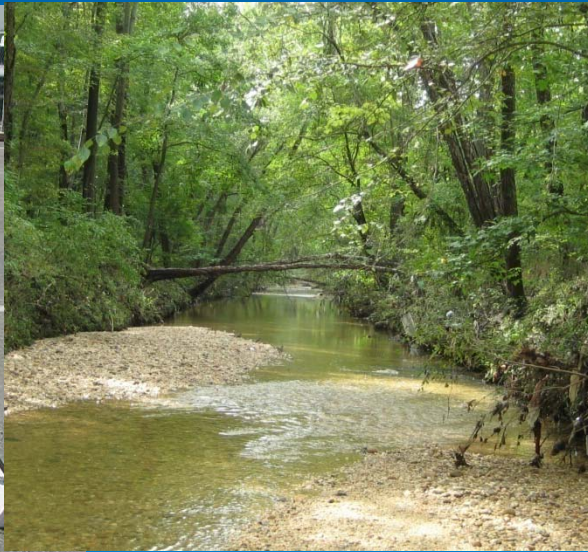


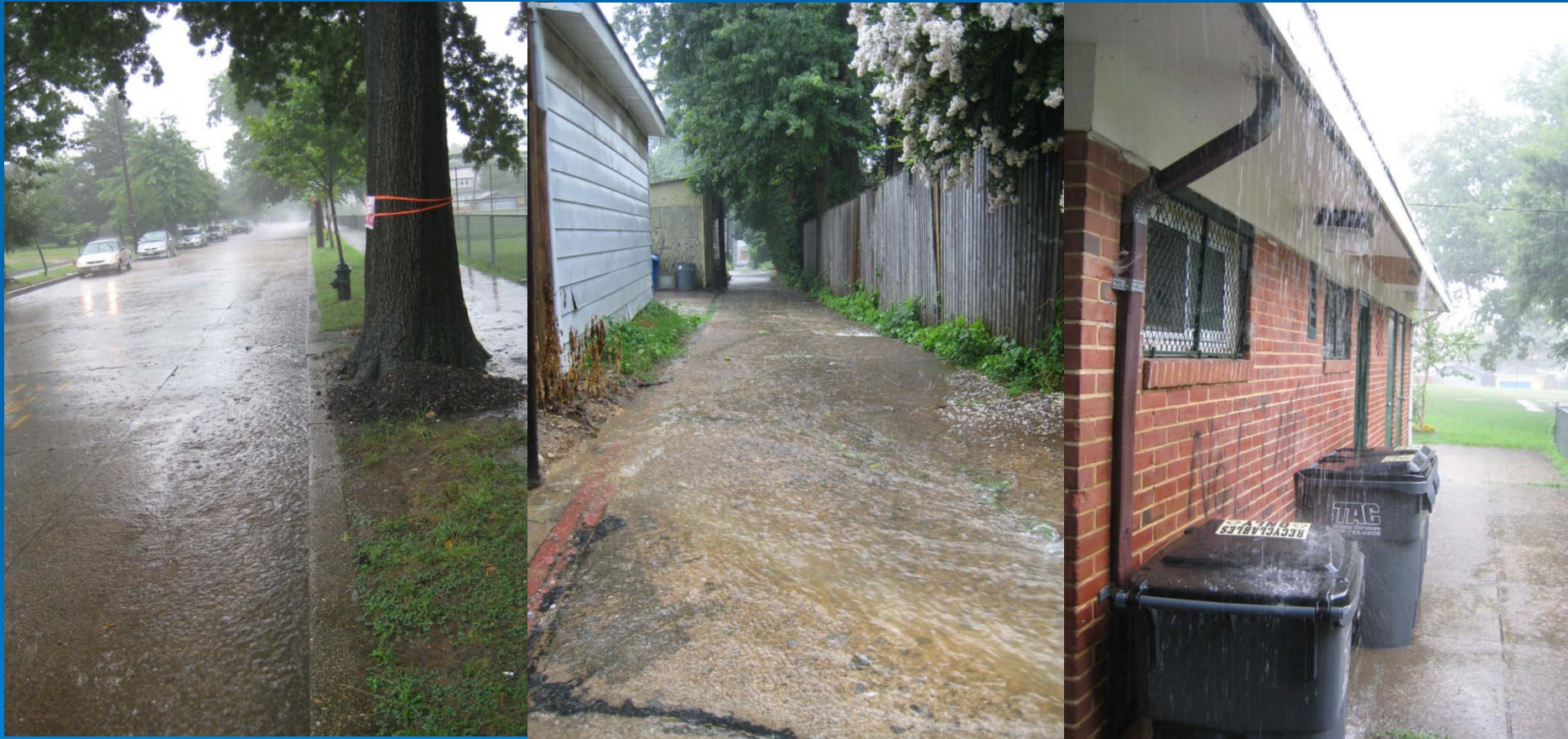
Stormwater Management in Washington DC



Presentation Outline

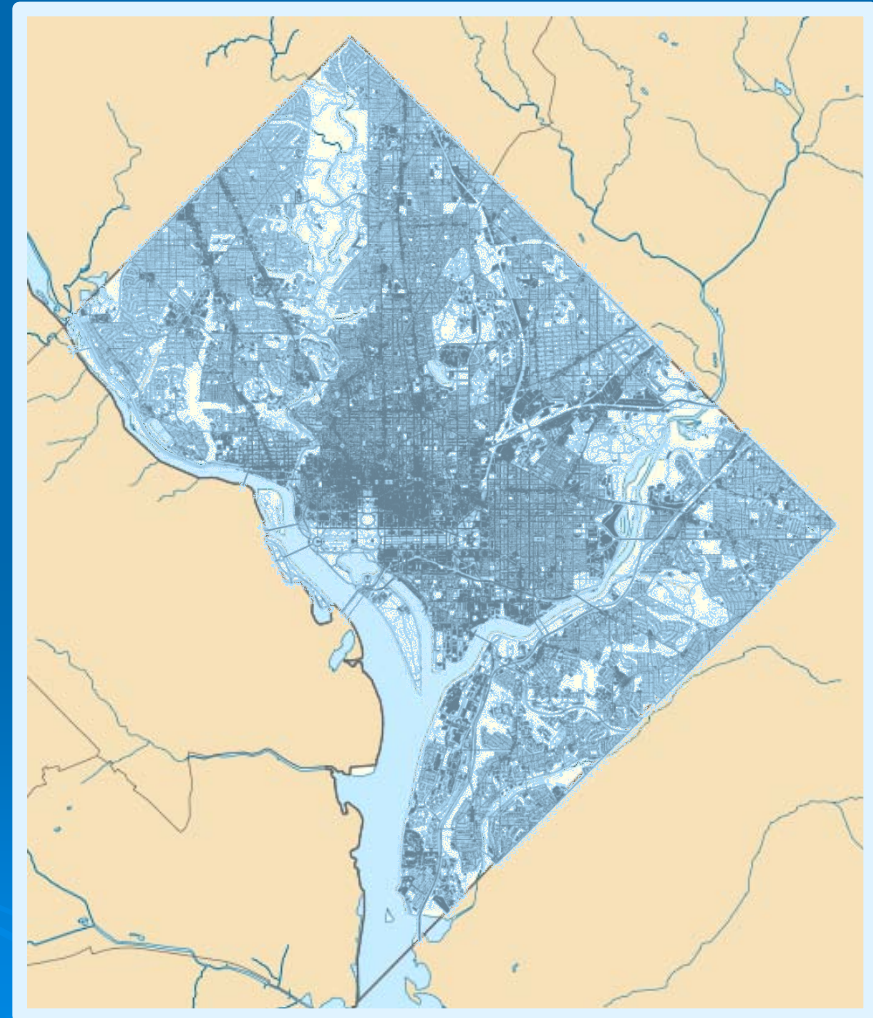
- Stormwater in the District – Current Condition and Environmental Impacts
- District's MS4 Permit
- Initiatives to Improve Stormwater Management and Comply with Permit
