

# Watershed Restoration Program

*Challenges Lead to Opportunities*

Craig Carson, Manager  
Montgomery County  
Department of Environmental Protection

# Montgomery County's Major MS4 Permit Requirements

---

- **Implementation Strategy**: Develop plan within one year that meets Permit requirements (projects, funding, water quality)
- **Watershed Restoration**: Retrofit 20% of impervious surfaces not currently controlled to the maximum extent practicable (MEP)
- **Water Quality**: Make Progress toward meeting permit wasteload allocations (nitrogen, phosphorus, sediment, bacteria, trash TMDLs)
- **Trash Reduction**: Implement initiatives to meet commitments in Trash Free Potomac Treaty goals
  - **Anacostia Trash TMDL (2<sup>nd</sup> trash TMDL in the U.S.)**
- **Public Outreach**: Engage public through outreach and stewardship opportunities
- **Report and Monitor**: Submit annual report on progress

# MS4 Permit Requirements: Focusing on Restoration

---

- Mitigating past sins by improving water quality
- From 1995 through 2010, added runoff management for approximately 2,200 impervious acres or equivalents
- 2010-2015, requires additional stormwater management for **20 percent** of impervious surfaces (4,300 acres = 6.7 square miles)
- **2015 – refined baseline number to ~ 3777**

# Watershed Restoration Process



# Watershed Study Process

## The Watershed Study Process



### STEP 1 — IDENTIFY WATERSHED

A watershed is selected for analysis.



### STEP 2 — DATA COLLECTION

• **Stormwater Practices Opportunities** – areas where stormwater practices can be provided or upgraded are identified. There are three major types of stormwater practices being evaluated:

- Larger stormwater practices (ie. Stormwater Ponds)
- Green Streets Practices – small stormwater practices are installed in the right-of-way to control and filter stormwater pollution during storm events
- Government Facilities – smaller, site specific stormwater practices are installed to capture stormwater from existing buildings and parking lots on County properties

• **Stream Assessments** – field evaluation of the stream is based on its physical condition, aquatic habitat, and identification of exposed/threaten infrastructure (i.e. sewer line) to determine restoration potential

• **Neighborhood Stormwater Assessment** – neighborhoods with inadequate stormwater control are evaluated for opportunities within the RainScapes Incentive Program

• **Reforestation Opportunities** – areas are identified for potential forest enhancement or expansion



### STEP 3 — DATA ANALYSIS AND PRIORITIZE PROJECTS

Data collected from Step 2 is analyzed and drafts of potential restoration projects are compiled, which are then prioritized based on water quality, aquatic habitat quality, and site condition.



### STEP 4 — DRAFT WATERSHED STUDY

A watershed study is drafted based on the result of the data analysis and project prioritization in Step 3.

### STEP 5 — PUBLIC MEETING

A public meeting will be held to present the draft watershed study to the public for comments.

### STEP 6 — FINALIZE AND PUBLISH WATERSHED STUDY

Comments from the public meeting is used to finalize and publish the watershed study



### STEP 7 — IMPLEMENTATION PLAN

An Implementation Plan is created and is a comprehensive roadmap the County uses for watershed restoration. The plan includes the individual Watershed Studies developed in Steps 1-6 and strategies to reduce stormwater pollution, bacteria, and trash and litter.

# Countywide Coordinated Implementation Strategy

	Description	Area (acres)
<b>A.</b>	<b>Impervious Area Subject to Third Generation MS4 Permit</b>	<b>25,119</b>
<b>B.</b>	<b>County MS4 Impervious Area Controlled to MEP in 2009</b>	
	Per The Strategy (2009)	3,661.0
	Updated BMP Tracking and Drainage Area Delineations	691.2
	MEP Verification of Existing Facilities	1,597.3
	Incorporating Existing Roadside Swales	278.3
	Crediting Disconnected Large Lots	7.4
	<b>TOTAL</b>	<b>6,235.2</b>
<b>C.</b>	<b>County MS4 Impervious Area Under/Uncontrolled (2015 Revision) (A-B)</b>	<b>18,884</b>
	<b>Restoration Requirement (2015 Revision) (20% of C)</b>	<b>3,777*</b>

*\*See Section C.ii. for comparison of final restoration requirement and original estimate in the Strategy*

## Countywide Watersheds

Summary of Implementation Plan schedule with expected MS4 permit area WLA compliance endpoints

	2015	2017	2020	2025	2030	Permit/ TMDL Target 2017	Permit/ TMDL Target 2020
Impervious Area Treated (acres) (cumulative)	4,292	6,014	7,722	10,518	11,154	6,008	7,723
% of Impervious Area Treated by ESD	18%	34%	47%	60%	635%		
Impervious Area Treatment Cost (Million \$) (see assumptions 1&2)	305	622	987	1,687	1,884		
% of Cost for ESD	53%	66%	70%	80%	80%		
Nitrogen (% Reduction)	18%	25%	36%	46%	51%	9%	20%
Phosphorus (% Reduction)	17%	23%	34%	44%	46%	12%	34%
Sediment (% Reduction)	23%	34%	54%	60%	62%	20%	37%
Bacteria (% Reduction)	11%	15%	20%	28%	30%		
Trash (% Reduction)	18%	16%	33%	41%	42%		

