DC's Watershed

STATION A

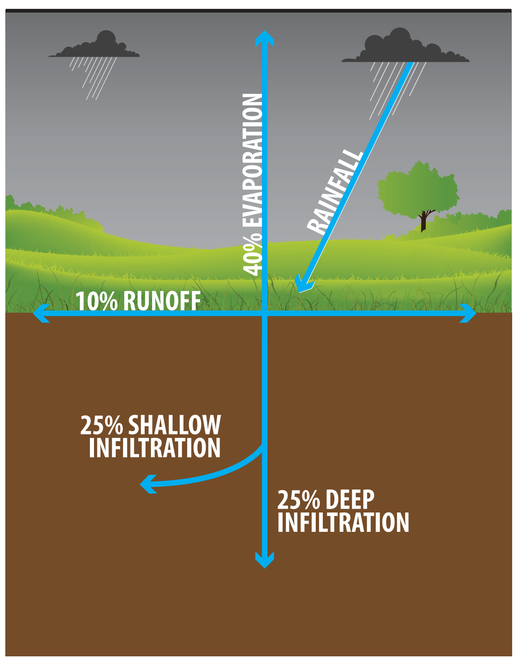
Know your Urban Watershed

What is a Watershed?

A watershed is an area of land where water collects to flow into a river, a lake, or another large body of water.

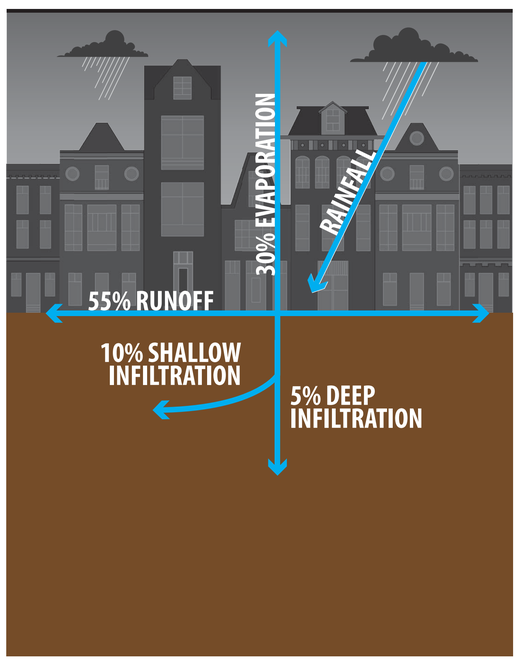
What Happens in a Natural Watershed

- 0% impervious
- Less stormwater runoff
- Surface runoff slower to reach stream or storm sewer
- Cooler runoff temperatures
- Minimal pollutants (natural filtering)
- Groundwater recharge



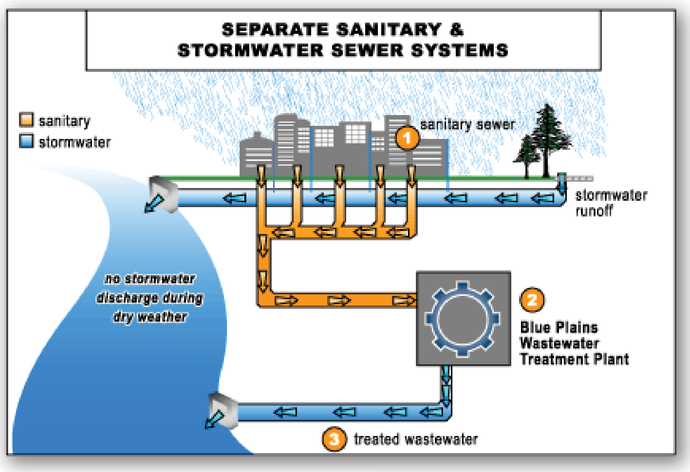
What Happens in an Urban Watershed

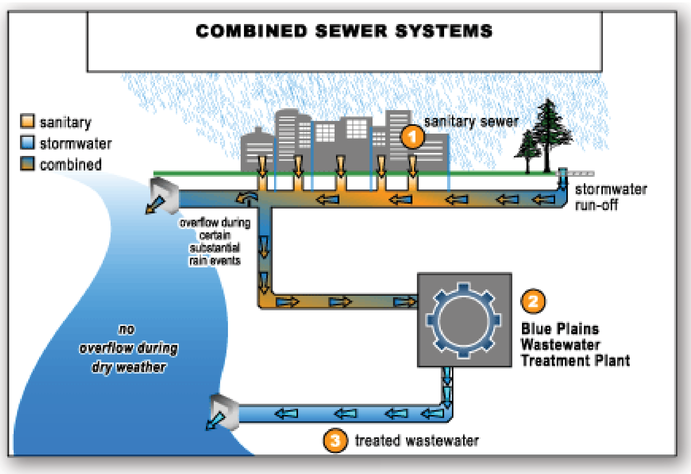
- 75%-100% impervious
- More stormwater runoff
- Faster stormwater runoff
- Warmer runoff temperatures
- Pollutant load (nitrogen, phosphorous, sediments and heavy metals)
- No groundwater recharge

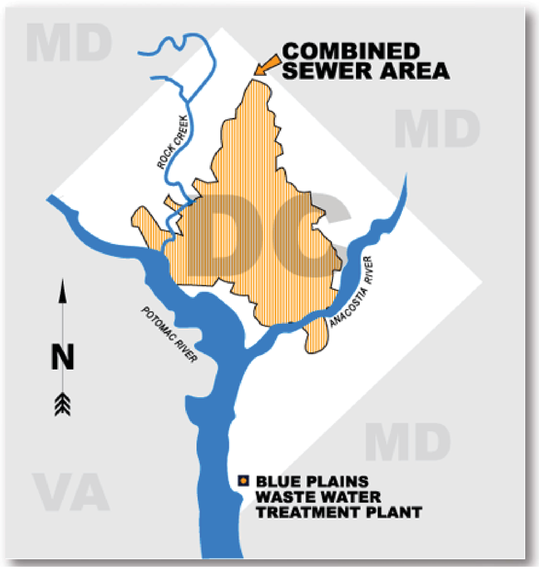


What is a Combined Sewer Overflow (CSO)?

- DC Water's wastewater collection system is comprised of 67% "separate" and 33% "combined" sewers.
- Separate sewers are made up of two independent piping systems: one for "sanitary" sewage (i.e., wastewater from homes and businesses) and one for stormwater.
- Combined sewer systems carry both sanitary sewage and stormwater in one piping system.
- During dry weather, sanitary sewage is collected in the combined sewer system and carried to the Blue Plains Advanced Wastewater Treatment Plant.
- During certain storm events the combined system overflows and a mixture of sanitary sewage and stormwater discharges into the District's receiving waterbodies (Anacostia River, Potomac River, and Rock Creek).
- These discharges are referred to as Combined Sewer Overflows (CSOs).







