



SMALL CITIES WITH BIG-CITY INFRASTRUCTURE PROBLEMS

Three Case Studies in
Stormwater Infrastructure Innovation

ACKNOWLEDGEMENTS

This paper was authored by Ellory Monks and Shalini Vajjhala from re:focus partners as a part of [Build it Green](#) (BIG), a collaborative program developed and led by re:focus partners and New Jersey Future with design support from SCAPE. Build it Green was made possible by the generous support of the Geraldine R. Dodge Foundation and the Robert Wood Johnson Foundation's New Jersey Health Initiatives.

BUILD IT GREEN (TECHNICAL ASSISTANCE) TEAM

re:focus partners is a design firm dedicated to developing integrated resilience solutions and innovative public-private partnerships for vulnerable communities around the world. Through large-scale programs like the RE.invest Initiative and the RE.bound Program, re:focus identifies systemic opportunities for innovation to create both public value and new private investment potential through projects with sound financial returns and economic, social, and environmental integrity for the communities they serve.

SCAPE is a design-driven landscape architecture and urban design studio based in New York. SCAPE believes landscape architecture can enable positive change in communities through the creation of regenerative living infrastructure and public landscapes. SCAPE works to integrate natural cycles and systems into environments across all scales, from the urban pocket-park to the regional ecological plan. SCAPE does this through diverse forms of landscape architecture—built landscapes, planning frameworks, research, books, and installations—with the ultimate goal of connecting people to their immediate environment and creating dynamic and adaptive landscapes of the future. SCAPE provided design and analytical support to all participating BIG cities and helped develop the Field Guide to CSO+.

BUILD IT GREEN PROGRAM LEADERSHIP

New Jersey Future is a nonprofit, nonpartisan organization promoting sensible growth, redevelopment and infrastructure investments to foster vibrant cities and towns, protect natural lands and waterways, enhance transportation choices, provide access to safe, affordable and aging-friendly neighborhoods and fuel a strong economy. The organization uses original research, innovative policy development, coalition-building, advocacy, and hands-on technical assistance to advance its mission. New Jersey Future led the state-level coordination of Build It Green, including funding, outreach, and events.

re:focus partners developed the BIG competition framework (application & evaluation process) and led all city-level design and technical assistance activities, including the creation of the Field Guide to CSO+.

BUILD IT GREEN PROGRAM FUNDERS

Geraldine R. Dodge Foundation is a private foundation based in Morristown, New Jersey. Established in 1974, the Dodge Foundation focuses on issues critical to New Jersey, and nonprofit organizations whose work has a direct and meaningful impact.

New Jersey Health Initiatives is the statewide grantmaking program of the Robert Wood Johnson Foundation. Established in 1987 in honor of the New Jersey philanthropic legacy of RWJF's founder, Robert Wood Johnson, NJHI supports innovations and drives conversations to build healthier communities through grantmaking across the State of New Jersey. To meet the many health needs of the state's diverse populations, regions and communities, the NJHI program encourages collaboration across sectors to foster deep relationships committed to long-term change affording all New Jerseyans the opportunity to live the healthiest life possible.

INTRODUCTION

It is apparent that cities across the United States are coping with aging and failing infrastructure systems. What is less apparent is that small cities often face many of the same overwhelming, chronic and costly infrastructure problems as big cities. However, most smaller cities and towns do not have the capacity, expertise or resources to address these challenges. Large cities, like New York and Los Angeles, have entire departments with dedicated budgets to tackle problems with aging water systems and deteriorating roads, for example. The City of Boston has a staff position for improving the city's public procurement processes and outcomes. Through 100 Resilient Cities, one hundred mostly large and medium sized cities around the world have new "Chief Resilience Officers." When innovation in infrastructure happens, it is often as a result of the hard work of these dedicated city officials, departments, and resources.

Very real barriers exist for all cities looking to implement systematic infrastructure upgrades, including the gap in predevelopment capacity and resources, challenges in public procurement, competing city priorities, the understandable risk-aversion of government officials and engineers, and of course, lack of funding.

Smaller cities have an added barrier to this already onerous list: simply because of their size, these cities often do not have the dedicated time, staff or resources to evaluate how to best upgrade their existing infrastructure systems to be smarter and more resilient. Even when there is strong political and community support, pursuing innovative infrastructure projects can be intimidating, requiring expensive consultants and time-consuming feasibility studies to develop and evaluate different alternatives. If and when small cities overcome these barriers and undertake public procurement processes, these cities rarely have the visibility to publicize calls for proposals to larger design, engineering, and construction firms.

This means that smaller cities are often stuck making incremental fixes to existing systems, replacing what they had, or in the worst cases, doing nothing. The result is taxpayer dollars spent on new infrastructure designed for yesterday's (or more accurately, last century's) challenges. Nowhere in the United States is the "small cities with big-city infrastructure problems" dilemma more apparent than in cities that have combined sewer and water systems. These combined sewer and water systems are the legacy of 19th and 20th century development patterns that have endured as cities have grown. In the 21st century, these combined systems create major health and environmental problems.

Over eight hundred communities in the United States have combined water and sanitary sewers. These combined systems transport household, commercial, and industrial wastewater along with storm water. As a result, these systems can overflow during periods of heavy rain or snowmelt, carrying untreated sewage and water into local and regional waterways. Associated environmental and health impacts can be severe; health impacts associated with exposure to these discharges include hepatitis, gastroenteritis, and other infections. The EPA and state environmental protection agencies have placed high priority on mitigating combined sewer overflows (CSOs) and have mandated major CSO reductions under the Clean Water Act.

It is estimated that the cost of reducing CSOs to comply with these mandates will run into the billions of dollars. For many smaller communities that are already resource constrained and coping with long lists of urgent priorities, water system retrofits will take decades and the costs of compliance are expected to place a tremendous burden on city and utility budgets.

THE CASE FOR INTEGRATED INFRASTRUCTURE PROJECTS

Integrated infrastructure projects are one way for small and medium-sized cities to spur near-term action and innovation to solve overwhelming and seemingly intractable infrastructure challenges, such as addressing CSOs. Integrated infrastructure projects address multiple community problems in one cohesive design. For example, in 2016 the government of Hong Kong opened [T-Park](#), a single project that incorporates a new waste-to-energy facility that combines sewage and wastewater treatment with desalinization, energy generation, and recreational amenities.

Although integrated planning might appear more complex than conventional project design and finance, pursuing cross-sector infrastructure projects can unlock new resources and build broader support for projects that would never move forward otherwise. Some of the benefits of integrated infrastructure design include:

UNLOCK NONTRADITIONAL FUNDING AND FINANCING

Integrated infrastructure projects solve multiple community problems. This means that a broader range of funding/financing sources are often available, including resources that are not typically accessible for traditional projects. Integrated infrastructure solutions can also combine revenue-generating project components (i.e. energy generation) with those that create savings or other benefits (i.e. green infrastructure and recreational space) to expand the potential mechanisms available for implementation.

CREATE NEAR-TERM POLITICAL WINS

Integrated infrastructure projects often pair long-term, mostly invisible problems (like CSOs) with a shorter-term, more visible “pain point” (like a lack of parking). This means integrated infrastructure projects can generate clear and visible near-term benefits for the communities they serve. This visibility makes it easier to communicate a project’s necessity to citizens and business owners, and gain the support of elected officials for overall project completion.

FOSTER INNOVATION THROUGH UNCOMMON COLLABORATIONS

Integrated infrastructure projects are, by their very nature, interdisciplinary, and require cross-sector collaboration. This means that stakeholders, departments, and people who do not frequently work together, like real estate developers and utility officials, must collaborate to achieve a common goal. These kinds of uncommon collaborations often lead to innovations and efficiencies that would not exist otherwise.

Taking an integrated approach to major infrastructure challenges offers all cities and utilities a new pathway to tackle high-priority projects while simultaneously leveraging resources and support for large-scale system change. This is especially important for cash-strapped small cities that don’t have access to the funding, financing, or implementation options available to larger cities to explore more modern or more sustainable technologies and solutions.

Whenever I run into a problem I can't solve, I always make it bigger. I can never solve it by trying to make it smaller, but if I make it big enough I can begin to see the outlines of a solution. — Dwight D. Eisenhower (attributed)

BIG SOLUTIONS FOR SMALL CITIES

Build it Green (BIG) was launched in March 2016 to explore how small cities could develop innovative solutions to existing CSO problems and serve as models for other communities across the nation facing similar environment and health challenges. The primary goal of BIG was to help three small and medium-sized New Jersey cities, selected through a statewide competitive application process, to design, finance, and implement integrated infrastructure projects specifically aimed at addressing CSOs alongside other urgent community priorities.

Three New Jersey cities were selected to receive technical assistance: the City of Gloucester, the City of Perth Amboy, and the City of Jersey City. Each city received nine months of technical assistance to design financeable, integrated CSO projects and pursue immediate funding opportunities.

