

Green Streets

Dennis Avenue

Environmentally Friendly Landscapes
for Healthy Watersheds

[www.montgomerycountymd.gov/
DennisGreenStreet](http://www.montgomerycountymd.gov/DennisGreenStreet)



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Jennifer St. John, Watershed Planner

Watershed Management Division

Department of Environmental Protection

jennifer.st.john@montgomerycountymd.gov



Introductions

- Jennifer St. John
 - Watershed Planner, Montgomery County Department of Environmental Protection (MCDEP)
- Other Project Team Members
 - Craig Carson
 - Restoration Program Manager, MCDEP
 - Mark Wilcox
 - Project Manager/Engineer, MCDEP
 - Bill Park
 - Design Engineer, Greenman-Pedersen, Inc.
 - Gerald McCauley
 - Montgomery County Department of Transportation (MCDOT)

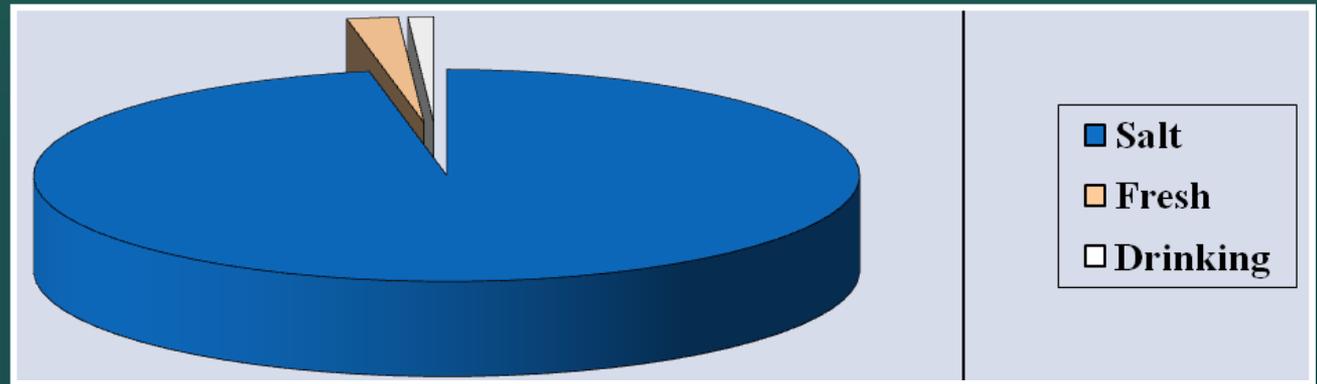
Today's Agenda

- Watershed 101
- Stormwater 101
- Why Green Streets?
- Green Streets Project Selection
- Project Location/Schedule
- Green Streets Practices
- Other Project Locations
- FAQs



Watershed 101

■ Sources of Water

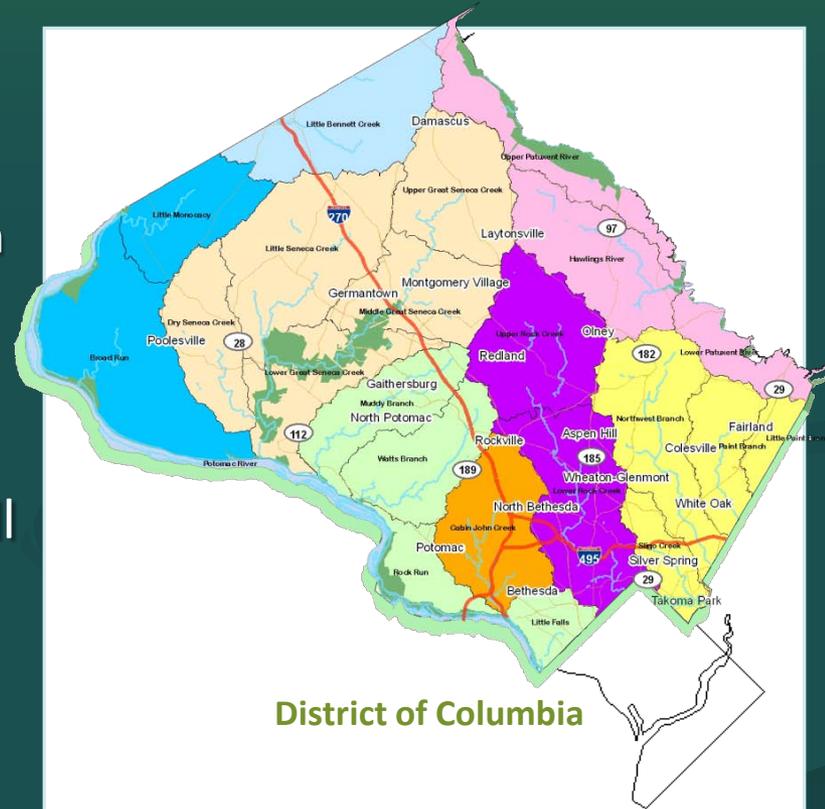


- About 97% is salt water
- About 2% is frozen
- Only 1% is available for drinking water
 - 95% from groundwater across the Country
 - 32% from groundwater, 68% from surface water in Maryland
- Potential for greater impacts from runoff in Maryland

Watershed 101

■ Montgomery County, MD

- 500 sq. miles
- 970,000 people
 - Second only to Baltimore City within Maryland in average people per square mile
- 184 languages spoken
- About 12% impervious surface overall
 - About the size of Washington DC
- Over 1,500 miles of streams
- Two major river basins:
 - Potomac
 - Patuxent
- Eight local *watersheds*