DC Clean Rivers Project

STATION B

Reducing Combined Sewer Overflows to the District's Waterways

Under the terms of a 2005 federally mandated legal agreement between DC Water, the District of Columbia, the US Department of Justice, and the US Environmental Protection Agency, DC Water is implementing the $2.6 billion DC Clean Rivers Project. The first phase of the project is underway and involves constructing a massive underground tunnel system to control combined sewer overflows (CSOs) to the Anacostia River. Since 2011, DC Water has explored the use of Green Infrastructure as a tool to reduce CSOs to the Potomac River and Rock Creek.

DC Water and the parties to the 2005 legal settlement announced a plan to allow for large-scale Green Infrastructure installations and other modifications to the DC Clean Rivers Project impacting the Potomac River and Rock Creek.

PROJECT OVERVIEW

96%
Amount of CSO volume reduction

25
Years to complete Long Term Control Plan under updated plan (2005-2030)

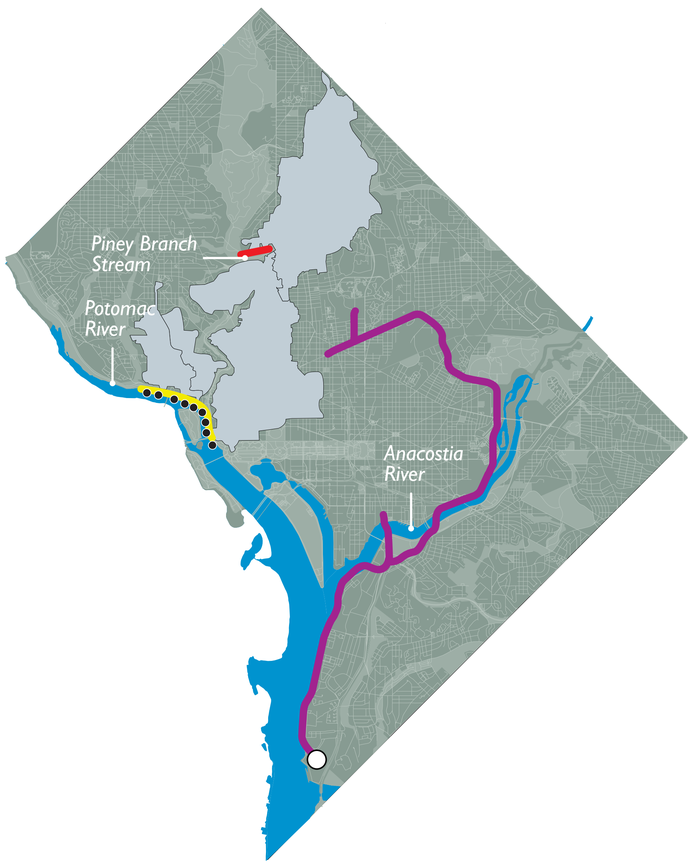
2.6
Project cost, in billions of dollars

KNOW YOUR BILL

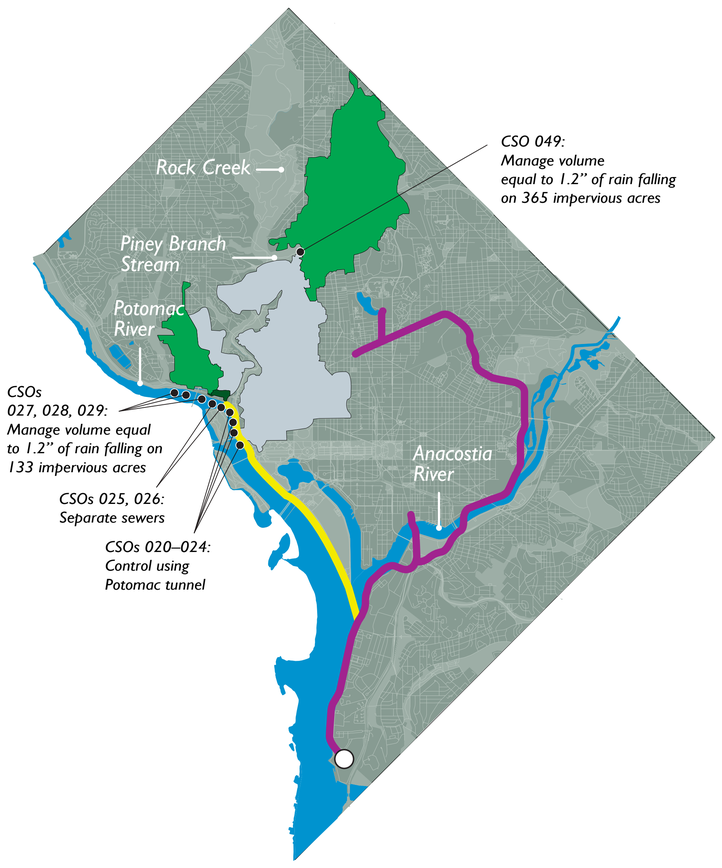
CURRENT WATER AND SEWER CHARGES - RESIDENTIAL	
Metering Fee	$3.86
Water and Sewer Services	$57.67
Clean Rivers IAC	$ 16.75
CURRENT CHARGES AND CREDITS	
DC Government PILOT Fee	$3.08
DC Government Right of Way Fee	$1.14
DC Govt Stormwater Fee	$ 2.67
TOTAL CURRENT BILL	$85.17

▲ *The DC Clean Rivers Project is ratepayer-funded. The DC Clean Rivers impervious area charge (IAC) is based on the amount of impervious surface on a property.*

EXISTING PLAN



UPDATED PLAN



LEGEND

- *Rock Creek and Potomac drainage areas*
- *Rock Creek and Potomac drainage areas with Green Infrastructure and targeted sewer separation*
- *Drainage areas with sewer separation*
- *Potomac River Tunnel*
- *Anacostia River tunnel system*
- *CSO outfalls (associated with updated plan)*
- *Blue Plains Advanced Wastewater Treatment Plant*
- *Rock Creek Tunnel*