 - Direct Public Investment
 - Regulatory Changes
 - Voluntary Retrofits – Financial Incentives

Urbanization Stormwater



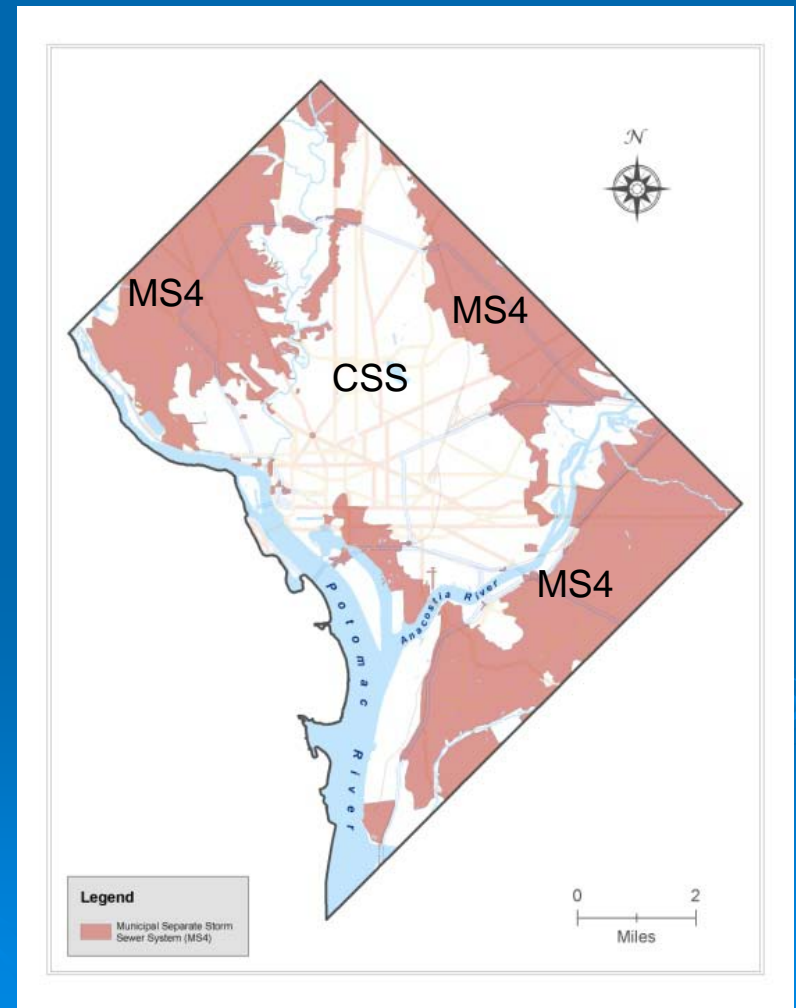
Imperviousness in the District

- 43% of District's land area is impervious.
- A single 1.2 inch storm falling on this area produces about 525 million gallons of stormwater runoff.