The BIG partner cities, like all cities, are unique in their priorities and challenges. Each city applied to the BIG Competition in a different stage of project predevelopment, from the earliest stages of prioritization and brainstorming to later stage cost and environmental performance estimation. The BIG technical assistance process was tailored to each city to reflect these different starting points.

The State of New Jersey is home to twenty-one communities with combined sewer systems. In 2015, the NJ Department of Environmental Protection issued permits to requiring significant reductions in CSOs. These mandates are largely unfunded, creating a strong push for utilities and communities to explore new ways of leveraging resources to meet their compliance obligations as part of ongoing Long-Term Control Planning efforts.

The BIG Team worked with each city to understand city challenges and priorities and to identify opportunities for incorporating local priorities and CSO mandates into integrated projects that can open up access to nontraditional funding/financing sources. The results in each city were recommendations from the BIG Team for the design, funding/financing and implementation of innovative stormwater infrastructure projects. The following sections provide a summary of the design and finance process and outcomes in each city and offer general insights, lessons learned, and recommendations for how to better support small cities as they seek to upgrade infrastructure systems.

As an accompaniment to the case studies described on the following pages, the BIG Team also created the [Field Guide to CSO+: A Strategy for Aligning Priorities and Tactics for Unlocking Resources](#). The Field Guide is intended to be a source of inspiration for local officials struggling to make progress on addressing CSOs in their communities. Specifically, the Field Guide includes a discussion aid for local officials to explore integrated infrastructure solutions with elected officials and utility leaders, to identify nontraditional funding/financing resources that may be available, and to outline practical paths to project implementation.



FIELD GUIDE TO CSO+

A Strategy for Aligning Priorities and Tactics for Unlocking Resources

CITY OF GLOUCESTER, NEW JERSEY

A CASE STUDY IN STORMWATER + ECONOMIC (RE)DEVELOPMENT

CITY OF GLOUCESTER, NEW JERSEY

A CASE STUDY IN STORMWATER + ECONOMIC (RE)DEVELOPMENT

BACKGROUND

The City of Gloucester is one of the country's oldest cities, dating its history back to 1623. As a port city located on the Delaware River across from Philadelphia, Gloucester was once home to nearly 4,000 high-quality industrial jobs. These jobs were lost to recession in the 1980s, and the City's current population is 11,400 residents (2010 Census). Gloucester experiences almost daily sunny-day, tidal flooding—related to one of its combined sewer outfalls—that results in frequent road closures. The City experienced 13 combined sewer overflow events in June 2016 alone. Some of the more extreme flood events, when rainfall or snowmelt coincides with high tides, cause floodwaters to surge up through the storm sewers at pressures strong enough to float manhole covers down one of the City's main streets. During the spring and fall seasons, this type of flooding occurs approximately twice a month and causes the City to block off entire streets for days at a time until the water subsides. In short, flooding impacts the bottom lines of nearly all residents and existing businesses in Gloucester. Flooding severely impedes the City's ability to pursue new economic growth opportunities, attract high-quality employers and jobs, and recover from decades of industrial job losses and high unemployment.

THE BIG SOLUTION

The overarching goal of the BIG Team was to position the City of Gloucester to undertake a comprehensive and integrated infrastructure project that strategically reduces flooding in the City and enables sustainable economic growth and employment.

Gloucester is in the earliest stages of planning to address its intertwined flood and economic development challenges. Therefore, the BIG Team's technical assistance focused on the capacity building, conceptual design, stakeholder engagement, and funding and implementation analysis, required to put the City on a realistic path to implementation.

Working with city officials and local business leaders, the BIG Team provided ideas and guidance for three main areas of activity: Design, Funding/ Financing, and Implementation.

KEY ACTIVITIES

- Idea generation workshop and site visit (August 2016)
- Completion of initial design concept (October 2016)
- Survey of local businesses to explore flood-related losses (December 2016)
- Introductory in-person meeting with Economic Development Agency representative (January 2017)
- Completion of funding/financing and implementation strategy (March 2017)
- Completion of analysis to support funding applications (March 2017)

Gloucester City is committed to the installation of green infrastructure to manage stormwater, provide good local jobs, and make our neighborhoods healthier and more beautiful. — Mayor William James

DESIGN

The historically industrial area between Market and Broadway Streets along the Delaware River in Gloucester has long been identified as an ideal location for redevelopment. The site lends itself to the entry of new industries into the regional economy because of its large tracts of vacant, undeveloped or otherwise underutilized land suitable for light industrial activity; its close proximity to Philadelphia; and its access to existing water, rail and transportation infrastructure. The chronic and severe flooding, described above, has been and continues to be a major barrier to the City as it seeks to establish a hub of sustainable industry and employment along its Delaware River waterfront.

Starting in 2014, Gloucester worked with Rutgers University to conduct a citywide feasibility study to identify the most promising sites to reduce combined sewer overflows using green infrastructure. The BIG Team built on this early analysis and conducted an initial site visit and idea generation workshop in August 2016.

To reduce flooding, mitigate CSOs, and maximize the economic redevelopment potential of this area, the BIG Team developed an initial design solution that links a series of green spaces designed to flood during rain events (e.g. constructed, nature-based bayous), beginning near the major intersection with the most significant flooding (Market and Broadway) and continuing through the City all the way to the banks of the Delaware River. This nature-based approach was designed to complement strategic traditional “grey” infrastructure interventions—such as the installation of backflow valves—at the key combined sewer outfall (G1) to address tidal flooding. While this idea remains in the very earliest stages of conceptual design, the BIG Team’s initial analysis suggests that there are promising infrastructure solutions available to address Gloucester’s chronic flood concerns using a combination of green and grey (nature-based and traditional) infrastructure solutions.

FUNDING/FINANCING

Gloucester is a very small city with outsized legacy infrastructure from its industrial heyday. Staff capacity and financial resources are significant constraints for the City. As a result, the City needs significant predevelopment support in order to complete key pre-construction design and engineering activities. The BIG Team identified the federal Department of Commerce Economic Development Agency’s (EDA) planning and technical assistance program, as both a promising source of initial funding and an eventual source of project finance for the City, because of the extent to which flooding impedes economic development and growth opportunities in Gloucester.

The BIG Team focused its technical assistance on helping the City apply for funding to secure the staff capacity and technical resources required for the next phase of work. The BIG Team’s main activities included a survey of local business owners’ flood damages, a meeting with the regional EDA representative, and completion of the analysis required for predevelopment funding applications. The BIG Team expects that the project that emerges from these activities will be an excellent candidate for construction financing through EDA’s Public Works Program and the New Jersey Environmental Infrastructure Trust (NJEIT).

Like many funding agencies, EDA generally requires a 50% local match as a demonstration of local commitment and buy-in. This matching requirement is often a challenge for small cities. In Gloucester’s case, this difficulty presented an opportunity to bring together a diverse set of public and private partners, including local developers, to work with the City to identify new cash and in-kind resources. The commitments that Gloucester secured are excellent and tangible examples of how local partners, such as redevelopers, and cities can work together to align priorities and resources.

IMPLEMENTATION

In addition to supporting Gloucester in developing content and analyses for immediate funding applications for predevelopment support, the BIG Team also worked with the City to identify key implementation activities for the next phase of work. These include the procurement— through traditional public RFQ/RFP processes— of engineering services, conceptual design alternatives analysis, community engagement and master planning support, and schematic design services.

The BIG Team recommended that the City develop an RFQ/RFP for wide distribution to procure the services of a single nationally recognized, high-capacity engineering firm with demonstrated experience working with small cities to design and develop innovative solutions using an integrated design and implementation approach. Working with a single firm that can sub-contract specialty design, grant writing and other services, as needed, has the benefit of minimizing the contracting and management responsibilities for a small city like Gloucester and maximizes the likelihood of a streamlined implementation process.

To ensure that several qualified bidders respond to the RFQ/RFP for the next phase of activities, the BIG Team recommended that the City go to extra lengths—beyond posting the solicitation on the City's website—to publicize and distribute the RFQ/RFP. Specifically, the BIG Team recommended that the City create a free profile on [the Atlas](#) and take advantage of its complimentary RFP publicity and distribution services.

The BIG Team also drafted a sample scope of work for the next phase of activities, and developed the following preliminary RFP evaluation criteria:

COST

The City should consider approaches (consistent with state and local procurement law) for selecting proposals based on the best value for money, rather than a typical least-cost approach to bid selection. In order to avoid disadvantaging green infrastructure approaches that have higher capital costs but lower operations and maintenance costs, where possible, the City should ensure that estimates of operations & maintenance costs for the life of each project or project component are included in the evaluation of all bids.

