Appendix A — Stakeholders

City Agencies and Administrative Bodies

NYC's administrative bodies and agencies, along with local political representatives, play a major role in managing and protecting natural resources and wildlife locally, while also advocating for local interests at the federal level. The following section identifies those relevant to this plan.

Community Boards (CB)
Community boards are local representative bodies that meet regularly to discuss community affairs and are responsible for addressing concerns from and provide support to community members. Community boards also represent their communities when meeting with city agencies to address community needs. There are 8 CBs with jurisdiction in the Harlem River watershed.

Local Elected Officials
Local elected officials who represent those that live within the watershed are valuable allies. Having locals reach out to their representatives encourages them to fight for the interests of their constituents, potentially having a positive impact on local and federal policy initiatives. Political districts that fall within the Harlem River watershed are as follows:

- City Council: 11, 14, 15, 16, 8 &17
- State Assembly: 77, 78, 79, 81, 84 & 86
- State Senate: 29, 32, 33 & 34
- Congressional: 13, 15 & 16

New York City Council (the Council)
The Council is NYC's legislative body that works in equal partnership with, though separate from, the Mayor's administration. It introduces and votes on City legislation, negotiates the City's budget, monitors City agencies and oversees land use and development. The Council has enacted legislation (further discussed in sections 1.6 and 1.7) regarding water quality, natural resource management and other topics directly relevant to this plan. Some examples include Local Law 3 of 2010, which requires restitution for any trees removed from NYC Parks or public property, Local Law 11 of 2013, which requires greater native plant biodiversity and limits the use of invasive species on public property, and mandates to develop a City Wetlands Strategy (2010) and Sustainable Stormwater Management Plan (2008).

New York City Department of Environmental Protection (DEP)
The DEP is the city agency that manages NYC's water supply and treatment. It protects public health and the environment by providing clean water, handling wastewater and preventing pollution. On a daily basis, DEP supplies over 1 billion gallons of water to nine million people through a system of 19 reservoirs, three lakes and 303 miles of aqueducts and tunnels, while treating 1.3 gallons of wastewater at 14 treatment plants. In accordance with the 2012 CSO Consent Order with the NYS Department of Environmental Conservation, DEP is in the process of developing Long Term Control Plans to reduce sewage outfalls and improve water quality in NYC's waterways. The Harlem River is on the DEC's 303(b) List of Impaired Waters Requiring a TMDL (total maximum daily load of a pollutant allowed into a waterway), and although a LTCP specific to the Harlem River has yet to be completed, one must be created to satisfy the CSO Consent Order.

NYC Department of Parks & Recreation (Parks)

Parks is responsible for the stewardship of nearly 30,000 acres of land in NYC, including providing and maintaining public green spaces, parks, street trees, recreational facilities and nature centers throughout all five boroughs. Parks is the largest landowner of open space within the Harlem River watershed and its Forestry, Horticulture, and Natural Resources Group (FHNR) is involved in the management of these lands by monitoring ecological health, providing watershed planning and conducting restoration projects. Parks also collaborates with and provides oversight for restoration and mitigation projects by DEP and other agencies on parkland.

NYC Department of Transportation (NYC DOT)
NYC DOT manages the following bridges that cross the Harlem River: Willis Avenue Bridge, Third Avenue Bridge, Madison Avenue Bridge, 145th Street Bridge, Macombs Dam Bridge, Washington Bridge, University Heights Bridge and Broadway Bridge. The 2015 Harlem River Bridges Access Plan aims to increase bicycle and pedestrian safety and access across these bridges between Manhattan and the Bronx. NYC DOT is also responsible for the streets and sidewalks in NYC.

NYS Department of Transportation (NYS DOT)
NYS DOT operates the Alexander Hamilton Bridge across the Harlem River, and maintains major roadways within the watershed, such as the Major Deegan Expressway, Cross Bronx Expressway, Henry Hudson Parkway, Edward L. Grant Highway and Bronx River Parkway. The Major Deegan Expressway, running along the Harlem River Shoreline, poses a significant barrier to waterfront access.

Metropolitan Transportation Authority (MTA)
The MTA manages NYC's public transit system, including subways and buses, the Metro-North Railroad (MN) and some of the city's bridges and tunnels, including the Henry Hudson Bridge and Robert F. Kennedy (Triborough) Bridge. The MN Harlem-Hudson Line runs along the Bronx Harlem River shoreline, severely limiting access to the waterfront. Several stations within the Harlem River watershed seem to be currently underutilized for local travel, but could potentially become important access points to the Harlem River Waterfront. MN also owns the Highbridge Yard maintenance facility on the waterfront between the Macombs Dam Bridge and Depot Place.

Local Environmental Stewardship and Education Organizations

Local organizations play a large role in advocating for environmental education and stewardship. By focusing on local issues and collaborating with community boards and city agencies, these groups can be very effective at advancing environmental efforts. Relevant groups active within the Harlem River watershed are outlined alphabetically below. The areas where groups are active are outlined in figure 4; groups active throughout the watershed or borough are excluded from figure 4 for clarity.

Bronx Children's Museum (BCM)
BCM is a "museum without walls" that engages children and families through mobile programs that help Bronx youth learn about themselves and their surroundings and become caregivers of the planet. They are active throughout the watershed and plan to open a new permanent museum space in Mill Pond Park in 2018.

Bronx Council for Environmental Quality (BCEQ)
BCEQ is a not-for-profit group that works to improve the Bronx's quality of air, land and water for future generations. They engage locals in fighting for environmental causes and hold community events, plantings and cleanups. Working with Parks, BCEQ advocated to get a large stretch of the Harlem River Waterfront recognized as a Brownfield Opportunity Area (BOA) under the NYSDOS's Brownfield Opportunity Areas Program, which aids communities affected by brownfield sites. They are also a partner of the Environmental Protection Agency's (EPA's) Urban Waters Federal Partnership in the Bronx and Harlem River watersheds. The members of BCEQ have been very involved in the Harlem River watershed planning process since the start, co-hosting our first community meeting, and will remain engaged throughout the remainder of the project, serving on the project's Watershed Advisory Council.

Bronx Land Trust
Through a network of urban community gardens, not-for-profit Bronx Land Trust mobilizes neighborhoods to preserve and manage public open spaces. Active throughout much of south and central Bronx, they offer gathering places for community organization.

Friends of Brook Park (FBP)
FBP is a community-based environmental group located in the South Bronx. In support of environmental justice, promoting respect for nature and access to the waterfront and green space, they involve community members in gardening projects, clean-ups, eco-education tours, canoeing and kayaking the Harlem River and Bronx Kill, and other events and activities. An active force in the Harlem River watershed, they have worked with other local organizations and schools to connect locals with nature.

Harlem River Community Rowing (HRCR)
HRCR is a not-for-profit volunteer group of rowers in NYC working to make rowing more affordable and accessible to New Yorkers. With a focus on the Harlem River, they are active in Upper Manhattan and West and South Bronx, providing rowing programs for adults. HRCR is working to expand and improve public access to and recreational activities along the Harlem River.

South Bronx Unite
South Bronx Unite is a community group that brings residents and organizations in the South Bronx together to protect the social, environmental and economic future of this neighborhood. They are active in numerous educational and environmental initiatives, particularly fighting for environmental awareness and justice.

Van Cortlandt Park Alliance (VCPA)
VCPA is a not-for-profit community-based organization active in Van Cortlandt Park in the North Bronx. With a focus on conserving and improving the park, they have partnered with Parks before on projects to improve the park and offer educational and stewardship programs for the local community. They are also a partner of the EPA's Urban Waters Federal Partnership in the Bronx and Harlem River watersheds and worked with BCEQ and Parks on the Harlem River BOA Nomination Report.

Regional Environmental Stewardship, Advocacy, and Management Organizations

In addition to the local organizations listed above, there are also larger regional organizations who have worked in the watershed or whose missions are relevant to the scope of the watershed plan. The following organizations may be able to offer potential resources and partnerships for future efforts.

Christadora: Nature, Learning, Leadership
Christadora offers environmental education in NYC's middle and high schools. They connect students with the outdoors and involve classes in environmental projects citywide, including the Bronx.

Citizens Committee for New York City (CCNYC)
CCNYC empowers low-income communities to improve their neighborhoods. Active in communities throughout the Bronx, they provide workshops and grants in support of a wide range of projects including composting, establishing community gardens and organizing farmers' markets.

The Gaia Institute
The Gaia Institute is a not-for-profit corporation that works with communities to maximize ecological benefits in urban areas through environmental engineering. They explore, research, design and test ways to manage human activities and waste in a way that is beneficial for people, the environment and both economic and ecological wellbeing. They have completed several projects within the Harlem River watershed, related to ecological restoration, stormwater management, environmental and aesthetic quality and pollutant removal and worked with BCEQ and Parks on the Harlem River BOA Nomination Report.

National Fish and Wildlife Foundation (NFWF)
Under the US Fish and Wildlife Service, NFWF works between the public and private sectors to provide grants for projects that protect and restore natural areas and native wildlife. Within the Harlem River watershed, NFWF has partnered with Parks, City Parks Foundation and the Friends of Van Cortlandt Park to fund projects that manage sewer and stormwater flow and improve environmental health within the watershed and its streams. NFWF is also a partner with the Long Island Sound Study (LISS) on the Long Island Sound Futures Fund (LISFF). The Harlem River watershed falls within the larger Long Island Sound Watershed; therefore, decisions affecting the Harlem River may also impact the Long Island Sound and LISS's management plan for it.

Natural Areas Conservancy (NAC)
NAC is a not-for-profit organization working in close partnership with NYC Parks to protect 20,000 acres of natural areas across the City's five boroughs. Working to conserve NYC's forests and wetlands, NAC contributes to research, management and restoration efforts and promotes the environmental and social benefits of natural areas provide. In the first ever city-wide ecological assessment, NAC collected ecological data spanning over a X acres in forests and wetlands, which is used to inform conservation, restoration, and management efforts.

New York City Audubon
NYC Audubon is a not-for-profit grassroots organization working to protect wild birds and their habitat in all five boroughs. An affiliate of the National Audubon Society, they protect the birds that call NYC's 30,000 acres of wetlands, forests and grasslands home. Through their

conservation campaigns, NYC Audubon collects data about birds, engages New Yorkers though educational programs and advocates for environmental policy.

New York City Soil and Water Conservation District (SWCD)
In partnership with the DEP and Parks, and receiving technical support from the U.S. Dept. of Agriculture's Natural Resources Conservation Service (NRCS), SWCD is part of nationwide network to assist local decision-makers in using and caring for the city's soil and water resources. Their work involves urban soil and green infrastructure research, public outreach and education, including published soil surveys of NYC. In partnership with Brooklyn College, NRCS, and The Gaia Institute, SWCD founded the NYC Urban Soils Institute, an initiative working to promote scientific understanding and the sustainable use of urban soils though research, education, analytical services, and data sharing platforms.

New York City Water Trail Association (NYCWTA)
NYCWTA is a citywide not-for-profit stewardship organization promoting recreational opportunities for non-motorized boating throughout NYC's waterways. They connect New Yorkers with access to boat launches citywide with their NYC Water Trail Map. The map identifies several access points along the Harlem River on the Manhattan side, but there are no public access points on the Bronx side to date.

NY-NJ Trail Conference (NY-NJTC)
NY-NJTC has been working since 1920 to provide recreational hiking opportunities and represent the interests and concerns of the NY and NJ hiking community. They are a not-for-profit service organization maintaining over 2,000 miles of trails and partnering with parks to monitor, protect and promote this network of public trails. NY-NJTC has helped to maintain trails and connect the public with trails in Van Cortlandt Park.

New York Restoration Project (NYRP)
NYRP is a not-for-profit conservancy that protects and preserves parks, community gardens and green spaces in New York City. Working in communities in need, they provide community engagement, capital construction, landscape maintenance and environmental education. They have partnered with Parks to complete the MillionTreesNYC initiative and help restore waterfront access to the Harlem River in upper Manhattan through the development of Sherman Creek Park. NYRP is currently developing a master plan to renovate open space in the South Bronx through the Haven Project.

Riverkeeper
Riverkeeper is a not-for-profit organization that protects the Hudson River and its tributaries to preserve the drinking water and recreational opportunities they provide the Hudson Valley and NYC. They patrol waterways and help to enforce water quality regulations, influence policy and law, and engage communities through outreach efforts.

Swimmable NYC – Storm Water Infrastructure Matters (SWIM) Coalition
S.W.I.M. is a coalition of different groups working together to ensure swimmable waters around NYC through green infrastructure and sustainable stormwater management practices. With committees focused on green roof tax credits, workforce development, public notification and fundraising, S.W.I.M. holds regular public meetings to promote education and awareness about stormwater and sewage management. They also comment on local policy and regulations related to water quality, advocating for clean, swimmable and fishable waters for New Yorkers.

Trees New York
Trees New York is a not-for-profit group that empowers citizens to protect NYC's urban forests. Several of their projects focus on planting and caring for street trees to help intercept stormwater from sewers and prevent runoff and flooding.

Trout Unlimited (TU)
TU is a national not-for-profit organization dedicated to conserving, protecting and restoring North America's coldwater fisheries and their watersheds. In partnership with the DEP, TU's New York chapter works in schools in the Bronx and across the city through their Trout in the Classroom project to educate students about the importance of stream and watershed health. They have engaged students in raising trout in their classrooms to be released into streams in Westchester County.

Waterfront Alliance
The Waterfront Alliance began as an effort to make the New York and New Jersey Harbor accessible to all and has since grown into force throughout the region connecting New Yorkers with recreational opportunities in the city's waterways. They work to improve public access to and the ecological health of NYC's waterfront. They offer waterfront educational programs, such as Harbor Camp, construct neighborhood docks to improve public waterfront access and connect the public with opportunities to access waterfront recreational activities like rowing on the Harlem River.

Regulatory & Planning Agencies

New York City Mayor's Office of Sustainability and Mayor's Office of Recovery and Resiliency
These Offices are responsible for providing research and analytics, coordinating between governmental and non-governmental stakeholders, and providing support to City Hall to direct and oversee sustainability policy and implementation. In 2007, they released a comprehensive sustainability plan for the City's future, known as PlaNYC. PlaNYC created a Green Codes Task Force and launched the MillionTrees NYC initiative, which engaged New Yorkers in planting and caring for more than a million trees across the city and funded invasive species removal and native forest plantings. Long term sustainability planning now continues under the new initiative, OneNYC, which establishes a plan for the City's future that addresses social, economic and environmental issues.

