The benefit of a privately-financed retrofit program is that it shifts additional risk to the private sector by placing responsibility for the full project lifecycle – design, build, finance, and maintain - on private parties. The public agency can set penalties or stop project repayment (inclusive of capital cost repayment) if the project does not deliver the contractually-defined reductions in runoff. Depending on how ratings agencies view the payment structure, it can also reduce the amount of debt on the public balance sheet and free up financing capacity for other projects. This is the approach that most closely resembles a project financing and it effectively combines the best of the

publicly-financed retrofit program with the risk transfer advantages of P3 delivery. However, long-term project financing of GI projects on private property also introduce some complexity. While in theory a public agency may not need to be involved in incentivizing projects beyond providing a stormwater bill credit, there are a number of risks and financing issues that may limit the development of a privately financed retrofit program absent additional public support. As discussed in detail below, a public agency may offer certain support to finance providers to encourage long-term investment in GI projects.

Market Mechanisms

There are two primary market mechanisms for incentivizing green infrastructure on private



property that cities have implemented on a limited scale to date: Stormwater credit trading and reverse auctions. A stormwater credit trading program functions based on local regulations that mandate that new or re-development projects manage a threshold amount of stormwater onsite as a condition of permit approval. These programs can provide an option to comply by buying "retention credits" from offsite stormwater retention projects and thereby create a marketplace where credits can be sold to parties with compliance obligations. Credits are generated when GI projects are implemented either on properties that do not have to comply with stormwater regulations or when projects exceed the compliance requirements. This incentivizes the parties who can limit runoff most cost effectively to undertake projects and capture the credit value from parties with higher retrofit costs.

The most active program of this type is the Stormwater Retention Credit Trading Program implemented by the Washington, DC, Department of Energy & Environment (DOEE). Individual property owners or aggregators can generate Stormwater Retention Credits (SRCs) and sell them to third parties, or to DOEE directly. DOEE provides a range of resources to encourage participation including a price lock program that provides project sponsors greater revenue certainty. Developers and contractors can satisfy up to half of their stormwater compliance obligations by purchasing SRCs. DOEE's credit database shows steadily increasing volume of SRC sales each year between 2014 and 2018 with stable prices around $2 per credit, substantially below the $3.61 in-lieu fee that regulated entities would otherwise have to pay to DOEE to satisfy off-site retention obligations, suggesting that the program delivers cost savings.

Other types of environmental credit markets could also incentivize green infrastructure investments from the sale of credits. The nutrient trading system in the Chesapeake Bay Watershed is one such example and third parties are currently implementing green infrastructure projects to reduce nutrient pollution from stormwater runoff. Because the credit value is typically received in full upon project completion, the private financing is typically short-term.

A reverse auction is an innovative way to source projects rather than a different contract type and could be used to solicit publicly- or privately-financed projects on private property. Under a reverse auction, a public agency issues a solicitation for private GI projects and selects the lowest cost projects. Lowest cost could either be defined based on capital cost (i.e. cost per acre) or a life-cycle cost metric (i.e. cost per gallon of stormwater retained per year). The latter would be inclusive of all costs to the design, build, finance, and maintain the retention projects over a given time period (likely 10-20 years). Depending on how the projects are to be financed, the public agency could provide a credit to participating property owners' stormwater bills, directly pay the upfront and ongoing maintenance costs of projects, or provide an availability payment. The public agency could include non-price factors in its selection criteria to prioritize projects that are located in areas with the greatest potential to reduce flooding, improve water quality, or increase infiltration and groundwater recharge.

Reverse auctions have been used in other parts of the economy including for procurement of renewable energy. They have been used on a limited basis for stormwater projects. The first was implemented in Cincinnati, Ohio, in 2007 under which homeowners bid on the compensation they would require in order to have retention measures such as rain gardens and rain barrels installed on their property. This is different from the competitive project bidding process outline above. Philadelphia's Greened Acre Retrofit Program included a competitive bidding mechanism although it set a per acre price ceiling rather than selecting projects on price in ascending fashion.

FINANCING IMPLICATIONS OF PRIVATE PROPERTY PROGRAMS

While expanding green infrastructure programs to private property has significant potential to reduce cost and risk for public agencies, there are a number of associated risks and considerations particularly where projects involve long-term private financing. Public agencies should be careful to design programs in ways that minimize these risks if they want to encourage private sector involvement. Below we discuss several key considerations and risks that will impact the success of private property GI programs and what public agencies can do to provide greater certainty for potential participants.

Restrictive Covenant

Any projects developed on private property will require some form of easement or restrictive covenant to limit use of the impacted areas until the investment – whether made by the public agency or a private financier – is paid in full. The restriction on the project area would need to survive any change in property ownership. Agreements can include a property-owner buyout option in case the property owner decides to remove the GI installation although private finance providers may require early repayment restrictions or penalties in this case. There is an inherent tension between the interests of the city/finance provider and the property owner here. The former would prefer a stronger and longer-term easement/covenant but excessive limitations on property use may limit participation in a retrofit program. New York City's Declaration of Restrictive Covenant - required for participation in the city's Private Property Retrofit Incentive Program – involves a 20 year term.[7] Philadelphia requires recipients of GARP funding to sign an Operations & Maintenance Agreement with a 45 year term.[8]

Any public agency directly paying the capital costs of projects will need to develop a standard covenant agreement for participants and carefully weigh protection of their investment against any impacts on program participation. In the case of private financing, a public agency could reduce transaction costs and encourage participation by providing standardized documentation in collaboration with private developers/financiers although financiers and property owners may still decide to develop their own documentation.