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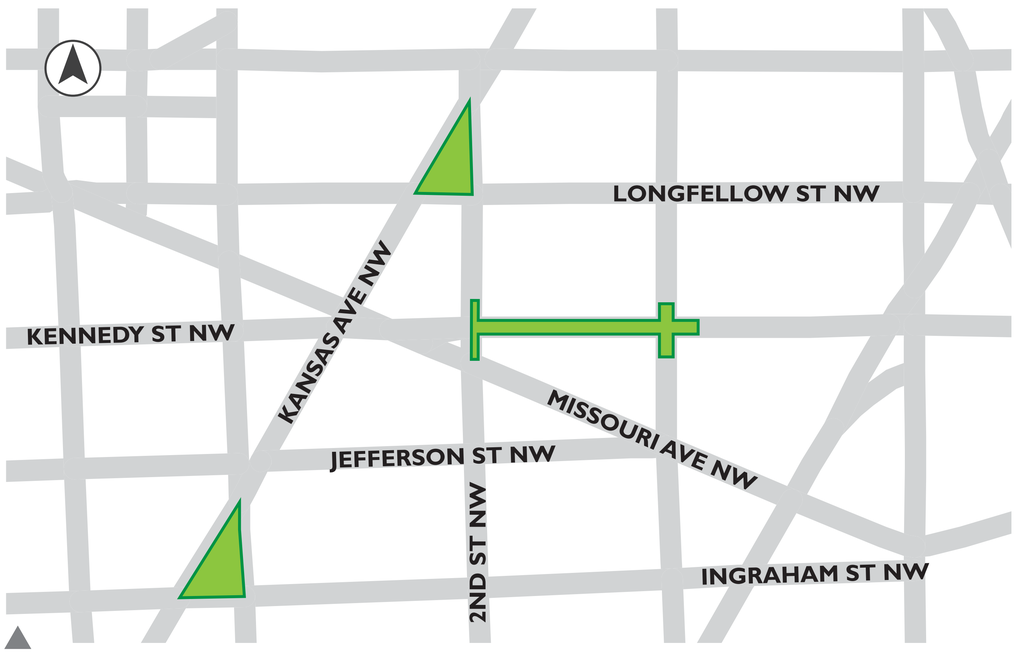
DRIVING Innovation + Performance

STATION C

Green Infrastructure Design Challenge

Beginning in 2013, DC Water hosted a two-phase Green Infrastructure Challenge to drive innovation and performance in Green Infrastructure design. The goals of the Green Infrastructure Challenge were to:

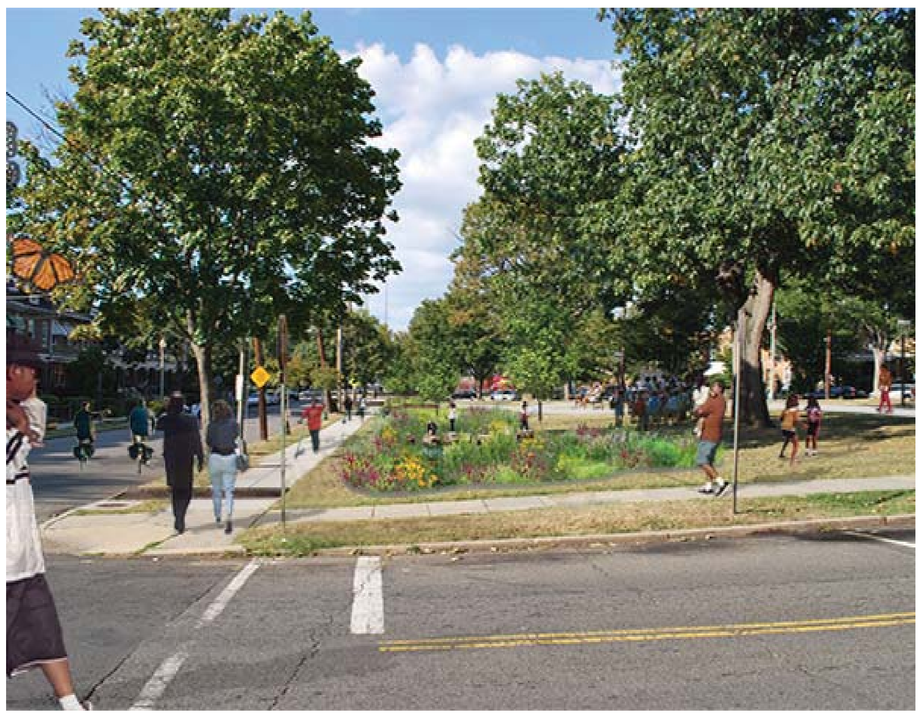
- Advance innovative technologies;
- Capture stormwater runoff;
- Demonstrate cost-effective solutions;
- Propose practical and implementable solutions that can be constructed; and
- Retrofit the urban environment



Green Infrastructure Challenge Sites.

In the first phase, seven design teams were selected as winners based on their concepts and designs. DC Water is currently in the second phase, where two of the designs have been funded for further design and construction: two triangle parks on Kansas Avenue NW, and the 100 block of Kennedy Street NW. Overall, DC Water has awarded over $1 million for both phases with the goal of driving innovation and performance for future design and construction of Green Infrastructure under DC Water's updated plan.

Rendering of Team Nitsch Engineering's Green Infrastructure Phase I winning design.



Rendering of Team CH2M s Green Infrastructure Phase I winning design.

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STORMWATER Management

STATION D

Green Infrastructure techniques to manage stormwater

What is Green Infrastructure (GI)?

GI uses vegetation, soils and natural processes to manage water and create healthier urban environments. When dealing with sites and neighborhoods, GI refers to stormwater management systems that mimic nature by soaking up and storing water.

GI Techniques:

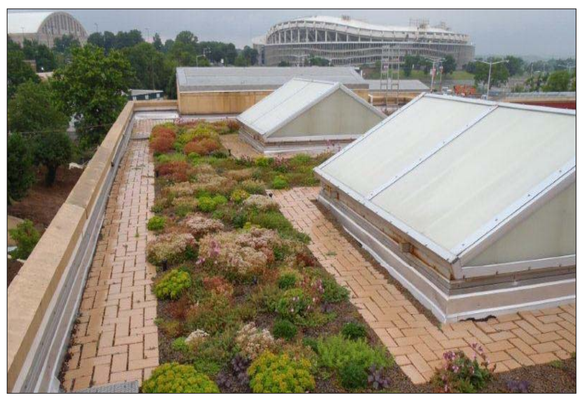
Porous Pavement

Surfaces that infiltrate, treat, and/or store rainwater where it falls. Porous pavements may be constructed from pervious concrete, porous asphalt, permeable interlocking pavers, and several other materials.

Bioretention

Bioretention is a planted filter bed of specialized soil and stone aggregate which filters and reduces stormwater runoff and remove contaminants to improve water quality.

Additional benefits include urban heat island reduction, green space enhancement, and air quality improvements.