Scope of the Problem

- Combined Sewer System
 - 1/3 of District
 - 3.2B gallons of sewage and stormwater overflows annually
- Separate Storm Sewer Sys
 - 2/3 of District
 - Direct discharge without treatment



Stormwater Quality

Stormwater washes trash, sediment, oil, grease, pet waste, and other pollutants into District sewers and waterbodies.



Stormwater Quantity

Its sheer volume erodes stream channels, toppling trees, washing sediment downstream, and severely degrading aquatic habitat.



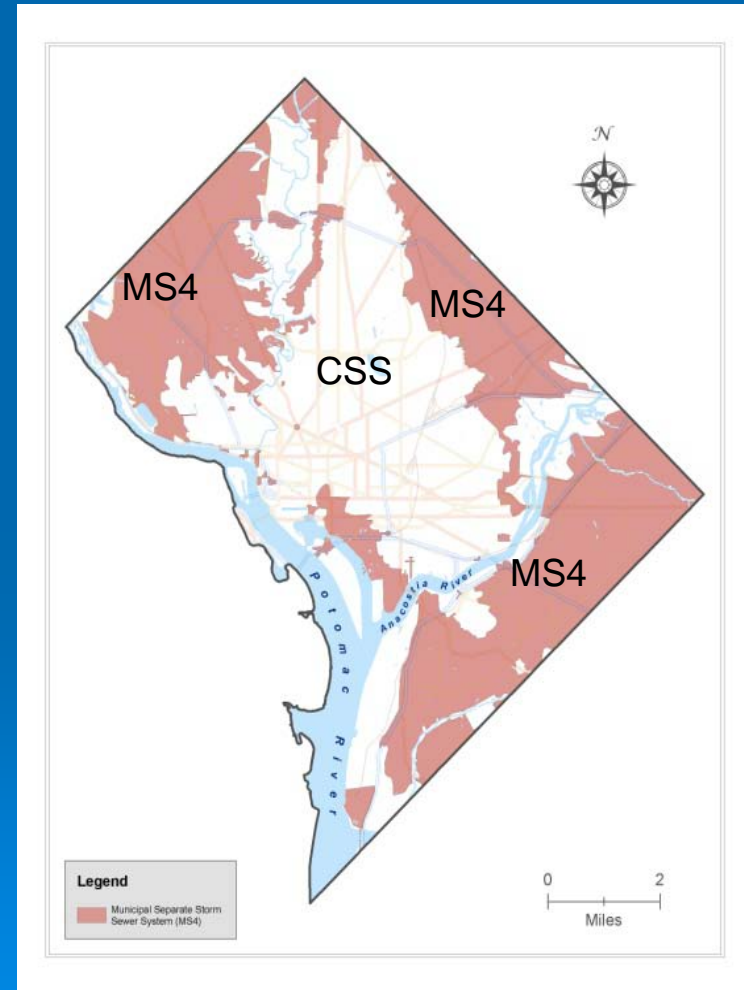
Cost of the Problem

➤ Combined Sewer System

- \$2.6B, capital project
- Expected completion 2025
- Funded by rate payers
- Green Infrastructure option?

➤ Separate Storm Sewer Sys.

- Rough Estimate –
 - \$7B+ Green build-out
 - \$10B+ traditional infrastructure
- Largely Unfunded



Stormwater Improvements

Direct Public Investment

Source of Funding:

- Local stormwater fees
- Bag law fees
- Federal Grants

Current Investment:

Approx \$17 Mill / Year



District's MS4 Permit

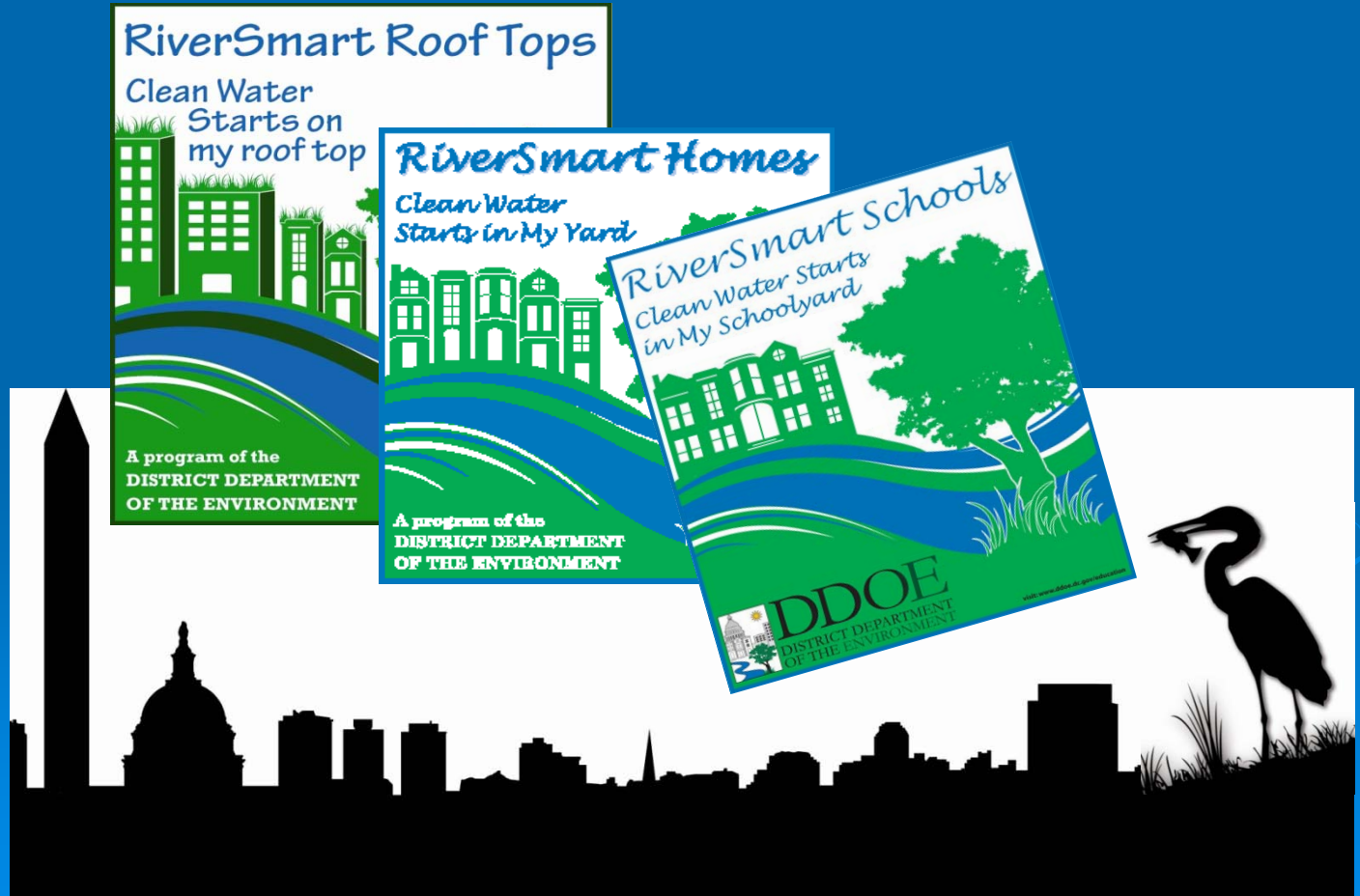
Issued Directly by EPA

Effective January 2012

Key Components:

- Retrofit 18 Mil SF of impervious surfaces within 5 years (1.5 Mil SF shall be in transportation ROW).
- Plant 4,150 trees within the MS4 area (net increase annual).
- Install 350,000 SF of green roofs within 5 years.
- Remove 103,188 lbs of trash annually from Anacostia River within 5 years.
- Develop Consolidated TMDL Implementation Plan & Revised Monitoring Strategy by May 2015.
- New stormwater regulations by July 22, 2013.
 - 1.2" retention standard for development.
 - Retention standard for substantial improvement projects.

Stormwater Management Initiatives



RiverSmart Homes



RiverSmart Schools

➤ Retrofit impervious & create outdoor living classrooms



RiverSmart Rooftops

- \$5/sf subsidy to incentivize green roof installation
- 1.3 million SF constructed
- 2nd only to Chicago!!



