TOGETHER NORTH JERSEY.

CONNECTING PEOPLE, PLACES, AND POTENTIAL.

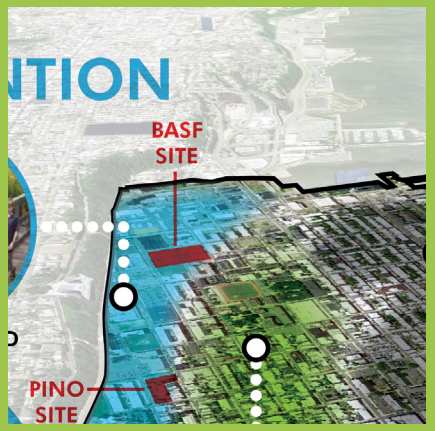
HOBOKEN GREEN INFRASTRUCTURE STRATEGIC PLAN

HOBOKEN, NJ

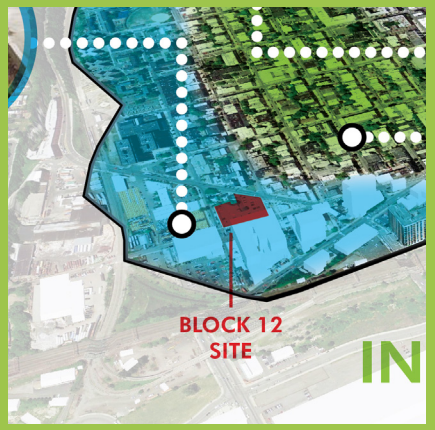
OCTOBER 2013

FINAL REPORT









HOBOKEN Quality Of Life Coalition

STEVENS INSTITUTE of TECHNOLOGY

NJTRANSIT The Way To Go.

EE&K a Perkins Eastman company

Clarke Caton Hintz
Architecture
Planning
Landscape Architecture

ABOUT TOGETHER NORTH JERSEY

In November 2011, the U.S. Department of Housing and Urban Development (HUD) awarded TOGETHER NORTH JERSEY (aka, North Jersey Sustainable Communities Consortium) a $5 million Sustainable Communities Regional Planning Grant. The grant is matched with an additional $5 million in leveraged funds from project partners. Grant funds have been used to implement the Local Demonstration Project (LDP) Program, develop a Regional Plan for Sustainable Development (RPSD) for the 13-county planning region (pictured to the right), and provide technical assistance and offer education opportunities that build the capacity of jurisdictions, organizations and the public to advance sustainability projects and initiatives.

The RSPD plan is both "place-based" and "issue-based" and uses sustainability, transit system connectivity and Transit-Oriented Development (TOD) as the central framework for integrating plans, regulations, investments, and incentive programs at all levels of government to improve economic and environmental conditions, while promoting regional equity and resource efficiency. For more information, please visit togethernorthjersey.com

ACKNOWLEDGEMENTS

- 13 County Governments in the NJTPA Region
- Edward J. Bloustein School for Planning and Public Policy at Rutgers University
- North Jersey Transportation Planning Authority (NJTPA)
- NJ TRANSIT
- NJ Office of Planning Advocacy (NJOPA)
- Housing and Community Development Network of New Jersey (HCDN-NJ)
- Sustainability Institute/Sustainable Jersey at The College of New Jersey
- NJ Future
- Building One New Jersey
- PlanSmart NJ
- Regional Plan Association (RPA)

DISCLAIMER

The work that provided the basis for this report was supported by funding under an award from the U.S. Department of Housing and Urban Development. The substance and findings of the work are dedicated to the public. The authors of the report are solely responsible for the accuracy of the data, statements and interpretations contained in this document. Such statements and interpretations do not necessarily reflect the views the Together North Jersey Steering Committee or its individual members or any other agency or instrumentality of Government.

ABOUT THE LOCAL DEMONSTRATION PROJECT PROGRAM

The Local Demonstration Project (LDP) Program seeks to advance specific projects, initiatives, and other investments for local communities to achieve short-term, implementable projects which are consistent with the RPSD goals and program outcomes.

The LDP Program provides technical assistance for strategic planning studies focused on designated areas or corridors associated with established or anticipated transit services and/or facilities. Eligible LDP projects will be sponsored by municipalities, counties, non-governmental organizations, community development corporations, and other interested organizations.

These demonstration projects help to identify partnering opportunities, milestones, and potential funding sources and serve as a model for future initiatives.

Please visit togethernorthjersey.com to learn more

12 KEY ISSUES

The range of issues faced by the communities within the Region in positioning themselves for a more sustainable future is broad. The Local Demonstration Project program as a whole will attempt to engage all of the the major policy issues that have been identified in recent years, as seen in the adjacent diagram. Each project of the LDP program will address Land Use and Transportation at its core and will identify several primary issues as the project's focus.

PROJECT PARTNERS

City of Hoboken

County of Hudson

Hoboken Quality of Life Coalition

HOPES CAP, Inc.

North Hudson Sewerage Authority

Stevens Institute of Technology

PROJECT TEAM

NJ TRANSIT

EE&K a Perkins Eastman Company

The Louis Berger Group

Clarke Caton Hintz

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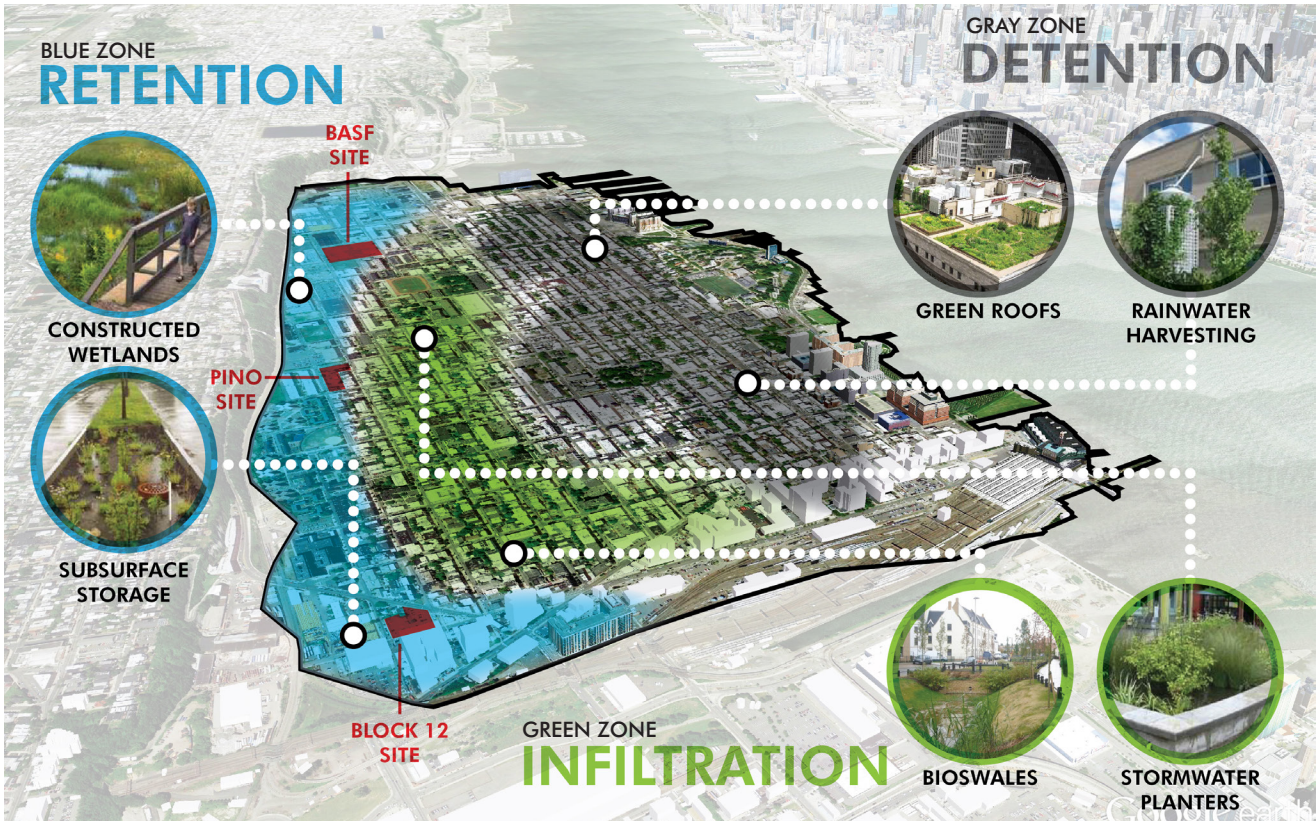
EXECUTIVE SUMMARY

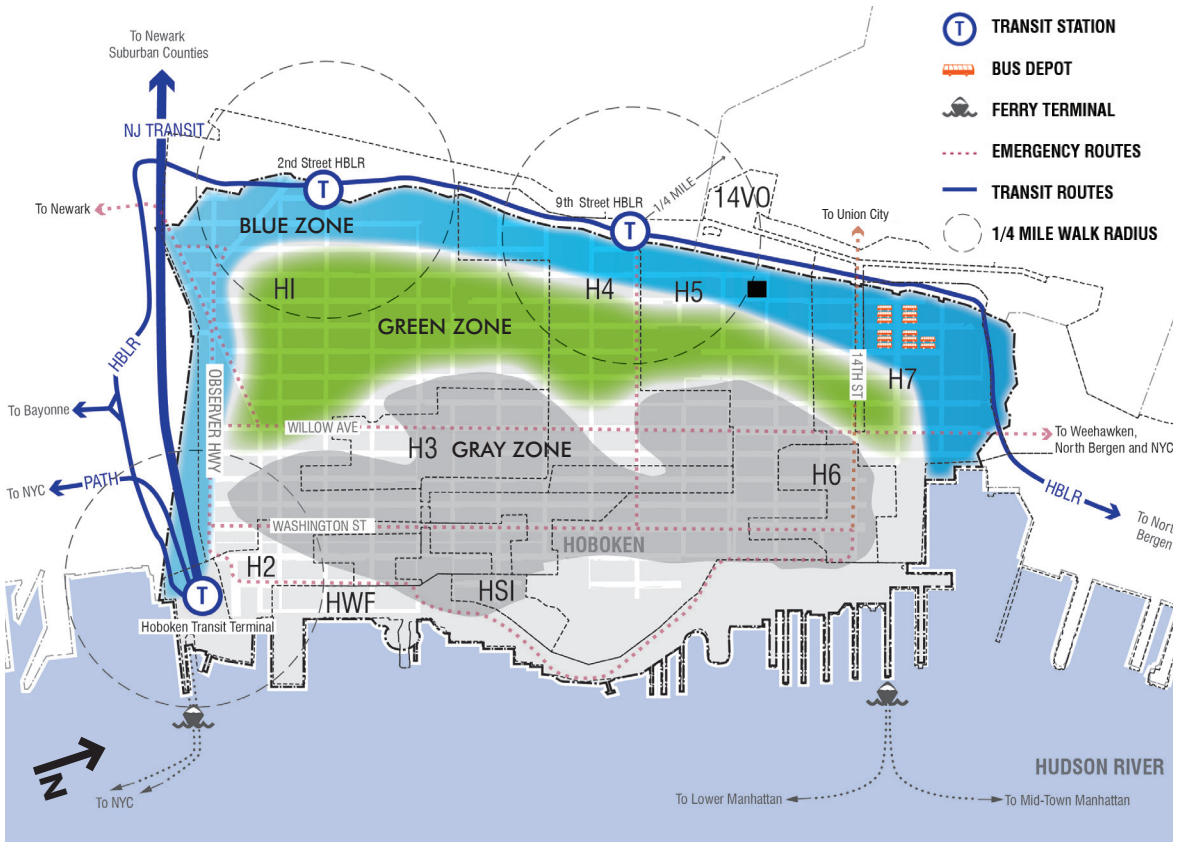
The increasing intensity and frequency of severe weather and flooding occurrences has created significant challenges to Hoboken's antiquated stormwater management infrastructure. Between July 2002 and July 2012 the City recorded 26 dates with greater than 2 inches of precipitation and tides of 4 feet or higher. During storm events, Hoboken's sewer infrastructure is overtaxed resulting in system backups that produce flooding in the lowest-lying areas. Stormwater that flows into the combined sewer system in Hoboken is exacerbated by the high percentage of impervious coverage in the City. Currently, the Hoboken waste water treatment plant is overtaxed by storm flows, on average, ***five times per month*** leading to combined sewer overflows. Future federal regulations may require the North Hudson Sewerage Authority to reduce this number to ***four per year.***

The impacts associated with this situation were most dramatically seen in the aftermath of Hurricane Irene and Superstorm Sandy when unprecedented flood levels crippled Hoboken's heavily-trafficked transportation infrastructure, stranded residents in their homes for extended periods of time, destroyed personal and public property and intensified public health hazards. The storms also brought commercial activity to an abrupt halt, collectively costing business owners millions of dollars in revenue.



Green Infrastructure Strategy for the City of Hoboken

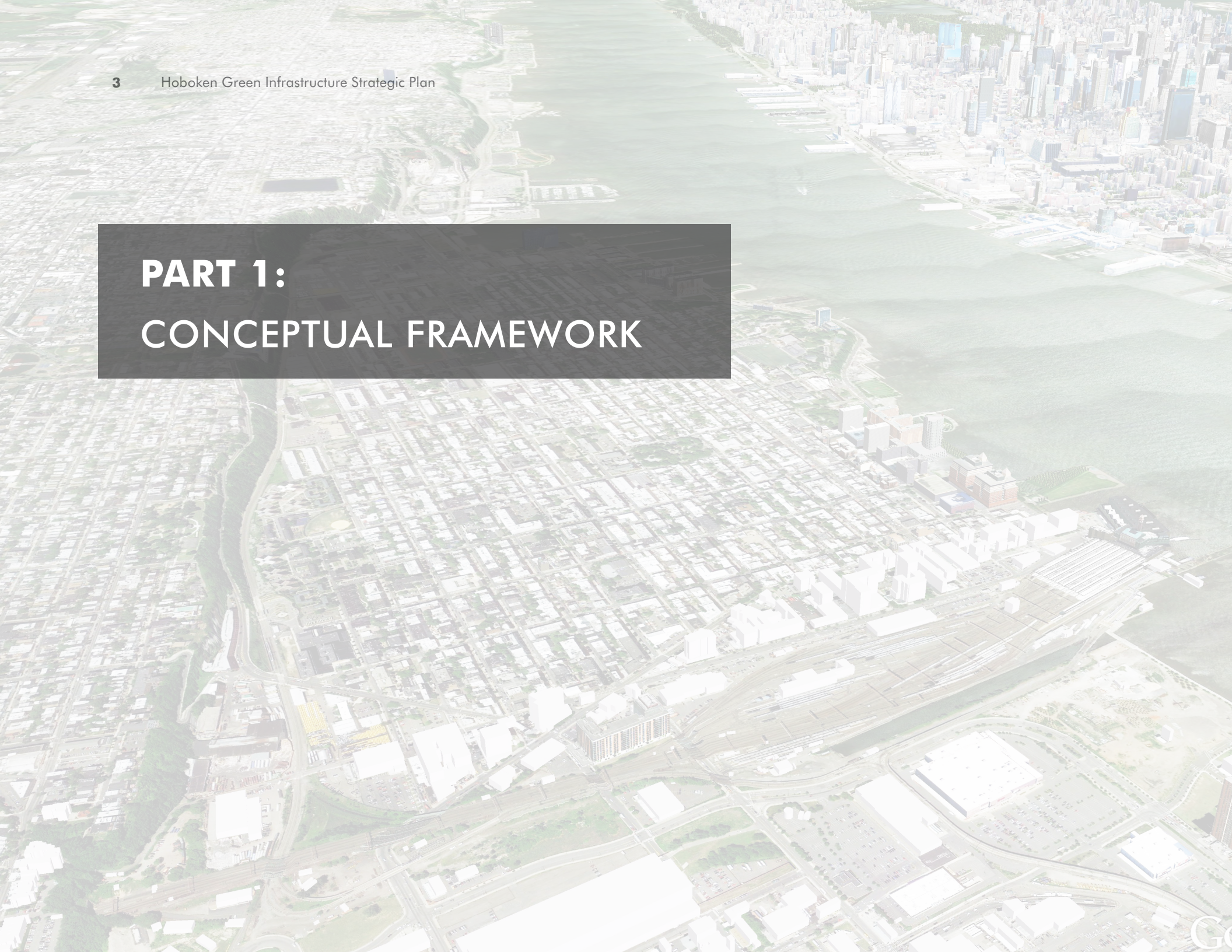
In Spring 2013, NJ TRANSIT, as part of Together North Jersey (TNJ), the USHUD funded regional planning effort for the 13-county northern NJ region, began the Hoboken Green Infrastructure Strategic Plan as part of the Regional Plan for Sustainable Development. This project, one of 18 competitively-selected Local Demonstration Projects sponsored by TNJ, focused on:



Relationship between transit and the three zones that affect which strategies are recommended

- Creating a framework for green infrastructure on both a city-wide and district by district basis;
- Identifying the most cost-effective place-based best management practices (BMP) the City can employ to address stormwater management and the anticipated increase in frequency of flooding events;
- Understanding how these measures can improve the resilience of Hoboken's transit infrastructure.
- Locating and prioritizing the assets and priorities most in need of protection;
- Developing a set of strategies the City can employ to implement the Plan.

Other parallel efforts include collaboration with Re.InvestInitiative.org, Global Green, and 100 Resilient Cities to develop the necessary tools to make the City resilient to future storm events. The City is also the focus of a potential design opportunity through the Rebuild by Design program for a comprehensive flood defense strategy, which is scheduled to enter the design development phase as of November 2013. Please also note that Appendix H in the back of this document is the RFP for the Post-Sandy Planning & Discovery Plan, which will serve as a legislative follow-up to this plan.



PART 1:
CONCEPTUAL FRAMEWORK

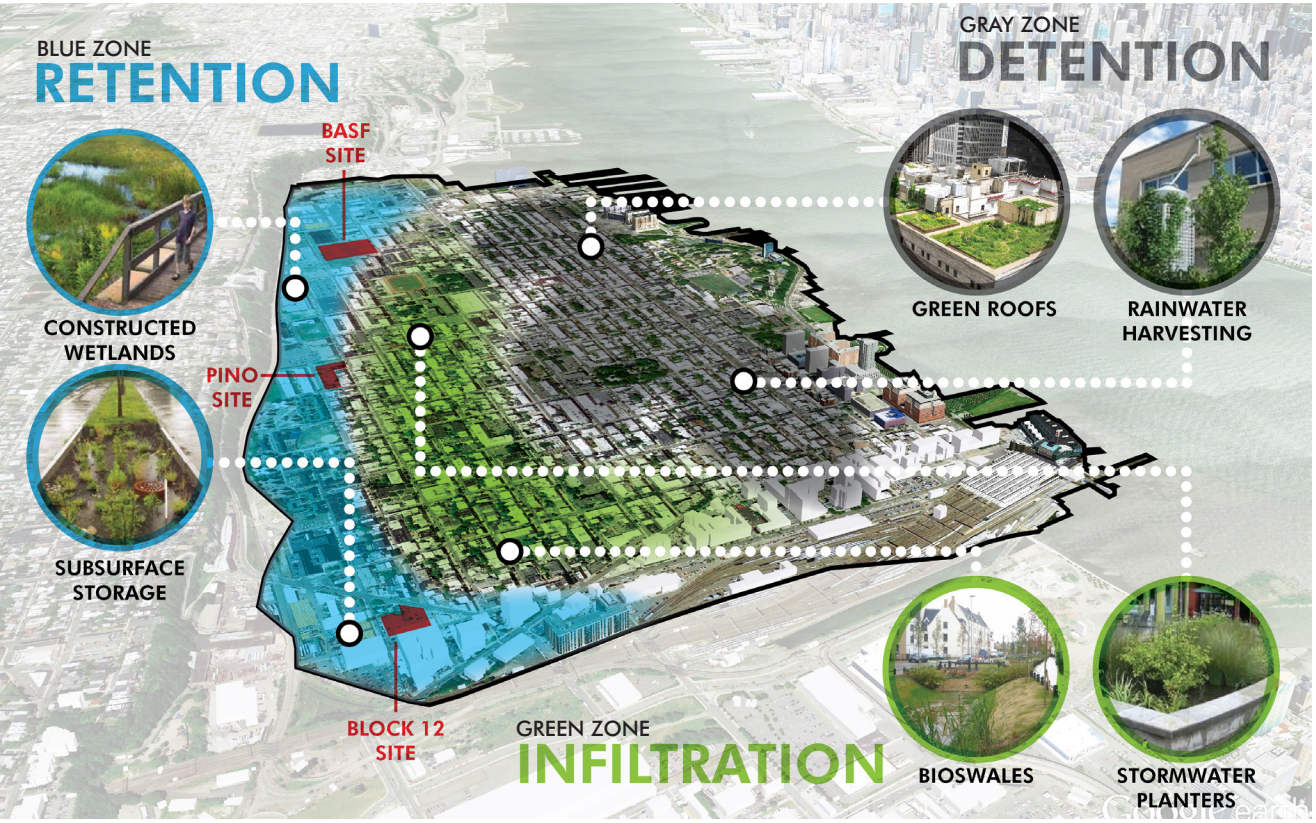
METHODOLOGY

SEWERSHED LEVEL ANALYSIS

The City of Hoboken sought a strategic and place-based approach to green infrastructure, which maximizes the benefit of capital investment for stormwater management. The Plan employed a sewershed level analysis to achieve this objective, as described below.

Based on its analysis of the carrying capacity of the underlying land forms, the Plan proposed a Conceptual Framework that organizes the City into three zones:

- *The Gray Zone*, which contains a shallow depth to bedrock and therefore cannot infiltrate stormwater efficiently, is most appropriate for above-ground BMPs such as rainwater harvesting and green roofs.
- *The Green Zone*, which has a greater depth to bedrock and soils that are capable of accepting and infiltrating stormwater and as such is most appropriate for vegetated BMPs like rain gardens, swales, and stormwater trees.
- *The Blue Zone*, which contains the lowest elevations in the City and therefore may be available for the detention of stormwater.



