

TPB Technical Committee  
5/3/2013  
Item #2

# Update on the “Green Streets” Policy Discussions and Workshop

Michael Farrell  
Transportation Planner IV

May 3, 2013  
TPB Technical Committee, Item #2



5/3/2013

Green Streets use landscaping, trees and other design elements to capture and filter stormwater runoff.

# Green Streets Policy Discussion

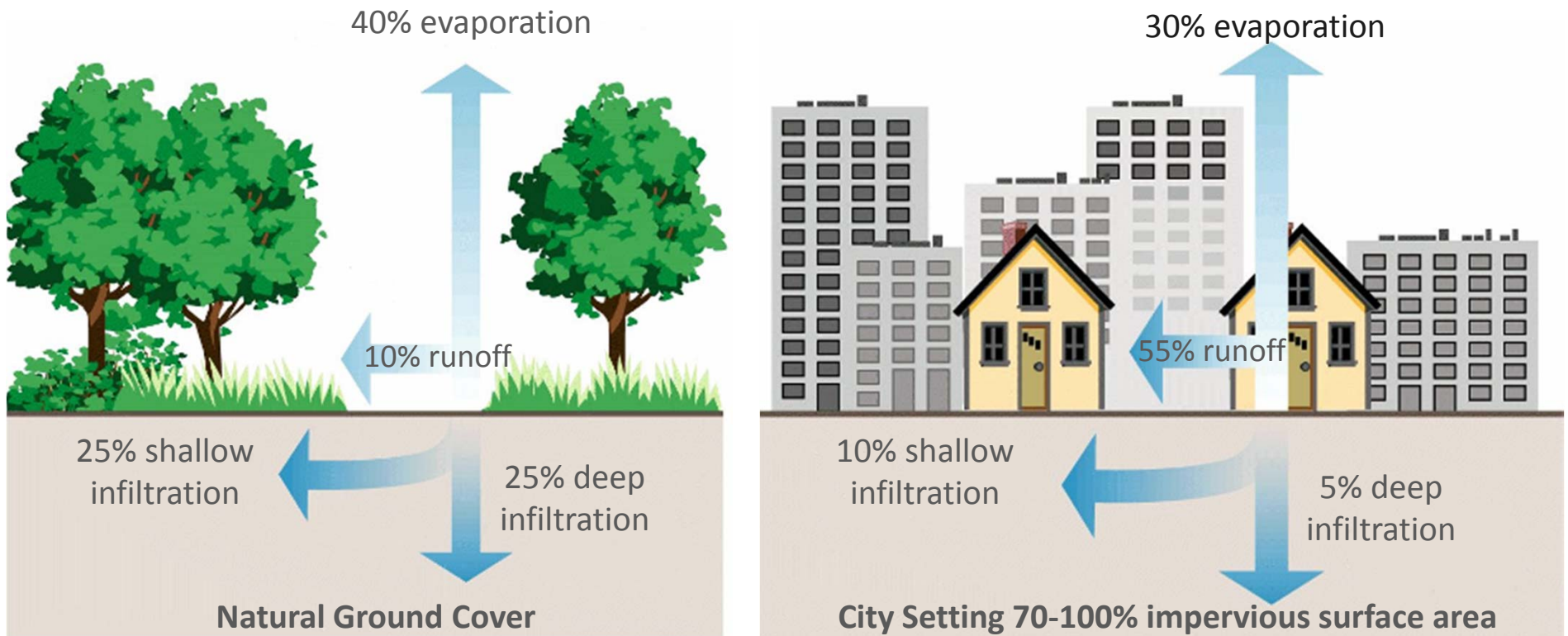
- December 19<sup>th</sup> – Letter to TPB from Anacostia Watershed Restoration Partnership
  - Requested that TPB adopt a regional Green Streets Policy similar to the TPB's Complete Streets Policy (adopted May 2012)
  - Cited the Prince George's Complete and Green Streets Policy as an Example
- January 11<sup>th</sup> – TPB Technical Committee
  - Suggested a stakeholders workshop
  - Learn what agencies are doing
  - Determine what gaps, if any, a regional policy could help fill, as well as potential obstacles
- Bike/Ped Subcommittee, STWG discussed
- DTP and DEP staff organized a workshop, held April 8<sup>th</sup>

# Green Streets Workshop

Monday, April 8th

- **Nine Speakers**
  - Keynote
    - Dominique Leukenhoff, Acting Deputy Director of Water Protection, Region 3, U.S. Environmental Protection Agency
    - Christine Knapp, Director of Strategic Partnerships, Philadelphia Water Department
  - District of Columbia
    - Meredith Upchurch, LID Team Lead, DDOT
  - Virginia
    - Pawan Sarang, VDOT
    - Matthew Meyers, Fairfax County Department of Public Works and Environmental Services
    - Jason Papacosma, Watershed Programs Manager, Arlington Department of Environmental Services
  - Maryland
    - Meg Andrews, Manager of Environmental Programs, MDOT
    - Danielle Glaros, Office of the Honorable Eric Olson, Prince George's County Council
    - James Wilson, Department of Public Works and Transportation, Prince George's County
- **90 participants**
  - Planners
  - DOT Public Works staff
  - Environmental Staff
  - Consultants and members of the public

# Natural vs. Urban Stormwater Drainage



Stormwater infiltrates into the ground  
Plants and trees work to absorb stormwater

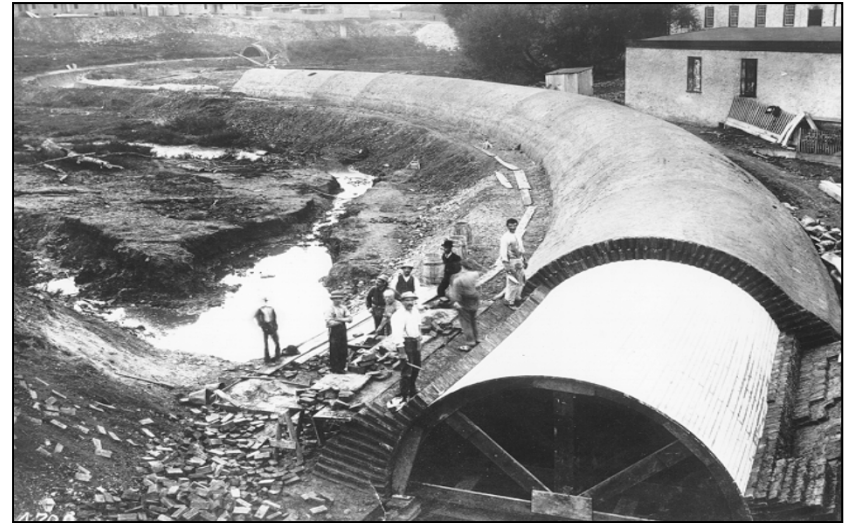
Water hits impervious surface and runs off roofs, streets, parking lots etc.