Rooftop Practices

A green roof, or rooftop garden, is a vegetative layer grown on a rooftop to manage stormwater. Green roofs provide shade and remove heat from the air through evapotranspiration, reducing temperatures of the roof surface and the surrounding air.

Cisterns & Rain Barrels

Rain barrels and cisterns are effective at capturing localized stormwater runoff to help control full-scale flooding.

Rain barrels and cisterns can be used to collect water that drains off the roof. They prevent water from running into the sewer system by storing it for later use. Using this stored water for landscaping, watering indoor plants or washing cars can lower monthly water bills.

REFERENCES
"Bioretention" DC Waters. November 23, 2013. Web: http://www.dcwater.com/workzones/projects/irvingstreet/irving_docs/Information_Sheet_for_Spring_Festival.pdf
"Green Roofs" U.S. EPA. June 13, 2014. Web: http://www.epa.gov/heatisland/mitigation/greenroofs.htm#1
"Stormwater Management Best Practices." EPA. Environmental Protection Agency, 5 Nov. 2012. Web. http://www.epa.gov/greeningepa/stormwater/best_practices.htm
Rain garden photo source: Photo Courtesy of Toledo Division of Environmental Services

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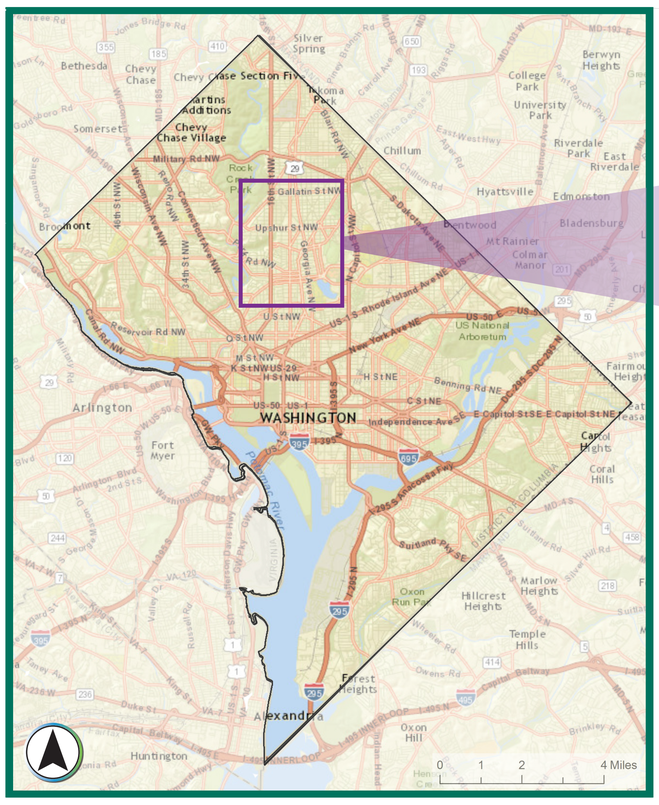
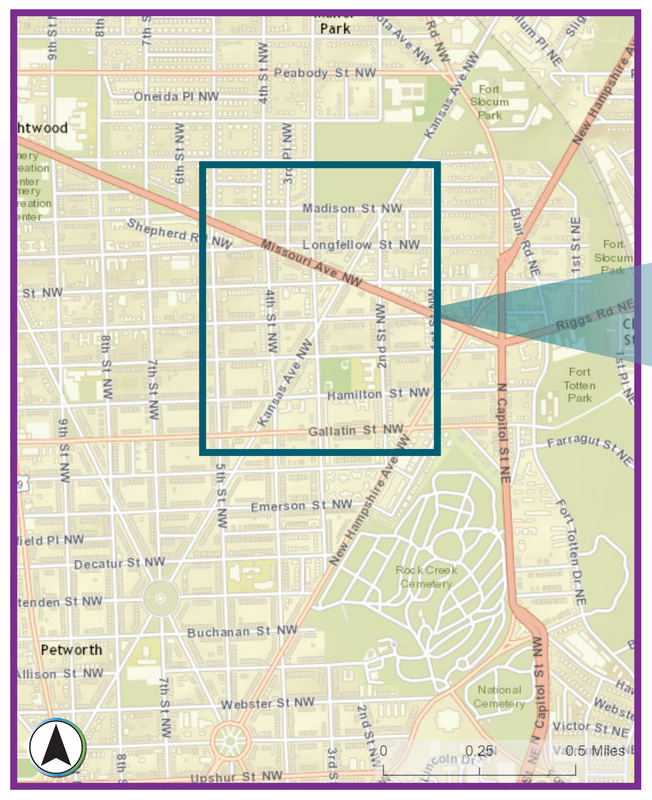
KANSAS AVENUE

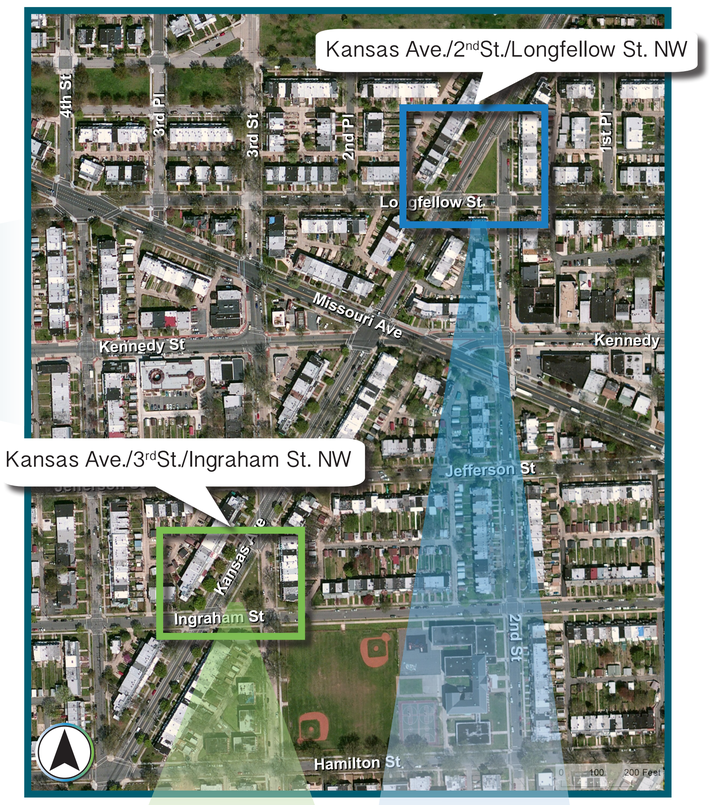
Green Infrastructure Parks

STATION E

Park Locations







Kansas/3rd/Ingraham Park

Kansas/2nd/Longfellow Park

REFERENCES

Map Source: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, TomTom, (C) OpenStreetMap contributors, and the GIS User Community.