New York State Department of Environmental Conservation (DEC)
DEC is the state regulatory agency overseeing programs to manage water, land, and air pollution, improve natural resources and the environment, and enhance the health, safety, and welfare of New Yorkers. In NYC, DEC regulates stormwater and sewage discharges and monitors DEP implementation of the terms of an Order of Consent to address CSO issues. DEC is also the approval authority for LTCPs developed by DEP. DEC's regulatory programs are outlined in further detail in section 1.6. In 2015 DEC issued the State Pollutant Discharge Elimination System (SPDES) permit to the City of New York for municipal separate storm sewer system discharges.

New York City Department of City Planning (DCP)

DCP is the City's primary land use agency responsible for urban planning and design and addressing land use and zoning issues in neighborhoods. DCP's New York City Waterfront Revitalization Program (WRP) establishes the City's policies relating to waterfront planning and development and aims to maximize the benefits distributed among public, economic and environmental uses of the waterfront. DCP recognizes an area of the Harlem River watershed along the Harlem River waterfront between Lincoln Avenue and 149th Street as the Special Harlem River Waterfront District (SHRWD) and developed a waterfront access plan (WAP) for this region. DCP is proposing to expand the SHRWD further south to Park Avenue in response to open space and resiliency concerns.

New York Department of State (DOS) Office of Planning and Development
DOS' Office of Planning and Development enables the sustainable growth and resilience of NY communities through partnerships with community organizations, government agencies, academia and other natural resource and social service groups to develop progressive land use solutions, building codes and standards and community-based development. DOS created the Coastal and Inland Waterways Program and Coastal Management Program (CMP) to ensure the protection and best use of New York State's coastal and inland water resources and to promote the revitalization of waterfront communities. Title 11 of the DOS Environmental Protection Fund, the Local Waterfront Revitalization Program, provides matching grants to eligible communities for planning and implementing projects that revitalize communities and waterfronts, including the funding for this watershed plan.

DOS also provides financial and technical assistance to communities who are impacted by brownfield sites through the Brownfield Opportunity Areas Program (BOA). A 5-mile area of the Harlem River waterfront stretching from West 149th to the Hudson River was nominated as a BOA, so this may be a potential funding source for future revitalization projects. The associated BOA Nomination Report, published by BCEQ and NYC Parks, outlines ways in which the Harlem River Waterfront can be improved to maximize access and recreational activities, even recommending transportation strategies to get Bronx residents to the waterfront.

New England Interstate Water Pollution Control Commission (NEIWPCC)
NEIWPCC is a not-for-profit interstate agency that was created by an Act of Congress in 1947 to coordinate between and develop resources to solve water and wastewater issues in New York and New England states. They also oversee local Long-Term Control Plans for TMDLs as part of the DEP's CSO Consent Order.

The NY-NJ Harbor Estuary Program (HEP)
Established in 1987 by the EPA's National Estuary Program and now managed by the Hudson River Foundation (HRF), HEP works to protect and improve water quality and productive habitats within the Hudson-Raritan Estuary. A partnership of federal, state, local, civic, environmental, fishing and educational groups, HEP advances habitat restoration, manages sediments, fosters community stewardship, educates the public and promotes safe access to public waterways. The applicable area of HEP's focus here includes the Harlem, East and Hudson Rivers and western Long Island Sound.

U.S. Environmental Protection Agency (EPA)
EPA is the federal agency tasked with protecting human health and the environment. It implements to Clean Water Act (CWA), sets water quality and wastewater standards consistent with CWA, and enforces compliance with these standards. EPA has approval authority over

DEC's state standards and regulations. Through their Urban Waters Federal Partnership, EPA also coordinates efforts between federal agencies and community organizations to connect urban communities with and improve their local waterways. The Bronx and Harlem River watersheds are designated Urban Waters under this partnership and EPA has partnered with NYC Parks and numerous other federal and local organizations to fund the Bronx River Greenway and advance other resiliency efforts in the area. EPA also partners with LISFF and NFWF as a sponsor of the LISS, a bi-state partnership dedicated to restoring and protecting the Long Island Sound, of which the Harlem River watershed is a part.

U.S. Army Corps of Engineers (USUSACE)
USUSACE is a federal agency operating under the Department of Defense that offers environmentally sustainable engineering services to maintain infrastructure and strengthen national security. They work in partnership with other government organizations, academic institutions and non-governmental organizations on large-scale ecosystem restoration projects. USUSACE is also the regulatory agency authorized to issue permits for construction projects within navigable waters and wetlands in the US. They are a partner of the EPA's Urban Waters Federal Partnership and worked with the Hudson River Foundation (HRF) to complete the Hudson-Raritan Estuary Comprehensive Restoration Plan (CRP), which includes recommendations for the Harlem River as part of the Plan's Harlem River, East River, and Western Long Island Sound Planning Region.

United States Geological Survey (USGS)
USGS is a scientific organization under the U.S. Department of the Interior that provides reliable scientific information about natural hazards, environmental health, natural resources, and the impacts of climate and land-use change to policy-makers and the public. A partner of the EPA's Urban Waters Federal Partnership, they administer environmental research and monitoring programs, including water quality monitoring in the Harlem River, and publish publicly available map and data sets.

Appendix B — Green Infrastructure Typologies

Parks

Harlem River Watershed Green Infrastructure Schematics

in the Borough of the Bronx

October 22, 2018
NRG, GI Unit, NYC Parks

Harlem River Watershed Sites

Van Cortlandt Riverdale Stables
- Existing Conditions
- Schematic
- North Section
- South Section

Van Cortlandt Golf Course Clubhouse
- Existing Conditions
- Schematic
- North Section
- South Section

Fordham Landing Playground
- Existing Conditions
- Schematic

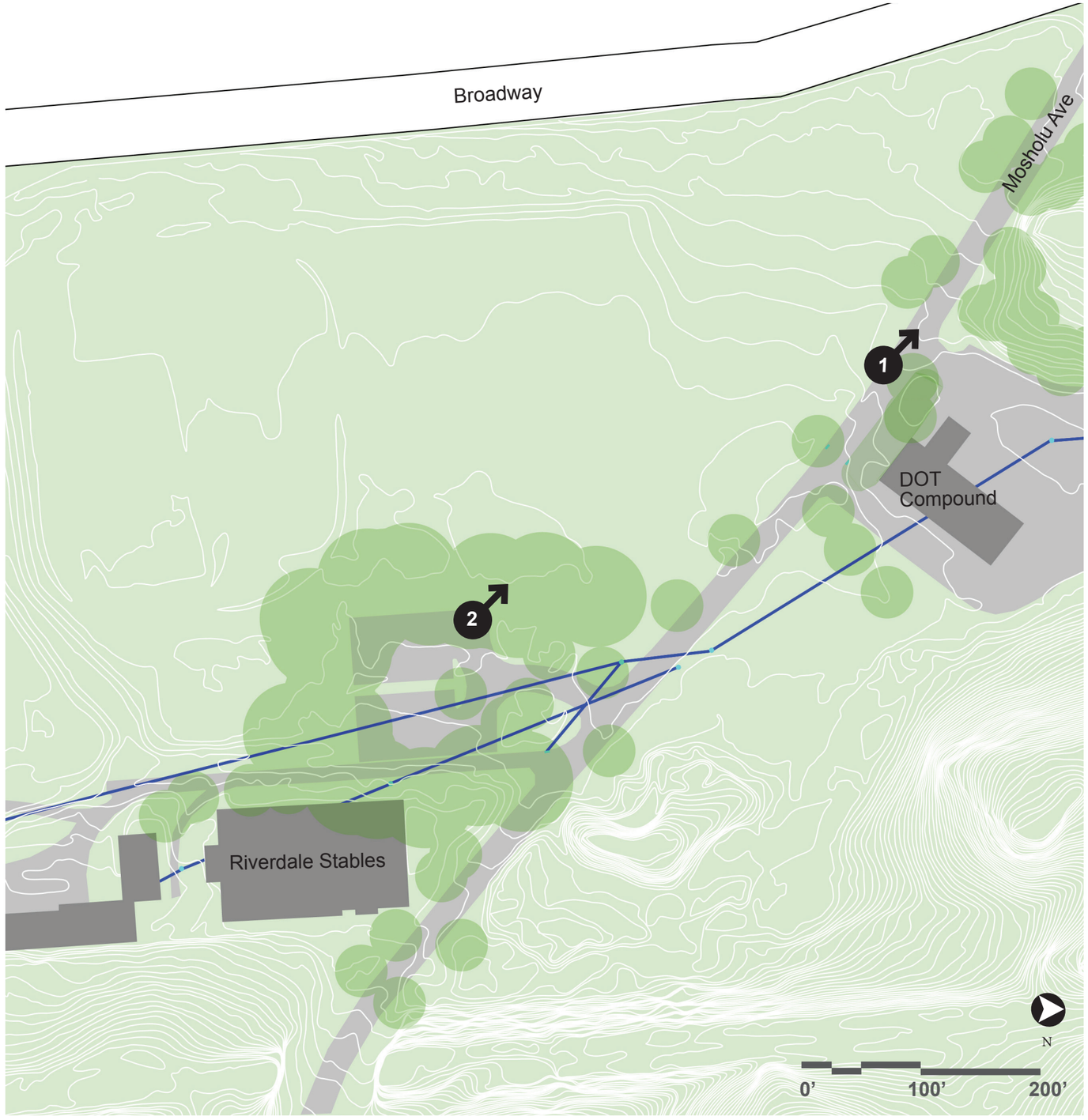
Slattery Playground
- Existing Conditions
- Schematic
- GI Practice Cost Analysis

Bridge Park South
- Existing Conditions
- Schematic

People’s Park
- Existing Conditions
- Schematic

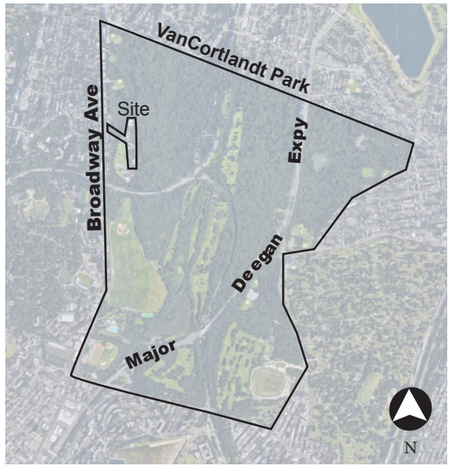


Van Cortlandt Riverdale Stables Existing Conditions



Legend

- Building
- Existing Catch Basin
- Existing Tree
- Storm Drain Line
- Sanitary Line
- Contour Line



1



Small boulders delinating road and field.

2

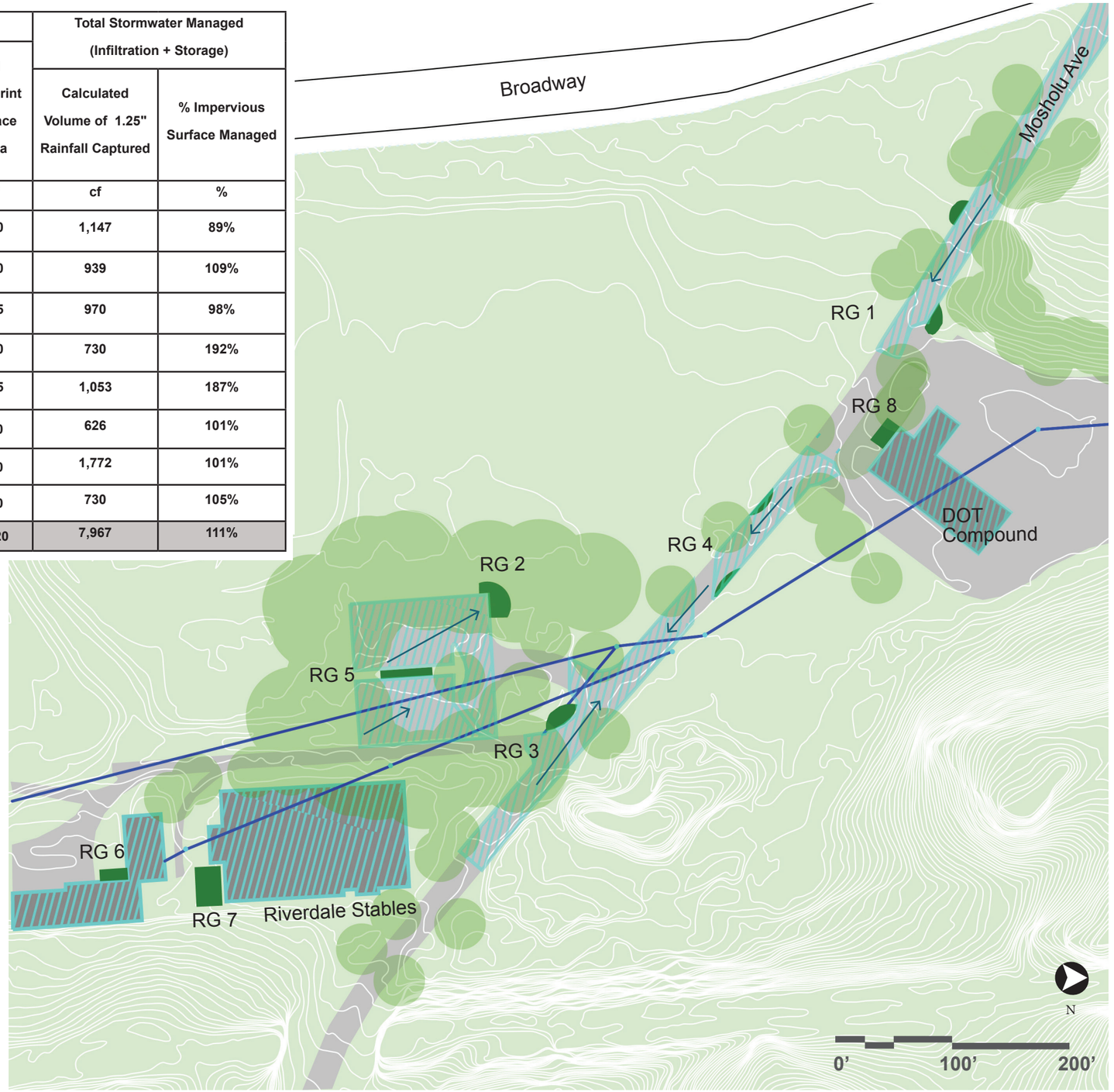


Low point in parking lot.

