Achieving Better Outcomes in Local Government Stormwater Programs through Pay for Performance

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Contents

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Abbreviations and Acronyms

CBP3	Community-Based Public-Private Partnership
CSO	Combined Sewer Overflow
D.C. DDOE	D.C. Department of Energy and Environment
EIB	Environmental Impact Bond
EPA	Environmental Protection Agency
ILF Fund	Stormwater In-Lieu Fee Special Purpose Revenue Fund
MS4	Municipal Separate Storm Sewer System
O&M	Operations and Maintenance
P3	Public-Private Partnership
RFA	Request for Assistance
RFP	Request for Proposals
SRC	Stormwater Retention Credit
TMDL	Total Maximum Daily Load
WPRP	Watershed Protection and Restoration Program

Executive Summary

Local governments are challenged with addressing stormwater pollution to meet water quality standards set forth by Total Maximum Daily Loads (TMDLs). Procurement and financial instruments used in traditional stormwater programs typically pay contractors based on delivery of a set of actions or volume of services (Pay for Success Learning Hub, no date). This oftentimes requires significant public staff time to design and administer projects, and places liability for performance risk and cost overruns on the local government. Additionally, green infrastructure has emerged as an attractive alternative to gray infrastructure solutions, however, its effectiveness is largely unproven. This combination of factors has piqued the interest of local governments around the country in cost-effective solutions that streamline agency staff time, and shift performance risk from the local government to the private sector.

Four programs in the Chesapeake Bay region were analyzed in order to identify how alternative delivery models that incorporate pay for performance[1] are being utilized in local government stormwater programs, and whether those approaches are likely to deliver better outcomes than traditional approaches. The analysis was carried out via a literature review and series of interviews with staff from each program and professionals with relevant expertise in this field of work. The structure, roles between the public and private sector partners, and degree to which pay for performance is applied varies across each program.

The lessons learned from this analysis provide a strong foundation to build upon and inform adoption of pay for performance in local government stormwater programs. However, each program analyzed is in its early phases of implementation and this analysis does not address the cost-efficiency, in terms of environmental benefit per dollar spent, of each approach in satisfying TMDL requirements. Nonetheless, this analysis highlights a broad range of program examples, outlines the key components and benefits of each program and pay for performance, and highlights a set of enabling conditions necessary to establish an environment conducive to pay for performance. Specifically, the following five enabling conditions were identified.

[1] Pay for performance is an approach to procurement and finance that bases payment on the delivery of measurable environmental outcomes.

- **Alternative compliance options** allow the local government to focus on project outcomes and hold private sector partners responsible for cost-efficiently designing and constructing green infrastructure installations.
- **Dedicated revenue streams** sustain private sector interest to invest in stormwater programs that utilize pay for performance. This is particularly important because the private sector is responsible for some or all upfront project implementation costs.
- **Metrics** must provide an accurate proxy for environmental performance in order to maintain confidence in the program, while ensuring **evaluation** costs do not outweigh the efficiencies gained by pay for performance.
- **Flexibility in finance system** allows local governments to encourage innovation and fund projects that demonstrate measurable environmental benefit rather than incentivize spending public funds within a defined period of time.
- **Leaders and champions** are essential in creating and aligning stakeholders with the vision for alternative delivery models that incorporate pay for performance because it is different than traditional approaches to stormwater management.

The findings and conclusions from this analysis are informative to local governments interested in designing alternative delivery models that incorporate pay for performance in stormwater programs. In particular, this analysis signals an interest from local governments to create accountability for public funds via alternative delivery models that utilize pay for performance. Continuing this analysis, after large volumes of green infrastructure have been installed, to determine the cost-efficiency and effectiveness of each program would provide valuable insights into the actual performance of each alternative delivery model. Finally, continuing this analysis would help local governments identify the type of alternative delivery model with most potential to achieve better outcomes considering the program's unique context.

The Basics of Pay for Performance

Pay for performance links payment to delivery of specified and measurable environmental outcomes. In the stormwater field, environmental outcomes are generally described as pollutant load reductions or water retention volume. Pay for performance can be delivered via outcomes-based finance instruments or procurement vehicles. By emphasizing the delivery of outcomes, pay for performance aligns the focus of local governments, service providers and investors on the successful delivery of cost-effective stormwater solutions to achieve water quality standards.

Pay for performance differs from traditional procurement and finance approaches that pay for the delivery of a set of actions or volume of services delivered without a meaningful portion of payment being linked to outcomes (Pay for Success Learning Hub, no date). Traditional approaches in the stormwater field describe outcomes as completion of an action, such as constructing a water treatment plant, opposed to outcomes related to environmental performance that affect long-term change (Pay for Success Learning Hub, no date). An example of an outcome in pay for performance is improved water quality resulting from installation of green infrastructure. An example of an action or delivery of a service is building a series of gray infrastructure tunnels. A disadvantage of traditional procurement methods is it focuses on least-cost projects and deemphasizes effectiveness. Therefore, project construction and maintenance are often done poorly because there is no incentive to deliver jobs efficiently or deliver environmental outcomes (Nees, 2017).

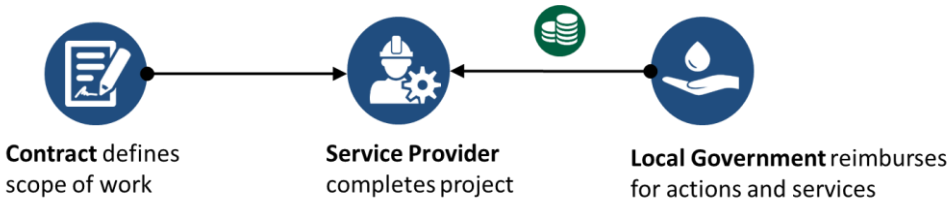

Figure 1: Simplified structure of a traditional procurement approach

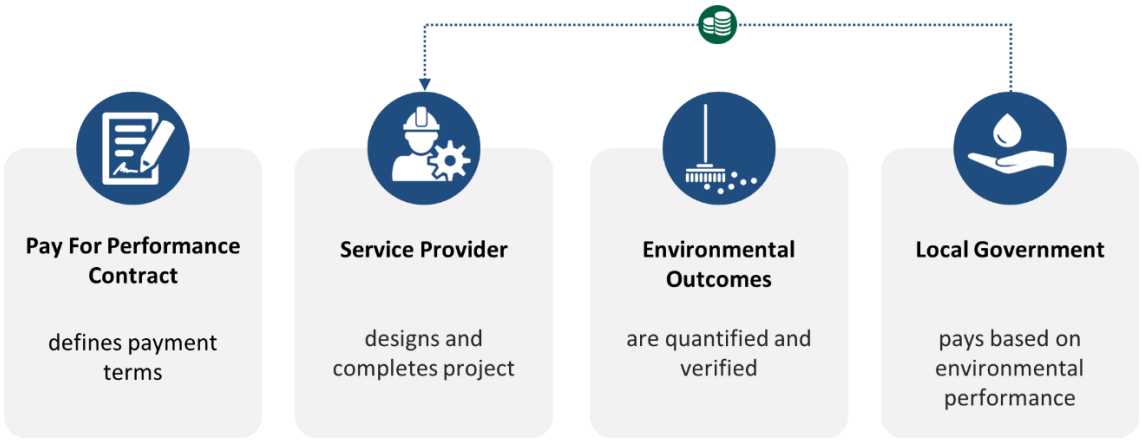

Figure 2: Simplified structure of a basic pay for performance procurement approach

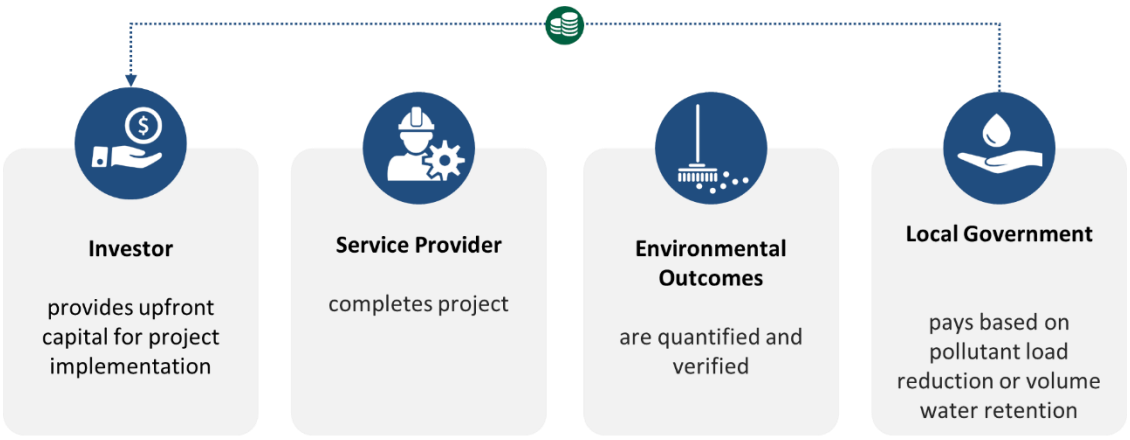

Figure 3: Simplified structure of a basic pay for success finance structure and investment deal

Pay for performance was initially piloted in the social services sector and has also been implemented in the health sector. For example, in the social sector pay for performance has been used as a contracting vehicle to procure services related to reducing recidivism. The Rhode Island Department of Administration/Division of Purchase solicited bids recently for a contractor to design and develop a program focused on improving employment and reducing recidivism outcomes for residents returning from prison or jail (State of Rhode Island, 2016). The State will provide some funding upfront to finance initial ramp-up costs, but the majority of payment is bound to performance related to measurable outcomes. A recent bid by the South Carolina Department of Health and Human Services provides another example of pay for performance, but in the health sector. In this bid, the agency sought support from private organizations to design a new incentive payment program for managed care organizations that

would structure payment around the improvement of health and social outcomes for beneficiaries (South Carolina Department of Health and Human Services, 2017).

Pay for Performance in Stormwater Management Programs

Pay for performance has been gaining traction as a procurement, contracting and finance approach in the environmental sector. It is particularly viable in the stormwater management field due to local governments' need to leverage public staff agency time and utilize cost-effective measures to mitigate stormwater pollution. Pay for performance is also viable in the stormwater field in part because of the recent emphasis from government, particularly at the federal level, to use green infrastructure solutions rather than gray infrastructure to mitigate stormwater pollution.