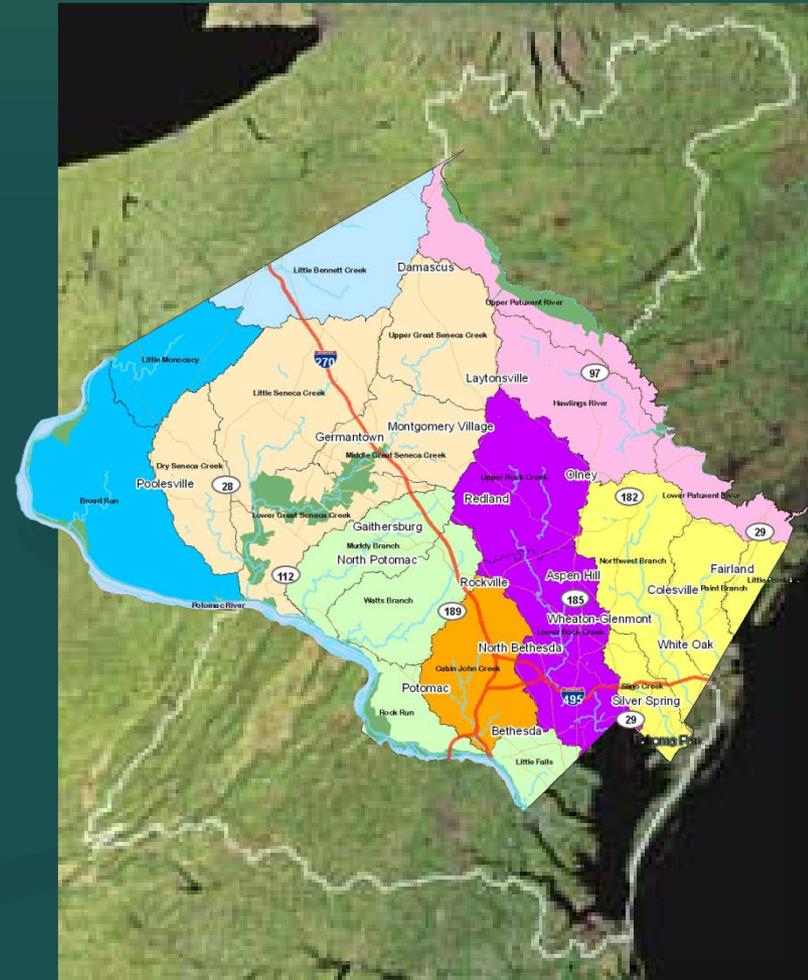


- **Impervious:** Not allowing water to soak through the ground.

Watershed 101

■ What is a Watershed?

- A *watershed* is an area from which the water above and below ground drains to the same place.
- Different scales of watersheds:
 - Chesapeake Bay
 - Eight local watersheds
 - Neighborhood (to a storm drain)

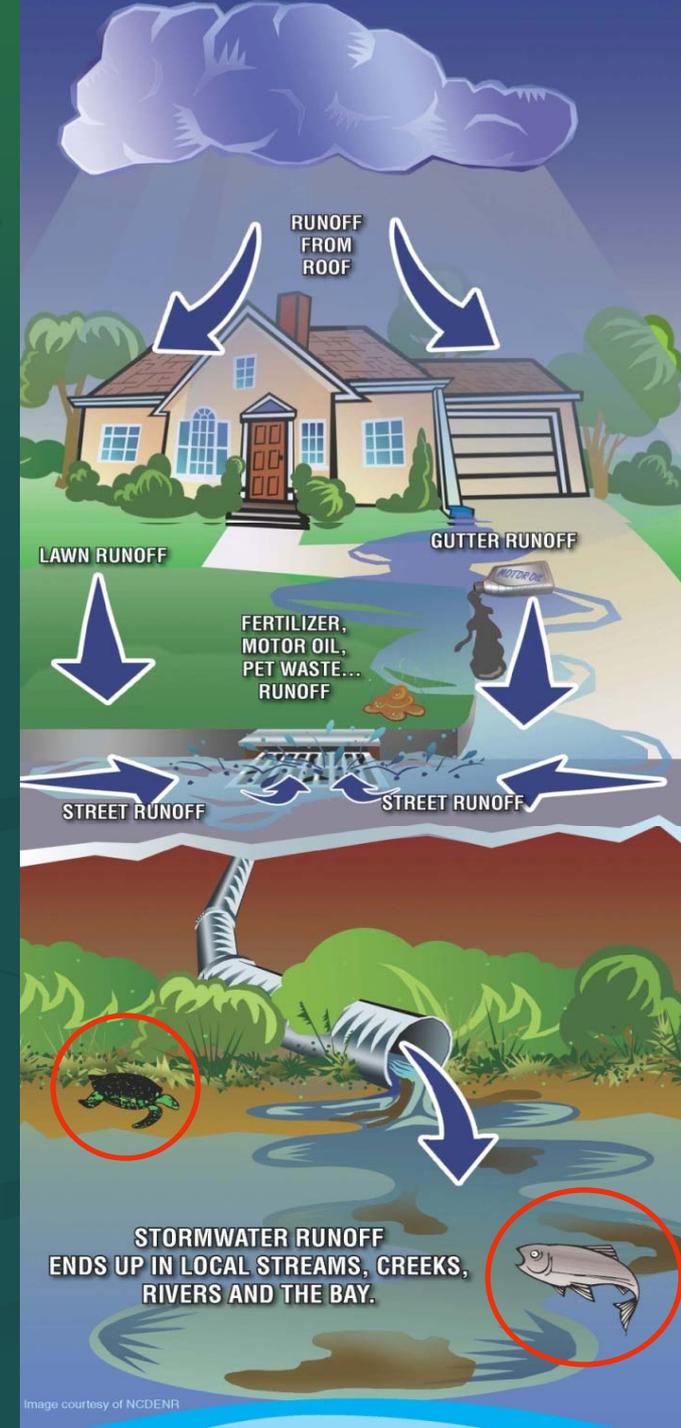


Watershed 101

■ What is Runoff?

- Water that does not soak into the ground becomes surface runoff. This runoff flows over hard surfaces like rooftops, driveways and parking lots collecting potential contaminants and flows:
 - Directly into streams
 - Into storm drain pipes, eventually leading to streams
 - Into stormwater management facilities, then streams

Two Major Issues:
Volume/Timing of Runoff
Water Quality



Watershed 101

■ What is the County doing to protect our Streams?