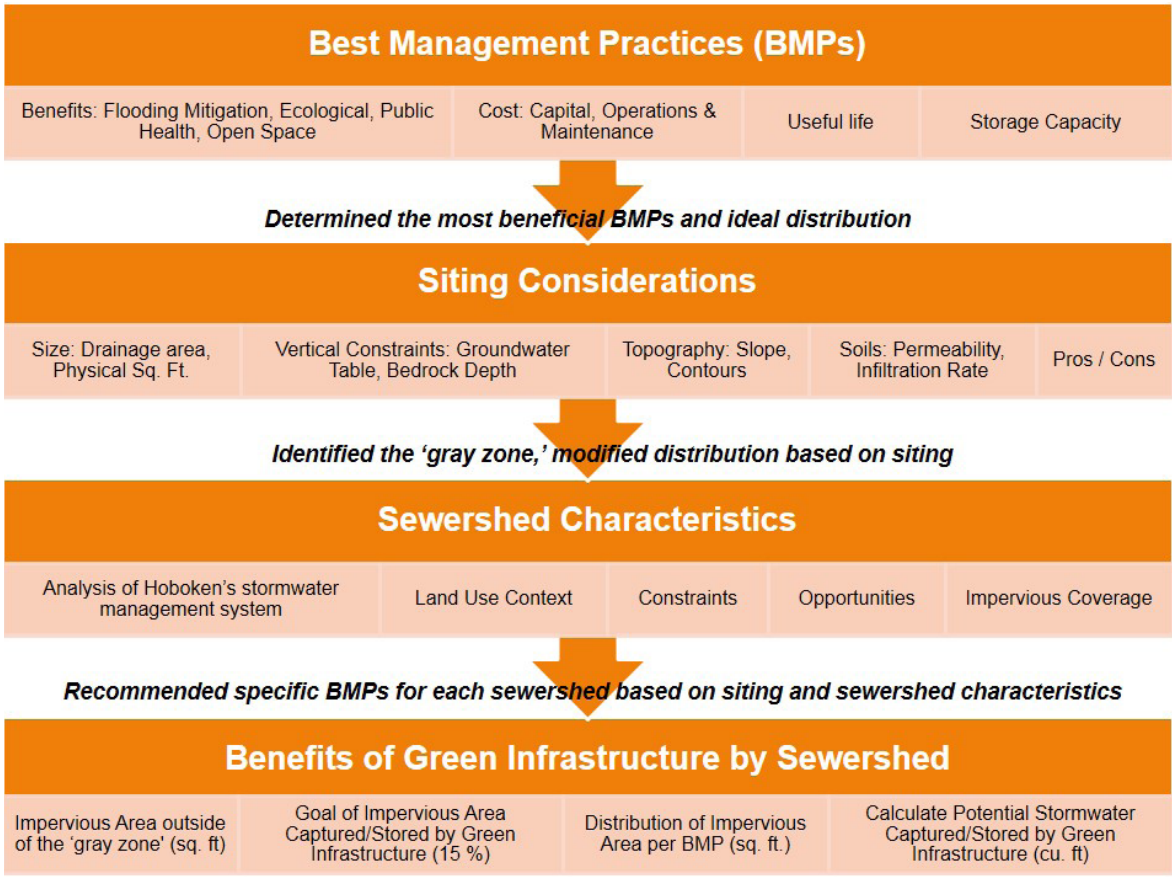
Green Infrastructure Strategy for the City of Hoboken

On the district level, the Plan identified sewersheds H1, H4, H5, and H7 (as identified by the North Hudson Sewerage Authority) as areas where green infrastructure would produce the most cost-effective results. The Team determined the most appropriate BMPs for each sewershed based on an analysis of Hoboken's existing stormwater management system, land use context for each sewershed, and siting considerations. To help identify which BMPs would have the most cost-effective impact, the Team conducted a literature review (which can be found in the appendix) of green infrastructure measures successfully employed in other cities.

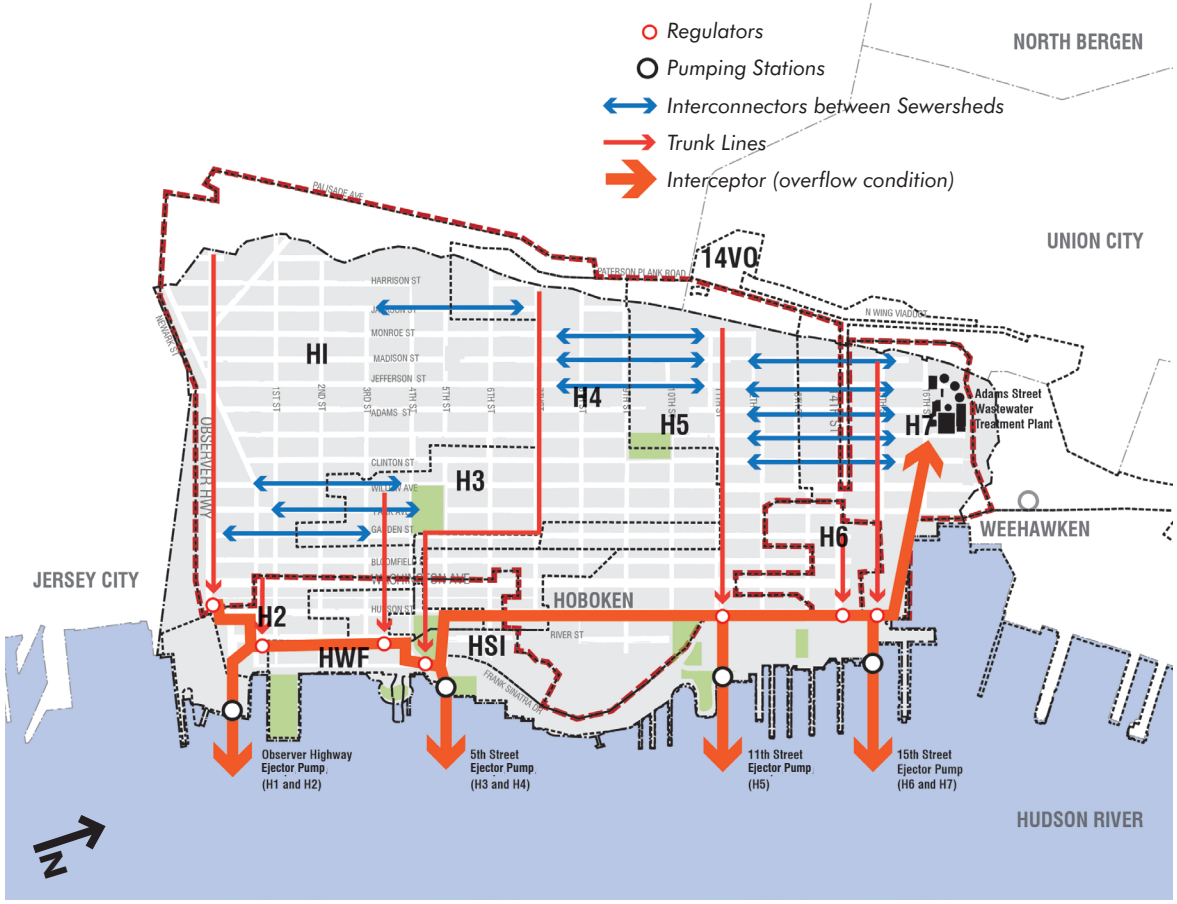
Green Infrastructure has the potential to address many issues. For example, recurring flooding is one of the most significant barriers to accessing the City's two Hudson Bergen Light Rail stations. Addressing flooding through green infrastructure will be essential in making critical infrastructure assets more resilient and will improve accessibility to transit. Because the City's most vulnerable populations are concentrated in its most flood prone areas, implementation of green infrastructure in these areas will be an important element in improving the quality of life for those most in need of protection.

The Plan puts forth a bold but pragmatic implementation strategy to implement these recommendations. This strategy is based on

- Leveraging opportunities for the City to take early and significant action, including the relatively large concentration of land controlled by the public sector. Also, it is largely concentrated within the sewersheds H1, H3, H4, and H7; and designated Redevelopment Areas, which presents opportunities to implement green infrastructure in a more comprehensive manner potentially engaging public private partnerships.
- Innovative regulatory measures such as performance-based zoning and establishment of a Stormwater Trust Fund to allow the City to address the issues.



Methodology



Hoboken Sewer System and recommended sewersheds for implementation of Green Infrastructure Best Management Practices

KEY FINDINGS

TARGETED SEWERSHEDS FOR GREEN INFRASTRUCTURE IMPLEMENTATION

The Team's initial analysis of Hoboken's sewer system revealed that sewershed interconnections allow stormwater to flow from one sewershed to another. Stormwater captured in one sewershed may be exacerbating flooding in another sewershed. Key interconnections between Hoboken's sewersheds, particularly between H1 and H3/H4, may cause increased localized flooding in the lowest areas. Therefore, the Plan recommends focused implementation of Green Infrastructure BMPs within sewersheds H1, H3, H4, and H5. In addition, interconnections between sewersheds were recommended as an area for future study.

Subsequent analysis of the subsurface conditions revealed that while sewershed H3 plays a key role in Hoboken's interconnected sewer system, its subsurface geology and land use context are not conducive to installation of vegetated BMPs (e.g., rain gardens, infiltration planters). Conversely, sewershed H7 has ideal subsurface geology as well as the presence of the North End Rehabilitation Area, presenting the City's most significant opportunity for targeted green infrastructure installation throughout an entire sewershed. As such, the Plan recommends H1, H4, H5 and H7 for strategic green infrastructure implementation.

DEMOGRAPHICS

PUBLIC HOUSING

Hoboken is home to a disproportionate quantity of subsidized and low-income housing. The city has more than three times the number of HUD-subsidized Housing Units (46 per 1,000 population compared to 13 in the North Jersey NJTPA region), more than five times the number of Public Housing Units (27 compared to 5), and almost three times the number of Multi-Family Housing Units (16 compared to 6) compared to the region.

POVERTY RATES

Hoboken has slightly higher rates of poverty (10.1%) than the North Jersey region (8.6%). This trend extends to families with children, which have higher rates of poverty (6.3%) compared with the region (5%) as a whole.

ACCESS TO TRANSPORTATION

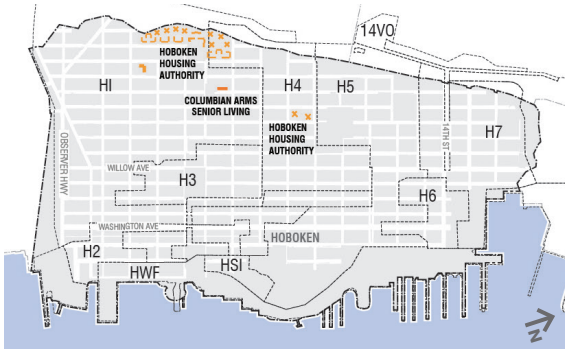
Transit is important to the mobility needs of residents in Hoboken, who have a higher percentage of carless households (15.7%) than Hudson County (13.7%) and the North Jersey region (12.5%).

One of the Plan's most significant concerns is identifying the people and assets that are most in need of protection. With the presence of Hoboken Housing Authority's Andrew Jackson Gardens and the Columbian Arms Senior Living Community in sewershed H1 and the Hoboken Housing Authority in sewershed H4, the City's most vulnerable populations are concentrated in the City's most flood prone areas. As such, implementation of green infrastructure in these areas has the greatest potential to address the areas frequently impacted by flooding. This will also have the potential to significantly improve the of life for Hoboken's most vulnerable residents.

"HOPES applauds the city's focus on positively affecting the Blue Zone; the most heavily impacted areas for flooding with most vulnerable populations, as cited in the report and looks forward to the continued growth of the city and its residents."

Hoboken Housing Authority

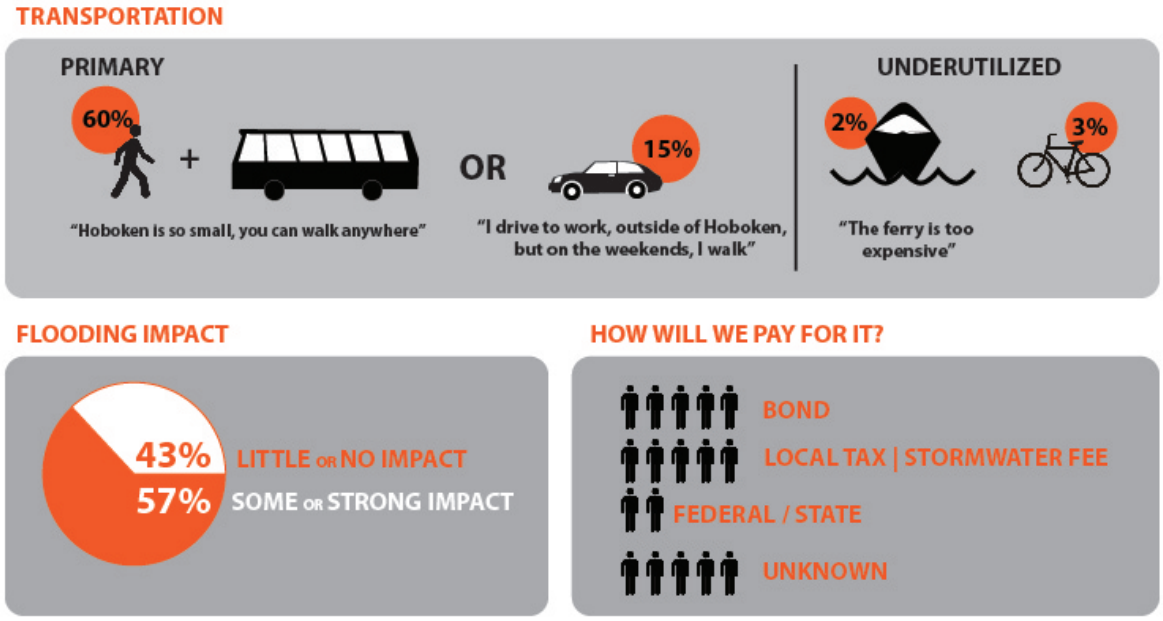
Jubilee Center



Hoboken Housing Authority Communities

OUTREACH

On April 18, 2013 the Team hosted an outreach event in the Hoboken Public Library in order to build awareness about the project and to gain input about local flooding. A community survey was made available on the City of Hoboken website from July 16th to August 5th, 2013. On-the-ground outreach was also conducted on July 24th in conjunction with HOPES and was based in their location at 532 Jackson Street in the Family Resource Center complex of the Hoboken Housing Authority. In addition to the online survey and door-to-door outreach, the survey was also made available in Hoboken public buildings such as the Public Library, Senior Building and City Hall. The City of Hoboken advertised these events via the City website, flyers were posted in public buildings prior to the events, and the events were publicized in the Together North Jersey newsletter, on the website and via social media outlets. Event locations were chosen based on centrality, presence in the community, and location in relation to the areas that flood frequently.



Survey results showing prmary mode of transportation for respondents, flooding impact, and how respondents propose to pay for stormwater management improvements.

IDENTIFICATION OF ISSUES AND CHALLENGES

The survey had a total of 196 respondents, and confirmed that the worst flooding typically occurs in sewersheds H1, H4 and H5, the southern and western portions of the city. 57% of respondents claimed that flooding has "some" or "strong" impact on their lives. Most residents were in favor of paying for stormwater management with either bonds or local taxes and stormwater fees.

The survey confirmed city-identified problem areas of minor localized flooding, which were considered when recommending locations for siting green infrastructure BMPs.

Outreach event at the Hoboken Public Library on April 18

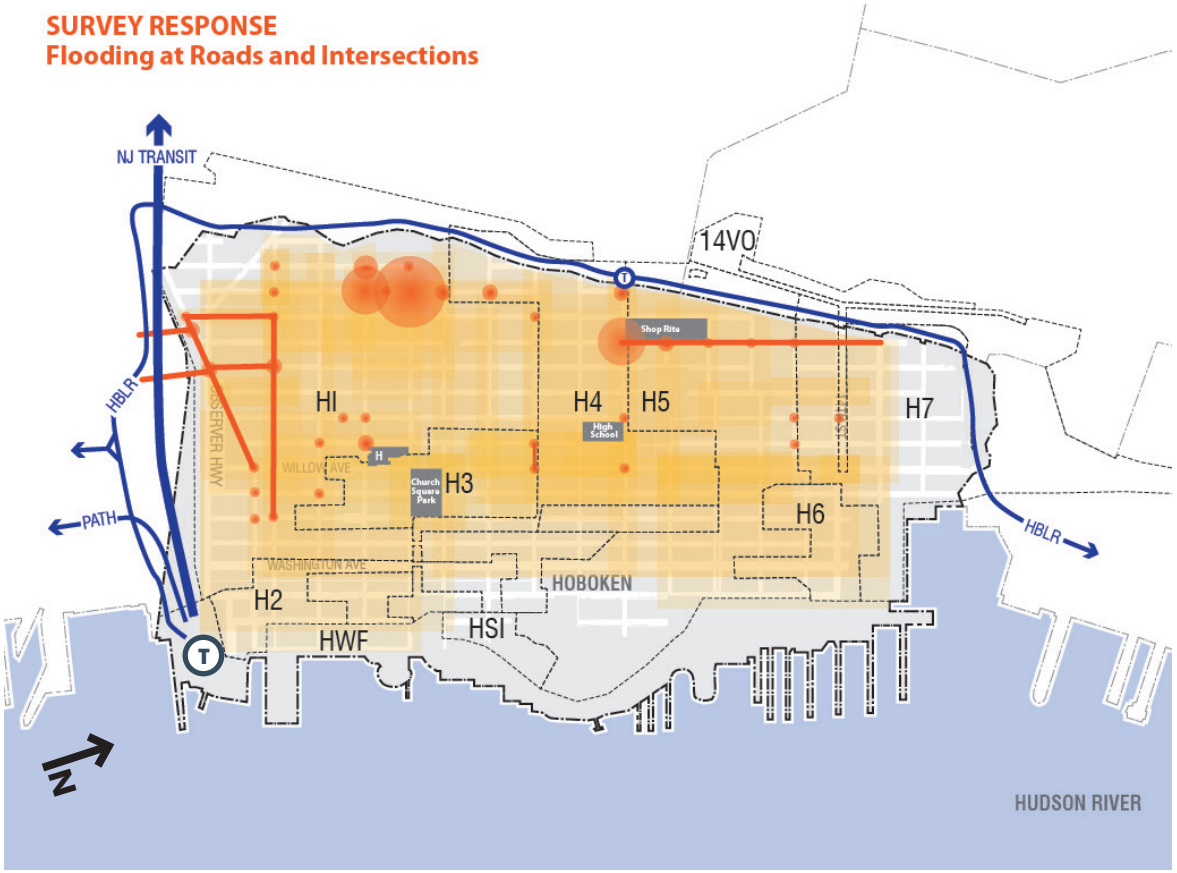
SERVICE ORGANIZATIONS

These organizations participated as members of the project's Steering Committee and were integral to informing the community engagement process.

HOPES Community Action Partnership Incorporated is a Hoboken-based organization which is part of a larger, nationwide network of community action agencies dedicated to fighting poverty through encouragement of self-sufficiency. Their mission is to provide community services that respond to the social, educational and training needs of individuals in an effort to overcome barriers and fight the causes of poverty. They operate from five different Hoboken locations, including the Family Resource Center in the Jackson Gardens community of the Hoboken Housing Authority.

Administering Surveys on foot in western Hoboken on July 24

Hoboken Quality of Life Coalition (QLC) is a community-based organization concerned about the air, earth and water of Hoboken, especially as it relates to issues such as development, open space, parking and flooding in the city. Their continuing efforts revolve around preserving the streetscape and the city's old and historic buildings.



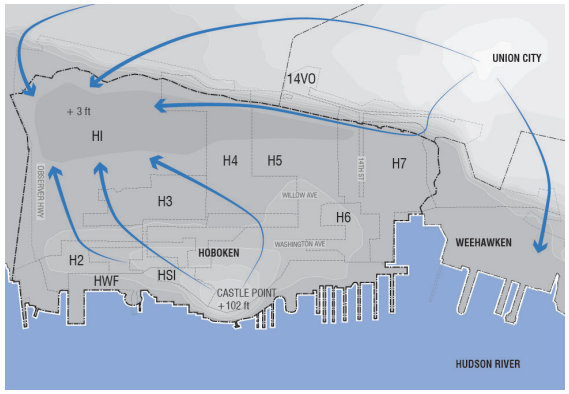
The survey confirmed that the worst flooding occurs in sewersheds H1, H4, and H5

FLOODING CONCERNS

PROBLEM LOCATIONS AND IMPACTS

Much of Hoboken's west side was built on filled wetlands, and a river was located on the City's western perimeter. The lowest areas of the City are located in the southwest, which is less than three feet above sea level. The high point in the City is located along the eastern cliff face at Castle Point. Surface stormwater flows generally follow the topography, leading to the west and southwest parts of the city with additional flows coming from the higher elevations of the surrounding communities such as Jersey City and Union City in the Palisades.

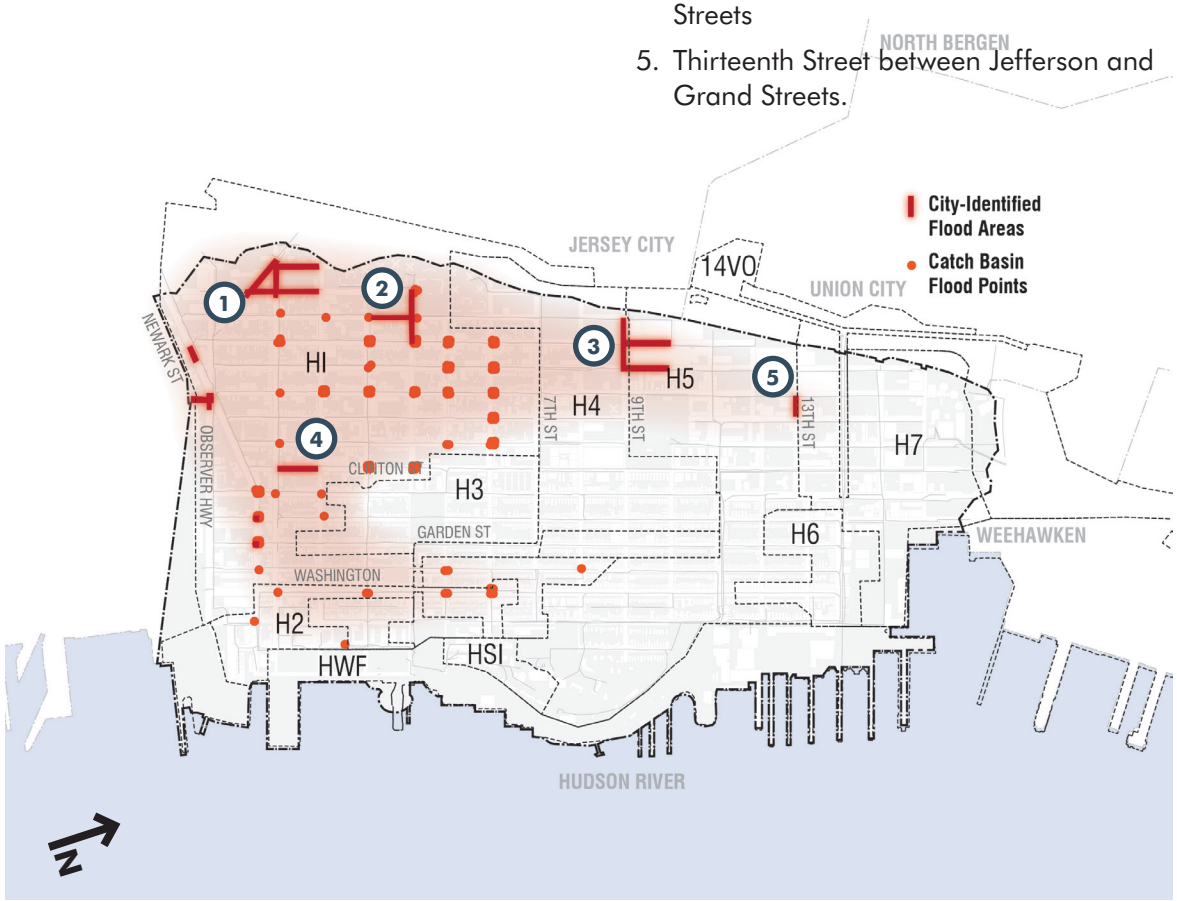
The City's flooding problems can be attributed to multiple sources: high tides, low topography, surface runoff, a prevalence of impervious surfaces, antiquated sewer infrastructure, interconnections between sewersheds, and insufficient pumping capability.