In the Chesapeake Bay Region, the United States Environmental Protection Agency Region 3 established an unprecedented schedule that requires local governments to restore the health of the Bay by 2025 (U.S. EPA Region 3 Water Protection Division, 2015). Many jurisdictions in the region were therefore required to set wasteload reduction targets and develop Watershed Implementation Plans to define a path toward meeting the goal of restoring the Bay by 2025. Since these water quality standards are stringent, many local governments were left looking for procurement structures that target limited stormwater funding towards projects that achieve the greatest benefits, and for partnership agreements that streamline the efforts to mitigate stormwater pollution and therefore, reduce the required public staff time.

Green infrastructure installations have emerged as an effective method for curbing stormwater pollution and mitigating flood risk, however, it is still a nascent approach that has not been widely implemented. The effectiveness and potential of using green infrastructure can vary from place to place because of geographical characteristics. In this regard, pay for performance offers a unique opportunity to pilot test green infrastructure and determine whether it can be expected to achieve greater environmental benefit more cost-efficiently than traditional gray infrastructure. Since payment is linked to performance, the risk of publicly financing projects that do not deliver intended results is mitigated, and the local government is able to make an

informed decision on whether to go forward with additional green infrastructure projects (Letsinger, 2017).

Potential Benefits of Using Pay for Performance

Pay for performance offers a wide variety of potential benefits to local governments that seek to achieve water quality standards through stormwater management.

Transfers Some Performance Risk from Public to Private Sector. Since funds are only granted to the contractor or investor based on performance related to measurable environmental outcomes, the local government's risk of project delivery is mitigated by the private sector. In traditional procurement approaches, the public entity pays based on the delivery of a defined scope of work, regardless of how well the project achieves or contributes to a long-term performance outcome. Considering the large scope of stormwater pollution problems, particularly in the Chesapeake Bay region, it is essential that public funds are directed towards projects with the greatest impact.

Allows for Parallel Implementation (Michelsen, 2017). This is of particular importance to local governments regulated by the Chesapeake Bay TMDL who are challenged by ambitious restoration schedules. Pay for performance allows additional partners to get engaged with minimal effort from public staff and therefore, streamlines the local government's efforts and allows them to concurrently implement stormwater projects.

Creates Efficiencies and Reduces Costs. Implementing pay for performance contracts at large-scale drives down the costs of local governments overseeing stormwater contracts. In particular, pay for performance can drive down per project transaction costs, including administrative, legal and procurement costs that can normally entail 10 – 40 percent of total project costs (NatLab, 2013).

Promotes Reporting and Verification (U.S. EPA Region 3 Water Protection Division, 2015). Reporting and verification are essential in pay for performance contracts as they serve as the basis for payment to private sector partners. Focusing on reporting and verification holds contractors accountable to performance outcomes rather than delivery of actions or services.

One notable downside to reporting and verification is that it can be costly. If the metric by which to report and verify does not strongly and accurately correlate on-the-ground actions to environmental benefit, the effectiveness of the program and pay for performance is diminished.

Creates Additional Opportunities for Innovative Partnership Agreements with the Private Sector. Public-private partnerships and have traditionally been used for large transportation and infrastructure projects. Community-based public-private partnerships (CBP3s) – a partnership between a local government and a private entity that provides flexibility, implements technological advances, addresses socioeconomic goals, and instills long-term financing structures (U.S. EPA Region 3 Water Protection Division, 2015) – have particular relevancy to stormwater programs implementing green infrastructure projects and using pay for performance contracting approaches.

Leverages the Creativity of the Private Sector. Pay for performance and other market-based environmental programs may leverage market forces to create better environmental outcomes more cost-efficiently. In this regard, pay for performance leverages the creativity and agility of the private sector to benefit local government stormwater programs.

Incentivizes Delivery of Long-Term Operations and Maintenance. Traditional procurement approaches often enable contractors to neglect long-term operations and maintenance issues because of insufficient liability provisions. Pay for performance creates the framework to hold contractors liable for long-term operations and maintenance and therefore, increases the local government's return on investment over time.

Streamlines Procurement and Contracting. By focusing on desired performance outcomes and providing service providers with more influence on the design of projects, local government staff is reduced compared to traditional procurement approaches in which the local government designs a project and then puts it out to bid for a contractor to build.

Supports Adaptive Management and Learning. Adaptive management practices can improve the environmental outcomes and efficiency of local government programs using pay for

performance by creating a platform to ensure advances in technology and science, and learning from previous projects are incorporated into ongoing program operations.

Leverages Private Capital and Private Property Owners as a Stormwater Solution. Pay for performance can be designed to create incentives for private property owners to implement green infrastructure projects, which is critical given that publicly owned properties alone often are not sufficient to achieve stormwater goals. Further, since payment is granted upon meeting performance expectations, private capital is needed to implement projects, which relieves public debt.

Program Structures that Facilitate Pay for Performance

In a traditional stormwater program, the local government oversees and controls each project phase, from design, build, finance, and operations and maintenance (O&M) (U.S. EPA Region 3 Water Protection Division, 2015). The structure of traditional programs is for the most part design-bid-build, in which the local government designs the project and then puts out a bid, for which private entities would compete to be awarded a contract to construct a defined project. However, some local government programs have begun using variations of this approach, such as design-build, in which a team of designers and construction firms submit a proposal in response to a bid, and the local government funds the integrated design and construction of the proposed project.

Phases of Green Infrastructure Development
Design – Build/Construct – Finance – Operate and Maintain

There are a variety of program structures that facilitate pay for performance. The program structures are not static and in many cases, a stormwater program may utilize multiple structures concurrently and over time, shift towards an approach that facilitates the sole use of pay for performance. Furthermore, stormwater programs may test an approach and over time transition to an approach that transfers more risk to the private partner or further streamlines the local governments operations.

Facility Oriented Public-Private Partnerships

Many public-private partnerships (P3s) are based on a contractual agreement between a public entity and private entity in which the two parties collaborate and share resources to deliver a facility or predetermined public service. Each party is often vested in the performance of the service, and share the risks and rewards of successful delivery (The National Council for Public-Private Partnerships, no date [a]). A private entity normally assumes responsibility for more than one of the project phases. The structure of traditional P3s varies in terms of risk transferred to the private entity. These structures enable the local government to focus on the important outcomes and delegate the responsibility of determining the means to achieve those outcomes to the private sector.

Community-Based Public-Private Partnerships

Community-Based Public-Private Partnerships (CBP3s) are a modification of traditional P3s that incorporate alternatives for the finance, design, build/construct, and operate and maintain phases of green infrastructure development. CBP3s are specifically designed to include community revitalization goals and simultaneously address stormwater pollution through the use of green infrastructure (U.S. Environmental Protection Agency, no date [b]). In addition to offering a cost-effective solution to address stormwater pollution, CBP3s that leverage green infrastructure offer opportunities to train and employ local constituents in underserved urban areas, and bring economic uplift to a community through improved real estate values.

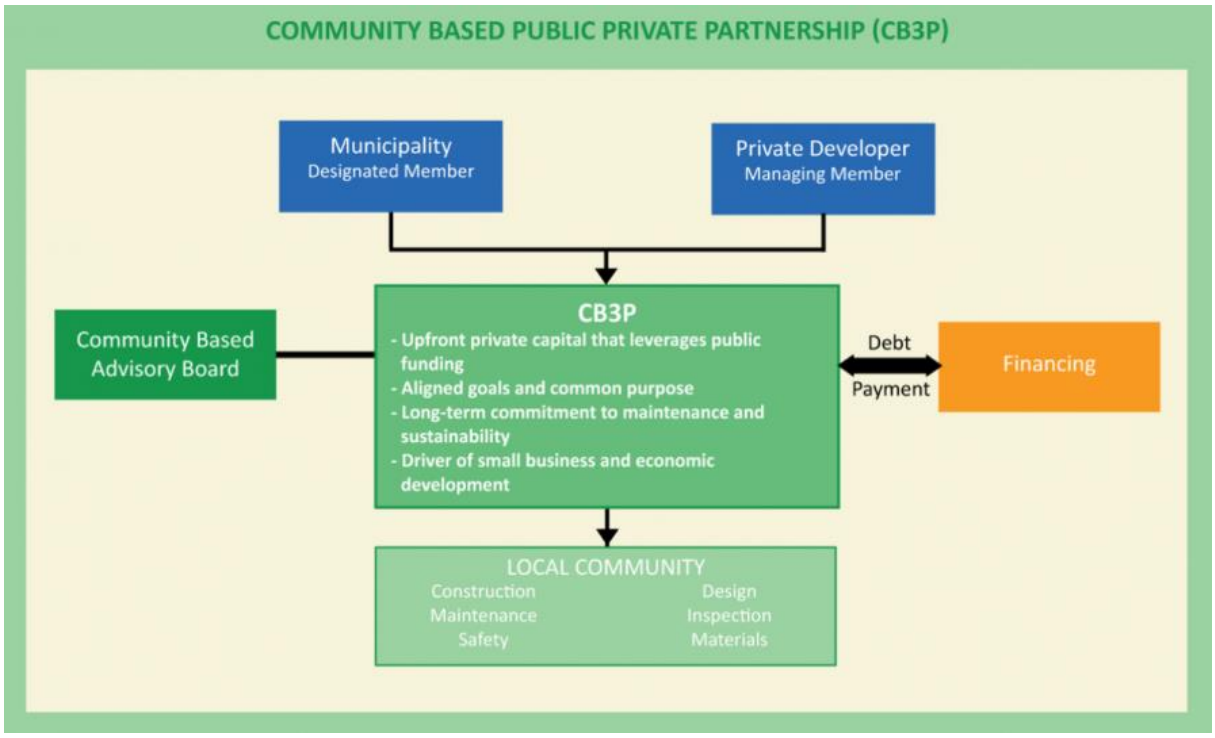

***Figure 4: Structure of a Community-Based Public-Private Partnership (U.S. EPA**, no date [b])*

P3s and CBP3s can both be structured in a variety of ways which transfer responsibility for managing and implementing the various phases of green infrastructure development. The structures listed in the table below begin with the least risk transfer to the private sector and end with the structure that transfers most risk to the private sector.