RELEVANT DEMONSTRATED EXPERIENCE

Bidding firms should demonstrate clear experience with small and medium-scale flood control and mitigation projects; green and grey infrastructure design and construction document development; and associated community design, planning, and engagement activities. Firms that do not have experience with project design and permitting in the State of New Jersey should explicitly state how they plan to address local legal and permitting requirements in the design process.

STAFF QUALIFICATIONS

All bids should be reviewed carefully to make sure they include the appropriate mix of technical experts including hydrologists, professional engineers (with PE licenses), and cost estimation experts.

The BIG Team noted that as with any public procurement process, the City must evaluate all bids for consistency and compliance with state and local procurement laws.

NEAR-TERM RESULTS

The major conclusion of the Build it Green Team in the City of Gloucester was that options do exist to mitigate the severe, chronic flooding that prevents economic growth in the City, and that there is a realistic path forward to funding/financing the additional activities that need to be completed before constructing and operating an appropriate flood solution(s). Specific materials prepared for the City of Gloucester through Build it Green included: (1) Initial Design Concept, (2) Business Survey and Results, (3) Funding/Financing and Implementation Strategy, (4) Analysis to Support Phase 2 Funding Applications, and (5) Letter of Support Template.

The BIG Team's capacity building and technical assistance efforts were rewarded with immediate and significant results. Broadly, the City of Gloucester is now empowered to pursue a comprehensive solution to its intertwined flooding and economic redevelopment challenges. Senior city officials were, and continue to be, actively engaged and committed to the City's efforts to address its flooding and economic development challenges. Perhaps most importantly, Build it Green generated a set of open, honest, and strategic conversations within the City's leadership about city priorities and how best to move forward acting on those priorities which resulted in the creation of a strategic coalition of partners—including city officials, local business owners, redevelopers, and a local academic institution—all working together toward the same goal.

RECOMMENDED NEXT STEPS AND LONG-TERM OUTCOMES

The BIG Team's technical assistance process was designed to help Gloucester lay the groundwork for multiple phases of future work. Recommended next steps include:

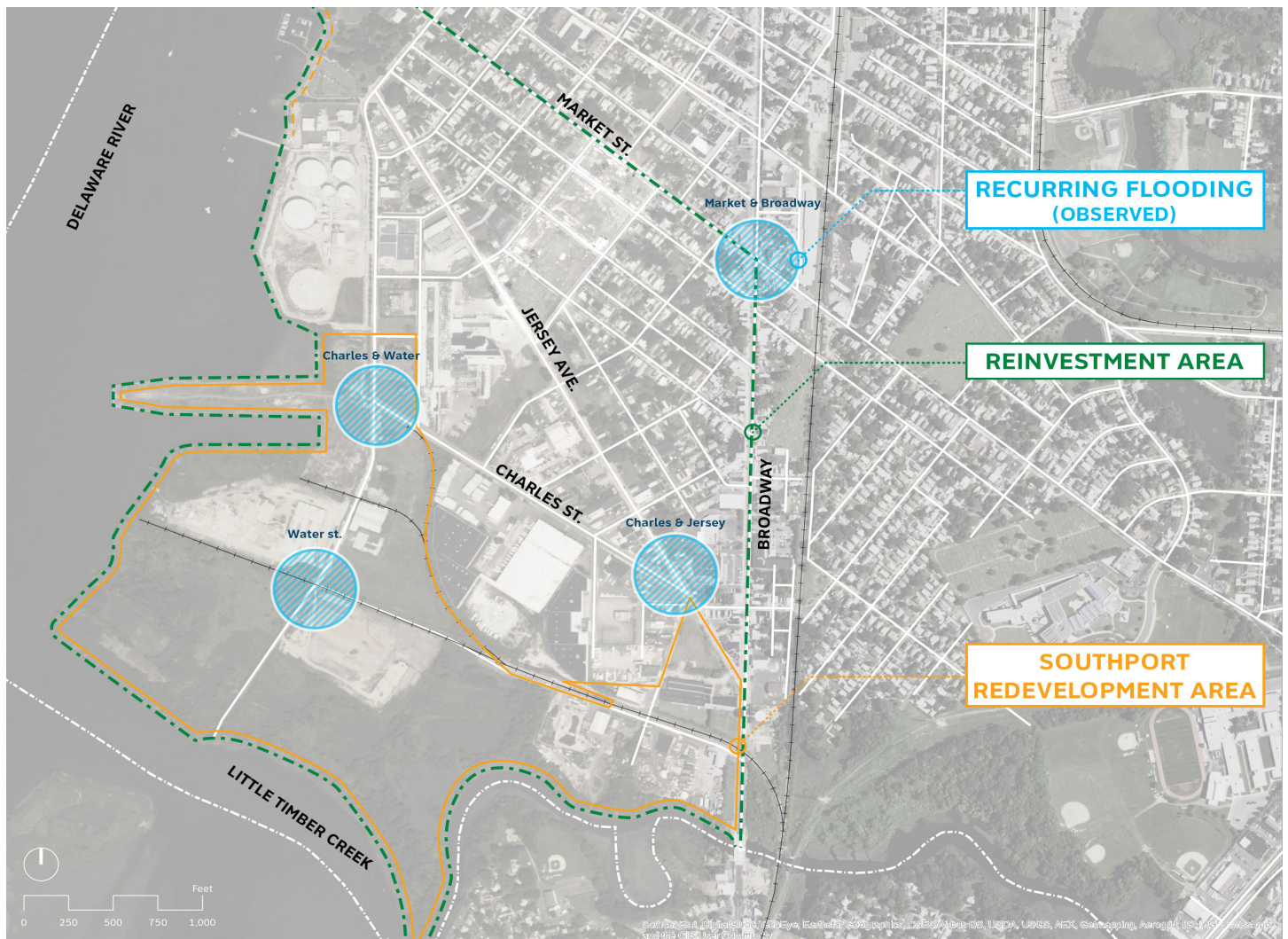
- 1 **DETAILED ENGINEERING ANALYSIS** to characterize the nature and extent of the chronic flooding that prevents investment in the proposed redevelopment area.
- 2 **CONCEPTUAL DESIGN ALTERNATIVES ANALYSIS** to determine options for mitigating chronic flooding, including analysis of the costs associated with protecting key assets and the funding/financing available to reach various levels of protection (e.g. 10-year, 100-year, 500-year storm), given that flooding will likely worsen in the future.
- 3 **COMMUNITY ENGAGEMENT AND PARTICIPATORY PLANNING** to engage with business owners, citizens and elected officials about the results of the engineering and design alternatives analyses and set local priorities for attracting new industries.
- 4 **DEVELOPMENT OF SCHEMATIC DESIGN DOCUMENTS** of the preferred comprehensive flood design solution suitable for final construction funding/financing.
- 5 **PREPARATION OF FOLLOW-ON FUNDING/FINANCING APPLICATIONS** to ensure that the City moves forward with implementing its vision for the planned reinvestment area.

**Note: "Schematic Design" is a term used in architecture to describe an initial design scheme that defines the general scope and conceptual design of the project. In engineering disciplines, this phase roughly corresponds to 30% design. Details that are often included in this phase of design include: specific site(s) identification, choice of interventions (e.g. detention ponds, bayou) and how they fit together to achieve project goals, including initial cost and performance estimates.*

The BIG Team strongly recommends that the City use competitive public procurement processes to secure the services required to complete these recommended activities.

Long-term, the anticipated outcome of the steps outlined above is the construction of a flood solution(s) in the City of Gloucester that removes flooding as the major barrier to growth and employment. City officials and local business leaders estimate that such an infrastructure solution, once constructed, will result in the creation and retention of thousands of jobs in Gloucester by 2025. Even longer-term, the BIG Team anticipates that Gloucester's efforts could result in a diversification of the regional economy and the creation of a new sustainable industrial hub.

Figure 1: Flooding hotspots and proposed reinvestment area in the City of Gloucester, New Jersey. Prepared by SCAPE.