Runoff goes into the sewers - worsens flooding

**The Environmental Protection Agency estimates that this type of pollution is now the single largest cause of the deterioration of our nation's water quality**

# The Traditional Storm Water Approach

- Brick and mortar solutions
- Highly engineered solutions – Detention vs. Retention
- Slow pace of permit renewals and retrofit due to “sticker shock”
- Storm Water as pollution – not an asset





# Why Green Infrastructure?



- Urban roads, along with sidewalks and parking lots, are estimated to constitute almost **two-thirds** of the total impervious cover.
  - Mandates to reduce stormwater pollution
  - US communities are facing a total of \$106 billion in needed stormwater management and combined sewer correction upgrades or improvements.
- Green Infrastructure often more Cost-Effective
- Added benefits - “Rain as a Resource rather than a Waste”
  - Augment water supplies
    - Ground water recharge
    - Enhance stream base flow
    - Stormwater capture and use
  - Beautification – Better Streetscapes – “Livability”
    - Higher property values
    - Reduced urban “heat island”
    - Economic development – retail growth
    - [www.restreets.org](http://www.restreets.org)
    - [www.werf.org/liveablecommunities/](http://www.werf.org/liveablecommunities/)



# Summary State Stormwater Regulations – per Chesapeake Bay TMDL\*

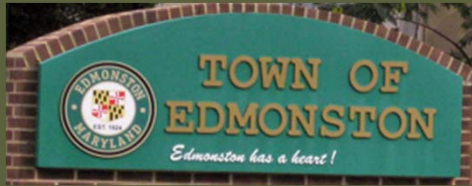
	MD	PA	VA	DE	DC	WV
New Development	1"- 2.6" OSR depending on soils and imperviousness; 5,000 sq ft (state-wide reg)	New development woods in good condition for 2 year-24 hour storm, which varies, but approx 1.5" OSR; 1 acre generally, but 5,000 sq ft for discharges to high quality waters (state-wide reg)	OSR not required. New rules (in full effect in 2014) include std extended detention & phosphorus limits; OSR is optional for meeting phosphorus limits. (state-wide reg)	Predevelopment hydrology (OSR) in draft (state-wide reg)	1.2" OSR; 5,000 square feet (District-wide reg, driven by the permit)	1" OSR (in MS4s, per permit)
Redevelopment	Same as above (state-wide reg)	Similar approach, but less stringent (state-wide reg)	Similar approach, but less stringent (state-wide reg)	Similar (state-wide reg)	Same as above (District-wide reg)	1" OSR, reductions for certain development (permit)
Retrofit	20% drainage area within Phase I MS4s; performance target is forest pollutant loads. (permit)	PAG-13 does have a TMDL planning requirement that could drive retrofits; no target/performance has been stipulated (permit)	Not yet, though there's a WIP commitment to include specific requirements in reissued MS4 permits this year and next year with specific performance objectives (permit)	No	Over 5 yrs: 350,000 ft <sup>2</sup> green roofs; net increase of 4,150 trees annually; addn'l 18 million sq ft drainage retrofit to meet the 1.2" std (permit)	No

# How EPA Supports Green Streets

- CWA Section 319 Program
- CWA SRF Program
- National Estuary Program (NEP) Grants
- **Green Highways Partnership**
- **Green Streets, Green Jobs, Green Towns (G3) Academy & Grants**
  - [www.epa.gov/req3wapd/pdf/](http://www.epa.gov/req3wapd/pdf/)
- Chesapeake Bay/NFWS Community Grants
- Green Infrastructure Technical Assistance
- HUD/DOT/EPA Sustainable Communities Grants







## Green Streets by the Green Highways Partnership



Low Impact Development Center, Inc  
www.lowimpactdevelopment.org



Green Highways Partnership  
www.greenhighways.org



Chesapeake Bay Trust  
www.cbtrust.org



Source: LID Center



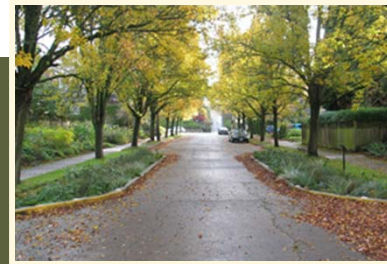
Source: LID Center

### What could be...



**Bioretention on family-friendly street edge**

Source: Portland Bureau of Environmental Services



**Traffic calming and signature green space at street entry**

Source: Portland Bureau of Environmental Services



**Rain gardens for viewing; pedestrian-friendly permeable concrete walks**

Source: LID Center

### Greening Tools...



**Solar trash compactor;**  
Program information on trash can  
Source: LID Center



**ADA-compliant PICP**  
Source: ICP1



**Energy-efficient light fixtures;**  
Banner standards on light poles  
Source: Cannell Graphics



**Permeable interlocking concrete pavement (PICP) in parking lanes**

Source: Portland Bureau of Environmental Services



**Streets constructed of pervious concrete pavement or other permeable surfaces**

Source: City of Bellingham, WA



**Curb bump outs/extensions provide bioretention areas; traffic calming measures improve safety**

Source: LID Center



**Rain garden, Maplewood, MN**  
Source: City of Maplewood, MN



**Recreation, alternative transportation support**  
Source: Damien Newton, Streetsblog.org



**Educational sign explaining greening practices**  
Source: Chuck Taylor, Advanced Pavement Technology



**Benches for local recycling and art opportunities**  
Source: LID Center



**Bioretention next to pervious concrete with recycled materials for edges**  
Source: LID Center

**Planning for environmentally sustainable growth in the Anacostia Watershed** 9

# Green City, Clean Waters

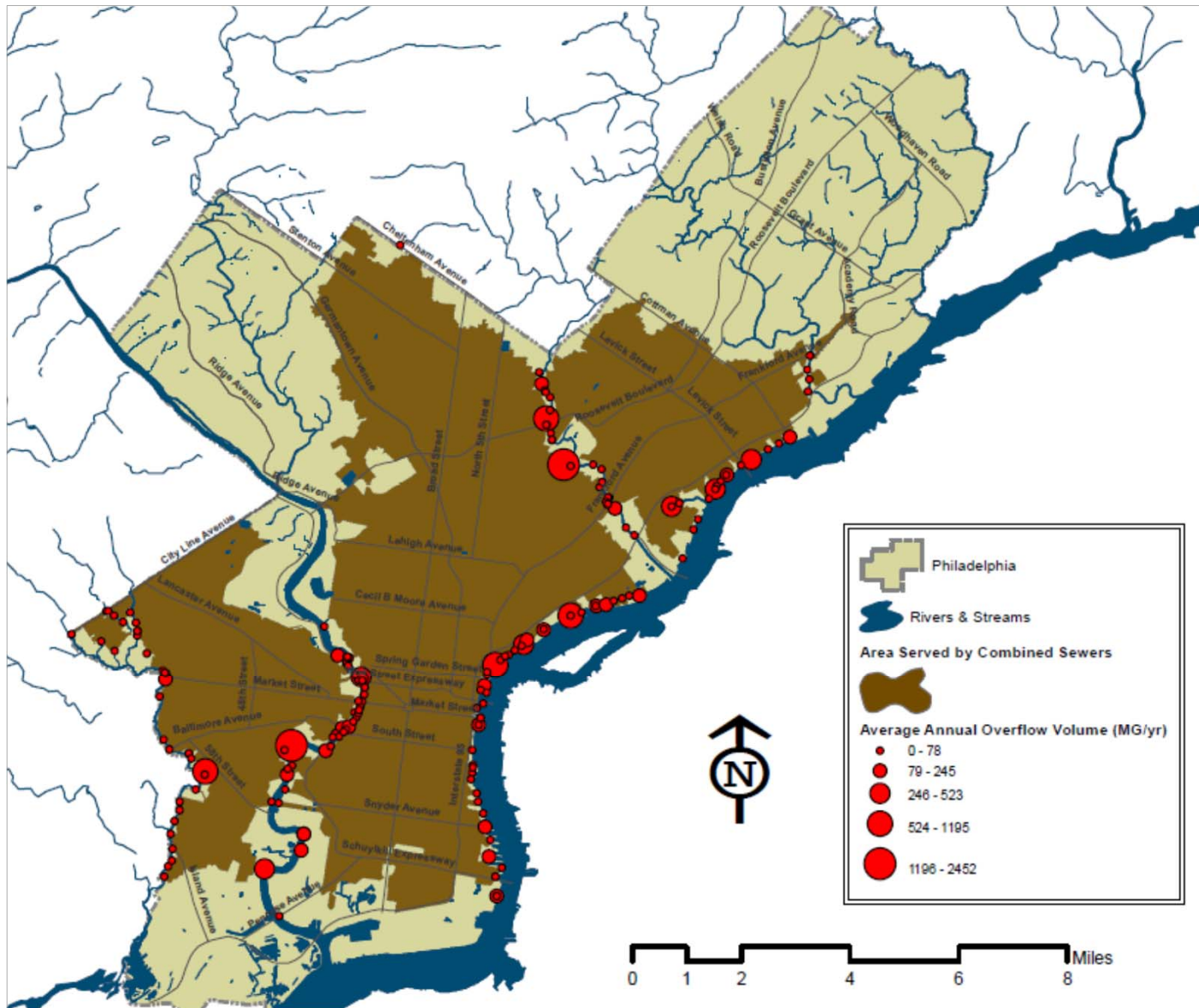
## The Role of Green Stormwater Infrastructure in Creating a Sustainable Philadelphia