Table 1: P3/CBP3 Program Structures

P3/CBP3 Structure	Description
Design-Build	Private entity is responsible for design and construction of green infrastructure. The local government owns the green infrastructure and carries out ongoing operations and maintenance (National Council for Public-Private Partnerships, no date [b]).
Design-Build-Finance and **Design-Build-Finance-Maintain**	Some portion of responsibilities related to financing the green infrastructure project is delegated to the private sector. In most cases, the green infrastructure financing is a mix of public and private capital, and the private entity is responsible for maintaining the project in the short- to mid-term timeframe (U.S. EPA Region 3 Water Protection Division, 2015).
Design-Build-Operate-Maintain	Private entity assumes responsibility for either operations and maintenance or just maintenance. The term for operations and maintenance responsibility for the private partner is generally short- to mid-term and the local government assumes responsibility afterwards (U.S. EPA Region 3 Water Protection Division, 2015).
Design-Build-Finance-Operate-Maintain-Availability Payment	The private entity assumes responsibility for some portion of financing responsibility for O&M projects in the long-term. The local government collects revenue and fees, and makes periodic payments to the private entity based on delivery of projects and fulfillment of performance expectations. Delivery obligations often relate to the execution of projects within a specified budget and timeframe. Performance expectations can range from environmental outcomes from the green infrastructure project to achievement of social and economic goals (U.S. EPA Region 3 Water Protection Division, 2015).

P3/CBP3 Structure	Description
Design-Build-Finance-Operate-Maintain-Revenue Concession	Private entity assumes revenue risk and is able to collect a portion or all of the revenue generated from the green infrastructure over the contract term (U.S. EPA Region 3 Water Protection Division, 2015).
Build-Own-Operate	Private entity develops green infrastructure on private property. In stormwater programs, this involves a private party installing green infrastructure on their property that generates credits that can be sold to another party who needs the credits for compliance (U.S. EPA Region 3 Water Protection Division, 2015). In the case of the D.C. Stormwater Retention Credits Trading Program, private property owners implement green infrastructure projects, which generates stormwater retention credits that can be sold on the open market. The private property owners are expected to maintain the project during the three-year term and at the end of the term, can renew the credits for another three years upon successful completion of inspection.

Market-Based Trading Programs

Market-based programs create the program infrastructure for entities to buy and sell units of environmental benefit, often referred to as credits. In the case of stormwater, credits are defined by pollutant load reductions – most commonly nitrogen, phosphorus and sediment – or by volume of water retention. In a market-based program, a seller could be a regulated entity who pollutes less than its permit allows and therefore, has extra credits to sell to another regulated entity who needs credits to achieve compliance. A seller could also be an unregulated party who voluntarily generates credits with the intent of selling to a regulated entity who needs them for compliance. Buyers are regulated entities that need credits to achieve compliance. In the stormwater field, buyers generally include construction companies and local governments.

Market-based programs inherently facilitate pay for performance since they are structured around the generation and exchange of credits. Therefore, payments can be structured around the delivery of credits.

Pay for Performance in Practice

Four programs using approaches that have some form of pay for performance to achieve local government stormwater goals were analyzed. The purpose of analyzing these four programs was to understand how pay for performance has been used in local government stormwater programs and determine whether these approaches have potential to achieve better outcomes than traditional approaches. Each program faces ambitious goals related to the Chesapeake Bay TMDL and is testing innovative, pay for performance procurement vehicles and financial instruments that leverage green infrastructure as a cost-effective approach. Furthermore, each program varies in terms of the way they are structured, the degree to which payments are tied to the delivery and verification of environmental outcomes, and the way services are financed, procured and secured for ongoing O&M. Finally, each program structure offers potential unique benefits that vary in terms of allocation of performance risk, the use of modeled versus monitored environmental performance outcomes, the degree to which project selection is streamlined and responsibilities of private sector partners.

Table 2: Programs Analyzed Using Alternative Delivery Models with Elements of Pay for Performance

Program	Structure	Pay for Performance Type	Risk Sharing	Metric	Initial Outlay
Prince George's County Clean Water Partnership	Design-Build-Operate-Maintain CBP3	Procurement	Fee tied to delivery of social and economic goals; Final project payments contingent upon Impervious Area Credit Certificate	Impervious Area Credits	$100 million
Anne Arundel County Watershed Protection and Restoration Program	Design-Build-Finance-Operate-Maintain-Availability Payment	Procurement	Payment based on delivery of pollutant load reductions and impervious acres treated	Water Quality Credits	$5 million
D.C. Stormwater Retention Credits Trading Program	Market-Based Trading Program	Procurement	Seller paid based on Stormwater Retention Credits (SRCs) generated	Stormwater Retention Credits	$12.75 million
D.C. Water Environmental Impact Bond	Environmental Impact Bond	Finance	Private investors mitigate risk	Percent Runoff Reduction	$25 million

Prince George's County Clean Water Partnership

The County's Phase II Watershed Implementation Plan, which is required under the Chesapeake Bay TMDL, specifies that it will retrofit 8,000 acres of impervious area by 2017 and an additional 7,000 acres by 2025 (Clean Water Partnership, 2016). These targets coincide with the Chesapeake Bay TMDL, which is designed to facilitate the implementation of pollution control measures to restore the Chesapeake Bay and its tidal rivers by 2025 (U.S. Environmental Protection Agency, no date [a]).

To achieve the goal of retrofitting 15,000 acres of impervious area as well as its National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (MS4) Permit, the County designed and implemented the Clean Water Partnership – a 30-year design-build-operation-maintain community-based public-private partnership between Prince George's County, Maryland and Corvias Solutions (Clean Water Partnership, 2016). The County estimates a cost of $1.5 billion to complete the 15,000-acre retrofit, and further estimates that the Clean Water Partnership will result in a 40 percent cost savings by streamlining government processes and utilizing private processes (Environmental Protection Agency Green Infrastructure Driven Urban Stormwater Initiative, 2014).

Corvias Solutions is considered the manager of the partnership, which means it is charged with overseeing all subcontractors throughout the design, construction, and O&M of stormwater improvement projects. Additionally, Corvias oversees a team of prime contractors, which includes a general contractor, design engineers and a completion certifier.

The County's Department of the Environment invested $100 million in the initial three-year retrofit. The scope of Corvias's agreement with the County includes an initial program area of 2,000 publicly-owned impervious area and an extended program area an additional 2,000 acres (Prince George's County, 2014 [b]). Corvias becomes eligible to oversee the expanded program area if it achieves a set of milestones that include measures related to the

Impervious Area Credits are received by the County on a "per acre" of land retrofitted basis and are used to satisfy the County's MS4 Permit (Prince George's County, 2015)

generation of Impervious Area Credits, participation of local small and disadvantaged businesses, job participation of County residents, implementation of a mentor-protégé program, and meeting the scheduled construction timeline within budget.

Financial Flows

Bond proceeds from County Stormwater Revenue Bonds are used to fund implementation of projects under the Master Program Agreement. The County is considering issuing these bonds on an annual basis to fund the Clean Water Partnership. These bonds are paid back with revenue generated by the County's Clean Water Act Fee that was established in response to Maryland's House Bill 987, which required nine counties and the City of Baltimore to collect a fee from private property owners to mitigate stormwater runoff pollution from impervious areas (Prince George's County, no date [b]). The Master Program Agreement emphasizes the use of private financing sources and grant proceeds, however, the initial impervious area treatments have primarily been through County issued debt (Hughes and Alexandrovich, 2017).

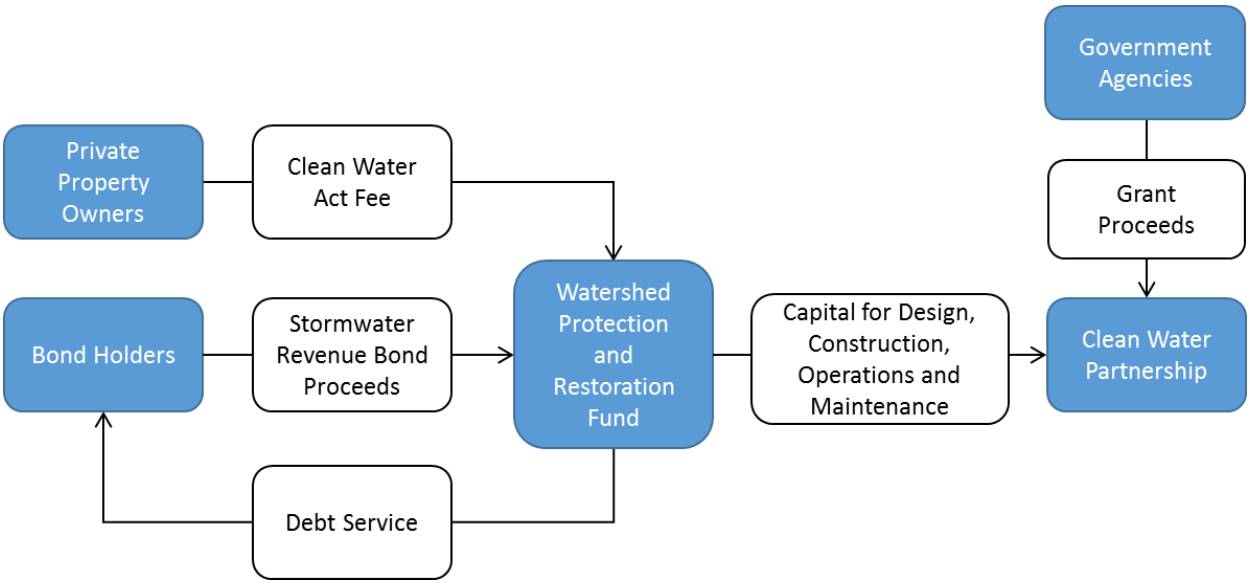

Figure 5: Clean Water Partnership Financial Flows

Procurement

Corvias was selected as the private partner in the Clean Water Partnership through a competitive bidding process. The subsequent work flow of the Clean Water Partnership consists of four primary stages. The first stage is annual planning, in which Corvias specifies the projects

being considered for the upcoming fiscal year. Each annual plan includes total cost and maximum design cost estimates for each project, and the planned social and economic development actions and maximum costs for those programs. Once the annual work plan is approved, the second stage of the developmental period work begins during which the general contractor procures subcontractors to provide materials and construct budgeted projects. Each project must include a budget book, which outlines the number of impervious area credits to be delivered, the number of best management practices, milestones and performance schedule, maximum project cost, and scheduled acceptance date. The third stage is the stage in which Corvias commences construction of County-approved projects. The fourth and final stage is the acceptance stage, in which the Completion Certifier inspects the projects and provides an "Impervious Area Credit Certificate" for the number of acres in the project that have been accepted.