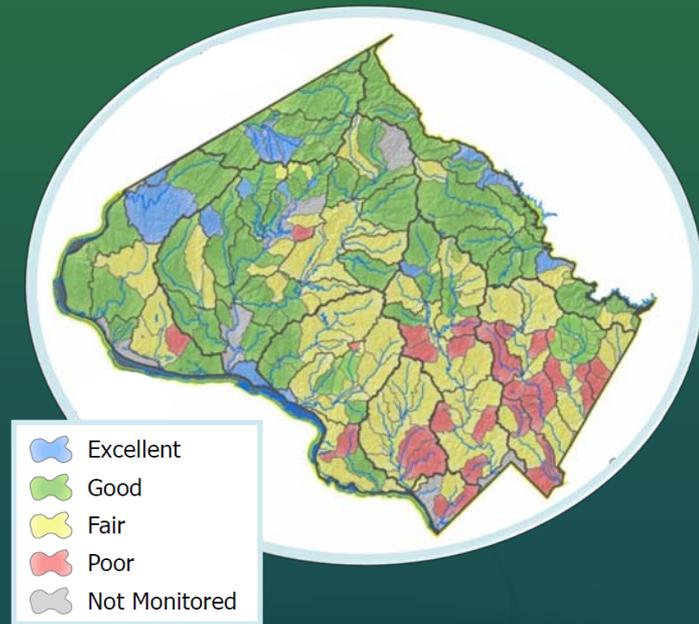
■ Must meet regulatory requirements

- Federal Clean Water Act permit program
- MS4 = Municipal Separate Storm Sewer System

■ Applies to all large and medium Maryland jurisdictions

■ County Programs

- Restore our streams and watersheds
 - Add runoff management
- Meet water quality protection goals
 - Reduce pollutants getting into our streams
- Educate and engage all stakeholders
 - Individual actions make a difference
- Focus on watersheds showing greatest impacts



Watershed 101

- MS4 permit, what is it?
- Montgomery County is responsible for:
 - What goes into our storm drain pipes
 - What comes out of them
 - What flows into the streams
- Requires additional stormwater management for **20 %** of impervious surfaces (4,300 acres = 6.7 square miles). That's about three times the size of Takoma Park.

That's equivalent to 32,912 football fields!



Watershed 101

- **Watershed Management Division**
- Stormwater Permit Coordination
 - Reporting, Monitoring, and Watershed Outreach
- Stormwater Management Facilities
 - Inspections and Maintenance
- Watershed Restoration
 - Stormwater Retrofits and Stream Restoration
 - RainScapes
- Construction Management
 - Oversees project construction
 - Administers contracts and procurement



Watershed 101

■ Resources

■ Local watershed groups

www.montgomerycountymd.gov/dectmpl.asp?url=/Content/dep/water/localgroups.asp

■ Regional and national groups

■ General information

www.montgomerycountymd.gov/DEP

■ Living a Green Life: My Green Montgomery

www.mygreenmontgomery.org

Stormwater 101

■ Impervious (hard surfaces)
= Increased runoff & pollutants

■ Reduced groundwater
recharge (infiltration)

■ Increased storm flows &
decreased base flows

■ Streams eroded, incised

■ Infrastructure threatened

■ Storm drain
systems convey
heated, dirty
water directly to
streams

■ Degraded aquatic habitat
& water quality



Why Green Streets?

- Rather than treating stormwater as a waste to be channeled quickly off-site and conveyed through pipes to ponds or basins...



- The County is using a more natural, small scale approach called Environmental Site Design (ESD) or Low Impact Development (LID).
- “Green Streets” are ESD/LID located within street right of way areas.
- Approx. 1/3 of impervious surfaces in our County are roadways.

■ Examples:

- Rain gardens
- Bioretention gardens
- Bioswales
- Tree Box filters
- Curb extensions
- Pervious sidewalk
- Permeable pavement



Why Green Streets?

- Stormwater runoff is captured and filtered in small landscaped areas that allow water to soak into the ground while plants and soils filter pollutants
- Replenish groundwater and stream baseflows, rather than sending polluted, heated water through pipes directly into our streams



- Create aesthetically attractive streetscapes that visually connect neighborhoods, schools, parks, and business districts



- Provide natural habitat



Why Green Streets?

Goals:

- Maximize stormwater management to improve stream conditions
- Improve water quality treatment
- Encourage infiltration of runoff from roadways, parking lots, and other impervious surfaces
- Fulfill the requirements in the County's National Pollutant Discharge Elimination System (NPDES) permit (issued in 2010), which requires:
 - New stormwater management for 20% of existing impervious area that is currently unmanaged (~ 4,300 acres).
 - Meet goals set forth in the "Potomac River Watershed Trash Treaty"
 - Identify pollution sources and improve water quality in all county watersheds
 - Increase use of Environmental Site Design (ESD), or Low Impact Development (LID)