Van Cortlandt Riverdale Stables Schematic

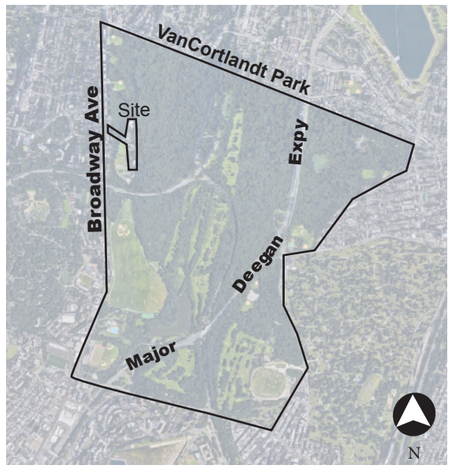
Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
Rain Garden 1	12,440	1,296	500	1,147	89%
Rain Garden 2	8,779	863	400	939	109%
Rain Garden 3	9,544	994	415	970	98%
Rain Garden 4	3,647	380	300	730	192%
Rain Garden 5	5,407	563	455	1,053	187%
Rain Garden 6	5,972	622	250	626	101%
Rain Garden 7	16,835	1754	800	1,772	101%
Rain Garden 8	6,661	694	300	730	105%
TOTALS	69,285	7,166	3,420	7,967	111%



Legend

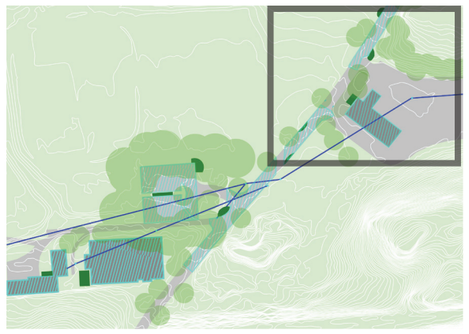
- Road/Parking Lot
- Building
- Vegetation
- Existing Tree
- Existing Catch Basin
- Tributary Drainage Area (TDA)
- Bioretention BR
- Rain Garden RG
- Contour Line
- Storm Drain Line
- Flow Direction

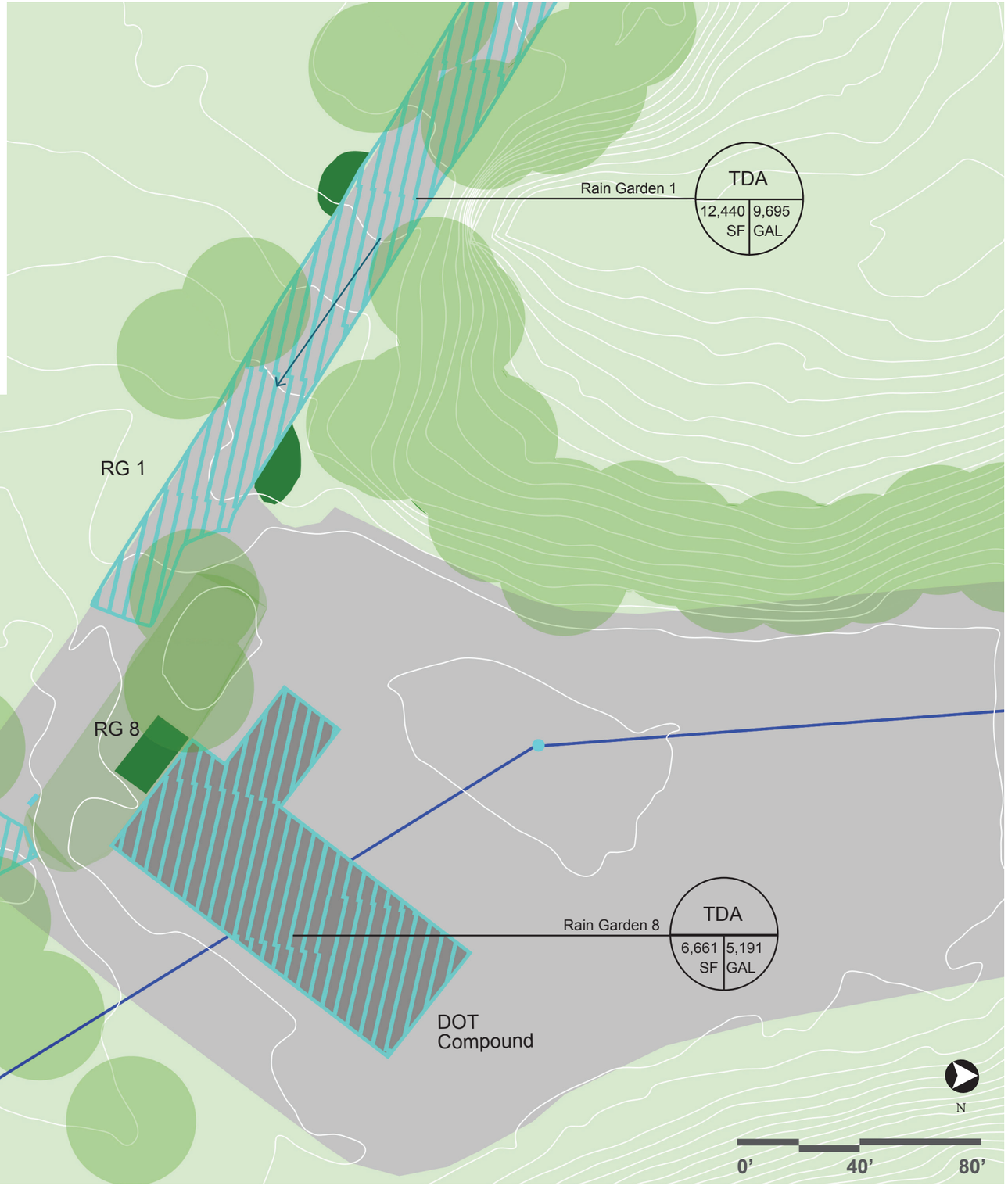


Van Cortlandt Riverdale Stables Schematic North Section

Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
RG 1	12,440	1,296	500	1,147	89%
RG 4	3,647	380	300	970	192%
RG 8	6,661	694	300	730	105%
TOTALS	22,748	2,370	1,100	2,847	120%





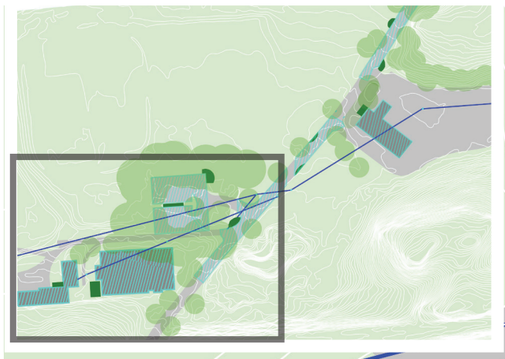
Legend

- Road/Parking Lot
- Building
- Vegetation
- Existing Tree
- Existing Catch Basin
- Tributary Drainage Area (TDA)
- Bioretention BR
- Rain Garden RG
- Contour Line
- Storm Drain Line
- Flow Direction

Van Cortlandt Riverdale Stables Schematic South Section

Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
RG 2	14,179	1,477	700	1,563	106%
RG 3	9,544	994	415	970	98%
RG 5	5,407	563	455	1,053	187%
RG 6	5,972	622	250	626	101%
RG 7	16,835	1,754	800	1,772	101%
TOTALS	51,937	5,410	2,620	5,984	111%



RG 2
Rain Garden 2
TDA 14,179 SF | 8,580 GAL
RG 5
TDA 9,544 SF | 4,212 GAL
Rain Garden 5
RG 3
Rain Garden 3
TDA 9,544 SF | 7,436 GAL
Rain Garden 7
TDA 16,835 SF | 13,118 GAL
TDA 5,972 SF | 4,652 GAL
Rain Garden 6
RG 6
RG 7
Riverdale Stables
N
0’ 40’ 80’

Legend

- Road/ Parking Lot
- Building
- Existing Tree
- Existing Catch Basin
- Tributary Drainage Area (TDA)
- Bioretentioni BR
- Rain Garden RG
- Contour Line
- Storm Drain Line
- Flow Direction

Van Cortlandt Golf Course Clubhouse Existing Conditions

Legend

- Road/Parking Lot
- Sidewalk
- Building
- Deck
- Vegetation
- Existing Tree
- Existing Catch Basin
- Vortech Stormwater Pipes
- Vortech Stormwater System
- Storm Drain Line

Van Cortlandt Lake

Old Putnam Trail

Clubhouse

Major Deegan Expy

N

0’ 100’ 200’

1

2

1

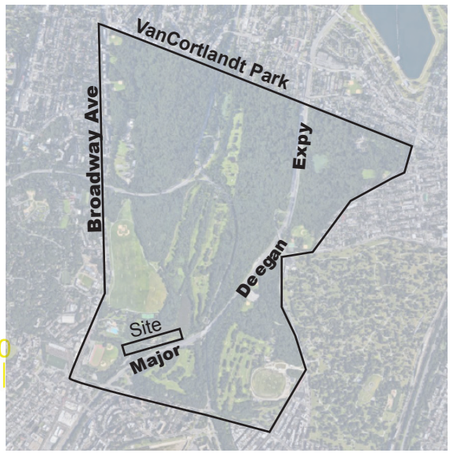


Water flow sheeting into planted roundabout.

2



Evidence of ponding at low point in parking lot.



Van Cortlandt Golf Course Clubhouse Schematic

Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
RG 1	9,430	982	6,514	13,676	1,392%
RG 2	7,525	784	620	1,397	178%
RG 3	474	50	152	422	854%
RG 4	63,715	6,637	3,500	5,417	82%
RG 5	4,084	425	200	451	106%
RG 6	8,172	851	416	972	114%
PP 1	9,615	1,002	2,681	5,437	543%
PP 2	9,150	953	2,021	4,117	432%
PP 3	19,744	953	2,021	4,118	432%
PP 4	4,475	466	1,014	1,825	391%
TOTALS	136,384	13,741	18,118	36,008	262%



Legend

- Road/Parking Lot
- Building
- Sidewalk
- Deck
- Existing Tree
- Contour Line
- Existing Catch Basin
- Storm Drain Line
- Vortech Stormwater Pipe
- Flow Direction
- Tributary Drainage Area (TDA)
- Permeable Pavement PP
- Bioretention BR
- Rain Garden RG
- Vortech Stormwater System

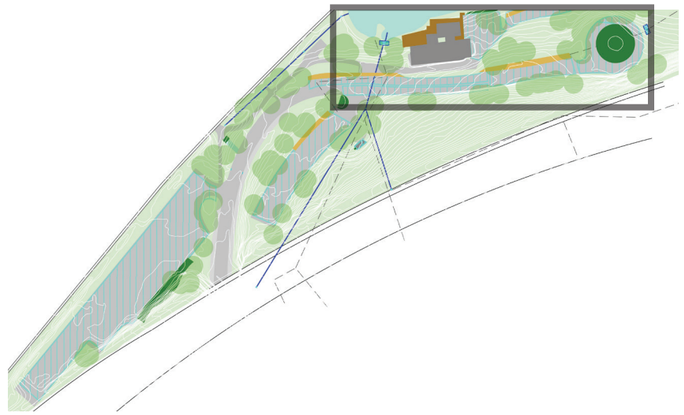
Van Cortlandt Golf Course Clubhouse Schematic North Section

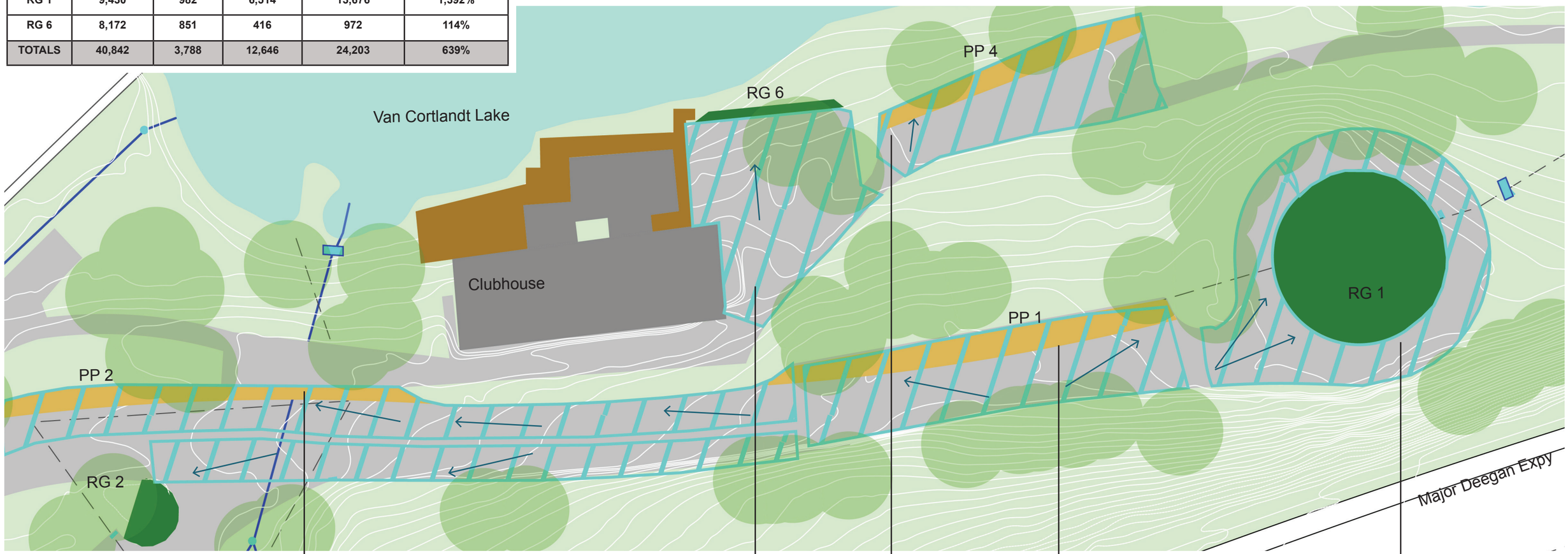
Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
PP 1	9,615	1,002	2,681	5,437	543%
PP 2	9,150	953	2,021	4,117	432%
PP 4	4,475	466	1,014	1,825	391
RG 1	9,430	982	6,514	13,676	1,392%
RG 6	8,172	851	416	972	114%
TOTALS	40,842	3,788	12,646	24,203	639%