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, the GIS User Community, and Google Maps.

KANSAS AVENUE

Green Infrastructure Parks

STATION F

Use of the Parks: How do you currently use the parks?

Place all color-coordinated dots that apply on each park where you have recently done the following:

- Picnics
- Napping
- Playing games (e.g., kid games, catch)
- Reading
- Sports/exercising
- Walking the dog
- Walking through the park to the other side
- None - I do not use the park

To add other uses, take a post it, write the use, and place it on the map

KANSAS AVENUE

Green Infrastructure Parks

STATION G

Issues in the Parks: What are the current issues you have noticed in the parks?

Place all color-coordinated dots that apply on each park where you have recently noticed any of the following issues:

- Crime
- Loitering
- Flooding
- Trash
- Pet waste
- Poor landscape maintenance
- Vehicle/pedestrian accidents
- None - I don't use the park

To add other issues, take a post it, write the issue, and place it on the map

KANSAS AVENUE

Green Infrastructure Parks

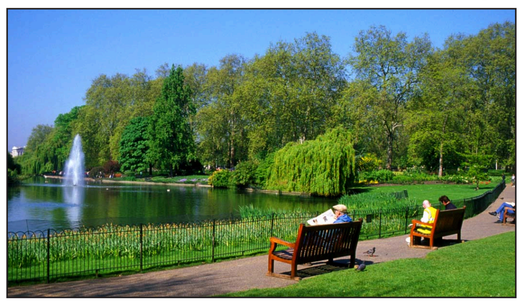
STATION H

Shape your Parks: What is your ideal mix of green and paved surfaces in the parks?

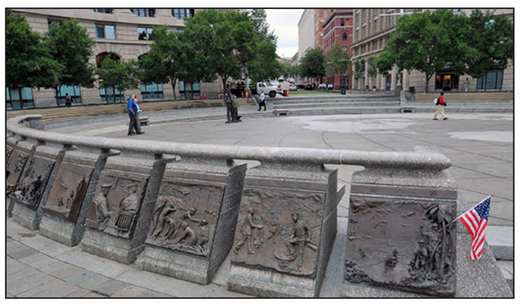
Place a dot to tell us your ideal mix of green and paved space in the redesigned parks

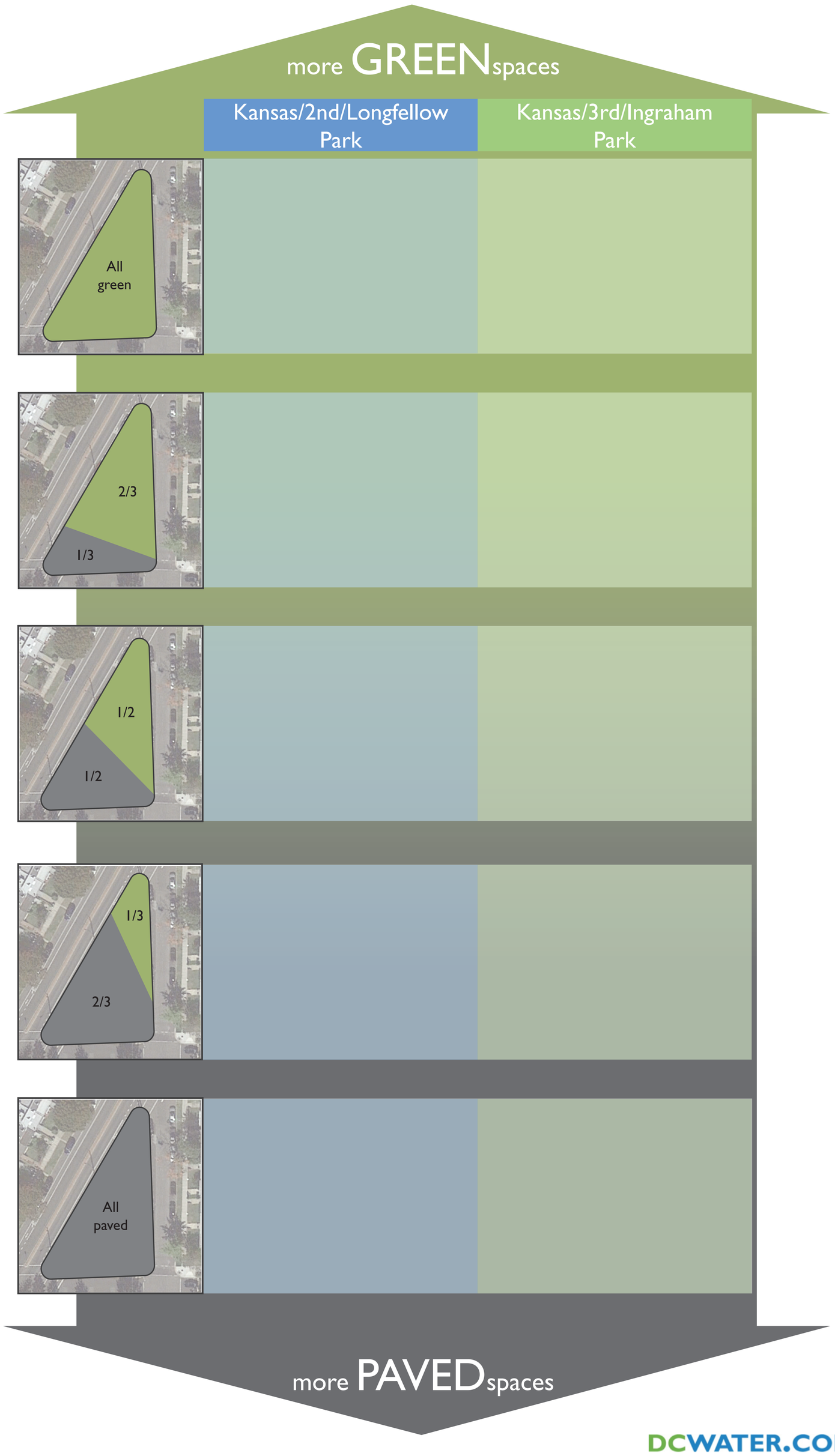
GREEN vs PAVED spaces

GREEN SPACE
Landscaped/lawn space with grass and plantings



PAVED SPACE
Space covered with pavers, concrete, or asphalt





KANSAS AVENUE

Green Infrastructure Parks

STATION 1

Vision for the Parks: What would you like to see in the parks?

