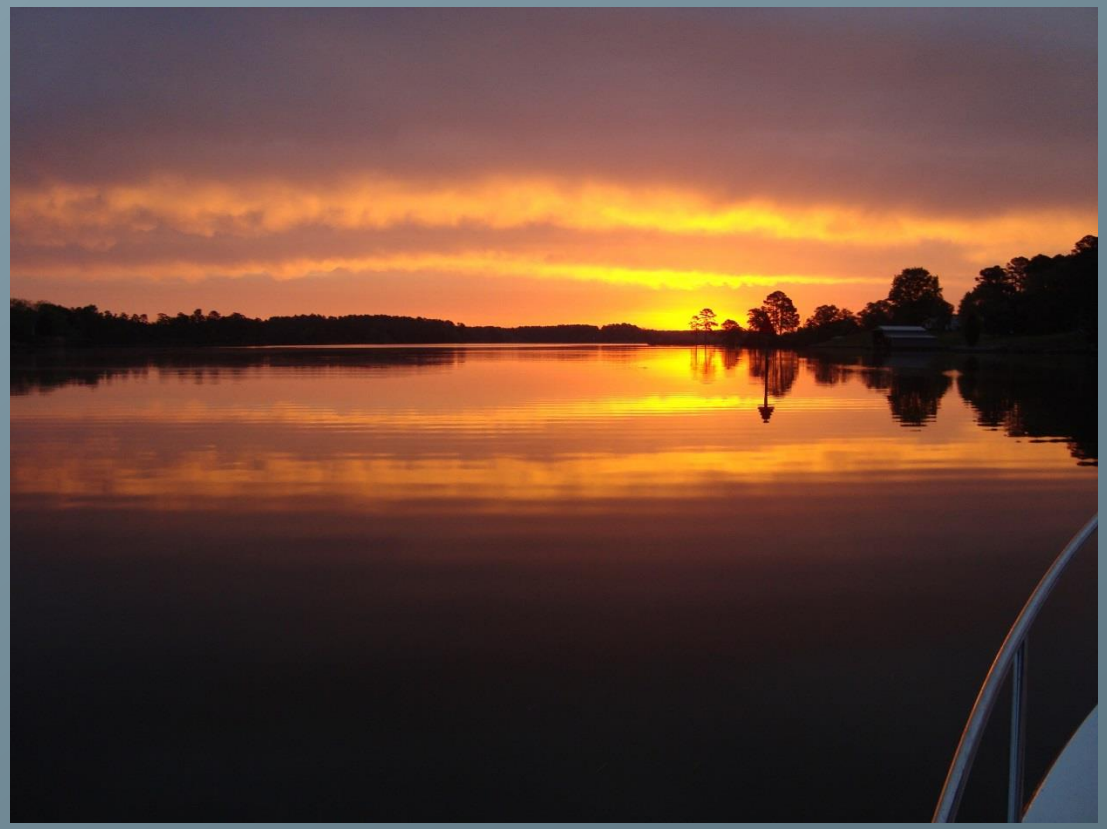
A Local Perspective on the Bay TMDL

Chesapeake Bay Commission



Department of Public Works and Environmental Services

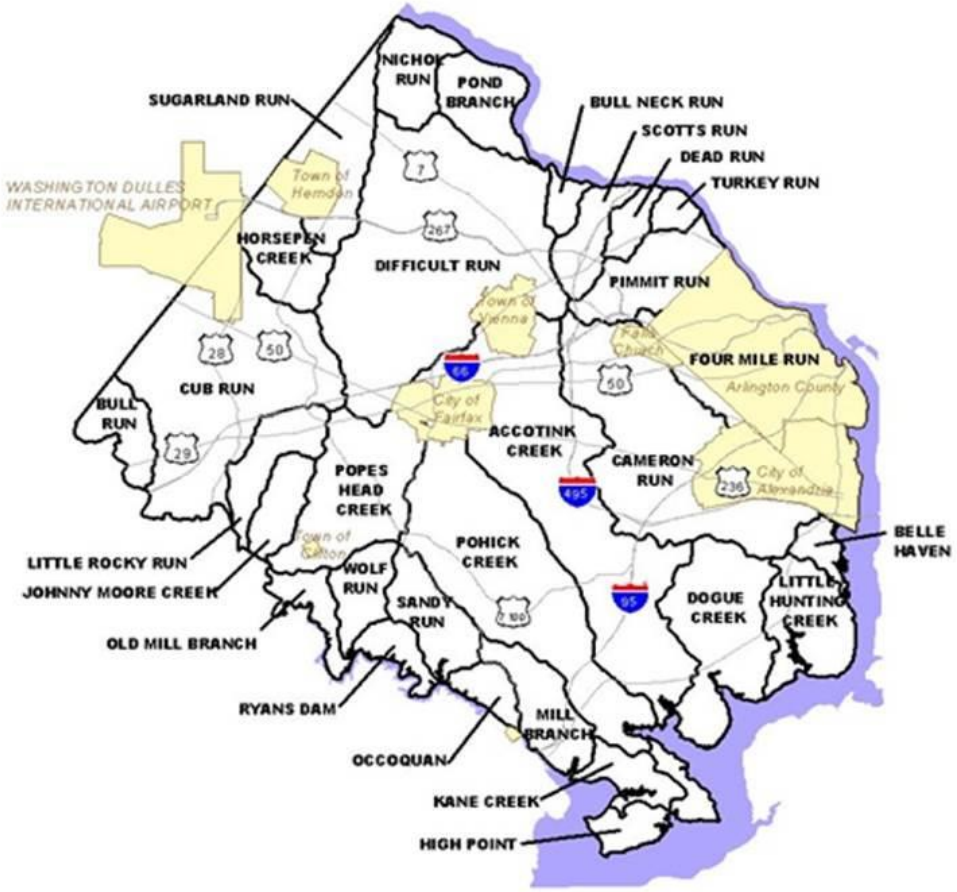
Working for You!