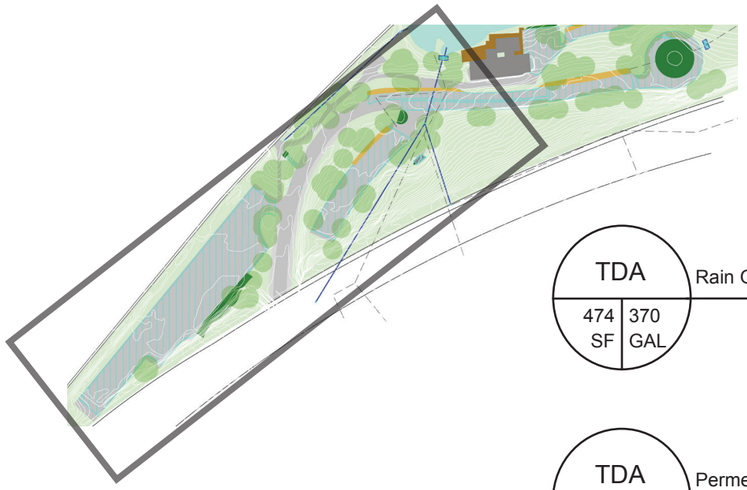
Legend

- Road/Parking Lot
- Building
- Existing Tree
- Existing Catch Basin
- Vortech Stormwater System
- Bioretention BR
- Rain Garden RG
- Permeable Pavement PP
- Tributary Drainage Area (TDA)
- Contour Line
- Storm Drain Line
- Vortech Stormwater Pipe
- Flow Direction





Van Cortlandt Golf Course Clubhouse Schematic South Section



Legend

- Road/Parking Lot
- Building
- Sidewalk
- Existing Tree
- Contour Line
- Existing Catchbasin
- Storm Drain Line
- Vortech Stormwater Pipe
- Vortech Stormwater System
- Flow Direction
- Tributary Drainage Area (TDA)
- Permeable Pavement PP
- Subsurface Retention SR
- Rain Garden RG

Old Putnam Trail

Major Deegan Expy

Remove Stairs

RG 3

TDA | 474 SF | 370 GAL — Rain Garden 3

PP 3

RG 5

TDA | 19,744 SF | 15,387 GAL — Permeable Pavement 3

TDA | 63,715 SF | 49,648 GAL — Rain Garden 4

RG 4

Rain Garden 5

TDA | 276 SF | 215 GAL

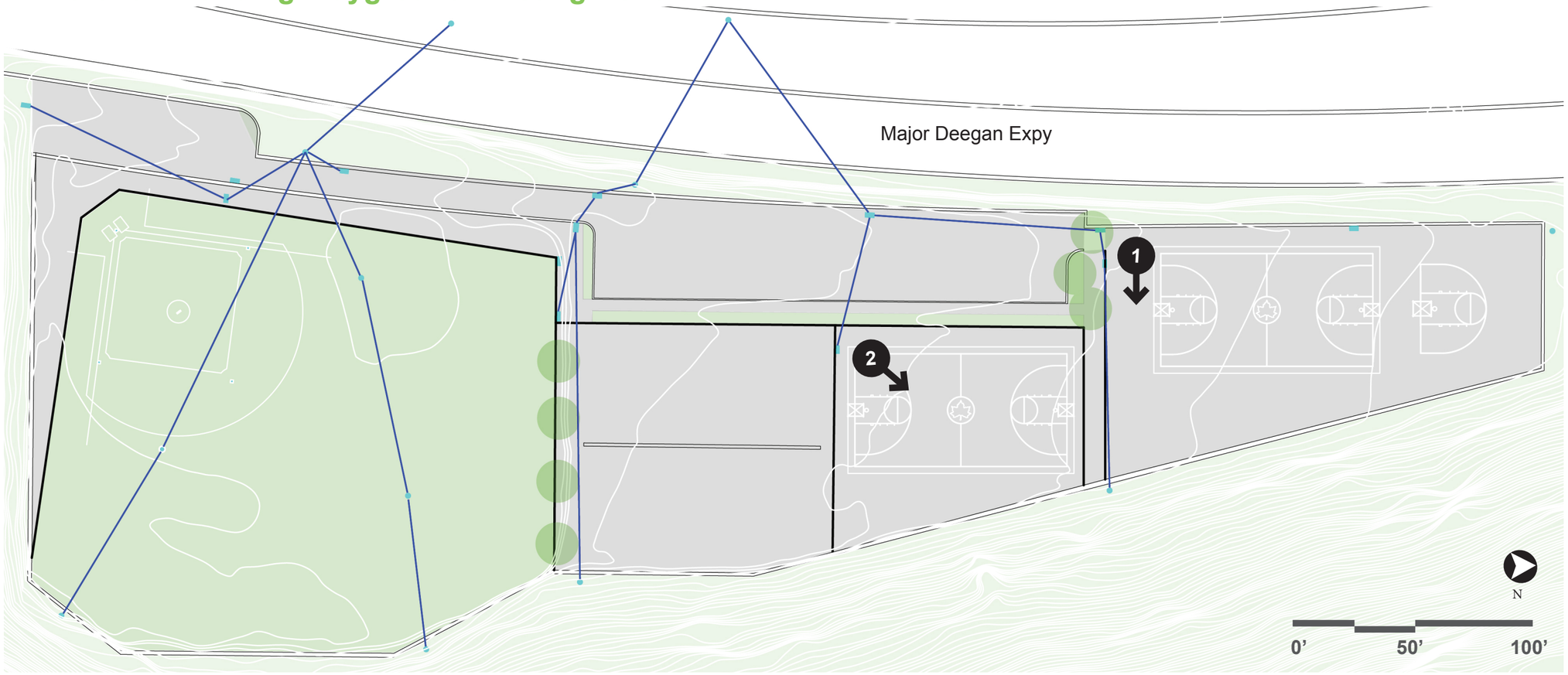
N

0’ 80’ 160’

Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
RG 2	7,525	784	620	13,676	1,392%
RG 3	474	50	152	422	854%
RG 4	63,715	6,637	2,550	5,418	82%
RG 5	276	29	20	45	157%
PP 3	19,744	2,057	1,000	2,067	101%
TOTALS	95,542	9,952	5,472	11,805	119%

Fordham Landing Playground Existing Conditions





Legend

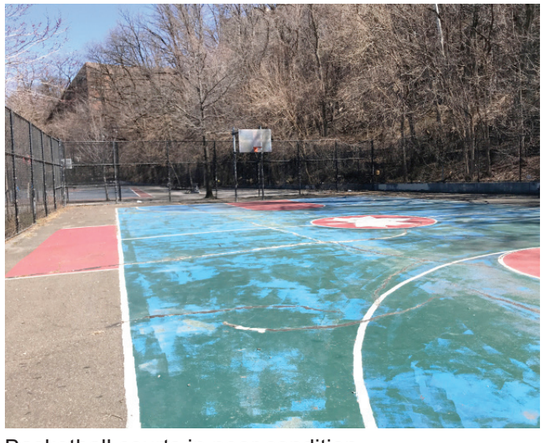
- Road/Parking Lot
- Existing Catch Basin
- Existing Tree
- Storm Drain Line
- Contour Line

1

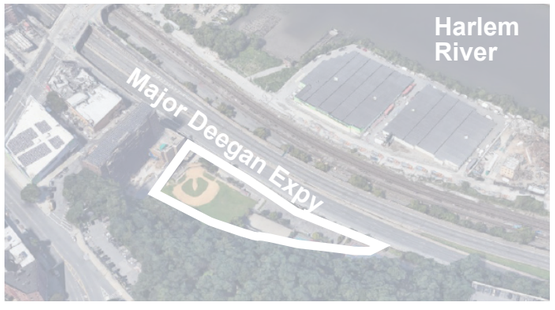


Water flow towards fencing, in open space.

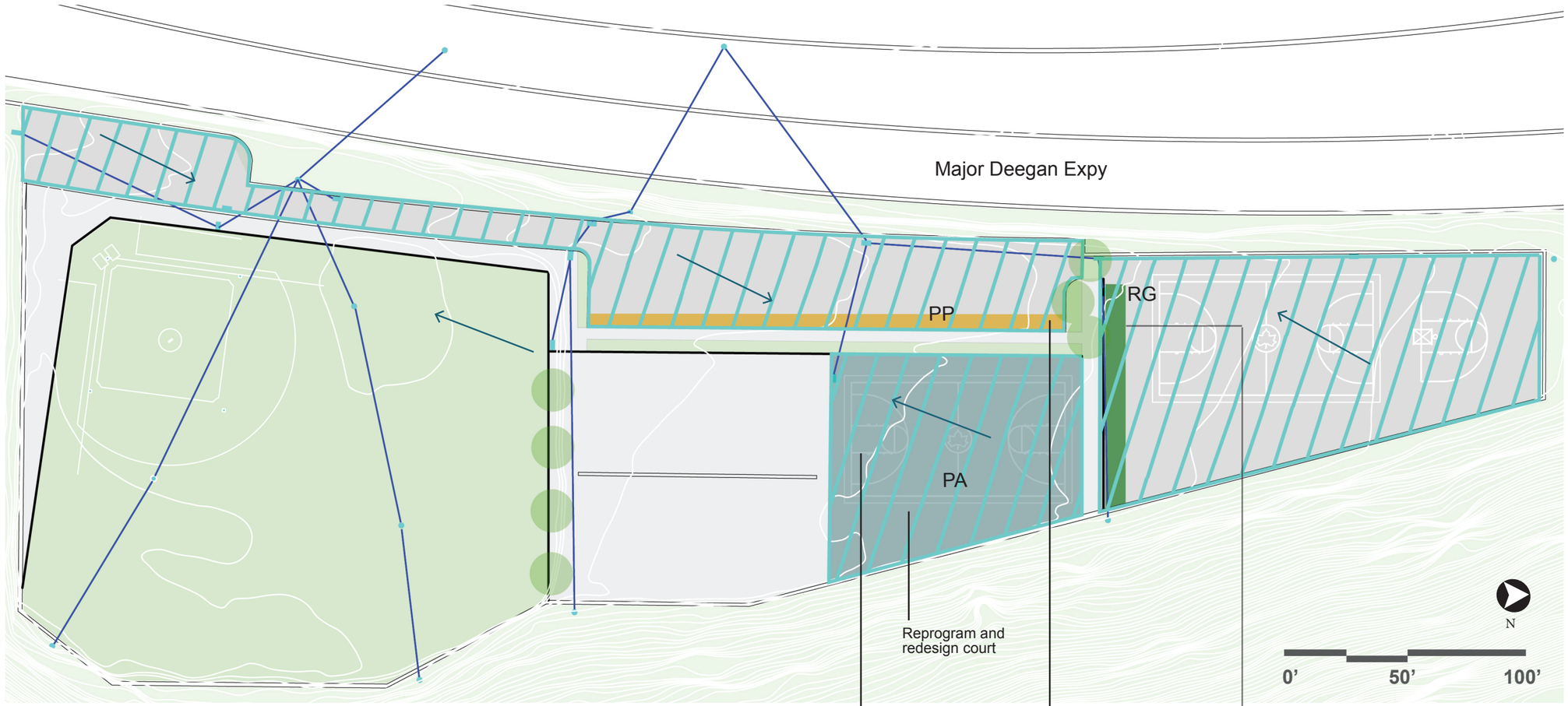
2



Basketball courts in poor condition.



Fordham Landing Playground Schematic

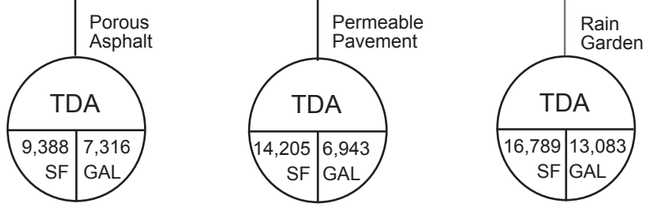


Legend

- Road/Parking Lot
- Field
- Existing Tree
- Tributary Drainage Area TDA
- Rain Garden RG
- Permeable Pavement PP
- Porous Asphalt
- Existing Catch Basin
- Contour Line
- Storm Drain Line
- Flow Direction

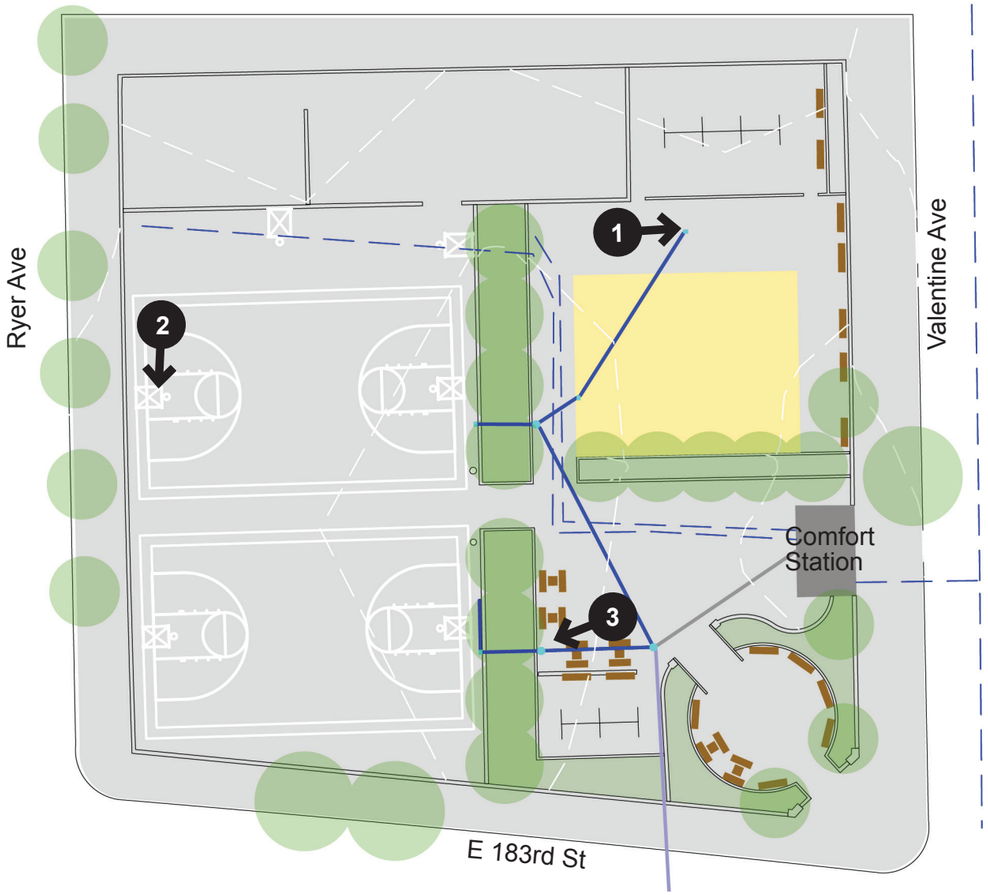
Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
Rain Garden	16,789	1,749	805	1,673	96%
Porous Asphalt	9,388	978	10,011	20,007	2,046%
Permeable Pavement	14,209	928	1,275	2,621	282%
TOTALS	40,386	4,207	12,091	24,301	665%





Slattery Playground Existing Conditions



Legend

- Building
- Hardscape
- Play Surface
- Benches
- Existing Catch Basin
- Existing Tree
- Contour Line
- Water Line
- Storm Drain Line
- Sanitary Line
- Combined Line
- Flow Direction

N

0’ 40’ 80’





1



Water flowing towards center in open play space.