### Assumptions:

1. Does not include repeated Outreach and Education costs beyond FY2015
2. Does not include an inflation multiplier

# Watershed Restoration Strategy



Uncontrolled runoff



Eroded streams



Increased storm flows & decreased base flows



Exposed infrastructure



Degraded aquatic habitat & water quality



# Watershed Restoration Strategy

---



**Stormwater Pond  
Retrofits**



**Stream  
Restoration**



**Green Streets**

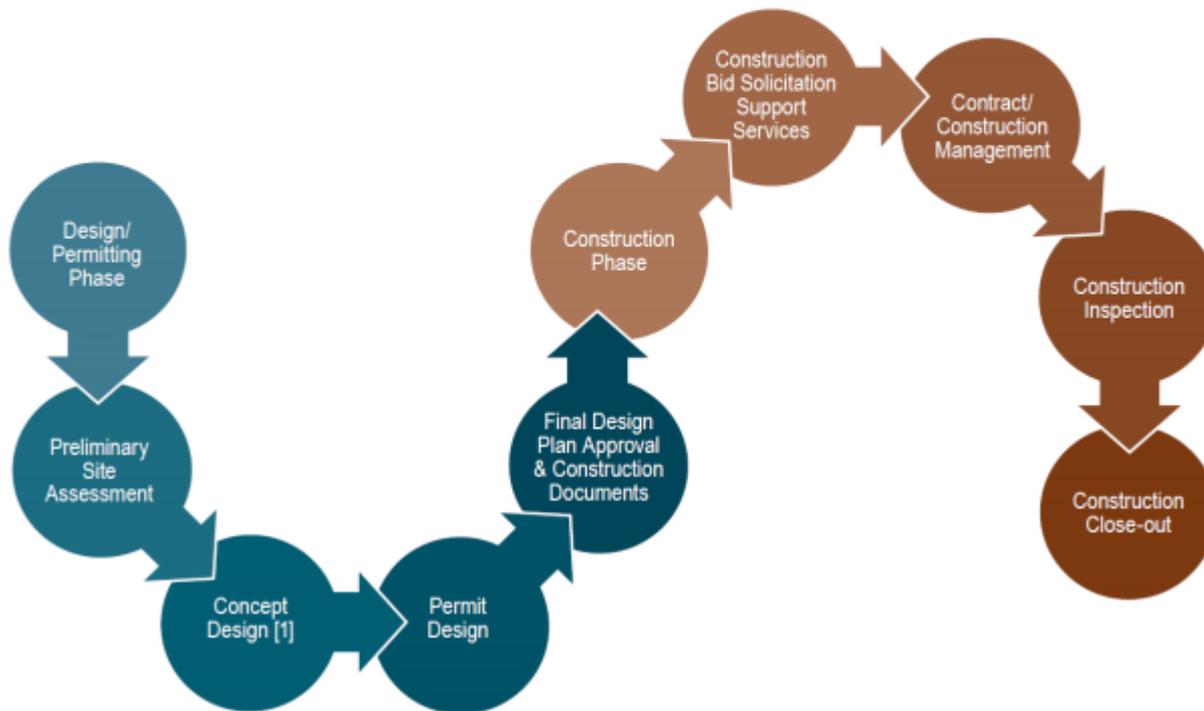


**Government Facility LID**

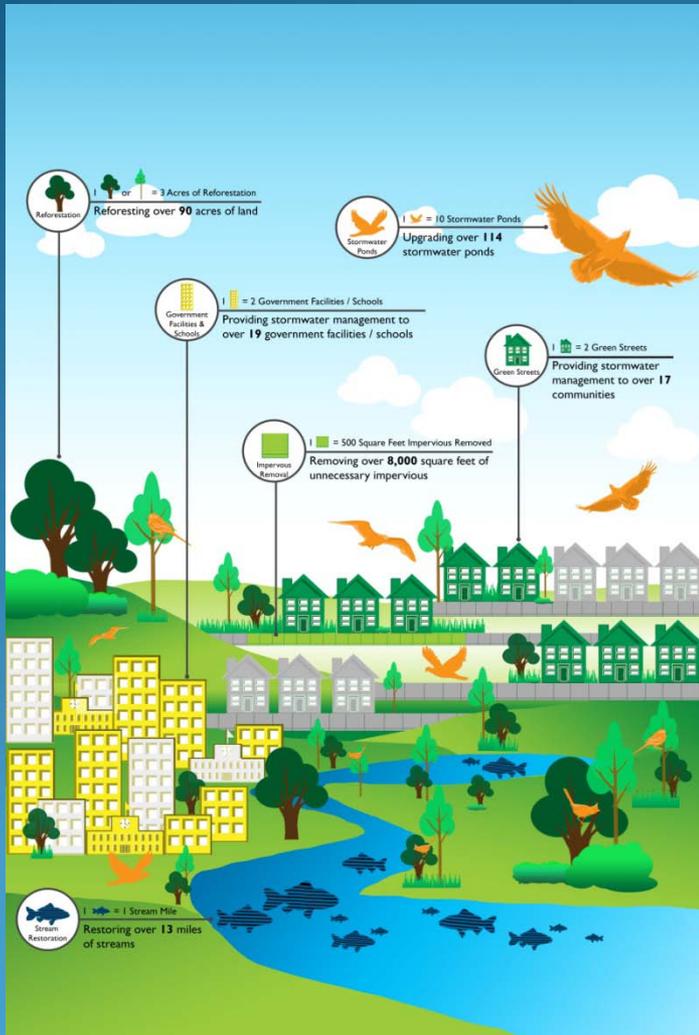
# Project Delivery

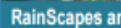
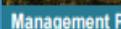
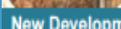
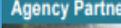
## D.II.5 PROJECT TIMEFRAMES

To improve efficiency and speed project delivery DEP developed a consistent set of deliverables and tasks that guide and mark the progress of restoration projects. Figure D-10 illustrates the steps involved during the design/permitting phase and the construction phase.



# Impervious Area Credits by Delivery Method



	Complete	In-Construction	In-Design	Total
<b>Capital Improvement Projects</b>	663.6	152.2	2268.8	3084.6
 Stream Restoration	88.7	57.5	510.2	656.4
 Green Streets	19.1	0.6	91	110.7
 Government Facilities	3.2		34.1	37.3
 Stormwater Retrofits	552.6	94.1	1633.5	2280.2
<b>RainScapes and WQPC Credits</b>	38.8			38.8
 RainScapes	15.8			15.8
 WQPC	23.0			23.0
<b>Complementary</b>	6.1	19.7	8.5	34.3
 Reforestation	6.0	19.7	8.5	34.2
 Impervious Surface Removal	0.1	0.03		0.1
<b>Management Programs</b>	248.6			248.6
 Street Sweeping	162.6			162.6
 Catch Basin Cleaning	86.0			86.0
<b>New Development and Redevelopment</b>	305.2			305.2
 MCPS	12.8			
 M-NCPPC	3.3			
 Private	53.4			
 New BMPs Treating	235.7			
 Existing Impervious				
<b>Agency Partnerships</b>	463.5	25.5	153.3	642.3
 ICC	252.7	16.9	58.8	328.4
 WSSC	23.2	8.6	94.5	126.3
 DGS	0.9			0.9
 MCPS	0.7			0.7
 DOT	50.0			50.0
 USACE	136.0			136.0
<b>Total</b>	1725.8	197.4	2430.6	4353.8

# New Stormwater Management Ponds



Stoney Creek Stormwater Management Pond – National Institutes of Health in Bethesda, Maryland