A Fairfax County, VA, publication
9/06/2018

Program Overview –Fairfax County

- **Size: 400 sq. miles**
- **Population: >1 million**
- **Phase I MS4 (since 1997)**

- 42,000 Storm Drainage Inlets
- 4,200 Private Stormwater Management Facilities
- 1,900 Public Stormwater Management Facilities
- 1,300 Miles of Pipe
- 850 Miles of Perennial Streams
- 105 Local Impairments



Drivers – Municipal Stormwater Program

Chesapeake Bay TMDL (Total Maximum Daily Load)
- Phosphorus, Nitrogen, Sediment

MS4 Permit (Municipal Separate Storm Sewer System)
- Inspection
- Maintenance
- Retrofit
- Training & Out Reach
- Administration

Local TMDLs
- Planning, Retrofitting

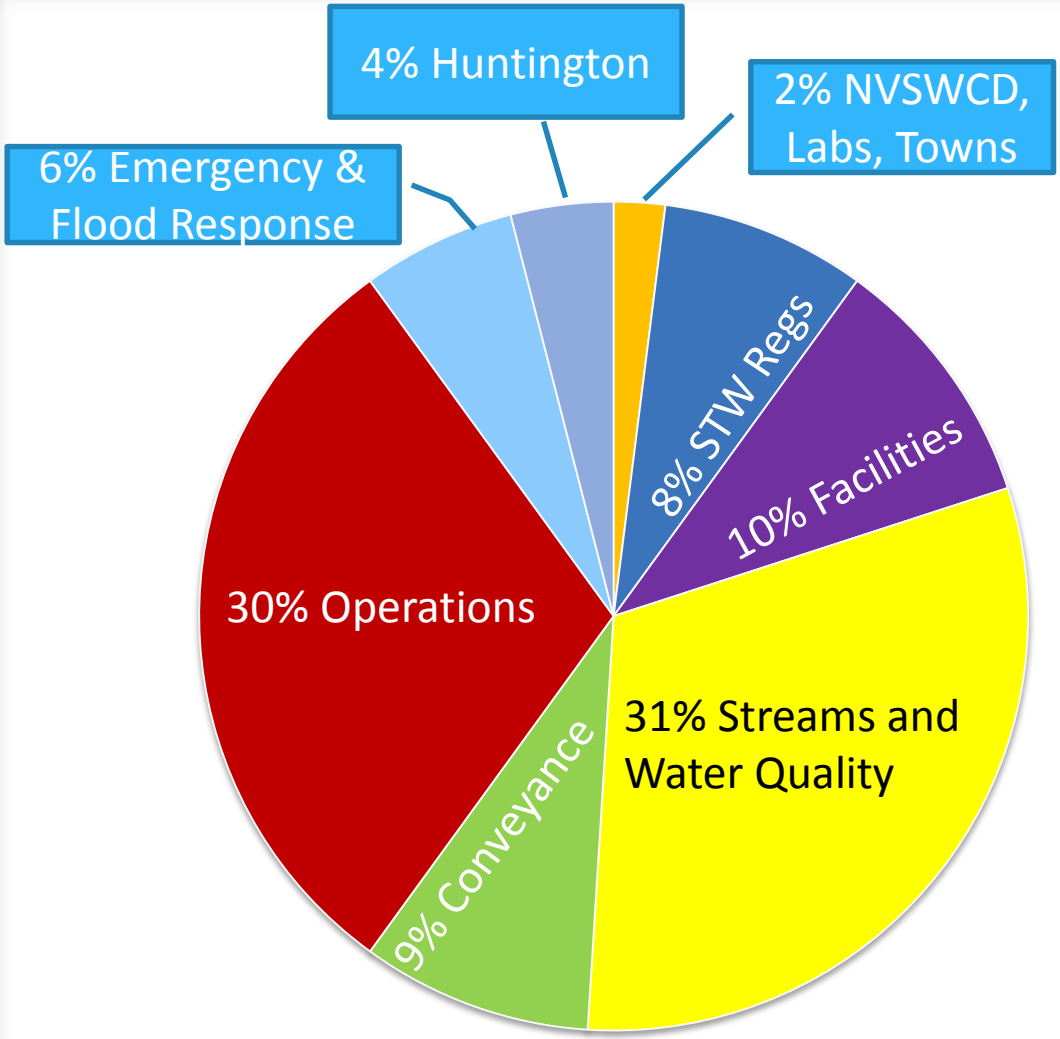
Infrastructure
- Inspection & Reinvestment

Dam Safety

Flooding
- Structure, Roads, Yards

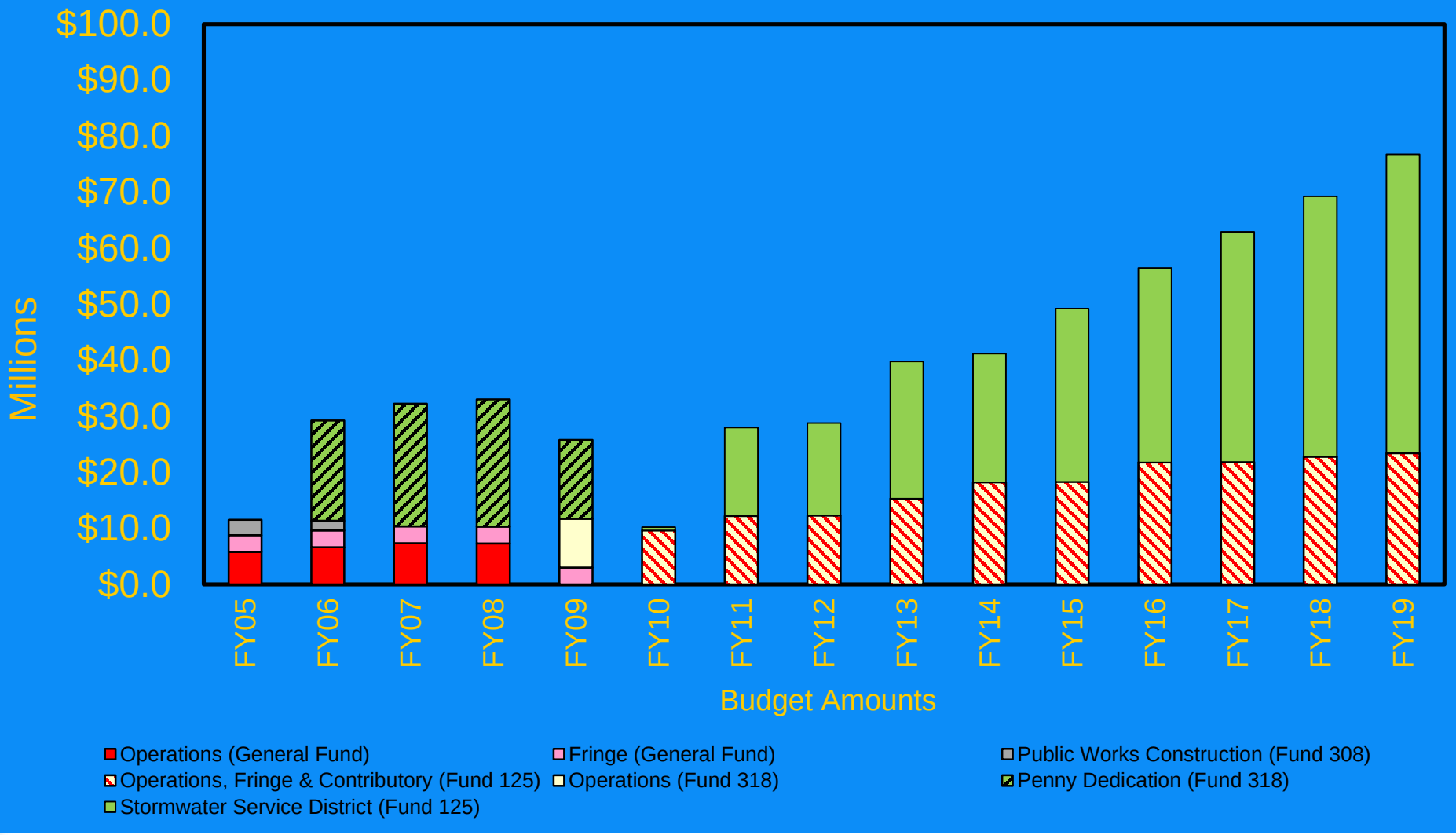
Watershed Management Plan Projects and Stormwater Update