The payments that the County makes to Corvias are separated into four different categories.

- **Advanced Payment**: $1 million that is paid upon completion of the Master Program Agreement. The advanced payment is intended to reimburse initial costs and advance a portion of Corvias's fees. $500,000 of this payment is fully earned by Corvias and is non-refundable to the County, $375,000 is treated as a credit to offset fees accrued by Corvias in the initial three-year term, and $175,000 is fully earned by Corvias if it achieves the milestones required to expand into the renewal term.
- **Design and Construction Payments:** Design costs are paid at four milestones (30 percent, 60 percent, 90 percent and 100 percent). Construction milestones vary from project to project.
- **Base Fee:** Applied to all project, and social and economic program costs. In the initial term, the fee is 5 percent and in the extended term the fee is 4.25 percent.
- **Incentive Fee:** Paid based on achievement of five criteria – early completion, budgeted cost, local-based small business, target class, and county resident participation. The rates for the incentive fee matches those of the base fee. However, the County is able to

withhold 25 percent of the incentive fee to ensure that Corvias fulfills performance requirements (Prince George's County, 2014 [b]).

Operations and Maintenance

Corvias is responsible for managing all aspects of O&M for the 30-year term of the Clean Water Partnership. In particular, Corvias is required to (1) create a Project Maintenance Plan for each project, (2) prepare annual O&M plans with budgets, (3) select and manage maintenance contractors, (4) develop, construct and accept capital repair and replacement contracts, and (5) implement social and economic development programs (Prince George's County, 2014 [a]).

Analysis of Use of Pay for Performance

The Clean Water Partnership has some elements of a pay for performance arrangement, but the majority of payments made to Corvias are not linked to the delivery of environmental outcomes on a project-by-project basis. For design and construction payments, Corvias is paid for reaching a series of completion milestones, which is more aligned with a traditional approach. The most significant pay for performance element is engrained into Corvias's eligibility to extend their contract and continue to be a partner in the Clean Water Partnership. This is a critical element to the Clean Water Partnership and incentivizes Corvias to perform as expected by the County and partnership. Furthermore, the incentive fee that is rewarded to Corvias based on achievement of five criteria reflects principles of pay for performance. However, the metrics on which the incentive fee is based relate to economic development and delivery of services on time and within budget rather than environmental outcomes.

In order for Corvias to receive final payment for a given project, the required Impervious Area Credit Certificate must be submitted to the County (Prince George's County, 2014 [b]). Therefore, a portion of payment is linked to the delivery of modeled outcomes. Impervious Area Credits serve as the basis for compliance with Maryland Department of the Environment regulations and are awarded based on the area of the green infrastructure installation and water quality volume, which is the volume of water that a green infrastructure installation is designed to handle. An Impervious Area Credit is granted on an acre-by-acre basis when the green infrastructure installation is designed to handle 1 inch of rainfall. When a green

infrastructure installation is designed to handle less than an inch, Impervious Area Credits are granted on a proportional basis (Maryland Department of the Environment, 2014).

Corvias's continued participation in the Clean Water Partnership is contingent upon a set of performance metrics that each carry different scoring weights (Prince George's County Council, 2014). Corvias must achieve 75 percent of its performance metrics to be eligible for the expanded program area. The weightings lean more heavily towards the social and economic development criteria than towards delivery of Impervious Area Credits or environmental performance of green infrastructure installations. However, the performance metrics place some emphasis on timely delivery of projects within budget.

Performance Metric	Weight
Participation of protected classes and local businesses	35%
County resident job participation	15%
Incubator and mentor-protégé program	15%
Construction timeliness	10%
Impervious acres retrofitted and Impervious Area Credits obtained	10%
Completion within budget	10%
Customer service	5%

A notable benefit of the Clean Water Partnership is the manner in which it significantly streamlines project selection for the County. By delegating design, build, operation and maintenance responsibilities to Corvias, the County is able to engage primarily on selection rather than engage on every phase of every project. This enables the County to focus its staff resources on other matters and engage on project selection after the private sector partners have thought through and proposed each major phase of each project.

Program Summary Table

Table 3: Summary of Prince George's County Clean Water Partnership

General	
Program Structure	Design-Build-Operate-Maintain CBP3
Roles	• Corvias – Manager • Prince George's County – Fund capital costs, approve plans and budgets, provide permitting guidance • CH2M Hill Constructors, Inc. – General Contractor • Bowman Consulting Group, Ltd and CH2M Hill Engineers, Inc. – Design Engineers • Unknown – Maintenance Contractor • Maryland Environmental Service – Completion Certifier
Risk Sharing	• Project Performance – County DOE • Corvias – Incentive fee only received if social and economic goals[2] achieved. Final payment for projects contingent upon delivery of Impervious Area Credit Certificate.
Metric	Impervious Area Credits
Environmental Regulations	Chesapeake Bay TMDL and Watershed Implementation Plan; MS4 permit
Financial Flows	
Initial Outlay	$100 million
Funding Source	• County Stormwater Revenue Bonds • Local Watershed Protection and Restoration Fund • Private capital raised by Corvias (potential option, but has not been implemented) • Grant proceeds

[2] Social and economic goals include (1) county-based participation, (2) minority and protected class business, (3) county resident man hours/job participation, (4) timeliness, and (5) ability to execute project within budget. (Prince George's County, 2014 [b])

Procurement	
Process	Manager and General Contractor develop bid packages. County reviews and provide comments on bid packages. (Prince George's County, 2015)
Payment Structure	• Design costs – paid at 30, 60, 90 and 100 percent • Construction costs – case-by-case basis • Base fee – applied to all costs • Incentive fee – based on social and economic goals • Final payment – contingent on attainment of Impervious Area Credit Certificate
Operations and Maintenance	
Term	30 years

Anne Arundel County Watershed Protection and Restoration Program

The Anne Arundel County Watershed Protection and Restoration Program (WPRP) takes a more traditional approach in its program structure. However, it recently released a request for proposals (RFP) for full delivery of water quality benefits, which utilizes some pay for performance features. The Full Delivery RFP allocates $5 million towards cost-effective green infrastructure projects that retrofit impervious areas and reduce pollutant loads on private lands throughout the County (Anne Arundel County, 2016). This is the first pay for performance contract the County has procured for its stormwater management needs. However, the Full Delivery RFP serves as a beta test and the County anticipates further leveraging pay for performance approaches in the future and has already requested an additional $5 million in next year's budget for a similar procurement vehicle (Michelsen, 2017). The Full Delivery RFP is particularly attractive as a procurement approach for the County as it faces an aggressive restoration and implementation schedule. By using this pay for performance approach, additional private partners are able to engage in stormwater retrofits with minimal County engagement (Michelson, 2017).

The Full Delivery RFP resembles a design-build-finance-operate-maintain-availability payment structure often used in P3s. In this instance, the County had a defined outcome it was trying to achieve – to obtain Maryland Department of Environment Water Quality Credits per the "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated Guidance for NPDES Permits, Aug 2014" (Anne Arundel County, 2016). The County is responsible for selecting and inspecting projects, and will pay the contractor based on delivery of modeled reductions of nitrogen, phosphorus and sediment pollutants, and impervious acres treated. Further, the County places responsibility for designing, building, and operating and maintaining the project for a specified period of time on the private sector partner selected under the Full Delivery RFP.

Water Quality Credits are calculated based on the size of the retrofit (acres) and pre-determined variables related to the pollutant of concern and impervious area equivalency (MD Department of the Environment, 2014).

The County anticipates to award a contract through the Full Delivery RFP in the spring of 2017 (Michelsen, 2017). Once awarded, the project will go through a three-phase inspection and acceptance process. Phase I, Initial Acceptance, occurs at the time of contract award requires that the County approve the proposed solution. Phase I serves to verify that the applicant's proposed plan has been accepted by the County and that the project will be accepted upon completion if implemented in accordance with state and local ordinance. Phase II, Substantial Completion Acceptance, is the phase in which the County inspects projects to determine whether they have been implemented in accordance with state and local regulations, and serves as the project completion acceptance. Lastly, Phase III, Maintenance Inspections, occurs once projects are completed. Each project is inspected during Phase III annually to ensure that it is performing its original intended function (Anne Arundel County, 2016).

The purpose of projects awarded under this RFP is to satisfy the County's MS4 permit requirements, as well as the requirements of the Chesapeake Bay TMDL and subsequent Maryland Phase II Watershed Improvement Plan. Projects implemented under this RFP must be eligible for Water Quality Credits consistent with the Maryland Department of Environment

standards. All mitigation, natural service and water quality improvement credits must be assigned to the County.

Financial Flows

The Watershed Protection and Restoration Fee is the revenue source for the Anne Arundel County WPRP's stormwater-related work. The fee is collected from County residents based on impervious surface area (Anne Arundel County Watershed Protection and Restoration Program, 2016). All revenue generated from the fee, as well as tax supported debt via general obligation bonds, is maintained in the Watershed Protection and Restoration Fund (Anne Arundel County, 2015). The fund accounts for all revenues generated from private property owners that are used for stormwater projects, as well as debt related to those projects.