Green Streets Project Selection

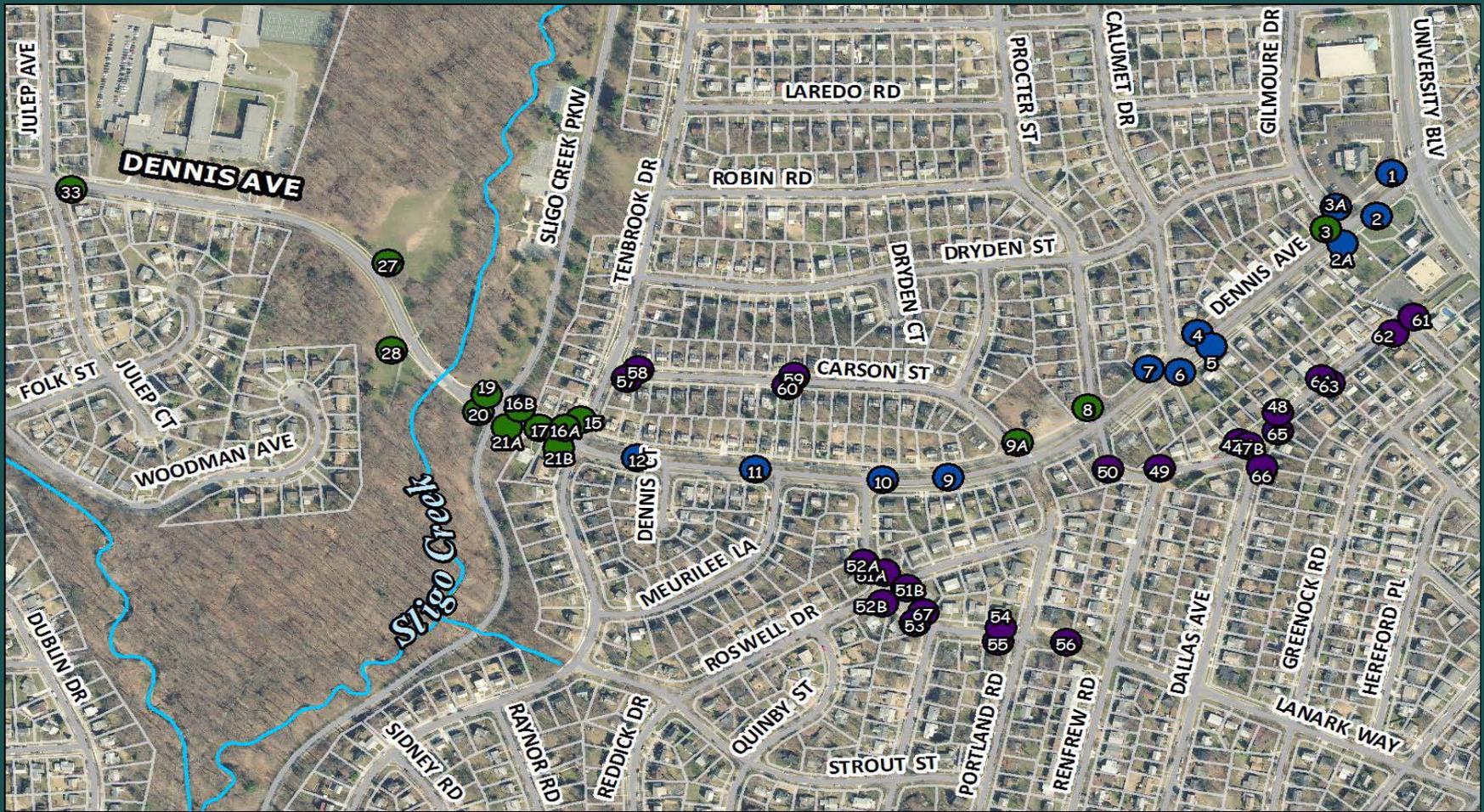
- MCDEP plans Green Streets projects:
 - For priority areas identified in Watershed Studies or Restoration Plans,
 - Concurrently with the Department of Transportation's (MCDOT's) planned roadway maintenance and/or rehabilitation work, and
 - Other



Project Location & Schedule

■ The project is divided into three phases:

- Phase 1 – Dennis West (Green) – April 2013
- Phase 2 – Dennis East (Blue) – May 2013
- Phase 3 – Dennis Peripherals (Purple) – Summer 2013



Green Streets Practices

ID	TYPE	PHASE	ID	TYPE	PHASE
1	Tree Box	2	33	Tree Box	1
2	Tree Box	2	47A	Parking Pad	3
2A	Tree Box	2	47B	Bioswale	3
3A	Tree Box	2	48	Parking Pad	3
3	Swale Curb Extension	1	49	Bioswale	3
4	Swale Curb Extension	2	50	Tree Box	3
5	Swale Curb Extension	2	51A	Swale Curb Extension	3
6	Underground Rainstore & Infiltration	2	51B	Bioswale	3
7	Swale	2	52A	Parking Pad	3
8	Tree Box	1	52B	Swale Curb Extension	3
9	Bioretention	2	53	Swale Curb Extension	3
9A	Tree Box	1	54	Swale Curb Extension	3
10	Bioretention	2	55	Swale Curb Extension	3
11	Bioretention	2	56	Bioswale with Mini Pools	3
12	Bioretention	2	57	Tree Box	3
15	Tree Box	1	58	Tree Box	3
16A	Swale Curb Extension	1	59	Tree Box	3
16B	Swale Curb Extension	1	60	Tree Box	3
17	Step Pool Storm Conveyance	1	61	Bioretention	3
19	Tree Box	1	62	Parking Pad	3
20	Tree Box	1	63	Parking Pad	3
21A	Swale Curb Extension	1	64	Parking Pad	3
21B	Swale Curb Extension	1	65	Bioretention Curb Extension	3
27	Step Bioretention	1	66	Swale Curb Extension	3
28	Step Bioretention	1	67	Swale Curb Extension	3