Treated = 110 impervious acres  
Completed - 2013



# Stormwater Management Pond Retrofits



Fallsberry Stormwater Management  
Pond in Potomac, Maryland



Treated = 13 impervious acres  
Completed - 2014

# Stream Restoration



**Before**

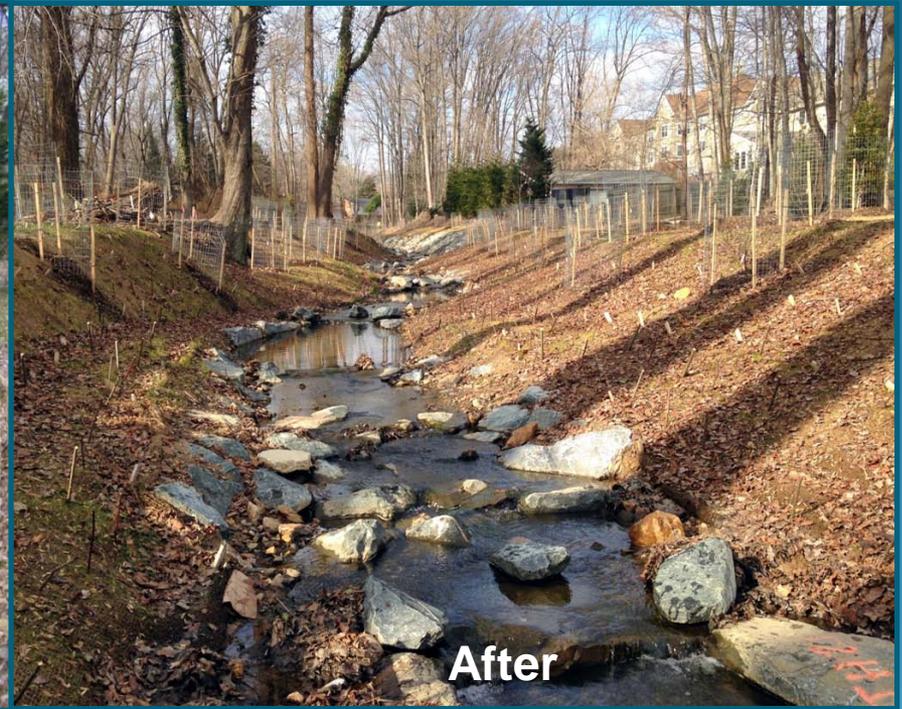


**After**

**Batchellor's Run East Stream Restoration  
Project near Layhill, Maryland**

**Length = 1,901 Feet  
Completed - 2012**

# Stream Restoration



Hollywood Branch Stream Restoration Project in  
Colesville, Maryland

Length = 4,700 Feet  
Construction Completed – 2015

# Stream Restoration



Before



After

Breewood Stream Restoration Project  
near Wheaton, Maryland

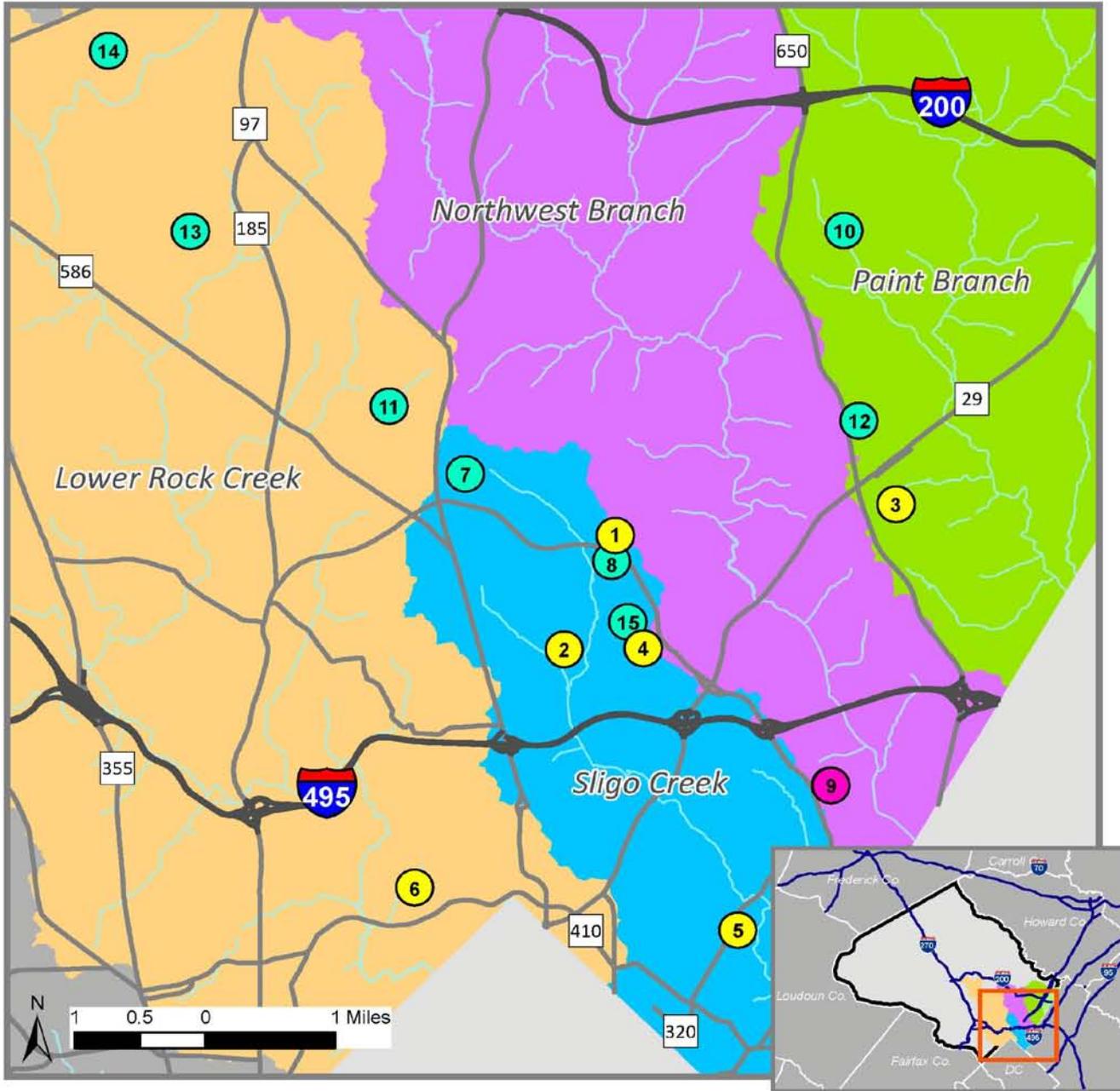
Length = 1,280 Feet  
Completed - 2015

# Green Streets

---



# Montgomery County Green Streets (March 2015)



	<b>COMPLETE</b>
1	Arcola Avenue
2	Forest Estates
3	White Oak
4	Dennis Avenue
5	Sligo Park Hills
	<b>IN CONSTRUCTION</b>
6	Donnybrook
7	Amherst
8	Breewood
9	Franklin Knolls and Clifton Park
	<b>IN DESIGN</b>
10	Cannon Road
11	Glenmont Forest
12	Springbrook \ Homestead Estate
13	Wheaton Woods
14	Manor Woods
15	McDonald Knolls \ Ballantrae \ Sligo Estates