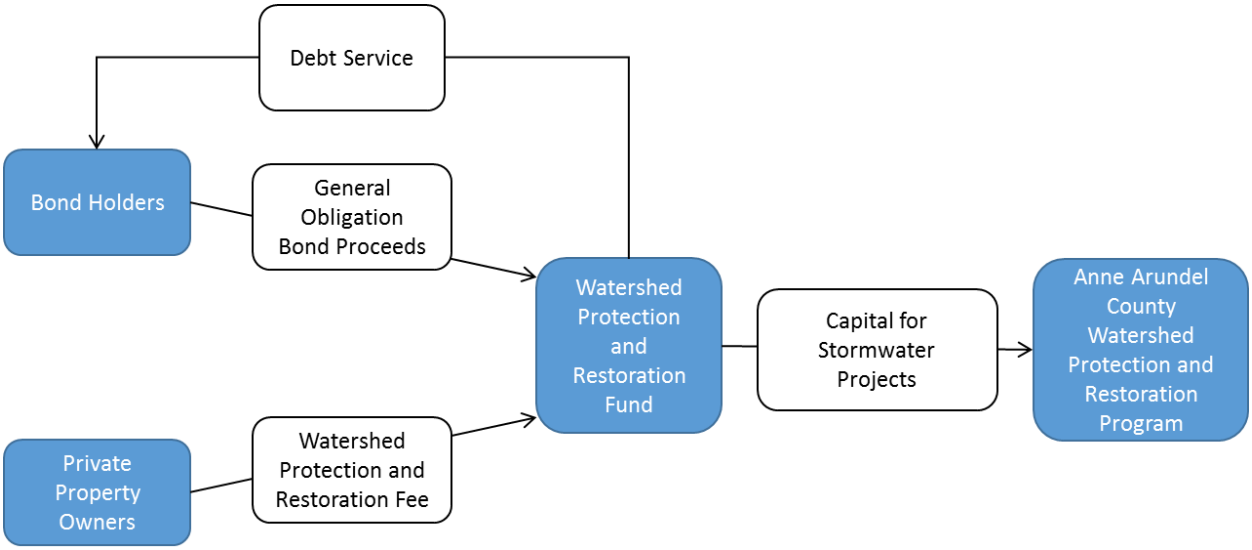

Figure 6: Anne Arundel County Watershed Protection and Restoration Financial Flows

Procurement

In response to the RFP, applicants specify the costs and state the financing plan for implementing proposed projects and the County picks based on cost-efficiency and anticipated environmental performance. Applicants must include in the cost proposal their proposed price per impervious acre treated, and price per pound of nitrogen, phosphorus and sediment reduced (Anne Arundel County, 2016). The reason project proponents must do this is the County will not make payment to project implementers until the projects have been completed and delivered to the County, and payments will be linked to the delivery of outcomes defined in

the proposal. Thus, the financing plan shows that the applicant is able to handle the project implementation costs prior to receiving payment from the County.

Payment to project implementers will be made in two phases. First, the County will make an initial payment upon completion of Phase II, assuming that the County verifies that the results of the project align with what was proposed in the proposal. At this point, payments for the maintenance period are withheld. The County will disburse the remainder of the contract funds to the project implementer at the end of a two-year term of Phase III, assuming the results and site of the stormwater quality improvement projects have been maintained. Furthermore, the County envisions that the contractor will be paid at the end of each year within the five-year maintenance period specified in the RFP. However, the amount of funds withheld for this operations and maintenance period will be a small fraction, likely five to ten percent, of the total payments (Michelsen, 2017).

The County has utilized various other more traditional procurement methods. These methods do not possess the key characteristic of pay for performance – having a meaningful portion of payment linked to delivery of outcomes – however, they do vary in terms of efficiency for the County.

Table 4: Procurement Approaches Used by Anne Arundel County for Contracts outside the Full Delivery RFP

Contract Type	Related Project Phase	Approach
Task Order Contracts	Design	The County put out a solicitation and selected six firms. Each firm was given $1 million contracts with the option to renew for five years and was assigned to various watersheds within the county. One benefit to this approach it is now efficient to contract because the County can select from a small group for design work. (Michelsen, 2017).
Open Ended Process	Design	For certain specialty needs, the County can pick from a group of contractors. However, the cap is $100,000 per project, so the scale of projects that contractors can take on under this procurement vehicle is limited (Michelsen, 2017).
Short List Process	Design	The County has a list of pre-qualified contractors that are able to bid. This short list is usually used for large-scale design work. This process routinely takes six months to execute (Michelsen, 2017).
Blanket Order Contract	Build/ Construct	Each blanket order contract allows for up to $5 million year for five years. This contract type mimics design task order contracts (Michelsen, 2017).
Low Bid	Build/ Construct	Lengthy process, generally takes six months to execute (Michelsen, 2017).

Operations and Maintenance

Under the Full Delivery RFP, the contractor is responsible for maintaining projects for five years and the County is responsible for inspecting projects and paying the contractor for successful maintenance (Michelsen, 2017).

Analysis of Use of Pay for Performance

The Full Delivery RFP is a pay for performance procurement and contracting mechanism that bases payments on the delivery of modeled environmental outcomes. This approach creates the need for private capital because contractors are not paid until the project's performance

has been verified. Therefore, risk of poor project execution and performance is transferred from the County to the private entity. This dynamic creates incentives for cost-efficiency and effectiveness of impervious surface treatments. Additionally, the County incentivizes ongoing maintenance by linking a portion of payment that is only granted upon successful inspection at the end of the five-year maintenance period. However, this payment is relatively small in relation to the full payment to the contractor.

This approach streamlines green infrastructure installations for the County, but only on a one-off instance since the majority of the County's stormwater work is done through more traditional approaches. However, the County's efforts are streamlined significantly on the projects selected under the Full Delivery RFP as it places responsibility for design, build, operation and maintenance on the private sector partner. Further, the County already has plans to solicit another $5 million of green infrastructure installations through a similar procurement vehicle. If the County continues to integrate this approach into its stormwater efforts, the responsibilities allocated to the private sector have potential to gradually increase over time and streamline the County's efforts.

This RFP allows the County to beta test how well pay for performance works and over time, create sustained demand for Water Quality Credits. By creating sustained demand, a contracting approach similar to mitigation banking could eventually be established in which private entities implement impervious area treatments in advance of solicitations with the intent of selling the resulting Water Quality Credits once a bid is released. This situation would be ideal for the County as it alleviates its performance risk and streamlines impervious area treatments. However, The County recognizes that mitigation bankers will not invest the resources necessary to establish themselves in this arena unless there is prolonged demand that provides some certainty that an investment in impervious area treatments would result in financial returns (Michelsen, 2017).

Program Summary Table

Table 5: Summary of Anne Arundel County's Watershed Protection and Restoration Program and Full Delivery Request for Proposals

General	
Program Structure	Design-Build-Finance-Operate-Maintain-Availability Payment
Roles	• Contractor (TBD) – Design, construct and maintain project • Anne Arundel County – Select projects and inspect
Risk Sharing	Contractor assumes risk and is paid based on agreed-upon price for each impervious acre treated and pound reduction of nitrogen, phosphorus and sediment (Anne Arundel County, 2016)
Metric	Water Quality Credits
Environmental Regulations	Chesapeake Bay TMDL and Watershed Implementation Plan; MS4 permit
Financial Flows	
Initial Outlay	$5 million
Funding Source	• Watershed Protection and Restoration Fund accounts for revenues from the Watershed Protection and Restoration Fee and debt services • General obligation bonds are issued for the Watershed Protection and Restoration Fund
Procurement	
Process	• County released Full Delivery RFP • Contractor designs and builds
Payment Structure	• County pays based off of impervious acres treated and pounds of nitrogen, phosphorus and sediment reduced after the project is completed and annually upon maintenance inspections
Operations and Maintenance	
Term	5 years

D.C. Stormwater Retention Credits Trading Program

The D.C. Stormwater Retention Credits Trading Program is a market-based program that facilitates voluntary installation of green infrastructure. A key component of the D.C. Stormwater Retention Credits (SRCs) is the flexibility provided in the 2013 Stormwater Rule, which requires that regulated development projects[3] retain at least fifty percent of Stormwater Retention Volume onsite and allows for the remainder of the Stormwater Retention Volume requirements to be achieved offsite by purchasing stormwater retention credits or by paying an in-lieu fee. Private property owners can voluntarily generate SRCs by installing green infrastructure and then sell the SRCs on the open market to regulated entities that need them for compliance.

Stormwater Retention Credit = 3.8 liters (one gallon) of retention for one year

This new approach of allowing offsite retention to achieve compliance is an innovation to past regulations that only allowed strict onsite compliance. D.C. Department of the Environment (D.C. DOEE) recognized the difficulties of achieving retention standards onsite (Van Wye, 2012) as well as the need for accountability for the environmental impacts of development projects. By allowing offsite compliance, regulated developers are offered flexibility in how they achieve retention standards and are able to seek the lowest cost of compliance, while still being held accountable for land disturbance impacts on water quality. Furthermore, offsite compliance provides financial incentives for private property owners to voluntarily install green infrastructure and facilitates dispersed development of green infrastructure within a region. This is particularly important in D.C. because some of the most significant water quality impairments in the city are in less affluent areas with lower land values (Branosky, 2017). Creating these financial incentives increases the probability that stormwater retention will be achieved in critical areas.

D.C. DOEE released a request for applications, titled "RFA for the Stormwater Retention Credit Purchase Agreement Program Management and Program to Award Funds for Identification of

[3] Regulated development projects include major infrastructure projects that disturb 5,000 square feet of surface or more.

Green Infrastructure Sites." The goals of the $12.75 million grant were to incentivize the installation of green infrastructure to control stormwater pollution and jumpstart the program (D.C. Department of Energy and Environment, 2016). By creating the purchase agreement program, D.C. DOEE will be able to leverage private investment for initial installation of green infrastructure in priority areas in D.C., and purchase and retire SRCs generated through the purchase agreement. Further, both SRC buyers and sellers were reluctant to generate or buy SRCs due to the nascent nature of the program – developers were hesitant to commit to compliance via SRCs because of a lack of price signals and sellers were reluctant because of uncertainty of the payback period and market price for SRCs (Branosky, 2017). Therefore, the grant created the certainty that SRCs generated under the purchase agreement program would be purchased by D.C. DOEE.

Financial Flows

The ongoing D.C. SRC Trading Program is funded through the Stormwater In-Lieu Fee Special Purpose Revenue Fund (ILF Fund), which is administered by D.C. DOEE. Revenue for the fund is generated by major development projects that pay the in-lieu fee to reach compliance. The base in-lieu fee is $3.50 per gallon of offsite retention volume, but the fee adjusts based on the Urban Consumer Price Index. In 2015, the fee was adjusted by 2.07 percent to $3.57 to account for inflation (Government of the District of Columbia Department of Energy and Environment, 2016). In order to avoid delays of green infrastructure installation, funds can be transferred to the ILF Fund from the MS4 Enterprise Fund with the expectation that those funds will be reimbursed with in-lieu fee revenues.