Fiscal Year 2019 Budget $77M



- (2%) NVSWCD, Occoquan Lab, Towns, $1.4 M
- (8%) Stormwater Regulatory Programs, $6.5 M
- (10%) Dam Saftey and Facility Rehabilitation, $7.5M
- (31%) Streams and Water Quality, $24.2M
- (9%) Conveyance Systems, $7.0M
- (30%) Operations, $23.3M
- (6%) Emergency and Flood Response, $5.0M
- (4%) Contribution to Huntington, $3.0M

History of Stormwater Funding



Stream Restoration

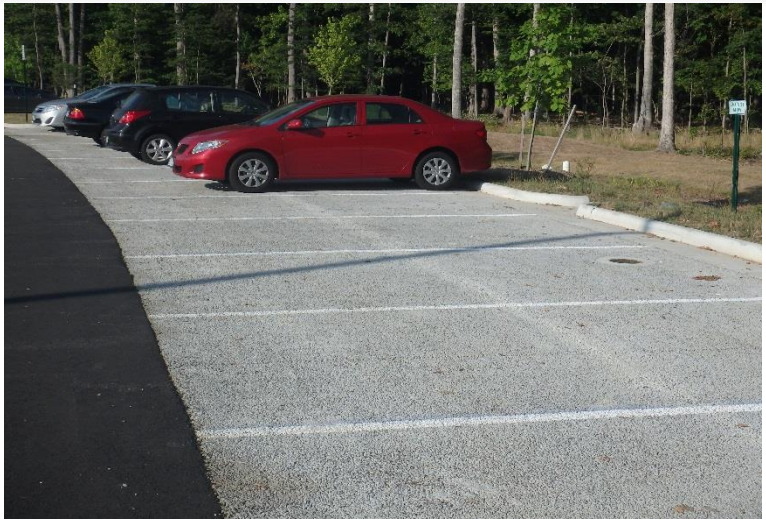
2014

2016

Stormwater Basin Retrofits

Retrofits

Partnerships - Stringfellow Park and Ride



Partnership - George Marshall High School

Partnership - Libraries and Schools

Porous Pavement Challenges

Deteriorated Porous Concrete Replaced with Porous Concrete Slabs

Sealed Porous Asphalt

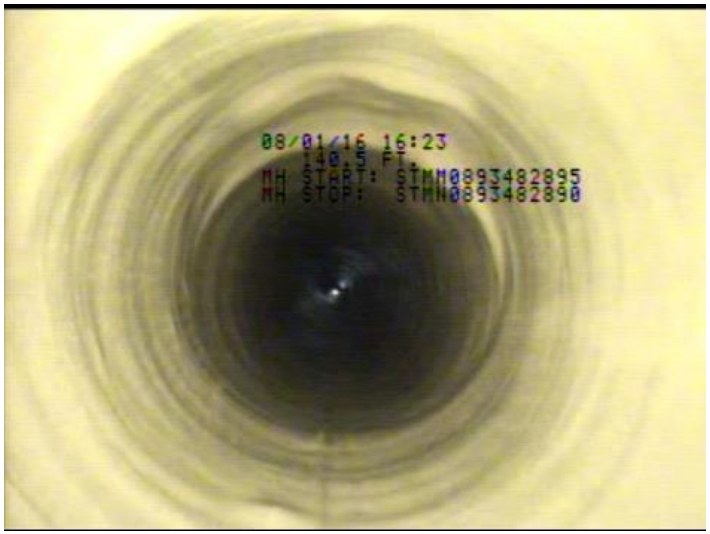
Green Street

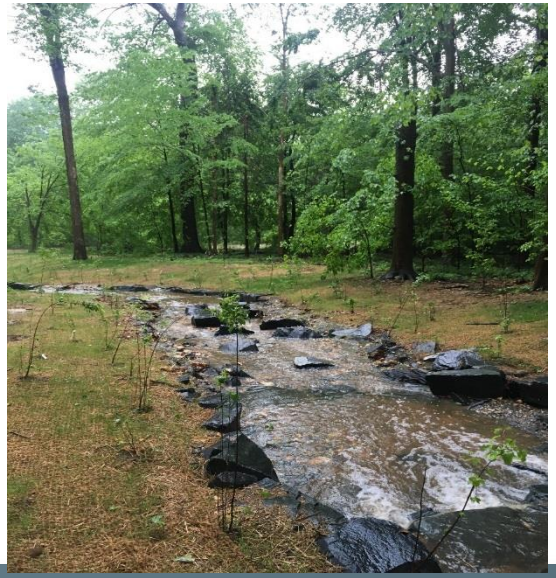
- Managing water at the source

Pavement Removal

Projects - Stream and Water Quality Improvements

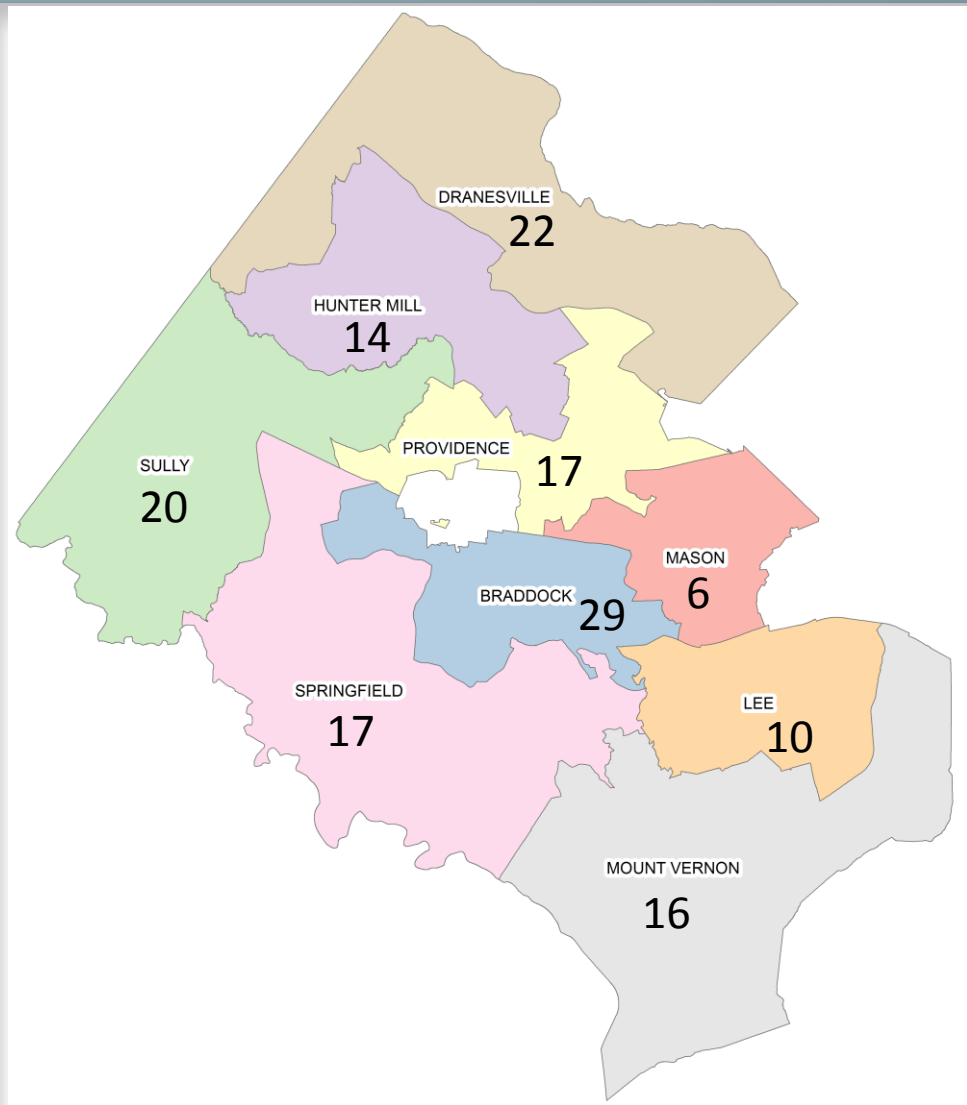
Conveyance Rehabilitation





Outfall Restorations

Completed Water Quality Projects



Completed Water Quality Projects FY10-18	