Change of Law Risk

Change of law risk is primarily a concern for privately-financed projects that rely on stormwater bill credits as a form of repayment. In this scenario, a developer finances and delivers a stormwater retention project to a property owner in exchange for a portion of the stormwater fee savings. If the stormwater fee or bill credit is later eliminated or significantly reduced, the revenue stream for repayment of the project will be affected. The private sector

has no ability to control this risk and would need to build in a significant premium to the cost of financing in order to account for this risk over a long-term contract.

If a public agency wants to attract private capital to GI projects with stormwater credits as a primary repayment source, public agencies will need to address this change of law risk. Guaranteeing payments to finance providers in the case of a material change of law that impacts project repayment would be one way to encourage participation and reduce risk premiums.

Revenue Collection

As with any financing, a key challenge for private stormwater financing is the credit quality of the recipient and the associated repayment risk. This is less of a risk where payments are being made directly by a public agency to the private finance provider but where a property owner is directly making payments to a third party finance provider based on stormwater bill credits, the credit quality of the property owner is key. While larger, well-capitalized property owners may present little credit risk, the ability to scale a retrofit program to a more diverse range of properties will likely require credit support.

There are a number of ways to reduce this risk for finance providers. In most cases, the economics of GI projects will require payments from the public agency beyond ongoing stormwater bill reductions. In this case, the payments from the city can be made directly to the finance provider for repayment of the project capital and the stormwater credit can be allocated to pay for ongoing maintenance expenses and incentives to the property owner for participation. In cases where stormwater credits make up all or most of the repayment stream, a public agency could reduce repayment risk by serving as a centralized revenue collection point. Especially where property owners continue to pay a portion of their original stormwater bill to the public agency and a portion to a project developer/financier, the public agency could collect revenue and distribute the proceeds to the third party. This way, the public agency could use standard remedies for non-payment such as shutting off water service or putting a tax lien on the property. There may be legal implications of comingling public and private revenues in this manner and there is a need for further diligence on this point.

Repayment Priority

Finally, one of the key challenges with retrofit projects on private property is the priority of repayment in the event of default. Financiers of green infrastructure retrofits – whether public or private – will want a senior priority which will be in tension with the interests of other debt providers such as mortgage holders. In the case of publicly-financed projects, the public agency will define a priority of repayment in the agreements required for

program participation. New York City's publicly-financed retrofit programs makes any future lien subordinate to the city's claim but leaves existing mortgages as the first priority. For privately-financed projects, a key question will be how finance-providers can gain enough comfort with the seniority of their obligation without raising undue objections from other interested parties.

One comparison point is PACE (Property Assessed Clean Energy) financing in which third party lenders provide financing to make energy efficiency improvements in residential and commercial buildings. There have been over $4 billion in PACE loans in the U.S. to date, but despite the success there have been challenges that may be instructive for private GI projects. PACE financing is repaid through a property tax assessment which makes it the highest repayment priority and presents a challenge for refinancing a mortgage or selling a property. The third party lender for PACE – or in this case GI retrofits – can object to a property transaction if their concerns are not properly addressed. More immediately, existing lenders are likely to object to any financing instrument that has priority over their outstanding obligation.

Public agencies will need to decide what type of support they would like to provide if they are going to promote privately-financed GI programs. A PACE-style, property tax-based payment mechanism for private GI financing is unlikely, but enabling property tax assessments in the case of non-payment would significantly enhance credit quality. This may come with the type of challenges that have limited the PACE financing market, however. Better yet, direct repayment of capital from the stormwater utility or other public agency with stormwater fees as the revenue source would provide the greatest security to finance providers and ensure the highest likelihood of program success. This would allow the public agency to achieve its stormwater goals more cost effectively while retaining the set of remedies available to government agencies in the case of default.

CONCLUSION

Emerging innovations in stormwater design and infrastructure procurement financing present a unique opportunity to dramatically improve the cost, risk, and performance of complying with stormwater regulations. Among the options available to public agencies, privately-financed retrofit programs provide the greatest ability to shift risk away from the public and to move toward a true pay-for-performance model that rewards successful runoff reductions over the useful life of an asset. As outlined above, there are a number of challenges and considerations that come with private financing, but public agencies can design programs to minimize these risks and ensure widespread participation. Following these guidelines, cities and counties will have a robust group of finance providers, project developers, engineers, and contractors prepared to help meet public stormwater goals and chart a new course in public infrastructure.

ENDNOTES

1 The EPA began implementing regulations for MS4 in the 1990s. Larger cities were first required to develop programs to manage runoff. Smaller cities were more recently required to do the same beginning, and there are now 7,500 communities with MS4 permits

2 For example, 55% of Philadelphia's impervious surfaces are privately owned.

3 Valderrama, Alisa and Davis, Paul. Wanted: Green Acres, How Philadelphia's Greened Acre Retrofit Program is Catalyzing Low-Cost Green Infrastructure Retrofits on Private Property. NRDC Issue Brief. January 2015.

4 For a more detailed discussion see the annotated bibliography in the August 2018 report

5 Valderrama, Alisa and Davis, Paul. Wanted: Green Acres, How Philadelphia's Greened Acre Retrofit Program is Catalyzing Low-Cost Green Infrastructure Retrofits on Private Property. NRDC Issue Brief. January 2015.

6 Public financed projects may require short-term private financing during the construction period but the focus here is on longer-term private financing.
Public-Private Partnerships in California.

7 New York City Declaration of Restrictive Covenant.

8 Valderrama, Alisa and Davis, Paul. Wanted: Green Acres, How Philadelphia's Greened Acre Retrofit Program is Catalyzing Low-Cost Green Infrastructure Retrofits on Private Property. NRDC Issue Brief. January 2015.

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