PennPraxis

Project Name: Developing PWSA's Strategic Plan for Stormwater

Project No.: 2020-025-OPS

TASK 4: *Interim Strategies Deliverable Update*

Initially submitted February 8, 2022
Revised June 14, 2022

Action 2: Definition of Initial Investment Strategy

Review of Existing Stormwater Capital Plans

As discussed in detail in our Peer Utilities briefing in October 2021, we are undertaking a geospatial analysis of the challenges and opportunities associated with Pittsburgh's stormwater challenges through the application of Four "Lenses":

1) Water quality challenges (PWSA CSO/SSO responsibility post-tunnel, MS-4)
2) Localized flooding and basement backups
3) Socioeconomic and environmental justice
4) Areas of opportunity

These four lenses were developed to help guide project selection for maximum impact in priority areas identified while developing the strategic plan. To understand which currently planned PWSA stormwater investments would represent progress towards addressing those priorities, we evaluated relevant projects listed in the PWSA 2021 – 2025 Capital Improvement Plan vis-a-vis the Four Lenses, and categorized the technologies selected as to how they address the concerns emphasized in each lens (See Figure 1 below for the project list and approximate location).

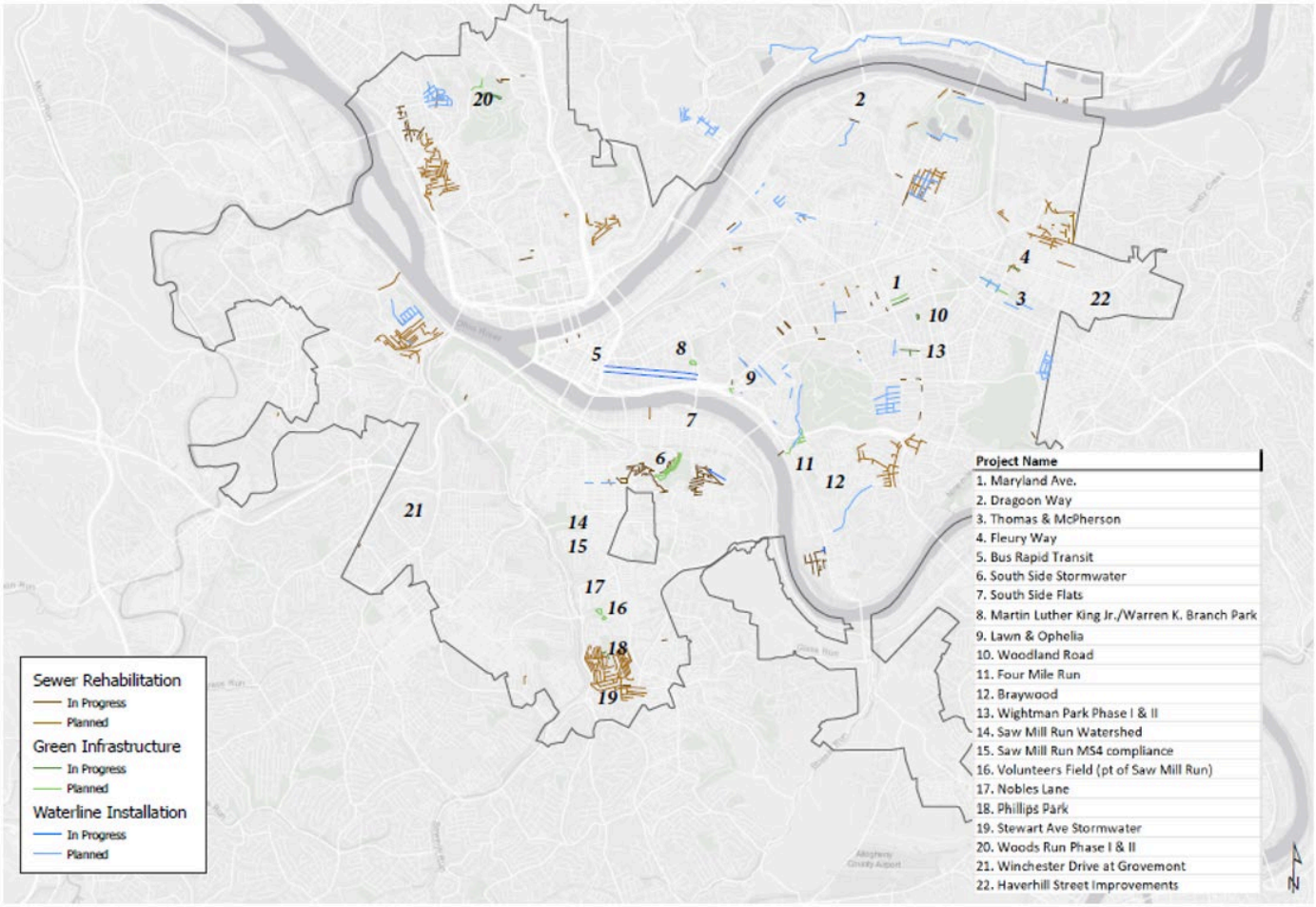
Preliminary Observations and Recommendations for PWSA

While most projects are designed to address multiple challenges, and the geospatial analysis is still undergoing refinement, we can offer the following observations:

- PWSA's existing projects are heavily focused on CSO mitigation in GreenFirst sheds, with lesser focus on flooding, basement backups, and MS4.
    - 11 out of 22 projects have CSO reduction among their primary stated goals, but only South Side Park & Flats (#6 & #7), Four Mile Run (#11) and Wightman Park (#13) appear to be located in areas with high post-tunnel volumes of CSOs for which PWSA will retain primary responsibility
    - 11 out of 22 projects are proposed to reduce flooding and an additional 5 to reduce basement backup. Maryland Ave (#1) and Woodland Rd (#10) address flooding and basement backups in the critical neighborhood of Shadyside
- Existing projects have a limited equity focus. Only 7 of the 22 projects (Thomas & McPherson (#3), Fleury Way (#4), Martin Luther King Jr./Warren K. Branch Park (#8), and Lawn & Ophelia (#9)) are located in areas identified for investment due to socioeconomic and environmental justice concerns. Saw Mill Run MS4 water quality projects (#14 & #15) may benefit portions of the Knoxville neighborhood but impacts may not be visible to residents.

- Only 5 of the 22 projects appear to address multiple lenses in a significant way.
- The majority of the 22 projects are either well in the design process or are part of multi-phase projects with some construction underway, limiting the scope for flexibility without stranding investment. Opportunities to adjust the project scope, even if later in design, to increase flood mitigation benefits (e.g., increasing storage, adding smart controls), should be considered.
- On many projects, PWSA has effectively partnered with other agencies such as the City, ALCOSAN and PennDOT to leverage funding, particularly with the ALCOSAN GROW Program. However, some partnerships have had mixed results, particularly with more ambitious projects like Four Mile Run, which have encountered challenges due to community expectations or delays relating to transportation elements out of PWSA's control. More extensive early feasibility analysis, partnership management, and expectation setting will benefit future projects of similar scale.
- Projects are distributed over a wide portion of the city, which may reduce the efficacy of the investments over shorter time scales. Consideration should be given to more intensively concentrating investments within a few priority areas

Figure 1: Location of the PWSA 2022 – 2026 Capital Improvement Plan Projects



The Table attached to this document as Appendix 1 outlines our analysis in detail.

Action 3: Leveraging Stormwater Fee Impact

3.1: Analysis of Incentives for Private Investment and Scaled "Pay-for-Performance" in Stormwater

Introduction

Pittsburgh Water and Sewer Authority (PWSA) has multiple regulatory obligations relating to combined sewer overflow control, pollution reduction within municipal separate storm sewer systems, in addition to shared responsibilities relating to flood mitigation, climate adaptation, and related concerns. Implementation of stormwater projects to address multiple objectives has typically proceeded through a design/bid/build process through which PWSA conducts planning studies to identify projects, primarily on public lands or in the right-of-way. Design projects are advanced through stand-alone contracts or using on-call contracts. Fully designed projects are then bid via low bid to qualified contractors.

While design/bid/build delivery offers many advantages, delivery under this mechanism can be costly and slow, causing many jurisdictions to explore the use of alternative delivery mechanisms, including full delivery, grant, and P3 models. These alternative delivery mechanisms are in wide use in several infrastructure markets, most notably transportation, and increasingly, water management. As PWSA looks to leverage the impact of its stormwater fee, looking at the potential for alternative delivery models to accelerate and reduce the cost of delivery is a critical strategy.

Why use an alternative delivery Model?

Alternative delivery models may offer a range of potential benefits to PWSA in implementing stormwater management. These include:

- Incentivizing private investment and participation
- Facilitating delivery of projects on private property.
- Leveraging market-based competition to lower
- Streamlining project assembly and delivery
- Risk transfer

What are the risks and rewards of alternative delivery?

The primary benefits of an alternative delivery model are to accelerate the pace of project delivery and lower the unit cost of the delivery. Alternative delivery also places the risk of delivery of the delivery entity, reducing risks to the municipality or utility. Risks/drawbacks to the municipality include a lack of control over the delivery, reduced input during project selection, design, etc. These risks can largely be mitigated through a well-structured contract and project delivery model that holds the delivery entity to pre-established standards.

Legal aspects

Alternative delivery models are in wide use throughout the U.S. as well as in the Commonwealth of Pennsylvania. Primarily legal obstacles include restrictions on the use of design/build, restrictions on the use public funds on private property, and procurement rules that can limit the use of certain contracting options such as best-value and qualifications-based contracting. A comprehensive legal review of options is outside of the scope of this contract but should be prioritized early in the program development process.

Types of models

There are several related alternative delivery models. For simplicity, these are divided into full delivery, grant, P3, banking and trading, and watershed district models. A detailed review of each model, as well as supporting case studies are provided at the end of this memo.