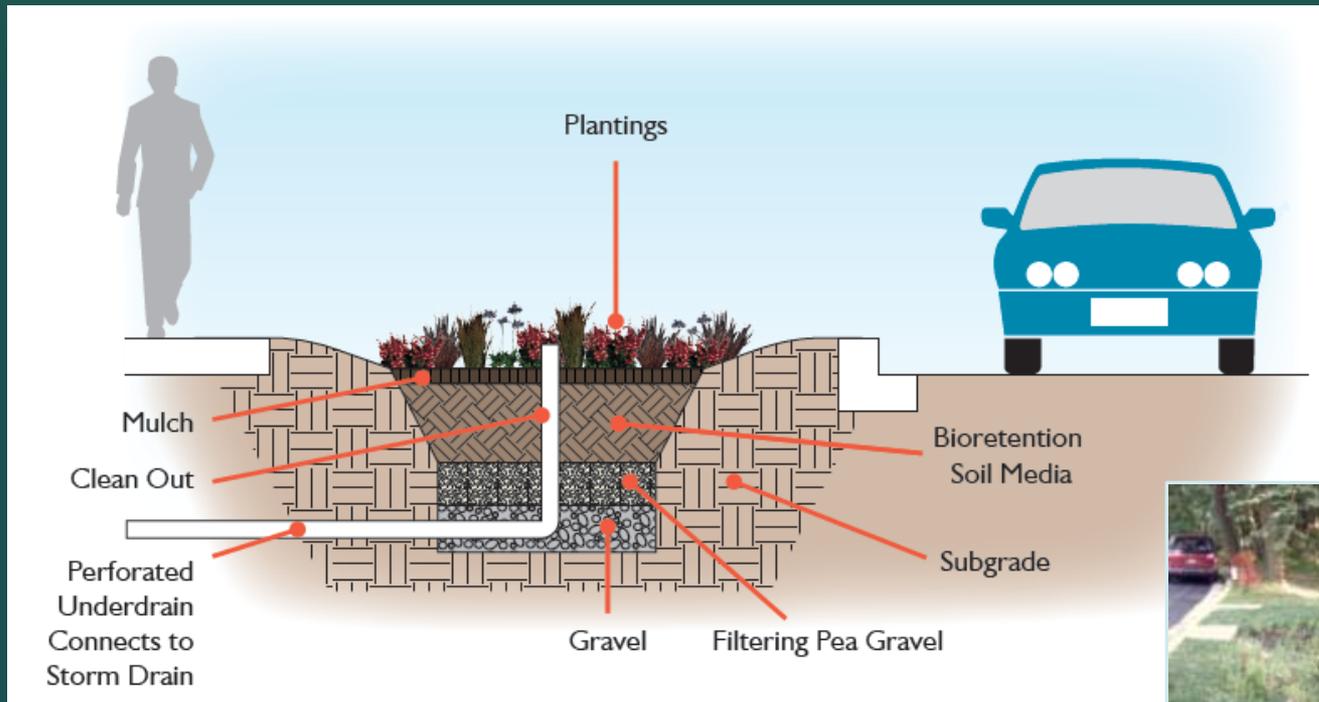
Green Streets Practices

- Dennis Ave Proposed Green Streets Practices:
 - Bioretention Garden
 - Tree Box Filter
 - Curb Extension
 - Parking Pad
 - Underground Rainstore Infiltration
 - Grass Bioswale
 - Step Pool Storm Conveyance/ Bioretention