2



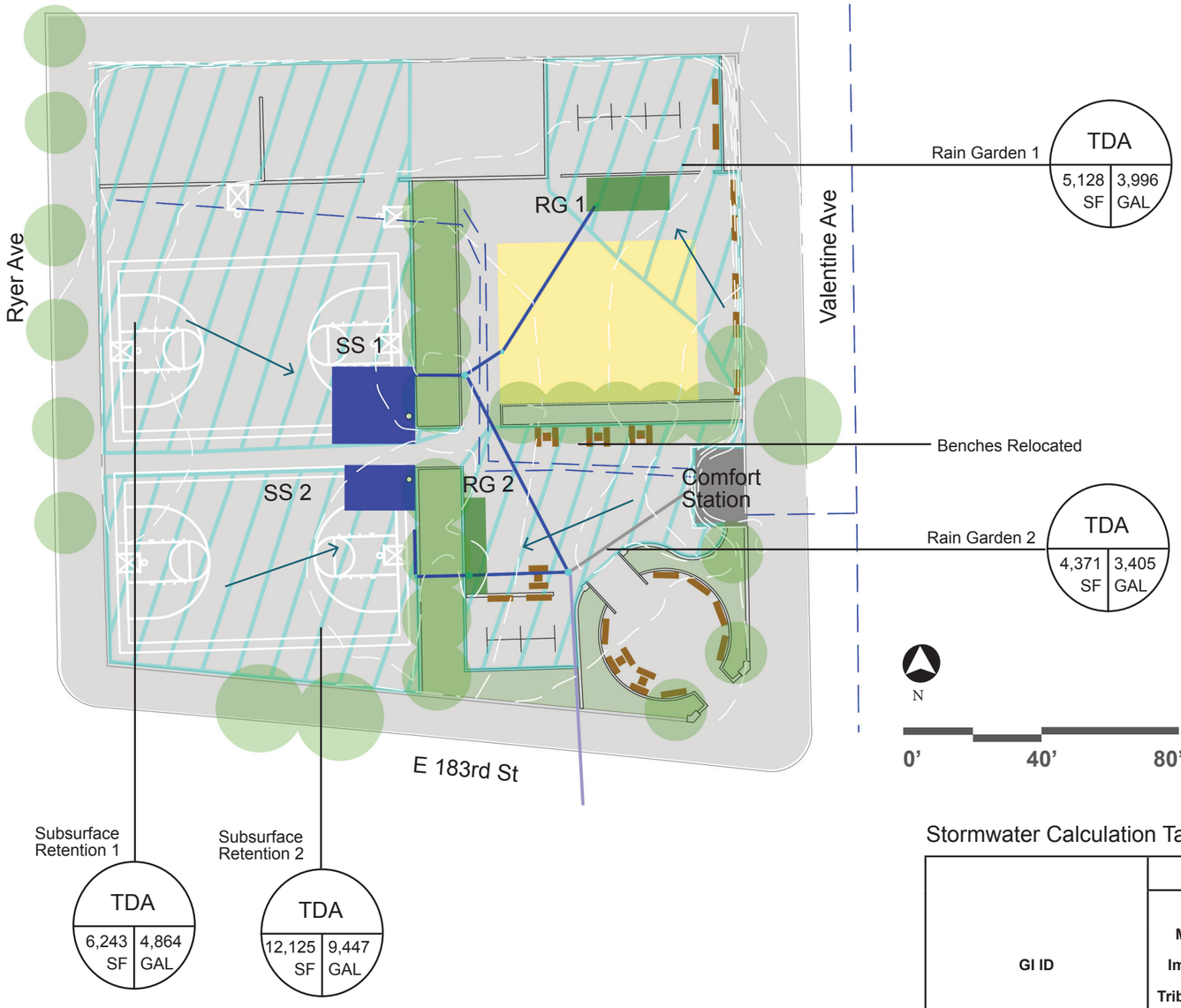
Basketball courts in good condition.

3



Low point in corner with catch basin.

Slattery Playground Schematic



Legend

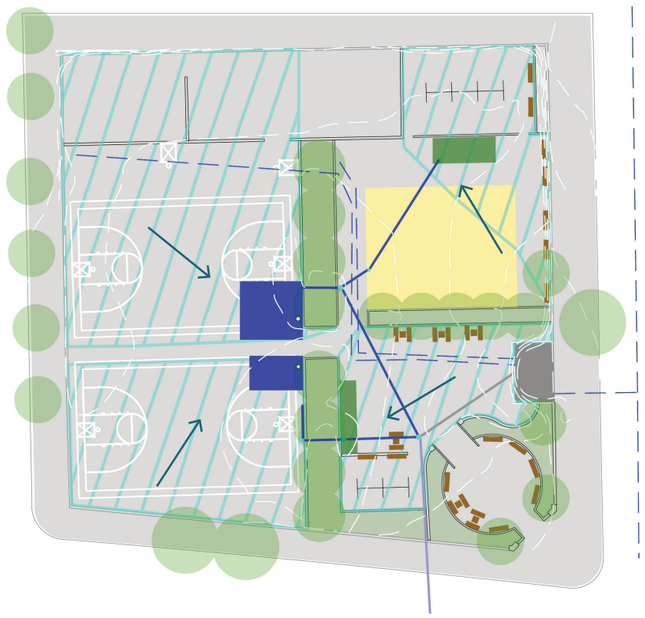
- Building
- Play Surface
- Benches
- Light
- Existing Catch Basin
- Existing Tree
- Contour Line
- Water Line
- Storm Drain Line
- Sanitary Line
- Combined Line
- Flow Direction
- Tributary Drainage Area (TDA)
- Subsurface Retention SR
- Rain Garden RG

Stormwater Calculation Table

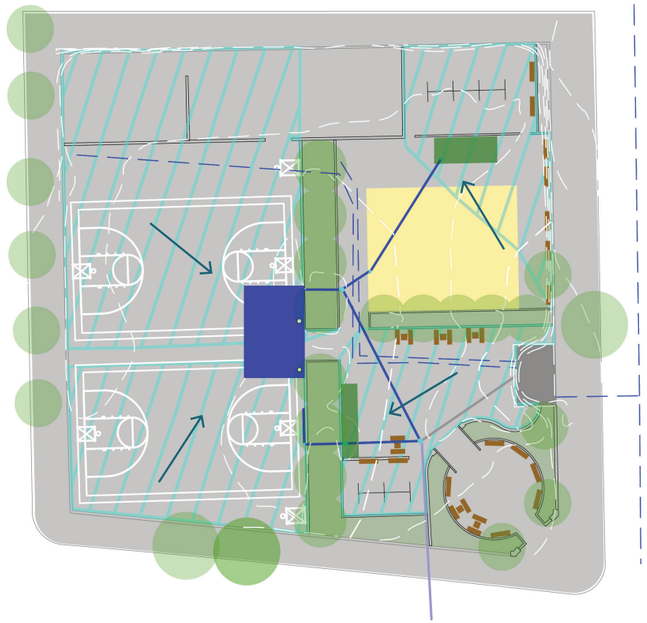
GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
Rain Garden 1	5,128	534	260	563	105%
Rain Garden 2	4,371	455	200	438	96%
Subsurface Retention 1	12,125	1,263	600	1258	100%
Subsurface Retention 2	6,243	650	300	645	99%
TOTALS	27,867	2,903	1,360	2,904	100%



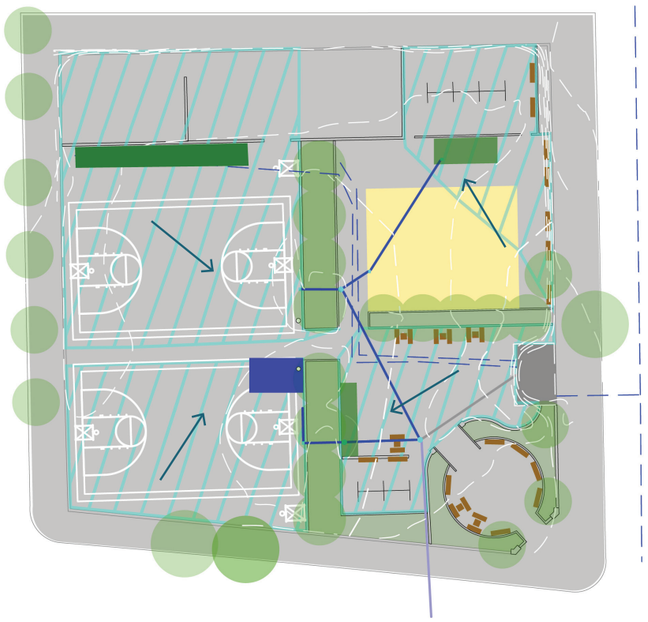
Slattery Playground GI Practice Design Options



Option 1: Two Subsurface Retention and Rain Garden



Option 2: One Subsurface Retention

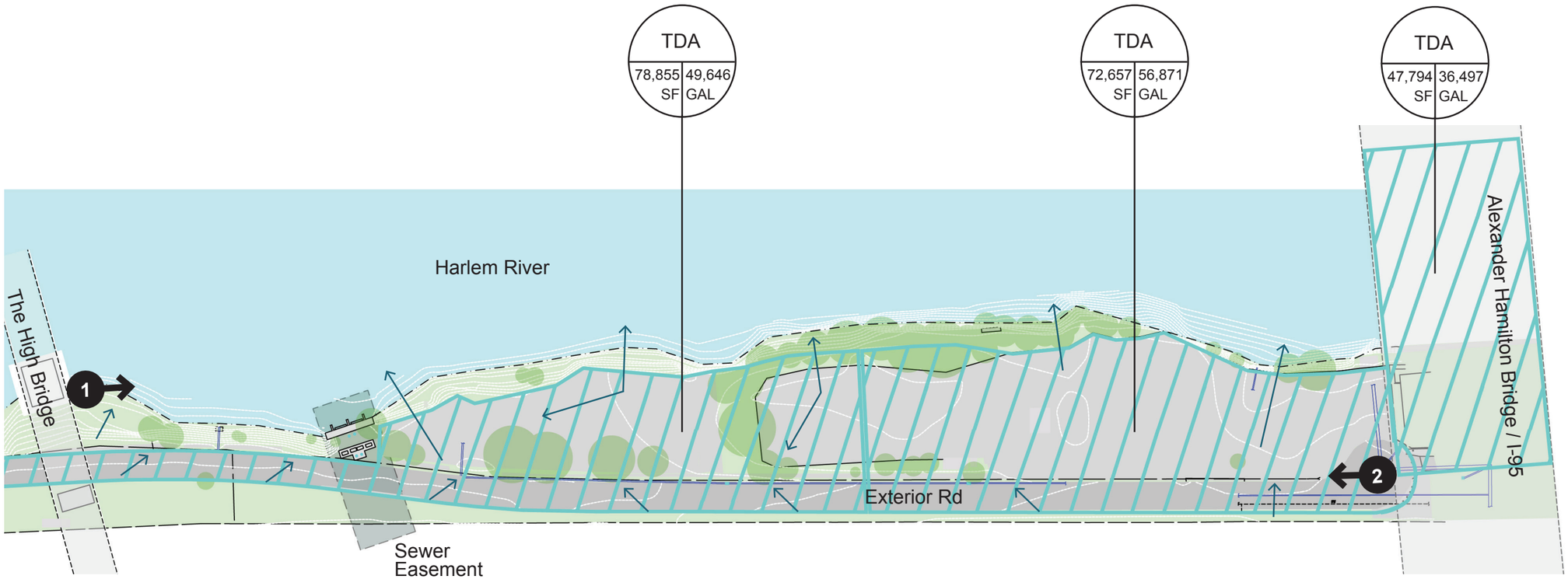


Option 3: One Subsurface Retention and an additional Rain Garden

Legend

- Building
- Play Surface
- Benches
- Light
- Existing Catch Basin
- Existing Tree
- Contour Line
- Water Line
- Storm Drain Line
- Sanitary Line
- Combined Line
- Flow Direction
- Tributary Drainage Area (TDA)
- Subsurface Retention SR
- Rain Garden RG

Bridge Park South Existing Conditions





N

0’ 100’ 200’

Legend

- Existing Catch Basin
- Existing Tree
- River
- Contour Line
- Water Line
- Storm Drain Line
- Flow Direction
- Tributary Drainage Area (TDA)

1

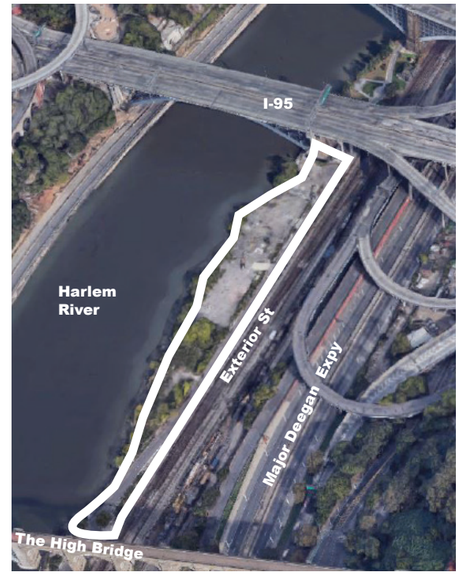


Rip rap along Harlem River.

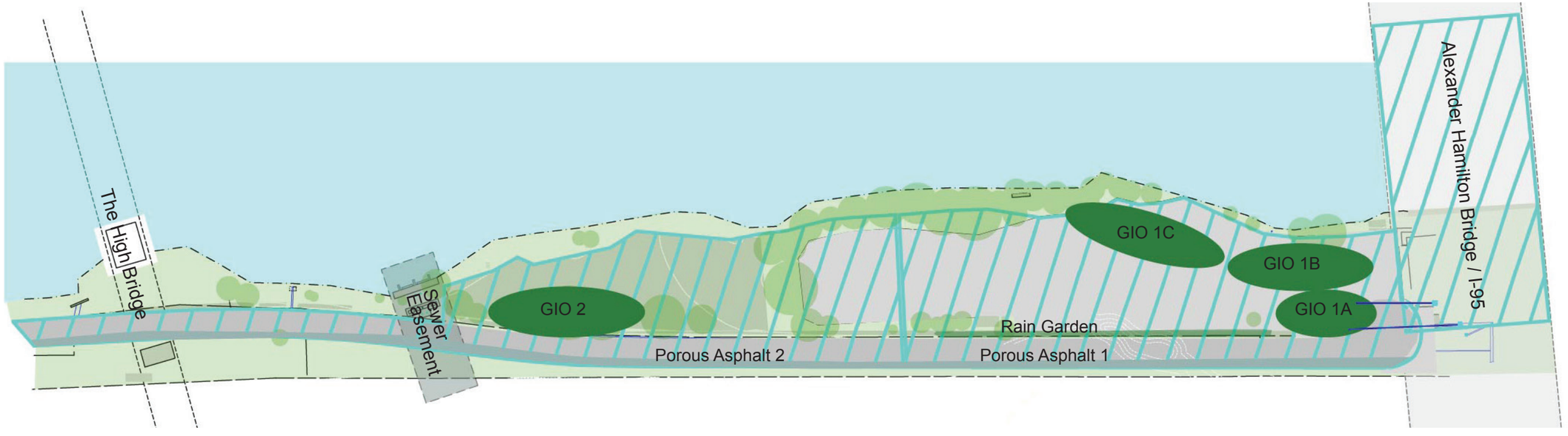
2



Overgrown vegetation, asphalt and concrete paving.