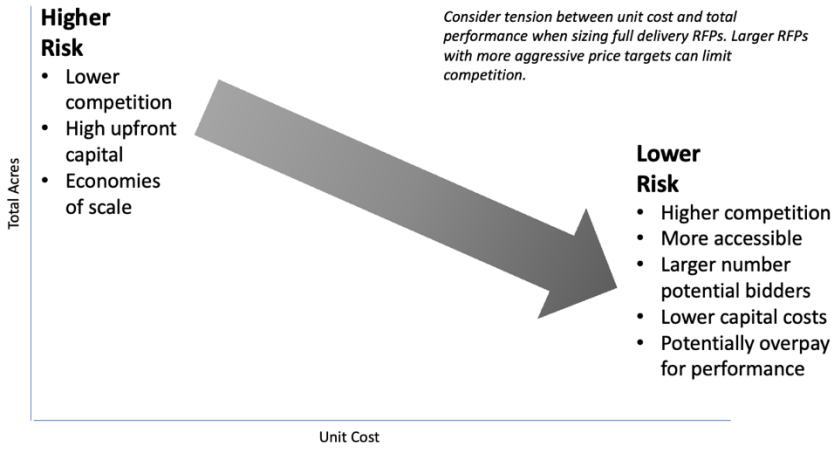
Recommendations and Conclusions for PWSA

Among the models evaluated, a full delivery program seems to offer the right combination of benefits for PWSA. Specifically, a full delivery program provides significant advantages versus a grant program, primarily because the contractual mechanism can include provisions such as liquidated damages that hold the provider financially accountable for delivery. While P3 is an attractive option in terms of the scope and scale of the program, full delivery contracts offer many of the same benefits of streamlining delivery and risk transfer, but also expand the potential for competition and for smaller sized firms to act as primes. Having a multitude of providers, rather than a single provider, can also be preferable given that each provider may bring a specialized approach and competition among providers can effectively lower the cost of delivery. Full delivery contracts would also allow PWSA to retain an additional measure of control in terms of site selection and implementation that is sometimes challenging with a P3.

Recommendations for full delivery contracts:

- Start with a moderate sized contract. *Starting with an initial contract of $5-$10 million would allow a multitude of local and regional providers to participate, while also attracting some national interest. If possible, PWSA should lead this procurement or partner with an appropriate city agency, such as URA, to the extent that the delivery is bundled with housing or other elements.*
- Conduct pre-screening and landowner negotiations, at least for some properties prior to the solicitation. *Queuing up willing landowners and highly feasible properties will jump start a full delivery program and encourage more participation. Following up with customers that are seeing large increases in stormwater fees would be a natural starting point for this engagement. Alternatively, focusing on groups that might be particularly vulnerable to the fee such as non-profits or faith based institutions could be a focus for initial outreach. PWSA should review property owner outreach that was conducted as part of the stormwater fee roll-out to identify a first cohort of property owners for early outreach. Prior to this outreach, the architecture of the full delivery program and associated funding should be in place.*
- Conduct market studies upfront to understand price versus supply and total supply at various rates of customer participation. *Understanding the availability of projects at*

various price points will allow for appropriate pricing and set expectations with the provider community. Studies on the effectiveness of various stormwater technologies within the Pittsburgh area, as are currently being conducted by PWSA, will help to align cost expectations per unit performance.



- Use a progressive award approach with a guaranteed maximum price. *Most stormwater projects have significant unknowns that can result in significant price uncertainty. This is far different than most stream restoration projects, which have been a focus of full delivery projects. The most effective strategy for dealing with this is to fund projects using a progressive model in which the provider can home in on a guaranteed price after subsurface investigations have been completed. Partial funding can be offered at this stage to mitigate risk.*

- Engage the provider community well in advance. *Providers may be reluctant or unaware of the program. Providing lots of information well in advance (e.g., at industry days) will inform the provider community and give required lead time for providers to come to a go decision based on the specifics of the solicitation. Industry events should be targeted—having one or more stand-alone rather than trying to incorporate into another event. That said, providing information at 3RWW conference or similar event could be good as a supplemental source of information. As with the landowner outreach, we would suggest that the specifics of the procurement be worked out ahead of time, including the approximate size and number of contract awards, schedule for release, etc.*

- Incorporate workforce and local participation requirements. *For instance, the delivery could require that a Pittsburgh-based firm provide a certain percentage of services, or that Pittsburgh residents provide a certain percentage of the labor hours for the project. The procurement could be structured to incentivize higher levels of participation. This is a great opportunity to get local companies and residents to participate in the delivery, understanding that at initially out-of-town firms may be leading efforts.*

- Use best value or qualifications-based selections. *Low bid contracting is likely to result in cost cutting measures with lots of change orders that delay implementation and inflate costs. Best value allows the best mix of qualification and cost-based selection.*

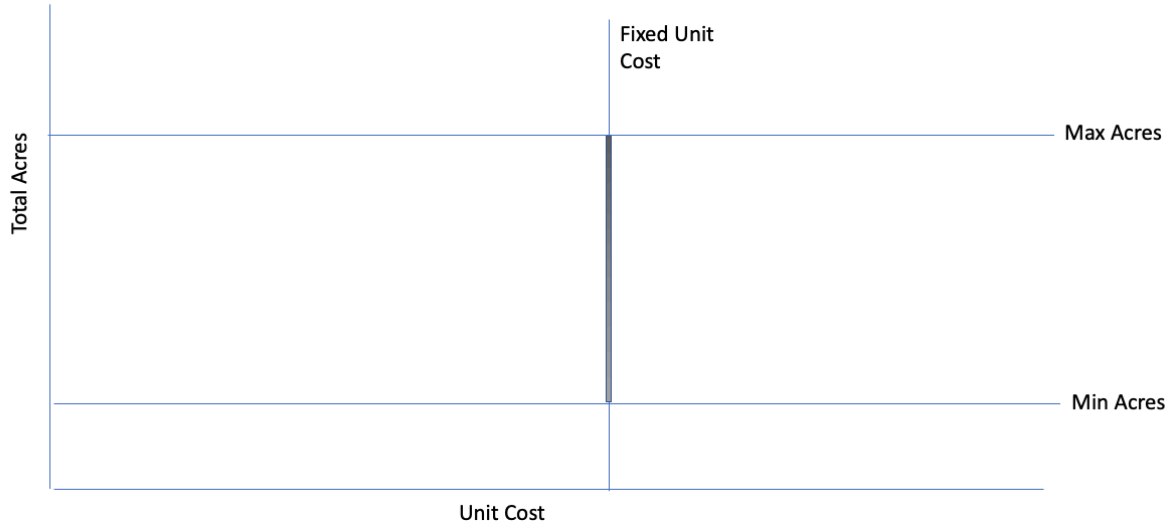
- Develop clear and simple criteria for design and acceptance. *The more predictable and consistent the requirements, the more providers will be interested in bidding. Establishing criteria upfront and minimizing changes over time that can introduce risk and uncertainty for providers is critical to maintaining a good pool of consistent providers.*

- Develop target implementation zones that reflect priorities. *Understanding where project opportunities intersect with priorities for implementation is critical and can be used to focus investments where they are needed most. In Pittsburgh, investments could be*

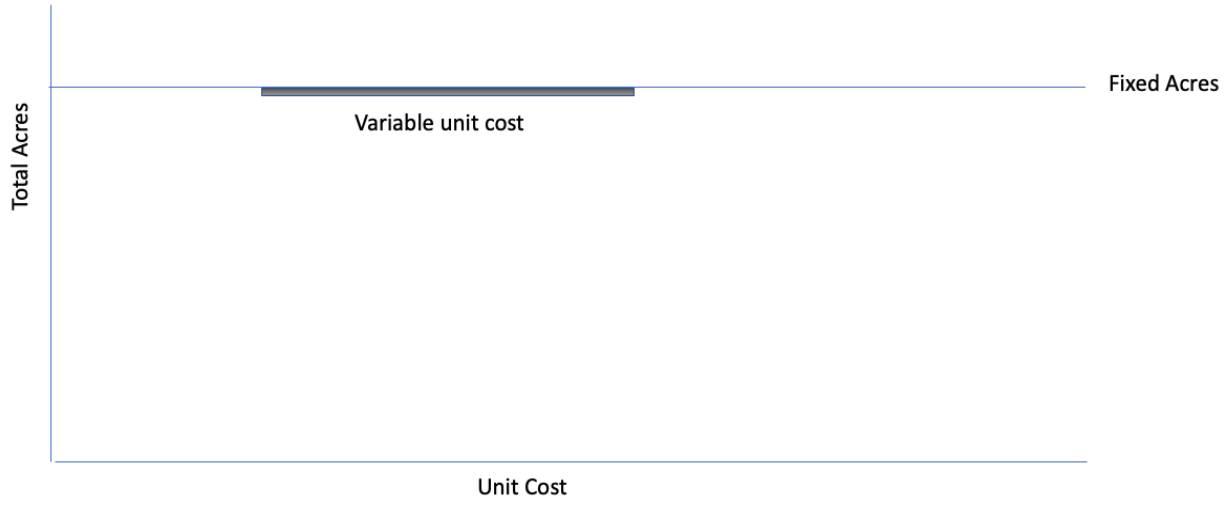
focused on the intersection of equity, water quality, flood mitigation, and opportunity, as represented by the four lenses mapping.

- Develop pre-engineered systems to reduce engineering requirements. *The use of pre-approved, standard designs can streamline delivery, reduce needed reviews, and ensure consistency in outcomes.*

Fixing Unit Costs. Fixed unit cost contracts allow flexibility on the minimum and maximum number of units for delivery. This ensures that the municipality can control the cost of delivery yet provides some flexibility for the aggregator/developer. This flexibility may be important in reducing the risk to the aggregator/developer, particularly if sites have not yet been identified. However, if sufficient supply is not available, total performance may be lower than desired.