Christine Knapp, Director of Strategic Partnerships, Philadelphia Water Department

[www.phillywatersheds.org](http://www.phillywatersheds.org)

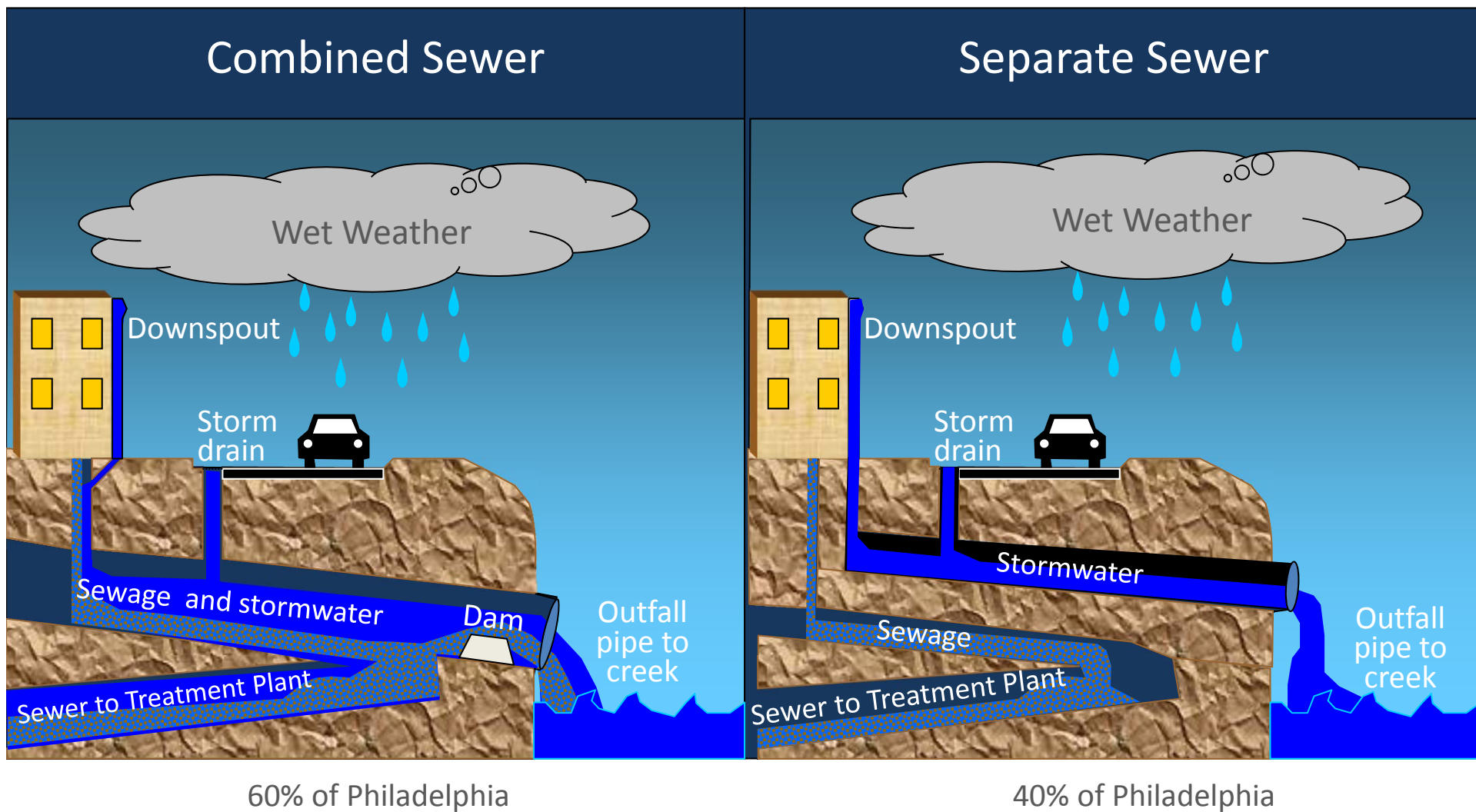


# Philadelphia's Combined Sewer System



- 63 sq. miles
- 164 outfalls
- 4 receiving water bodies

# Types of Sewers in Philadelphia



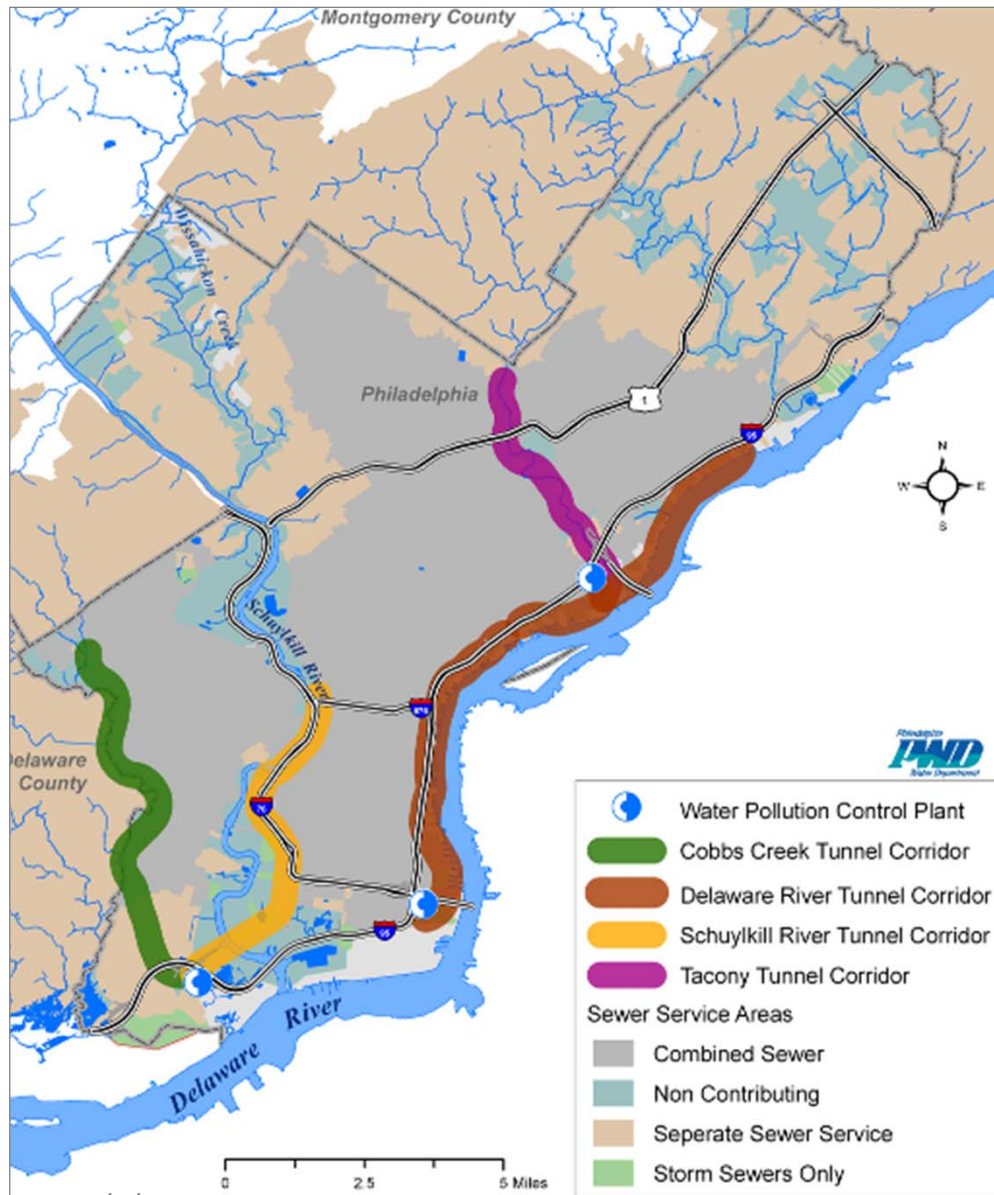
# How to Reduce Combined Sewer Overflows (CSOs)

