

Introduction to Stormwater Issues

Thanh Dang, Public Works Planner
City of Harrisonburg



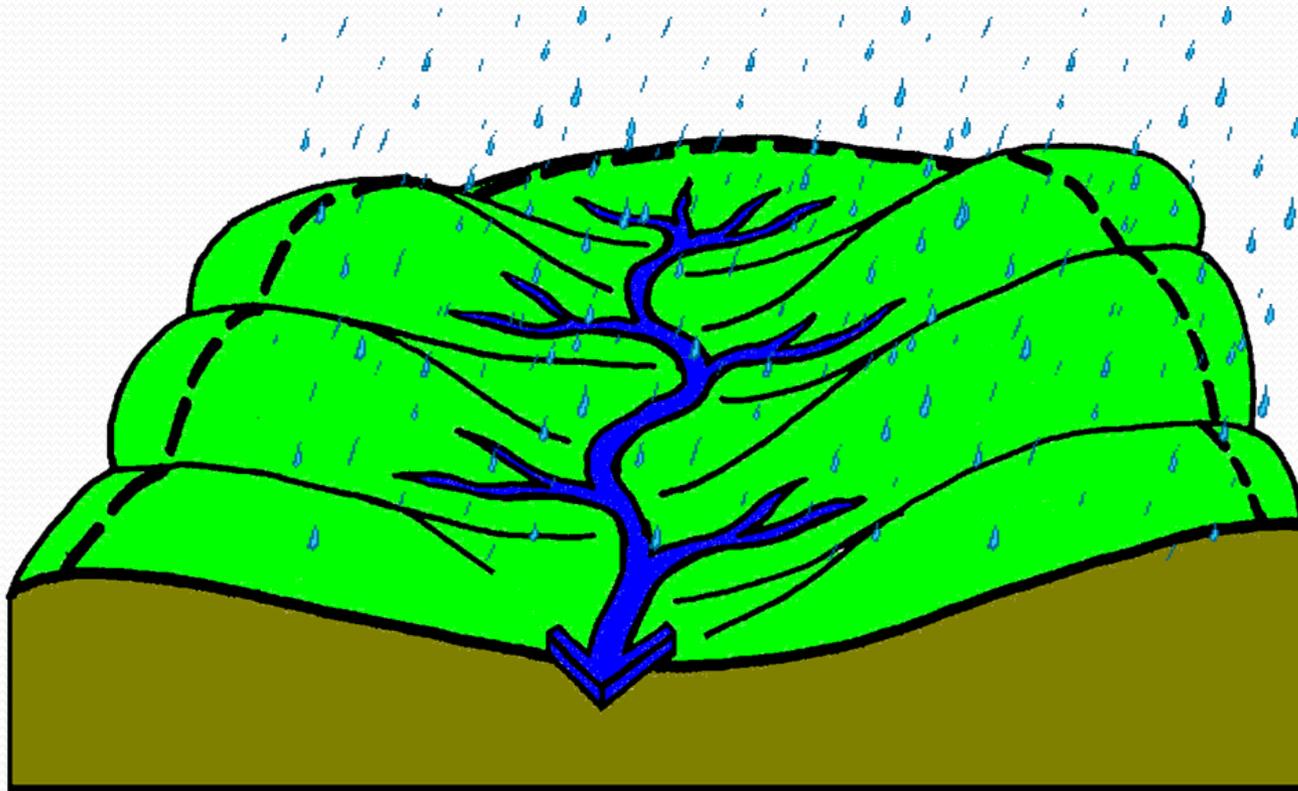
South Fork Shenandoah River

Conclusion

- Science and funding are lagging behind regulations
- Stormwater revenues must rise significantly > 100%
- Cultural Change – Managing Expectations
 - Reaching out to community (property owners, developers, engineers, planners, businesses, etc.)
 - Providing program in schools
 - Explaining the condition of our streams
 - Trying to provide realistic cost and time estimates
 - Trying to explain benefits of low impact development techniques, restoration and retrofit projects
- Honest/Open/Intelligent Discussion
- What can I do to help?