Fill in the blank: Write your answer(s) to each question on a post-it and place it on the board

	"I want my parks to HAVE _____"	"I want my parks to BE _____"
	(Example: trees, play space, picnic area...)	(Example: safe, clean, open to all ages...)
Kansas/3rd/Ingraham Park		
Kansas/2nd/Longfellow Park		

KENNEDY STREET

Green Infrastructure Streetscape

STATION J

Streetscape Location

DDOT/DC Water Projects

Design

DDOT Kennedy Street NW Improvement Project Status

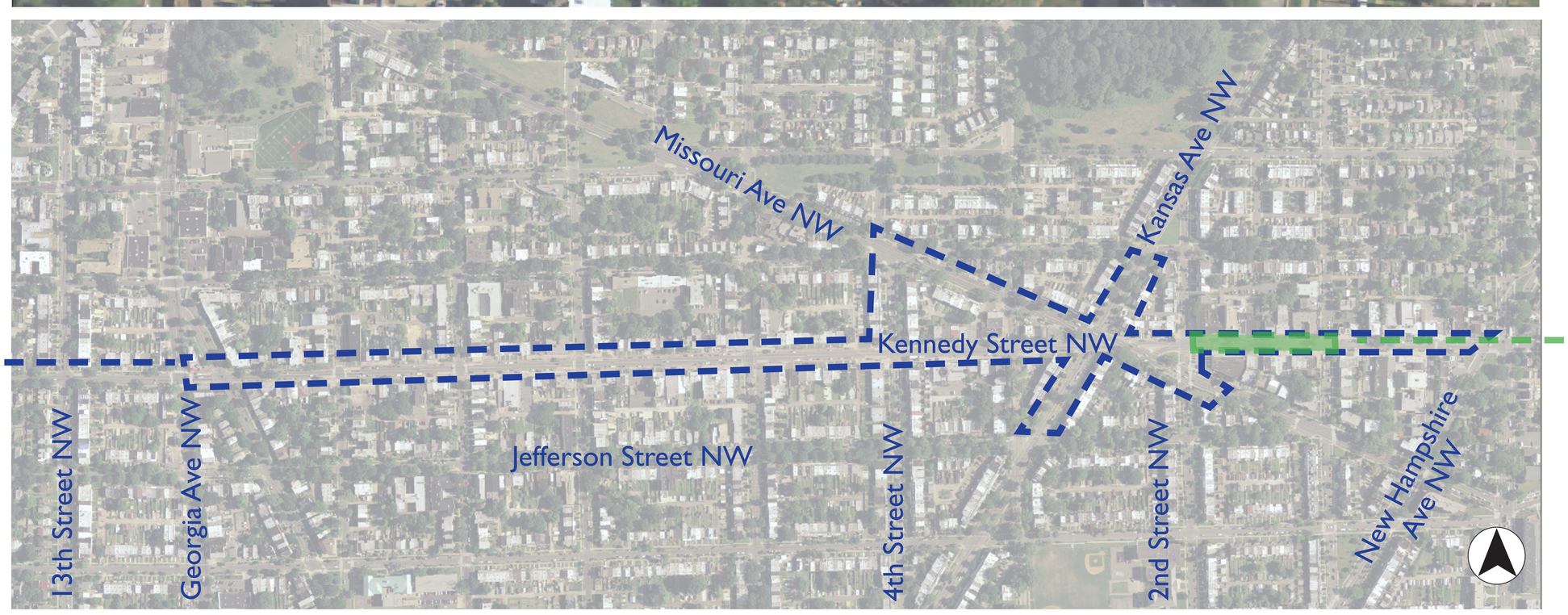
- Pre-Final Drawings Complete

DC Water Kennedy Street Green Infrastructure Streetscape Project Status:

- Design Submission to DDOT; June 15, 2015
- Final Drawings Fall 2015

Const.

Anticipated Construction Start
Fall 2015 - Summer 2016



KENNEDY STREET

Green Infrastructure Streetscape

STATION K

What are Green Streets?

Anatomy of a Green Street

Green Infrastructure and Green Streets

WHAT Green Infrastructure uses plants, soils, and other materials and technologies to manage stormwater and create healthier environments. When applied to streets, Green Infrastructure serves as an alternative stormwater management system that mimics nature by soaking up, storing, and treating stormwater where rain hits the street. Green streets incorporate wider sidewalks, landscaping, traffic calming, art, and other features to enhance and expand open space and improve the pedestrian experience.

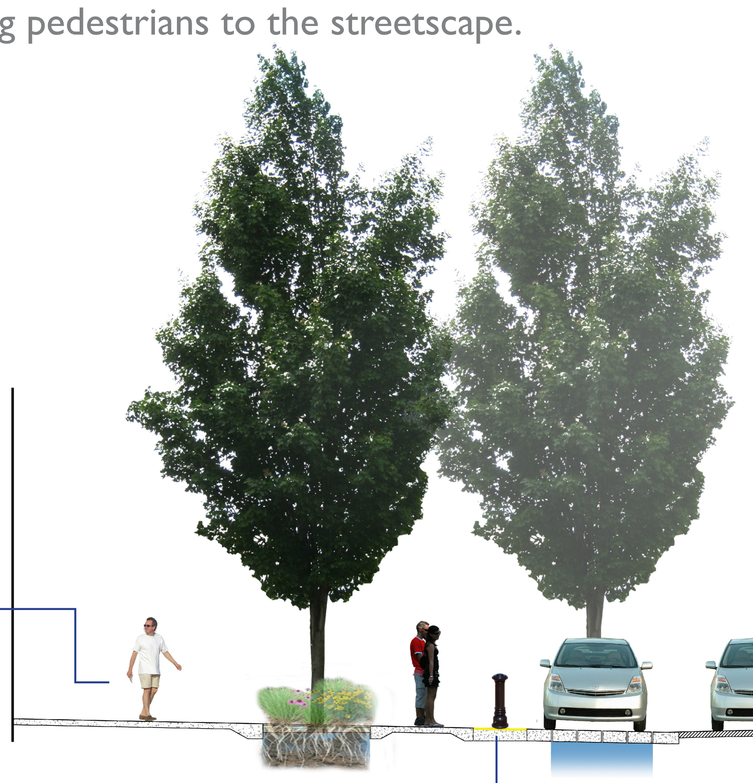
WHY Green Streets can improve water quality by integrating Green Infrastructure, improve pedestrian safety by shortening crossing distances and raising drivers' awareness of pedestrians, improve human health by increasing the amount of air purifying vegetation, and yield economic benefits by drawing pedestrians to the streetscape.