# Green Streets

## Forest Estates

### Green Streets

Environmentally Friendly Landscapes  
for Healthy Watersheds

#### Green Streets in Your Neighborhood



Department of Environmental Protection  
Green Streets in Your Neighborhood

Forest Estates

# Green Streets

## Forest Estates

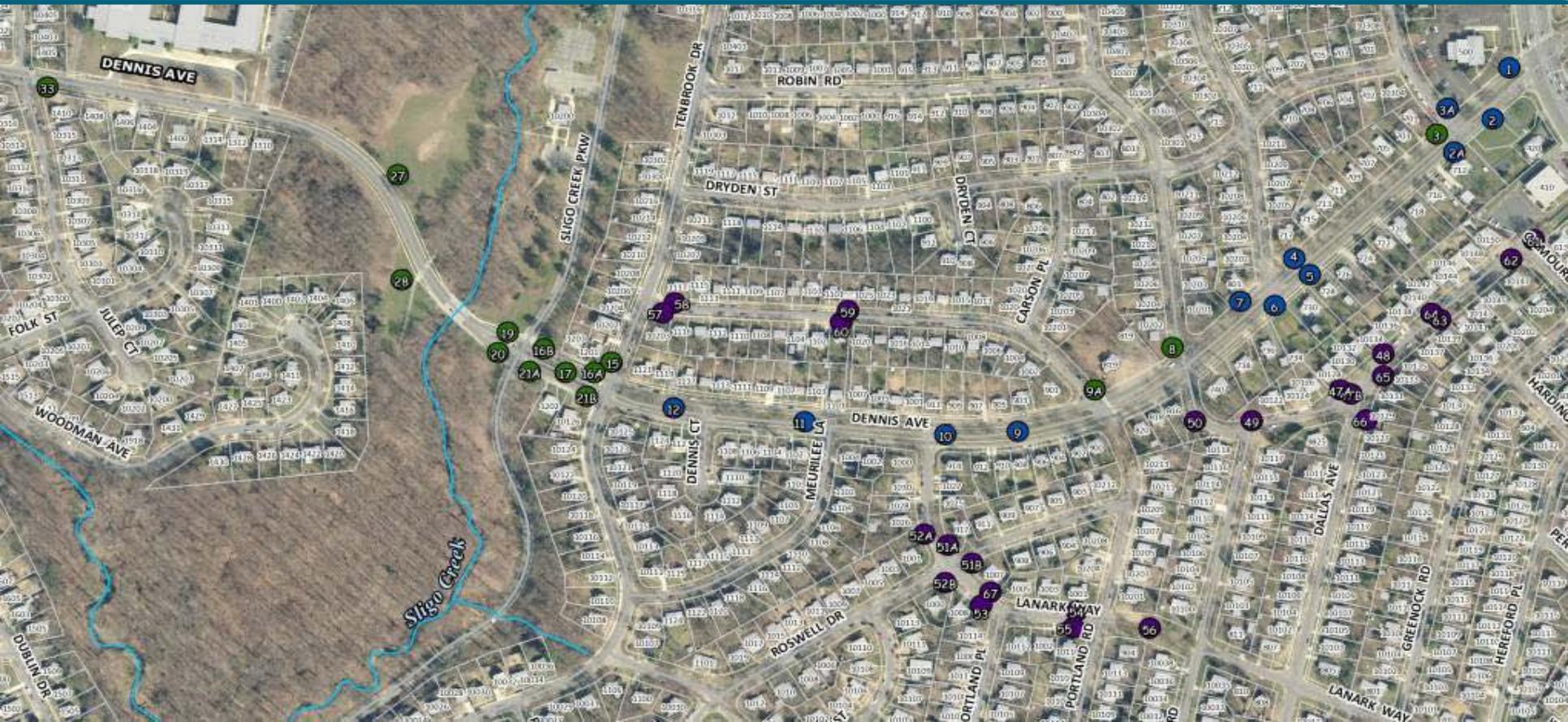


# Green Streets

## Dennis Avenue

Project divided into  
three phases:

- Phase 1 – Dennis West (Green)
- Phase 2 – Dennis East (Blue)
- Phase 3 – Dennis Peripherals (Purple)