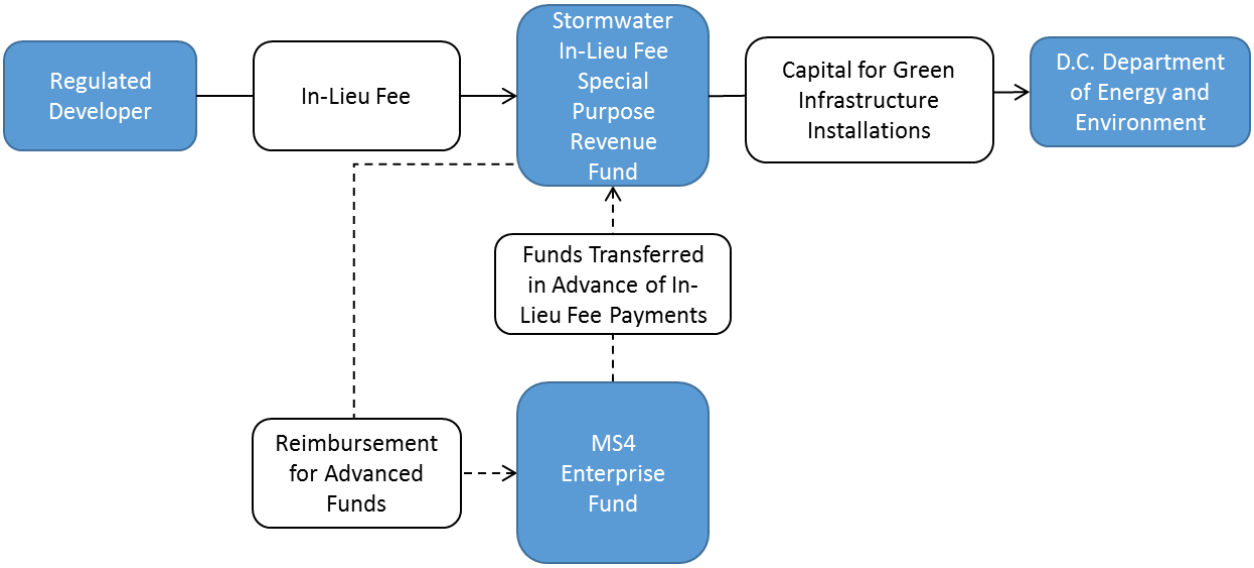

Figure 7: Ongoing D.C. Stormwater Retention Credits Trading Program Financial Flows - In-Lieu Fee

Installation of green infrastructure for voluntary trades of SRCs are funded by private capital. The private property owner, or SRC generator, uses private capital to install green infrastructure and the resulting SRCs are purchased with private capital by a regulated developer.

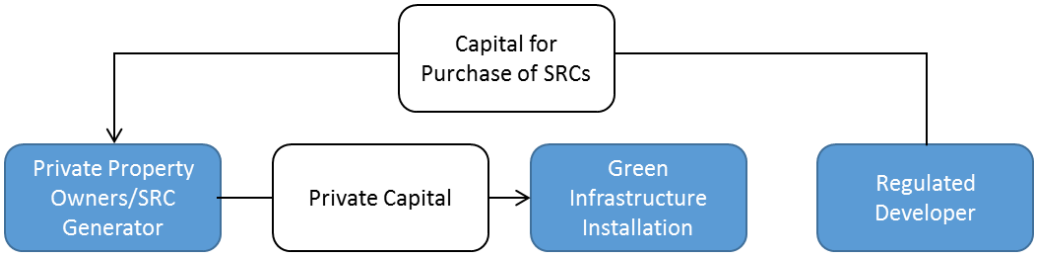

Figure 8: Financial Flows of a Stormwater Retention Credit Trade

Additionally, the previously discussed RFA for the SRC Purchase Agreement Program Management and Program to Award Funds for Identification of Green Infrastructure Sites is funded through revenues generated by a stormwater fee that all residential and private property owners pay. Revenue from the fee is housed in the D.C. Stormwater Permit Compliance Enterprise Fund (D.C. Department of Energy and Environment, 2016), which is the capital mechanism that is used to provide capital to the grantee of the RFA. Finally, SRC generators are able to sell their credits to the grantee at a specified price or to a regulated developer.

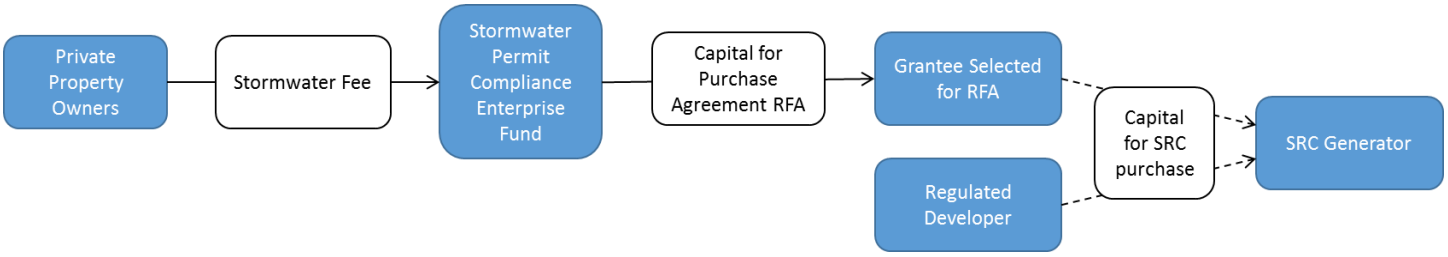

Figure 9: Financial Flows for Purchase Agreement RFA

Procurement

Since the generation of stormwater retention credits is voluntary, the procurement process is streamlined and requires less effort than projects that are designed and then put out for bid by D.C. DOEE. The following describes the procurement process for voluntary generation of SRCs.

- A private entity interested in implementing a green infrastructure project on their property, referred to as an SRC generator, designs the green infrastructure in accordance with the Stormwater Management Guidebook by creating a Stormwater Management Plan.
- DOEE reviews and approves of proposed Stormwater Management Plan.
- The SRC generator installs the green infrastructure and applies for SRCs.
- DDOE does a post-construction inspection and if the project passes, the SRC generator is granted SRCs for up to three years.
- The SRC generator sells SRCs to regulated parties, based on an agreed-upon price, that need them for offsite retention.
- The SRC generators can reapply for SRCs at the end of the term. If the project is verified as being maintained, the SRC generator is granted the SRCs for another three years.

Operations and Maintenance

If SRC generators would like to continue to sell the SRCs in the market beyond the initial three-year period, they must maintain the green infrastructure installation and pass a D.C. DOEE inspection. If the SRC generator passes the inspection, it can sell its SRCs for an additional three years.

Analysis of Use of Pay for Performance

The D.C. SRC Trading Program is structured such that payments are made to an SRC generator based on the SRCs produced by green infrastructure installations. SRCs are representative of stormwater volume retention and therefore, this contracting approach is paying for the modeled outcomes achieved. D.C. DOEE is purchasing SRCs initially to jumpstart the SRC Trading Program via the recently released RFA. However, after the program is up and running, private capital will be leveraged for green infrastructure installations as the purchasing of SRCs shifts away from D.C. DOEE and towards transactions solely between SRC generators and regulated developers.

There are several notable and unique features to the D.C. SRC Trading Program. First, SRCs are written into the development regulations put forth by the 2013 Stormwater Rule. This facilitates the shift of some costs for green infrastructure installations away from D.C. DOEE to the private sector because developers are required to purchase SRCs or pay an in-lieu fee to achieve compliance. This means that public dollars will not have to be used in perpetuity to fund generation of SRCs because private dollars will be transferred from regulated developers to private property owners who voluntarily install green infrastructure (Van Wye, 2017). Another key benefit of the SRC Trading Program is it shifts risk of long-term maintenance failure from D.C. DOEE to the private sector because green infrastructure installations must pass inspection to recertify SRCs in three year increments. This is an important component to the SRC Trading Program since participation by SRC generators is voluntary (Van Wye, 2017). Finally, since the program is working in a market context, market pressures are likely to emerge that create competition to cost-effectively install green infrastructure in order to provide low, competitive prices for SRCs.

Program Summary Table

Table 6: Summary of the D.C. Stormwater Retention Credits Trading Program

General	
Program Structure	Market-Based Trading Program
Roles	• D.C. DOEE – approve SRC generating projects • Private property owners – Implement projects and sell resulting SRCs • Regulated parties – achieve retention standards
Risk Sharing	• SRC generator assumes risk that project will generate intended SRCs and sell on the market • Buyer and D.C. DOEE assume no risk
Metric	Stormwater Retention Credit = 1 gallon of retention for 1 year
Environmental Regulations	Municipal Separate Storm Sewer System Permit
Financial Flows	
Initial Outlay	$12.75 million for Stormwater Retention Credit Purchase Agreement Program and Program or Award of Funds to Identify Green Infrastructure Sites. SRCs purchased by D.C. DOEE from this initial outlay will be retired.
Funding Source	• Ongoing program funding – Stormwater In-Lieu Fee Special Purpose Revenue Fund (Government of the District of Columbia Department of Energy and Environment, 2016) • For RFA – D.C. Stormwater Permit Compliance Enterprise Fund (D.C. Department of Energy and Environment, 2016)
Procurement	
Process	• Private party creates Stormwater Management Plan • D.C. DDOE reviews and approves plan, does post-construction inspection, and grants SRCs

Payment Structure	• Private party receives money for SRCs sold to regulated entities
Operations and Maintenance	
Term	3 years

D.C. Water Environmental Impact Bond

The District of Columbia Water and Sewer Authority is an independent authority of the District government that provides drinking water and wastewater services to Washington D.C. and several Virginia and Maryland municipalities. Part of the District is serviced by a combined sewer system that carries stormwater and sewer water through the same pipe. During heavy storms, these waters can overwhelm the system and result in Combined Sewer Overflows (CSOs) which discharges the polluted waters into the local waterbodies. This excess water discharge is detrimental to the water quality of the Anacostia and Potomac Rivers and Rock Creek (D.C. Water, no date).

It is for this reason that the U.S. Environmental Protection Agency (EPA) required D.C. Water to create a Long-Term Control Plan as part of its National Pollutant Discharge Elimination System permit for mitigating the water quality impairments caused by the CSOs. D.C. Water, under its original Consent Decree, planned to construct a tunnel system to handle the CSOs. In 2015, in conjunction with the US EPA, Department of Justice and D.C. government, D.C. Water modified its Consent Decree to allow for the use of green infrastructure to mitigate CSOs. In wake of the updated Consent Decree, D.C. Water removed plans to build one of the planned tunnels and modified plans of another planned tunnel. Alternatively, the new Consent Decree included provisions to construct 365 acres of green infrastructure (D.C. Water, 2016). Green infrastructure to date has not been implemented by D.C. Water at this scale, therefore there is inherent risk in its performance. Furthermore, D.C. Water is mandated to make sound financial decisions on behalf of its ratepayers (Connella, 2017).