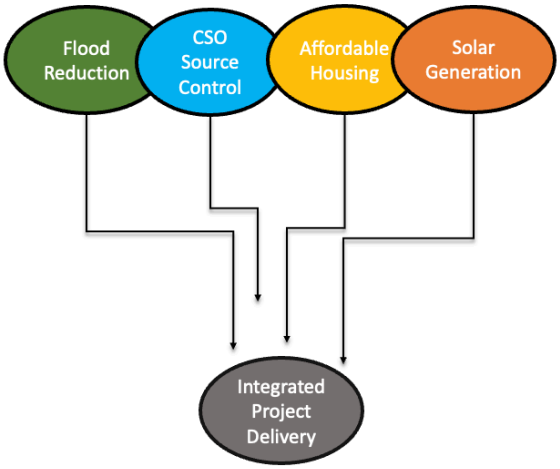


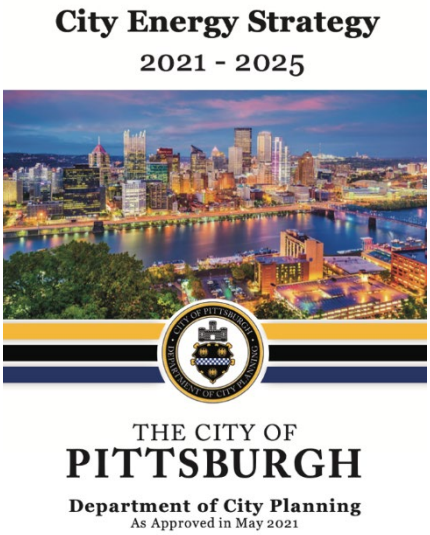
Fixing Total Performance. Fixed total performance contracts allow for a variable unit cost along with a minimum and maximum number of units for delivery. This ensures that the total number of units are delivered, while acknowledging that the cost of delivery may not be fully predictable at the outset of the contract. With this model, the costs can be managed through fixing the % mark up on the delivery or by negotiating costs on a project-by-project basis following initial design.



Neighborhood Integrated Environmental Full Delivery Contracts

Moving beyond the traditional full delivery model, PWSA has an opportunity to break new ground in advancing the concept of full delivery contracting for stormwater to encompass a much broader range of outcomes. Traditionally, full delivery projects have focused on a very narrow set of performance criteria, commonly either CSO volume reduction or MS4 pollutant load reduction. One potential expansion of this concept would be to incorporate a full delivery model for stormwater into developer-focused solicitations directed toward improving Pittsburgh disinvested neighborhoods. These neighborhoods, which include areas such as Homewood and Beltzhoover, are characterized by significant depopulation and disinvestment and abundant vacant land. Currently, Pittsburgh's Urban Redevelopment Authority (URA) is working to assemble vacant parcels for redevelopment in some of these neighborhoods. For instance, URA recently released a developer RFI requesting developer input and concept designs for a low-income mixed-use development of five-parcels in Homewood.





Integrated delivery models create the opportunity to fuse stormwater objectives with elements of Pittsburgh's energy strategy, some of which focus on renewable energy generation on public lands.

In addition to or as an alternative to a standalone full delivery contract, PWSA could partner with URA to incorporate green stormwater infrastructure and other stormwater improvements into affordable housing developments. These stormwater systems could extend beyond the level of stormwater management needed to comply with developer regulations. For instance, stormwater from the surrounding right-of-way could be managed, or on-site systems could be upsized to manage in excess of the volume and rate control requirements in the stormwater ordinance. In the latter case, the newly adopted stormwater code provides grants from the City for increasing the volume of stormwater storage provided beyond the regulatory minimum, providing a built-in mechanism to fund this work, at least in part. Incorporating stormwater management as a part of affordable housing developments would accomplish three important goals. First, integrated stormwater systems would be seen not as competing with development (as could a stand-alone project sited on an otherwise developable vacant parcel) but as a complement to development. Second, combining stormwater management and affordable housing acts as a potential hedge against

"green gentrification", an unintended consequence of green infrastructure investments within many disinvested communities.

One potential technology that could provide both energy generation and stormwater management is the solar green roof (see also Solar Green Roof section). Solar green roofs are commercially available products that combine a traditional sedum green roof with a roof-mounted solar array. This product could be easily incorporated into affordable housing developments and offers some interesting synergistic benefits versus stand-alone systems. For instance, the cooling properties of the green roof moderate roof temperatures in the summer months, which can significantly increase the efficiency of the solar array during these periods. Also, the green roof acts to ballast (hold down) the solar panels, eliminating the need to drill through the underlying roof membrane to anchor the solar panels to the roof structure. With this ballasting function, green roof becomes fundamental to the solar installation and therefore can be funded using solar incentives or under commonly used models for solar funding such as power purchase agreements (PPAs). Under a PPA, the solar provider funds the installation of the solar array (and in this case the accompanying green roof), selling power back to the owner or the grid, usually over a 20-year lease period. This model could provide a means for private financing of the green roof.

Beyond affordable housing, an integrated full delivery model could also incorporate various modes of renewable energy infrastructure including solar generation and battery storage. This approach would align well with Pittsburgh's recently released Energy Strategy (2021-2025). One of the recommendations of this plan (I-2) discusses the need to identify publicly owned lands (which would include vacant parcels assembled for redeveloped by URA) as sites for renewable energy storage and generation infrastructure.

Finally, additional local-based installations focused on flood mitigation, such as backflow prevention (e.g., installation of backflow preventers on private laterals) or inlet and curb reconstruction could be layered into the delivery, further extending the outcomes associated with the integrated full delivery model. In this case, SRF funding could be used to fund these upgrades, following a model used by the Chester Stormwater Authority in the Commonwealth of Pennsylvania. Using this model, the Authority has sourced over $34 million in SRF low interest loans to fund basic stormwater like inlet replacements as well as green infrastructure. Under a similar model, PWSA could source SRF funds that could be used by local developers to install neighborhood stormwater improvements in concert with affordable housing and solar generation projects. Further, ALCOSAN GROW funding could be leveraged to fund source control aspects of these projects, provided projects can be targeted in areas requiring source control under ALCOSAN's Interim Wet Weather Plan.

Alternative Delivery Implementation Models

Full Delivery Models

The full delivery model places the primary responsibility for project delivery on an aggregator/developer, which is typically a private, for-profit firm. This entity may self-perform all or a portion of the work. Typically, the aggregator/developer would bring on a team of support providers that may include designers, contractors, and specialty service providers. This model is in wide use in the Southeast for stream and wetland projects and is gaining in use in the northeast/mid-Atlantic for stream restoration and urban stormwater projects. There are a range full delivery models that vary in terms of several important elements, including:

- Services
- Number of Providers
- Asset Ownership
- Project Location and Portfolio Size
- Project Identification and Selection
- Land Control
- Contracting Models
- Pricing and Performance Models
- Funding Models

These elements largely drive the types of entities that can compete for contracts, the relative risk to the private delivery entity vs. the municipality, and other important aspect of program performance.

Services

Full delivery contracts typically include design and construction, but may also include pre-development services project origination and development, and post-construction services such as operations and maintenance.

Asset Ownership

Long term asset ownership typically rests with the procuring municipality or utility. In some cases, however the aggregator/developer may assume long term ownership of the asset, or at least responsible charge for operations, maintenance, and asset performance. Or ownership and responsibility for operations and maintenance could be turned over to a third party, such as a local community development corporation (CDC) or land trust.

Project Locations and Portfolio Size

Full delivery procurements may focus on a specific project type (e.g., schools, faith-based institutions, etc.), geography (e.g., target sewersheds) or may provide performance or minimum project criteria (i.e. at least XX feet of stream restored, XX acres of impervious surface managed) that may define the delivery. These criteria can be imposed on an individual project level or a portfolio scale. If private properties are included as target projects, municipalities/utilities may face restrictions in terms of the use of capital or operating dollars.

Project Identification and Selection

Full delivery models differ with regards to the entity responsible for project identification and selection. In some cases, the procuring entity may simply establish project criteria and ask proposers to identify project sites that meet qualifying criteria. This offers the proposers maximum number of project sites, but can be associated with some downsides for the municipality, including:

- Potential lack of interest/bids if risk is too high
- Lack of control of what sites are ultimately delivered (beyond initial criteria)

In other cases, the municipality may advance the selection process by conducting a screening level analysis, conducting landowner engagement, or advancing specific sites through preliminary design. This helps to reduce risk and encourages bidding, as the upfront costs of bidding are lessened.

Contracting Models

Full delivery can incorporate a wide variety of contracting models including low bid, best value, and qualifications-based contracts. Contracting models chosen may depend strongly on local procurement rules. Low bid contracting provides the most certainty around initial cost but limits the ability of the procurement agency to select a preferred provider or to manage the quality of the delivery. Qualifications-based selection can be an attractive alternative that lets the procuring entity on board one or more providers based on prior experience. However, the downside of this model is that the municipality/utility loses leverage on pricing once a qualifications-based selection is made. Best value contracting offers a nice combination of selection based on price and qualification.

Pricing and Performance Models

Full delivery contracts typically stipulate fixed pricing per unit of delivery/performance. Most commonly this is expressed as a managed volume or managed impervious area, such as the greened acre, or acre-in. or in terms of unit pollutant reduction, typically lb/yr of sediment. Full delivery models can incorporate traditional payment structures based on percent completion, or more commonly a structured around one or more milestone payments. Milestones can range from multiple milestones, for instance at the completion of design or permitting, construction, etc. or may be restricted to a single payment upon delivery. Other payment structures can include a recurring payment over time based on continued performance following delivery (either presumed or measured). In some cases, incentive payments are provided for achieving particular levels of performance or for accelerated delivery.

Payment/Funding Models

Most full delivery models rely on the developer aggregator to self-fund part or all the delivery with the municipality reimbursing the developer for services, performance, or for purchase of the asset. In some cases, the aggregator/developer may be required to fund some or all the pre-

development work, design, or construction prior to payment. In these instances, significant outside funding streams are often required, and one or more private financing partners may be part of the delivery team, sometimes as an equity partner. If large quantities of upfront capital are needed to facilitate the delivery, particularly if sites have not yet been selected, this may escalate the cost of the delivery, due to the high cost of private capital at this stage. This may in turn restrict the number of potential bidders.