# Green Streets

## Dennis Avenue



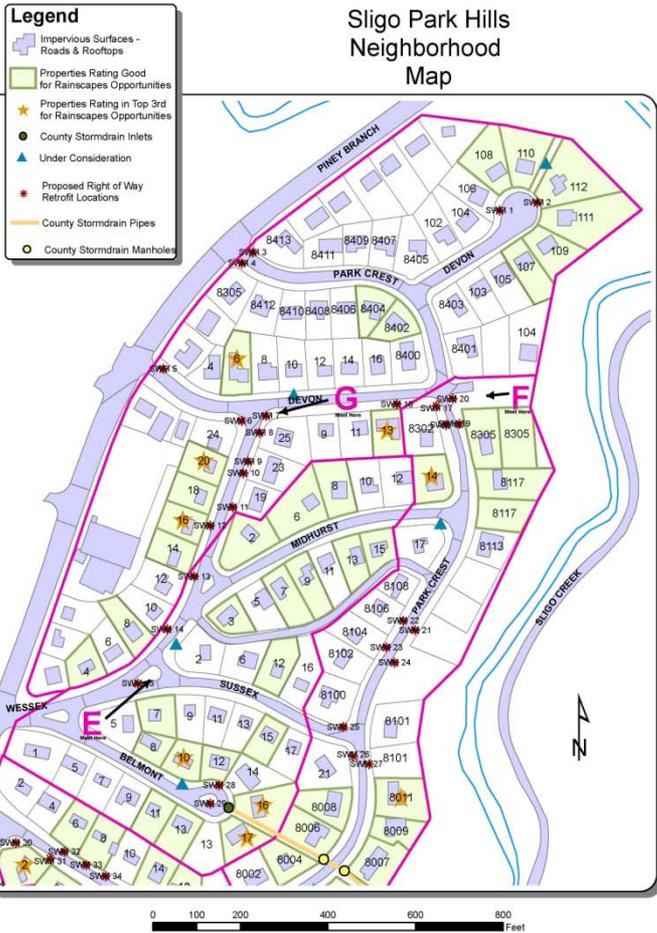
# Green Streets

## Dennis Avenue

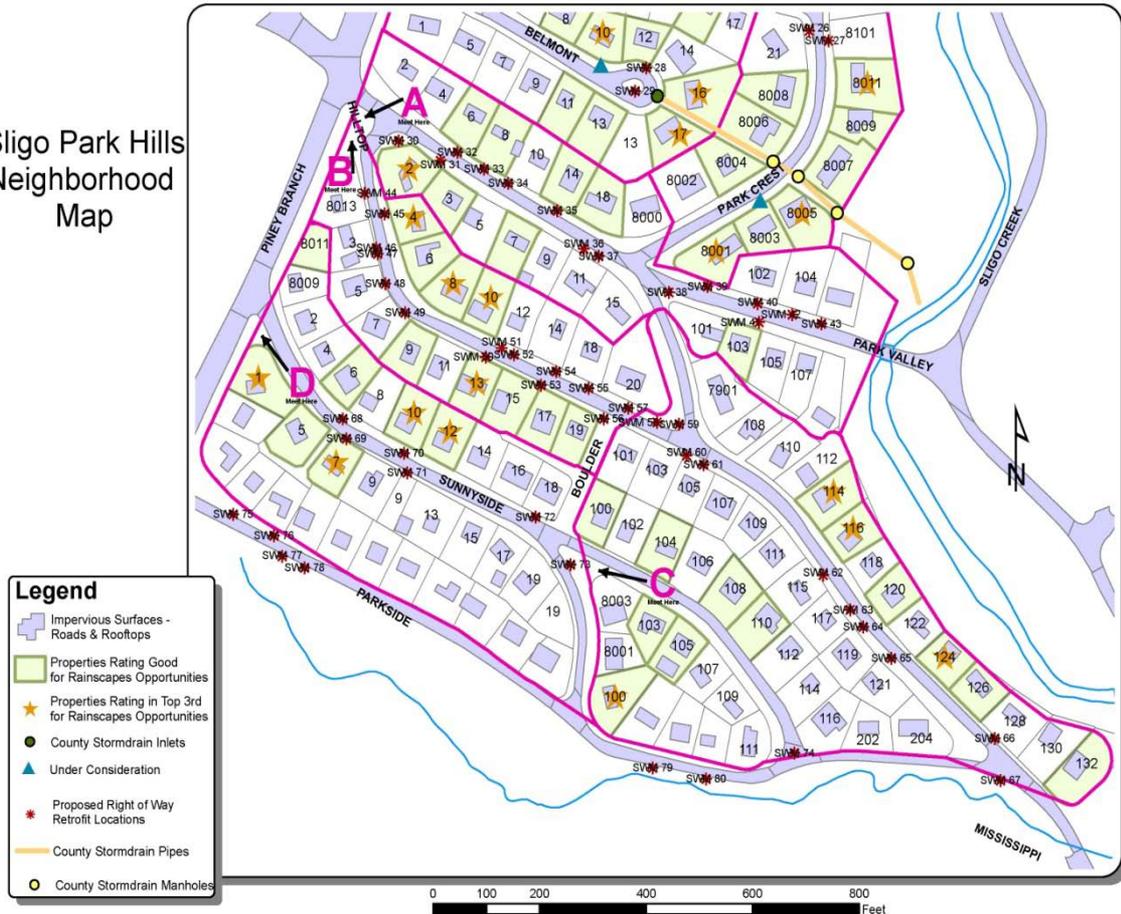


# Green Streets

## Sligo Park Hills Neighborhood

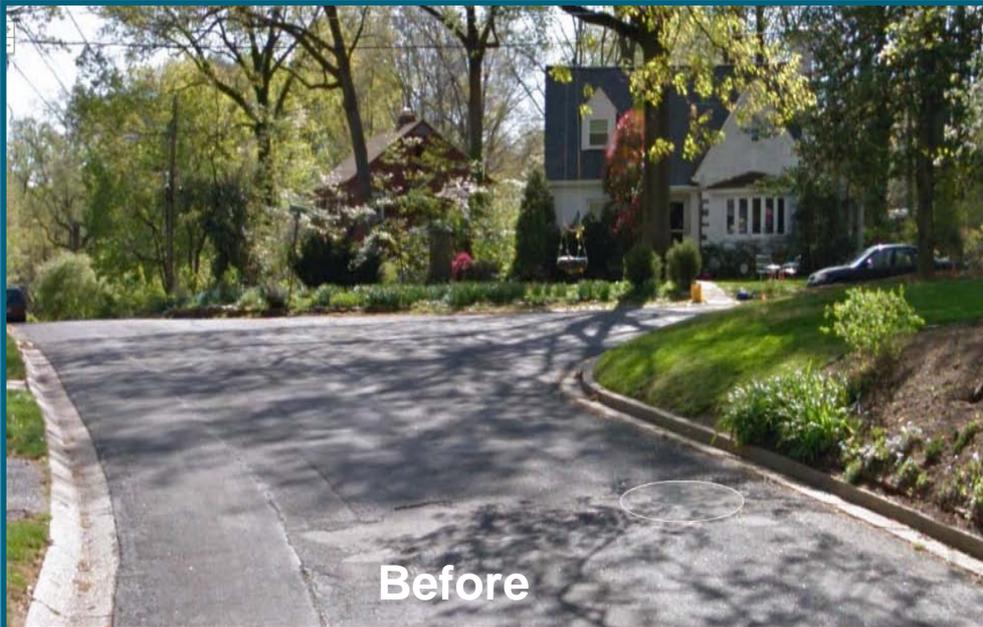


**Sligo Park Hills Neighborhood Map**



# Green Streets

## Sligo Park Hills



Bioretention and rain gardens within the green panel

# Green Streets

## Sligo Park Hills



Pavedrain parking pads