1425 K Street

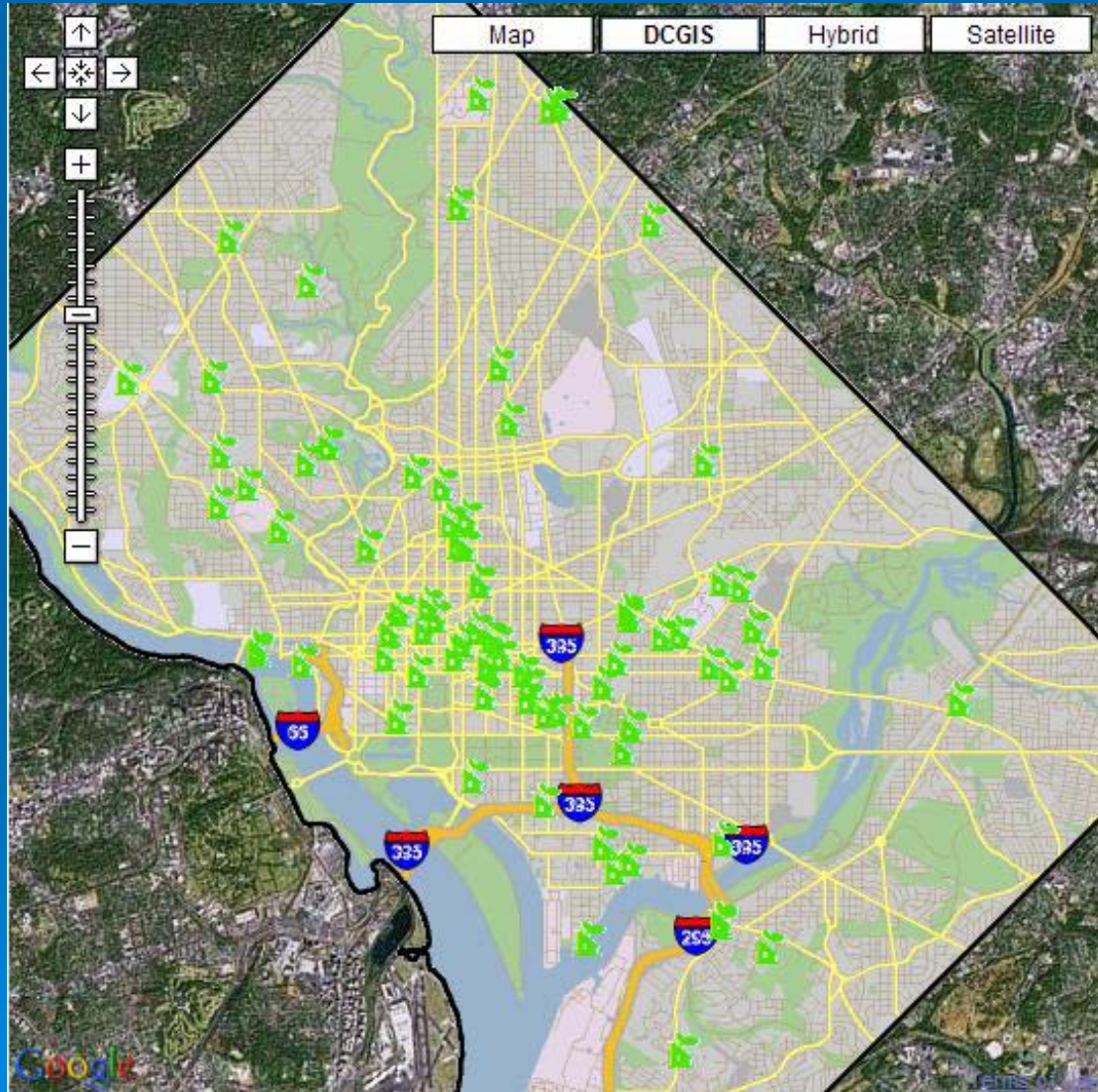


Human Rights Campaign



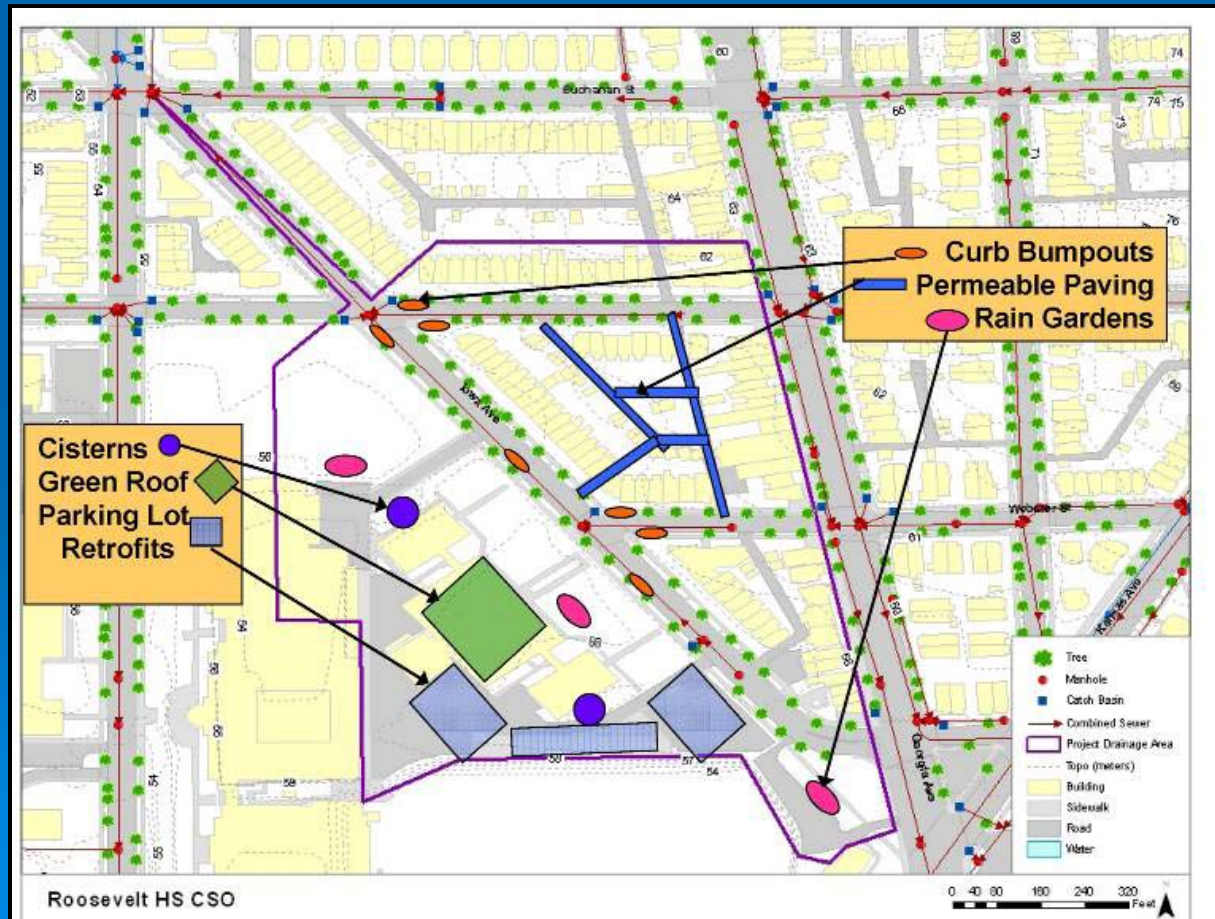
ASLA Office

Green Roof Locations



Green Build-out Model

Sewershed implementation to test results of model



DC Tree Canopy Loss

1973

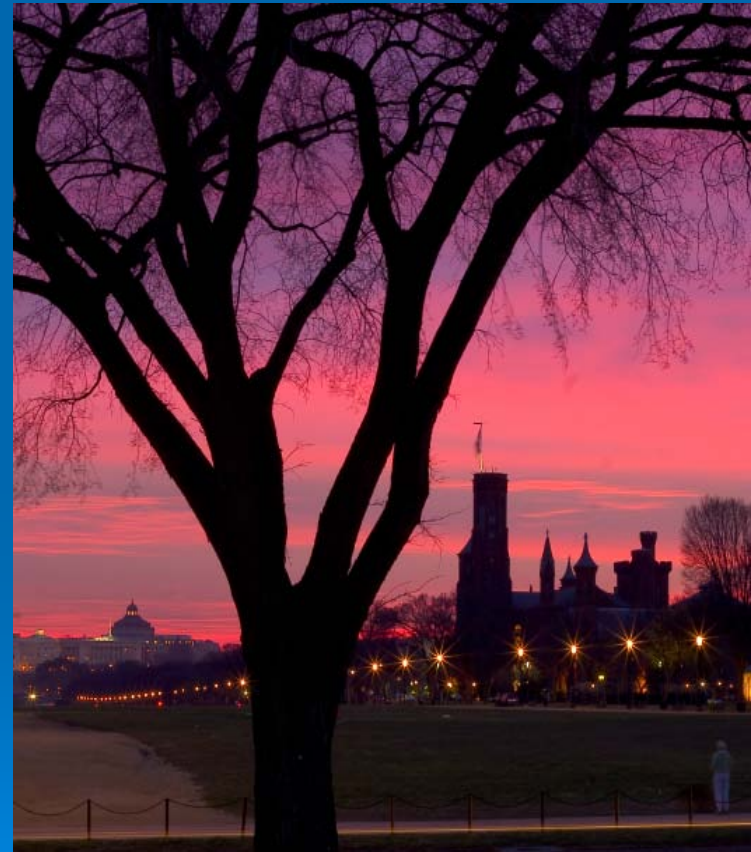


1997



DC Tree Canopy Goal

- Increase cover from 35% to 40% by 2032
- Need to plant 10,000 per year to reach goal
- Protect Existing Tree Canopy



Other Direct Investments

- Green Streets and Alleys
- Stream Restorations
- Enhanced Street Sweeping
- Education/Outreach
- End of pipe treatment

Other Stormwater Mgmt Initiatives

Bag Law - 5 cent fee for disposable bags

- 80% of D.C. residents report reduction in disposable bag use.
- On average, households moved from using 10 disposable bags/week to 4 bags/week.
- 4 out of 5 D.C. residents carrying reusable bags when they shop.