Number of Projects	151
Acres Treated	33,150 Ac
Linear Feet Treated	48,700 LF
Phosphorous Removed	8,100 lb/yr
Nitrogen Removed	38,450 lb/yr
Sediment Removed	1,503 ton/yr

Total Project Cost: $97,400,000

Completed Facilities FY10-18: Cost based on Averages

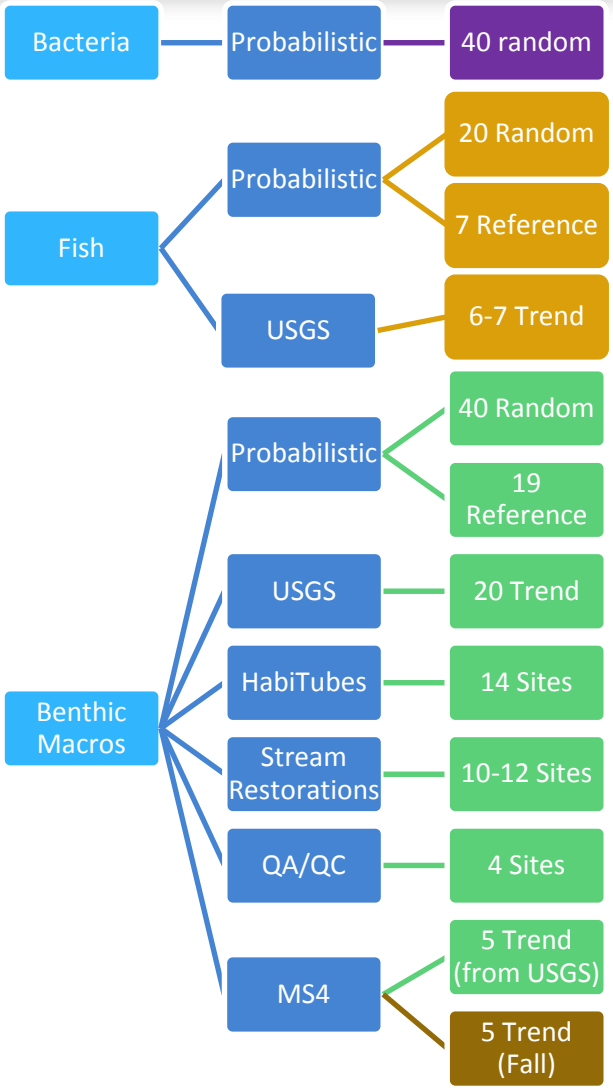
Practices	Number Installed	Capital Cost ($/(lb/yr))		
		TN	TP	TSS
Stream Restoration	34	$ 2,800	$ 14,900	$ 49
Pond Retrofits	51	$ 5,700	$ 101,400	$ 45
Infiltration Swales & Trenches	14	$ 11,400	$ 145,800	$ 211
Dry Swales	9	$ 14,500	$ 176,900	$ 254
Bioretention (Rain Gardens)	27	$ 24,900	$ 253,200	$ 374
Pervious Pavement	27	$ 28,800	$ 250,100	$ 312

Metrics – Maintenance Unit Costs

Facility Type	Annualized Insp, Maint, and Replacement Total	Average Treated Area (acres)	Cost to Maintain per Acre Treated ($/acre)
Infiltration	$2,000	0.38	$5,300
Bioretention	$1,300 - $3,800	0.57	$4,500
Vegetated Swale	$2,200	1.5	$1,500
Filtering Practice	$3,500	1.3	$2,700
Constructed Wetland	$6,900	4.6	$1,500
Wet Pond	$5,400	40	$140
Dry Pond	$6,900	16	$430
Manufactured BMP	$1,350	1.4	$960