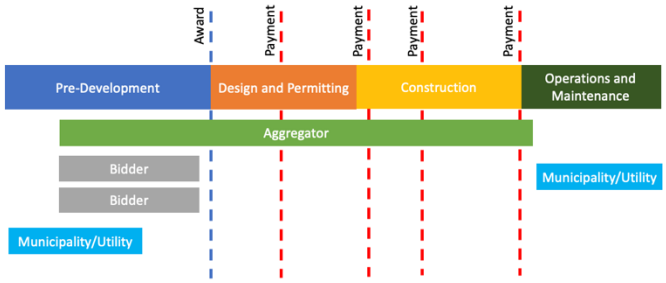
Land Control

For municipally owned land, land control is typically negotiated prior to the procurement to the extent that varying agencies need to provide consent. For private properties, land control is typically obtained by aggregator/developer in the form of a Letter of Intent and later a Landowner Agreement. The Landowner agreement may or may not stipulate compensation to the landowner, but a lease or upfront payment is common. Stormwater fee credits may play a significant role in obtaining landowner participation.

Examples of full delivery models include solicitations from Springettsbury Township, PA, Anne Arundel County, MD, Howard County, MD, and DC Water Rock Creek A. Summaries of these programs are provided below:

<u>Springettsbury Township, PA</u>

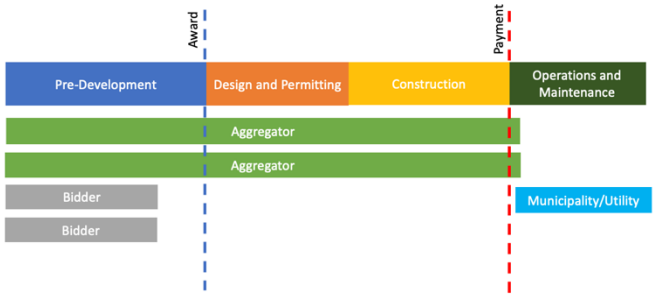
- ~$2 million contract for MS4 compliance, ~700,000 lb of annual sediment reduction
- Design/build stream restoration
- Single award, best value including fixed cost per unit sediment reduction
- Public sites pre-selected by municipality, with an option to provide alternative sites
- Milestone payments negotiated with provider
- Long term O&M by municipality with short term O&M by aggregator/developer (one permit cycle)



Full Delivery Model for Springettsbury Township, PA.

<u>Anne Arundel County, MD</u>

- Several rounds of full delivery solicitations ~ $5 million each
- Design/build + 5 years of maintenance
- Single or multiple awardees per round
- Private property only within MS4 boundary
- All pre-development conducted by aggregator during bid phase, no compensation for non-selected bidders

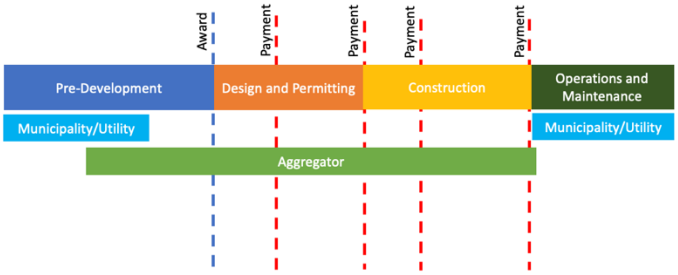


Full Delivery Anne Arundel County. Note: pre-development is 100% the responsibility of the aggregator

- Award based on cost per acre of impervious + technical evaluation and experience.
- Negotiated payment schedule
- County responsible for O&M, aggregator/developer must provide easement

Howard County, MD

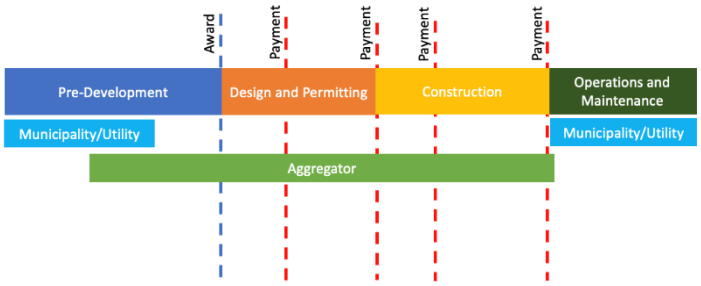
- $2 million full delivery for stormwater retrofits including design and construction
- Single award – best value
- Project sites located on institutional properties pre-vetted by County with land ownership, owner consent pre-negotiated



Full Delivery for Howard County. The County provided significant upfront project development and landowner coordination, allowing bidders to propose only on properties that were pre-vetted.

DC Water Green Infrastructure Rock Creek A

- Design/build + maintenance for 1-year guarantee period
- Green infrastructure installations for publicly owned sites in ROW
- 50% engineering drawings provided to bidders
- Initial short list based on qualifications
- Short listed bidders develop engineering designs in several month collaboration period with stipend for non-selected bidders
- Payment is based on fixed price bid with milestone payments



Full Delivery for Howard County. The County provided significant upfront project development and landowner coordination, allowing bidders to propose only on properties that were pre-vetted.

Grant Models

Grants offer a unique but related model to full delivery contracting that does not require the use of a traditional competitive procurement process. With a grant model, municipalities/utilities provide grant monies to project grantees, who then lead project delivery. Typically, projects are selected and proposed within a grant application process. Grants are distributed to selected grantees, which are usually either individual property owners or project aggregators, In the latter case, a single grant may be awarded to an aggregator for the delivery of several projects across sites owned by multiple landowners.

Grants typically offer less certainty around the delivery than a full delivery contracting mechanism. Grants impose a lower level of contractual obligation to deliver the project, creating a larger potential for the grantee to fail to deliver (default) without facing significant financial or legal consequences. By contrast, many full delivery contracts can impose penalties, including liquidated damages for failure to deliver, and are a stronger delivery mechanism for this reason.

Grant Program Administration
Funding sources may be restricted on private property; therefore, the municipality/utility may elect to use a third party to administer the program. Alternatively, municipality/utility may act as the grant administrator.

Single vs. Multiple Owner
Grant programs differ with respect to what entity can apply for funding. In many cases the grantee is an individual property owner. The owner then contracts with a team of engineers and contractors to implement the project. In the case of multiple owner grants, grants are awarded to an aggregator/developer, who then works with individual property owners to deliver projects across multiple sites.

Long Term O&M
Grant programs typically require property owners (not aggregators) to assume long term O&M responsibilities. This is one of the key advantages of grant programs but can also lead to challenges with property owner participation.

Payments
As private owners are typically not able or willing to provide private financing, grant programs typically (but not always) provide payments on a milestone basis and reimburse grantees for expenses as incurred. Grants directed at aggregators may operate closer to a pay for performance model in which payments are delayed toward the end of the delivery.

Examples of grant models include programs in Philadelphia, Cleveland, San Francisco, and St. Louis. Summaries of these programs are provided below:

<u>Philadelphia, PA</u>
<u>Philadelphia Water Department Stormwater Grants Program</u>

- Long standing grant program with extensive history
- Funds design and construction for green infrastructure with 1.5 inches of managed precipitation depth required
- Annual funding round ~ $5-10 million per year, some years up to $25 million
- Provides grants to both property owners and aggregator/developers
- Deep discount on stormwater fees creates strong impetus for participation
- Reimbursement program based on negotiated milestones
- Landowners must commit to 45-year maintenance agreement at own expense
- Current program uses multi-factor rubric to fund projects
- Priorities are low cost, community involvement, CSO, ROW management, match, and greening
- Changes in program guidance, funding levels have been challenging for providers

St. Louis, MO

MSD Project Clear Rainscaping Large Grants Program

- Funds a variety of green infrastructure types including design and construction
- Applicants can be owners or aggregator/developers
- No set cost limit for competitive program but cost effectiveness is a major component. $180,000 per acre of total drainage area for non-competitive" development-review grants"
- Payment is on a reimbursement basis upon project completion
- Funding levels are around $5 million per year with annual funding round for competitive projects and year-round submission of "development-review grants"
- Management of 1.14 in. or more preferred for competitive program
- Match preferred but not required
- Restricted to Mississippi CSO Region (a subset of the City) for competitive program
- Benefit points system for weighting factors such as visibility, sustainability, EJ considerations etc.

San Francisco, CA

SFPUC Green Infrastructure Grant Program

- Awarded 9 projects and nearly $8,000,000 since 2019
- Funds design and construction for a wide array of GI
- Must be with SFPUC sewer system service area
- Maximum award is $765,000 per acre of impervious managed and $2 million in total funding per award
- Payments at 4 milestones – one for planning and design, 3 for construction
- Must include at least 2 co-benefits
- Must manage a minimum of 0.5 acres
- 0.75 inches of precipitation depth minimum

Cleveland, OH

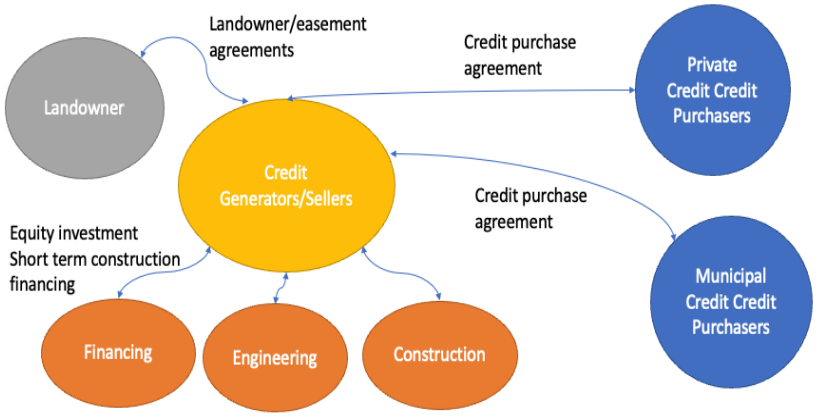
NEORSD Green Infrastructure Grants

- 45 projects funded at total award of ~8.3 million from 2014-2020.
- Awards limited to $250,000 for construction, $25,000 for design only. No unit cost restriction
- Covers design and construction and first year maintenance
- Combined sewer system only
- Applicants can be Sewer District member communities, governmental entities, non-profits or businesses working in partnership with their community.
- Maintenance required for "life expectancy of the project" as determined on case-by-case basis.
- Reimbursement basis without set milestones.
- Evaluation based on benefits, feasibility, programmatic capacity to maintain, visibility, etc.