WHERE Green streets are often implemented on residential or collector roads. The components of a Green Street occur within the roadway/parking lanes and/or within the public right-of-way that extends outwards from the edge of the road.

Curb Extensions
Curb extensions narrow the roadway and, when planted as bioretention areas, slow and treat stormwater runoff.

Art & Education
Art presents an opportunity to integrate education and inspire curiosity and wonder within the streetscape.

Street Trees
Street trees slow and treat stormwater. The shade they produce also decreases the temperature of runoff on the roadway (improving the health of receiving waters), and improves the comfort and air quality of the landscape for pedestrians. Carefully specified soils encourage infiltration and give roots room to grow.



Bioretention
Bioretention planters slow, store, and treat stormwater runoff. When integrated into the right-of-way, they provide aesthetic appeal.

Enhanced Sidewalk
Wider sidewalks can accommodate lively uses, providing room for seating, outdoor eating, art, and landscaping.

Permeable Pavement
Using porous pavements (such as pavers or porous asphalt) in parking lanes, sidewalks, or elsewhere in the right-of-way can provide stormwater treatment and storage.

Curbless Street
Shared streets equally value drivers, pedestrians, and bicyclists, improving safety and overall experience of the landscape.

Shared Streets

WHAT Shared streets remove curbs in order to integrate the vehicular and pedestrian experience. This process can actually improve the safety of both by raising drivers' awareness of pedestrians and bicyclists that use the street. All users are valued.

WHY Separating uses often prioritizes drivers and separates them from the streetscape. The road often functions as a corridor, or a place to pass through. Shared Streets encourage drivers, pedestrians, and bicyclists to be aware of their environment. This improves their safety and also encourages them to take interest in the shops that may line the street.

KENNEDY STREET

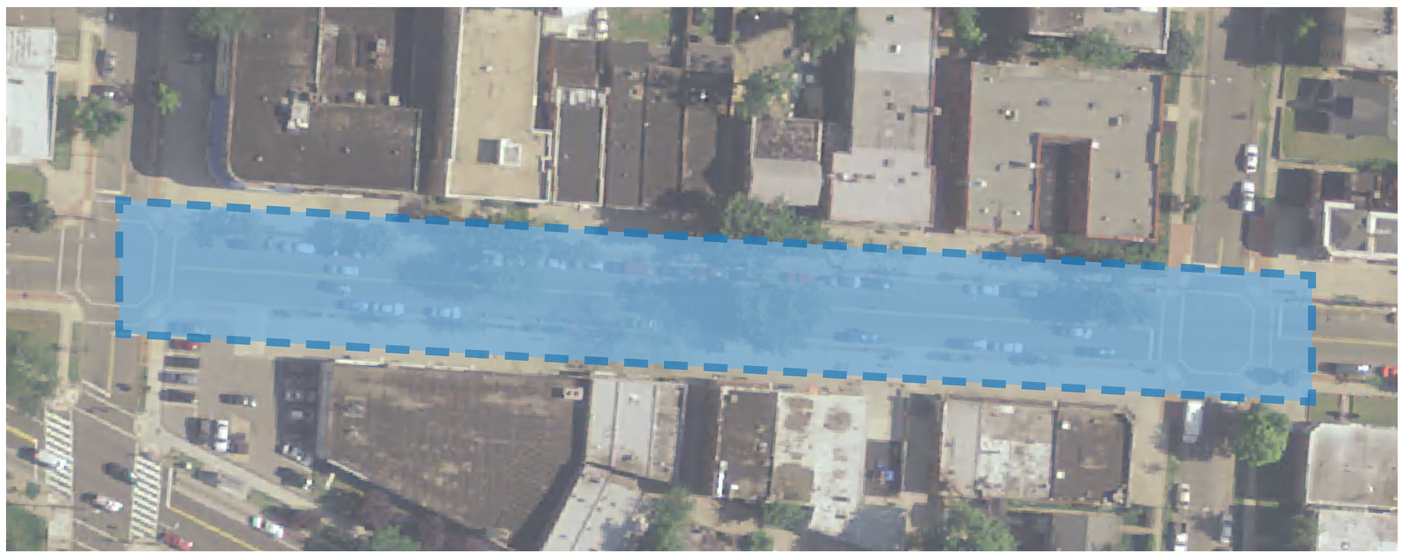
Green Infrastructure Streetscape

STATION L

Green Infrastructure and Combined Sewers

Using Green Infrastructure to Reduce Stormwater Volume Entering Combined Sewers

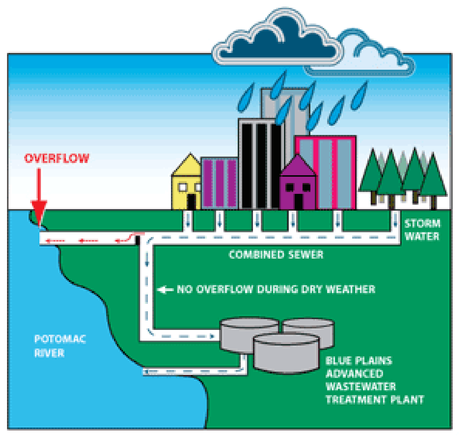
When it rains just over 1" the amount of stormwater runoff produced by one block of Kennedy Street could...



Fill 6 Above-Ground Swimming Pools

Fill 512,000 8oz Water Bottles

During Large Storm Events, this Runoff Can...



- Enter storm drains and the Combined Sewer System, discharging into the Rock Creek, Anacostia, and Potomac Rivers.

Green Infrastructure Can...

- Be used as a sponge to absorb and evaporate/ infiltrate rainfall
- Decrease the amount of trash, heavy metals, bacteria and other pollutants in stormwater
- Reduce and eliminate the amount of stormwater discharged to the combined sewer