Surface Stormwater Flows

These factors combine to pose the highest flood risk in the southwest portion of the city. Specifically, flooding occurs most often at catch basin flood points and around certain intersections:

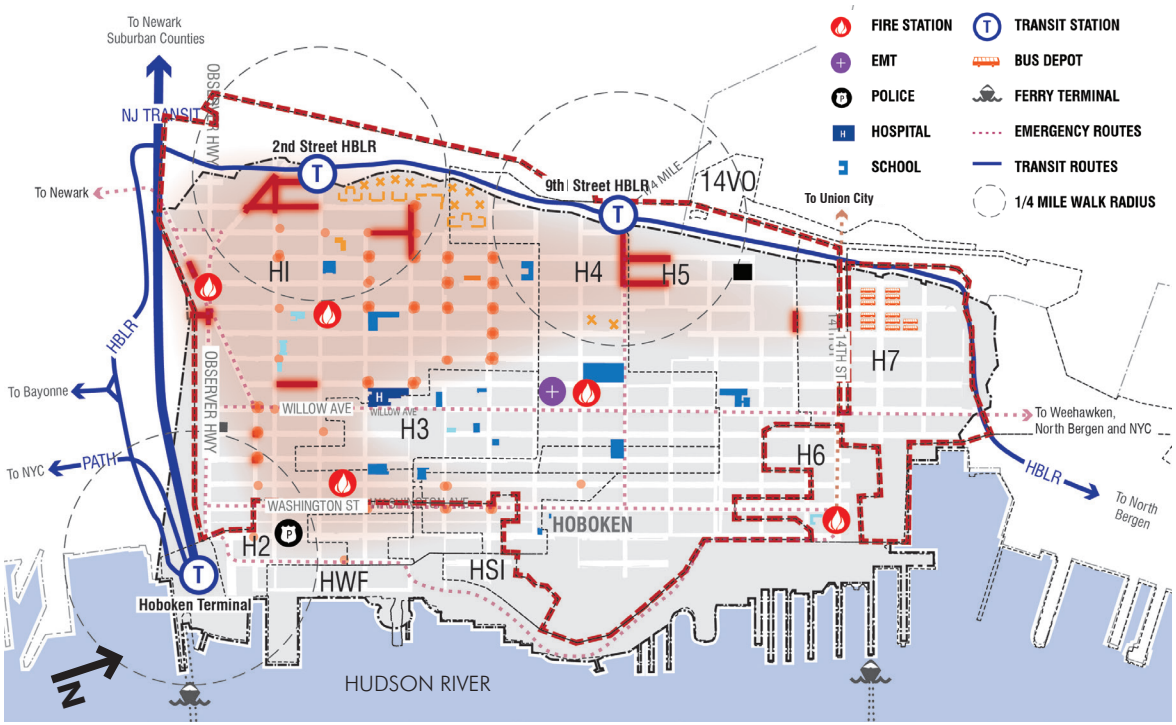
1. Paterson Avenue and First Street
2. Jackson Street and Fourth Street
3. Ninth Street between Monroe Street and Madison Street
4. Clinton Street between First and Second Streets
5. Thirteenth Street between Jefferson and Grand Streets.



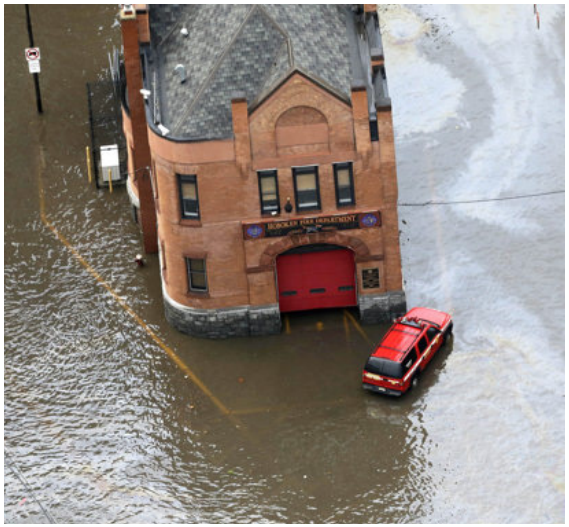
Stormwater Management Problem Areas

KEY ASSETS TO BE PROTECTED

- Critical facilities are concentrated in H1, H3 and H4
- Transit infrastructure is concentrated at the borders of H1, H2, H4, H5, and H7

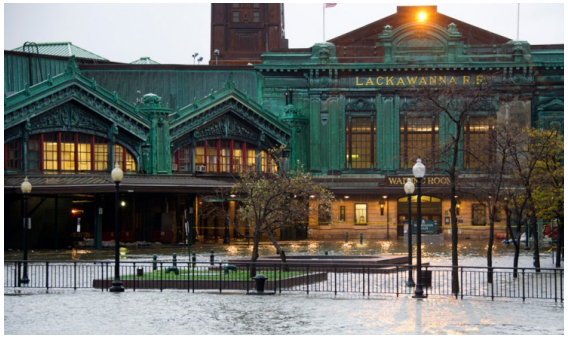


Stormwater Management Problem Areas



Hoboken Fire Department Ladder Co. 2 / Engine Co. 1

PSE&G Substation



Hoboken Terminal

BEST MANAGEMENT PRACTICES

Rain Garden in right-of-way

Stormwater Infiltration Planter

Enhanced Tree Pits

Rain Garden Bump Out

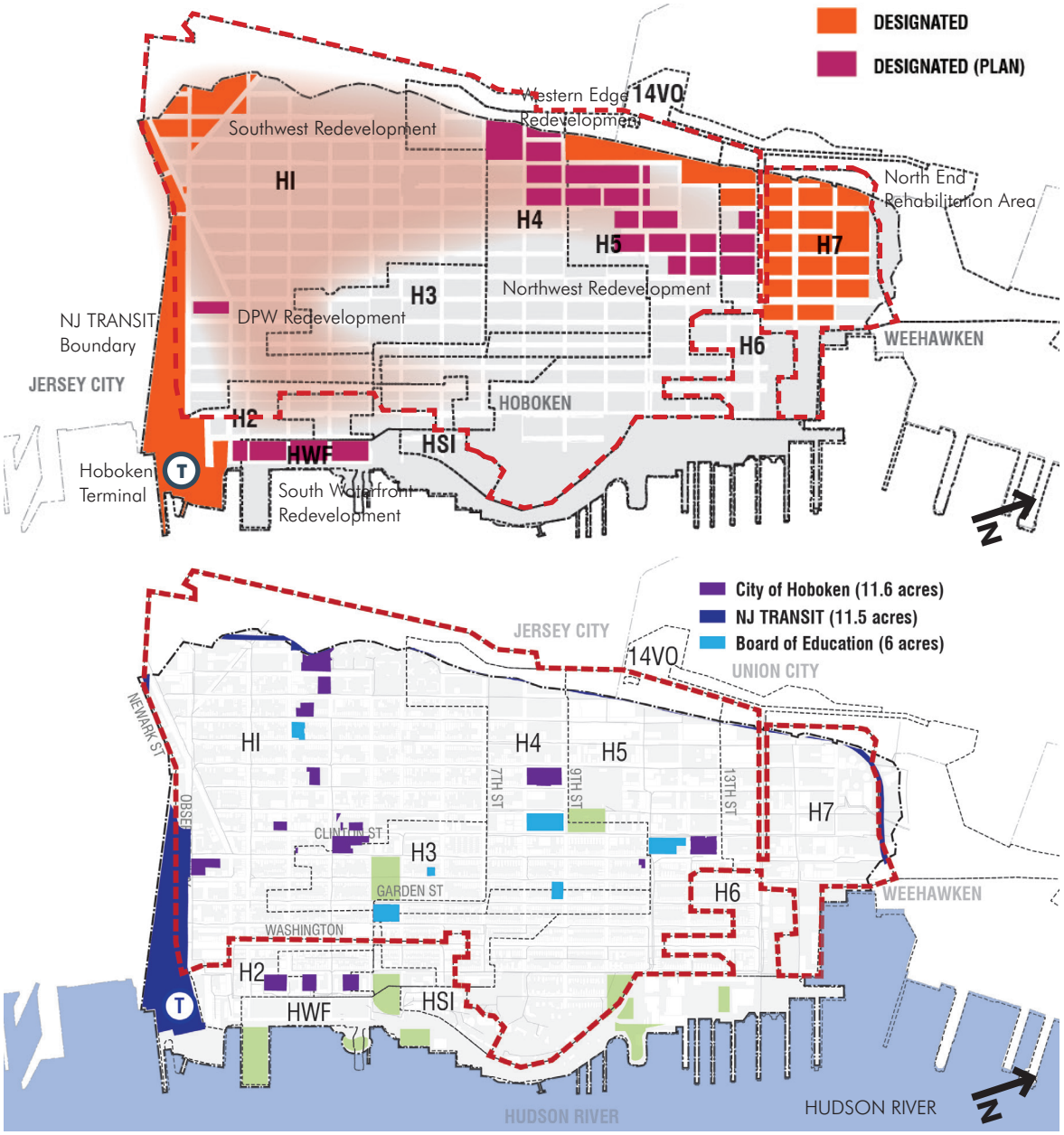
There are a wide range of actions that the City can take to reduce stormwater on a lot-by-lot basis through the implementation of best management practices (BMPs). Designs that utilize BMPs help to minimize impervious surfaces, absorb stormwater and mimic the natural water cycle through the processes of infiltration, evaporation and reuse. BMPs can help reduce the overall volume of stormwater generated on-site and recharge groundwater supply. BMPs that were considered for use in the City include:

- Constructed wetlands
- Permeable pavements
- Stormwater street trees
- Vegetated swales
- Rainwater harvest and reuse
- Basins or ponds
- Rain gardens
- Stormwater infiltration planters
- Subsurface storage
- Green roofs

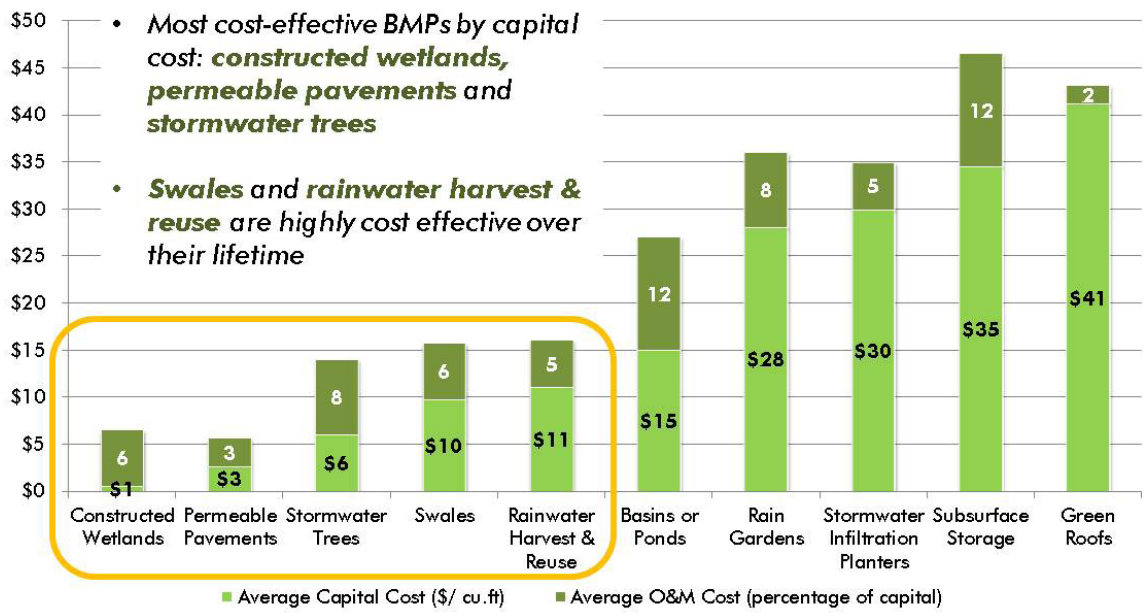
OPPORTUNITIES

The primary sewersheds where green infrastructure installations would appear to be most beneficial include the H1, H4, H5 and H7. Public sector entities control 29.1 acres in Hoboken, which is largely concentrated within the four key sewersheds (H1, H2, H4 and H5). Designated Redevelopment Areas offer larger-scale opportunities to implement green infrastructure, among which is the BASF site located in the Northwest Redevelopment area.

BASF Site



Proposed Land Use Changes (above) and Public Ownership (below)



BMPs Cost Effectiveness per cubic foot of implementation

	FLOODING MITIGATION		ECOLOGICAL BENEFITS		PUBLIC HEALTH			OPEN / GREEN SPACE	
BMP	Volume	Peak Discharge	Water Quality	Wildlife Habitat	Air Quality	Heat Island Effect	Noise Pollution Reduction	Beautification	Expanding Recreation
Basins or Ponds									
Constructed Wetlands									
Vegetated Swales									
Stormwater Trees									
Rain Gardens									
Subsurface Storage									
Rainwater Harvesting/Reuse									
Stormwater Planters									
Permeable Pavements									
Green Roofs									

BMPs Benefits *Highest Benefit* *Some Benefit* *Little Benefit*

OPPORTUNITIES

Existing open space and recreation areas, as well as schools, roadways and other public property provide significant opportunities for the integration of green infrastructure Best Management Practices (BMPs). Hoboken's three proposed parks (located within the BASF, Pino, and Block 12 sites, shown in the map on page 18) are also ideal locations for the implementation of BMPs.

New development and redevelopment can incorporate source controls (BMPs that absorb water before it can enter the stormwater system) such as green roofs, infiltration technologies and subsurface detention. The most effective BMPs include constructed wetlands, permeable pavements and stormwater tree pits. When factoring capital cost as well as operation and maintenance, swales and rainwater harvest/reuse tend to be highly effective over their useful lifetime.

Implementation of green infrastructure best management practices can help mitigate the significant costs involved in improving the gray infrastructure system to reduce the frequency of future CSO events.

PART 2:
CITY WIDE STRATEGY

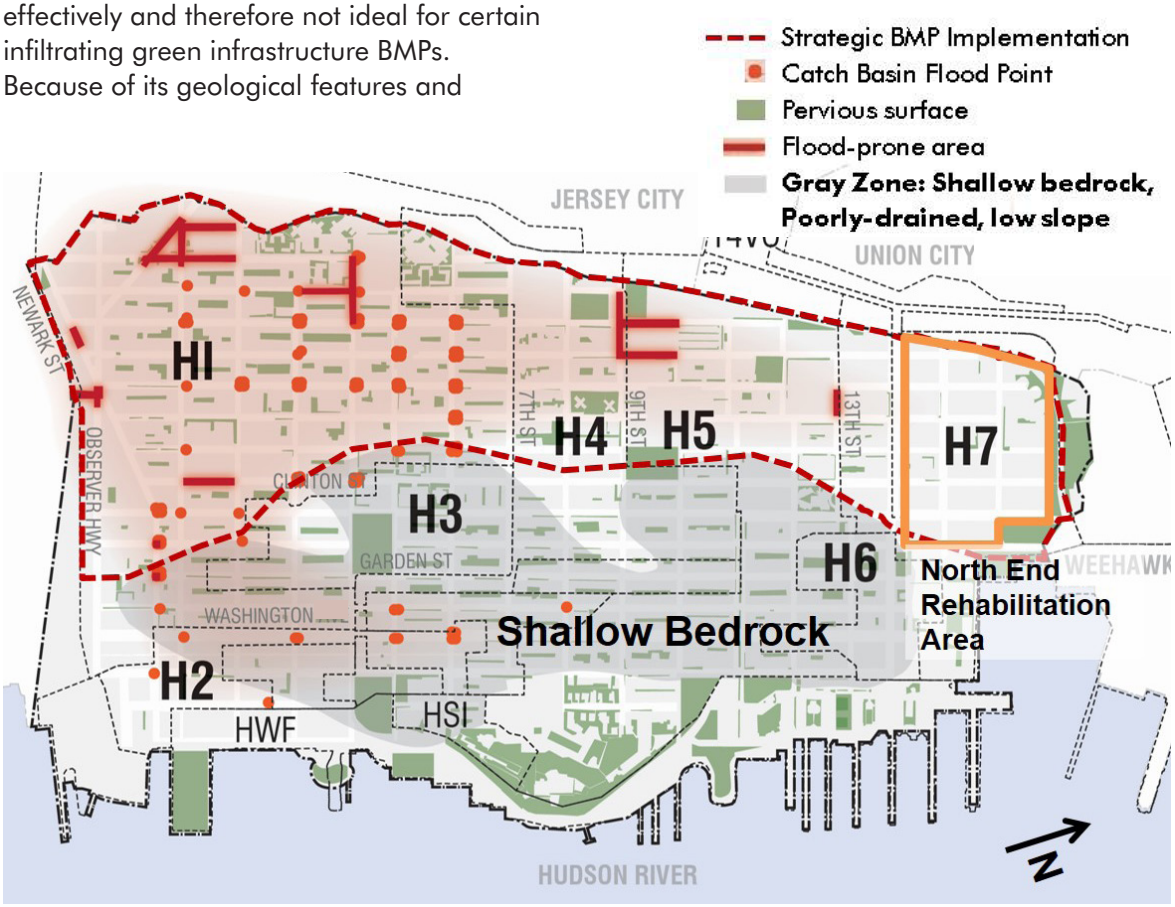
THE PLAN

Based on analysis of the carrying capacity of the underlying land forms, and contingent upon watertable data which will have to be part of a follow-up study, the Plan proposed a Conceptual Framework that organizes the City into three zones:

- ***The Gray Zone,*** which contains a shallow depth to bedrock and therefore cannot infiltrate stormwater efficiently, is most appropriate for above-ground BMPs such as rainwater harvesting and green roofs.
- ***The Green Zone,*** which has a greater depth to bedrock and soils that are capable of accepting and infiltrating stormwater and as such is most appropriate for vegetated BMPs like rain gardens, swales, and stormwater trees.
- ***The Blue Zone***, which contains the lowest elevations in the City and therefore may be available for the detention of stormwater.

This framework provides an overarching conceptual construct that can be used to educate residents, business owners and developers as Hoboken advances its green infrastructure program. It can also be used to help guide strategies for the individual sewersheds and future redevelopment of the areas in the northwestern part of the city.

Almost all of the sewersheds H2, H3 and H6 are on shallow bedrock ("Gray Zone"), preventing stormwater from infiltrating effectively and therefore not ideal for certain infiltrating green infrastructure BMPs. Because of its geological features and potential redevelopment opportunities in the north end of the City, H7 presents the greatest opportunity for targeted green infrastructure installation. However, H1, H4 and H5 are also recommended for strategic Best Management Practice (BMP) implementation.



Strategic Direction

GRAY ZONE: DETENTION STRATEGIES

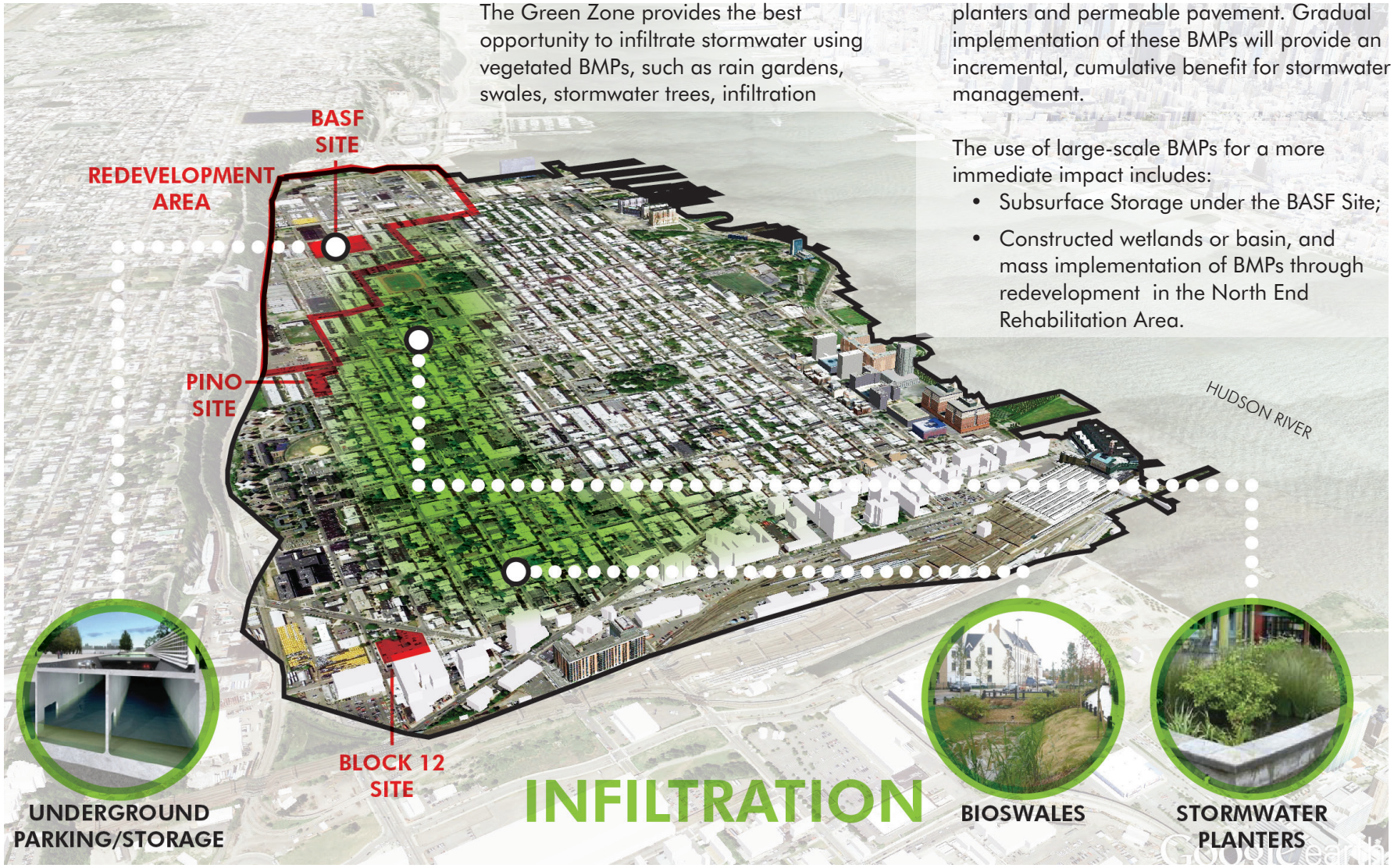
Although the Gray Zone limits certain BMPs due to the shallow bedrock, the detention of stormwater through above-ground BMPs (rainwater harvesting and green/blue roofs) and subsurface storage creates a real opportunity to reduce runoff during storm events.