## Conventional Approach

Store sewage/stormwater in deep tanks and tunnels and pump back into sewer system after rain event



# Centralized Storage (Tunnel) Option



- **\$9 - \$10 Billion**
- Greatly exceeds residents' limit of affordability
- Construction and long-term operations use enormous amounts of energy
- Highly specialized design and construction limits local jobs
- Hard to adapt to uncertain climate changes

# How to Reduce Combined Sewer Overflows (CSOs)

## New Approach

Design streets and urban sites so rainfall infiltrates, supports vegetation, and/or is reused

Photo Credits: Philadelphia Water Department and Meliora Environmental Design



**Stormwater Tree Trench**



West Mill Creek, Philadelphia, PA

**Stormwater Planter**



Columbus Square, Philadelphia, PA

**Stormwater Bump-out**



Queen Lane, Philadelphia, PA

**Green Roof**



PECO Building, Philadelphia, PA

**Rain Barrel**



Row home, Philadelphia, PA

**Flow-Through Planter**



Philadelphia Water Department, Philadelphia, PA



# Our Goal

## 9,500 Impervious Acres Converted to “Greened Acres”

**Greened Acre**: An acre of impervious cover that is retrofitted to utilize *green stormwater infrastructure* to manage stormwater using source controls such as infiltration, evaporation, transpiration, decentralized storage and reuse.

- Enforce strong stormwater **regulations** on development
- Create stormwater **billing** structure that rewards good practices
- Design and construct **Capital Investments** in green stormwater infrastructure and **Leverage Private Investment**



5/3/2013

17



# Creating Green Streets in DC

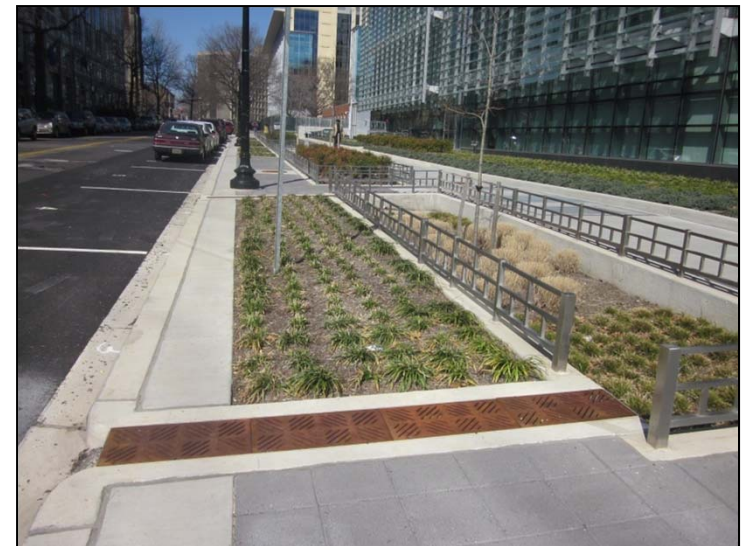
**MWCOG Green Streets Workshop  
April 8, 2013**

Meredith Upchurch  
LID Team Lead  
District Department of Transportation  
Infrastructure Project Management Administration  
Stormwater Management Branch

<http://ddot.dc.gov/DC/DDOT/Projects+and+Planning/Environment/Low+Impact+Development>

# DC Green Street Policy Evolution

- Anacostia Waterfront Initiative Transportation Architecture Design Guidelines (2005)
- Great Streets Program (2005-present)
- DDOT Action Agenda (2010)
- DDOT Sustainability Plan (2010)
- DDOT Complete Streets Policy (2010)
- DDOT LID Action Plan (2010)
- DC MS4 Permit (2011- 3<sup>rd</sup> Permit)
- New Citywide Stormwater Regulations (2013)
  - Retain 1.2 inches of runoff



Completed  
2012

# Great Street: Pennsylvania Avenue SE



Before: P St open



After: P St closed, Bioretention #1



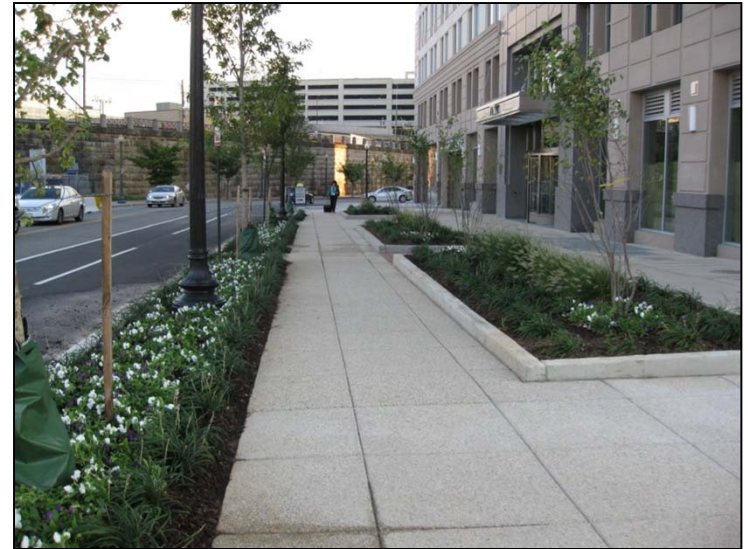
5/3/2013



Bioretention #2

# Street Tree Planting

- Larger Tree Spaces
- Increased Soil Volumes
  - Structural Soils
  - Structural Cells
- Permeable Pavements