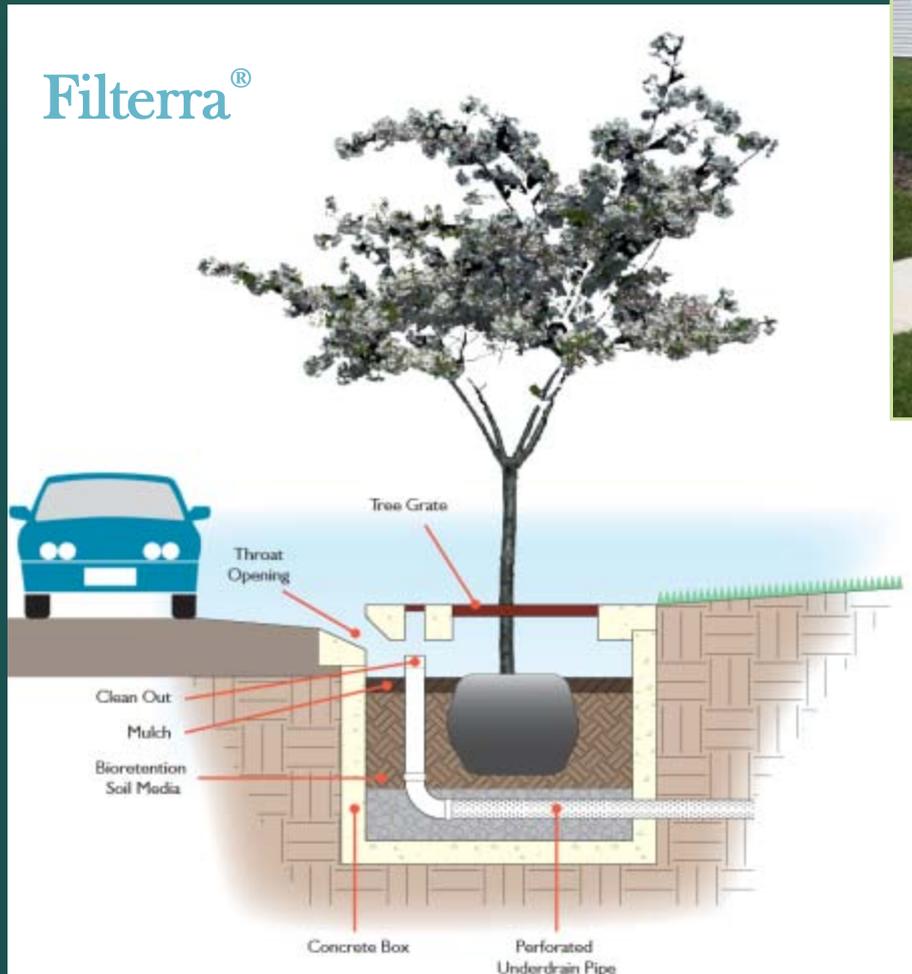
Green Streets Practices

■ Bioretention Garden



Green Streets Practices

■ Tree Box Filter



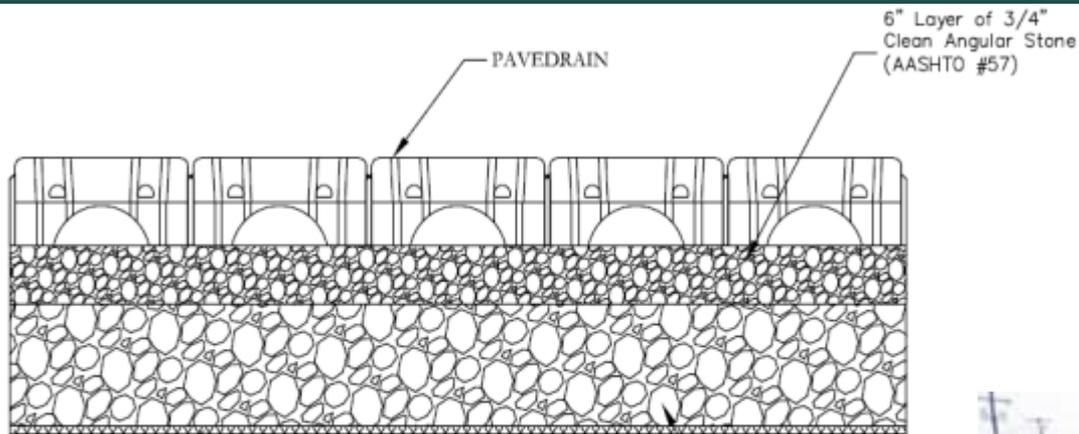
Green Streets Practices

■ Curb Extensions



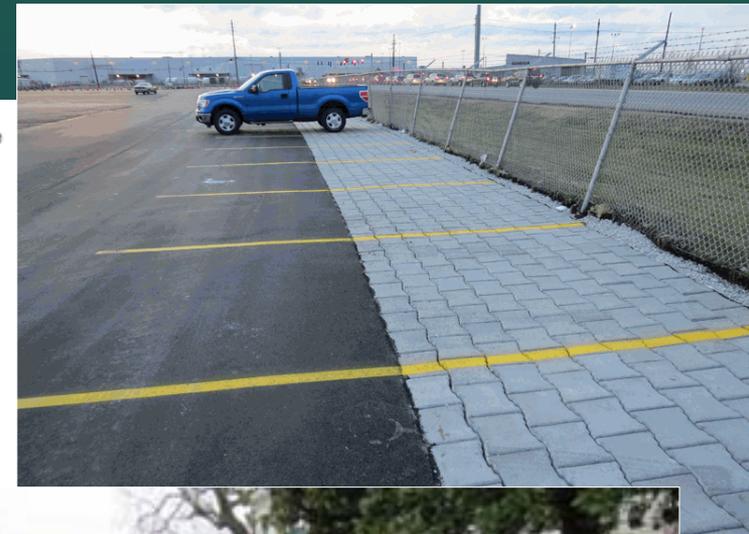
Green Streets Practices

■ Parking Pads



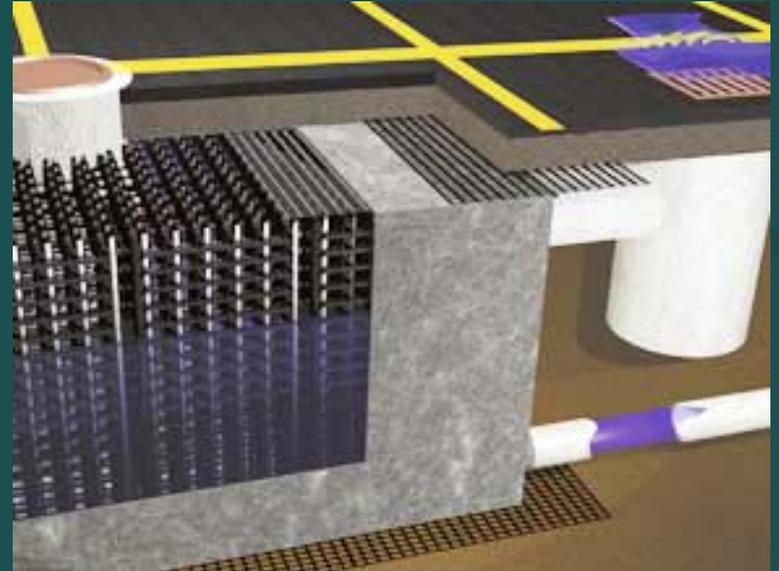
Geotextile (Mirafi RS580i) Recommended.

CROSS-SECTION
END VIEW



Green Streets Practices

- Underground Rainstore Infiltration



Green Streets Practices

■ Grass Bioswales



Forest Estates



Redmiles Rd

12.18.2008



Redmiles Rd

12.18.2008



Redmiles Rd

12.18.2008

Other Green Streets Locations

■ Completed Projects:

Sligo Creek

- Arcola Ave
- Forest Estates

Lower Rock Creek

- Aspen Hill Rd (in front of library)
- Kensington Library

Paint Branch

- White Oak



Arcola Avenue



Forest Estates Neighborhood



Aspen Hill Road



White Oak

Other Green Streets Locations

■ In-Design or In-Construction Projects:

Sligo Creek

- Dennis Ave (In-Construction)
- Amherst Ave
- University Towers
- Sligo Park Hills Neighborhood
- Breewood Neighborhood

Northwest Branch

- Franklin Knolls & Clifton Park Neighborhoods

Paint Branch

- SHA ICC – Upper Paint (In-Construction)
- MCDOT – Rainbow Drive (In-Construction)



MCDOT – Rainbow Dr
Under Construction



SHA (ICC) Kingshouse Rd
Under Construction



White Oak - Under Construction

Green Streets Locations

■ Construction Process



Before



During



After

Frequently Asked Questions

- How do the Green Streets practices work?
- Depends on type of practice, but generally:
 - Stormwater runoff from the roadway is diverted into an inlet opening in the curb, and is filtered through a mixture of highly permeable soils (sand, mulch, compost), then stored in an underlying gravel layer before percolating into the groundwater and/or entering into an underdrain that flows to the storm drain system.
 - When certain facilities are full after rain events, water may pond up to 6 inches before draining within 12 to 48 hours.



Frequently Asked Questions

- Who is responsible for maintaining Green Streets practices?
 - MCDEP is responsible for maintenance
 - MCDEP will monitor the practices **monthly** to make sure they are functioning properly. MCDEP will:
 - Ensure that plants are healthy
 - Water during initial plant establishment
 - Remove dead, diseased, or dying plants
 - Replace plants as needed
 - Replenish mulch
 - Regularly weed
 - Remove sediment & trash



Frequently Asked Questions

- How Can I Help?
 - Become a **Watershed Keeper** and help MCDEP by adopting projects on public property, such as Green Street practices, tree plantings, or trash clean ups.
 - Adoption of a project may require routing visual inspection, removing trash or debris, and weeding as necessary.
 - Volunteers will communicate with MCDEP staff any major issues with their adopted project, as instructed during project-specific training.



Frequently Asked Questions

■ How Can I Help?

■ RainScapes Rebate Program

- The County's RainScapes program promotes and implements projects on residential, institutional, and commercial properties to reduce stormwater pollution.



- Maximum Rebates: **\$2,500** residential **\$10,000** commercial/
institutional

■ RainScapes Techniques:

- Downspout Diversion
- Rain Barrels, Cisterns* (water re-use)
- Rain Gardens*
- Permeable Pavers*
- Green Roofs*
- Conservation Landscaping*
- Urban Tree Canopy*
- Pavement Removal*
- Dry Wells*
- Soil Reconditioning and Amendment

* Eligible for Rebate

Visit www.rainscapes.org for more information and to apply online.



Questions?