GREEN ZONE: INFILTRATION STRATEGIES

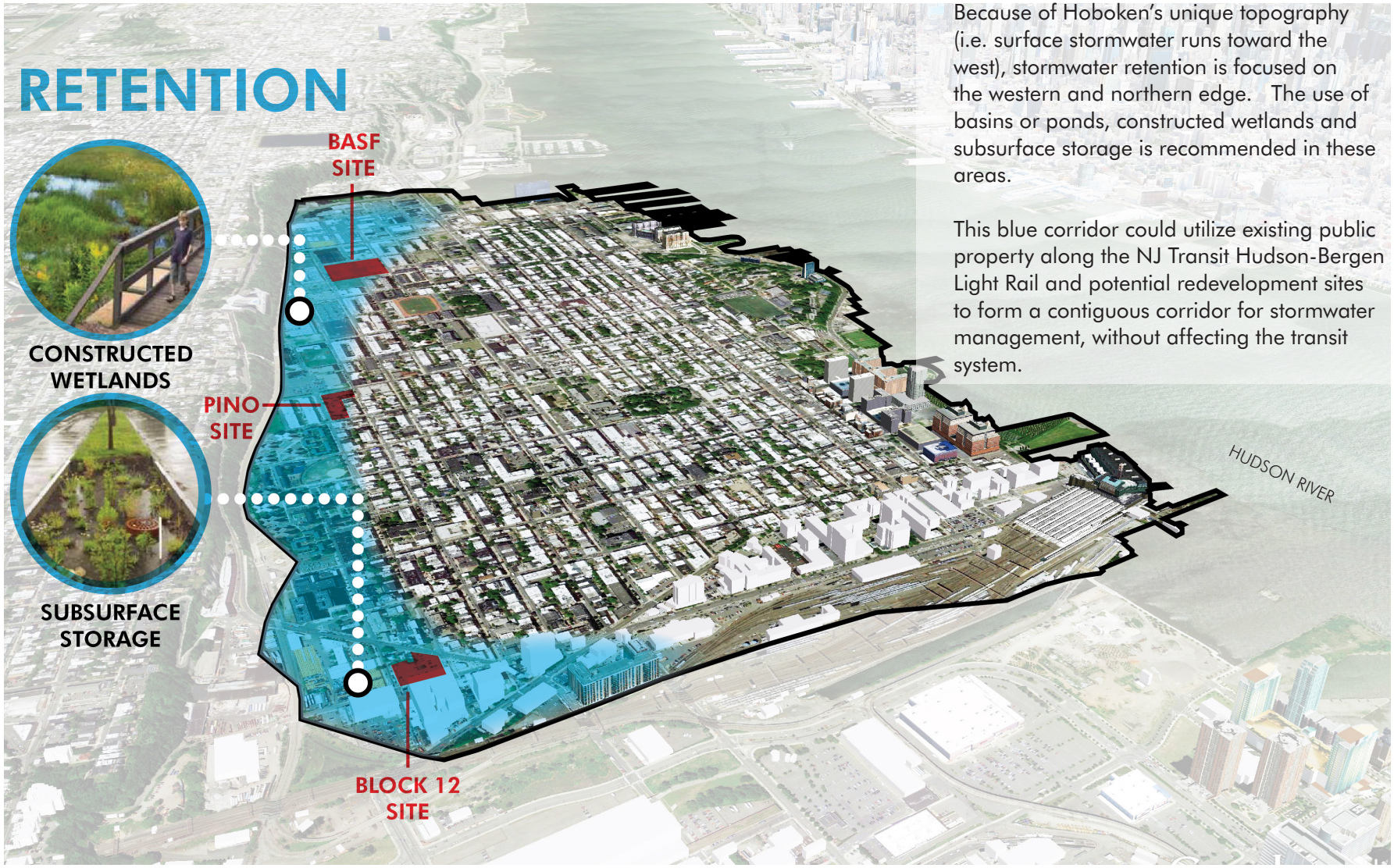
The Green Zone provides the best opportunity to infiltrate stormwater using vegetated BMPs, such as rain gardens, swales, stormwater trees, infiltration planters and permeable pavement. Gradual implementation of these BMPs will provide an incremental, cumulative benefit for stormwater management.

The use of large-scale BMPs for a more immediate impact includes:

- Subsurface Storage under the BASF Site;
- Constructed wetlands or basin, and mass implementation of BMPs through redevelopment in the North End Rehabilitation Area.



BLUE ZONE: RETENTION STRATEGIES



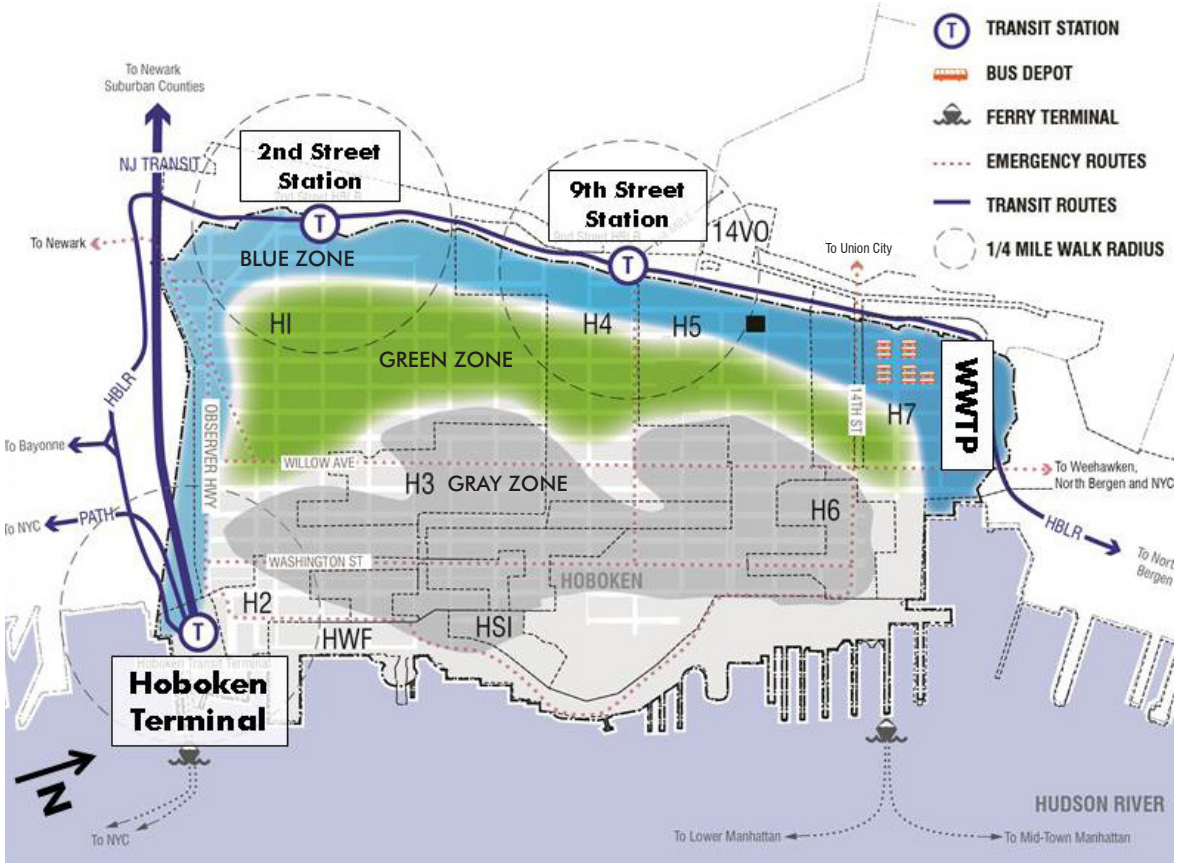
Because of Hoboken's unique topography (i.e. surface stormwater runs toward the west), stormwater retention is focused on the western and northern edge. The use of basins or ponds, constructed wetlands and subsurface storage is recommended in these areas.

This blue corridor could utilize existing public property along the NJ Transit Hudson-Bergen Light Rail and potential redevelopment sites to form a contiguous corridor for stormwater management, without affecting the transit system.

MAKING TRANSIT MORE RESILIENT

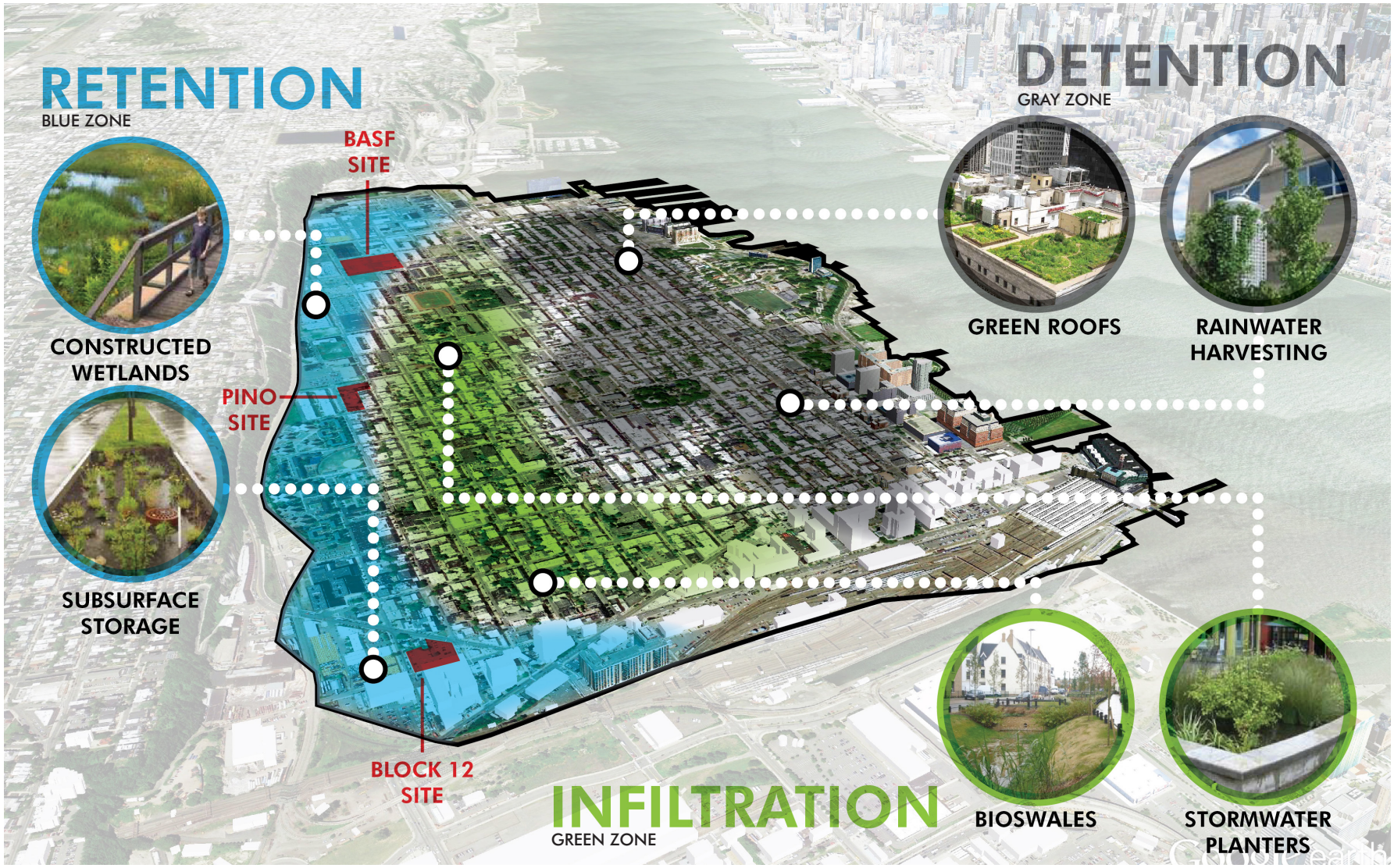
Recurring flooding is one of the most significant barriers to accessing the City's two Hudson Bergen Light Rail stations. Addressing flooding through green infrastructure has the potential to improve accessibility to transit. In addition, because the HBLR right-of-way runs through sewersheds H1, H2, H4, H5 and H7, along the "blue zone", it presents a significant opportunity to implement several green infrastructure BMPs.

2nd Street HBLR Station



WWTP: Wastewater Treatment Plant

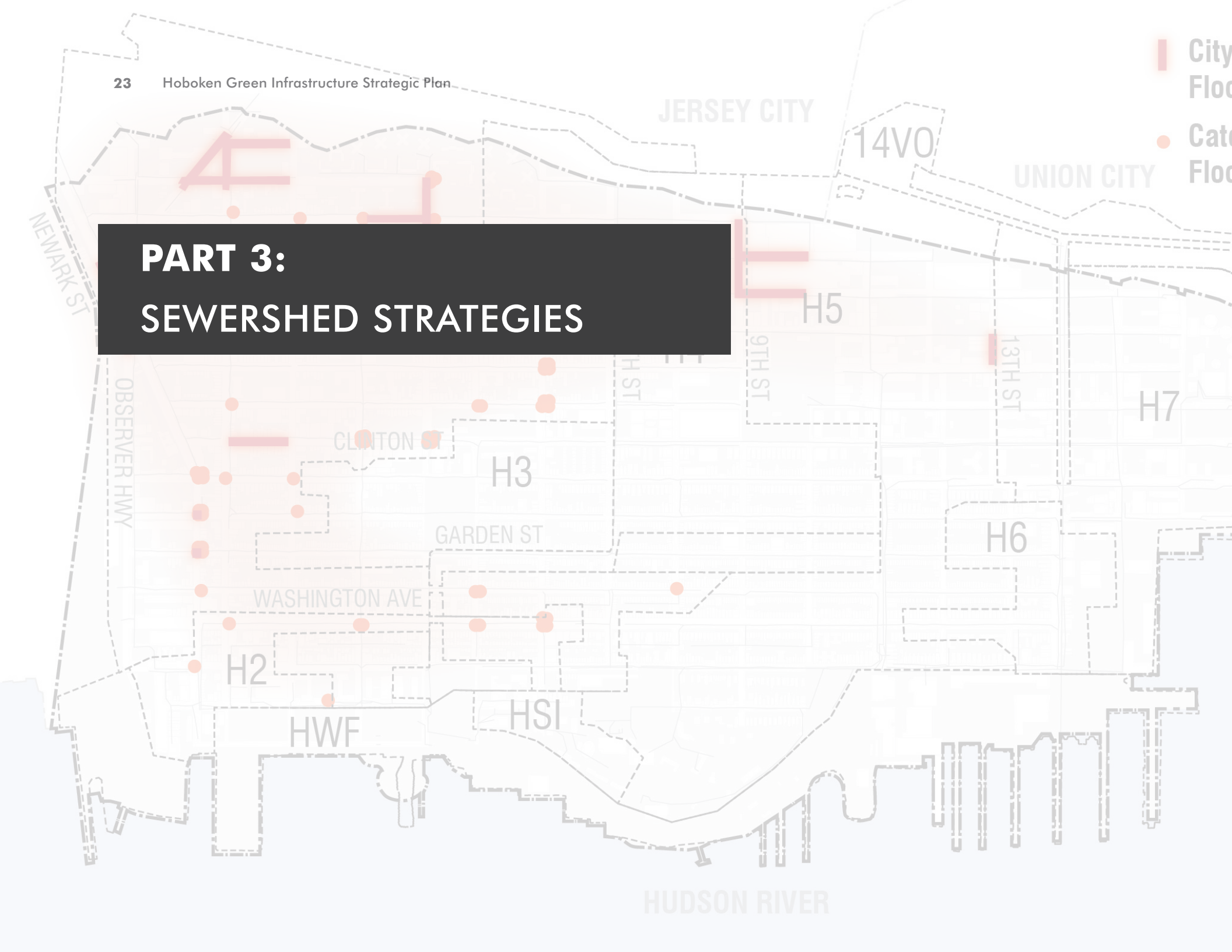
CONNECTING THE DOTS



Although each zone is identified by its ability to process stormwater, they are all interconnected. This strategic approach allows detention, infiltration and retention to work together, increasing stormwater management benefits by employing specific green infrastructure BMPs in their most suitable locations.

Gray infrastructure improvements should work cooperatively with this green infrastructure strategy. Separate sewer lines could be constructed to convey stormwater from localized flooding problem areas to green infrastructure retention systems in the blue zone. Further analysis of how the sewersheds affect each other should be a priority.

PART 3:
SEWERSHED STRATEGIES

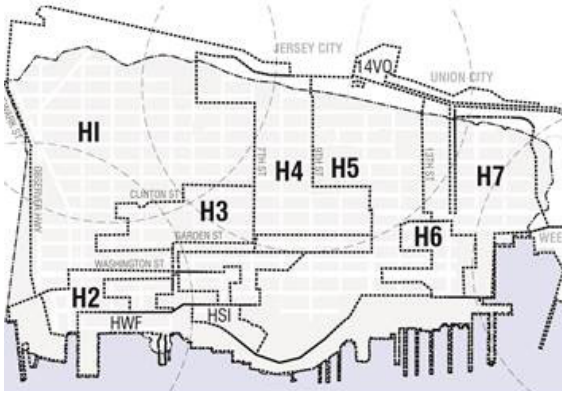


OVERVIEW

POTENTIAL STORMWATER THAT CAN BE CAPTURED USING GREEN INFRASTRUCTURE

BMP	H1	H2	H3	H4	H5	H6	H7
Basins or Ponds	780,031				125,938		368,994
Constructed Wetlands	234,009				37,781		110,698
Swales	156,006	4,556		48,684	25,188		73,799
Stormwater Tree Pits	78,003	1,519	867	16,228	12,594	357	36,899
Rain Gardens	312,013	9,111		129,823	50,375		147,598
Subsurface Storage	234,009	11,389	19,505	97,368	37,781	8,038	110,698
Stormwater Planters	468,019	9,111		97,368	37,781		110,698
Permeable Pavements		2,430		25,965	10,075		29,520
Rainwater Harvest & Reuse	19,014	634	1,182	5,007	4,631	520	7,559
Green Roofs	38,028	2,535	4,730	20,029	9,261	2,079	15,118
TOTAL	**2,319,133**	**41,284**	**26,284**	**440,472**	**351,404**	**10,994**	**1,011,581**

Estimated Potential Amount of Stormwater (cu. ft.) captured or treated by BMPs by Sewershed during a 1-year storm event
Gray signifies that a BMP is not recommended in a given Sewershed due to siting considerations or sewershed characteristics



Sewersheds H1, H4, H5 and H7 present the biggest potential opportunities to capture the largest quantity of stormwater using green infrastructure BMPs. The chart highlights the BMPs best suited for each sewershed. A blank area in the chart signifies that a BMP is not recommended in a given sewershed.

It is important to note that all recommendations and calculations within this plan are based on a review of the best data available. Proper site evaluation, site-specific investigation and testing will be necessary during engineering design for individual BMPs at selected locations.

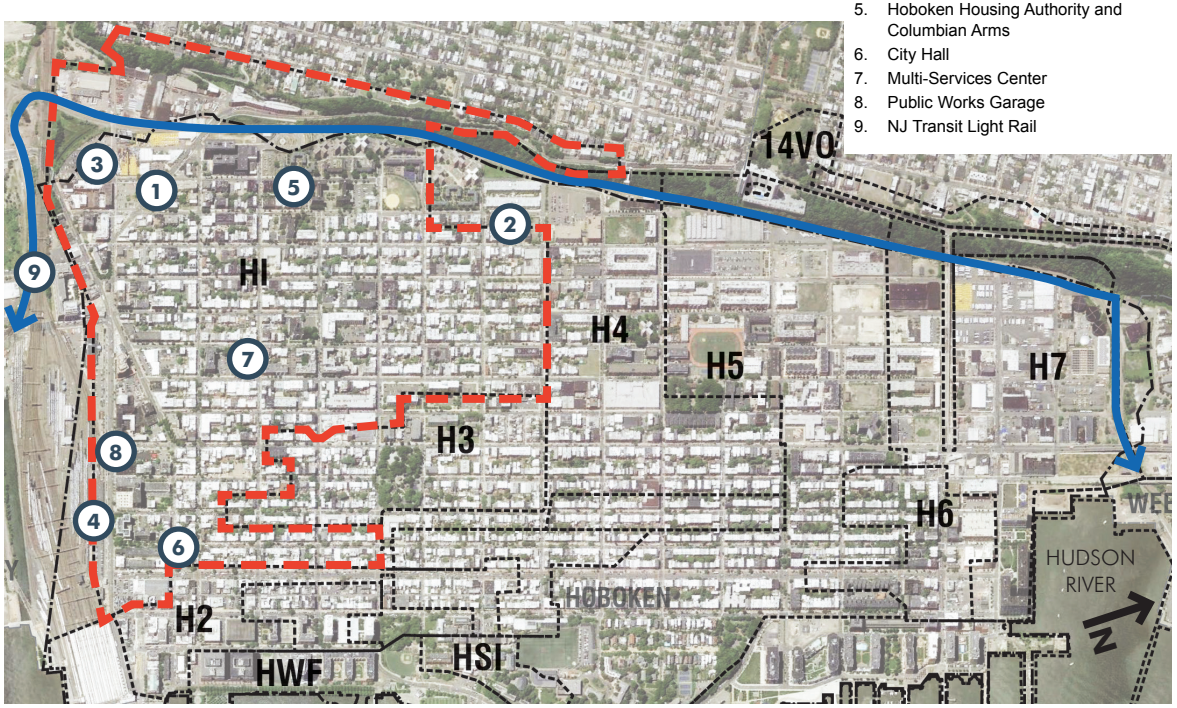
H1: SOUTHWEST SEWERSHED

The H1- Southwest Sewershed contains residential neighborhoods, business districts concentrated on Observer Highway and Washington Street, redevelopment areas, park sites and City facilities including City Hall. Because this area is the low point in the City, stormwater concentrates in the H1 sewershed making the southwest section of the city very flood prone.