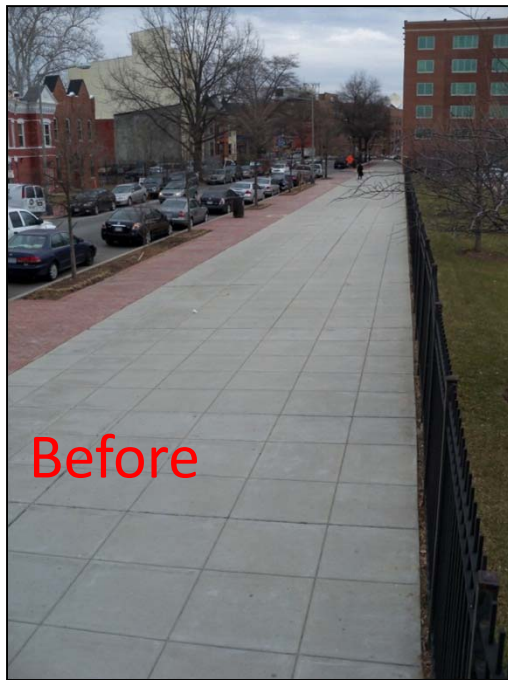


# Private Installations in Streets



# Paving Removal Program

ARRA Funded project began 2010



P St & North Capitol St NE

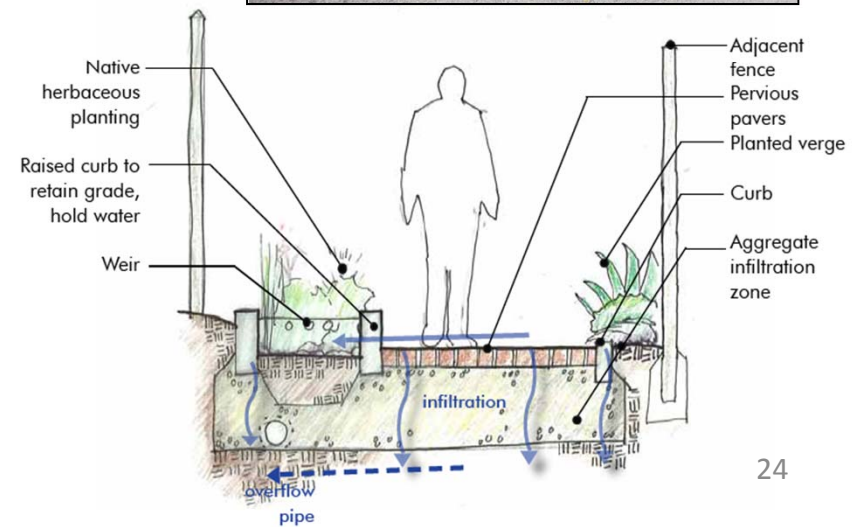
5/3/2013



Calvert St Median

# Green Alleys

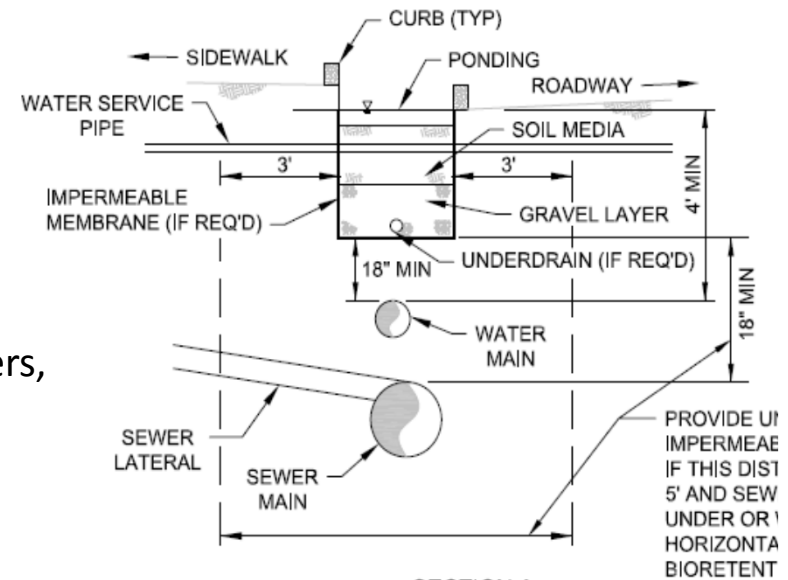
- Install permeable pavement in Alleys for reconstruction or new construction
  - Pervious Concrete
  - Porous Asphalt
  - Permeable Pavers
- Pilot Pedestrian only access Green alley





# Design Challenges

- Underdrain connection
- Utility Coordination
- Space available
  - Tree Space, Parking lanes
  - Adjacent public land open space
- Competing Uses
  - Pedestrian zones, bike lanes, bus shelters, mature trees, sidewalk cafes
- Maintenance
- LID and GI Standards are under development



# Design Challenge: Pedestrian Safety



# VDOT Stormwater Management

- The Virginia Stormwater Management Regulations are applicable to all Regulated Land Disturbance Activities (RLDA) undertaken by or for VDOT
- All routine maintenance activities exempted
- On-site retention not required.
- Low Impact Development (LID) permitted within VDOT ROW with maintenance agreement.
  - VDOT Subdivision Street Acceptance Policy encourages LID practices
- Central office staff develop Municipal Separate Storm Sewer (MS4) program wide policies and procedures, handle annual reporting, training, and assessment of VDOT's operations.
- District staff responsible for implementation
  - [www.virginiadot.org/programs/stormwater\\_management.asp](http://www.virginiadot.org/programs/stormwater_management.asp)

# Current Best Management Practices

Table 11-1 VDOT Drainage Manual

Water Quality BMP	Treatment Volume	Target Phosphorus Removal Efficiency	Percent Impervious Cover**
Vegetated filter strip Grassed swale		10% 15%	16-21%
Constructed wetlands Extended detention Retention basin I	2xWQV 2xWQV 3xWQV	20% 35% 40%	22-37%
Bioretention basin Bioretention filter Extended detention-enhanced Retention basin II Infiltration	4xWQV 1xWQV	50% 50% 50% 50% 50%	38-66%
Sand filter Infiltration Retention basin III with aquatic bench	2xWQV 4xWQV	65% 65% 65%	67-100%

\*Innovative or alternate BMPs not included in this table may be allowed at the discretion of DCR and VDOT.

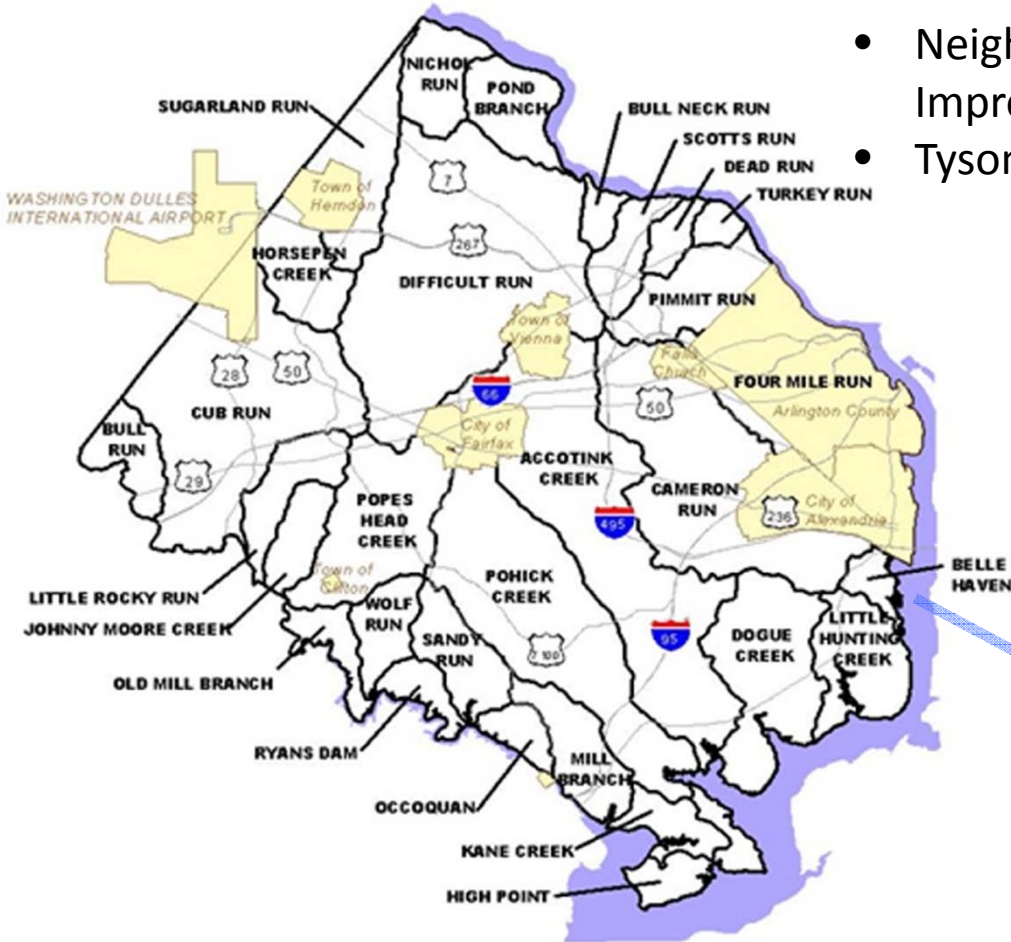
\*\*Percent Impervious Cover: The ratio of the new impervious area and the area within the right-of-way and easements per project outfall.