Bridge Park South Schematic

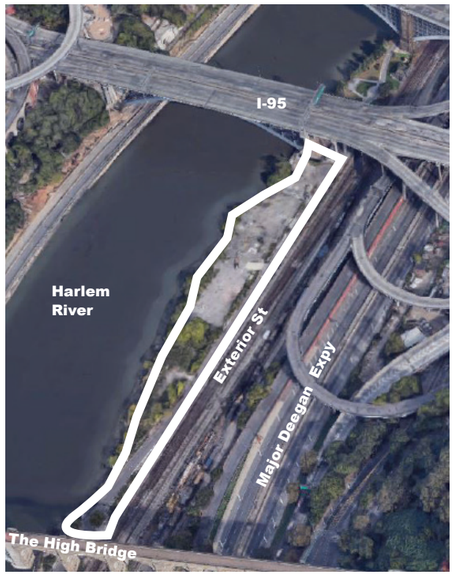


Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
GIO 1A	47,794	4,879	3,595	3,966	81%
GIO 1B			2,984	2,966	61%
GIO 1C			3,462	4,044	83%
Rain Garden	72,657	7,603	2,000	2,600	58%
Porous Asphalt 1			7,016	5,613	378%
Porous Asphalt 2	78,855	6,637	6,233	7,037	201%
GIO 2			11,281	9,024	306%
TOTALS	199,306	19,119	36,571	35,250	184%

Legend

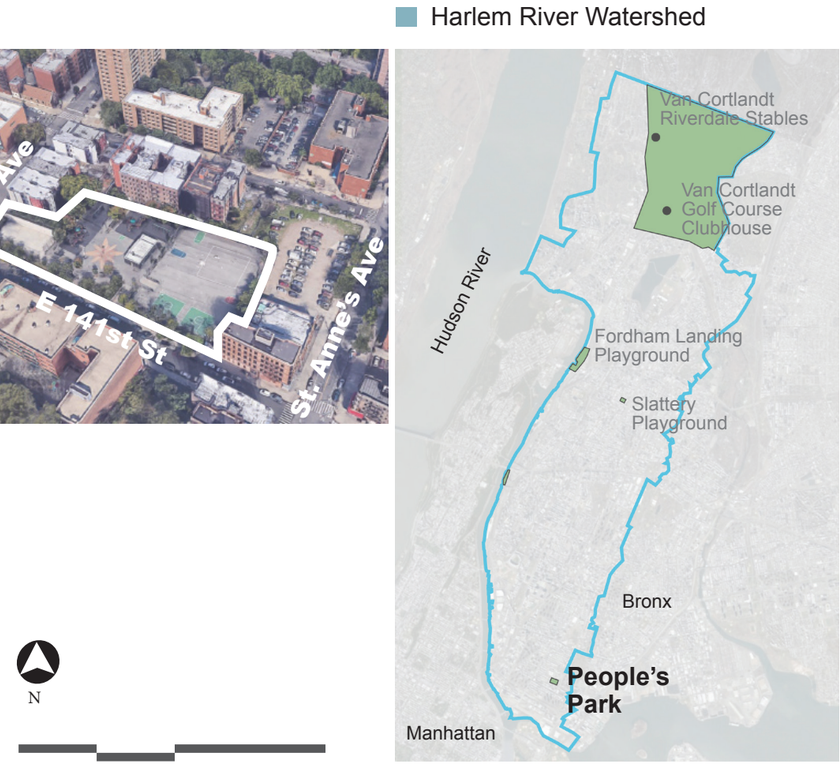
- Existing Catch Basin
- Existing Tree
- Contour Line
- Proposed Pipe
- Flow Direction
- Porous Asphalt PA
- GI Opportunities GIO
- Rain Garden RG
- Tributary Drainage Area (TDA)

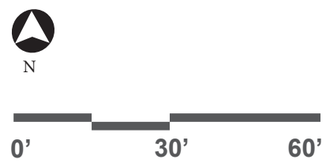


People’s Park Existing Conditions









Legend

- Building
- Courts
- Benches
- Play Surface
- Existing Catch Basin
- Existing Tree
- Contour Line
- Water Line
- Storm Drain Line
- Sanitary Line
- Flow Direction

1



Low point in open area, edge of court.

2



Low point in seating area.

People's Park Schematic



Legend

- Building
- Play Surface
- Benches
- Courts
- Existing Catch Basin
- Existing Tree
- Contour Line
- Water Line
- Storm Drain Line
- Sanitary Line
- Flow Direction
- Tributary Drainage Area (TDA)
- Rain Garden RG

Stormwater Calculation Table

GI ID	GI Asset Data			Total Stormwater Managed (Infiltration + Storage)	
	Managed Impervious Tributary Area	Volume 1.25" Rainfall on Impervious Area	GI Footprint Surface Area	Calculated Volume of 1.25" Rainfall Captured	% Impervious Surface Managed
	sf	cf	sf	cf	%
Rain Garden 1	2,835	295	200	439	148%
Rain Garden 2	9,201	958	550	1,156	121%
Rain Garden 3	15,338	1598	600	1,258	79%
TOTALS	27,374	2,852	1,350	2,853	100%



Appendix C — Shoreline Assessment Protocol

Introduction and Objectives

The NYC Department of Parks and Recreation (NYC Parks) developed this protocol as an internal product to characterize and assess shorelines for restoration opportunities in conjunction with its watershed planning efforts on the Bronx side of the Harlem River and the North Shore of Staten Island. Specific objectives for this assessment are to:

- Provide a field-based characterization of shoreline condition for NYC Parks properties that differentiates between shoreline slope, bank substrate type and size, and relative condition.
- Characterize the ecological and physical condition of the shoreline.
- Use characterization results to inform opportunities for shoreline restoration using softer or hybrid approaches an armored waterfront. These opportunities may include living shoreline construction, erosion control, shoreline vegetated buffer enhancement, debris removal with volunteers, or locations to create safe public waterfront access points.

Approach

NYC Parks reviewed a number of other shoreline assessment protocols. The following projects or programs were referenced in the development of this protocol:

- Hudson River Shoreline Rapid Assessment – Stuart Findlay of the Cary Institute, Jon Miller of Stevens Institute, Consensus Building Institute, and Hudson River National Estuarine Research Reserve (HRNERR)
- Waterfront Facilities Maintenance Management System (WFMMS) – NYC Economic Development Corporation (EDC)
- NYC Shoreline Inventory – NYC Department of City Planning (DCP)

Our approach includes:

1) A desktop analysis of available geospatial data to generate maps of target shoreline segments based on DCP's Shoreline Inventory.
2) An in-field assessment to characterize those shoreline segments based on bank substrate type and size, slope, and relative condition (based on erosion and presence/absence of dumped trash and other debris). We also note any potential obstacles that may impede shoreline restoration (e.g., combined sewer outfall (CSO) locations) and areas where park patrons are actively accessing the shoreline.
3) Resulting maps of bank types and condition, maps of shoreline and park access points, and compiled field data for each shoreline segment.
4) Recommendations for restoration and other work are highlighted.

This approach, the resulting maps and collected data, and ultimate recommendations are described below.

Desktop Analysis of Shoreline Types

- Generate maps of the shoreline for area(s) of interest using current orthoimagery. Multiple maps may be necessary to capture the entire shoreline at a close enough resolution (i.e., a full 8.5 x 11 sheet of paper) to be used in the field.
- Review existing datasets listed in the table below (as applicable) to familiarize yourself with the shorelines to be assessed prior to a field visit.

Table 1. Existing data sources to review.

Data to review	Source(s)	Notes
Shoreline type	DCP's Shoreline Inventory, EDC Waterfront Facilities Inventory	In the Harlem River watershed, the primary shoreline type is riprap, with some bulkhead and limited sections of piles & natural shoreline.
Waterfront access locations	Any previous watershed planning efforts + the NYC Parks Trail Inventory (some parks may have mapped trails to the shoreline)	Reports reviewed for the Harlem River are listed in full in the Harlem River Watershed Plan.
Slope of adjacent parkland	DEM or 1ft contours	
Sewershed data	NYC DEP	Does the shoreline have CSO or MS4 outfalls, or is it in a direct drainage area?
Condition of built structures	EDC WFMMS	Only applicable for shorelines with bulkheads or other built structures.

- Identify reaches or study areas by splitting the shoreline into segments based on shoreline type (from DCP's Shoreline Inventory) for in-field verification & data collection. Mark the start and end points of each segment on directly on your previously generated maps for reference in the field.
- Assign each segment an ID as follows: "Park name_shoreline segment #". Number the segments in numerical order from North to South or West to East (whichever is more appropriate for your area of interest).
- Finally, generate a datasheet for each segment to record data in the field. Bring extra datasheets into the field, to further differentiate shoreline segments based on field conditions, as needed.

Field Assessment of Shoreline Condition

Conduct all field assessments at low tide. Refer to the nearest NOAA tide gage for tidal data. For the Harlem River, refer to NOAA tide gage at Randall's Island.

Supplies needed: maps, datasheet for each segment + extra blank ones, camera, GPS.

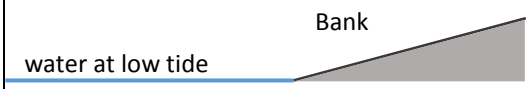
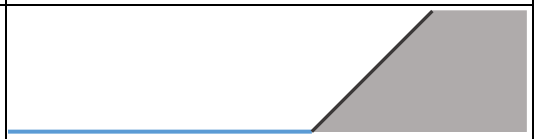
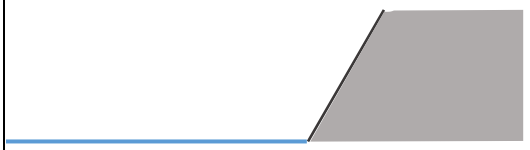
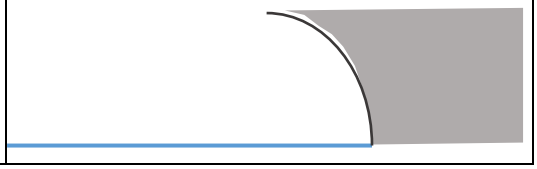
Collect the following information in the field:

Visual documentation

- Take up & downstream photos at the start and end point of each NYC Parks property's shoreline. (4 total photos)
  - Naming convention for these four photos should be "Park name_[Cardinal direction (either N/S or W/E)_view [upstream/downstream]"
    - E.g., if visiting Bridge Park, the photos would be named:
      - Bridge Park_N_view upstream
      - Bridge Park_N_view downstream
      - Bridge Park_S_view upstream
      - Bridge Park_S_view downstream
  - Mark photo locations on your map.
- For parks with multiple shoreline types, take photos that are representative of each type.
  - Mark photo locations on your map.
  - Naming convention should be "Park name_shoreline segment #"
- Take GPS points and photos of key landmarks and notable features, including areas of erosion.
  - Mark these points on your map.
  - Depending on the feature being captured, the naming convention for these photos should be "Park name_shoreline segment #_[feature]"
  - Landmarks/features could include (but are not limited to):
    - Erosion
    - Debris/Dumping
    - CSO
    - Outfall
    - Informal access point
    - Boat launch

Bank slope

- Estimate the slope from the top of the bank to the base (toe) of the bank **at low tide**.
  - Use the table below as a guide for how to measure & record bank slope.
  - If there is a marked difference, or obvious break in slope, between the slope of the upper and lower bank, record the upper bank slope as 'bank slope' in the data sheet & record the lower bank slope as 'toe slope'.

Relatively flat (<15 degrees)	
Moderate to Steep (15-45 degrees)	
Very Steep (45+ degrees)	
Undercut (>90 degrees)	

Bank Type

- Determine shoreline bank type based on the following categories:
  - Natural
    - Sandy – loose deposits of natural substrate, e.g. sand and gravel
    - Marshy – shoreline that is soft, wet, and periodically or continually flooded to a shallow depth; usually characterized by wetland grasses and other plants or exposed mudflat
    - Natural rock, bedrock
  - Hardened
    - Bulkhead – vertical retaining walls intended to hold soil in place and stabilize the shoreline. (DCP, 2013) Common materials include timber, concrete, and steel sheet pile
    - Gabions – wire mesh enclosures filled with cobble or crushed rock that are stacked to form semi-flexible, permeable walls
    - Revetment – large, sloping structures that armor a shoreline to protect against erosion
  - Riprap
    - Riprap -- typically composed of stone rubble or concrete blocks and intentionally placed on a sloped surface to protect the underlying soil from erosion and reduce the forces of wave action (DCP, 2013)
- For hardened banks, are there any visible defects, cracks, or missing segments? (y/n)
- For riprap banks, also record the following information:
  - Riprap material – is there any non-natural material present? (y/n)
    - Riprap may be:
      - Natural stone (e.g., granite)

- Construction debris (e.g., chunks of asphalt or concrete)
- Concrete blocks
- Mix of any of the above

- Are there any areas that are missing sections of riprap? (y/n) If yes, GPS those locations and also mark those places on the map/datasheet.
- Riprap stone class size diameter, based on the intermediate axis (e.g. not the longest or shortest length of the rock)
  - ≤ 1 foot
  - 1-4 feet
  - > 4 feet
  - * For segments with multiple stone class sizes, pick the category that is most descriptive of the reach.

Bank Erosion

- Determine bank erosion based on the following:
  - Prevalence – is there any erosion? (y/n) If yes, is the erosion in isolated pockets or typical of the reach?
  - Types of erosion

General bank scour – caused by excessive velocities and/or wave energy; reaches of exposed soils on sloping banks are generally evidence of general bank scour.	
Undercutting – removal of material at the base of the shoreline, leaving an overhang & leading to potential bank failure.	

Surface erosion – usually indicated by gully-like scars in the stream bank.	