The total potential amount of stormwater that can be captured using green infrastructure in the H1 sewershed is approximately 2.3 million cu.ft. Basins, infiltration planters and rain gardens have the highest potential to capture the most amount of rainfall.

Opportunities:

1. Block 12 Park
2. Pino Site (H1/H4)
3. Southwest Rehabilitation Area
4. DPW Redevelopment Area
5. Hoboken Housing Authority and Columbian Arms
6. City Hall
7. Multi-Services Center
8. Public Works Garage
9. NJ Transit Light Rail



Pino Site

Columbian Arms Housing

City Hall

Block 12 Site

The City has identified Southwest Park, also known as Block 12, as a future site for a new park in Western Hoboken. With Hoboken's growing population of young families and senior community, additional park space is viewed as essential to accommodate an increasingly active community. Block 12 Site not only represents a significant open space resource but also provides an excellent opportunity to increase the capture and treatment of rainfall.

Due to shallow slopes, deeper bedrock and high groundwater table, the amount of rainfall retained can be increased by 30% through the use of infiltration planters and rain gardens and reducing impervious coverage to 50% of the lot area.

Infiltration Planters

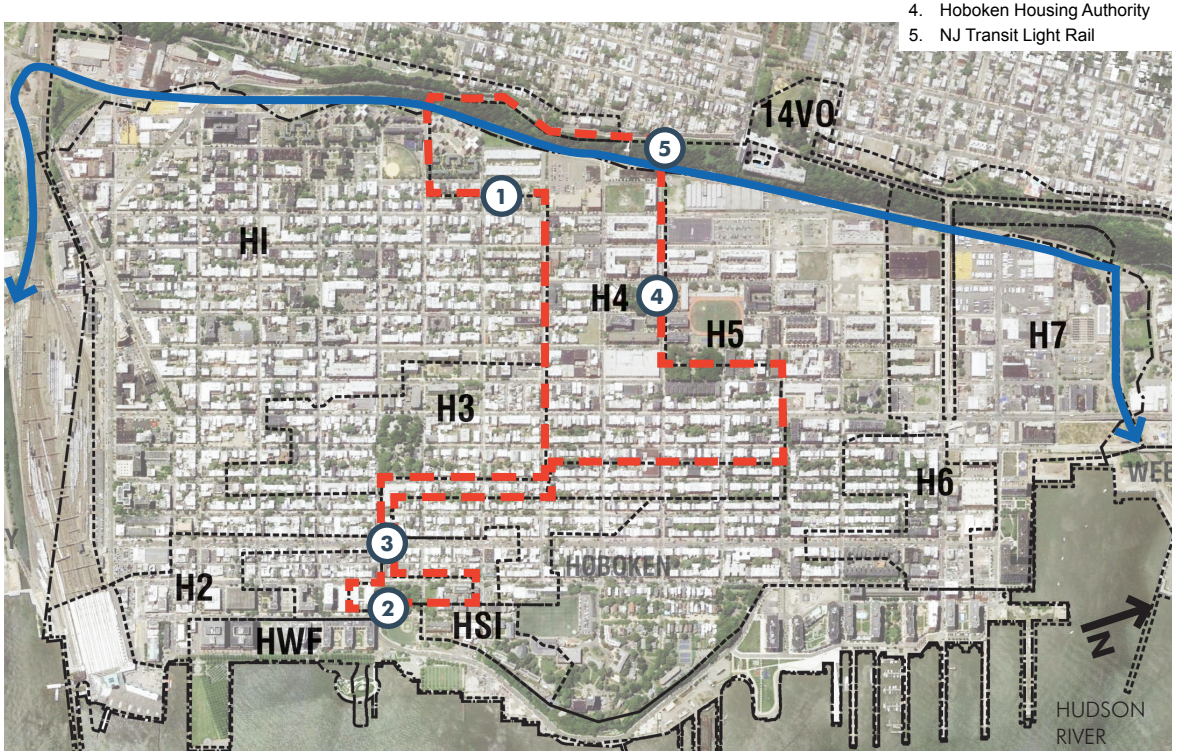
H4: MIDTOWN SEWERSHED

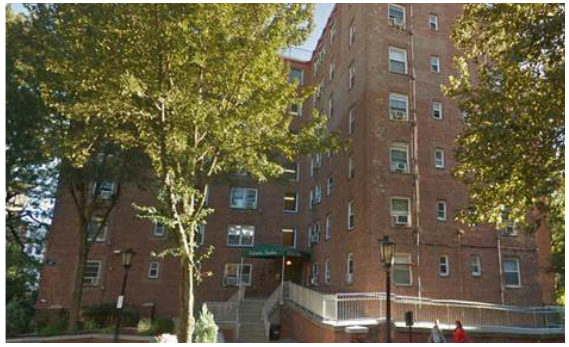
Residential units are concentrated in the H4-Midtown Sewershed including a Hoboken Housing Authority facility. The 9th Street NJ TRANSIT Hudson Bergen Light Rail Station is also located on the boundary between the H4 and H5 Sewershed. The eastern part of this sewershed contains shallow bedrock and poorly drained soils. However, there still exists a potential to capture stormwater using green infrastructure along the western end of the H4 sewershed.

The total potential amount of stormwater that can be captured using green infrastructure in the H4 sewershed is approximately 440,000 cu.ft. with rain gardens, infiltration planters and subsurface infiltration or storage devices having the highest potential for stormwater capture.

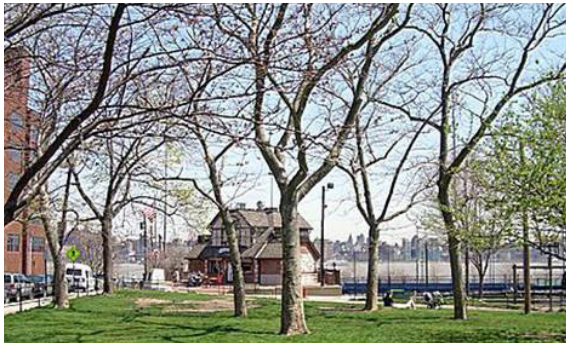
Opportunities:

1. Pino Site (H1/H4)
2. Stevens Park
3. Rain Gardens Demonstration
4. Hoboken Housing Authority
5. NJ Transit Light Rail





Hoboken Housing Authority



Stevens Park

9th Street HBLR Station

Pino Site

The City is interested in acquiring this one acre property (known as Pino Site) for a park in Western Hoboken as part of an agreement to continue the redevelopment of the Monroe Center site. This potential park site near the Jubilee Center, Monroe Center for the Arts, and a growing residential neighborhood would bring much needed open space and transform unused land into a community gathering focal point.

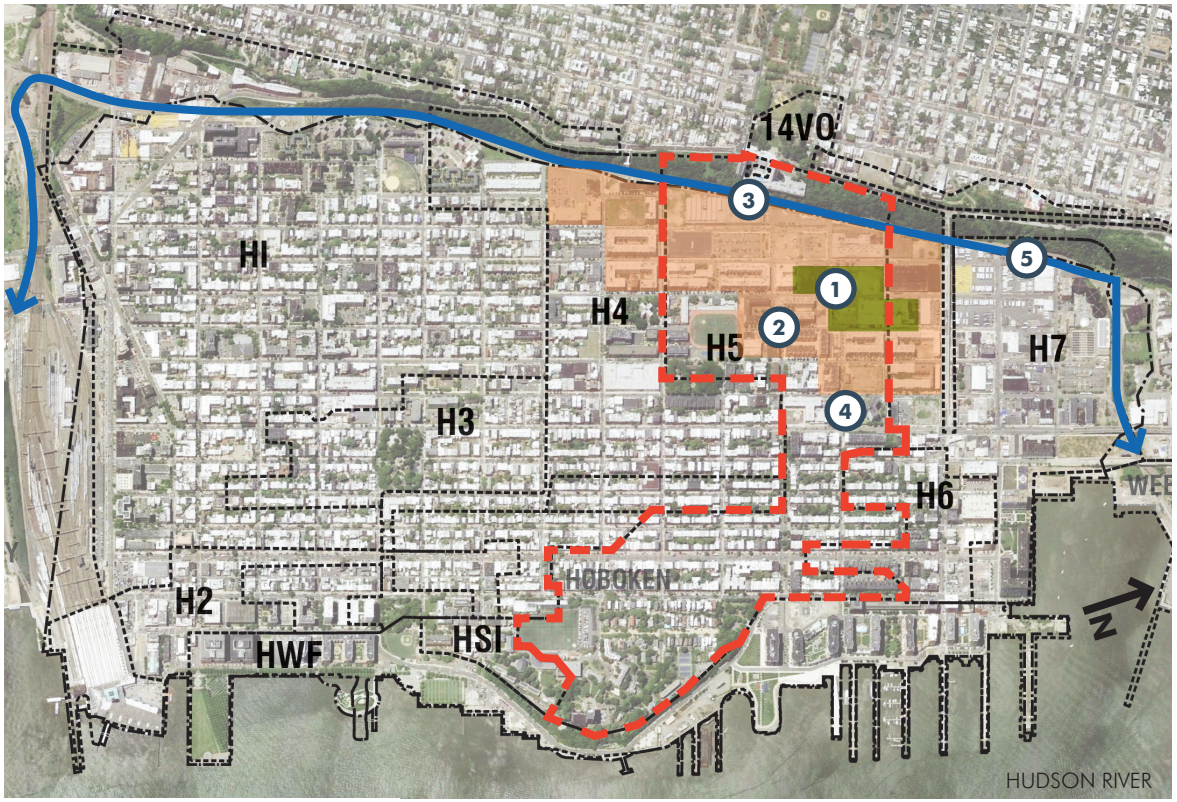
Pino Site provides a great opportunity to increase the capture and treatment of rainfall. Due to shallow slopes, the amount of rainfall retained can be increased by 46% through the use of BMP's such as subsurface storage and tree planters and reducing impervious coverage to 50% of the lot area.

Tree Planter Pits

H5: NORTHWEST SEWERSHED

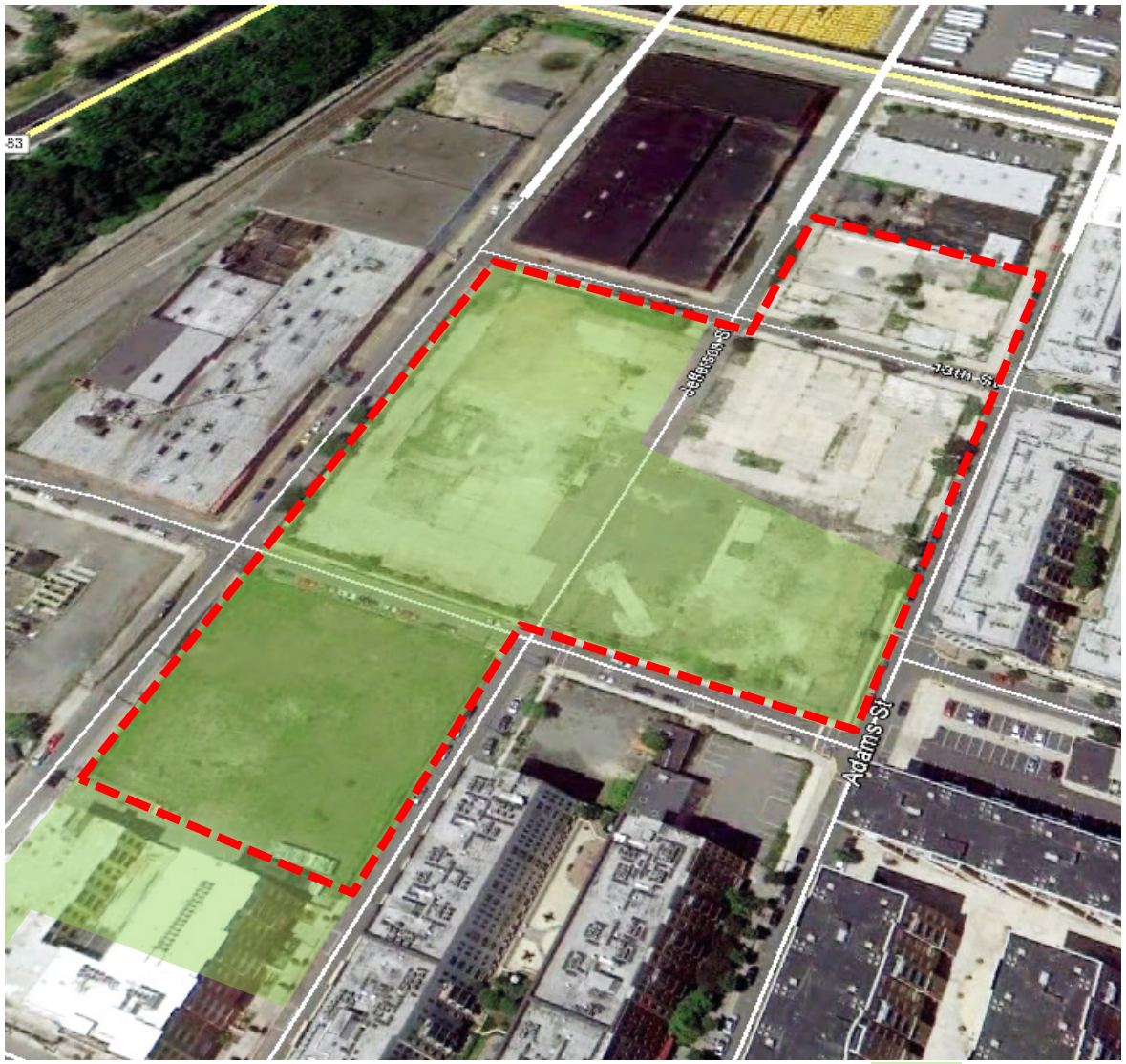
Residential neighborhoods, business districts and the Western Edge and Northwest Redevelopment Area make up the H5-Northwest sewershed. Although there is little publicly owned land in this sewershed, there is an extensive amount of land area within the identified redevelopment areas that provide ripe opportunities to retain vast amounts of stormwater. Rain gardens and stormwater basins/ponds have the potential to capture the most amount of rainfall.

The total potential amount of stormwater that can be captured using green infrastructure in the H5 sewershed is approximately 350,000 cu.ft. with basins or ponds, rain gardens, stormwater infiltration planters and subsurface infiltration or storage devices potentially capturing the highest volumes of stormwater.



Opportunities:

1. BASF / Cogins Site
2. Northwest Redevelopment Area
3. Western Edge Redevelopment Area
4. Hoboken Housing Authority
5. HBLR



BASF Site *Well-drained Soils*

The City is focused on acquiring land to provide large active space for residents at a fair market price. The BASF Site, a six acre site in Western Hoboken, is a unique opportunity to provide much needed large open space swaths for active recreation while also addressing the need to manage stormwater efficiently.

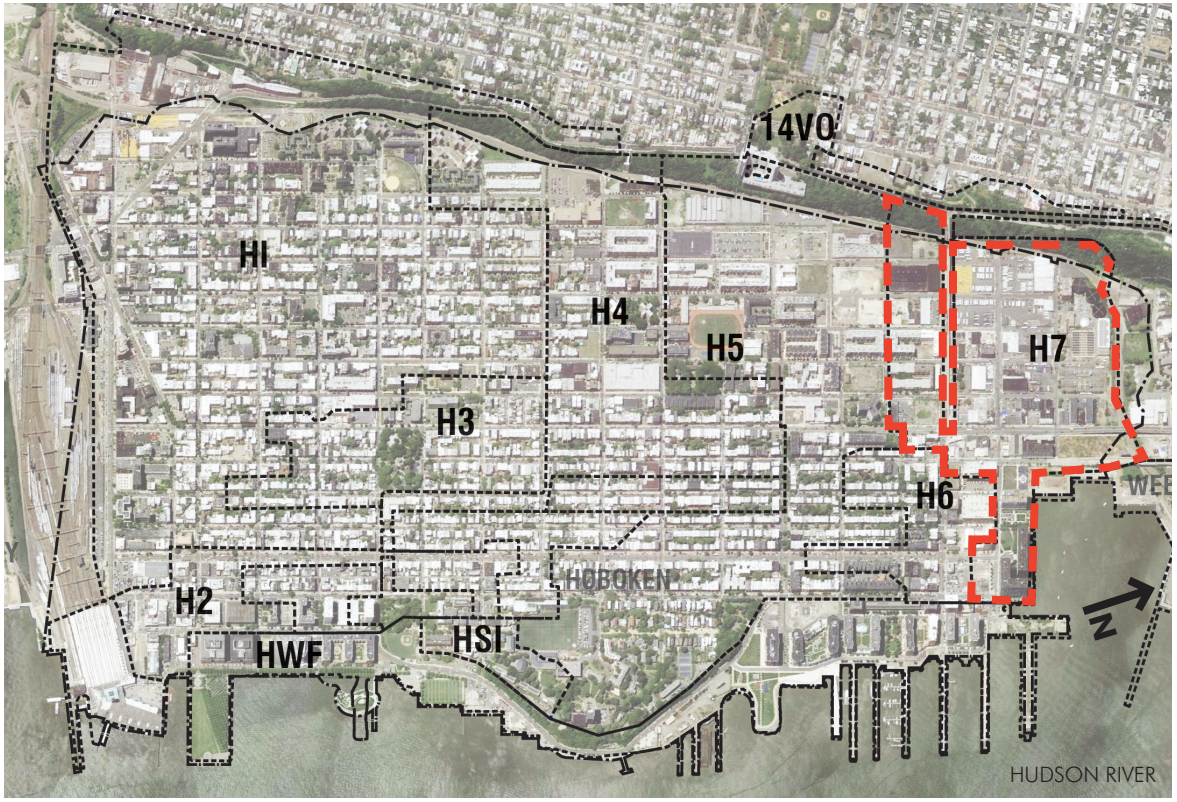
BASF Site provides a great opportunity to increase the capture and treatment of rainfall. Due to well drained soils and deeper bedrock, the amount of rainfall retained can be increased by 31% (after capping the contaminated site) or 47% (after remediating the contaminated site) through the use of BMP's such as wet ponds, rainwater harvesting and reuse, green roofs and subsurface storage and reducing impervious coverage to 30- 50% of the lot area.

Basin

H7: NORTHWEST SEWERSHED

Industrial uses, surface parking lots and the North End Rehabilitation Area make up the H7-Northwest sewershed. Although there are marginal well-drained soils in this sewershed, there is an extensive amount of impervious area within the identified redevelopment areas, which should be reduced, that provide opportunities to implement large scale BMP's. Rain gardens and stormwater basins/ponds have the potential to capture the most amount of rainfall.

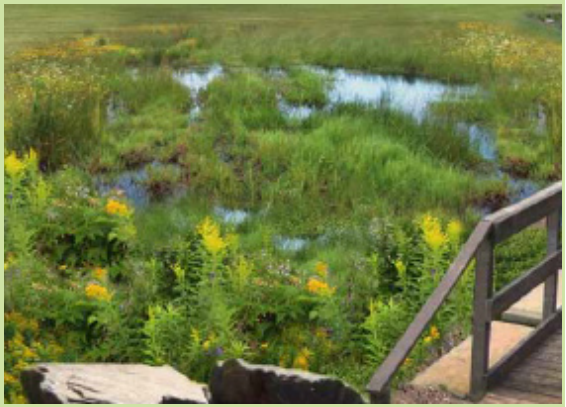
The total potential amount of stormwater that can be captured using green infrastructure in the H7 sewershed is approximately 1 million cu.ft. with basins or ponds, rain gardens, constructed wetlands, infiltration planters and subsurface infiltration or storage contributing highest to stormwater capture.



View of 14th Street which is appropriate for large scale best management practices.

PART 4:
RECOMMENDATIONS BY BMP

CONSTRUCTED WETLANDS



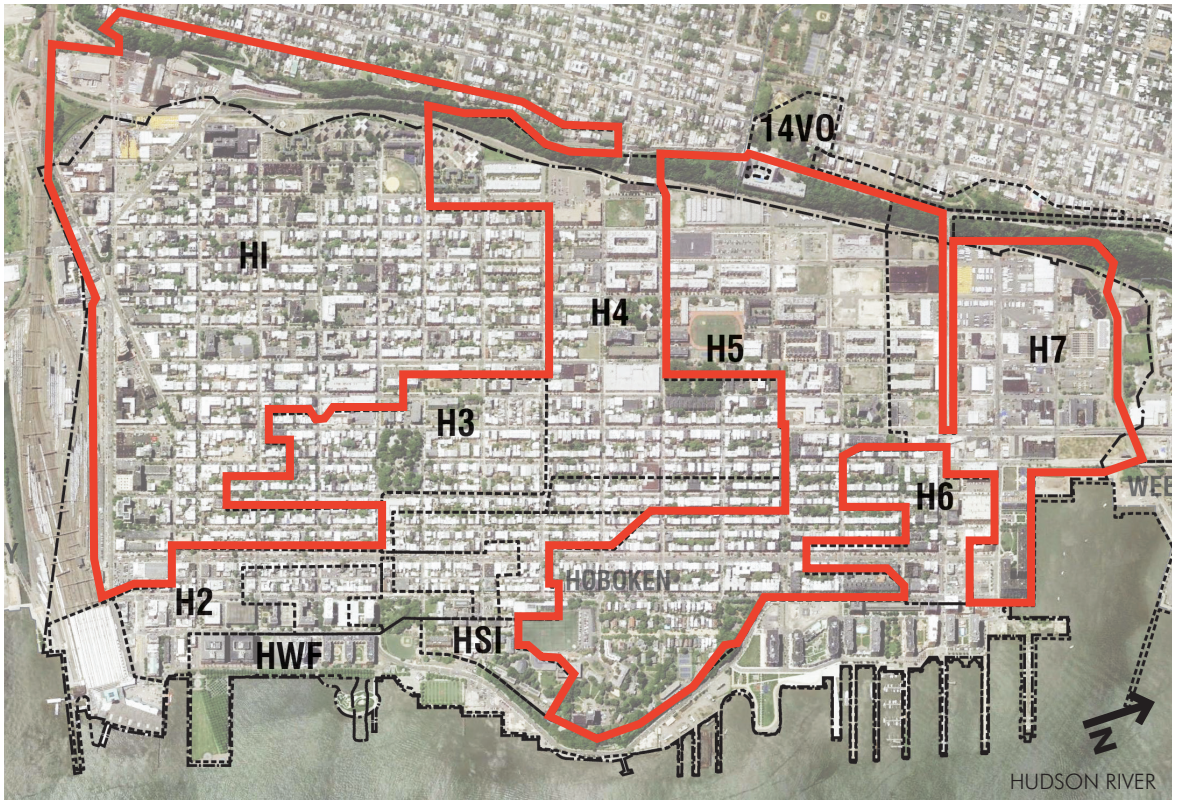
Examples of Constructed Wetlands

COST EFFECTIVENESS

Useful Life	**> 20 years**
Capital Cost	**$0.45/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**6%**

Constructed wetlands are recommended in the H1, H5 and H7 Sewersheds. Although these BMPs require a large amount of surface area, they also provide opportunities for passive recreation and wildlife habitat. Constructed wetlands require minimally upstream slopes from which to direct stormwater, making H1 and H7 ideal candidates due to their lower elevation.