Comprehensive Biological Monitoring

MS4



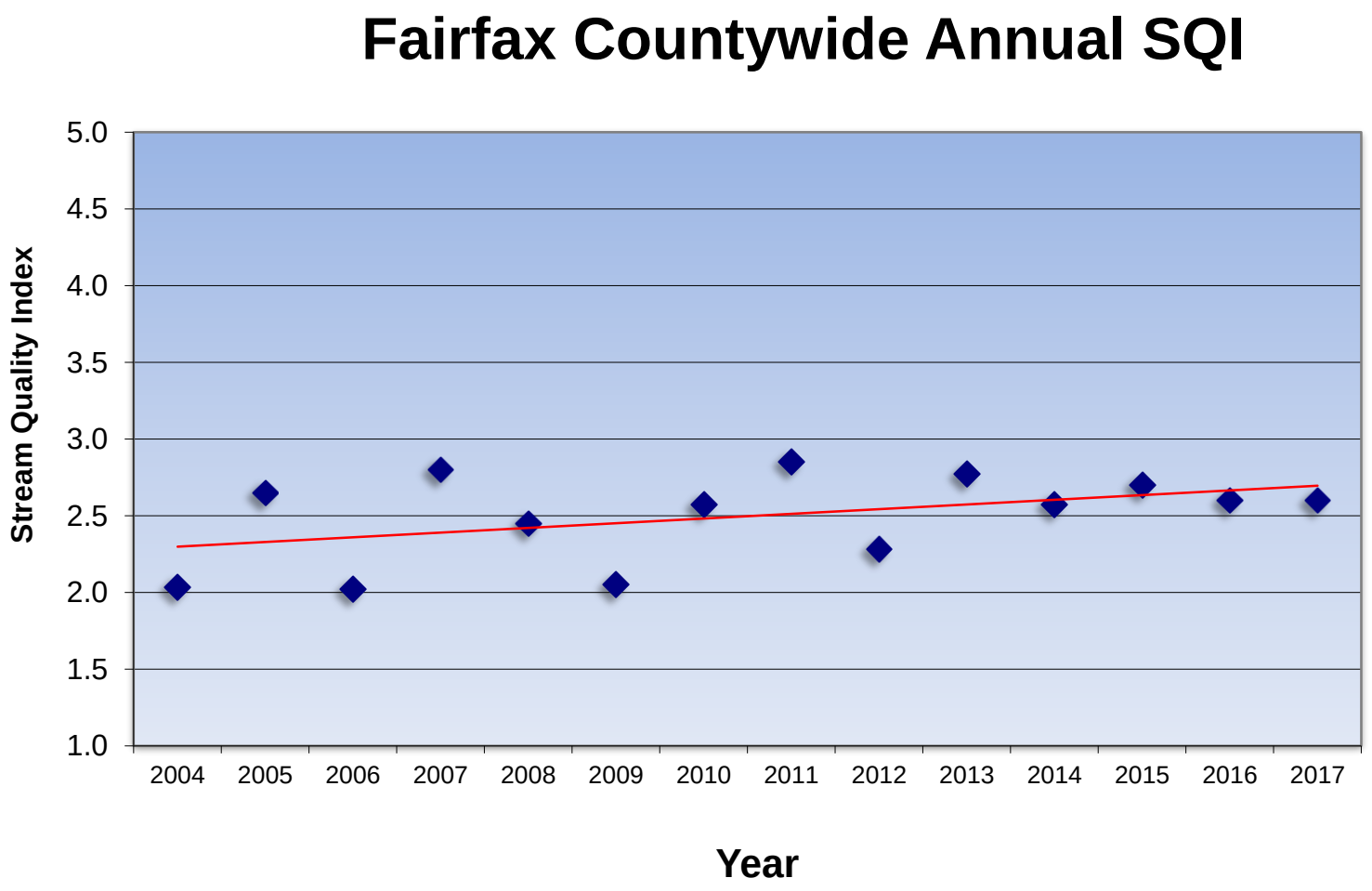
Continuous (5X per year)

Late Summer (Aug-Sept)

Spring (Mar-Apr)

Fall (Oct)