The D.C. Water Environmental Impact Bond (EIB) is an innovative $25 million tax-exempt bond that shares the risk of the green infrastructure's performance between D.C. Water and the private investors, Calvert

Runoff reduction percentage is calculated based off of data extrapolated from flow meters after the installation of green infrastructure.

Foundation and Goldman Sachs Urban Investment Group. D.C. Water still pays for the construction of green infrastructure on 20 acres of impervious area through revenues collected from ratepayers. However, the EIB is structured based on three performance tiers with contingent payments for over- or under-performance related to runoff reduction percentage. The expected rate of return on the bond is 3.43 percent, which is paid if the green infrastructure performs as expected in performance tier 2. If the green infrastructure exceeds performance expectations and achieves performance tier 1, the investors will be paid a $3.3 million outcome payment, increasing the total rate of return to approximately 6.4 percent (Connella, 2017). Further, if the green infrastructure does not meet performance expectations and lands in performance tier 3, the investors will make a $3.3 million risk share payment to D.C. Water, lowering the total rate of return to approximately 0.5 percent (Connella, 2017).

Table 7: Performance Tiers and Contingent Payments. Table modified based on Fact Sheet: D.C. Water Environmental Impact Bond [D.C. Water, no date])

Performance Tier	Outcome Ranges	Contingent Payment
1	Runoff Reduction > 41.3%	D.C. Water makes $3.3 MM Outcome Payment to Investors
2	18.6% <= Runoff Reduction <= 41.3%	No contingent payment
3	Runoff Reduction < 18.6%	Investors make $3.3 MM Risk Share Payment to D.C. Water

The work flow related to the EIB contains four major phases over the 5-year term. First, flow meters are installed in year one in the areas for green infrastructure installation to determine baseline conditions. In years two and three, the green infrastructure is installed by a private sector contractor. Next, in year four flow meters are reinstalled to measure the actual impact of the green infrastructure installation. Finally, in year five, payments are made to investors based on the actual environmental performance of the green infrastructure installation in comparison to baseline conditions.

Financial Flows

The private investors, Calvert Foundation and Goldman Sachs Urban Investment Group, capitalized the Environmental Impact Bond. The proceeds from the Environmental Impact Bond are controlled by D.C. Water and used to fund the installation of green infrastructure by a private sector contractor through a competitive design-build solicitation. D.C. Water pays the private investors back with performance-adjusted debt service using revenues generated through fees to its ratepayers. The repayment by D.C. Water to the private investors is based off of the performance tiers and contingent payments previously discussed and described in Table 7: Performance Tiers and Contingent Payments.

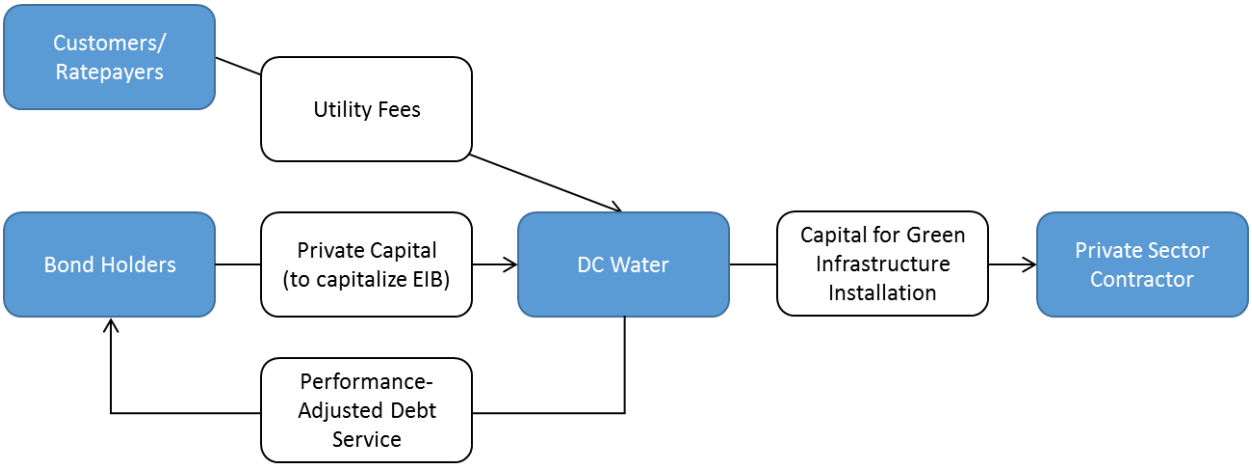

Figure 10: Financial Flows for D.C. Water Environmental Impact Bond

Procurement

D.C. Water will select private sector contractors to carry out the green infrastructure installation through a design-build contract. The contract for the green infrastructure construction will not use a unique pay for performance contract that links performance of the green infrastructure installation to payments to the private sector contractor.

Operations and Maintenance

D.C. Water is responsible for ongoing O&M of green infrastructure during and after the five-year mandatory tender period. Furthermore, D.C. Water is responsible for pre-construction monitoring to develop baseline conditions and post-construction monitoring to determine the

environmental performance of the green infrastructure installation. The pre- and post-construction monitoring serves as the basis for payment to investors.

Analysis of Use of Pay for Performance

The D.C. Water EIB is a form of outcomes-based financing with several notable benefits. For instance, it reduces D.C. Water's financial risk associated with implementing green infrastructure on a large scale to meet water quality standards (Letsinger, 2017). Therefore, the EIB allowed the opportunity to pilot the green infrastructure approach on 20 of the 365 acres specified in the modified consent decree. If it exceeds expectations, D.C. Water could confidently accelerate the installation of green infrastructure. If it meets expectations, D.C. Water can confidently go forward as planned to install green infrastructure for the remaining 345 acres. Similarly, if green infrastructure underperforms, D.C. Water can temper expectations on green infrastructure installations and revert back to its plan for the gray infrastructure pipeline.

Another benefit to the D.C. Water EIB is that it connects bond buyers to outcomes, which enables public entities to finance innovative but unproven approaches to stormwater management (Letsinger, 2017). In most cases, a local government will issue municipal bonds to fund projects. However, in these instances gray infrastructure is a more likely approach because it's tested and even though it may not be the most cost-effective or best suited for addressing stormwater, it will be used because it is low risk for investors. The D.C. Water EIB is a scalable finance structure that mitigates green infrastructure performance risk and incentivizes innovation (Letsinger, 2017).

A notable difference between the D.C. Water EIB and the other programs analyzed is that it uses verified outcomes as the basis for payment to investors rather than modeled outcomes. Therefore, the D.C. Water EIB is paying based on the actual environmental performance of green infrastructure. This approach works well in D.C. Water's case as it is applied to a 20-acre retrofit and the total acres of green infrastructure installations needed are far less than other programs analyzed. However, paying based off of actual environmental performance may prove difficult in large-scale, regional efforts to install green infrastructure. One reason is monitoring

costs could end up accounting for a disproportionate amount of total program costs if every green infrastructure installation had to undergo pre- and post-construction monitoring to determine payments to the private sector partners. Furthermore, the pace at which a stormwater program could install green infrastructure would likely be slowed down, which may create difficulties in large-scale, regional programs with ambitious TMDL goals. Nonetheless, the use of verified outcomes fits the needs of D.C. Water well as it serves as applied research and development into the ability of green infrastructure to satisfy water quality regulations.

The D.C. Water EIB mitigates the investment risk in green infrastructure, but does not significantly streamline project selection or place a large portion of green infrastructure development responsibilities with private sector contractors. Contractors are selected to carry out the projects implemented under the EIB through design-build contracts. However, D.C. Water is responsible for ongoing operations and maintenance, as well as pre- and post-construction performance monitoring. Furthermore, rather than allocating responsibility for project identification to a private sector partner, D.C. Water identified the 20-acre green infrastructure installation to be completed.

Program Summary Table

Table 8: Summary of D.C. Water Environmental Impact Bond

General	
Program Structure	Environmental Impact Bond
Roles	• D.C. Water – program oversight and management • Investors - Calvert Foundation and Goldman Sachs Urban Investment Group • Investors' Counsel – Orrick, Herrington and Sutcliffe LLP • Bond Counsel – Squire Patton Boggs LLP • Financial Advisor – Public Financial Management, Inc. • Technical Advisor – Harvard Kennedy School Government Performance Lab

	• Pay for Success Transaction Coordinator – Quantified Ventures (D.C. Water, no date)
Risk Sharing	D.C. Water pays for construction, but risk is mitigated by investors
Metric	Percent runoff reduction (measured in million gallons per average year per impervious acre)
Environmental Regulations	Chesapeake Bay TMDL and Watershed Implementation Plan, Combined Sewer Overflow discharge requirements, Municipal Separate Storm Sewer System Permit
Financial Flows	
Initial Outlay	$25 million
Funding Source	Private investor capital
Procurement	
Process	• Service providers selected through competitive design-build bid
Payment Structure	• Investors paid based on performance tiers • Procurement with service providers does not use a pay for performance model
Operations and Maintenance	
Term	1 year

Establishing an Environment Conducive to Pay for Performance

Implementing pay for performance in local government stormwater programs requires careful consideration of a number of factors. This section lays out five critical components that supported the design and implementation of the projects analyzed in this paper, including alternative compliance options, dedicated revenue stream, effective metrics and evaluation practices, leaders and champions, and flexibility in the local government's finance system.

Alternative Compliance Options

Regulations that focus on outcomes, offer alternative compliance options, and are not overly prescriptive offer the flexibility needed for local governments to implement pay for performance. By focusing on outcomes, local governments are able to invest in projects that are efficient and perform as expected, and streamline operations by allocating more responsibilities to private sector partners, such as design, construction, operations and maintenance. This is essential in pay for performance as it puts the impetus of delivering projects that deliver and sustain intended outcomes on the private sector. Furthermore, the use of both alternative compliance options and pay for performance motivates the private sector to deliver projects in a cost-efficient manner and innovate new methodologies for mitigating stormwater pollution. This drive for cost-efficiency and innovation is not incentivized by traditional programs and overly prescriptive regulations.