CITY OF PERTH AMBOY, NEW JERSEY

A CASE STUDY IN STORMWATER + STREETS

**DESIGN ALTERNATIVE 03:
PRIORITIZE PEDESTRIAN SAFETY AND EXPERIENCE**

DESIGN FEATURES:

- Eliminate traffic lane
- Build sidewalk bump-outs
- Move existing curb

KEY MOVES:

- Improve pedestrian safety and experience
- Increase art, education and science
- Reduce CSOs

CONSIDERATIONS:

- Shared use marking for bicycles and pedestrians
- Adjust lane marking for bicycles
- Temporary construction impacts
- Requires relocation of street trees
- Requires relocation of street trees
- Requires relocation of street trees
- Requires relocation of street trees

DESIGN NOTES:

- Move existing curb
- Build sidewalk bump-outs
- Increase art, education and science
- Reduce CSOs

KEY MOVES:

- Build sidewalk bump-outs to reduce CSOs
- Increase pedestrian safety and experience
- Increase art, education and science
- Reduce CSOs

build it green

Perth Amboy's 2nd Street Corridor Project
Design + Finance Working Session and Engineering Site Visit
Wednesday, December 7, 2016, 1-4pm, Perth Amboy City Hall, 260 High Street

Competition (July 2016 – March 2017) is currently assisting Perth Amboy in integrated and financeable combined sewer overflow (CSO) solution for the corridor, as well as supporting the City as it submits the project to the New Jersey Infrastructure Trust and other sources for funding/financing. This opportunity for city staff to learn about the 2nd Street Corridor design process. Specifically, the goals of this working session are to:

1. Discuss design alternatives 3. Conduct an engineering review of the proposed design and discuss the opportunity to integrate green infrastructure into the design process.
2. Discuss design alternatives 3. Conduct an engineering review of the proposed design and discuss the opportunity to integrate green infrastructure into the design process.
3. Discuss design alternatives 3. Conduct an engineering review of the proposed design and discuss the opportunity to integrate green infrastructure into the design process.

TACTICS FOR UNLOCKING RESOURCES

H. CSO* STREETS

Effective strategies for addressing combined sewer overflows can include redesigning street(s) to include green infrastructure interventions like bioswales, which divert stormwater from the combined sewer system by increasing infiltration and reducing runoff. Green infrastructure can be effectively combined with targeted upgrades to surface transportation infrastructure to create safe and attractive multimodal transportation corridors that simultaneously manage stormwater.

Who Should Consider this CSO+:
CSO communities that are interested in upgrading multimodal corridors to reduce CSOs and increase pedestrian and bicycle safety, mobility, and access.

What's Involved:
Redesigning street(s) into safe and attractive multimodal corridors to reduce CSOs and increase pedestrian and bicycle safety, mobility, and access.

How to Pursue:
Identify a corridor for improvement, which should be located in the CSO watershed and should be strategically important for mobility and access (e.g. connects a mass transportation stop with other community amenities). Commit to developing a project that transforms the identified street(s) into a safe and attractive multimodal corridor that simultaneously mitigates CSOs.

Inspirations:
Ocean Park Boulevard Green Street (Santa Monica, CA)

Implementation
City Champion
The CSO+ Streets champion must ensure other city departments' awareness of support for and participation in project design and funding/financing. The Mayor, business administrator, public works, police and fire. This person must:

- Work across departments, with several stakeholders, to ensure that the project is built
- Have appropriate authority to make strategic design and finance decisions.
- Possess enough seniority to directly communicate with elected officials, including the Mayor and City Council.

The right CSO+ Streets champion in your community may be the Director of Planning, Transportation or Public Works.

Project Team
From priority setting and brainstorming to operation and maintenance, essential technical staff throughout the life of the CSO+ Streets project will include city officials (or contracted consultants) from the departments: planning, transportation, public works, grant writing and engineering. Significant design, engineering and construction required for or on the project.

CITY OF PERTH AMBOY, NEW JERSEY

A CASE STUDY IN STORMWATER + STREETS

BACKGROUND

The City of Perth Amboy is a coastal city in north-central New Jersey located along the Raritan Bay and connected by bridge to Staten Island, New York. Perth Amboy has a population of ~50,000 residents (2010 Census) and is a majority Hispanic community. The City has experienced significant population growth in recent decades and has invested in a major revitalization of its downtown and waterfront. The waterfront is a heavily used amenity, despite the presence of eight CSO outfalls that discharge directly to the Raritan River. The City has undertaken action to address its CSO issues as part of a 2012 EPA consent decree, and more recently has invested in the development of the 2nd Street Park, a new 6-acre park on a former brownfield adjacent to the waterfront. The anticipated park, located on formerly industrial land, is designed to provide valuable acres of open space along with other amenities, like a roller skate park and walking trails, for residents.

As part of its application to the BIG Competition, the City expressed a strong commitment to expanding green infrastructure, reducing CSOs, and improving pedestrian safety and access in the areas adjacent to the planned 2nd Street Park.

THE BIG SOLUTION

The City of Perth Amboy applied to the Build it Green Competition with a specific site (2nd Street) identified and a clear understanding of the outcomes the City wished to achieve through the redesign of 2nd Street. Through Build it Green, the City made significant progress on the whole set of predevelopment activities required for financing, permitting, engineering, and construction of a new CSO mitigation and street revitalization project. As a result of Build it Green, the City is now positioned to initiate construction funding/financing (and associated design, engineering and permitting activities) for a new complete street that the BIG Team named the “2nd Street Greenway.”

Major activities completed during the BIG Competition included the development of design, funding/financing, and implementation documents and recommendations. Each of these activities is described in detail in the following sections.

KEY ACTIVITIES

- 2nd Street priorities workshop and site visit (August 2016)
- Delivery of initial design concept and cost estimates (September 2016)
- Planning meeting with NJEIT and NJDEP (November 2016)
- Design alternatives workshop and site visit; designation of preferred alternative for funding applications (December 2016)
- Completion of funding/ financing and implementation strategy (February 2017)
- Delivery of proposed design documents, analysis to support funding/financing applications, and all supporting materials (February 2017)

DESIGN

The BIG Team worked with the City of Perth Amboy to refine its preliminary ideas for transforming 2nd Street into the “2nd Street Greenway,” a new complete street that combines improved pedestrian and bicycle safety, education, and CSO mitigation via green infrastructure. The proposed site is 5 city blocks long and connects an essential transit hub with the City’s waterfront. Beach-goers, pedestrians and bikers heavily utilize the street and waterfront, despite the several CSO outfalls located directly on the beach. There are also several businesses on 2nd Street, including a junkyard, auto repair shop, early-education center, and a public school. The corridor is a major hotspot for foot traffic, including students, parents and school staff, despite safety concerns for pedestrians. Specifically, there is an intersection at 2nd and Market St with poor visibility on a heavily trafficked bridge. Improving this intersection is a top priority for the City.

Vehicular traffic flows on 2nd Street are extremely problematic. The Perth Amboy Police and Fire Departments report that accessing 2nd Street during emergencies is challenging due to frequently double-parked trucks and cars blocking traffic. Furthermore, school drop off and pick up at the elementary school brings almost all of 2nd Street to a near stand still for an hour twice a day Monday through Friday because there is no outlet at the end of the street and cars must make a U-turn in order to exit the street from the school. Unsurprisingly, parents of children at the elementary school report frequent frustration with this situation.

The site of the future 2nd Street Park is at the end of the street, and park amenities are expected to further increase car and pedestrian traffic. The proposed 2nd Street Greenway is intended to serve as the primary access point to the 2nd Street Park and support the following goals: divert stormwater from CSO system, increase pedestrian and bicycle safety, improve health and wellbeing, improve connectivity, and create educational and recreational opportunities for residents. The BIG Team’s proposed conceptual design includes multiple layered design elements along the entire corridor with bioswales strategically positioned to maximize the volume of water diverted from Perth Amboy’s combined sewer system, as well as various traffic calming measures, painted curb extensions (neckdowns) and bicycle facilities to increase safety at dangerous crossings and around school areas.

Anticipated future residential development along the street offer opportunities to utilize green infrastructure for beautification and public space enhancements. To this end, the BIG Team’s proposed design also includes seating, lighting and other amenities that are strategically located to encourage use of the street environment by users of different ages and abilities. Additionally, the adjacent elementary school and future 2nd Street Park offer opportunities to integrate educational and recreational features in the proposed design and to introduce green infrastructure to children and families through art, information, and play. The BIG Team recommended the use of signage and other on-site communications technology to share information about how green infrastructure features work in a manner that is accessible and engaging for both children and adults. The proposed design also creates space for the future integration of sensors and other technology to monitor environmental performance of the bioswales and other indicators (e.g. temperature, air quality, noise level), pending funding.

FUNDING/FINANCE

The BIG Team’s primary recommendation to the City was to pursue full project funding for the 2nd Street Greenway through the New Jersey Environmental Infrastructure Trust (NJEIT), while simultaneously exploring grant opportunities through NJDOT Transportation Alternatives Program (TAP) and regional philanthropies.

The BIG Team recommended that [NJEIT](#) be the primary source of funding/financing for the 2nd Street Greenway because of the scope and scale of funds available and NJEIT’s stated interest in supporting projects like the 2nd Street Greenway. NJEIT’s mission is to provide low-interest loans for water infrastructure projects in New Jersey. In the last several years, NJEIT has made a concerted effort to expand its support for CSO mitigation projects and has more recently taken steps to support green infrastructure approaches to CSO mitigation. One such step was the introduction of principal forgiveness funding for green infrastructure projects. The BIG Team recommended to that City that it pursue the maximum amount of principal forgiveness funding for green infrastructure projects available through NJEIT as a part of its funding/financing strategy for the 2nd Street Greenway.