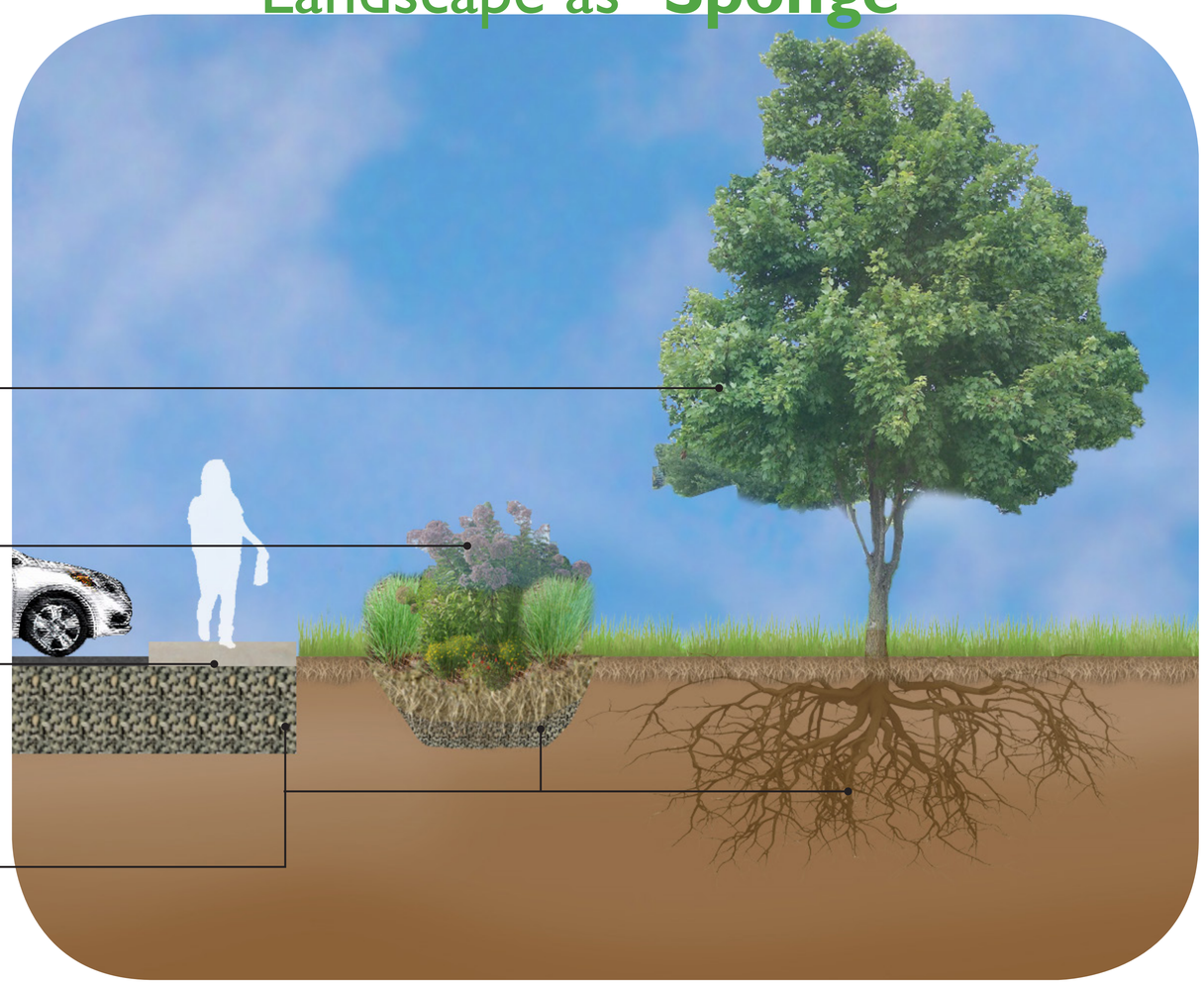
Canopy

Landscape at the Ground Plane

Permeable Pavements

Soils and Underground Storage

Landscape as "Sponge"



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KENNEDY STREET

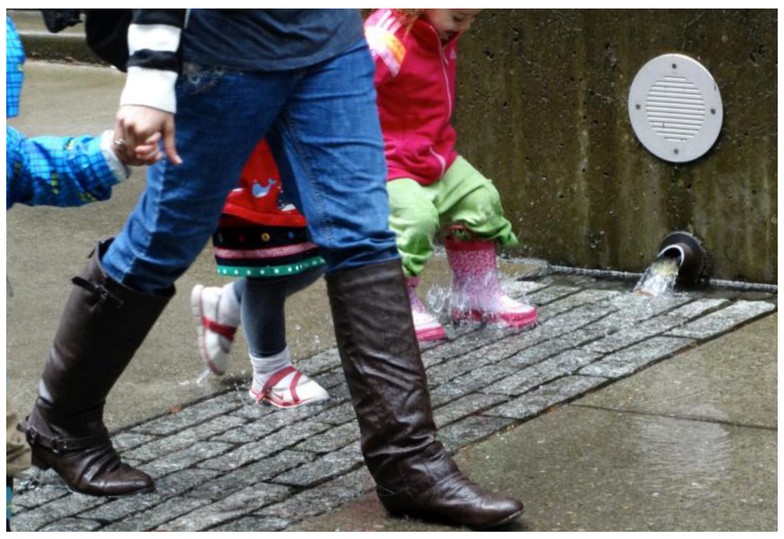
Green Infrastructure Streetscape

STATION M

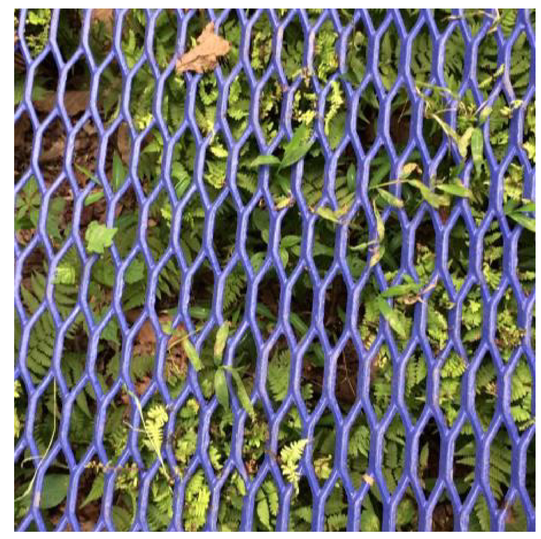
Art and Education

Art can transform how we see a site...

Creating Ways of Making the Path of the Rain Apparent



Creating a Sense of the Water Above and Below, with Functional and Evocative Ways of Capturing Rain



Activating the Hardscape Spaces

KENNEDY STREET

Green Infrastructure Streetscape

STATION N

Art and Education

Art Works Hand in Hand with Site Design and Construction...

Ways of Involving the Community in Short Term Projects while Construction is Ongoing

To Help Create a Place where Function is also Intriguing

And Giving the Community New Ways to Understand their Watershed

and Understand the Patterns of Water Flowing

Place to Make the Connection between Rain and City

KENNEDY STREET

Green Infrastructure Streetscape

STATION

Stormwater Art

Instructions: Place stickers to indicate your preferences...

Envisioning Art

Timing of Installation

Pre-Construction | During Construction | Post-Construction

Longevity

Temporary Installation | Both | Permanent Installation

Look/Feel

Sculpture | Painting | Interactive | All

Location

Street | Planter | Sidewalk | Building

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