# Fairfax County Green Streets



- Neighborhood Drainage Improvements
- Tysons Corner Plan

## Chesapeake Bay Watershed



Size: 395 sq. miles

Population: 1.2 million

5/3/2012 MS4 - Phase 1 Community

# Neighborhood Drainage Design Goals:

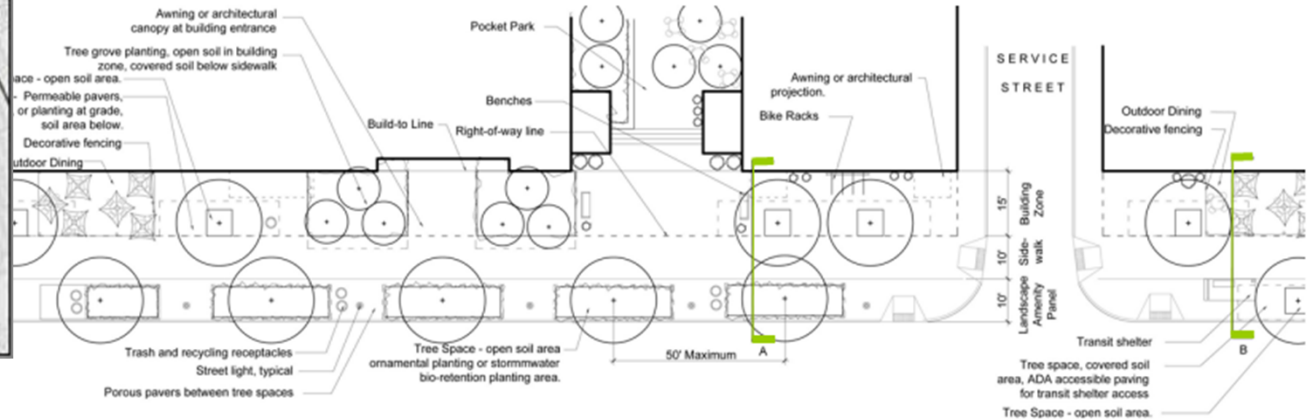
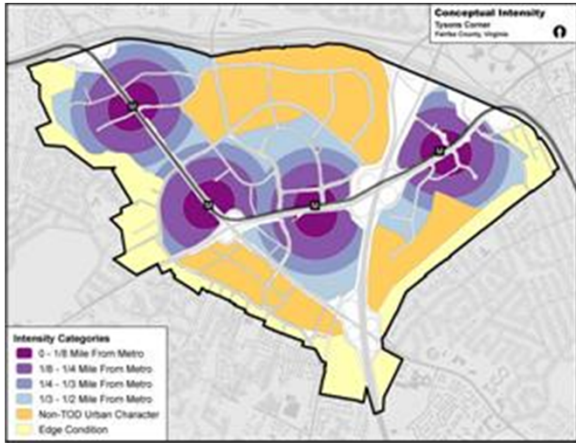
- ✓ Reduce flooding and erosion
- ✓ Collect runoff at the source
- ✓ Improve water quality
- ✓ Improve tributary stability
- ✓ Use innovative & functional designs
- ✓ Make it aesthetic

## Solutions:

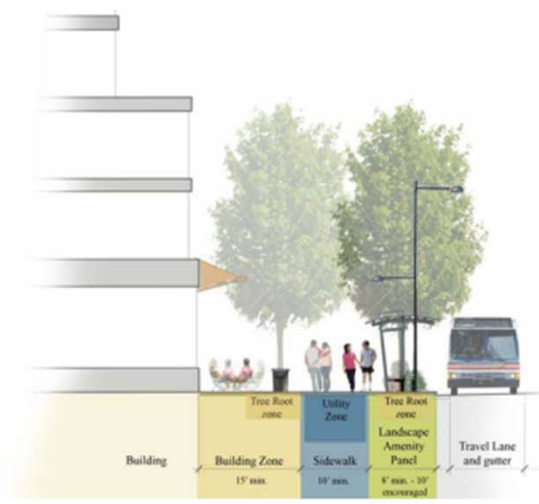
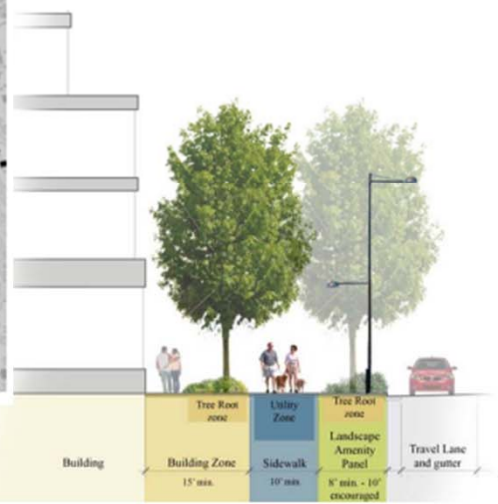
- ✓ Swales
- ✓ Permeable Pavement
- ✓ Infiltration Trenches



# Tysons Corner Comprehensive Plan



d Streetscape Example - Plan



Note: All measurements shown are from back of curb.

# Arlington Green Streets

- Green Streets are the core element of Arlington's stormwater program
- "More than a filter"
  - Reduced volume, heat island, beautification, traffic calming
- Opportunities
  - Road Diets, Traffic Calming, Redevelopment, Pedestrian Improvements
- Challenges
  - Utilities, parking
- "Design, Learn, Design"
  - Green Streets designs are still evolving; learn from performance.
- Long term plan
  - Projects scored and ranked
- Maintenance obligations will grow over time



# Patrick Henry Drive



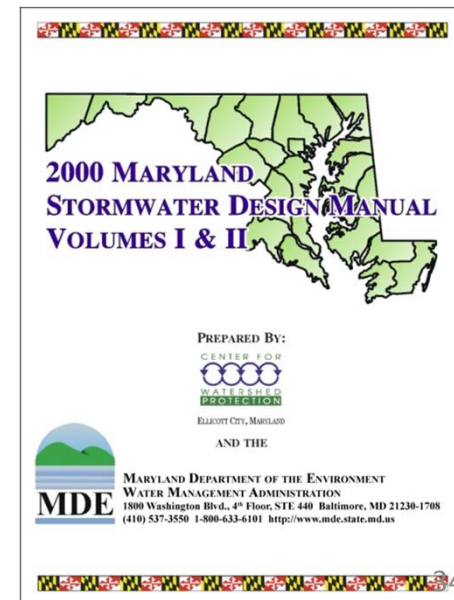
5/3/2013



33

# Maryland's SWM Framework

- The State Highway Administration (SHA) is responsible for only one quarter of the lane miles in MD
- Statewide Stormwater Manual 2000.
- New Regulatory Drivers
  - Stormwater 2007
  - The Bay TMDL and Maryland's Watershed Implementation Plans
  - Sustainable Growth & Agricultural Preservation Act of 2012