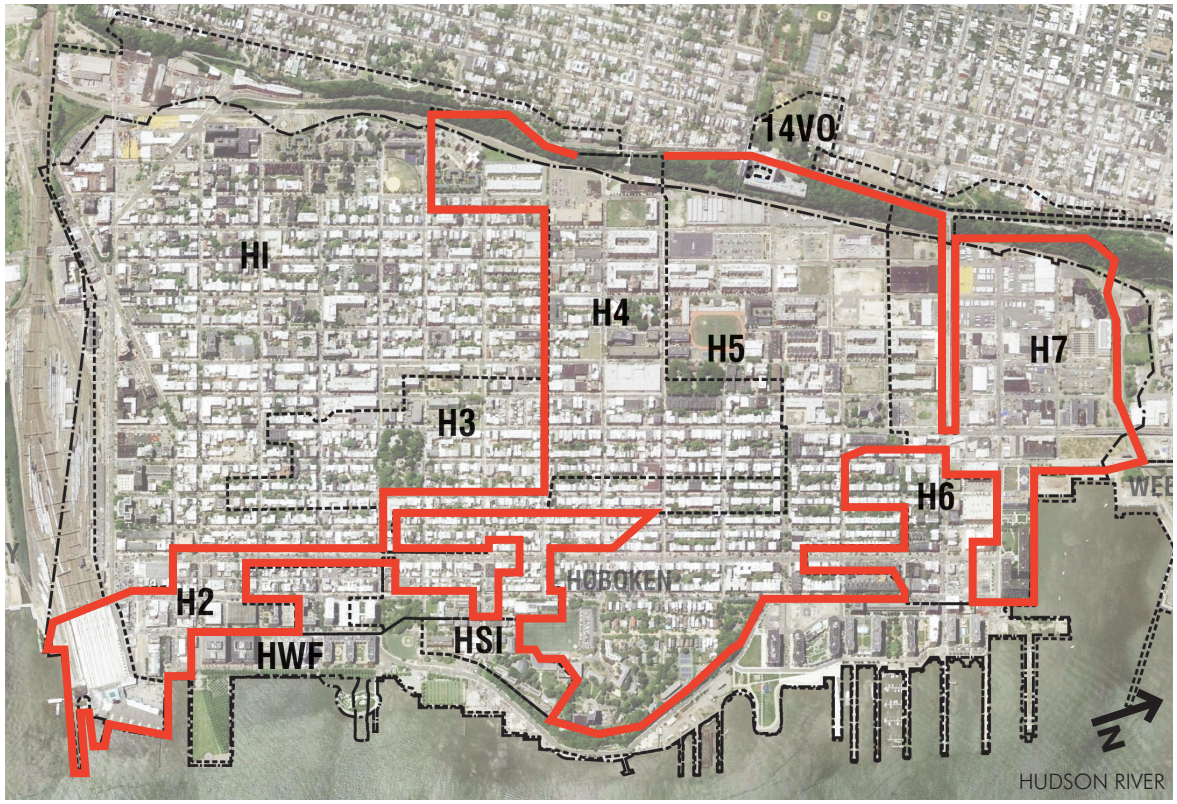
Constructed wetlands are one of the most effective BMPs with a capital cost of 0.45 cents per cubic foot.



PERMEABLE PAVEMENTS

Permeable pavements are recommended in the H2, H4, H5 & H7 sewersheds and serve as an alternative to pervious material used for sidewalks, driveways, parking lots and bicycle lanes. Snow removal is generally easier on permeable pavement surfaces due to a faster freeze-thaw cycle. Because the integrity of the permeable pavement structure may be harmed by standing water, it is not suitable for high-volume roadways.

Permeable pavements are one of the more effective BMP's with a capital cost of $2.62 per cubic foot and a useful life of 20 to 40 years.



Permeable Asphalt

Permeable Paver Alley. Chicago, Il

COST EFFECTIVENESS

Useful Life	**20-40 years**
Capital Cost	**$2.62/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**3%**

STORMWATER STREET TREES

Stormwater Tree Pits

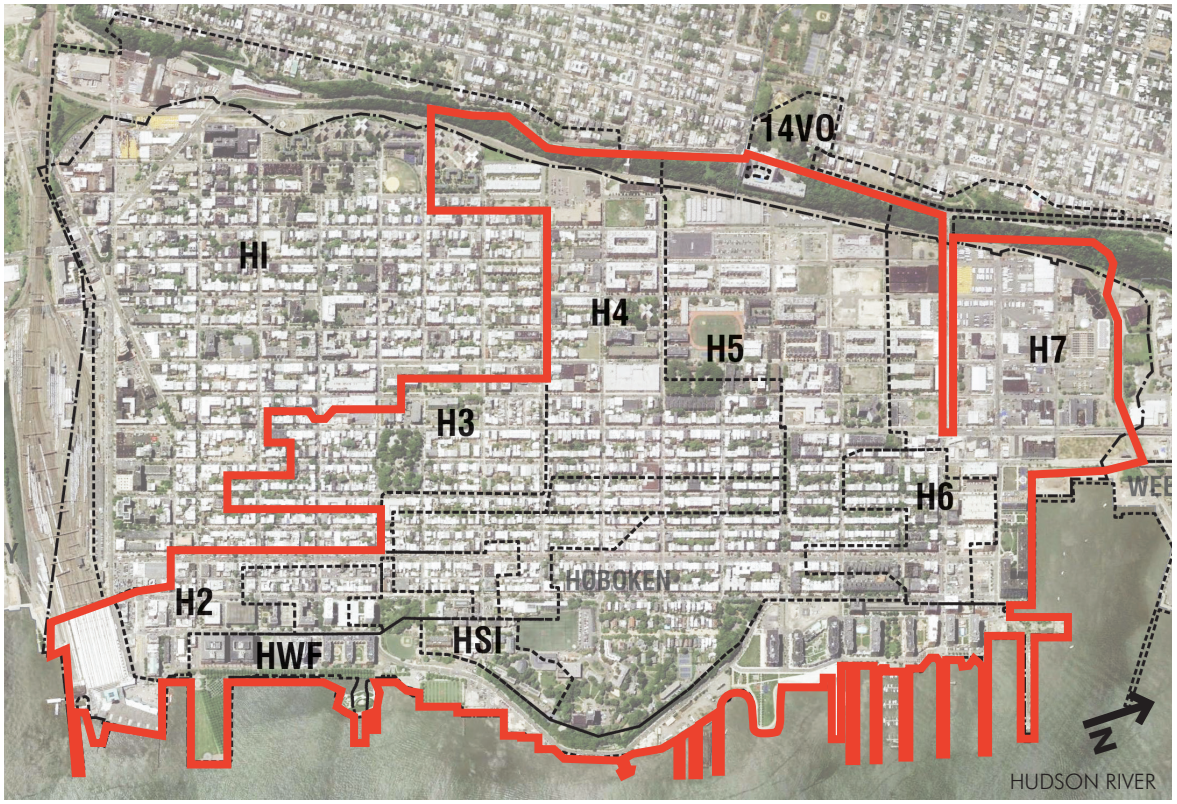
Stormwater Street Trees

COST EFFECTIVENESS

Useful Life	**13-37 years**
Capital Cost	**$5.98/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**8%**

Stormwater Tree Pits are recommended in all the Sewersheds except for the H1 sewershed. Although stormwater tree pits may interfere with utility infrastructure, they can fit nicely into the design fabric of the City sidewalk and bicycle network. Species, site selection and design may increase infiltration by allowing trees to penetrate through impervious zones in soils.

Stormwater tree pits are one of the more effective BMPs with a capital cost of $5.98 per cubic foot and a useful life of 13 to 37 years.

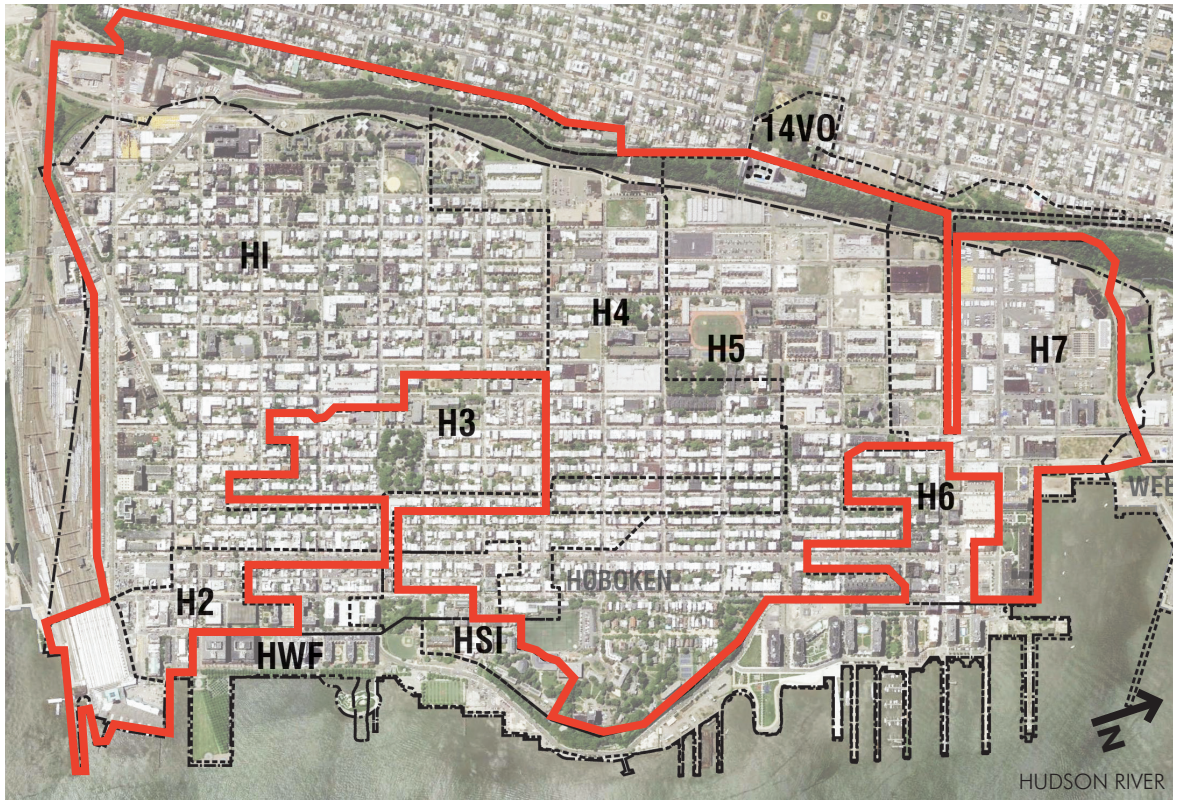


VEGETATED SWALES

Vegetated Swales are recommended in the H1, H2, H4, H5 and H7 Sewersheds. Although these BMPs do not treat large drainage areas due to the small surface area they cover, they are well suited for treating road runoff because of their linear design.

Swales and rain gardens can also serve as facilities for snow storage and treatment.

Swales are one of the more cost-effective BMPs with a capital cost of $9.72 per cubic foot.



Right-of-Way Swale

Parking Lot Swale

COST EFFECTIVENESS

Useful Life	**20-50 years**
Capital Cost	**$9.72/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**6%**

RAINWATER HARVEST/ REUSE

Rainwater Harvest

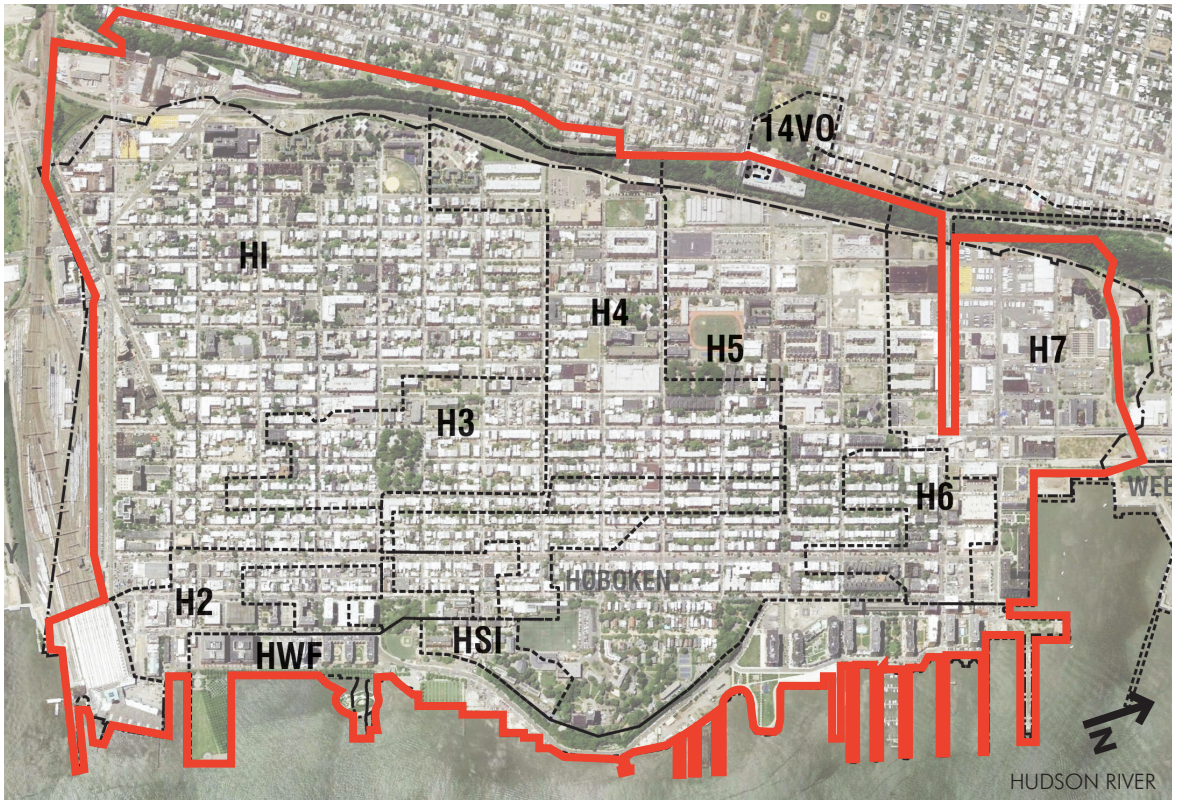
Connected Rain Barrels

COST EFFECTIVENESS

Useful Life	**20-50 years**
Capital Cost	**$11.03/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**5%**

Rainwater harvest and reuse is recommended in all swersheds. Rainwater harvest works well on sites that have limited space, that are entirely impervious or were brownfields (contaminated). Green roofs have the ability to provide additional insulation and wildlife habitat. Rainwater harvesting can serve as an irrigation source and subsurface storage areas can be installed below many flat surfaces such as parking lots, parks and sidewalks.

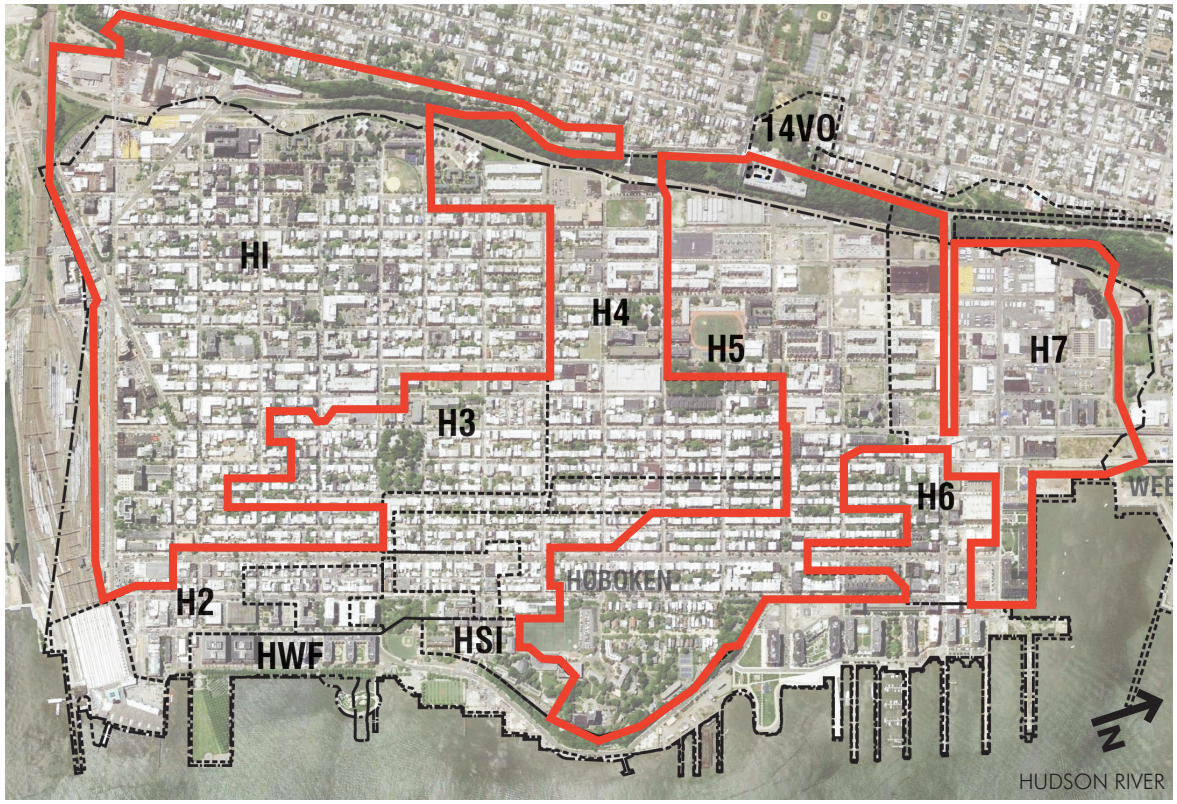
Rainwater harvesting is one of the more cost effective BMPs due to its low maintenance cost, and is very accessible to the public at large.



BASINS OR PONDS

Basins or ponds ar recommended in the H1, H5 and H7 Sewersheds. They require a large surface area, as well as shallow slopes upstream to provide for stormwater flows into the basins or ponds. Basins can also serve as facilities for snow storage and treatment.

Basins have the capacity to treat a large drainage area, up to 25 acres. However, given their construction and maintenance costs, basins are not very cost-effective.



Basin

COST EFFECTIVENESS

Useful Life	**>20 years**
Capital Cost	**$15.00/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**12%**

RAINGARDENS

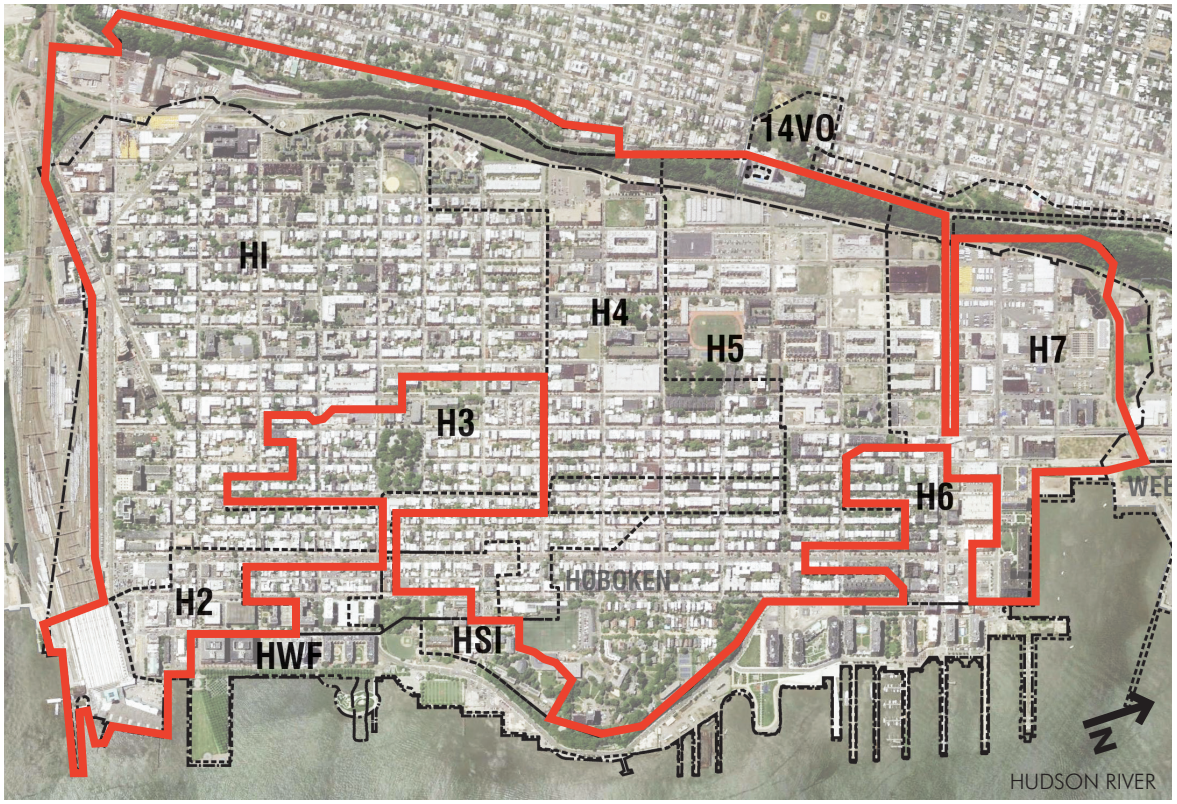
Examples of Rain Gardens

COST EFFECTIVENESS

Useful Life	**20-50 years**
Capital Cost	**$28.05/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**8%**

Swales, rain gardens and stormwater planters are recommended in the H1, H2, H4, H5 and H7 Sewersheds. Although these BMPs do not treat large drainage areas due to the small surface area they cover, they are well suited to treat runoff from sidewalks and the public right-of-way as curb bump-outs, and fit well within an urban context.