  - Erosion severity (1-3 scale)
    - 1: minor – bank is generally stable, minor erosion in one or two isolated spots
    - 2: moderate – bank is mostly stable with some localized erosion, replacement of missing rip-rap or additional riparian planting or other relatively low-intensity actions can likely rectify the problem spots
    - 3: severe – bank is in danger of failing, reconstruction is needed to stabilize the bank
  - As discussed in the Visual Documentation section above, be sure to take GPS points and photos of erosion & mark the locations on your map/datasheet.

Outfalls & debris/dumping

- Are there outfall pipes present? (y/n)
- Is there any debris/dumping present? (y/n)
- As discussed in the Visual Documentation section above, be sure to take GPS points and photos of any outfalls and/or dumping & mark the locations on the map/datasheet.
- Also on the datasheet, record the following information about any outfalls:
  - Material (concrete, cast iron, unknown)
  - Type (CSO vs stormwater vs unknown)
  - Flowing at time of visit? (y/n)
  - Condition (good (e.g, intact) vs. poor (e.g., crumbling or blocked)

Vegetation

- Is riparian vegetation present on the banks? (y/n)
  - If present:
    - Estimate % of segment that is vegetated
    - If possible, estimate % native vs invasive & note predominant species:

    - Primary invasive species: *Phragmites*, mugwort, knotweed, tree of heaven, etc.
    - Primary native species: *Iva*, *Baccharis*, bayberry, switchgrass, bluestem, etc.
- Is aquatic vegetation visible in the channel? (y/n/not able to observe)

Waterfront access

- Are there formal waterfront access points (e.g., boat launches, beaches, docks)? (y/n)
- Are there informal waterfront access points (e.g., desire lines to the water, discernible congregation points (either from seeing people use them or evidence such as discarded fishing equipment, beverage containers, etc.))? (y/n)
    - If yes to either of the above, as discussed in the Visual Documentation section above, take GPS points and photos of any access points & mark the locations on the map/datasheet
- For shoreline parks with adjacent sidewalks, greenways, etc, note the location of and condition of any built structures on the data sheet
- Also note any other observed human uses (e.g., # of people biking, fishing, etc.)

Other

- Please note that there is space on the datasheet for any other observations or notes you may wish to record

Harlem River Shoreline Assessment Results

Shoreline bank types & condition

Based on the DCP Shorelines Inventory, the primary shoreline type of the Bronx side of the Harlem River is riprap, with some bulkheaded areas and limited sections of piles and natural shoreline.

The segments of NYC Parks properties' shoreline on the Harlem River assessed using this protocol were nearly all riprap, with one section of concrete bulkhead. Since the majority of the shoreline assessed was riprap, each shoreline was further broken into segments based on riprap size and/or material during field assessment.

For the riprap segments, condition was determined based on the presence/absence of riprap and the severity of any documented erosion. For the bulkheaded segment, condition was determined based on whether or not there were any visibly missing, cracked, or defective sections of bulkhead. For the natural segment, condition was determined based on the severity of any documented erosion.

Maps 1-3 below show the 8 segments identified and assessed on August 15, 2018 and their assessed condition.

Observations of each segment's shoreline type, material, stone size (if applicable), slope, presence/absence of missing sections of riprap, erosion type, erosion severity, notes on any

other notable features, and overall condition are catalogued in Table 2. Site-specific areas of concern are highlighted in Table 3.

Outfalls & Dumping

Outfalls and dumping of debris were both observed along the shoreline in Bridge Park South and Mill Pond Park. CSO and MS4 outfalls contribute floatables, local scour problems, and other pollutants to the shoreline during wet weather. The most prominent outfall, CSO WI-060, is located just north of the High Bridge in Bridge Park South & is currently in poor condition – two of the four CSO gates are either broken or missing.

Shoreline Access

Access to the shoreline is limited across all three parks; even where it is possible, it is not programmed or intentional. In particular, the majority of shoreline access locations in Bridge Park and Bridge Park South highlighted in the maps below are unsafe due to steep slopes and/or uneven, potentially unstable rocky surfaces that are not appropriate for recreation.

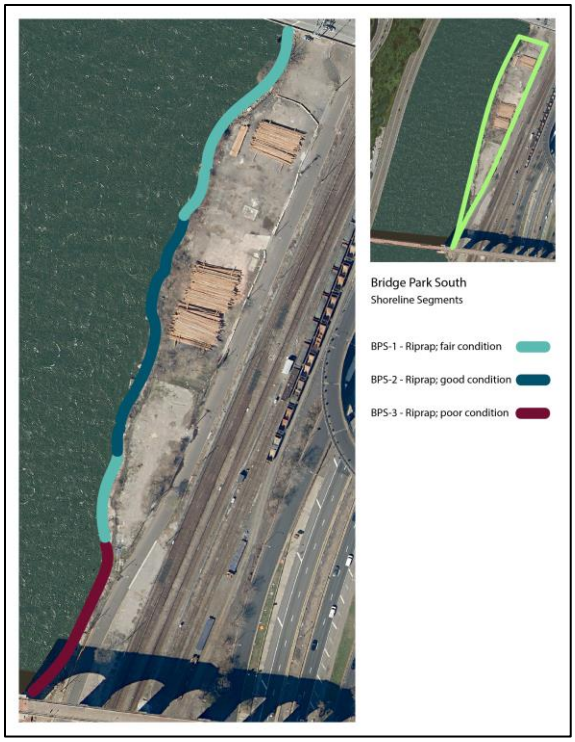
Vegetation

The shoreline in Bridge Park and Bridge Park South contains both vegetated and unvegetated areas; most of the vegetation is comprised of invasive species. Invasive vegetation can crowd out native species, reduce biodiversity, and block river views/access. Common invasive species found along the shoreline in these two parks are: mugwort, oriental bittersweet, Japanese knotweed, and tree of heaven (*Ailanthus altissima*). The majority of Mill Pond Park's shoreline is also vegetated but appears to be more regularly maintained/intentionally landscaped with native plants than Bridge Park & Bridge Park South.

Map 1. Shoreline segments assessed at Bridge Park.



Map 2. Shoreline segments assessed at Bridge Park South.



Map 3. Shoreline segments assessed at Mill Pond Park.

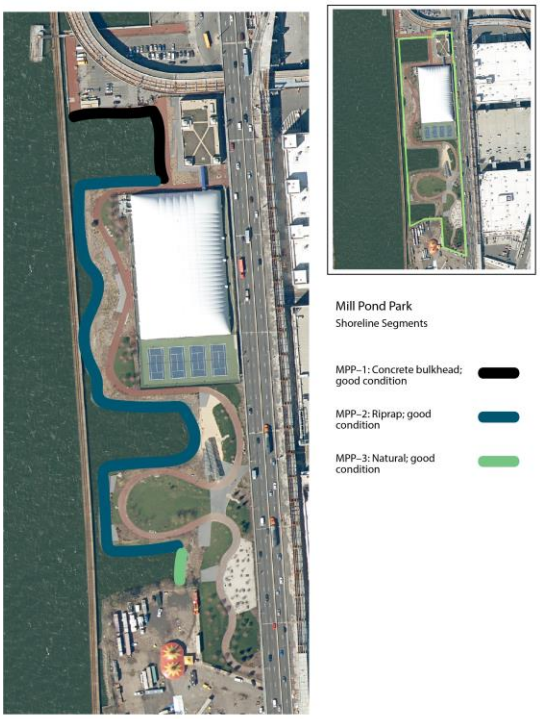


Table 2. Field assessment observations.

Segment ID	Shoreline Type	Riprap size (or type material)	Slope	Missing Sections? (Y/N)	Erosion Type	Erosion Severity	Unique Features?	Overall Condition
BP-1	Riprap	1-4 ft	Very Steep	N	Scour	Moderate		Fair
BP-2	Riprap	>4 ft	Very Steep	Y	Scour, undercut	Severe	Severe undercutting below ⊥ slope, exposing old wooden pilings; dangerous access	Poor
BPS-1	Riprap	1-4 ft	Moderate to Steep	N	Scour	Moderate		Fair
BPS-2	Riprap	≤1 ft	Moderate to Steep	N	Scour	Minor	Area with remains of dock & wooden pilings; Blue crabs, baitfish, & birds observed	Good
BPS-3	Riprap	1-4 ft	Moderate to Relatively flat	Y	Scour, undercut	Severe	Sidewalk is undercut & failing. Active CSO. Small (~12 inch diameter), filled, circular pipe discharge – likely an old stormwater outfall.	Poor
MPP-1	Bulkhead	Concrete	n/a	N	n/a	n/a		Good
MPP-2	Riprap	≤1 ft	Moderate	N	Scour	Minor		Good
MPP-3	Natural	Sandy/Rocky	Relatively flat	N	n/a	n/a	Small beach area adjacent to Bronx Point/Pier 5 property. At times, difficult to access due to overgrown vegetation	Good

Table 3. Site-specific concerns.

Location	Management Issue(s)	Photo
From the north side of the High Bridge to CSO outfall WI-60 (Segment BPS-3)	Erosion and scour is occurring such that the adjacent sidewalk is crumbling into the river.	
CSO outfall WI-60 (Segment BPS-3)	CSO regularly overflows contributing trash to the river, shoreline, and upland – including in dry weather. The CSO gates are in need of repair by DEP.	
Severe erosion & undercutting just north of the Alexander Hamilton Bridge and south of the Washington Bridge (Segment BP-2)	What appears to be an old overlook area has crumbled and/or washed away, leaving the shoreline vulnerable to erosion. The large, solid conglomerate block of the shoreline seen in this photo is overhanging at least 4 feet of empty space that has been washed away.	

Erosion in Mill Pond Park (Segment MPP-2)	Area of the bank where gabions are exposed to tides and intense wave action is vulnerable to erosion.	

Appendix D — Tracking and Monitoring

Tracking & Monitoring: Green Infrastructure Site-Specific Recommendations

GI = Green Infrastructure = Priority Project * = Project Partner Other than NYC Parks and NYC DEP

ID	Location	Recommended Action	Description	Short Term (< 5 years)	Long Term (>5 years)	CSO Sewershed	Status 2022	Status 2023	Notes
GI1	VCP Stables	Green Infrastructure	Capture onsite runoff in the parking lot and around the catchbasins.	✓		WI-056			
GI2	VCP Woodlawn Playground	Green Infrastructure	Capture onsite runoff from impervious surfaces.	✓		WI-056			
GI3	Allen Shandler Recreation Area Parking Lot	Green Infrastructure	Capture onsite runoff in the Allen Shandler Recreation Area parking lot, around catch-basins, or in rain gardens in the area just north of the baseball field.	✓		WI-056			
GI4	Mosholu Golf Course Proposed Golf House	Green Infrastructure	Invest in green infrastructure when developing new golf house.	✓		WI-056			
GI5	VCP Golf House Parking Lots	Green Infrastructure	Infiltrate onsite runoff with permeable pavers in select parking spots or in rain gardens at low points in the parking lots.	✓		WI-056			
GI6	VCP SW Playground	Green Infrastructure	Capture street and onsite runoff in the damaged asphalt area.		✓	WI-056			
GI7	Spuyten Duyvil Playground	Green Infrastructure	Capture street runoff.	✓		WI-077			
GI8*	South of Van Cortlandt Park	Green Infrastructure	Install rain gardens, green roofs, and bioswales on public and private property detailed in the Harlem River Hilltop Plan in partnership with multiple organizations, including Riverkeeper, NYCSWCD, NYC DOT, and NYC DEP.	✓		WI-056			
GI9	Bailey Playground	Green Infrastructure	Capture onsite runoff in rain gardens in the seating area between the north handball and basketball courts, or in subsurface storage systems under both basketball courts.	✓		WI-056			
	Fort Independence Park	Green Infrastructure	Explore GI opportunities to manage stormwater in partnership with BCEQ.	✓		WI-056			
GI11	Mosholu Parkway	Green Infrastructure	Capture onsite runoff in the landscape area west of the multipurpose play area and basketball court or in a subsurface storage system under the basketball court.	✓		WI-068			
GI12	Williamsbridge Oval Recreation Center	Green Infrastructure	Install green roof to increase stormwater capture.	✓		WI-068			
GI13	Marble Hill Playground	Green Infrastructure	Capture onsite runoff in the multipurpose play area or in subsurface storage systems under the basketball courts.		✓	WI-078			

Tracking & Monitoring: Green Infrastructure Site-Specific Recommendations

GI = Green Infrastructure = Priority Project * = Project Partner Other than NYC Parks and NYC DEP

ID	Location	Recommend-ed Action	Description	Short Term (< 5 years)	Long Term (>5 years)	CSO Sewershed	Status 2022	Status 2023	Notes
GI14	Kingsbridge Heights Community Center	Green Infrastructure	Install green roof to increase stormwater capture.	✓		WI-056			
GI15	Washington's Walk	Green Infrastructure	Capture street and onsite runoff in subsurface storage systems under the multipurpose play area.	✓		WI-056			
GI16	Fordham Landing Playground	Green Infrastructure	Capture street and onsite runoff in subsurface storage systems under the parking lot, baseball field, or basketball courts.		✓	WI-057			
GI17	Devoe Park	Green Infrastructure	Capture street and onsite runoff in rain gardens in the landscape area at the west end of the park or in subsurface storage systems under the basketball courts.		✓	WI-057			
GI18	St. James Park	Green Infrastructure	Install green roof to increase stormwater capture. Capture street and onsite runoff in the landscape area on the south side of the park or in subsurface storage systems under the athletic courts.		✓	WI-057			
GI19	Poe Park Visitors Center	Green Infrastructure	Install green roof to increase stormwater capture.	✓		WI-068			
GI20	Aqueduct Walk	Green Infrastructure	Capture runoff from surrounding streets in rain gardens in the landscape area between W181st St. and W180th St.	✓		WI-062			
GI21	Slattery Playground	Green Infrastructure	Capture street and onsite runoff in the multipurpose play area.	✓		WI-068			
GI22	Webster Playground	Green Infrastructure	Capture street and onsite runoff in subsurface storage systems under the athletic courts or rain gardens in existing planters.	✓		WI-068			
GI23	Mount Hope Playground	Green Infrastructure	Capture street and onsite runoff in the landscape and open areas adjacent to the play equipment or in subsurface storage systems under the basketball courts.		✓	WI-062			
GI24	Tremont Park	Green Infrastructure	Capture street and onsite runoff in the park's open spaces.	✓		WI-068			
GI25	Bridge Park South	Green Infrastructure	Capture stormwater runoff from Alexander Hamilton Bridge scuppers.	✓		Direct Drainage			

Tracking & Monitoring: Green Infrastructure Site-Specific Recommendations

GI = Green Infrastructure = Priority Project * = Project Partner Other than NYC Parks and NYC DEP