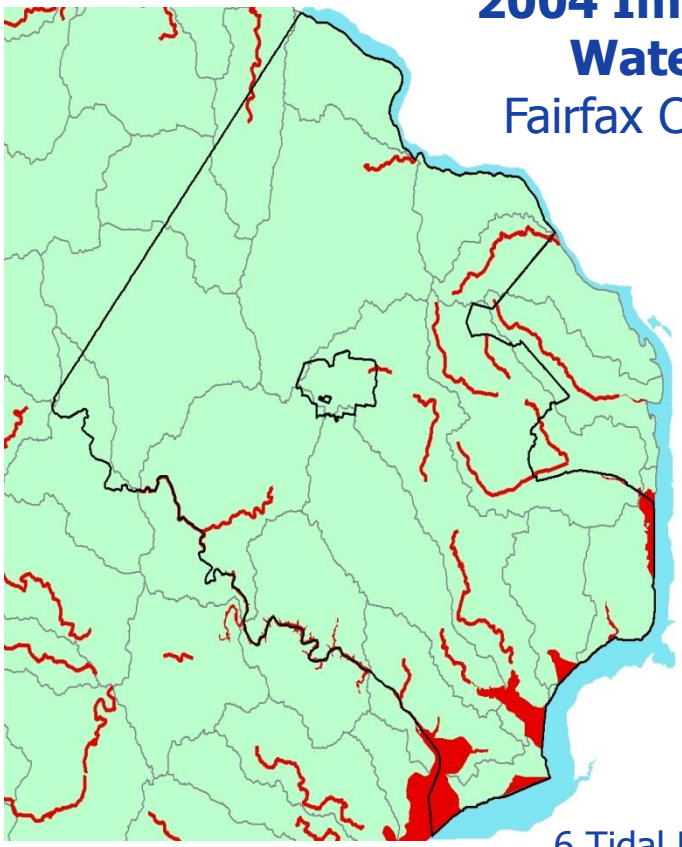
Stream Condition Score



Overview - Explaining A Program

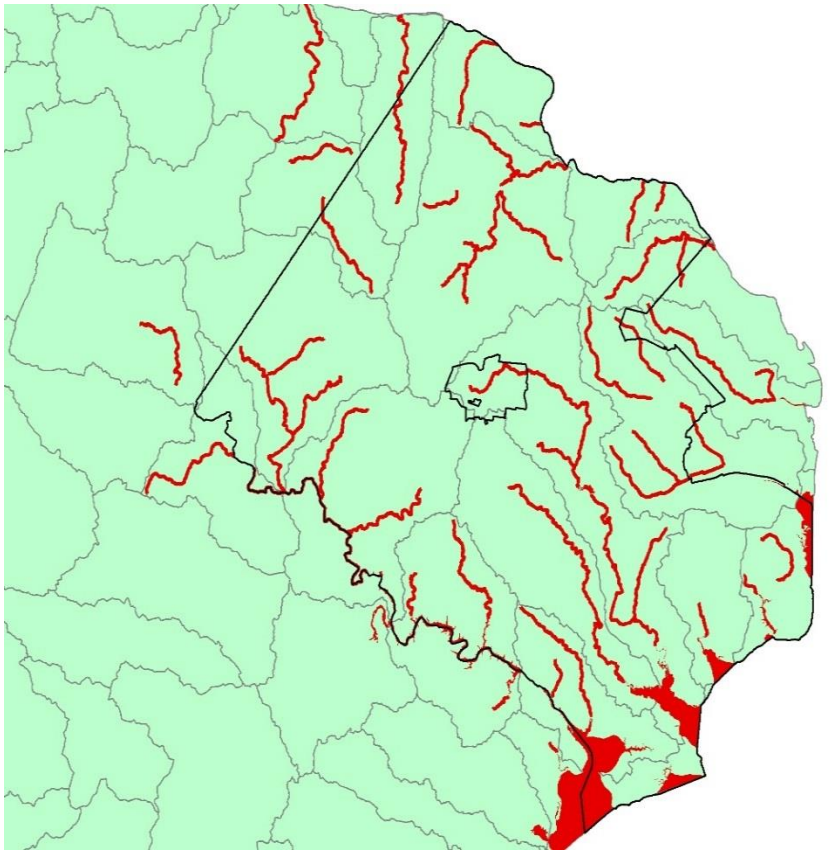
- What exactly are we required to do?
- How much will it cost?
- What do I get for my investment?
- What are the most cost effective solutions?
- What are the long term impacts and costs?

Challenges - Local Impairments



2004 Impaired Waters
Fairfax County

17 Streams
1 Reservoir
6 Tidal Embayments
24 Total Impaired Waters



- 2014 Impaired List is 105

Challenges - Local TMDLs

	WLA	Reduction
Bacteria		
Upper Accotink Creek:	0.13 E+15 cfu/yr	92%
Lower Accotink Creek:	1.73 E+12 cfu/yr	97%
Bull Run:	7.61 E+10 cfu/yr	89%
Difficult Run:	9.44 E+12 cfu/yr	90%
Four Mile Run:	2.04 E+13 cfu/yr	98%
Pope's Head Creek:	6.83 E+11 cfu/yr	94%
Sediment		
Bull Run:	4,096 tons/yr	78%
Difficult Run:	3,595 tons/yr	32%
Pope's Head Creek:	1,571 tons/yr	28%
PCBs		
Tidal Potomac:	54.7 g/yr	75%
Salt		

Explaining STW to the Lay Person

- The capital cost for P removal is $15,000 -$200,000/lb.
  - Gold sells for $1,200/oz.

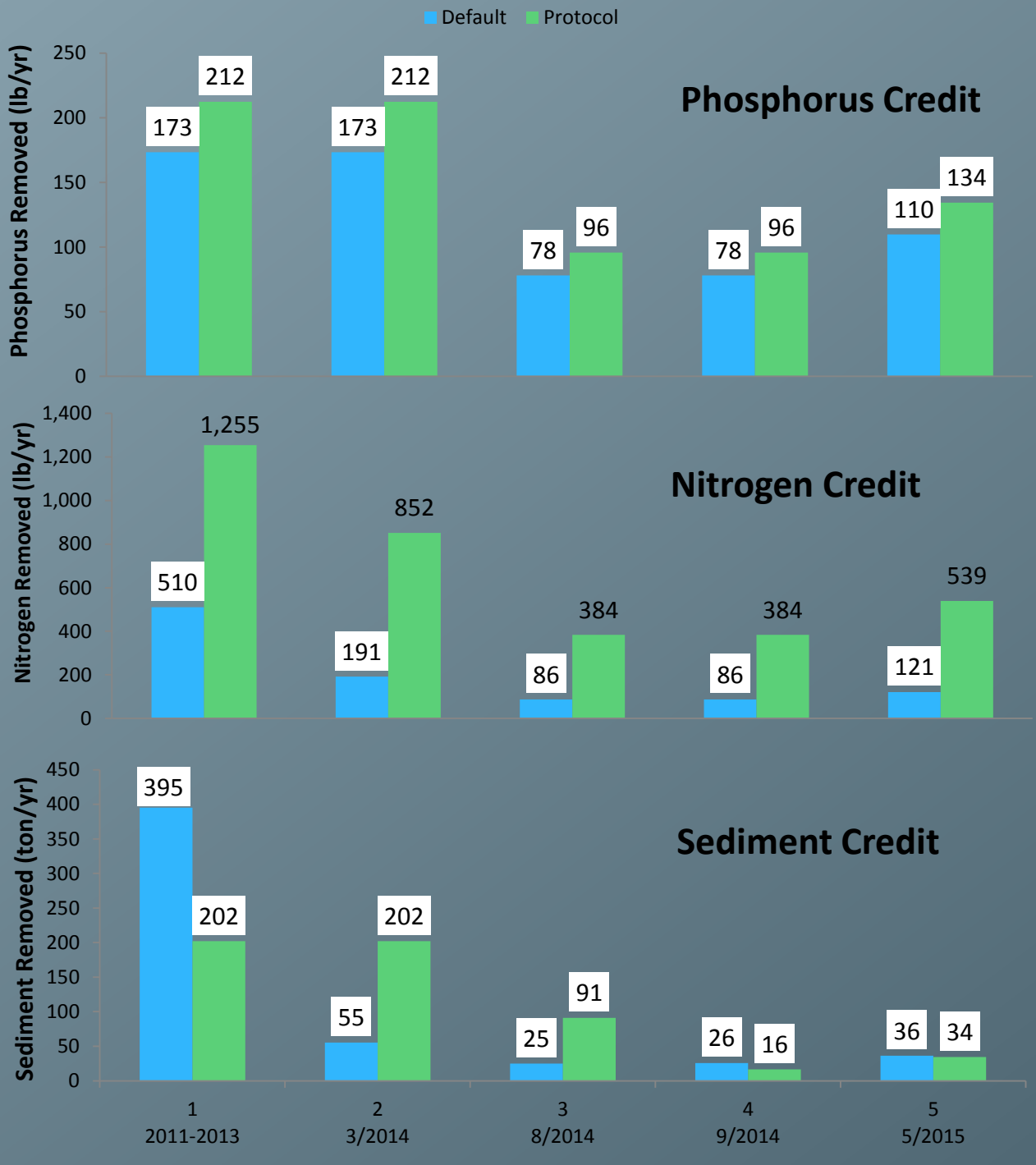
- Where is the sediment coming from?