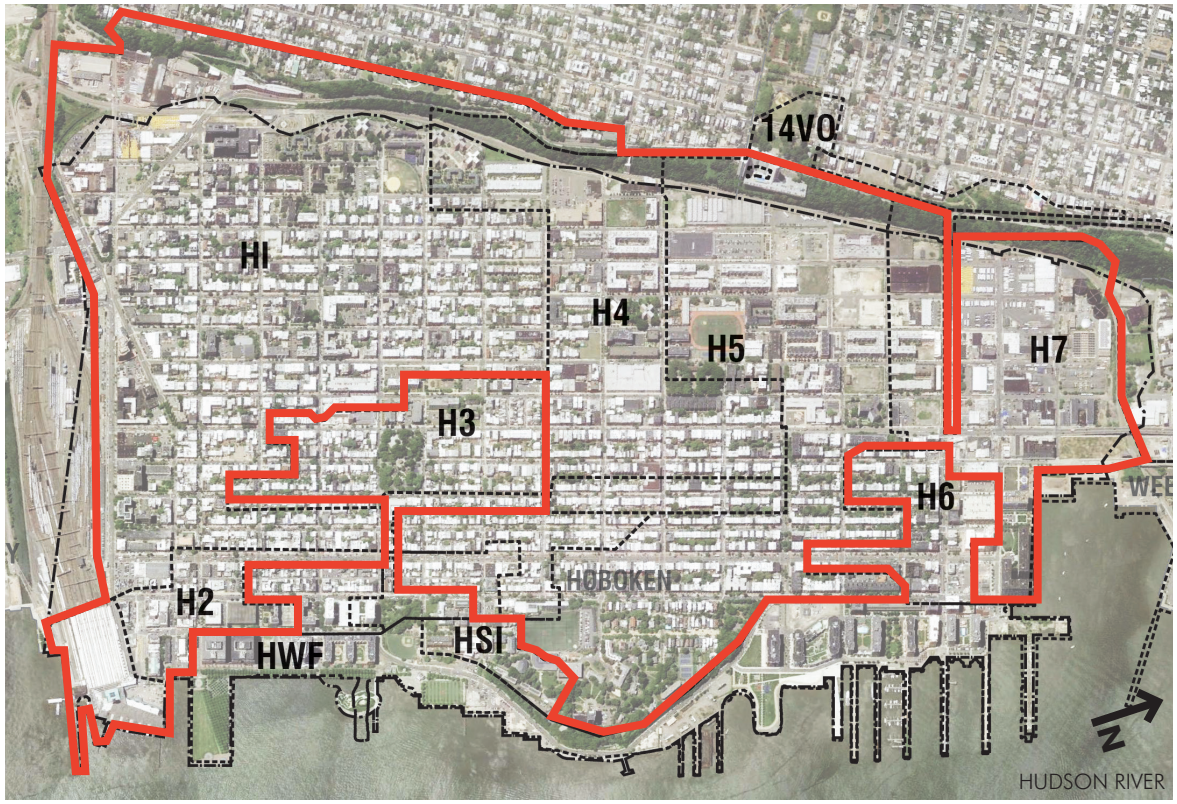
Rain gardens can also serve as facilities for snow storage and treatment. However, they are on the higher end of capital costs among other BMPs because of potential excavation costs.



STORMWATER INFILTRATION PLANTERS

Stormwater infiltration planters are recommended in the H1, H2, H4, H5 and H7 Sewersheds. Like rain gardens, they do not treat large drainage areas because of their small surface area, however they are uniquely suited for Hoboken's urban fabric, and can easily be connected to downspouts alongside apartment buildings or commercial businesses.

Stormwater planters have a lower maintenance cost than rain gardens, given their size, with average maintenance costs of only 5 percent.



Stormwater Planter

COST EFFECTIVENESS

Useful Life	**20-50 years**
Capital Cost	**$29.92/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**5%**

SUBSURFACE STORAGE

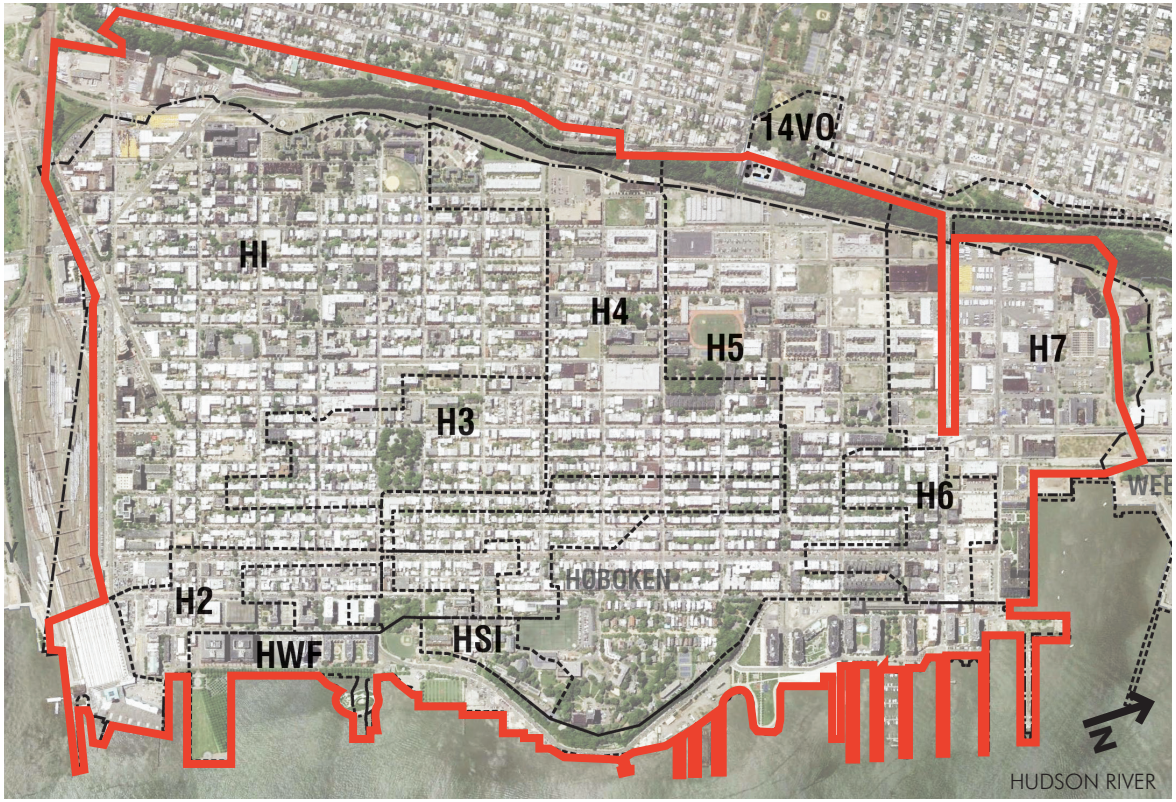
Subsurface Storage

Subsurface storage or detention is recommended in all the City Sewersheds. These BMPs work well on sites that have limited space, that are entirely impervious or were brownfields (contaminated). Subsurface storage is ideal for flat surfaces, such as parking lots, parks and sidewalks, especially in the case of redevelopment areas.

Capital costs are relatively high for subsurface storage, at $34.52 per cubic foot, and can grow exponentially depending on bedrock excavation or utility relocation.

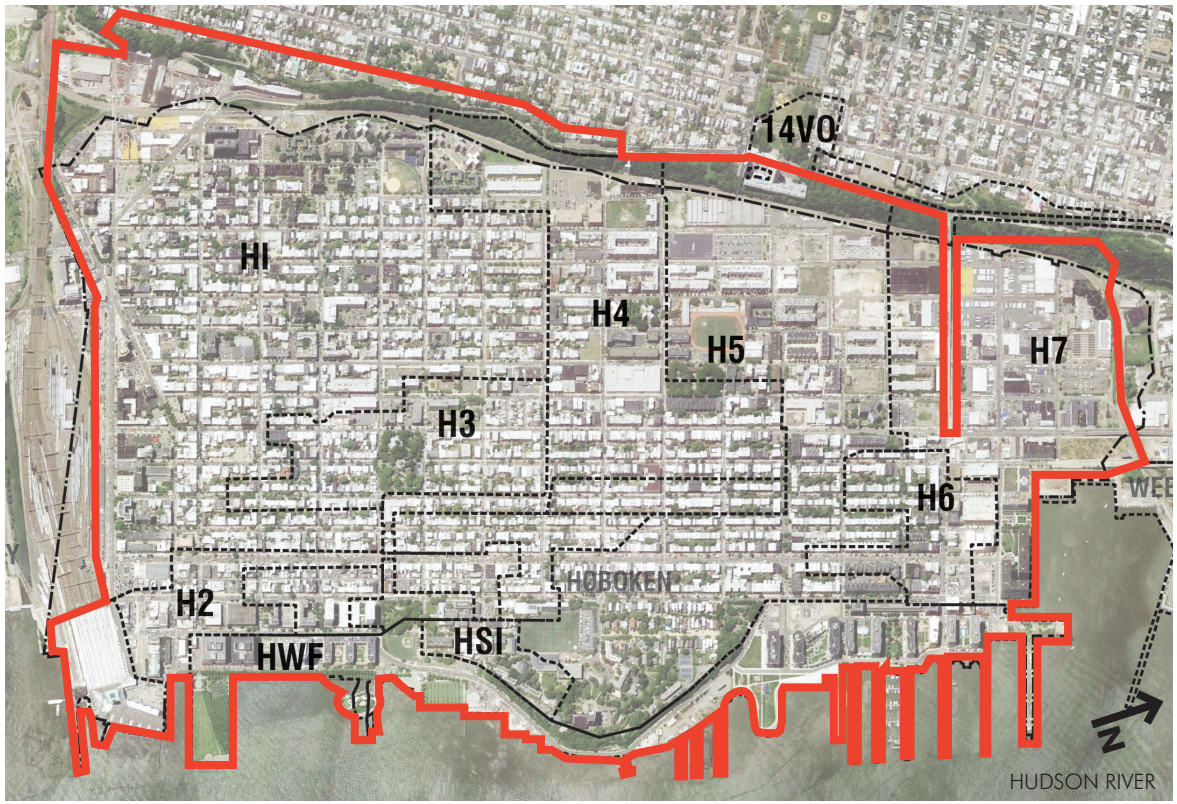
COST EFFECTIVENESS

Useful Life	**20-50 years**
Capital Cost	**$34.52/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**12%**



GREEN ROOFS

Green roofs are recommended in all the City Sewersheds, but are especially recommended for the "gray zone" where other BMPs are limited. Like subsurface storage and rainwater harvest or reuse, green roofs work well on sites that have limited space, that are entirely impervious or were brownfields (contaminated). Green roofs also have the ability to provide additional insulation and wildlife habitat. Green roofs vary in design, with modular construction suitable for a wide variety of roof conditions. However, their implementation is limited by the strength of the building, size and slope of the roof.



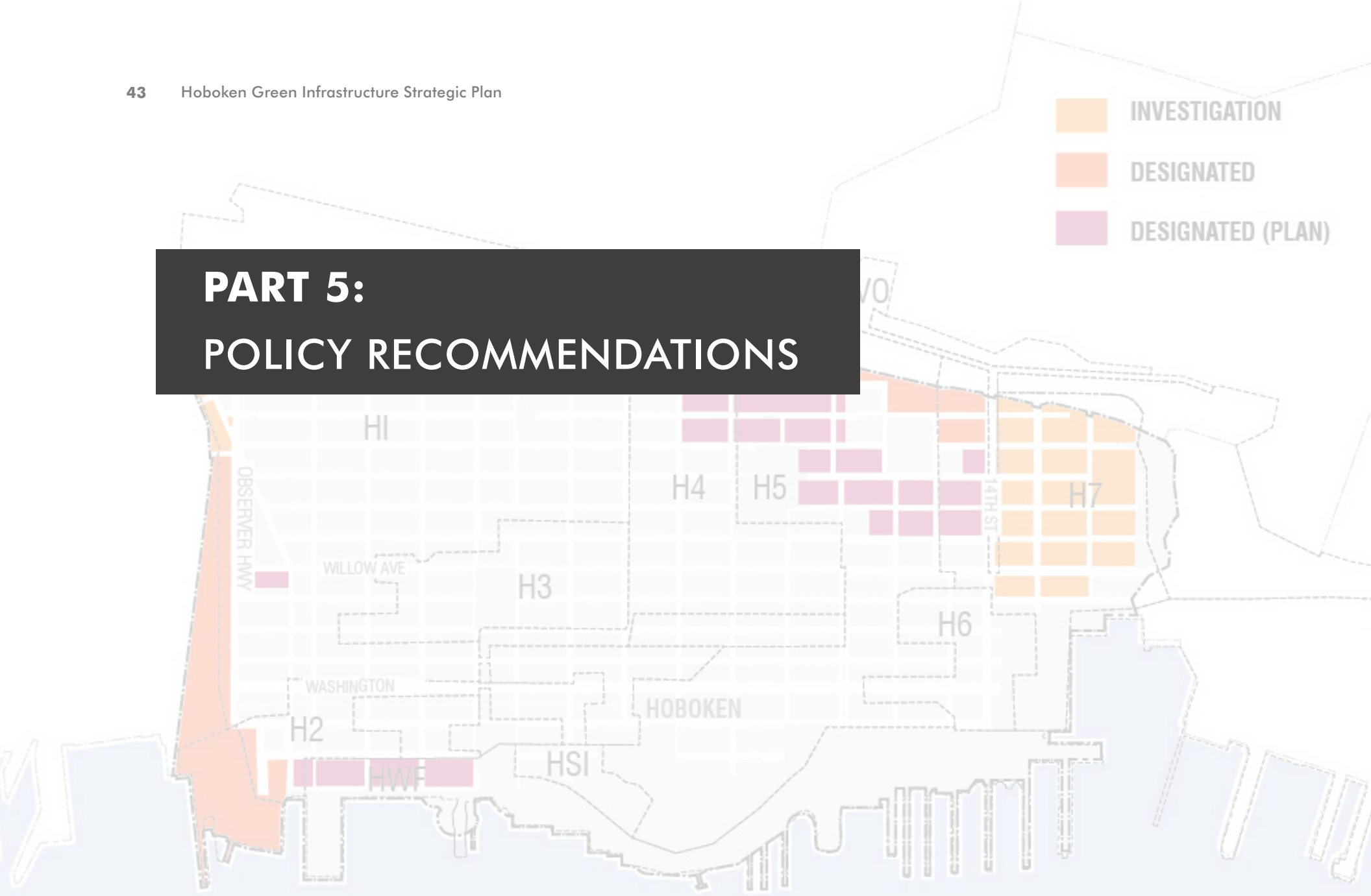
Green Roof

While green roofs have the most expensive capital of the BMPs evaluated, they also have one of the lowest maintenance costs, at only two percent.

COST EFFECTIVENESS

Useful Life	**20-50 years**
Capital Cost	**$41.14/cu.ft.**
Annual Operations & Maintenance Cost (as percentage of capital cost)	**2%**

PART 5:
POLICY RECOMMENDATIONS



PERFORMANCE/INCENTIVE ZONING

Performance-based standards require a site to function in a particular way, regardless of the design. Performance-based standards allow for greater function at lower costs than prescriptive standards because they accommodate more creative and integrated designs. For stormwater management, one example of a successful strategy is the adoption of a performance goal related to the amount of rainfall retained on site, which allows the developer to implement whichever BMP or BMPs are best suited to the site. Whereas incentive zoning provides bonuses in terms of increased density, floor area ratio and/or height based on the amount of rainfall retained on site, the performance based zoning can be a flexible, site specific regulating tool. The City of Philadelphia has developed a new ordinance that is a performance-based approach to manage the quantity of stormwater entering the combined sewer system which is a good model to study for future policy regulations.

Free library of Philadelphia

Regulation	Rainfall Retained		
	1-25%	25-50%	51%+
FAR	1.0	3.2	4.0
Height	2 story	8 story	12 story
Density	28 DU/ Acre	55 DU/ Acre	90 DU/ Acre

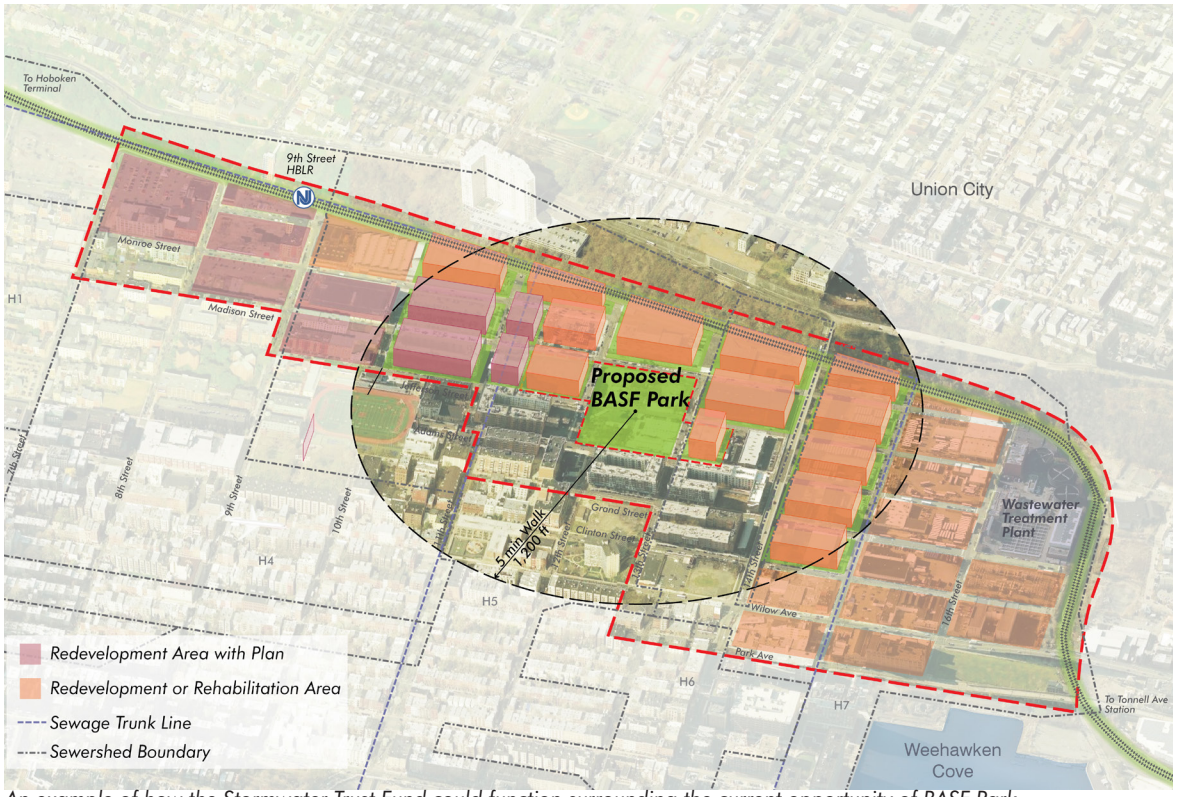
Philadelphia has adopted an ordinance that rewards developers with height and density bonuses for greater rainfall retention

STORMWATER TRUST FUND

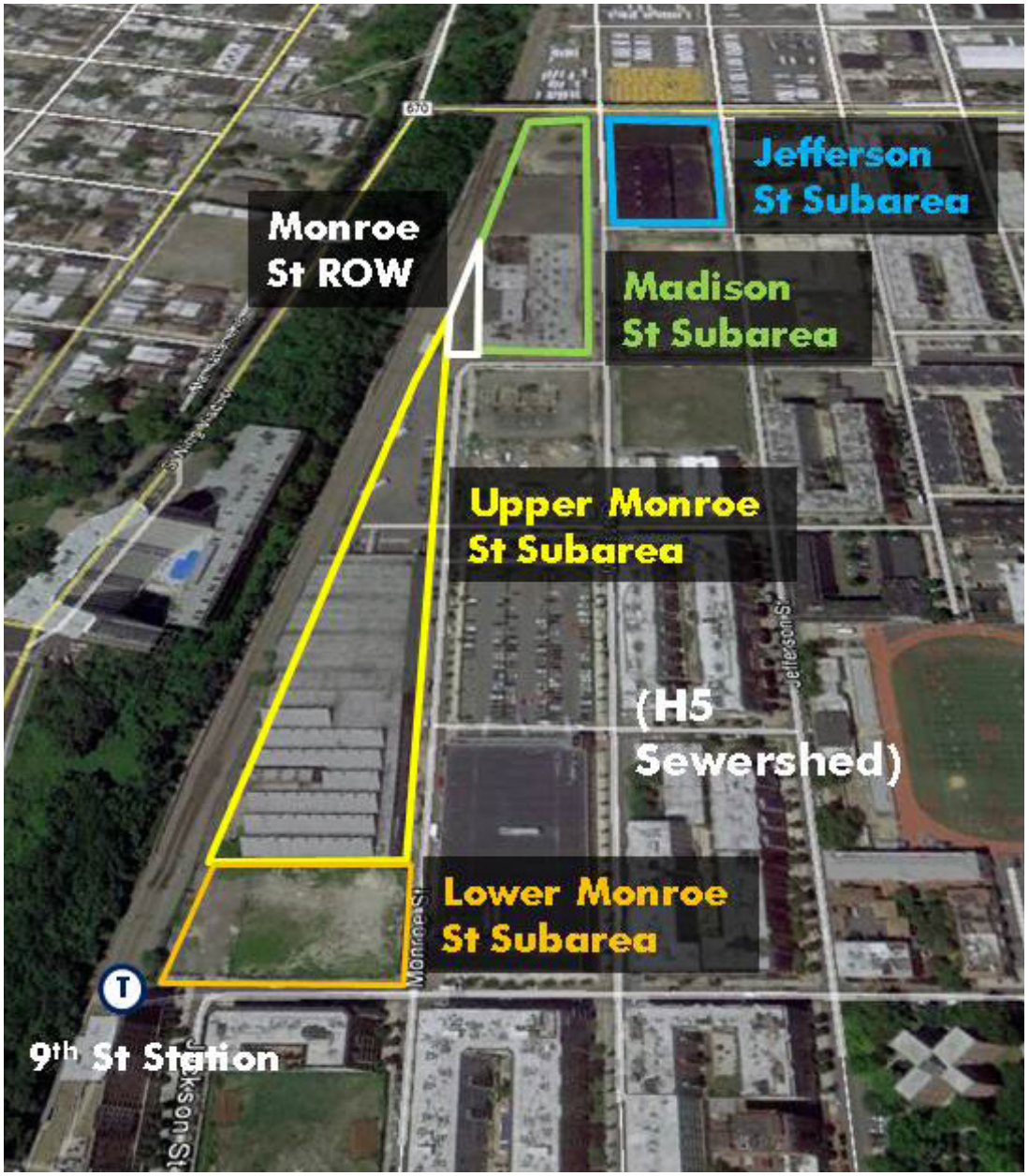
A Stormwater Trust Fund may be a valuable tool for sites where BMPs cannot be implemented based on specific site conditions or excessive costs. A trust fund is a mechanism that allows a developer to provide a contribution in lieu of meeting a required standard. Municipalities have implemented parking and street tree trust funds for situations in which developers may not be able to meet the requirement because of site specific constraints. Instead, they provide funds equal to a pre-determined amount per parking space or tree.