Banking and Trading/Market Based Models

Banking and trading models offer an interesting alternative to full delivery and grant models. Under a banking and trading model, credit developers, usually for-profit firms, obtain land and build credit generating projects, usually on private properties. These credits are certified by the municipality/utility and are then sold on a credit exchange to credit buyers. Credit buyers can be land developers who require credits to meet stormwater regulations for new or redevelopment, or the municipality/utility who may purchase credits to meet MS4 or CSO compliance obligations. While banking and trading can provide some important benefits, it requires a significant upfront and on-going investment that can outweigh the potential benefits. The Stormwater Retention Credit program in Washington D.C. is the most advanced and well-developed banking and trading program for stormwater.

Banking and trading models involve transactions between credit sellers and purchasers. Sellers procure a range of technical services from service providers, while negotiating land control with property owners. Credit purchasers may include both private developers and the municipality.

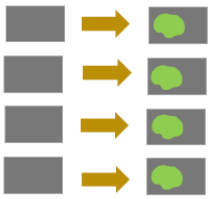


<u>Washington D.C.</u>
<u>Stormwater Retention Credit Program</u>

- Stormwater Retention Credit – one managed gallon for 1 year
- Developers can purchase SRCs in lieu of on-site management for 2 year. Up to 100% in certain areas.
- Credit generators can sell credits to DOEE if cannot sell to private buyer (this is a key risk mitigation strategy to encourage participation)
- On-line credit marketplace to facilitate trades
- High value credits generated in MS4 helps to focus projects in these areas

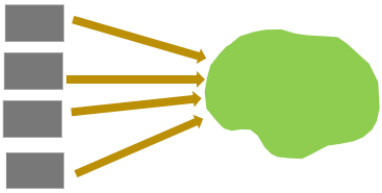
Watershed Districts

Watershed Districts are areas, typically neighborhoods or sewersheds) in which stormwater fees from within the district boundaries are collected and used to build centralized stormwater facilities within that locale. Residents and businesses within the district obtain reduced stormwater fees once the project or projects are built. This offers a potentially cost-effective alternative to building stormwater credit projects on individual properties, which can be cost prohibitive, particularly for smaller properties. Ongoing O&M of many small-scale installations on individual properties can also be challenging and expensive. The Watershed District concept has been evaluated by the Nature Conservancy within the Eastern Market Neighborhood of Detroit but remains primarily an untested concept.



Conventional credit program.
Provide credits on property-by-property basis

Problem – individual projects for small properties are very expensive



Watershed district program.
Build centralized, neighborhood projects.
Provide credits on pooled basis

The concept of watershed districts pools stormwater fee credits within a specific neighborhood and geography. Rather than invest in small scale projects that are credited on an individual basis. The pooled investment is used to build large scale green infrastructure within the target geography. Concept is relatively untested but could have some appeal in Pittsburgh.

Public Private Partnerships

Public Private Partnerships extend and expand the full delivery model to encompass a wide array of services, often at a large scale. The contract mechanism is a partnership agreement to which a private developer/aggregator and the municipality/utility are party. Typically, P3 models involve the delivery of a large portfolio of assets, as well as implementation of related programmatic functions such as contracting, procurement, work force development, and community outreach. P3 models are often structured such that private financing or, in some cases, State Revolving Funds (SRFs) may be used to fund the program, with repayment made as assets are built. Incentive structures may be incorporated for accelerated delivery or exceeding performance benchmarks. To date, the majority of P3 efforts have been implemented by Corvias Solutions, including partnerships in Prince Georges County, MD (see summary below), Milwaukee, WI, and Chester, PA. As of the writing of this memo, the City of Seattle has released an RFP for a stormwater focused P3 named RainCity.

P3s offers an attractive delivery mechanism in which program elements can be leveraged and scaled in ways that are difficult to achieved with smaller full delivery or grant-based alternative delivery mechanisms. However, this model can limit competition and places the delivery in the hands of a single provider over an extended time period.

<u>Prince Georges County, MD</u>
<u>Clean Water Partnership</u>

- P3 between the County and Corvias Solutions
- Total program costs of ~$200 million through 2021.
- To date, over 4,000 credit acres of impervious using a range of BMPs including ponds, GI, and stream restoration totaling over 232 projects.
- Local participation goals include 30-40% of the total project scope by the County's small, minority, and women-owned businesses. Additional goals for 50% local business participation and 51% county resident hours during peak construction season.
- Mentor/Protégé Program to develop local businesses.
  Alternative compliance targeting small projects on tax exempt, faith based, or 501(c)3s.

3.2: Exploration of Innovative Technologies

Maintaining an openness to adaptive management and technological innovation can allow for more cost-effective solutions that will leverage the impact of PWSA's stormwater fee.

Smart Sewers and Real Time Control

One example is the application of real time controls (RTC), or continuous monitoring and adaptive control (CMAC), which has proved successful in peer cities. Real time control systems encompass a range of technologies and processes, "including hydraulics, instrumentation, remote monitoring, process control, software development, mathematical modeling, organizational issues, and forecasting of rainfall or flows".[1] RTC systems do not have to be complex, as they are scalable, and the scope can be adjusted to fit site-specific operational needs.

Recommendations and Conclusions for PWSA

The following recommendations and conclusions are based on a case study and literature review:

- Insofar as RTC have primarily been deployed to date as an element of CSO/SSO control, clarify target sewer sheds where CSO/SSO control are a primary driver of planned investment
- Perform an initial system screening to gauge "control-worthiness" of PWSA's existing system using the Planning Aid for Sewer System real Time control (PASST). This can be performed in conjunction with detailed priority shed master planning so that RTC options can be evaluated in concert with other interventions.
    - PASST was developed and published in 2004 by Schütze et al. and updated in 2017. A fully worked case study is available which details the procedures of evaluating the control potential of the system and setting up an RTC system and control algorithm.[2]
    - A web-based version of the PASST evaluation table (in German) is available at http://www.passt.infraconsult.de/03_Bewertungstabelle/bewertungstabelle.html
- Evaluate dry weather system capacity to determine whether RTC inline storage is an option.
- If initial PASST screen indicates "control-worthiness", pursue detailed RTC evaluation using hydrodynamic model (see Stage 2 of Real Time Control evaluation procedure in Appendix 2). This evaluation could be applied first to one or two priority sheds to facilitate the implementation of a pilot scale application.
- RTC strategies can vary in complexity and extent and can be utilized in specific focus areas rather than trying to apply a full system smart sewer network from the outset. Initial implementation should focus on priority sheds identified in the Strategic Plan for

[1] Stinson, M. K. and C. Z. Vitasovic. *Real Time Control of Sewers: US EPA Manual*. In Proceedings, 2006 World Water and Environmental Resources Congress, Omaha, NE, May 22 - 25, 2006. American Society of Civil Engineers (ASCE), Reston, VA, ., (2006). Retrieved from: https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=154344

[2] Manfred Schütze, Maja Lange, Michael Pabst, Ulrich Haas; Astlingen – a benchmark for real time control (RTC). Water Sci Technol 31 May 2018; 2017 (2): 552–560. doi: https://doi.org/10.2166/wst.2018.172. Retrieved from: https://iwaponline.com/wst/article/2017/2/552/38794/Astlingen-a-benchmark-for-real-time-control-RTC

Stormwater, particularly where CSO/SSO source control is likely to be required post tunnel and post regionalization.

- Case studies of RTC implementation in South Bend, Cincinnati, and Buffalo show that a phased approach that builds incrementally has a higher success rate and easier management. Further, project managers involved recommend first installing sensors to provide real time monitoring for better sewer system characterization during wet and dry conditions.
- Dynamic flow diversion to convey flow away from overloaded interceptors during wet weather events could still present an opportunity for a system operating at the higher end of its design capacity during dry weather.

RTC Implementation Examples

South Bend, IN

The City of South Bend, IN developed a real time control and real time decision support system (RTDSS) in partnership with the University of Notre Dame and Purdue University to optimize the use of its existing infrastructure.[3] The partnership led to the formation of EmNet, a private company that has since worked with Evansville, IN; Columbus, OH; Buffalo, NY; and San Francisco, CA to implement RTC systems. EmNet is now a subsidiary of Xylem.

- Dry weather overflows have been completely eliminated and combined sewer overflow volumes were reduced by more than 70 percent annually (1000 MG/year).[4]
- The smart sewer program required 60 percent less infrastructure investment compared to their original long-term control plan, which saved the City $400 million in capital expenditure spending.[5]
- The project cost $7 million to implement and costs an additional $280,500 per year for data collection, operations, and maintenance fees. The project was completed in four years, between 2007 and 2011, which included the development of software and hardware.[6]
- The project managers recommend that cities seeking to adopt smart sewer technologies focus first on installing sensors and collecting data to help understand the existing system capacity, as well as "invest[ing] more, earlier".[7]
- Having good communication between the smart sewer infrastructure contractor, the city, and the water authority(s) is crucial, as is having clearly defined operation procedures and designated responsibilities.

[3] Gilot, Gary & Henthorn, Patrick & Ruggaber, Timothy. (2013). *From Concept to Practice: South Bend, IN's Intelligent Collection System.* Proceedings of the Water Environment Federation. 2013. 647-666. 10.2175/193864713813504395. Retrieved from: https://www.researchgate.net/publication/314524603_From_Concept_to_Practice_South_Bend_IN's_Intelligent_Collection_System
[4] "Utility Reduces CSO Volume by More Than 70% and Saves $400 Million in CapEx Spending Using "Smart Sewer" Technology," Xylem, accessed January 13, 2022, https://www.xylem.com/en-us/support/case-studies-white-papers/south-bend-indiana-reduces-combined-sewer-overflow-70-percent-saves-400-million/
[5] Ibid.
[6] "South Bend, Indiana Uses Smart Sewer Technology to Monitor and Manage Increased Water Levels," Indiana University Environmental Resilience Institute, accessed January 17, 2022, https://eri.iu.edu/erit/case-studies/south-bend-indiana-uses-smart-technology-to-monitor-and-regulate-wastewater-levels.html
[7] Ibid.