# New State Requirements

- Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP)
  - *Capture and treat from 1 inch to 2.6 inches of rainfall depending on the design and site conditions.*
  - *ESD must be used to treat runoff from 1 inch of rainfall.*
  - *ESD must be exhausted before any structural BMP is used.*
- Bay TMDL and WIP. Maryland's Watershed Implementation Plan (WIP) affects the State Highway Administration through the MS4 Permit:
  - SHA to provide treatment for:
    - *30% of pre 1985 developed land in MS4 Phase I areas, and*
    - *20% of pre-1985 developed land in MS4 Phase II area.*
    - *Total of approximately 8,000 acres to be treated*



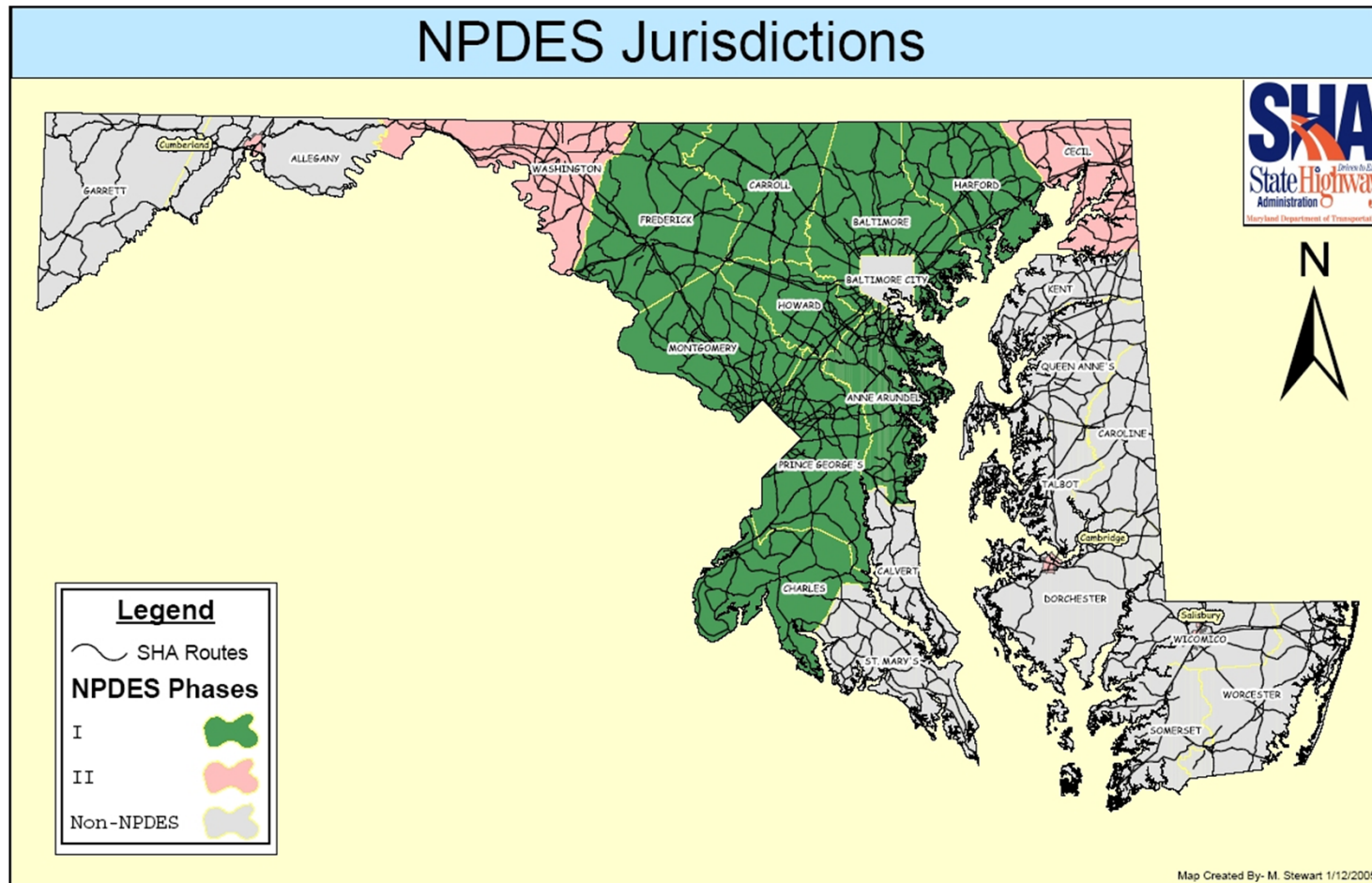
From this...



to this.



# SHA MS4 Permit Areas



# Challenges

- ESD to the MEP + Complete Streets + Compact walkable development =
- Dramatic increase in the number and concentration of SWM facilities
- Limited ROW for many competing purposes
  - SWM facilities
  - Motorists and freight carriers
  - Transit users
  - Pedestrians and Bicyclists

# Watershed Approach

- Collaboration with local planning agencies
- “Many counties have performed restoration assessments on targeted watersheds. The planning process described ...allows individual site development to be evaluated in the context of these larger resource protection efforts.” MDE  
Stormwater Manual
- Identifying SWM opportunities in local area plans.

# Prince George's County Complete and Green Streets Policy (12/2012)

## **SUBTITLE 23. ROADS AND SIDEWALKS.**

### **DIVISION 7. COMPLETE AND GREEN STREETS.**

#### **Sec. 23-615. Complete and Green Streets Policy.**

- ◆ The County hereby adopts a complete and green street policy and principles, consistent with the adopted Complete Street Policy by National Capital Region Transportation Planning Board and the National Complete Streets Coalition, as revised by the County Code.
- ◆ All planned County financed and approved road, sidewalk, trail and transit related construction and reconstruction projects shall include environmental site design and facilities for the combined use of motor, emergency and freight vehicles, transit, bicycles and pedestrians, except when cost shall be disproportionate to the projected need or when such facilities would be inappropriate due to the nature of the project, including the context and character of the surrounding built and natural environment of the neighborhood or area.
- ◆ The Department will review and revise, as deemed necessary by the Director, plans, manuals, policies, processes and the capital improvement program to foster the implementation of a complete and green street on public roadways projects, including privately built projects approved by the Department or on non-County projects funded in part or entirely by county funds.



# Legislation CB-83-2012

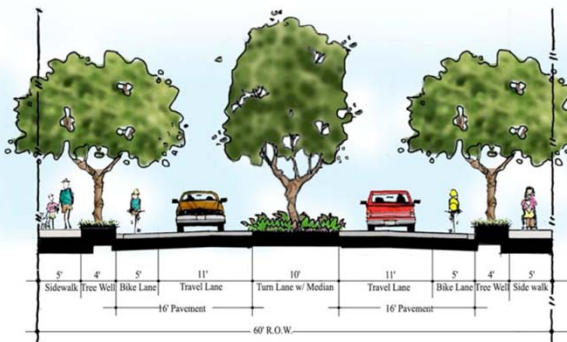
- ◆ **Complete Street** means a public street that safely and adequately accommodates motorized and non-motorized users, including pedestrians, bicycles, motor, freight, emergency and transit vehicles, in a manner appropriate to the function and context of the facility.
- ◆ **Green Street** means a street or road that safely and adequately accommodates and incorporates best management practices of environmental site design for addressing stormwater runoff, including using small scale stormwater management practices, nonstructural techniques, and better site planning to minimize the impact of road and sidewalk development on water resources.