A Stormwater Trust Fund would employ a similar approach. Developers would be required to retain a certain amount of rainfall on site. If, for specific site constraints (carrying capacity of the land), the Developer cannot meet the requirement, they would have the option to provide an in-lieu contribution equal to a pre-determined amount based upon the cost of an adequate BMP mechanism. The municipality can utilize the funds to implement BMP's in strategic locations that benefit an entire sewershed and/or City at large. In the case of sewershed H5, these funds may be used to develop a new park with parking and stormwater storage capacity.

Rotterdam Museumpark: Underground parking and stormwater storage



An example of how the Stormwater Trust Fund could function surrounding the current opportunity of BASF Park



WESTERN EDGE REDEVELOPMENT AREA

The Plan identified the Western Edge Redevelopment Area to test the recommended performance and incentive based zoning. The Western Edge Redevelopment Area contains several conditions that make it particularly effective for this analysis, including the fact that it is:

- located in the H5 sewershed which generates the second highest volume of stormwater;
- identified as highly flood prone;
- located adjacent to the 9th street NJ Transit Station;
- identified as a redevelopment area with a adopted plan;
- able to retain a significant amount of rainfall; and
- located adjacent to the BASF Site.

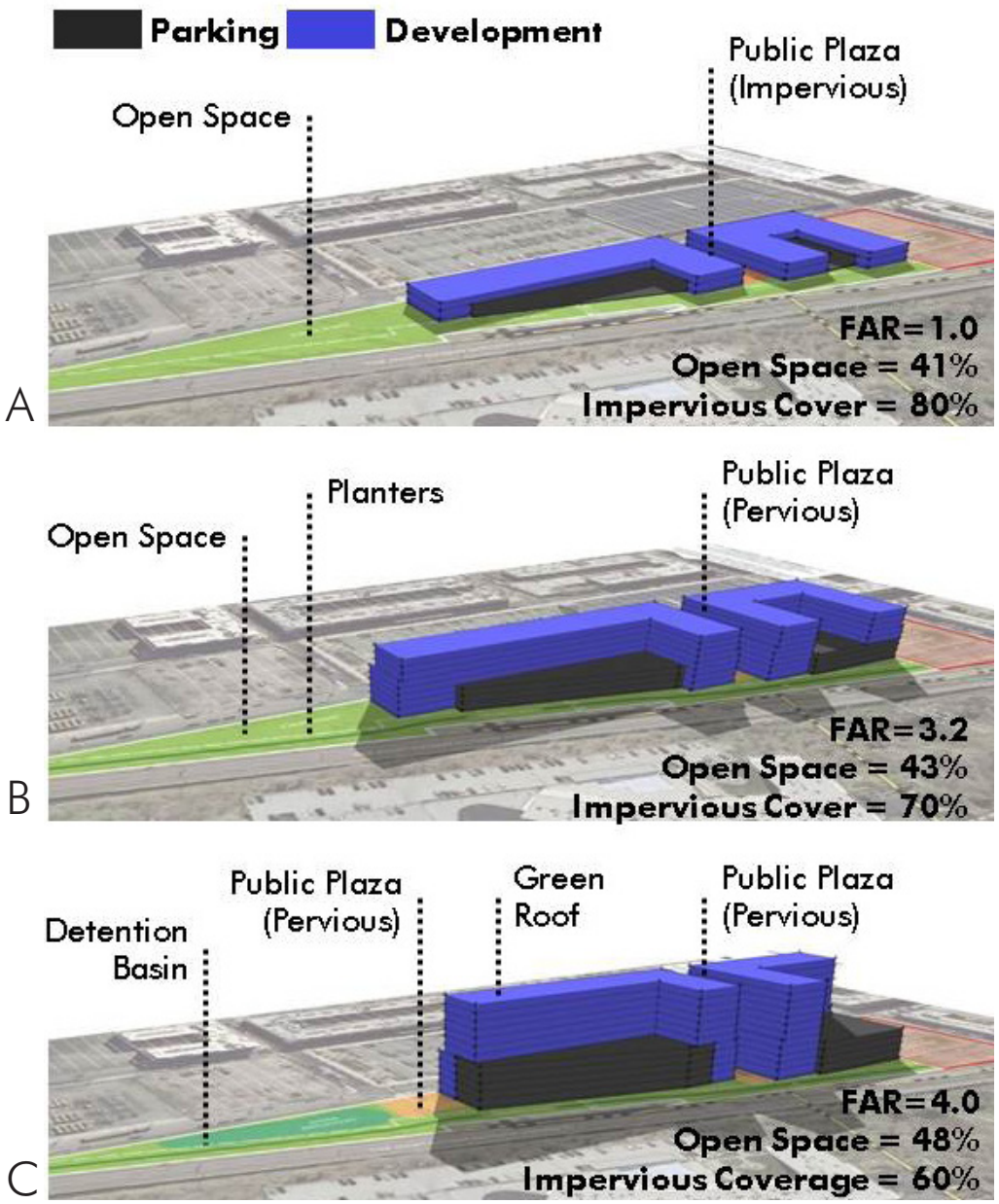
9th Street Station

POTENTIAL DEVELOPMENT SCENARIOS

Three different scenarios were analyzed based on the performance goal of increasing the amount of rainfall retained on site compared to the existing condition. Incentive zoning was used to analyze the effect of increased height, residential density and floor area ratio.

While decreasing impervious coverage is important, implementation of specific BMPs is equally important to the overall objective of retaining and treating the most amount of rainfall on site.

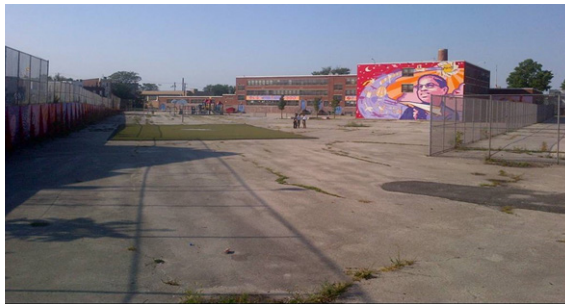
- In Scenario A, with no BMPs, FAR of 1.0 and impervious coverage of 80%, there is a 7% increase of rainfall retained compared to the existing condition.
- In Scenario B, with 50% of the impervious area treated with BMPs, FAR of 3.1 and 70% impervious coverage, there is a 33% increase in rainfall retained compared to the existing condition.
- In Scenario C, with 90% of the impervious area treated by BMPs, FAR of 4.0 and 60% impervious coverage, there is a 40% increase in rainfall retained compared to the existing condition.



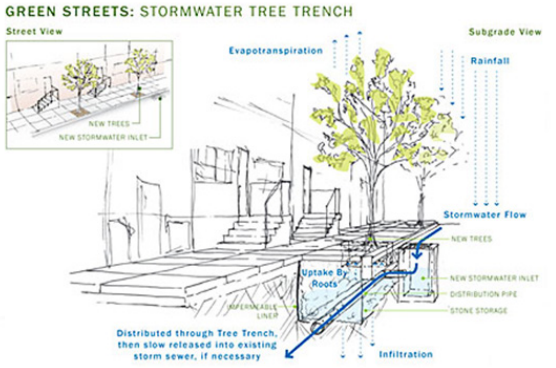
CASE STUDY: PHILADELPHIA

Philadelphia, PA requires sites to manage the first inch of runoff from all directly connected impervious areas. The requirement must be met by "infiltrating" the water volume unless infiltration is determined to be infeasible (due to contamination, high groundwater table, shallow bed rock, poor infiltration rates, etc) or where it can be demonstrated that infiltration would cause property or environmental damage. The newly adopted performance based ordinance does not dictate how to manage the first inch of stormwater on-site. It does however, provide guidance on a variety of innovative BMPs that can be used to meet the requirement. Approximately 500 developments over the past year have adopted the new performance based requirement. One such effort underway in north Philadelphia is the William Dick Elementary School. Six acres of asphalt will be transformed into an artificial turf field with underground storage for excess rainfall to be absorbed for reuse as irrigation in nearby gardens.

Plans for William Dick schoolyard renovation incorporating subsurface rainwater storage under the turf field



William Dick schoolyard prior to implementation of performance based BMP's



Source: Philadelphia Water Department

PART 6:
NEXT STEPS AND IMPLEMENTATION

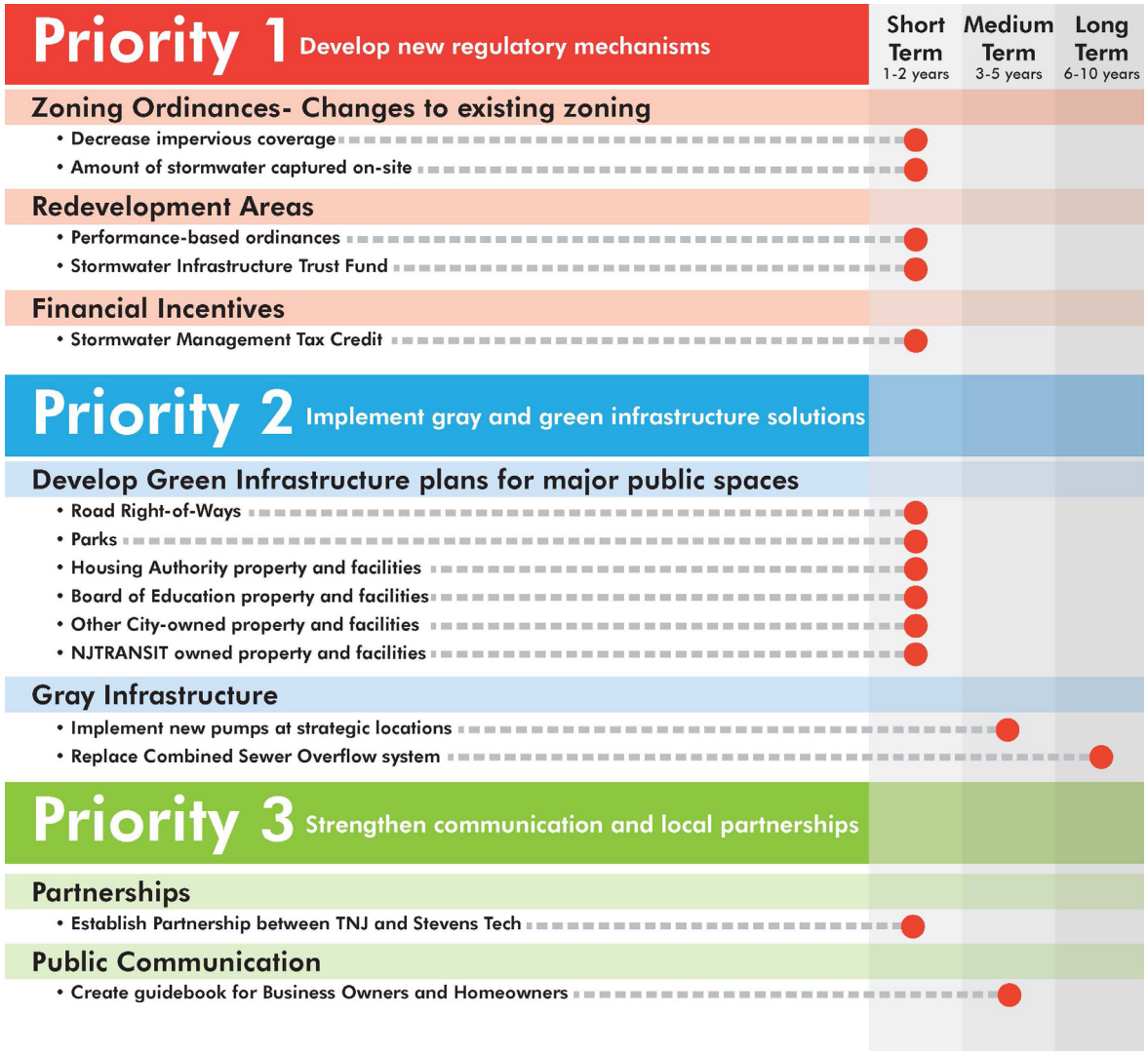
PROJECT OUTCOMES AND NEXT STEPS

The outcome of this project includes the creation of a strategic city-wide framework to reduce flooding through the implementation of best management practices, which will structure future implementation of actions in the public realm, development community and for City residents and business owners. In order to organize future implementation efforts, the Project Team developed an Action Agenda. The issues and challenges raised by the residents of Hoboken during the engagement process were integrated into a set of priorities created by the Project Team and the Steering Committee. They include:

Develop new regulatory mechanisms. By controlling what is allowed to be built and where development can occur, development can improve the city's stormwater management.

Implement gray and green infrastructure solutions. Different levels of flooding and other factors such as topography, soil type and bedrock depth will determine which strategy is most effective at a given location.

Strengthen communication and local partnerships. Get the word out to the local community about how to improve the "water footprint" of residents.



NOTE: priorities and proposed funding mechanisms can be found in greater detail in Appendix A

STATE AGENCY ROUNDTABLE DISCUSSION

The Project concluded with a Roundtable Discussion on March 5, 2014. The discussion presented an opportunity for project partners to share key challenges and recommendations with representatives from key state agencies.

Apart from the Project Team and Steering Committee participants, other notable attendees included John Hansbury from NJEIT, Mathew Abraham from NJEDA, Jennifer Cribbs from HUD, and Dan Kennedy and Kate Meade from NJOPA.

Although the Roundtable Discussion marked the conclusion of the Local Demonstration Project, it set the stage for the next stage of the project's evolution: the creation of regulatory mechanisms that assist in stormwater management and the incorporation of green infrastructure BMPs into redevelopment plans.

The Project Team leads a discussion on the implementation, next steps and priorities on March 5

TOGETHER
NORTH
JERSEY.

CONNECTING
PEOPLE, PLACES,
AND
POTENTIAL.

Planning and Implementation Agenda: Hoboken Green Infrastructure Strategic Plan
DRAFT - 4/3/14

This table prioritizes the recommendations put forth in the Green Infrastructure Strategic Plan. Successful implementation of plans requires strong local support and action, as well as assistance and funding from Hudson County, the State of New Jersey, and other agencies or nonprofit organizations. These actions are illustrated in the Planning and Implementation Agenda.

Priority	Category	Program/Improvement/Activity	Detail	Time Frame	Possible Funding Sources	Stakeholders & State/County Assistance
Priority 1: Develop Regulatory Mechanisms	Zoning Ordinance and Incentives	Incorporate Best Management Practices (BMPs) into ordinances, redevelopment/rehabilitation plans considering land use context of recommended sewersheds	Amend Municipal Code, Chapter 196: Zoning, Appendix A & B and future redevelopment plans	Short	HUD Community Development Block Grant Program - Disaster Recovery (CDBG-DR)	Hudson County, NHSA, Property owners and Private Developers, HUD, Department of Community Affairs (DCA)
		Work with Hudson County and North Hudson Sewerage Authority to develop compatible standards	Authority Resolutions 12-117, 12-118	Short	NHSA, Hoboken Operating Budget	NHSA, Hudson County, Property owners and Private Developers
		Implement a Stormwater Trust fund for Redevelopment Areas, and work with the State to get authorization for a stormwater utility or PILOT program	Northwest Redevelopment Area DPW Redevelopment Area Western Edge Redevelopment Area NJ TRANSIT Boundary Redevelopment Area North End Rehabilitation Area Southwest Redevelopment Area	Short	Sustainable Jersey Small Grants Program	Hudson County, Property owners and Private Developers, NJ Economic Development Authority (NJ EDA), NJ Redevelopment Authority (NJRA), NJEIT, EPA, City of Hoboken
		Study potential financial incentive programs (i.e. Stormwater Management Tax Credit, Rebates and Installation Financing)	Review costs, benefits and regulatory requirements for financial incentives	Short	Academic Institutions (e.g., Stevens Institute, Rutgers University), non-profit organizations (e.g. NJ Future)	Hudson County, Property owners and Private Developers
		Implement Performance/Incentive Zoning for new projects	Establish performance standards for impervious surface area reduction	Short	Sustainable Jersey Small Grants Program, Hoboken Operating Budget	Hudson County, Property owners and Private Developers
		Provide zoning incentives especially in areas with highest contribution to flooding	Modify FAR, Height, Density requirements for impervious surface area reduction	Short	Sustainable Jersey Small Grants Program, Hoboken Operating Budget	Hudson County, Property owners and Private Developers

Priority 2: Implement Gray and Green Infrastructure Solutions	Gray Infrastructure Sewer System Improvements	*NHSA Project:* Install Wet Weather Pump Stations (with collective capacity to pump 281 mgd during wet weather events)	H3/H4/HIS, Sinatra Dr. near 4th St.	Short	NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, Clean Water State Revolving Fund (CWSRF) Green Project Reserve (GPR)	City of Hoboken, Hudson County, NJ DEP, EPA, NJEIT
			H5,Sinatra Dr. N near 11th St. / Maxwell Place	Medium		
			H6/7, Hudson St. near 15th St.	Long		
		NHSA Project: Study the interconnections among sewersheds and analyze potential for disconnecting or intercepting flow between those interconnections Gray denotes projects led by NHSA, which require NHSA Review	Potential interception of flow from H3 to H1	Short	NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, Clean Water State Revolving Fund (CWSRF) Green Project Reserve (GPR)	City of Hoboken, Hudson County, NJ DEP, EPA, NJEIT
			Potential interception of flow from H5 to H4 and H7	Short		City of Hoboken, Hudson County, NJ DEP, EPA, NJEIT
	Property Acquisition for Green Infrastructure Implementation	Acquire and develop open space that can be utilized for parks and recreation as well as stormwater management through green infrastructure	Block 12 Park (Block 12 Lots 1-8 and 11-18)	Short	State of New Jersey Hazard Mitigation Grant Program, Hudson County Open Space Trust Fund, NJ Green Acres Program	NHSA, Hudson County, NJ DEP, NJ OEM, NJEIT
			Pino Site Park (Block 74 Lots 3-20)	Medium		
			BASF Park (Block 103 Lots 7-26; Blocks 107 and 107 All Lots; Block 113 Lots 1-6 and 7-32)	Medium		
		Streets (e.g., daylighting areas, sidewalks, bike lanes and parking lanes)	Washington Street*	Short	NJ Environmental Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, CWSRF GPR, Shade Tree Commission Budget (for stormwater tree pits), FHWA Transportation Enhancement Program, HUD CDBG, North Jersey Transportation Planning Authority (NJTPA) - Transportation Improvement Program (TIP), Congestion Management and Air Quality (CMAQ)	Hudson County, City of Hoboken, NJ DOT, NJ DEP, Hoboken Shade Tree Commission, Adjacent Property Owners, Hoboken Fire Department, Hoboken Quality of Life Coalition, NJEIT, Hoboken Green Team, Fund for a Better Waterfront, Hoboken Quality of Life Coalition *Emergency Snow Route; will require additional consideration for emergency operations ** County Road; would be partnership with Hudson
			Newark Street**	Short		
			Adams Street	Medium		
			Clinton Street	Medium		
			Jackson Street	Long		
			Jefferson Street	Long		
			9th Street*	Short		
			Madison Street	Short		
		Parks	BASF (potential future park)	Long	Hudson County Open Space Trust Fund, DEP Green Acres Program, HUD CDBG	Hudson County, NJ DEP Green Acres, NJ DCA, HUD, Hoboken Shade Tree Commission, Hoboken Quality of Life Coalition, Hoboken Green Team, Fund for a Better Waterfront, Hoboken Quality of Life Coalition
			Block 12 (future park)	Medium		
			Pino Site (potential future park)	Long		
			Existing Parks	Medium		

	Green Infrastructure Implementation Schedule for Major Public Facilities	Housing Authority property and facilities[θ]	Andrew Jackson Gardens North and South / Harrison Gardens	Medium	NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, CWSRF GPR, HUD CDBG	Hudson County, HUD, NJ DEP, Hoboken Housing Authority, NJEIT
			Christopher Columbus Gardens	Long		
			Fox Hill Gardens	Long		
			Church Towers	Short		
		Board of Education property and facilities[θ]	Hoboken High School	Medium	NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, CWSRF GPR	Hudson County, NJ DEP. Board of Education, Parent Teachers Associations, NJEIT, NJDOE
			Joseph F. Brandt Primary School	Short		
			AJ Demarest Middle School	Short		
			Thomas G. Connors Elementary School	Short		
			Wallace Elementary School	Medium		
		Other City-owned land/facilities	City Hall	Short	NJ Hazard Mitigation Grant Program, NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, CWSRF GPR	Hudson County, Rutgers School of Biological and Environmental Sciences, NJ OEM, NJ DEP, NJEIT
			Multiservices Community Center	Short	NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure, CWSRF GPR, HUD CDBG	Hudson County, NJ DEP, NJ DCA, HUD, NJEIT
		NJ TRANSIT Projects	Hoboken Terminal Area	Medium	NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure	Hudson County, NJ DEP, City of Hoboken, NJEIT, NJT, NJSA, NJ DEP Infrastructure Trust, Sandy Resiliency Funding for Infrastructure
			NJ TRANSIT Redevelopment Area	Medium		
			9th Street HBLR station Area	Short		
			2nd Street HBLR Station Area	Short		
Priority 3: Strengthen Communication and Local Partnerships	Education and Awareness	Create a guidance document for City/County public improvements, operations & maintenance	Create municipal handbook for City departments / agencies	Short	HUD CDBG-Disaster Relief	NHSA, Hudson County, NJ DCA, HUD
		Create a stormwater management guidebook informing Homeowners and Business Owners about Best Management Practice implementation	Create a residential handbook for homeowners, renters, and businesses	Short	Sustainable Jersey Small Grants Program, U.S. Forest Service National Urban and Community Forestry Challenge Grant Program, Stevens Institute	NHSA, Hudson County, Hoboken Green Team, HOPES, Fund for a Better Waterfront, Hoboken Quality of Life Coalition
		Develop a public awareness community education campaign about flood mitigation, water conservation and green infrastructure benefits	Expands upon 5% Initiative Project proposed by the City through the NJ HMGP	Short	State of New Jersey Hazard Mitigation Grant Program, EPA CARE Program, Stevens Institute	NHSA, Hudson County, NJ OEM, Hoboken Green Team, HOPES, Fund for a Better Waterfront, Hoboken Quality of Life Coalition
	Partnerships	Establish partnership between City of Hoboken, NHSA. NJ DEP, NJ Transit and Stevens Institute of Technology in order to further the priorities from the Green Infrastructure Strategic Plan	Schedule regular working meetings, provide status updates and benchmark progress	Short	EPA CARE Program	NHSA, NJ DEP, Stevens Institute of Technology, NJ TRANSIT

Time Frame Legend SHORT: 3-6 months, MEDIUM: 6-18 months, LONG: 18-36 months

Gray denotes projects led by NHSA, which require NHSA Review

[θ]Board of Education and Housing Authority priority sites are to be coordinated with the Housing Authority or school district