# School Low Impact Development Projects

## Ridgeview Middle School



Completed - 2012

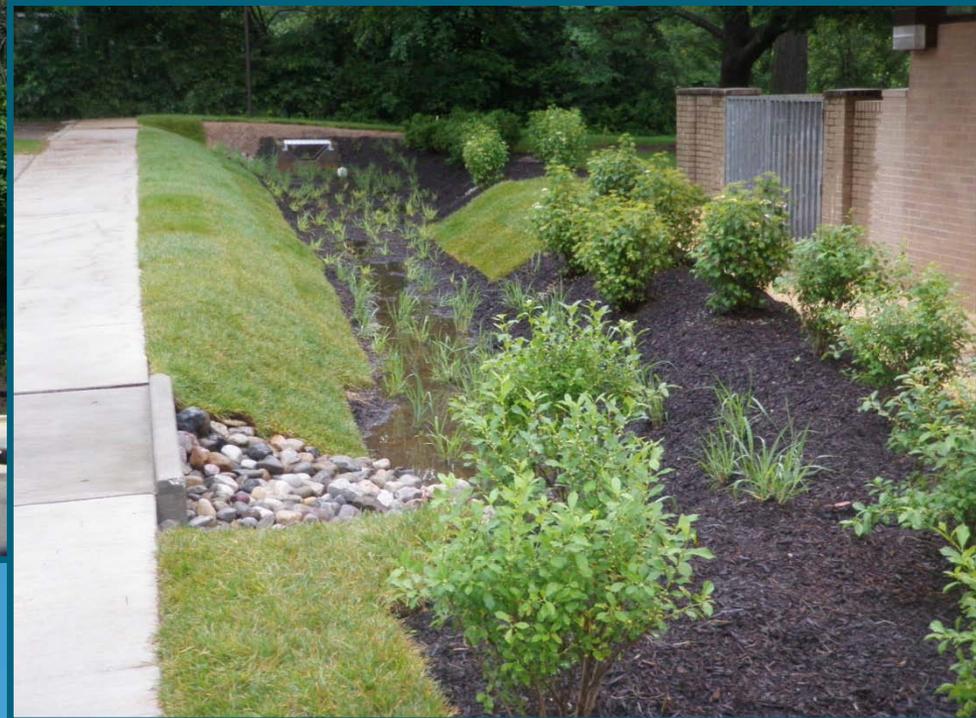


# Government Facilities Low Impact Development

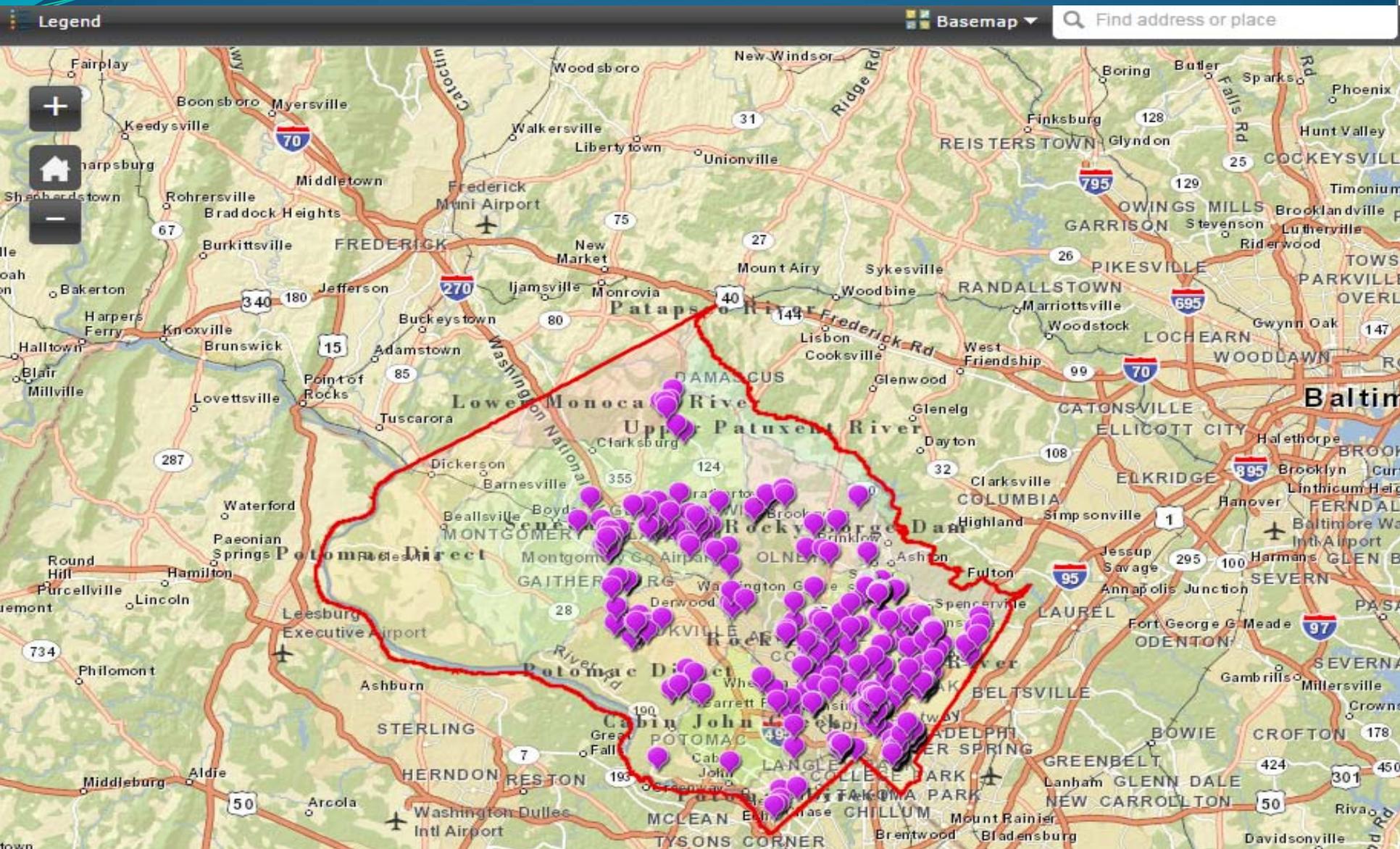
## Kensington Library



Completed - 2012



# Find a Restoration Project



# Watershed Restoration Outreach – Public Acceptance

Public outreach effort involves engaging and gathering community input through public meetings, community walks and individual meetings.