- For More Information/Updates:

Jennifer St. John

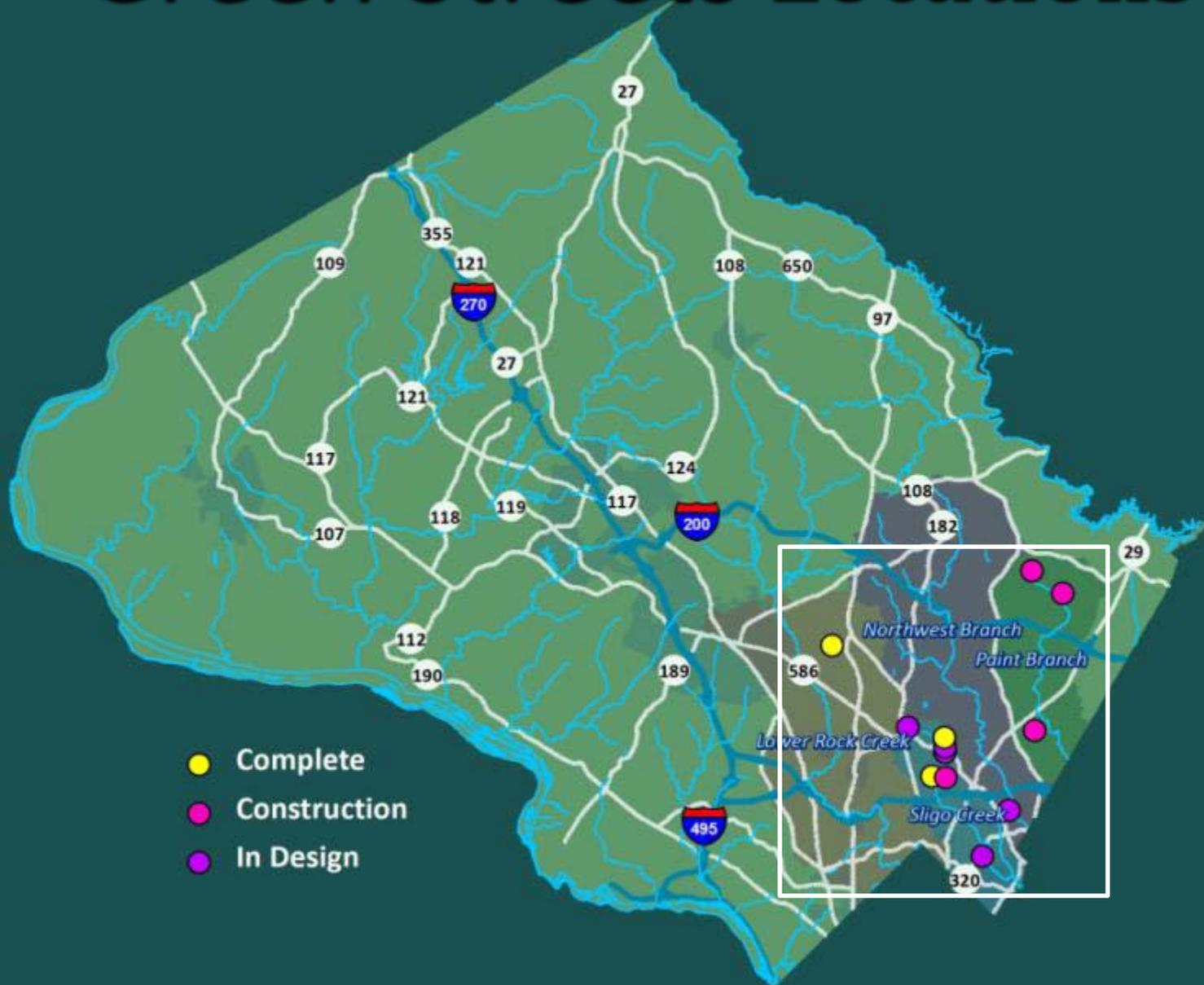
240-777-7740 jennifer.st.john@montgomerycountymd.gov