River Basin	Urban Pervious (lbs Sediment/ac)	Urban Impervious (lbs Sediment/ac)
James	**101.08**	**676.94**
Potomac	**175.80**	**1,171.32**
Rappahannock	**56.01**	**423.97**
York	**72.78**	**456.68**

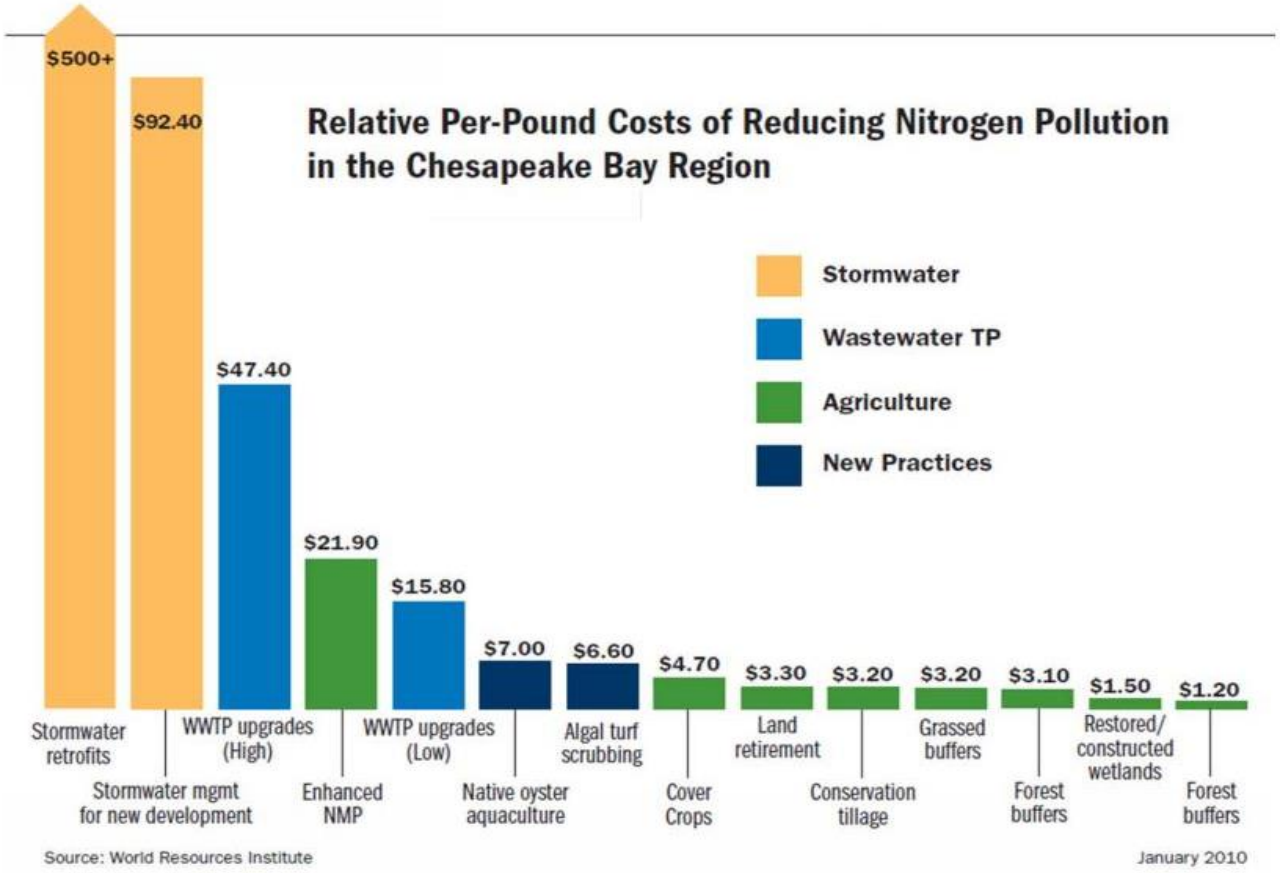
- Where do P and N come from?
- Targets seem to move – next slide

Changes in Stream Credit

1. New Interim Rate & Original Expert Panel Report
2. Expert Panel Report Changes
3. TMDL APG
4. GIT-Approved Expert Panel Report
5. Revised TMDLAPG



Explaining STW to a Rate Payer



For more information on nutrient trading and an updated version of this cost-curve, please visit the World Resources Institute Website at:
http://www.wri.org/publication/how-nutrient-trading-could-help-restore-the-chesapeake-bay

Explaining STW to the Lay Person

- How are we going to sustain thousands of residential green devices?
  - Typically treat small area or <0.5lb.

Need Sound Science

- What exactly are we required to do?
  - We need consistency, we can't keep moving the targets and accounting
  - Realistic, Achievable Goals
- How much will it cost?
  - We need realistic estimates – EPA Estimated $7.9B/yr. @ $23,900/lb. P
- What are the most cost effective solutions?
  - We need better and consistent science – Where are the loads really coming from? What do the treatment practices really do?
- What are the long term impacts and costs?
  - We need to understand the sustainability of our actions.
- We need Federal and State Leadership & Funding to Develop the Science

Stormwater is about Cultural Change

What do I get for my investment?