## Working Together—A Neighborhood Process

### Project Selection

Project is selected based on priority watersheds identified in Watershed Study Report, or based on the Department of Transportation's roadway rehabilitation schedule, or other priority



### Preliminary Assessment

- Opportunities are identified within the neighborhood based on available information and field visits by the County's project team
- Public meeting to receive input from the community



### Design

- Proposed designs are prepared utilizing detailed field survey and geotechnical information
- Ongoing public outreach



### Final Design

- Community walk to provide design update and receive further public input
- Additional design revisions

### Construction

- Designs are finalized
- Green Street practices are constructed
- Green Street practices are planted



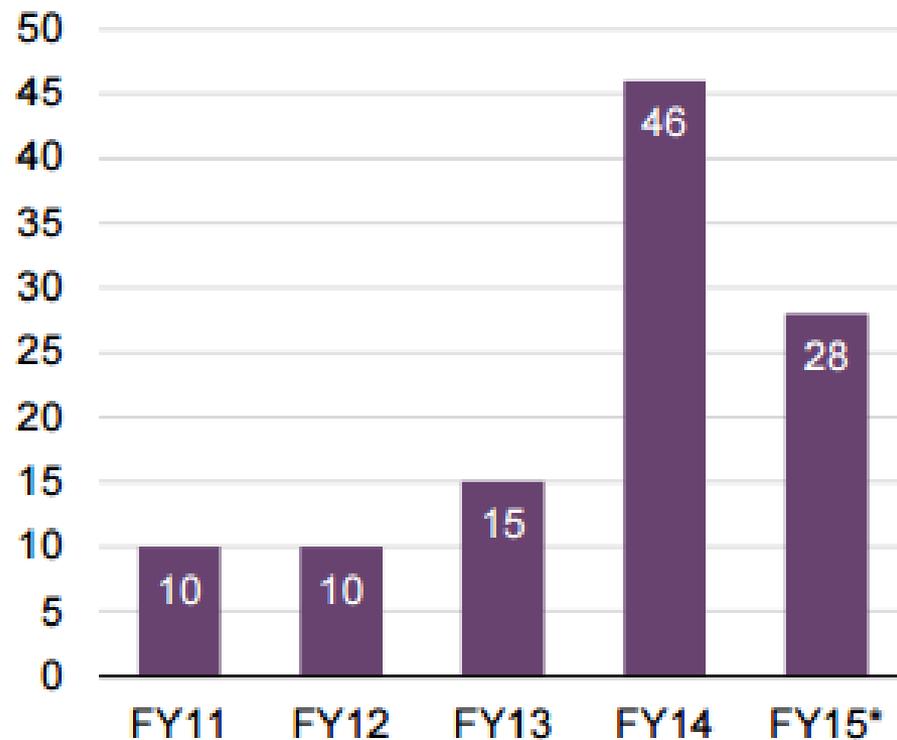
### Maintenance

- Final inspection
- As-builts drawings are accepted
- Green Street practices are entered into DEP maintenance system
- Green Street practices are inspected and maintained monthly