For municipalities intrigued by pay for performance but with reservations, a beta testing approach is an effective way to ease into alternative compliance options and outcomes-based procurement and financing. For example, a local government could utilize design-build procurement first that focuses contractors on delivery of environmental outcomes, and then offload more responsibilities to the private partners, such as design-build-operate-maintain. Next, the local government could test pay for performance procurement with one-off solicitations, similar to Anne Arundel County's Full Delivery RFP, or by utilizing contracts that link small portions of payment to outcomes. Learnings from these beta tests could then inform

future pay for performance approaches and allow the local government to hone its approach through a multi-step process.

Examples of Alternative Compliance Options Facilitating Pay for Performance

The 2013 Rule on Stormwater Management and Soil Erosion and Sediment Control did two things that were essential in the design of the D.C. Stormwater Retention Credits Trading Program. First, it deemphasized the focus of managing stormwater with gray infrastructure and brought more focus on the use of green infrastructure. This allowed D.C. DDOE to transfer some of the responsibility of stormwater management to major development projects by creating regulations around water retention, rather than leaving responsibility solely to public agencies. This effectively caused the stormwater externalities of major development, such as nutrient and sediment runoff, to be internalized by major developers. It also created the impetus for major development to have a large role in the effort to retrofit impervious areas in D.C. and achieve water quality standards (D.C. Department of Energy and Environment, 2013). Second, the updated regulation allowed regulated entities to achieve 50 percent of their retention requirements off-site by purchasing SRCs or paying an in-lieu fee. This modification provides regulated entities the flexibility needed to pursue the most cost-effective means to achieve compliance while simultaneously keeping stormwater mitigation at the forefront.

Additionally, the 2015 modification to D.C. Water's Consent Decree allowed D.C. Water to supplement gray infrastructure with green infrastructure as a means to achieve water quality standards in the Potomac River and Rock Creek. Specifically, the Consent Decree modification eliminated plans for one gray infrastructure tunnel and modified another, and required D.C. Water to retain 1.2" storm on 365 impervious acres in the Rock Creek sewershed and 133 acres in the Potomac River sewershed (D.C. Water, 2016).

This modification to the Consent Decree created the opportunity for D.C. Water to test green infrastructure as a cost-effective solution to stormwater management, which D.C. Water would not be able to do without assurance from regulators (Letsigner, 2017). Additionally, since green infrastructure has not been implemented at a scale this large in D.C., the updated Consent Decree created the need to mitigate the risk of using new technology and approaches. This

motivated D.C. Water to focus on outcomes and pursue an outcomes-based finance option, which led to the creation of the D.C. Water Environmental Impact Bond.

Dedicated Revenue Stream

A dedicated revenue stream is necessary to maintain interest of the private sector in implementing green infrastructure and other stormwater management projects that use a pay for performance approach. Since pay for performance pays service providers based on delivery of outcomes, and therefore creates need for service providers to finance project implementation, a consistent revenue stream is necessary to maintain willingness of the private sector to invest the time and money to pursue pay for performance opportunities.

All four programs examined in this paper have dedicated revenue streams. These dedicated revenue streams are essential as they sustain the demand for continued participation and ongoing operations of each program.

- Prince George's County's Clean Water Act Fee is a revenue stream that is accounted for in the County's Local Watershed Protection and Restoration Fund and is used to fund the Clean Water Partnership. The Clean Water Fee charges County residents an annual administrative fee of $20.58 per tax account year and an impervious area fee of $20.90 per 2,465 square feet of impervious area (Prince George's County, no date [a]).
- Anne Arundel County's Watershed Protection and Restoration Fee is a revenue stream that is accounted for in the County's Watershed Protection and Restoration Fund. The fee is collected from all County residents based off of impervious surface area.
- The ongoing D.C. Stormwater Retention Credits Trading Program is funded from the in-lieu fee that development projects can pay for offsite retention. Furthermore, private property owners can voluntarily implement green infrastructure and then sell the resulting SRCs to developers that need them for compliance. The consistent revenue stream from developers and private property owners can be attributed to the rapid growth of the real estate market and resulting capital from development projects.
- D.C. Water, being a water utility, has a consistent revenue stream from its ratepayers.

Metrics and Evaluation

Pay for performance requires the determination of quantifiable metrics by which to base project evaluation and payments. Without careful consideration, evaluation costs can inflate, dampen the efficiencies gained by pay for performance and distract the overall goal of achieving greater outcomes in a cost-efficient manner. In this regard, it is important to focus on proxies of outcomes that demonstrate modeled or verified pollution reductions rather than overly rigorous metrics.

Standardizing performance metrics and standards nationally and within states could streamline project evaluation, create efficiencies for local governments and provide a platform to learn from other local governments. By having consistent metrics to choose from, local governments could save the human and financial resources necessary to develop metrics and evaluate projects' success in achieving those metrics. Further, increasing local government to local government learning opportunities would likely lead to greater efficiencies and widespread testing and adoption of new methods and technologies for curtailing stormwater pollution. In the stormwater sector, pollutant load reductions and volume retention are good proxies and could serve as a standardized metric. Impervious acres retrofitted is a good proxy, but it relates to an action rather than the outcome of the action. However, standardized metrics would be very difficult to implement due to the unique contexts of stormwater programs such as regulatory requirements, watershed hydrology characteristics, and stakeholder interests and characteristics.

Leaders and Champions

Pay for performance deviates from the status quo and therefore, requires a strong leader with a vision to push its organization towards a new approach. Typically, garnering initial buy-in for pay for performance requires the most active change management efforts and later efforts become more efficient after the new approach has demonstrated better results than traditional approaches (Letsigner, 2017). Political will and support to try new and innovative approaches creates the momentum needed to gain buy-in from an organization. An effective way to garner political will has been promotion of socioeconomic benefits of green infrastructure, particularly

local job creation. It was the D.C. mayor's priority that 51 percent of the jobs associated with green infrastructure installation be given to qualified residents (Letsinger, 2017).

Buy-in and support from finance and procurement departments is also essential due to the vast difference between contracting for outcomes and actions. In the Anne Arundel Full Delivery RFP, the procurement department was able to identify an existing procurement vehicle they could leverage. However, a shortcoming of the vehicle is that it only allowed for single awards (Michelsen, 2017). The support of the procurement department was vital to the execution of the Full Delivery RFP and will continue to be vital if Anne Arundel County pursues solutions to the limitations of single awards.

Another responsibility of leaders and champions is to instill confidence not only that it will work, but that it will achieve better outcomes. Clear evidence and data must support the claim that pay for performance will reduce the cost of achieving water quality standards and achieve the same or greater environmental benefits compared to strict compliance approaches. Beta testing, as seen in Anne Arundel County with the Full Delivery RFP, is an effective way to demonstrate the value of pay for performance and phase it into the program over time without fully committing to it right away.

Similarly, it is necessary for leaders and champions to address skepticisms and lack of trust in pay for performance. Two common concerns related to pay for performance include the private sector profiting from environmental improvement and the perception of developers being allowed to pay to pollute. In some cases, the organizations leading the efforts to instill pay for performance approaches are also the same organizations that would benefit from it. To address these issues, neutral organizations that do not have a stake are effective champions because they can serve as a non-biased opinion of market potential (Nees, 2017). Another way to mitigate these concerns is to demonstrate a better return on investment for pollutant load reductions in comparison to traditional approaches. However, demonstrating better return on investment requires post-construction data and therefore is a less viable option for garnering initial buy-in.

Flexibility in Finance System

Traditionally, local government finance systems lack some key components that facilitate the use of pay for performance. For example, local governments often use a “use it or lose it” approach with annual budgets, which creates incentives for local governments to disburse funds quickly, and deemphasizes focus on outcomes and cost-efficiency. It also hampers local governments from investing in projects that demonstrate potential for significant environmental uplift. In order for local governments to focus on outcomes without financial restrictions, it is important they are able to utilize flexible financial instruments, such as loan guarantees and low interest loans. These types of financial instruments better support innovation and offer greater flexibility in when and how funds are disbursed.

Conclusion

Achieving water quality standards through effective stormwater management is a challenging issue for local governments. This can be attributed to a variety of reasons, including inefficiencies in program operations, insufficient provisions that hold private sector partners liable for projects that do not deliver intended results, and competing priorities, such as infrastructure and economic development. Given these difficulties, there is an emerging appetite and interest in new, innovative approaches in the stormwater sector.

The four programs analyzed in this paper highlight several key learnings about pay for performance and alternative delivery models.

- A focus on outcomes is the foundation to pay for performance. Once a local government becomes focused on outcomes, procurement vehicles, investment instruments, and the roles and responsibilities of private and public partners can be structured in a way that transfers some performance risk to private sector partners and targets funds towards projects that create environmental benefit.
- Pay for performance allocates more responsibilities to private sector partners and streamlines public involvement in program operations. This makes private sector partners become more vested in the performance and delivery of projects and allows the local government to achieve similar results with less public staff time. Therefore, private sector partners become motivated to design and construct green infrastructure installations that deliver long-lasting benefits, and local government staff have additional resources to deploy additional stormwater mitigation efforts.
- Green infrastructure and the alternative delivery models seen in the programs analyzed in this paper offer ancillary benefits, such as economic development. Incorporating these ancillary benefits can garner greater support for local government stormwater programs, particularly when the program creates jobs and benefits local businesses.
- Stringent water quality standards motivate local governments to try new, innovative approaches to stormwater management.

The programs analyzed in this paper are informative case studies utilizing alternative approaches that incorporate pay for performance. These alternatives show potential to deliver better outcomes than traditional approaches in a more cost-effective manner. However, the programs are in early phases of implementation, so a conclusion regarding whether or not they are delivering better results cannot be made yet. Nonetheless, the fact that these alternative approaches have been designed and implemented is a signal that there is desire for increasing the effectiveness of local government stormwater programs. Local government stormwater program managers should continue to monitor these programs and extract lessons as each unfolds. In particular, stormwater managers should focus on the program structures, roles and responsibilities between private and public sector partners, procurement vehicles, and financial instruments used to fund stormwater work.

Pay for performance has potential to serve as a foundational element for achieving water quality standards in a cost-efficient and streamlined manner. Therefore, pay for performance and the programs analyzed in this paper should be further investigated for broad use in local government stormwater programs.

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