- 50% reduction in bag litter recovered from waterways.
- Two-thirds of residents are seeing fewer plastic bags as litter.
- 53% of residents support the bag law, 16% are “bothered” by it, and almost 1/3 have no feelings about the law.
- Fee generating approx \$2 Mill per year for environmental education and restoration.

Other Stormwater Mgmt Initiatives

- Coal Tar Ban
 - PAH concentration in coal tar > pure motor oil
 - Extremely low hanging fruit – other products available
- Stormwater Fee Discount Program

Imperative to find other solutions

Stormwater Management Regulations

- Total area subject to SWM Regulations annually
- Total area retrofitted with retention via DDOE direct investment annually

10 : 1

Revised Stormwater Regulations

Major land-disturbing activity

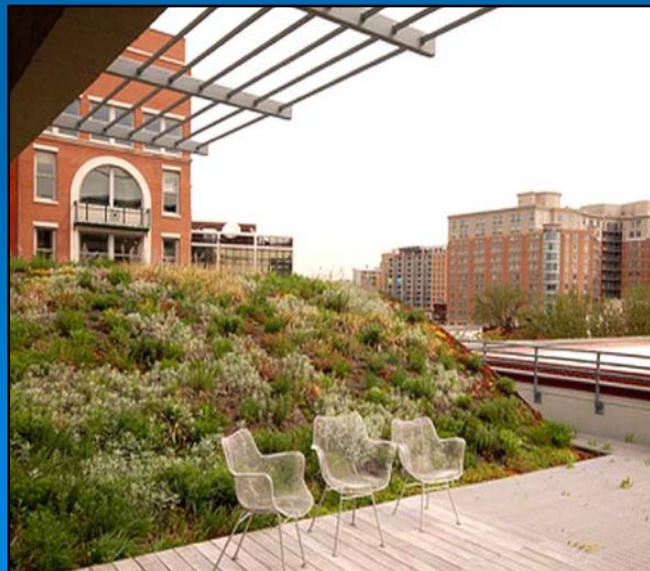
- Retain the first 1.2” of rainfall on site or through a combination of on-site and off-site retention.