ID	Location	Recommended Action	Description	Short Term (< 5 years)	Long Term (>5 years)	CSO Sewershed	Status 2022	Status 2023	Notes
GI26	West Bronx Recreation Center	Green Infrastructure	Install green roof to increase stormwater capture.	✓		WI-062			
GI27	Gouverneur Playground	Green Infrastructure	Capture street and onsite runoff in a subsurface storage system under the basketball court.	✓		WI-068			
GI28	Mullaly Park	Green Infrastructure	Install green roofs to increase stormwater capture. Capture onsite runoff in the landscape areas or subsurface storage systems.	✓	✓	WI-062			
GI29	Macombs Dam Park	Green Infrastructure	Capture onsite runoff in rain gardens in the landscape area at the southern end of the park or in subsurface storage systems under the baseball fields.		✓	WI-063			
GI30*	Arcilla Playground	Green Infrastructure	Capture street and onsite runoff in rain gardens in the corner of the park adjacent to the half court and baseball field in partnership with NYC DOE.	✓		WI-068			
GI31	Patterson Playground	Green Infrastructure	Capture onsite runoff in the multipurpose play area.		✓	WI-075			
GI32	Willis Playground	Green Infrastructure	Capture onsite runoff in the asphalt area on the southern side of the park or in a subsurface storage systems under the asphalt area on the northern side of the park.	✓		WI-068			
GI33	People's Park	Green Infrastructure	Capture street and onsite runoff in rain gardens. Install green roof to increase stormwater capture.	✓		WI-068			
GI34	Van Cortlandt Park Pedestrian Bridge	Green Infrastructure	Explore feasibility of GI opportunities in conjunction with the construction of the Van Cortlandt Park pedestrian bridge over the Major Deegan Expressway.	✓		WI-056			

Tracking & Monitoring: Van Cortlandt Park Site-Specific Recommendations

VCP = Van Cortlandt Park

ID	Location	Recommended Action	Description	Short Term (< 5 years)	Long Term (>5 years)	Leads & Partners	Status 2022	Status 2023	Notes
Park-wide	Van Cortlandt Park Edges	Ecosystem Management	Eliminate vinelands at all edges of the park.	✓	✓	NYC Parks Van Cortlandt Park Alliance			
	Upland Forest	Ecosystem Management	Inspect and maintain past restoration sites.	✓	✓	NYC Parks Van Cortlandt Park Alliance			
			Develop and implement Park-wide deer impact and Emerald Ash Borer management plans.	✓		NYC Parks			
			Expand Forever Wild area in Van Cortlandt Park.	✓		NYC Parks			
	Trails	Trails Management	Develop plan to continue trail closures to reduce ecosystem fragmentation.	✓		NYC Parks Van Cortlandt Park Alliance			
			Update trail maps and develop maintenance plan.	✓		NYC Parks Van Cortlandt Park Alliance Natural Areas Conservancy			
VC1	Van Cortlandt Park Northeast Forest	Ecosystem Management	Continue campaign to consistently monitor and remove mile-a-minute vine.	✓	✓	NYC Parks Van Cortlandt Park Alliance			
VC2	Van Cortlandt Park Northeast Forest	Ecological Assessment	Examine feasibility and impacts of removing large tracts of *Phragmites* at the head of a Tibbetts Brook tributary.	✓		NYC Parks			
VC3	Van Cortlandt Park Northeast Forest	Ecosystem Restoration	Complete restoration around large vernal pond.	✓	✓	NYC Parks			
VC4	Tibbetts Brook Corridor	Ecosystem Management	Restore large stretch of riparian forest from the northern park border south to the Mosholu/Sawmill Parkways exchange.	✓	✓	NYC Parks Van Cortlandt Park Alliance			
VC5, 8, 9, 10, 12, 13, 18, 26	Tibbetts Brook Discharge Pipes and Culverts	Stormwater Control	Identify sources of untreated stormwater and opportunities for stormwater treatment; Coordinate stormwater controls and maintenance across city agencies (short-term); Implement actions (long-term).	✓	✓	NYS DOT NYC Parks NYC DEP			
VC6	Van Cortlandt Park Northwest Woods	Ecosystem Restoration	Complete restoration of the northwest edge of the Northwest Woods.	✓	✓	NYC Parks			
VC7	Van Cortlandt Park Trails	Stewardship	Continue to train summer interns in trail maintenance and lake management.	✓		Van Cortlandt Park Alliance			
VC11, 14	Tibbetts Brook and Tributaries	Ecosystem Management/ Stewardship	Remove debris through volunteer events and contractors.	✓		NYC Parks Van Cortlandt Park Alliance			
VC15	Van Cortlandt Garage and Salt Shed	Stormwater Control	Evaluate current conditions at garage including: salt storage, run-off and drainage, fueling station and fuel storage, paving, and general site use. Work to adopt NYS DEC best practices and improvements through the MS4 permit.	✓		DSNY NYC DOT NYC Parks			
VC16	Tibbetts Brook Corridor	Ecosystem Management	Manage invasives to control multiflora rose expansion.	✓		NYC Parks Van Cortlandt Park Alliance			

Tracking & Monitoring: Van Cortlandt Park Site-Specific Recommendations

= Priority Project

ID	Location	Recommended Action	Description	Short Term (< 5 years)	Long Term (>5 years)	Leads & Partners	Status 2022	Status 2023	Notes
VC17	Van Cortlandt Park Golf Course	Natural Areas Access	Connect John Muir Trail with Putnam Trail and to allow access to Tibbetts Brook.	✓		NYC Parks VCP Golf Course			
VC19, 20, 27	Tibbetts Brook and Tributaries	Ecosystem Management/ Stewardship	Remove debris through volunteer events and contractors.	✓		NYC Parks Van Cortlandt Park Alliance			
VC21	Vault Hill	Ecosystem Restoration	Complement restoration of Vault Hill cemetery with eradication of Japanese honeysuckle from eastern slope of hill.	✓		NYC Parks Van Cortlandt Park Alliance			
VC22	Tibbetts Brook	Signage	Include informative and educational signage as part of Tibbetts Brook wetland restoration.		✓	NYC Parks			
VC23	Mosholu Golf Course	Stormwater Control	Evaluate practices at golf course and stables and identify improvements needed to reduce runoff and protect water quality and natural areas.	✓		NYC Parks			
VC24	Croton Woods	Ecosystem Restoration	Restore forest behind the western Gulf gas station / Dunkin Donuts.	✓	✓	NYC Parks Van Cortlandt Park Alliance			
VC25, 28, 32, 35, 37	Van Cortlandt Lake Discharge Pipes	Stormwater Control	Inspect conditions (short-term) and conduct routine maintenance (long-term) of stormwater basins discharging to Van Cortlandt Lake. Explore green infrastructure options for stormwater treatment.	✓	✓	NYS DOT NYC Parks NYC DEP			
VC29	Parade Ground	Stormwater Control	Develop best management practices for Parade Ground. Rebuild outflow into Lake.		✓	NYC Parks NYC DEP			
VC30	Van Cortlandt Lake and Tibbetts Brook Corridor	Ecosystem Management	Manage invasive water chestnut on Van Cortlandt Lake and identify a long-term strategy for eradication.	✓		Van Cortlandt Park Alliance Westchester Parks Foundation			
		Water Quality Monitoring	Continue water quality monitoring program within Tibbetts Brook and Van Cortlandt Lake to identify nutrient loads, illicit discharges and spills. Expand water quality monitoring to Yonkers.	✓	✓	Van Cortlandt Park Alliance Westchester Parks Foundation			
		Water Quality Monitoring	Make water quality data easily accessible to the public.	✓	✓	Van Cortlandt Park Alliance Westchester Parks Foundation			
VC31	Putnam Greenway	Ecosystem Management	Maintain forest habitat in Putnam Greenway Corridor.	✓	✓	NYC Parks			
VC33	Tibbetts Brook and Van Cortlandt Lake	Stewardship	Continue volunteer watershed crew weekly water quality monitoring.	✓	✓	Van Cortlandt Park Alliance			
VC34	Van Cortlandt Lake Edge	Parkland Accessibility	Construct an ADA accessible boardwalk.	✓		NYC Parks Van Cortlandt Park Alliance			

Tracking & Monitoring: Van Cortlandt Park Site-Specific Recommendations

= Priority Project

ID	Location	Recommend-ed Action	Description	Short Term (< 5 years)	Long Term (>5 years)	Leads & Partners	Status 2022	Status 2023	Notes
VC38	Tibbetts Brook	Ecosystem Restoration	Restore degraded Phragmites wetland as first phase of project to reconnect Tibbetts Brook to the Harlem River.		✓	NYC Parks			
VC39	Tibbetts Brook	Programming	Continue to build educational curriculum around Tibbetts Brook and Van Cortlandt Lake for students and adults to grow the connection between residents and the brook.	✓		NYC Parks Van Cortlandt Park Alliance			
VC40	CSX Site	Stormwater Management	Investigate opportunities and funding for daylighting as many sections of Tibbetts Brook as possible along the new Putnam Greenway downstream of Van Cortlandt Park.	✓		NYC Parks BCEQ Van Cortlandt Park Alliance			
VC41	Right-of-Way at Dickinson Ave and VCP S	Forest Restoration—Street Trees	Plant street trees to increase canopy cover and capture and infiltrate stormwater.	✓		NYC Parks			
GI1-4, 8, 34	VCP Golf House Parking Lots, Allen Shandler Recreation Area Parking Lot, VCP Stables, Mosholu Golf Course Proposed Golf House	Green Infrastructure	Implement green infrastructure recommendations (see page 76).	✓		NYC Parks NYC DEP			

Tracking & Monitoring: Waterfront Site-Specific Recommendations

WF = Waterfront

ID	Location	Recommended Action	Description	Short Term (< 5 years)	Long Term (>5 years)	Leads & Partners	Status 2022	Status 2023	Notes
WF1	CSX Property Along I-87	Property Acquisition	Acquire public open space.		✓	NYC Parks			
		Greenway Connectivity	Extend the Harlem River Greenway along CSX property north to Kingsbridge.		✓	NYC Parks			
WF2	Harlem River at W 193rd St.	Stream and Wetlands Restoration	Investigate opportunities and funding to daylight Tibbetts Brook along a new by-pass route to the Harlem River.	✓		NYC DEP NYS DEC NYC Parks			
WF3	Spuyten Duyvil	Shoreline Restoration	Partner with MetroNorth to evaluate potential needs to protect & enhance existing salt marsh.		✓	NYC Parks MetroNorth			
WF4	Bridge Park, Roberto Clemente	Stewardship	Work with NYS Parks to hold engagement events across Roberto Clemente State Park & Bridge Park.	✓		NYC Parks NY-NJ Harbor and Estuary Program			
		Programming	Share NYC DEP water quality data collected at Roberto Clemente State Park with NYS Parks to enhance already existing environmental education curriculum to provide more focused attention on the Harlem River.	✓		NYC DEP NYS Parks USGS Urban Waters Federal Partnership			
WF5	Bridge Park	Shoreline Restoration	Work with volunteers on invasive plant management to restore habitat and views of the Harlem River.	✓		NYC Parks NGO partners			
			Evaluate stability of shoreline and overlook. Repair using materials and structures that can increase habitat for aquatic organisms.	✓	✓	NYC Parks			
WF6	Bridge Park	Waterfront Access	Work with community groups to hold trash and invasive removal events to improve access and views of the River.	✓		NYC Parks NGO partners			
WF7	Bridge Park South	Programming	Explore opportunities for educational programming related to restored shoreline habitat.	✓		NYC Parks			
WF8	Bridge Park South	Shoreline Restoration	Restore shoreline to support intertidal habitat.	✓	✓	NYC Parks			
WF9	Bridge Park South	Signage	Include signage in Bridge Park South on historic use of the Harlem River & information on fish consumption.	✓		NYC Parks NYC DEP			
WF10	Bridge Park South	Shoreline Restoration	Remove excess concrete and debris and increase habitat complexity and native plant cover.	✓		NYC Parks			

Tracking & Monitoring: Waterfront Site-Specific Recommendations

= Priority Project

ID	Location	Recommended Action	Description	Short Term (< 5 years)	Long Term (>5 years)	Leads & Partners	Status 2022	Status 2023	Notes
WF11	Bridge Park South	Waterfront Access	Design and construct Bridge Park South to allow for on-water access point if/when additional funding is secured.	✓		NYC Parks			
		Greenway Connectivity	Extend the Harlem River Greenway at Bridge Park South. Improve connectivity of Bridge Park South with the High Bridge by prioritizing completion of ongoing step improvement project.	✓		NYC Parks			
		Parkland Connectivity	De-map Exterior Street and convert to parkland.	✓		NYC DOT NYC Parks			
WF12, 15-16	Mill Pond Park	Shoreline Restoration	Explore feasibility of restoring intertidal and subtidal habitat through natural and nature-based solutions.	✓		NYC Parks			
			Plant areas of eroded shoreline with native shrubs to buffer wave impacts.	✓		NYC Parks			
WF13	Bronx Children's Museum, other community orgs.	Programming	Leverage partnerships to expand existing programming, such as City Park Foundation's Green Girls program.	✓		NYC Parks Community Organizations			
WF14	Mill Pond Park	Waterfront Access	Work with community groups to hold trash and invasive removal events to improve access and views of the River.	✓		NYC Parks NGO partners			
WF14, 17	Pier 5, Mill Pond Park	Parkland Connectivity	Ensure a connection between Mill Pond Park and Pier 5 by extending the Harlem River Greenway through the Mill Pond Park expansion and esplanade at Pier 5.		✓	NYC Parks NYC EDC			
WF17	Pier 5	Greenway Connectivity	Extend the Harlem River Greenway through the Mill Pond Park expansion and esplanade at Pier 5 to connect to the planned Lower Concourse Park at 144th Street.		✓	NYC EDC NYC DCP Private Developers			
WF18	144th St	Development	Develop Lower Concourse Park.	✓		NYC Parks			
WF19	Park Avenue	Development	Support waterfront redevelopment to increase public access and climate resiliency.		✓	South Bronx Unite NYC Parks			
WF20	Mott Haven-Port Morris Waterfront	Greenway Connectivity	Extend South Bronx Greenway along the waterfront from Park Avenue to East 135th Street.		✓	South Bronx Unite NYC Parks NYS DOT			
WF21	Lincoln & Alexander Avenues	Development	Explore feasibility of redeveloping into community space and designing to protect infrastructure from potential flooding.		✓	South Bronx Unite NYC Parks			
WF22	NW Edge of Randall's Island Shoreline	Shoreline Restoration	Explore feasibilityof restoring native marsh.	✓		Randall's Island Park Alliance NYC Parks			