The BIG Team also suggested that the City apply to the NJDOT’s [Transportation Alternatives Program](#) (TAP). TAP provides funds for community based “non-traditional” surface transportation projects that strengthen the cultural, aesthetic, and environmental aspects of the nation’s intermodal system. Up to \$1 million in funding is available per project on a reimbursement basis. Importantly, projects receiving TAP funding must be authorized for construction within 2 years of grant notification and must have formal community support.

After the City has confirmed initial funding for the core project elements through NJEIT and TAP, the BIG Team recommended that the City pursue additional philanthropic resources and public-private partnerships to fund additional site amenities, including art installations, educational exhibits, public wifi technology, sensors for evaluating changes in environment and public health performance indicators, and other upgrades. The BIG Team recommended that, where possible, the City approach corporate foundations for technology donations, for example, for environmental health monitoring equipment.

IMPLEMENTATION

The BIG Team made several detailed recommendations aimed at helping the City move forward quickly and decisively to implement its vision for the 2nd Street Greenway, and provided a comprehensive package of recommendations on project timeline, stakeholder engagement options, strategic partnership opportunities, operations and maintenance considerations, and a strategy for public procurement of additional services required before and during construction (e.g. additional design, engineering, permitting).

As part of its package of final deliverables to the City, the BIG Team provided conceptual design documents complete at a level of detail sufficient to support the City’s first phase funding applications. For example, the recommended design includes initial cost and environmental performance estimates. The BIG Team emphasized to the City that additional design, engineering, and permitting activities will need to be completed once the City has confirmation of funding/financing, and that there will be many opportunities to further refine the proposed design and address specific local issues and concerns.

Perth Amboy is proactive about environment and urban infrastructure initiatives. Working with the re:focus team will reinforce these efforts to design a project that protects the Raritan River. These initiatives maintain and aid our local community in its preservation. — Perth Amboy Mayor Wilda Diaz

NEAR-TERM RESULTS & LONG-TERM OUTCOMES

The primary result of Build it Green in Perth Amboy is that the City is now positioned and empowered to submit the 2nd Street Greenway to NJEIT and NJDOT TAP for construction (and prerequisite additional design, engineering, permitting) funding/financing. Through the Build it Green participatory design workshops, the City built broad support, enthusiasm and participation among city departments, including the Mayor's and Business Administrator's offices, and the Planning, Public Works, Engineering, Police and Fire Departments. This support will be key to successfully constructing and maintaining the 2nd Street Greenway.

The long-term outcomes associated with the recommended design of the 2nd Street Greenway are significant and include measurable environmental, safety, mobility, education and health improvements. The BIG Team's proposed conceptual design for the 2nd Street Greenway had an explicit goal of diverting stormwater from Perth Amboy's combined sewer system. Based on initial environmental performance analysis, it is estimated that the proposed 2nd Street Greenway will result in the diversion of approximately 22,870 cubic feet of stormwater per standard storm event (equivalent to a 2-hour 1.25" rain event, as defined by NJ BMP's, Stormwater Quality Design Storm) from Perth Amboy's combined sewer system. This represents a significant environmental benefit because of the severe local pollution and environmental impacts associated with combined sewer overflows.

When taken together, the proven transportation strategies proposed on 2nd Street are intended to create a safer, more attractive and more effectively utilized multimodal transit corridor. Significant improvements to pedestrian and bicycle safety (i.e. reduction in accidents) are expected as a result of the 2nd Street Greenway. Because of these improvements, pedestrians and cyclists will be more likely to use the 2nd Street Greenway to access the City's waterfront, nearby transit station, and the planned 2nd Street Park. In addition, it is expected that the 2nd Street Greenway will result in fewer double-parked cars and trucks on 2nd Street, resulting in easier access for emergency vehicles and more efficient school drop-off and pick-up.

The interventions on 2nd Street are also intended to lay the foundation for expanded investment in educational displays and signage, health and environmental monitoring, and improved public internet/wifi access. The proposed design includes examples of these types of amenities to illustrate how they could be integrated into other major street improvements concurrently or subsequently. For example, wireless micro-data collection on environmental health indicators (e.g. heat island effects, urban air quality) can inform the implementation of children's health programs to improve health outcomes, like reducing acute asthma incidents. In addition to creating opportunities to monitor and evaluate the performance of the installed green infrastructure, these elements are anticipated to provide broad public benefits and position Perth Amboy as a leader in technology innovation.

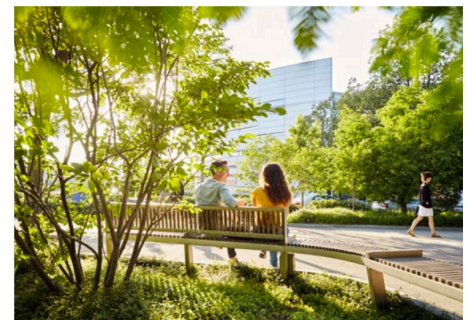
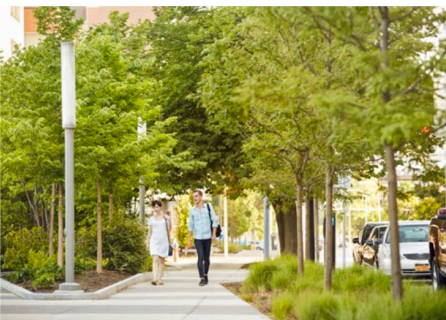
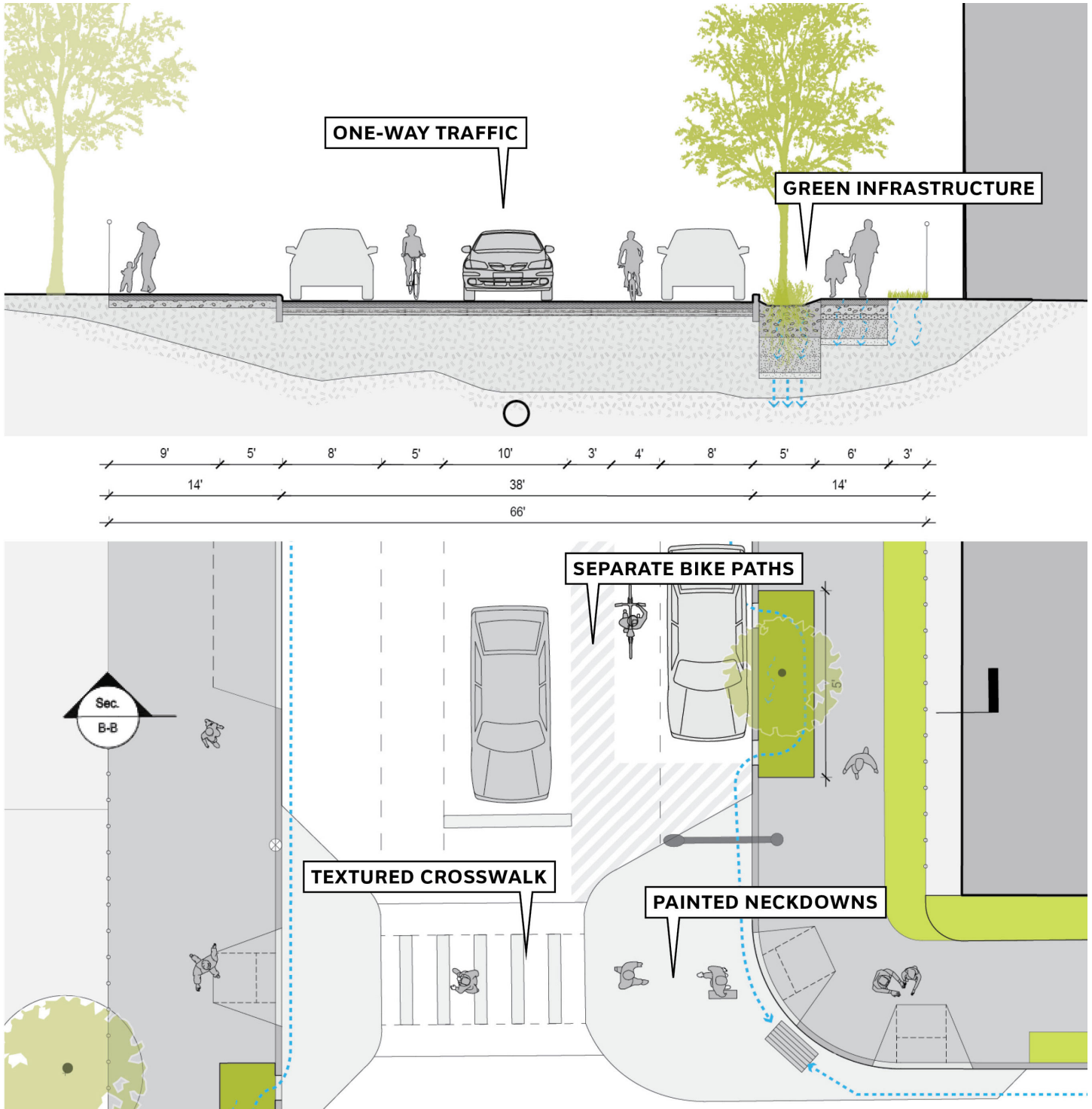


Figure 2: Sample cross-section included in design recommendations to the City of Perth Amboy. Prepared by SCAPE.