Major substantial improvement activity

- Retain the first 0.8” of rainfall on site or through a combination of on-site and off-site retention.

Retention achieved with green infrastructure.

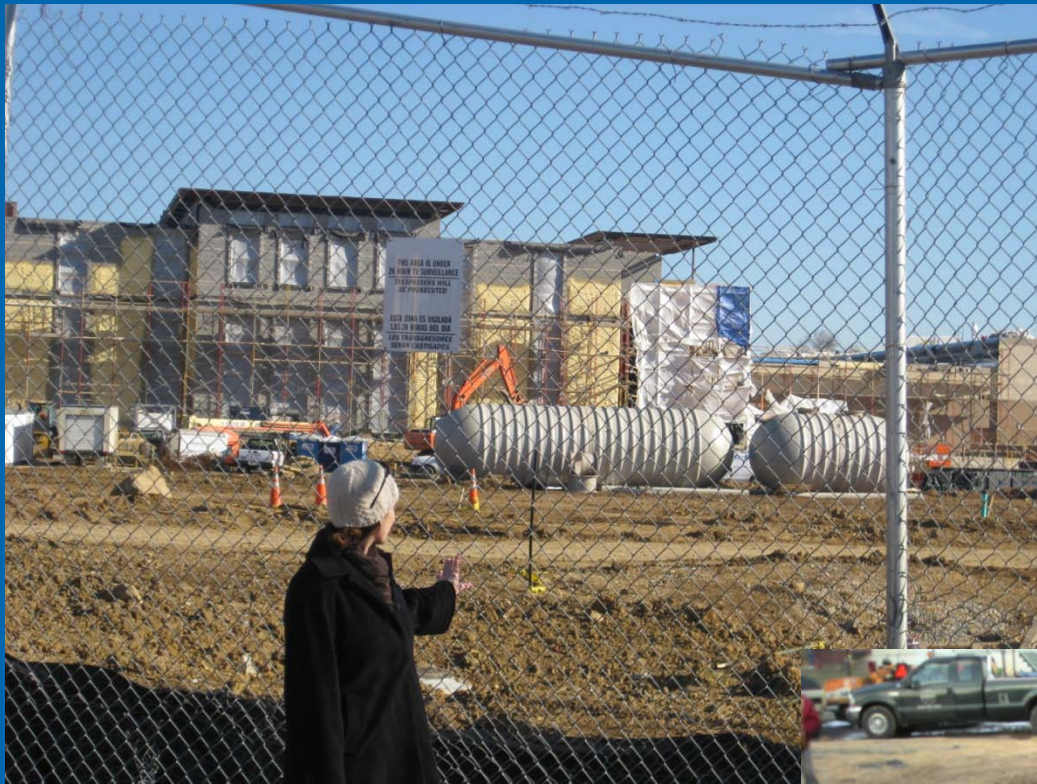
Green Roofs



Stormwater Tree and LID Boxes



Rainwater Harvesting for Non-potable Uses



Retention Standards

- Will gradually make District “spongier” – 1% per year.
- Regulated development will be biggest driver of retrofits.
- Essential for long-term restoration of waterbodies.



Allowable Use of Off-Site Retention

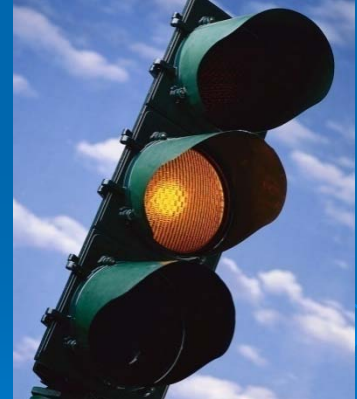
On-site retention $\geq 50\%$ of volume.

- No need to prove that on-site retention is technically infeasible or environmentally harmful.



On-site retention $< 50\%$ of volume.

- Must prove that on-site retention is technically infeasible or environmentally harmful.



Impervious surface =
14,000 sf

Regulated Volume = 10,000 gal.
On-site minimum = 5,000 gal.

Options to Achieve Off-Site Retention

- Stormwater Retention Credits (SRCs)
 - Privately tradable.
 - Created by voluntary retrofits or sites that exceed regulatory obligation

- In-lieu fee
 - Payable to DDOE.

Trading Maximizes Sustainability

➤ Problem of imperviousness is opportunity for trading to:

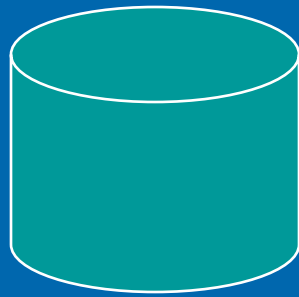


- Maximize cost savings & flexibility for regulated sites.
- Increase retention and accelerate restoration of waterbodies.
- Increase socioeconomic benefits, with more LID (health, aesthetics, environmental justice, green jobs).