- Collecting, Treating and Transmitting STW is not Free
  - It has a big cost - We need Support for our Funding Tools
  - Funding for Stormwater on Transportation Projects
- We do not have a Shared Value for Environmental Benefits
- STW Systems have been Ignored
  - Drain the swamp
  - Get it in a pipe
  - Fill the low area
  - Dilution is the solution

- Our every day actions have a big cumulative impact
  - Pet Waste
  - Litter
  - Impervious surfaces
  - Fertilizer

Additional Information

- Randy Bartlett

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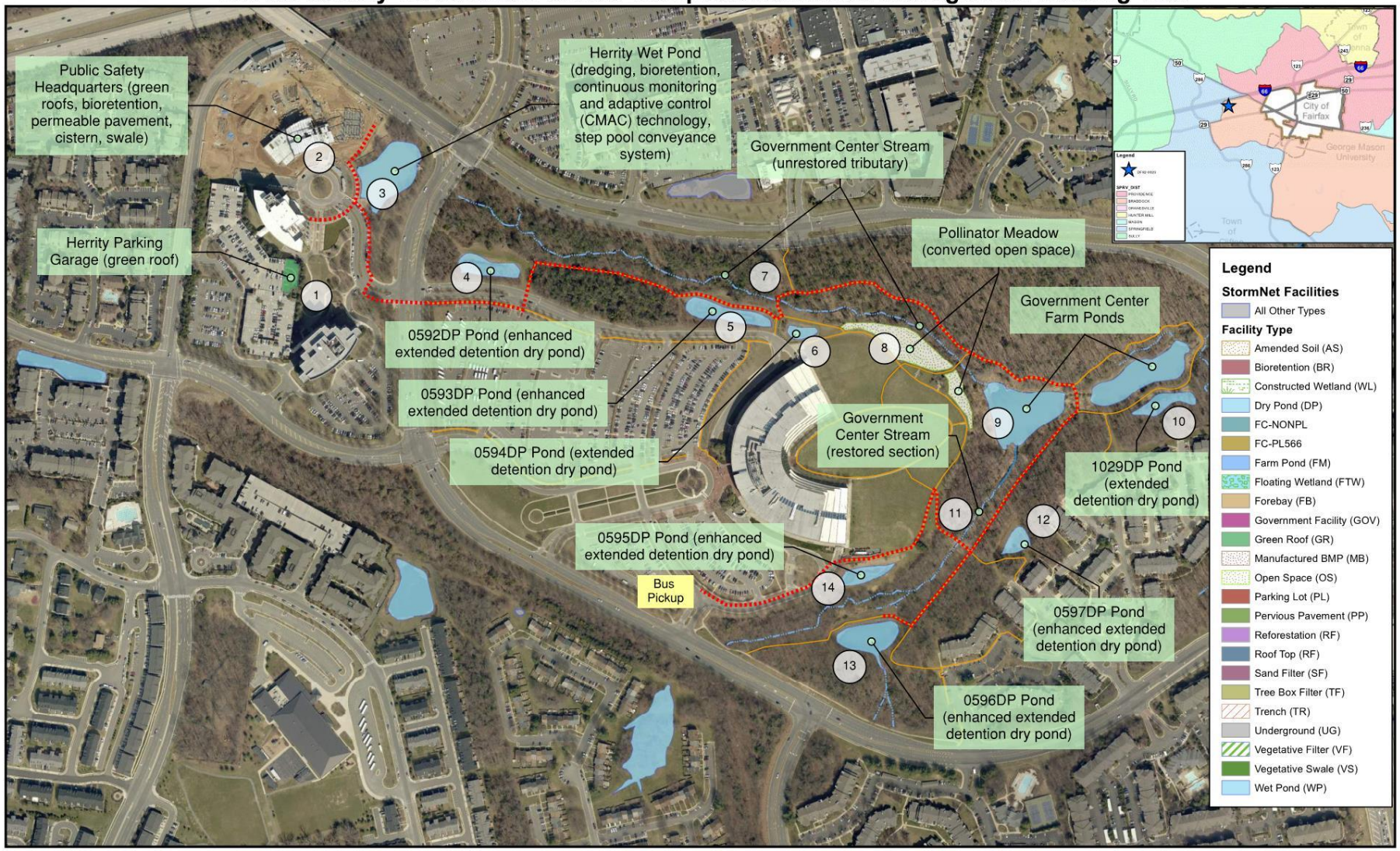
9/17

Fairfax County Government Center Complex Stormwater Management Walking Tour



N W E S

570 285 0 570 Feet

Fairfax County
Department of Public Works and Environmental Services
Stormwater Planning Division

https://arcg.is/0ziWri

PUBLIC SAFETY HEADQUARTERS GREEN INFRASTRUCTURE

STORMWATER MANAGEMENT PRACTICES

VEGETATED ROOF (GREEN ROOF)

Five vegetated roofs use special drainage systems to slow down, evaporate, and filter rainwater before it enters the drain. Green roofs also moderate internal temperatures.

$663,700 lb P/yr $113,900 lb N/yr $4,000 lb Sediment/yr

RAINWATER HARVESTING SYSTEM

Rainwater is harvested from the top roof and collected in an underground, 25,000-gallon cistern. Water from the cistern is used to irrigate landscaping around the building.

$342,100 lb P/yr $47,800 lb N/yr $2,200 lb Sediment/yr

WET POND CONTINUOUS MONITORING & ADAPTIVE CONTROL (CMAC)

Using a cloud-based platform, the CMAC system continuously watches the weather forecast and monitors the pond water levels. The system automatically adjusts valves to meet site pollutant removal and volume control goals.

$133,600 lb P/yr $15,100 lb N/yr $160 lb Sediment/yr

REGENERATIVE STORMWATER CONVEYANCE (RSC)

RSC systems (the outfall to the pond) is an open-channel, sand seepage filtering system that utilizes a series of shallow aquatic pools, riffle weir grade controls, native vegetation and underlying sand channel. The system combines features and treatment benefits of swales, infiltration, filtering and wetland practices.

$263,100 lb P/yr $36,700 lb N/yr $1,700 lb Sediment/yr

BIORETENTION BASIN OR RAINGARDEN

These depressed, landscaped gardens capture and filter stormwater runoff. During storms, runoff temporarily ponds then rapidly filters through a bed of sand, soil, and organic filtering media. Native plants like rushes and sedges help take up and treat stormwater, provide wildlife benefits, and create appealing landscaping.

$196,400 lb P/yr $27,400 lb N/yr $1,300 lb Sediment/yr

PERVIOUS PAVERS

The PSHQ service driveway is paved with permeable pavers. These interlocking brick pavers allow water to drain through the gaps between the bricks into a gravel base below. The water than infiltrates or slow flows into the storm drain system that discharges to the wet pond.

$248,400 lb P/yr $42,600 lb N/yr $1,500 lb Sediment/yr

VEGETATED SWALES

Vegetated swales provide the same services as bioretention cells, but they are shallower, configured as linear channels, and can be planted with sod or native plants. These swales create a 1,100-foot-long treatment path that terminates at an engineered outfall.

$79,400 lb P/yr$13,600 lb N/yr$480 lb Sediment/yr