CITY OF JERSEY CITY, NEW JERSEY

A CASE STUDY IN STORMWATER + COASTAL PROTECTION

CITY OF JERSEY CITY, NEW JERSEY

A CASE STUDY IN STORMWATER + COASTAL PROTECTION

BACKGROUND

Jersey City is the second largest city in New Jersey with a population of over 260,000 (as of 2015) and approximately 30 miles of waterfront along the Hudson and Hackensack Rivers directly across from Manhattan. In recent years, the City has experienced rapid population growth and a boom in real estate development, and the City has aggressively pursued new economic opportunities. A key target area for remediation and redevelopment is Mill Creek, which is also the site of one of the City's largest CSO outfalls and a primary route for storm surge related flooding.

Mill Creek is a distressed shallow tidal estuary and tributary of the Hudson River located within the New York Harbor Complex basin. The Mill Creek channel originates at a CSO outfall and is approximately 700 feet long. Initially a navigable creek surrounded by islands and marshlands, the area around Mill Creek was developed from the late 1800s-1980s for heavy industrial use, which left behind a legacy of significant soil, surface water, and groundwater contamination. The Jersey City Redevelopment Agency (JCRA) has agreements in place with NJDEP as part of a voluntary cleanup program to obtain oversight of areas of environmental concern at the Aetna Street Properties, which include Mill Creek.

In 2012, Mill Creek was a major path for storm surge during Hurricane Sandy, allowing floodwaters to travel far inland and damage important community assets, including a local hospital, high school and public housing projects. Several studies have pointed out that Mill Creek is an obvious area for intervention if Jersey City is to meaningfully reduce storm surge risk.

Mill Creek and its surroundings have shifted away from industrial uses and towards residential development over the past two decades. The site is now located within the Grand Jersey Redevelopment Area, designated for new mixed-use retail/residential buildings of 12-16 stories, with the area of the creek itself zoned for a planned park. Several studies and proposals have been prepared for Mill Creek prior to the City's application to Build it Green. Each focused on remediation, CSO mitigation, or storm surge protection individually. However, the City recognized that a cohesive solution for Mill Creek must take into account its role both as an outfall point for CSOs and an entrance point for storm surge.

THE BIG SOLUTION

Jersey City applied to Build it Green to evaluate the feasibility of and options for integrating coastal protection alongside CSO mitigation into the planned redevelopment of Mill Creek. The BIG Team concluded that the redevelopment of Mill Creek represents a tremendous opportunity to reduce Jersey City's storm surge risks and protect against the type of destruction that occurred during Hurricane Sandy, all while reducing CSOs. Furthermore, the BIG Team's analysis showed that nontraditional, private financing may be available to support a full system of stormwater upgrades and integrated coastal protection measures.

The goal of Build it Green in Jersey City was to take a holistic approach to redevelopment along Mill Creek and analyze the feasibility of designing, financing, and implementing an integrated infrastructure solution that incorporates remediation, CSO mitigation, and coastal protection.

Any meaningful CSO + Coastal Protection solution at Mill Creek will likely require large infrastructure upgrades that take many years, if not more than a decade, to fully realize. The project will also require significant financial modeling, in addition to conventional design and engineering analyses, before it can be effectively designed, financed, or built. As a result of Build it Green, the City now has a clear path forward to designing and financing an integrated coastal protection + CSO mitigation solution at Mill Creek.

DESIGN

Build it Green's initial design activities in Jersey City focused on analyzing a set of proposals (in progress) for remediation and CSO mitigation around Mill Creek. It is important to note that the analyses underway at the outset of the BIG Team's work did not include coastal protection as an explicit priority, and were instead aimed exclusively at achieving local remediation and/or CSO mitigation goals. That said, the BIG Team concluded that the proposed CSO solutions were well-designed concepts and that the recommended interventions would be a major improvement over current conditions at the site, offering significant benefits to mitigating total overflows and addressing long-term CSO issues at Mill Creek.

In order to evaluate the potential for integrating coastal protection into these proposals for remediation and CSO mitigation at Mill Creek, the BIG Team used existing topographic data, records on the levels of storm surge during Hurricanes Sandy and Irene, and current FEMA flood maps to conduct an initial analysis of the storm surge protection afforded by the stand-alone remediation and CSO mitigation proposals. The BIG Team's preliminary assessment is that while the proposed CSO solution would provide significant CSO benefits, it would not provide any significant storm surge benefits to the areas surrounding Mill Creek.

The BIG Team then conducted an initial opportunity analysis and concluded that it is possible to expand the design scope for the site to develop an integrated set of CSO and coastal protection interventions at Mill Creek that will provide storm surge protection to the neighborhoods and assets nearby. The BIG Team's opportunity analysis suggests that an integrated solution that protects a wider area could also provide significant financial benefits—including avoided flood losses—to Jersey City businesses and residents on a large enough scale that the City may be able to access new sources of nontraditional financing.

KEY ACTIVITIES

- Mill Creek priorities workshop and site visit (August 2016)
- Analysis of existing design and engineering proposals for site remediation and CSO mitigation (August 2016)
- Delivery of initial opportunity analysis for storm surge integration into existing activities (September 2016)
- Financing and implementation analysis and recommendations (November 2016)

FINANCE

The BIG Team's major conclusion in Jersey City was that the most promising design opportunity is also the most compelling financing opportunity: integrating a Mill Creek CSO solution with a comprehensive coastal protection solution is the most likely path to attracting nontraditional or private funding/financing for both priorities. The BIG Team's analysis suggests that it may be possible to design an integrated CSO + coastal protection project at Mill Creek that attracts private capital on a scale large enough for full project finance.

Historically, major infrastructure projects that provide large but dispersed public benefits—like large-scale coastal protection projects—were publicly financed. Because these projects do not offer any direct options for revenue generation, like toll roads/bridges or utility user fees, most projects rely on federal and state grants and loans along with targeted local government funds for their design, construction, and operation.

In the current world of constrained public budgets at all levels of government, the type of comprehensive coastal protection needed at Mill Creek requires a new approach to project finance. Traditional financial instruments are unlikely to generate the scale of capital required for several reasons. First, there are no direct revenues that can be captured from coastal protection projects. Success is based on what doesn't happen. A storm hit, but the community was not flooded. Second, the indirect benefits of any coastal protection accrue in the form of avoided losses or savings, not in the form of increased tax revenues that can be captured through instruments like tax-increment financing (TIF). Finally, by definition, large-scale flood protection systems are designed to benefit large numbers of people across diffuse areas. As a result, there is no single “user” of a proposed project that benefits exclusively. Instead the benefits of any truly effective comprehensive coastal protection project should be widely distributed across multiple beneficiaries.

Based on these considerations, the BIG Team recommended that Jersey City explore the use of insurance-based financing to capitalize the CSO, coastal protection, or both components of the Mill Creek project. Specifically, the BIG Team recommended that Jersey City explore the feasibility of using a Resilience Bond for project finance. Resilience Bonds are a new variation of conventional Catastrophe Bonds that link insurance and resilience projects to monetize avoided losses—such as, a reduction of flood damages—from resilience projects.

In Resilience Bonds, the benefits offered by risk-reduction projects, such as flood barriers, are monetized up-front using financial industry catastrophe models and captured through a rebate structure. The resulting rebate serves as a source of predictable funding which communities can proactively invest in projects that strategically reduce risk, like coastal protection in the Mill Creek project. If Catastrophe Bonds are similar to life insurance policies that only pay out when the worst disasters strike, then Resilience Bonds are more like progressive health insurance programs that incentivize healthy choices—like quitting smoking or exercising regularly—that reduce long-term risks and the cost of care.

The primary beneficiaries (Sponsors) of Resilience Bonds are large public and/or private asset holders with existing or anticipated insurance obligations, including cities, utilities, developers, universities, and hospital systems. Like purchasers of conventional insurance, Sponsors agree to pay insurance premiums in exchange for a defined payout in the event of a disaster. Because both Catastrophe Bonds and Resilience Bonds are insurance products—not municipal bonds—Sponsors are only responsible for paying premiums, not for repaying bond principal, which can help protect municipal debt capacity or credit ratings. Resilience Bonds offer the additional benefit of generating flexible project funding, via a rebate mechanism, outside of traditional public budget silos. For cash-strapped cities and utilities, this can open up entirely new funding for large-scale and/or long-term resilience projects.