Trading's Potential to Leverage Retention

➤ Same retention for 1.2" storm:

Strict On-Site



10,000
gallons

Trading

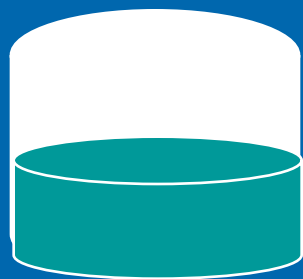


5,000 + 5,000 =
10,000
gallons

Trading's Potential to Increase Retention

- Greater retention for storms smaller than 1.2"
- Example – 0.6" storm:

Strict On-Site



5,000 gallons

Trading



5,000

+



5,000 =

10,000 gallons

- 90% of storms in Washington DC are less than 1.2".
- This scenario yields 57% increase in annual retention.

Benefits to District Waterbodies

- Increased annual retention District-wide.
- Increased capture of first-flush volume.

Example SRC Transaction

- Grocery parking lot voluntarily retrofits w/4,000 gal BMP to generate 3 years of SRCs or 12,000 SRCs.*
- Church parking lot voluntarily retrofits w/2,000 gal BMP to generate 3 years of SRCs or 6,000 SRCs.
- Regulated site has 3,000 gal yearly offsite obligation & purchases total of 18,000 SRCs to comply for 6 years.
- By end of 6-year period, regulated site purchases additional credits or pays in-lieu fee.

*Note: Opportunity for discount on stormwater impervious fee provides layered incentive for retrofit.

Leverage Regulations and Incentives to Drive Voluntary Retrofits

➤ Layered incentivizes

- Subsidy Programs (RiverSmart)
- Stormwater Fee Discount Program
- Stormwater Retention Credit Trading Program

QUESTIONS?

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To download the District's Proposed Rule on Stormwater Management, draft Stormwater Management Guidebook, & related resources, visit:

ddoe.dc.gov/proposedstormwaterrule

Trash Load Reductions

Activity Category	Activity	Load Reduced before Reduction Factors Are Applied (lbs)	Load Reduced After Reduction Factors Are Applied (lbs)	Calculation Methodology
End-of-Pipe and In-Stream BMPs	Watts Branch Bandalongs	4,143	4,143	Based on empirical data collected. Data for the lower Watts Branch Bandalong was collected between January & September 2012. Data on the upper Bandalong was collected between December 2011 and November 2012.
	Nash Run Trash Trap	1,894	1,894	Annual average (2009-2012) based on empirical data.
	Hickey Run BMP	10,000	2,000	Based on assumed efficiency of 100% capture for design capture of device. A reduction factor of 20% is then applied since glass and plastic bottles may not be emptied of water.
	James Creek Bandalong	327	327	Based on empirical data collected.
Road-way and Block Cleanups	Adopt-A-Block Program	NA	NA	Collaborating with Office of the to collect empirical clean-up data.
Sweeping Environmental Hotspots	Sweeping Environmental Hotspots	144,768	72,384	Total amount of trash removed was estimated based on trash loading coefficients for roadways. The trash load was then multiplied by the total area of roadways swept within the environmental hotspots. The resulting load was then divided by two because roughly half of the roadway (the middle of the road) is swept in these areas because they are unsigned. Environmental hotspots within the Anacostia watershed are swept twice per month, 8 months out of the year, in addition to other signed and unsigned areas throughout the MS4 area. Total amount of trash calculated using the methodology above is multiplied by 16. A reduction factor of 50 percent is then applied since an entire hotspot may not be swept during each sweeping event.
Clean-Up Activities	Clean-Up Events	37,647	3,825	Based on empirical data collected (see additional table for tracking of each clean-up event) during the 2012 Anacostia Watershed Society Earth Day Clean-Up. A reduction factor of 50.8% is first applied, which accounts for the District's portion of the Anacostia being served by the MS4. A second reduction factor of 20% is applied to account for the fact that not all plastic and glass bottles collected may be emptied of water before trash is weighed.
	Skimmer Boats	700,000	5,877	Total amount of trash and debris removed is multiplied by 16.5%, since this represents the proportion of the watershed which lies within DC. A second reduction factor of 50.8% is applied to account for the area of the District's portion of the watershed served by the MS4. A third reduction factor of 50% is applied since not all material collected by the skimmer boats may be trash. Finally, a fourth reduction factor of 20% is applied since not all plastic and glass bottles collected are emptied of water.
Education and Outreach	Watershed Wide Anacostia Campaign	NA	NA	Efficiency being assessed.
	Trash MEWEES	NA	NA	Efficiency being assessed.
Regulatory Approaches	Bag Law	NA	NA	Efficiency being assessed.
	Total Annual Reduction	939,240	90,450	

Numeric Performance Standards and Compliance

Numeric Requirement	Time Period	FY 2012 Achievement
Retrofit 18,000,000 square feet of impervious surfaces	Permit term	698,550 square feet
Retrofit 1,500,000 square feet of impervious surfaces in the transportation right-of-way	Permit term	378,644 square feet
Plant 4,150 trees within the MS4 area (net increase)	Annually	7,846 trees *
Install 350,000 square feet of green roofs on District properties	Permit term	79,137 square feet
Remove 103,188 lbs of trash annually from the Anacostia River	By the fifth year of the permit	90,450 pounds of trash, approx 940,000 lbs removed in total

*Estimated mortality based on literature review