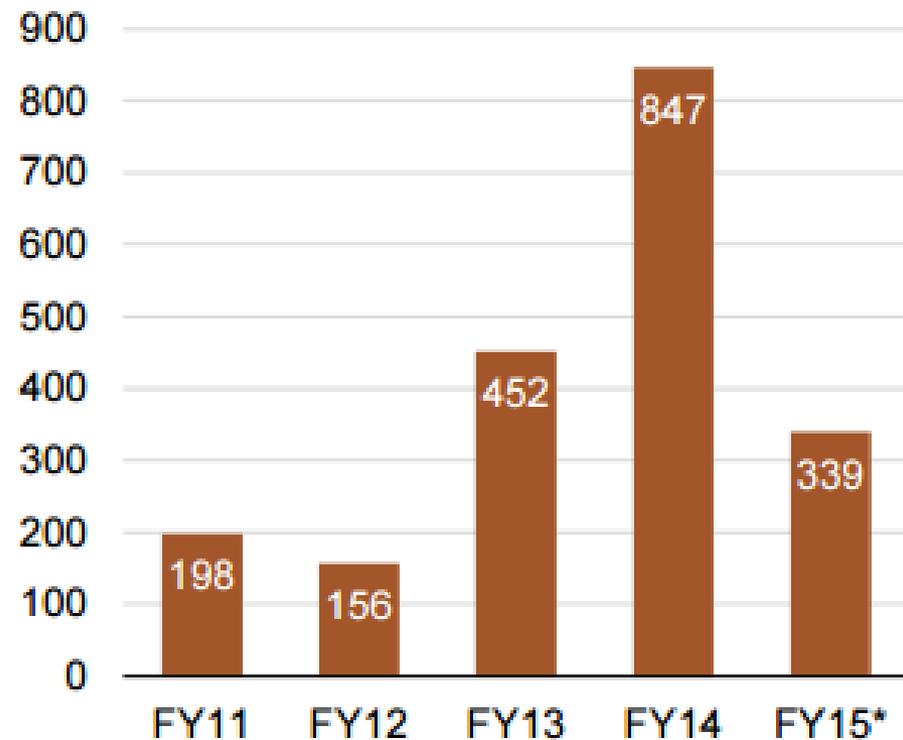
last revised March 11, 2014

# Watershed Restoration Outreach

## Meetings



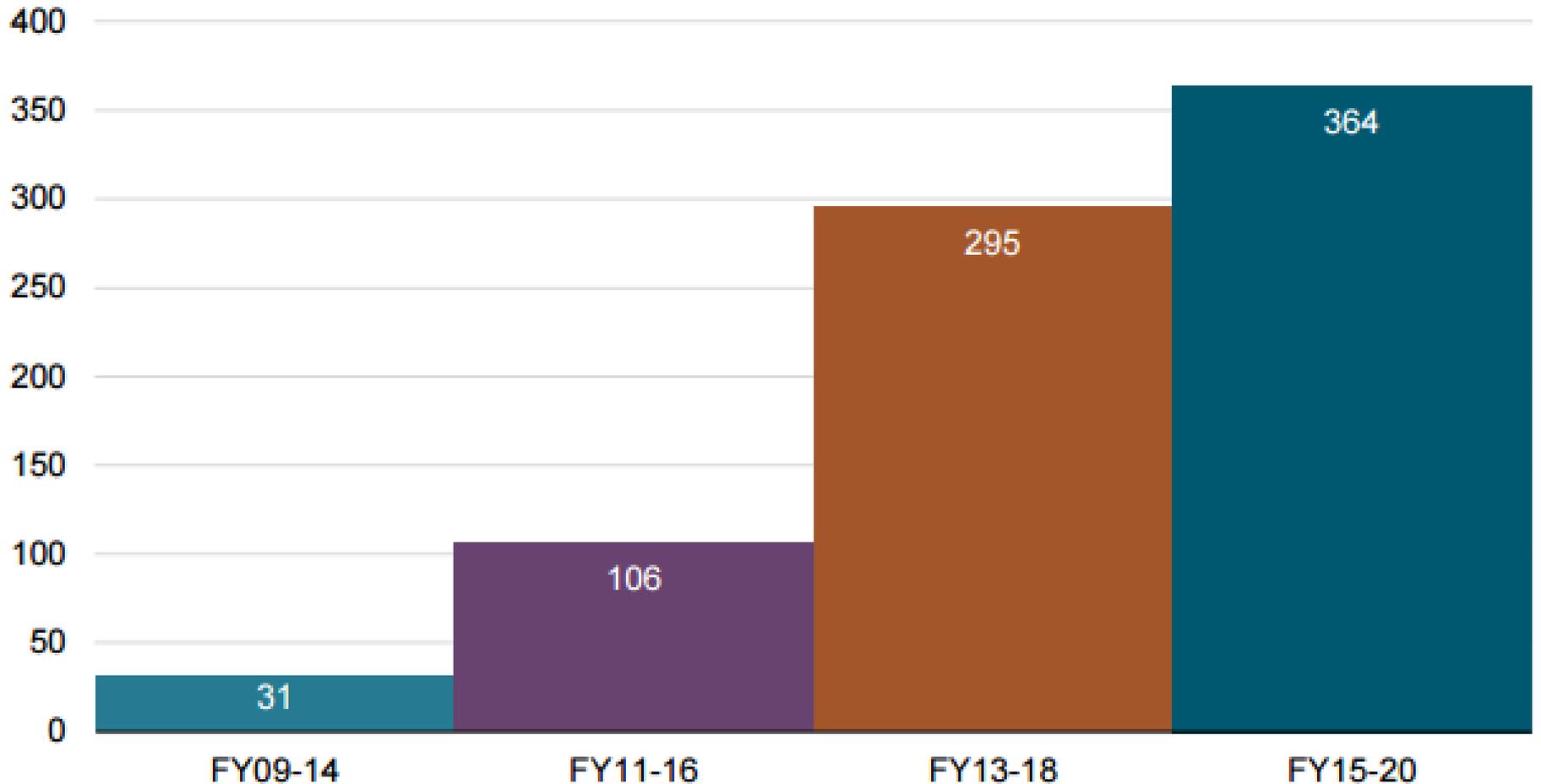
## Impressions



\*FY15 does not include efforts beyond the end of the permit cycle (February 2015).

# Watershed Restoration Capital Improvement Budget

CIP Budget for 5-year Periods (Millions of Dollars)

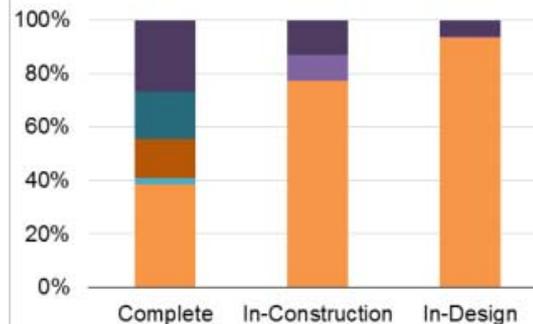


# Implementation Results

## As of February 2015

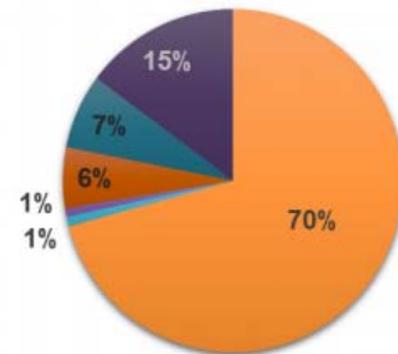
- Completed restoration treating 1,726 acres of impervious area or its equivalent
- 197 acres under construction (acres or projects referred to as “inconstruction”).
- 2,431 acres were under contract for design (acres or projects referred to as “in-design”).

Status by Delivery Method



■ Capital Improvements Program Projects  
■ RainScapes and WQPC Credits  
■ Complementary Restoration Projects

Total by Delivery Method



■ Management Programs  
■ New Development and Redevelopment  
■ Agency and Department Partnerships

# Measuring Success: Small Watershed Restoration

## *Breewood Tributary of Upper Sligo Creek Community Description*

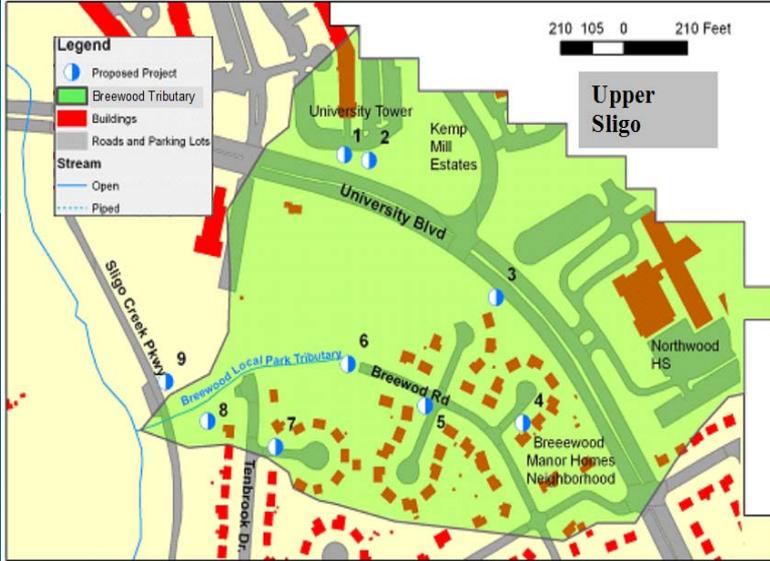
- Approximately 60 acres
- No HOAs
- 33% imperviousness
- Presbyterian Church
- Diverse Community
- Mixed Use – Single Family Homes and High Rise Apartments
- Local High School

### ■ Retrofits

- Green Streets Stormwater Retrofits
- RainScapes Neighborhood
- Parking Lot LID Retrofits

### ■ Stream Restoration

- Environmental Outreach and Litter Reduction
- Local Park Improvement – Weed Warriors
- Biology, flow, and water quality monitoring



Contractor demonstrating sampling equipment during cleanup event

# Clean Water, Green Communities

## Stream Restoration



## Green Streets



## Stormwater Ponds