Project Webpage: www.montgomerycountymd.gov/DennisGreenStreet



Extra Slides

Green Streets Locations

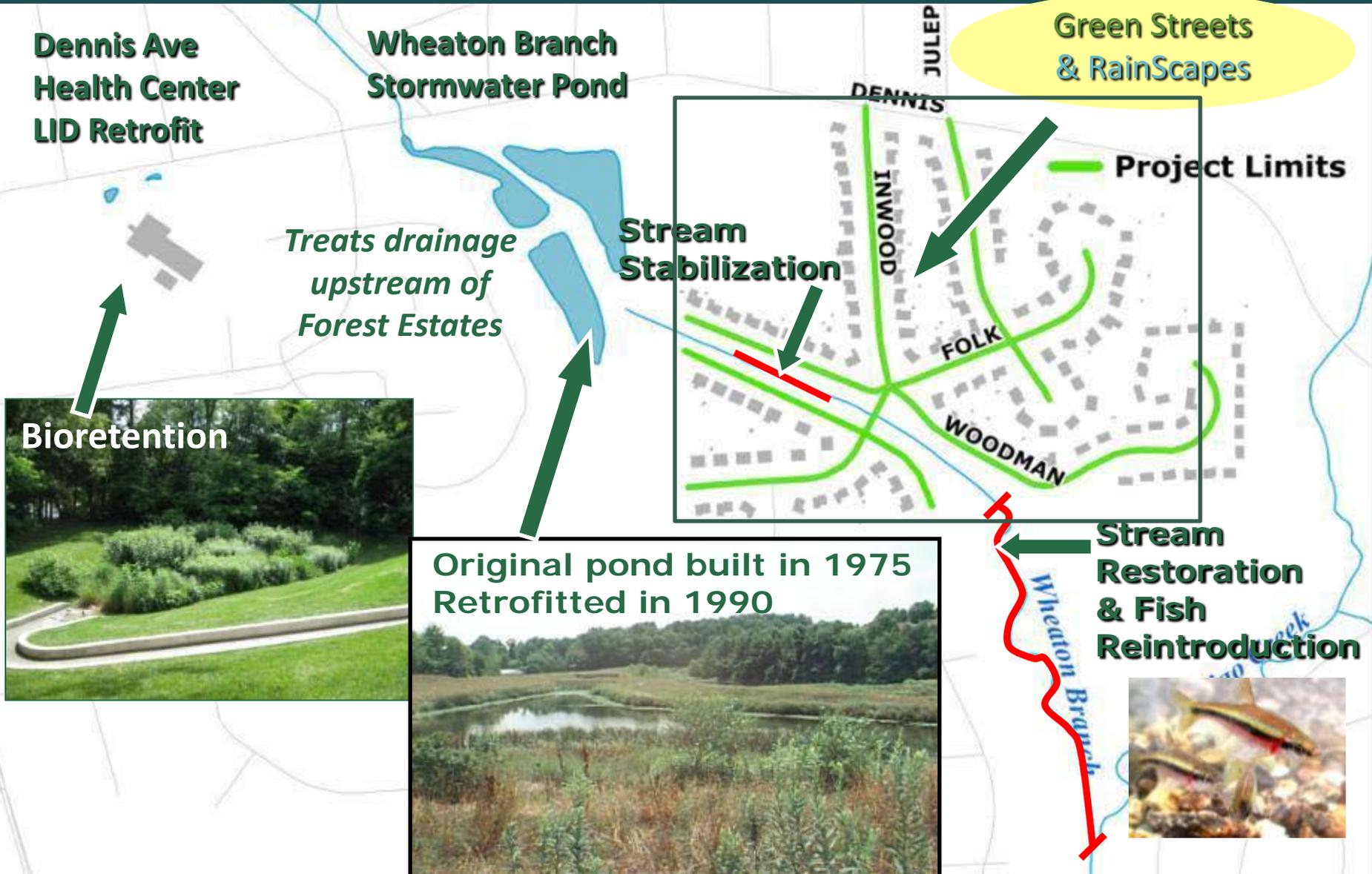


Green Streets Locations



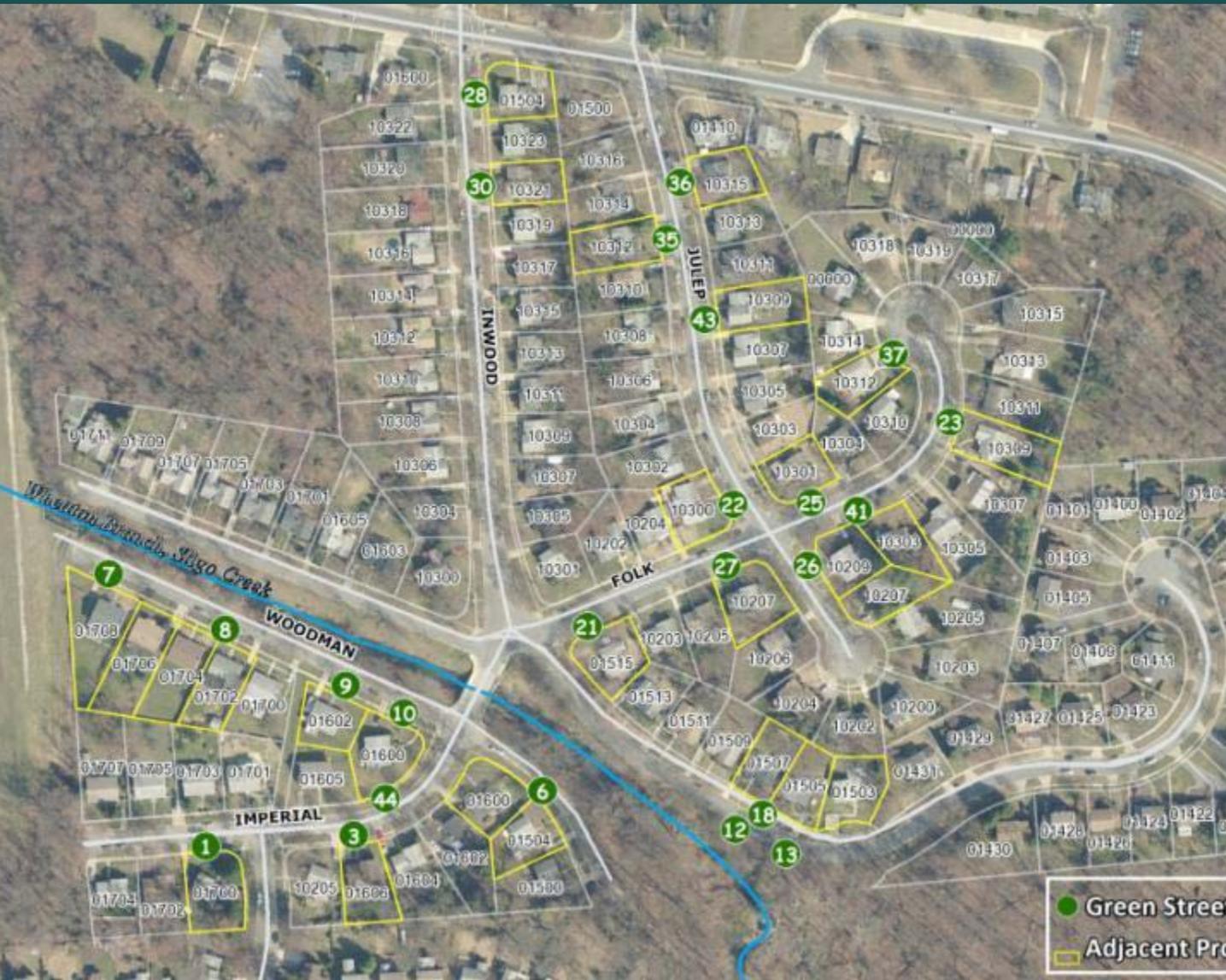
Green Streets Locations

Efforts on Wheaton Branch, Sligo Creek & Forest Estates



Green Streets Locations

■ Example: Forest Estates ~10 acres Impervious Treatment



ID	FEATURE TYPE
1	Bioretention Garden
3	Rain Garden
6	Rain Garden
7	Bioretention Garden
8	Bioretention Garden
9	Bioretention Garden
10	Bioretention Garden
12	Bioretention Garden
13	Bioswale
18	Bioretention Garden
21	Bioretention Garden
22	Rain Garden
23	Rain Garden
25	Bioretention Garden
26	Rain Garden
27	Rain Garden
28	Rain Garden
30	Rain Garden
35	Rain Garden
36	Rain Garden
37	Rain Garden
41	Rain Garden
43	Rain Garden
44	Rain Garden

Green Streets Construction

- At Forest Estates



Green Streets Construction

- At Forest Estates



Green Streets Planting

- At Forest Estates



Green Streets Maintenance

- At Forest Estates



Green Streets Miscellaneous

- Storm drain inlet uncovered



- Storm drain outfall to stream