Cincinnati, OH

The Metropolitan Sewer District (MSD) of Greater Cincinnati worked with Xylem to implement real time control system as part of its CSO mitigation program. MSD reports a reduction of 247 million gallons of overflow reduction as a result of the RTC program and avoided capital costs of $38 million. Some additional reported benefits include:

- Reduction of overflows by 15% in the first year after implementing real time monitoring capabilities, and by 33% in the second year after implementing real time control capabilities.[8] [9]
- Low cost of implementation at approximately $.01/gal.

Buffalo, NY

The Buffalo Sewer Authority (BSA) operates a sewer system with a designed capacity of up to 750,000 people but is serving closer to 250,000. The excess capacity presented an opportunity to use real time control for inline storage and maximize the capacity of their collection system.[10] Additional highlights:

- Real time control program reduced their long-term control plan cost from $525 million to $380 million, a reduction of about 27 percent. The first three inline storage RTC sites have reduced Buffalo's CSO overflows by 450 million gallons (around 23%).[11]
- Used hydraulic model of the collection system to identify the locations best suited for RTC storage projects.

Albany, NY

Albany's Department of Water and Water Supply implemented a smart network using the Opti Platform in the Beaver Creek Sewershed, their largest combined sewershed that previously discharged over 530 MG/YR of combined sewer overflows to the Hudson River. Additional highlights:

- Increased wet weather capture from 10% to 90% at a cost of $0.005 per gallon.[12]
- enerated 93% capital savings and generated 6.5X improvement in wet weather capture mitigating downstream flooding and CSOs.

[8] *Smart Sewer Systems and Smart Data Infrastructure*, EPA. Retrieved from: https://www.epa.gov/system/files/documents/2021-11/smart-sewer-webinar.pdf
[9] *The Case for Operation Optimization*, Metropolitan Sewer District of Greater Cincinnati. Retrieved from: https://msdgc.org/downloads/initiatives/innovative_technologies/The_Case_for_Operational_Optimization_v2.pdf
[10] Hammerstein, Matt, "Artificial Intelligence in Wet Weather Infrastructure" (2019). Williams Honors College, Honors Research Projects. 893. https://ideaexchange.uakron.edu/honors_research_projects/893
[11] "Real-Time Decision Support System exceeds expectations – helps reduce CSOs by 450 million gallons helping reduce consent agreement by $145 million," Xylem, accessed January 19, 2022, https://www.xylem.com/en-us/support/case-studies-white-papers/machine-learning-reduces-combined-sewer-overflow-volume-and-helps-reduce-a-consent-decree-by-145/
[12] "City of Albany, NY," OptiRTC, https://optirtc.com/assets/images/case-studies/CaseStudy-Albany-New.pdf?_cchid=d4b8b7e9a4b7fe409bde53e3c850a831

Stormwater Management + Renewable Energy Systems

Another group of technologies that could help PWSA better leverage its stormwater fee are installations that integrate renewable energy generation or storage and stormwater management. These include projects that co-located stormwater retrofits with solar arrays or battery storage projects. Among the most promising of these technologies are solar green roofs – integrated rooftop installations that include both a green roof and solar arrays. These technologies have been in wide use within Europe, but have only been recently introduced commercially into the U.S.

Solar green roofs installed in conjunction with affordable housing offers a particularly potent combination of environmental and social benefits as well as multiple revenue streams and subsidies.

Recommendations and Conclusions for PWSA

- Engage with the Pittsburgh City Planning Department regarding the potential for co-locating stormwater and energy generating facilities that advance the City's Energy Strategy.
- Engage with URA regarding the possible inclusion of supplement stormwater management and solar generation pay for performance requirements into affordable housing RFPs (see also Alternative Delivery Memo).
- Evaluate the potential for incorporating stormwater retrofits and battery storage projects into a single incentive program that could reduce the installation costs of both project types.

Solar Green Roofs

Solar green roofs provide the potential to "stack" subsidies for property owners. For instance, an installer of a green roof solar system for stormwater compliance (e.g., as part of new or redevelopment) may qualify for a volume or rate control incentive grant under the new Pittsburgh Stormwater Ordinance, provided the green roof can be upsized to provide additional management beyond the required volume or rate control. This incentive could be paired with renewable energy incentives, such as the federal tax credit.

Installation of the solar roof system can also be funded privately as through a power purchase agreement, in which the solar provider pays for the cost of the system and then sells power to the owner or back to the grid for a period of time, typically 20 years. In this instance, the inclusion of a green roof component can increase the efficiency of the solar array, helping to reduce the return on investment. This can make smaller roof surfaces potential candidates for a PPA-funded solar installation than might be possible with a conventional solar array. The increase in the efficiency of the solar array is due to the cooling effect of the green roof, which

can increase solar capture efficiency during the summer months. Additionally, as the green roof provides a structural role in the solar panel array, acting to ballast the solar panels, the green roof itself can be funded through the PPA as an integral system component. Further, the ballasting function of the green roof means that the solar array can be installed without puncturing the waterproof roof membrane. While solar green roofs can prove challenging due to loading concerns when implementing as a retrofit of an existing building, incorporating into new construction is far more straightforward. In these instances, the roof design can incorporate the loading requirement for the solar, green roof, usually with only a small premium on the cost of construction.

Stormwater Retrofits and Battery Storage

Beyond solar green roofs, the emergence of battery storage incentive programs could create another opportunity to combine stormwater management and renewable energy infrastructure. Some jurisdictions are now implementing incentive programs to encourage the deployment of battery storage projects. One such program is Energy Storage Solutions, a new statewide program targeted at incentivizing battery storage projects within vulnerable communities in Connecticut. Enabled by state legislation, the program began on January 1, 2022, and will continue for nine years. The program provides an upfront subsidy (up to 50% of project costs for commercial customers) as well as incentive payments based on energy contributions back to the grid.

The emergence of programs like Energy Storage Solutions could provide an opportunity for co-location of stormwater retrofit projects that provide stormwater fee credit. By combining or "stacking" subsidies, customers can realize revenue/savings from multiple streams with a single capital project. Programs could benefit from cross-marketing as well, helping to increase the uptake of both battery storage and stormwater retrofit projects.

3.3 Exploring Sources of External Funding

Given the gaps between PWSA's current revenue and forecasted investments needed to meet the objectives of the Strategic Plan, securing external funding will be crucial to the success of the plan. Leveraging these sources of funds will be crucial to achieving a higher level of service faster while keeping stormwater fees affordable for customers. With the passage of the Infrastructure Investment and Jobs Act (IIJA), federal funding opportunities will be particularly strong over the next 5 years, while local and state-based programs such as the ALCOSAN Green Revitalization of Our Waterways (GROW) program and Pennsylvania DEP Growing Greener will continue to be effective and important sources of funding that can be used as non-federal match.

Potential External Funding Sources

Program	Type	Geography	Funding Level	Application Period	Strategic Plan Funding Priorities	Cost Share
ALCOSAN GROW	Grant	Allegheny County	$10 million per year (average since 2016)	Annually in Fall	Sewer separation projects that feed regional hilltop or ravine storage projects, particularly in watersheds that are not draining to proposed ALOSAN tunnels	Unknown
Growing Greener	Grant	Pennsylvania	18.2 million (2021)	4/22/22-6/24/22 (FY22)	Watershed storage in equity communities, Nature-based floodplain projects that incorporate pollutant load reduction in TMDL (i.e. Saw Mill Run) areas	15% local match

PennVest Clean Water State Resolving Funds	Loan	Pennsylvania		Quarterly (May 4, 2022 August 3, 2022 November 2, 2022, February 1 2023, May 3, 2023	Separate and combined sewer capacity enhancements	
FEMA BRIC	Grant	National	$1 billion (FY21)	9/30/21-1/28/22 (FY21)	Nature based floodplain restoration and associated property acquisition, particularly for Saw Mill Run	25% non-federal

PennVest Clean Water State Revolving Funds

PennVest Clean Water State Revolving Funds are typically looked at a source of capital funding for wastewater projects. The program does, however, allocate significant funding for stormwater projects. While PWSA has successfully procured PennVest funding to support other aspects of its capital budget, it has not previously sought PennVest funding for stormwater projects. With the current inflation environment and interest/bond rates going up, PennVest loans could be a potentially important source of low-cost capital to support implementation of aspects of the Strategic Plan. Given the focus of other programs like FEMA BRIC, ALCOSAN GROW and, PennVest loan applications might be most appropriately used to fund combined or separate sewer conveyance/capacity enhancements, either as stand-alone projects or in combination with watershed storage projects.

As of 2019, PennVest also provides a programmatic financing option that provides non-project specific funding for capital improvement plan. Although provided mainly for drinking water and wastewater, PennVest has a non-point source ProFi option that can fund "stormwater, green infrastructure applications, conservation easements, and other types of restoration projects for wetlands, streambanks, and watersheds." This option should be strongly considered as a strategy for funding projects through PennVest.

ALCOSAN GROW

ALCOSAN GROW funding has been successfully obtained by PWSA to fund projects such as the Four-Mile Run, Wightman Park, SoHo Green Infrastructure Project. With the implementation of the Interim Wet Weather Plan, ALCOSAN will likely shift future GROW funding to combined

sewer areas that are not managed under its current plan (i.e., by the proposed tunnels), providing an opportunity to leverage funding for projects such as partial sewer separation projects on sloped hillside and hilltop areas that feed regional storage projects in ravine typologies. According to recent input from ALCOSAN, the availability of this funding stream is questionable in the long term, but should be available to support near term projects.

Pennsylvania DEP Growing Greener

Pennsylvania DEP's Growing Greener Program (and associated Federal 319 Non-Point Source Program) provides funding primarily for water quality projects that address non-point source pollutants such as sediment, nitrogen, and phosphorus. In recent grant guidance, this traditional focus has been augmented by a new emphasis on projects that address flood resiliency and target equity areas. Growing Greener grants can be obtained for design and construction as a single grant. Alternatively, applicants can apply for funds for design only or for construction only. Given the current guidance, PWSA should look to Growing Greener to fund the design of integrated floodplain projects, particularly if addressing non-point source pollution (for instance through stream restoration).