Resilience Bonds can bring together the entities that stand to benefit the most from an infrastructure project into a financial agreement structure similar to that of a homeowner's association, where members pay dues proportional to the benefits they receive. The BIG Team concluded that additional design and modeling—specifically, financial catastrophe modeling—are necessary to determine if it is possible to design an integrated CSO and coastal protection solution for Jersey City that would attract outside investment at a scale large enough to fund one or both components of the project through a Resilience Bond.

IMPLEMENTATION

In order to evaluate if and to what extent any storm surge project could generate significant financial benefits, the BIG Team recommended that the City incorporate a targeted set of catastrophe modeling-based analyses into the next stages of planning for the site to answer the following threshold questions:

Who are the primary financial beneficiaries of storm surge mitigation at Mill Creek?

Is the amount of financial protection afforded by storm surge protection at Mill Creek large enough to generate a rebate at the scale necessary for project finance?

What physical level of storm surge protection at Mill Creek affords the optimum level of financial protection for surrounding assets?

Does the financial protection offered by storm surge mitigation at Mill Creek stand on its own? Or are the financial protections of storm surge mitigation at Mill Creek only compelling as a part of a more comprehensive regional protection strategy?

Catastrophe models are financial industry tools that model catastrophes, such as hurricanes, and forecast expected losses from a wide range of potential events. For example, these models estimate financial expected losses at a parcel-level, based on insurance industry trusted and verified databases of exposed assets for 100, 200, and 500-year storm events. In this case, these models could be used to simulate the financial losses that would occur in the areas surrounding Mill Creek from tens of thousands of potential hurricane tracks along the East Coast, as well how those financial losses may or may not change, if a coastal protection project were built. Moreover, the models can help identify which asset holders and stakeholders are likely to experience the greatest losses and benefits.

Overall, answering each of the questions outlined above, with models that the insurance and finance industries already trust and use, is prerequisite to pursuing any type of insurance-based finance for the Mill Creek redevelopment area and/or other at-risk areas of Jersey City. It is important to note that more typical risk-based engineering modeling results or cost-benefit analyses cannot be substituted for catastrophe modeling to answer these questions. As a conclusion to its technical assistance, the BIG Team worked with city officials to evaluate options for funding and pursuing the required financial catastrophe modeling.

Jersey City will develop an integrated, innovative project to take on storm surge flooding, combined sewer overflows, and historic industrial contamination,

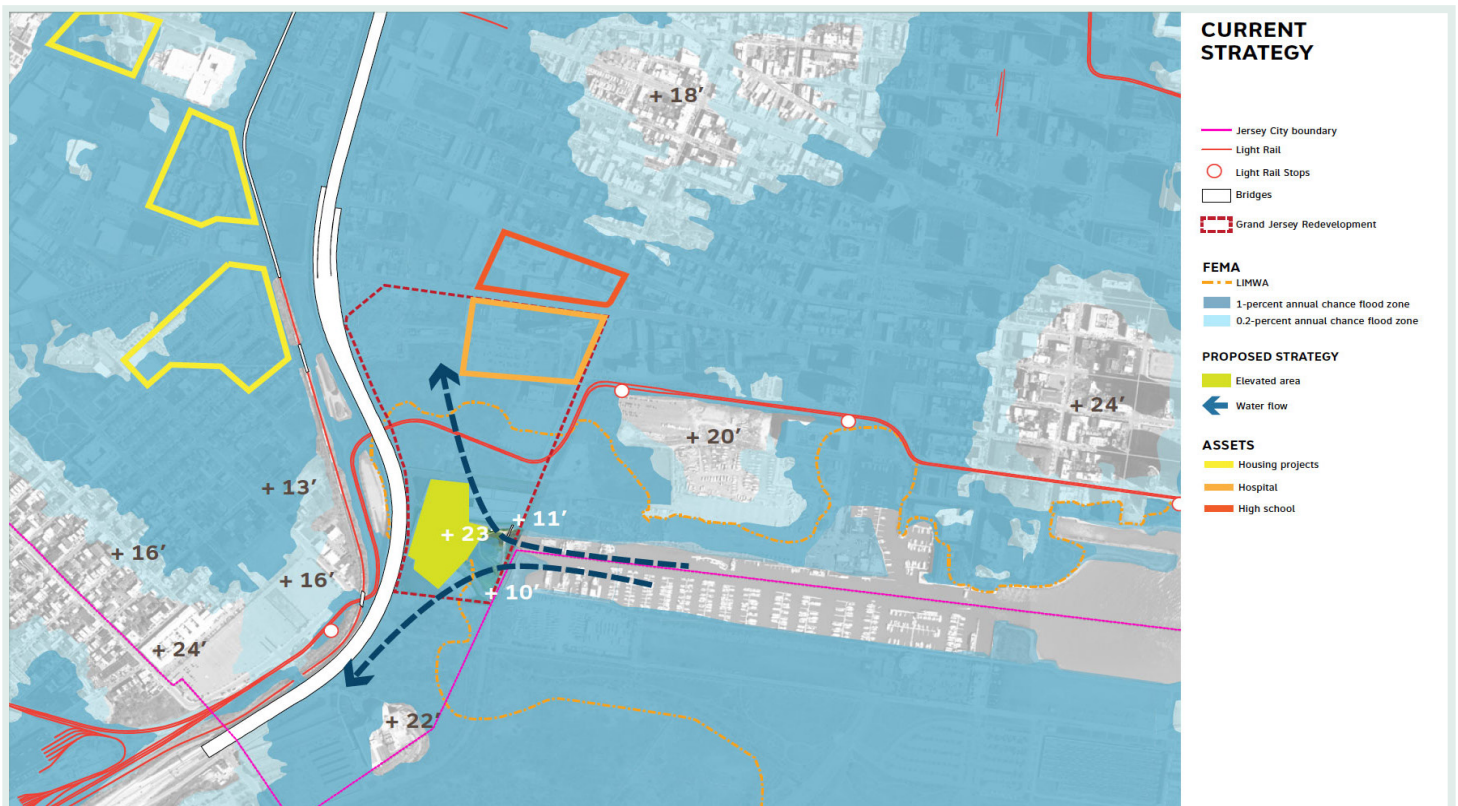
These are issues that cross neighborhoods and affect some of the city's most vulnerable residents, and we are honored to be selected for this unique opportunity.

— Jersey City Mayor Steven Fulop

NEAR-TERM RESULTS & LONG-TERM OUTCOMES

The near-term result of Build it Green in Jersey City is that the City is now educated about and empowered to pursue the financial catastrophe modeling that the BIG Team believes is prerequisite to designing and financing an integrated coastal protection and CSO solution at Mill Creek. This financial catastrophe modeling could lay the foundation for attracting private resources on a scale large enough to finance one or both of the major components (CSO mitigation and coastal protection) of an integrated solution at Mill Creek. If an integrated solution were successfully designed, financed, built, and maintained, it is expected that long-term outcomes of such a project would be enormous and would provide physical and financial protection for tens of thousands of Jersey City residents and protect several large, critical assets from the type of devastation caused by Hurricane Sandy.

Figure 3: A visualization of the Build it Green Team's initial opportunity analysis of incorporating coastal protection into the planned redevelopment of Mill Creek. Prepared by SCAPE.



INSIGHTS AND LESSONS LEARNED

Build it Green yielded a variety of insights relevant for any small- or medium-sized city interested pursuing integrated infrastructure projects. Perhaps the most important of these insights is that rapid predevelopment to access new money for infrastructure projects is hard, but possible. In all cases, successful implementation—making the large leap from early stage idea generation to funding and construction—requires cities to have clarity of vision and the focus to pursue that vision. The lessons below are intended to help foster dialogue and catalyze more strategic coordination among local officials, utilities, community organizations, funding agencies, and a wide variety of other stakeholders to unlock resources for infrastructure innovation.

HIGH BARS FOR BIG CITIES CAN BE UNREACHABLE FOR SMALL CITIES.

The general sentiment among small city officials is that the bar required to submit projects for funding or financing is so high that it is almost unreachable. This high bar often intimidates officials in small and medium-sized cities from even calling agency officials to ask for help with application processes, let alone attempting to submit a project.

For example, submission forms for planning and technical assistance grants often require narratives of anticipated project outcomes with quantitative estimates. EDA's Planning Assistance Program requires applicants to submit letters of support from local business owners that include specific estimates of the number of jobs that will be retained or created as a result of a proposed project. Similarly, applications for construction funding/financing typically, and understandably, require cost and performance estimates—but those requirements exist even if the application includes provisions for additional design, engineering and permitting activities that will be completed prior to construction.