# Why?

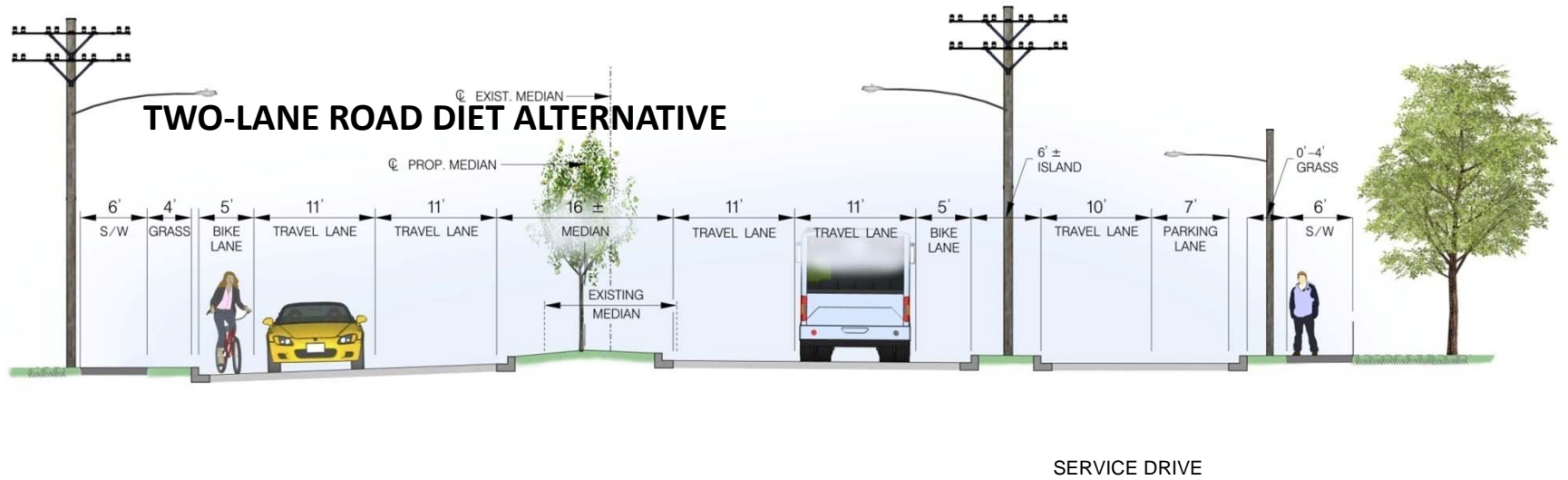
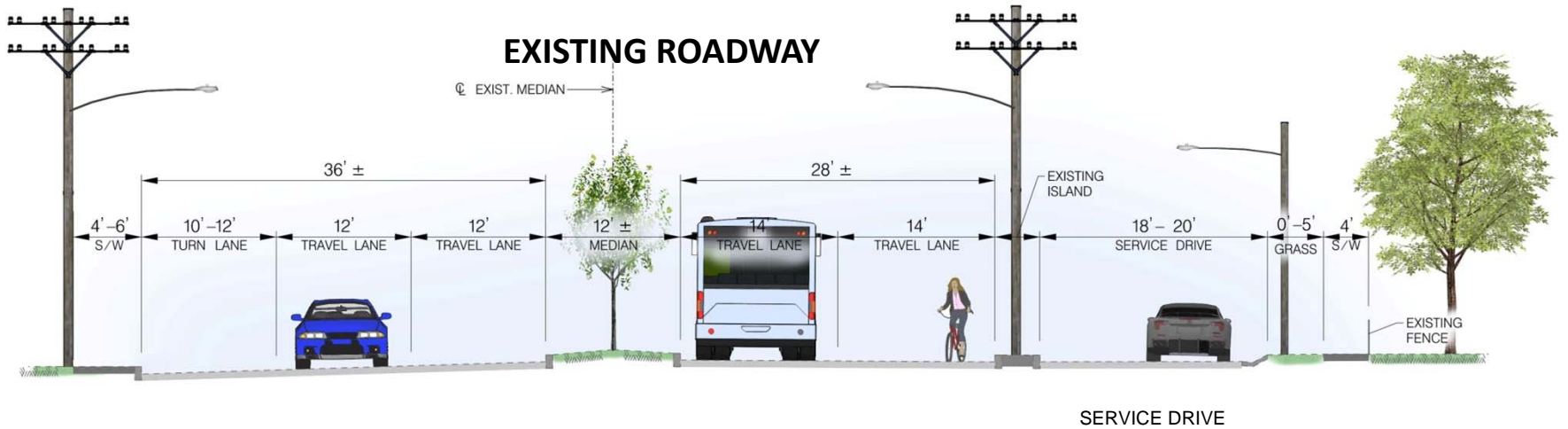
- ◆ Create more livable communities and places
- ◆ Manage stormwater in an environmentally-friendly way
- ◆ Address TMDL and WIP
- ◆ Increase tree canopy
- ◆ Make it easier for people to walk, bike, and use public transportation



5/3/2013



# Ager Road Green/Complete Street Design



# Summary - Lessons Learned

- Stormwater runoff pollution must be reduced
  - Stormwater runoff worsens flooding, water quality
  - Regulations require it
  - Long term process, but need to start now
- Green Infrastructure is often more cost-effective
- Multiple Benefits from Green Streets
  - Enhanced water supplies, beautification, reduced heat island, enhanced property values, economic development
- Green Streets can be Complete Streets
  - Traffic calming, road diets, and streetscaping projects provide opportunities for, benefit from Green infrastructure
  - But trade-offs cannot always be avoided
- Design is still a work in progress
  - West coast designs need adaptation to eastern climate
  - Some trial and error
  - Challenges - utilities, competing uses, soil conditions, connections to drainage
  - Maintenance
- Cooperation between multiple agencies and developers is needed
  - Transportation cannot do it alone
  - Watershed strategy vs. site strategy
  - A directive from the top of a government or agency can help bring multiple departments and agencies together

## Green Streets Policies - Local Government Survey Results – February, 2013

Local Government	Status	Comments
District of Columbia	●	DDOT has adopted a complete streets policy that includes green streets. They are in the process of adopting LID standards for the right of way that should be in place in mid-2013.
Charles County	○	
Frederick County	NR	
City of Frederick	NR	
Montgomery County	NR	
City of Gaithersburg	●	
City of Rockville	●	The 2013 Rockville Creek Watershed Study includes a recommendation to update the road code to include green street techniques and pilot a green street retrofit project. Once a green street is successfully pilot the City will develop lessons learned for potential future policies and projects.
City of Takoma Park	○	
Prince George's County	●	
City of Bowie	○	TMDL and new Stormwater Management regulations may require development of Green streets policy.
City of College Park	NR	
City of Greenbelt	●	Any time work is done to a street we look into all the green options available.
Town of Bladensburg	●	Green Streets Sector Plan approval
Arlington County	○	The County does not have a Green Streets policy, but does have a Green Street Program to help meet is Municipal Separate Storm Sewer Permit (MS4 Permit) and the Chesapeake Bay Total Maximum Daily Load (TMDL) requirements. <a href="http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page81126.aspx">http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page81126.aspx</a>
Fairfax County	●	Environmentally-sensitive streetscaping concepts have been incorporated in design guidelines for Tysons Corner, and complete streets policies have been adopted.
Loudoun County	○	
Prince William County	○	
City of Alexandria	●	Included in City Master Plan and associated small area plans; and Transportation Management Plan
City of Fairfax	○	
City of Falls Church	NR	
City of Manassas	NR	
City of Manassas Park	○	

- - Implemented
- - In Progress
- - Not Started
- N/A - Not Applicable
- NR - No Response

# Next Steps?

- A. Develop a regional Green Streets policy modeled on the TPB's Complete Streets policy.
  - Continue to share information on Best Practices through the relevant committees and periodic workshops.
- B. Share information, but do not develop a regional Green Streets Policy.
- C. Other?

# Questions?

**Michael J. Farrell**  
Transportation Planner IV  
Metropolitan Washington Council of  
Governments  
202-962-3760  
[mfarrell@mwkog.org](mailto:mfarrell@mwkog.org)