FEMA Building Resilient Infrastructure and Communities (BRIC)

The Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC) Program is FEMA's pre-disaster mitigation funding program. BRIC provides funding for a range of disaster mitigation activities, primarily through an annual national competition, a smaller pool of funding is allocated directly to states, territories, and tribal entities. BRIC provides funding for planning, project scoping, design, and construction. Applications to BRIC are made by states, territories, and tribes on behalf of local project applicants. In Pennsylvania, BRIC applications are packaged and submitted by the Pennsylvania Emergency Management Agency (PEMA).

BRIC is a highly competitive program that emphasizes cost effectiveness in project selection as demonstrated through FEMA's Benefit Cost Analysis methodology. In the first two years of the program (FY20 and FY21), requests have exceeded the available funding by an approximately 4:1 ratio. Funding priorities also include the use of nature-based communities and funding for underserved communities via the Justice40 Initiative. BRIC funding also requires alignment with County-level and State-level Hazard Mitigation Plans.

BRIC provides a potentially potent source of funding for PWSA, particularly with regards to nature-based flood mitigation projects, such as are depicted in the Floodplain Project Type. Pre-planning/scoping to ensure that projects are competitive based on FEMA's Benefit Cost Analysis is critical. In developing BRIC applications, PWSA should coordinate project development and identification efforts with the City of Pittsburgh, Office of Sustainability, Allegheny County Department of Emergency Services (which led the development of the County's Hazard Mitigation Plan, and Local nonprofits such ss the Watersheds of South Pittsburgh.

Recommendations

Develop a Joint Funding Strategy

PWSA, in collaboration with other city entities through the Joint Stormwater Task Force, should develop a stormwater and resilience funding strategy. This strategy would build on the grant opportunities identified in the Strategic Plan to build out specific agency roles, target projects, and application timelines. Particularly important to this effort will be to identify multi-objective, nature-based projects that can meet both PWSA's needs as well as meeting the goals of other agencies and neighborhood-based plans. These projects need to be developed with a detailed understanding of funding preferences to improve the chances of funding, particularly for highly competitive national funding programs like FEMA BRIC. Also critical will be to identify strategies for leveraging multiple outside funding sources. This will require careful alignment of project development, grant application, and implementation timelines through a collaborative planning process. This strategy will allow PWSA to align project timelines to facilitate funding from multiple programs. (For instance, obtain Growing Greener funds to provide design resources (and non-federal match) and subsequently pursue a FEMA BRIC grant and/or PennVest financing).

Additional considerations with respect to alignment of funding streams include:

- Alignment of Priorities – Developing a nuanced idea of how funding preferences interact will allow PWSA to plan for projects that appear to multiple funders. For instance, if PWSA is developing a project for Growing Greener funding to fund design but to BRIC or PennVest funding to support construction, the concepts offered in the initial Growing Greener Grant must also reflect FEMA and/or PennVest funding preferences and requirements.

- Procurement, Matching and Other Requirements – Each grant program has individual requirements for how design and construction services must be procured, what qualifies as matching funds, and topics such as prevailing wages and minority/woman owned business requirements. Understanding these requirements upfront is critical to deploying grant resources effectively. For instance, if competitive bidding is required, the use of a full delivery project delivery model may not be possible.

Hire a Grant and Funding Coordinator or Consultant

External funding is often limited by internal capacity. Given the anticipated high levels of funding available over the next several years, PWSA in collaboration with other city partners should co-fund a grant and funding coordinator or consultant. This coordinator would initially develop a funding strategy and subsequently to assist with the development of individual grant applications. A dedicated resource can bring the time and expertise to the grant development process required to optimize project selection and design to enhance funding possibilities. PWSA could also look to local foundations to provide grant development support, possibly through a consultant contract.

Action 6: Joint Task Force

As discussed in Task 2, one of the six Targeted Actions of the SWSP is to develop a framework and charge for a city-wide Joint Task Force focused on localized flooding and stormwater management. The initiative can maximize impact of investment despite resource scarcity, confront climate change and future adaptations, streamline project approvals and implementation, speed up delivery of quality-of-life improvements in environmental justice communities, and create compelling incentives for source reduction and increased cooperation.

Managing stormwater and localized flooding is a whole-of-government challenge. While PWSA has assumed significant responsibility for management of water quality and quantity issues around stormwater within the City, and the recent imposition of the stormwater fee cements the perception of PWSA's responsibility in the eyes of rate-payers, in reality PWSA exercises precious little control over many of the key factors that contribute to these challenges and complicate the implementation of solutions (e.g.: impervious public and private landscapes, overlapping utilities, etc.). Across city government, current siloed roles and responsibilities inhibit effective planning, funding, and execution of needed investment. Furthermore, given PWSA's limited resources in this regard, without leveraging the knowledge, capability, and resources of other departments/authorities, PWSA's efforts will not succeed.

The scope and terms of PWSA's engagement with city government is memorialized in a series of agreements and memoranda, with a specific MOU governing responsibility for MS-4 permit compliance currently under negotiation. In addition, it is expected that both PWSA and the City will be parties to the pending consent decree with respect to ongoing CSO/SSO compliance. The current change in mayoral administration provides a window for broadening, accelerating, and formalizing this cooperation.

Peer Utility Experiences

While the challenges faced by other cities with respect to stormwater and localized flooding vary somewhat, and the specific structure, history, and political dynamics among entities involved are necessarily unique, hard won experience from peer cities can provide valuable models to emulate and adapt to Pittsburgh. As the specific scope and operation of the proposed task force takes shape, PWSA can draw on specific input from peer utilities.

New York, DC, and Philadelphia have implemented similar approaches in response to distributed compliance responsibility and major flooding events, with promising results. We interviewed current and/or former utility management from each city:

- In the case of New York, the best analogue is the relatively new flooding Task Force currently addressing fallout and actions in response to Hurricane Ida.
- Philadelphia offers two examples to work from: A Clean Water Task Force developed to coordinate the City's various departments' response to MS-4 requirements, and the Flood

Risk Management Task Force developed to address longer-term flooding issues associated with floodplain management, floodplain development and climate change-induced changes to flood risk.

- The experience in Washington D.C. offers no fewer than four analogous task forces: The Stormwater Fee Task Force, The Green Cabinet, the Clean water Task Force, and the Mayor's Flooding Task Force.

Key takeaways/lessons learned from our conversations can be distilled as follows:

1. Establish joint goals and objectives.
2. Identify key issues for resolution to achieve goals and objectives.
3. Initiate resolution of conflicts or uncertainties.
    a. Either achieve consensus on a path forward
    b. Task smaller groups of agencies/parties to resolve
    c. Report back to group
    d. Elevate to decision-makers if unsuccessful
4. Report and highlight accomplishments

<u>Proposed Goals for the Task Force:</u>

Based on interviews with other key stakeholder agencies earlier in the planning process and input from peer cities, the following initial goals for the establishment of the Task Force, subject to agreement of the parties, are recommended:

1) Shared adoption of, and accountability for, the priorities of the PWSA Strategic Plan for Stormwater
2) Accelerated negotiation and adoption of applicable MOU's governing responsibility for stormwater compliance and management of flood risk
3) Improved collection and sharing of flooding and stormwater data
4) Coordination of public input and development of accurate, consistent messaging around localized flooding and stormwater issues
5) Identification and elimination of existing barriers to effective implementation of investment at scale, e.g.:
    a. Development of streamlined review and approval processes for PWSA-led stormwater projects in public spaces/ROW
    b. Criteria for inclusion of stormwater investments/benefits inclusion in other city-led projects
    c. Coordination of incentives and enforcement for stormwater activities undertaken as part of private investment
    d. Coordination of evaluation and approval for alternative delivery mechanisms of stormwater services

6) Identification of opportunities for shared investments with stormwater/flooding benefits by aligning stormwater planning, budgeting, and funding strategies with other capital investments in affected communities, e.g., transport, housing, recreation, education

Proposed Structure of the Task Force:

While the specific makeup of the task force will require agreement from PWSA and the City, we would propose the following basic structure:

a) A core group of "core members", jointly chaired by PWSA executive management and a senior member of the mayor's staff, to consist of senior staff from the following organizations:

- *PWSA Executive Management*
- *Mayor's Office (Chief Operating Office or Chief of Staff)*
- *City Planning/Resiliency*
- *DPW/Parks and Rec*
- *DOMI*
- *DPS/OEM*
- *City Finance*
- *URA*
- *Chief Equity Officer*
- *Pittsburgh Schools*

This group would be responsible for adoption of specific goals, responsibilities, and timelines for the Joint Task Force. While the head of each department would not necessarily serve as a task force member, experience elsewhere has shown that the various representatives should have sufficient seniority and decision-making authority within their respective groups to allow for meaningful negotiation and ability to commit their groups to a specific course of action.

b) Insofar as significant coordination of activities will be required with entities beyond the city, a larger group of stakeholders would be invited to participate to include:

- *PWSA Functional Area Management (Operations, Engineering, Stormwater, Finance)*
- *ALCOSAN*
- *PennDOT*
- *Duquesne Light*
- *People's Gas*
- *ACHD*
- *ACCD*

- *Regional FEMA*
- *Local ACOE*
- *Interested Labor, Business, and Community Organizations*

Proposed Initial Actions for Task Force:

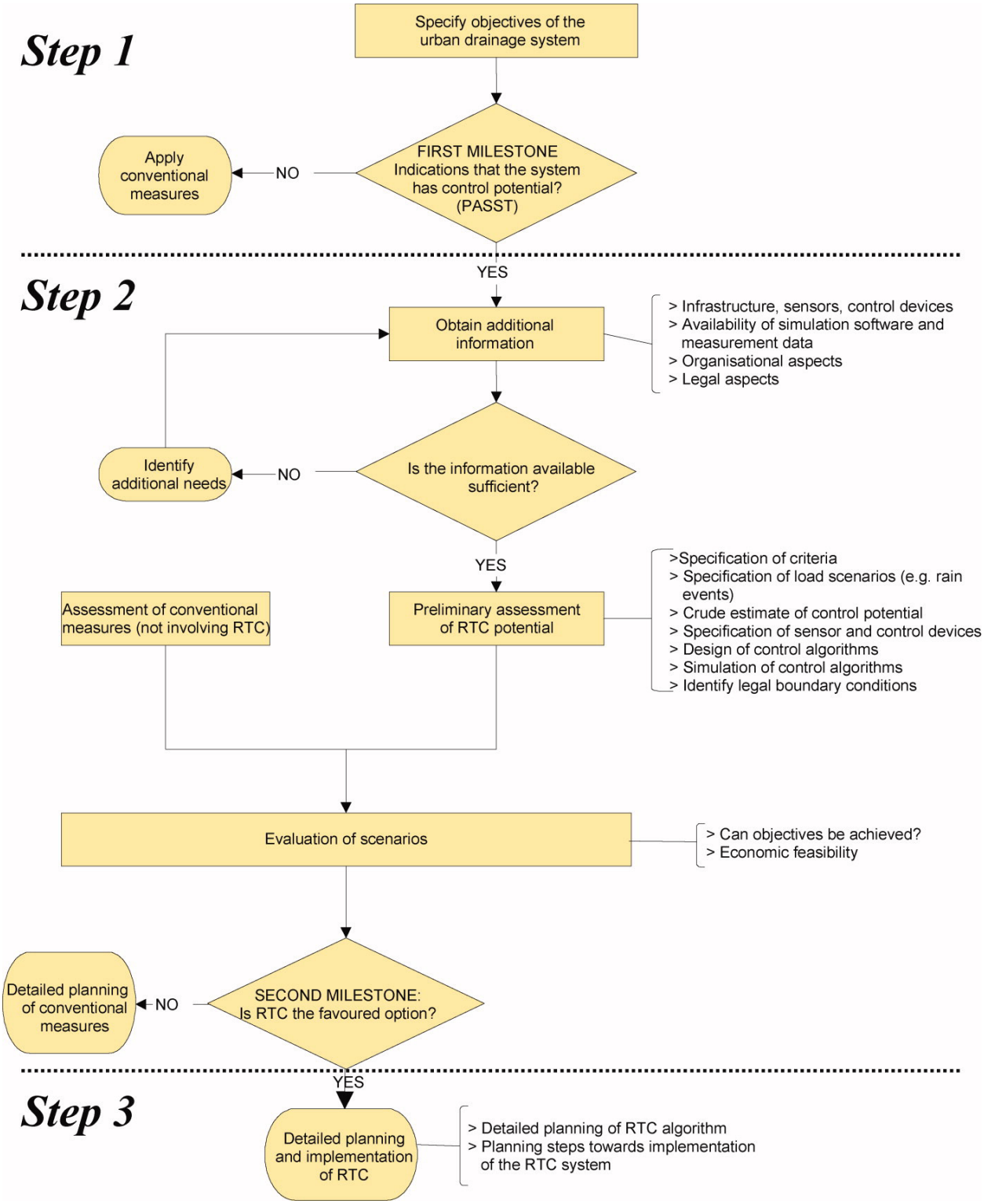
Based on the experience of other cities with this model, we propose the following initial actions to provide clarity around the mission and goals of the Joint Task Force:

- Secure Mayoral and Council buy-in, including any necessary executive orders or actions
- Public announcement regarding the JTF
- Agree consensus Goals/Objectives and associated schedule (assume semi-monthly meetings from outset),
- Commitment to information sharing, and public interaction
- Inventory current efforts/responsibilities and agreements among parties. Solicit JTF member and public input for identifying impediments and opportunities
- Undertake coordinated analysis of planning and capital/funding cycles and potential areas of leverage and joint funding opportunities.

APPENDIX 1 – Summary of Capital Projects

Project Name (per PWSA)	Proj ID	Sewershed	Neighborhoods	Technologies	addressing	Runoff Managed	Status	Budget Cost	Comments
1. Maryland Ave.	GROW: 2019_01_036		Ward 7	Permeable pavement GSI to handle 1" in 15 min downspout disconnection street tree protect/plantings	basement back-ups **Neighborhood flooding**	13 ac. impervious 1.5" runoff event		total $6.33M incl. previous	in public ROW documented flooding/backups in 2014, 2015 engage residents on private property improvements
2. Dragoon Way	Unidentified		Ward 10	upsizing infrastructure	street & property flooding		not started	$1.16M	
3. Thomas & McPherson	2018-GI-106-0 GROW: 2017_01_032	A-42	Point Breeze North Ward 7	Storage & slow release Permeable pavement bioretention	reduce CSOs	0.47 MGY 11.6 ac. impervious GROW estimate: 3.21 MGY	Const. 25%	$4.52M total $10.9M incl. previous	ALCOSAN GROW - partial funding combined with water main improvements
4. Fleury Way	2021-424-102-0 2019-424-103-3	A-42	N. Dallas Ave Ward 12	Sewer conveyance regrade and new catchbasins	Reduce flooding		Planning	$0.60M	cost share with City DOMI database has a 2019 ID number different than CIP
5. Bus Rapid Transit	2020-GI-100-0	M-05 M-19	Downtown Ward 1 & 4	permeable pavement subsurface storage bioretention	reduce CSOs?			$1.52M total $5.6M incl. previous	cost share with City DOMI
6. South Side Stormwater	2109-GI-100-0	M-16	South Side Slopes Wards 16 & 17	slow release swales & step pools sub & surface storage raingardens stormwater separation	reduce CSOs source control CSO consent order basement back-ups	26 ac impervious	Design 100%	$4.36M total $9.29 incl. previous	Aligns with City's South Side Park Master Plan
7. South Side Flats	Unidentified		South Side Flats Wards 16 & 17	separate sewer improved conveyance	reduce CSOs		Not started	$3.53M	
8. Martin Luther King Jr./Warren K. Branch Park	2019-GI-104-0 GROW: 2017_01_031	M-19	Terrace Village West Oakland Ward 4 & 5	Storage & slow release bioretention swale smart valve	reduce CSOs	7 MGY 7 ac. impervious	Design 90%	$5.35M Total $1.63M incl. previous	ALCOSAN GROW - partial funding
9. Lawn & Ophelia	2017-424-104-0 GROW: 2017_01_036	M-19B	South Oakland Ward 4	stormwater parklet rain garden permeable pavers subsurface storage	reduce CSOs improved park gathering	0.63 MGY 1.9 ac impervious	Design 100%	$0.76M Total $1.63M incl. previous	ALCOSAN GROW - partial funding: $0.31M data from both PWSA & ALCOSAN websites
10. Woodland Road	2018-GI-108-0 GROW: 2020_01_030	M-22	Shadyside Ward 14	dry stream restoration storage with slow release bioretention	reduce CSOs reduce surcharge sewer basement back-ups	3.28MGY 7ac impervious	Const. 70%	$0.58M Total $2.72 (inl. prior yrs)	Collaboration & cost share with Chatham Univ. ALCOSAN GROW - partial funding
11. Four Mile Run	2018-GI-102-0 GROW: 2021_01_021	M-29	Garfield Hazelwood Oakland Squirrel Hill Ward 15	stream daylight/restoration larger sewers/conveyance flood plain creation/bioretention subsurface storage **sewer separation** **Smart valve - Lake level control**	reduce CSOs basement back-ups Neighborhood flooding	24 MGY	Design 90%	$16.4M total $45M incl. previous	Includes water main relocation ALCOSAN GROW - $10m to be reimbursed data from both PWSA & ALCOSAN websites
12. Braywood	Unidentified		Ward 15	possible permeable paving bioswales subsurface detention	persistent flooding		not started	$0.91M	early planning stages to improve level of service
13. Wightman Park Phase I & II	2017-424-105-0 GROW: 2020_01_031A	M-29 Four Mile R	Squirrel Hill Ward 14	rain garden with storage subsurface storage street bumpouts separate SW	reduce CSOs sewer basement back-ups	2.24 MGY 12 ac impervious GROW estimate: 7.51 MGY	Const.: Ph I: 100% Ph II: 75%	$0.43M Total $6.7M (inl. prior yrs)	ALCOSAN GROW - partial funding Aligns with City's Wightman Park Improvement Proj.
14. Saw Mill Run Watershed	2020-424-109-0	Saw Mill Run	Overbrook Ward 32	stream restoration vegetated floodplain	reduce erosion MS4 water quality reconnect people to stream		Planning	$1.00M	
15. Saw Mill Run MS4 compliance	Unidentified	Saw Mill Run	Ward 32 & 29	MS4 compliance	MS4 compliance		not started	$3.5M	project types not identified
16. Volunteers Field (pt of Saw Mill Run)	2018-GI-104-0	Saw Mill Run	Carrick Ward 29	Ph I rain garden Ph II athetic field regrading inlet sediment traps	MS4 water quality	0.75 MGY sediment 2.2k lbs/yr	Const.: Ph I: 100% Design: Ph II: 90%	$0.94M Total $1.74 (inl. prior yrs)	
17. Nobles Lane	2021-424-104-0	Saw Mill Run	Carrick Ward 29	Sewer conveyance regrade and new catchbasins green filters in catchbasins	overland flooding			$0.16M	no existing stormsewer
18. Phillips Park	2019-424-103-2	Saw Mill Run	Carrick	subsurface storage - slow release Queenston sewer separation	street & property flooding		Const. 100% sewer design		emergency project
19. Stewart Ave Stormwater	Unidentified	Saw Mill Run	Carrick Ward 29	source control	street & property flooding		not started	$3.10M	project types not identified
20. Woods Run Phase I & II	2017-424-108-0 GROW: 2019_01_038		Perry North Ward 26	rain gardens stream & wetlands restoration tree plantings sewer separation	reduce CSOs reduce flooding & erosion Water quality	2.44 MGY 7.2 ac impervious	Const.: Ph I: 100% Design: Ph II: 90%	$3.01M Total $10.2M (inl. prior yrs)	ALCOSAN GROW - partial funding
21. Winchester Drive at Grovemont	Unidentified		Banksville Ward 20	Sewer conveyance regrade and new catchbasins	overland flooding hillside erosion		Const. 95%	$0.20M Total $0.84M (inl. prior yrs)	poorly designed street and catchbasins
22. Haverhill Street Improvements	Unidentified		Ward 13	intercept groundwater seep landslide stabilization	flooding & sediment		not started	$0.70M	

APPENDIX 2 – Real Time Control Evaluation Protocol



Real Time Control evaluation procedure (Schutze, M. et. al, 2008)