City officials (and the engineers, design professionals, and consultants that support them) are rightfully wary of “back of the envelope” estimates that are not underpinned by specific project specifications. This means that in order to submit initial applications, cities must find a way, without any dedicated resources or capacity, to get far enough into a design process that it is possible to generate reasonable and defensible cost and performance estimates.

The high bars to submit infrastructure projects for funding and financing were originally put in place for good reasons—to avoid corruption, maximize public benefits, protect cultural resources and the environment—but these standards and regulations were often designed with large, high-capacity cities and traditional “grey” infrastructure projects in mind. Small and medium-sized cities pursuing more innovative infrastructure projects are at a distinct disadvantage because these projects tend to be smaller and made up of many different components. For example, a green stormwater system may be comprised of dozens of different elements, including street trees, bioswales, repaved roads and constructed wetlands.

Although these high bars to submit infrastructure projects for funding and financing often represent an intimidating, and oftentimes, impossible hurdle for small and medium-sized cities, city officials should not let it prevent them from seeking much needed technical assistance and resources.

They [funding/financing agencies] want projects to be practically constructed before they'll fund or finance them. – Perth Amboy city official

FOR FUNDERS, THE ROAD TO PROJECT INCOMPLETION IS PAVED WITH GOOD INTENTIONS.

Most funding/financing and regulatory agencies are beginning to recognize the challenges described above. The responses of many agency officials are well-intentioned but misguided. First, some officials encourage small and medium-sized cities to submit projects for funding/financing without regards to the city's capacity or resources to actually reach the high bar required to submit an application. This often manifests itself as agency officials minimizing or brushing aside application requirements in conversations with city officials, or suggesting that there is flexibility in the process where none exists.

Other agencies have introduced measures into funding/financing application processes to lower the bar to submit projects, but in doing so, they create uncertainty and confusion about which requirements and processes apply to which types of applicants. For example, some federal agencies will lower city-matching requirements if a city is in financial distress. But the requirements for demonstrating financial distress sufficient to lower a city-matching requirement are not clear or stated upfront. This type of uncertainty can prevent small and medium-sized cities from applying for resources because they are unsure of what their matching requirement will be and if they can meet it.

Taken together, misplaced cheerleading and inconsistent guidance through application requirements and processes can lead to frustration, confusion and delays for low-capacity cities seeking to upgrade aging and failing infrastructure systems. Funding agencies must recognize this and dedicate extra effort to make existing processes more transparent while simultaneously seeking to improve and simplify those processes with the goal of reaching the applicants with the greatest need and potential.

CITY LEADERS MUST EMPOWER INTERNAL CHAMPIONS FOR PROJECTS.

Strong and clear city leadership is required to pursue any integrated infrastructure project. Practically speaking, the best way to ensure continuing city leadership on an integrated infrastructure project is to designate a project champion. Without a project champion, such projects often fail to get off the ground. A champion plays an essential role in advocating for the project with other city officials, elected officials, project partners, and community members. This champion is the city's face of the project and must be actively involved in community engagement. The first step to pursuing any integrated infrastructure project should almost always involve designating a project champion. The designated project champion must have a clear mandate from elected leadership and must be empowered to make key design and finance decisions. In the absence of an empowered champion with a clear mandate, projects often remain in the idea phase indefinitely and rarely attract significant resources.

SMALL CITIES SHOULD SEEK OUT PARTNERS WHO ALREADY HAVE SHOVELS IN THE GROUND.

There may be no such things as shovel-ready projects, but there are such things as shovel-ready partners. Small cities with limited project development and implementation capacity need to look for other local partners who have (metaphorical) shovels. Typically, those partners are private (re)developers and local utilities. Reaching out to these partners to explore opportunities for collaboration can be the difference between having a project plan and getting to a ground-breaking or ribbon cutting ceremony.

SILOS ARE LUXURIES, AND SMALL CITIES CAN'T AFFORD THEM.

So much has been written about the unintended, damaging consequences of the siloed approach to decision-making in governments and large organizations. With regards to major infrastructure projects, taking a siloed-approach—where a large, expensive infrastructure project is the primary or sole responsibility of just one department—is a luxury only big cities can afford. Many small and medium-sized cities are resource constrained and struggle to provide essential services and meet payroll. Smaller budgets and less staff means that many smaller cities literally cannot afford to take a siloed-approach to upgrading infrastructure systems. Pursuing a large infrastructure project in a small city is, for lack of a better phrase, a big deal. Infrastructure projects, especially more innovative infrastructure projects, happen in these cities infrequently, if ever, and can take up a large percentage of local borrowing capacity. Infrastructure projects in small and medium-sized cities require an “all hands on deck approach,” and often the offices or departments of the mayor, business administrator, planning, public works and engineering are all actively aware of and engaged in project design, finance, construction and maintenance. Small city leaders need to encourage and foster interaction among departments to create space for overlapping projects to merge and win-win projects to emerge.

BE THE PLACE WHERE EVERYONE KNOWS YOUR NAME.

Small and medium-sized cities have one major advantage over large cities as they pursue infrastructure upgrades: because of their size and streamlined decision making processes, it is often possible to get things done far more efficiently. In small cities, there are typically fewer people involved in any given project. It tends to be clear who has decision-making authority for which types of decisions, and this means that key design and finance decisions are made more quickly and more definitively. Because there are fewer people involved, it's also possible to quickly bring stakeholders into a room (or on a phone call) to discuss design and finance alternatives and to come to consensus on a path forward. This can make it much easier for outside consultants, designers, and engineers to work with smaller cities.

For example, the City of Perth Amboy held a design alternatives workshop through Build it Green. In addition to officials from the planning, public works, engineering, police, and fire departments, the Mayor and Business Administrator also actively participated in the workshop. Participants wrote their design feedback on sticky notes and discussed the tradeoffs involved in various design alternatives and quickly settled on path forward. This kind of enthusiastic participation and rapid consensus decision making across city departments at such an early project stage is practically unheard of in large cities. What took one day to accomplish in the City of Perth Amboy would have taken months elsewhere. Small cities should recognize this advantage and capitalize on it.

RECOMMENDATIONS

The success of small cities in pursuing systematic infrastructure upgrades depends not only on city officials, but also on a variety of other stakeholders who share common priorities and are vested in the outcomes of specific projects. Below is a set of recommendations for these other stakeholders to support local infrastructure innovation.

FOR UTILITIES: Utilities should not allow rigidity in long-term planning processes (e.g. water utility long-term control planning for CSO mitigation) to prevent them from taking advantage of opportunistic projects that can create near-term project implementation wins. As Fred Pocci (Authority Engineer, North Hudson Sewerage Authority) stated, “We have to make a plan [to address CSOs] but we also have to be aware of how we’ll solve the problem.”

FOR CONSULTING, DESIGN, AND ENGINEERING FIRMS: Consulting, design, and engineering firms should not allow formal procurement processes to prevent them from innovating beyond specified scopes of work and they should actively seek opportunities and efficiencies provided by taking an integrated approach to infrastructure design, finance, and implementation.

FOR NOT-FOR-PROFIT ORGANIZATIONS: Community-focused NGOs should work directly with government funding and regulatory agencies to make existing funding processes more transparent and accessible, and to implement reforms that attract broader participation.

FOR ACADEMIC INSTITUTIONS: Academic institutions should continue to provide and expand opportunities for small and medium-sized cities to collaborate with them to study local infrastructure challenges, collect baseline data, and identify and analyze possible solutions.

FOR PHILANTHROPIES: Philanthropies should direct more resources to outcome-oriented infrastructure project design and implementation efforts in underserved communities to catalyze progress on long-term social, environmental, and health objectives.

FOR STATE GOVERNMENT FUNDING AGENCIES, INCLUDING STATE INFRASTRUCTURE TRUSTS: State government funding agencies, including state infrastructure trusts, should do more to focus on the needs of their applicants and recipients rather than on internal processes and requirements. They should dedicate extra effort to make existing processes more transparent while simultaneously seeking to improve and simplify those processes with the goal of reaching the applicants with the greatest needs.

The problem of outdated water infrastructure in New Jersey is enormous. The cost to fix it will run into the billions of dollars, well beyond the resources of many of our older cities. We’re pleased to be able to support [Build It Green] [to help] cities identify and implement the smartest, most beneficial, cost-effective ideas for modernizing our water infrastructure to meet the needs of the 21st century. — Chris Daggett, President and CEO, Geraldine R. Dodge Foundation

Disclaimer

This report has been prepared for general guidance and does not constitute design, engineering, or financial advice. The infrastructure projects described in this report are the recommendations of the Build it Green Team and are not necessarily reflective or indicative of any specific city plans or commitments. All design details and illustrations included in this report are for illustrative purposes only. re:focus does not endorse any of the organizations used as examples or referenced in this publication, or their products, or services.