What is a Watershed?

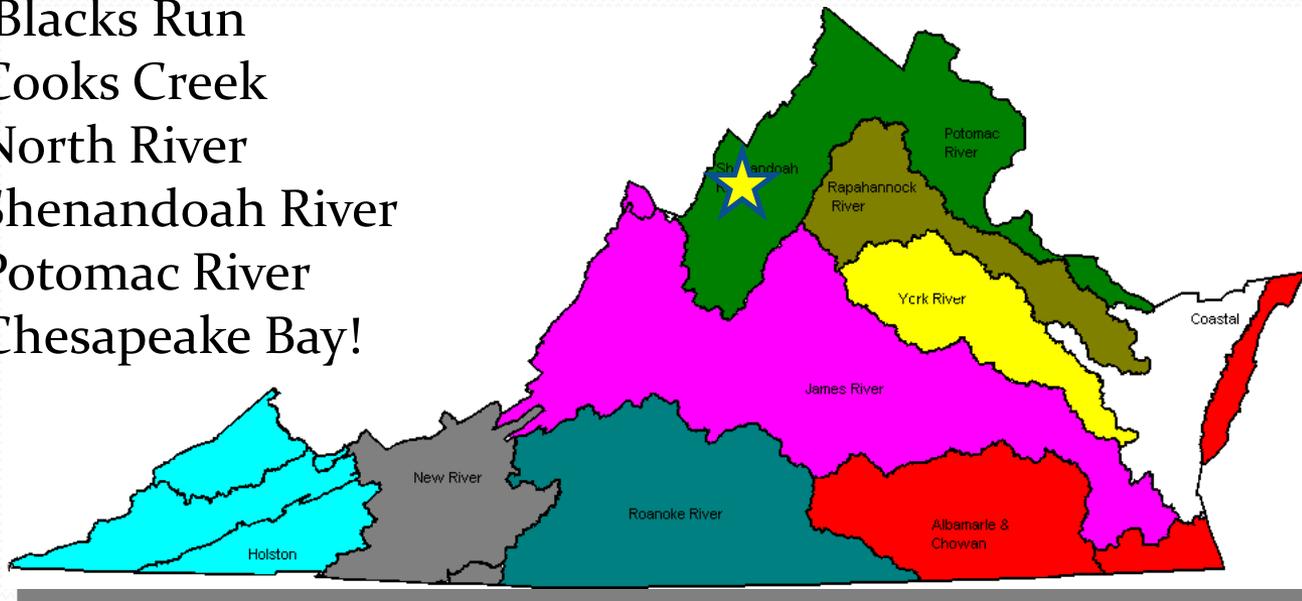
- AREA OF LAND that drains to a stream, marsh, or other body of water



Virginia's Watersheds

Our Watershed Address

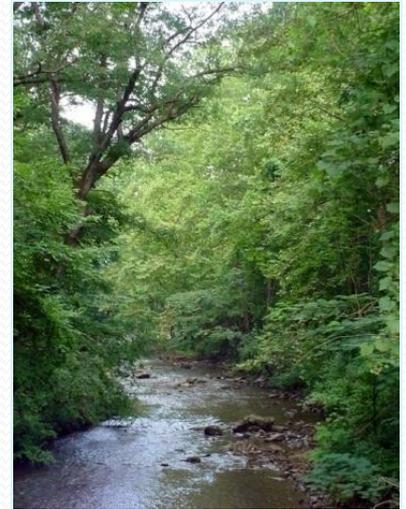
- Blacks Run
- Cooks Creek
- North River
- Shenandoah River
- Potomac River
- Chesapeake Bay!



- 9 major watersheds
- 49,350 miles of perennial streams & rivers

Healthy Stream Characteristics

- Thick growth of vegetation with diversity of grasses, shrubs, and trees
- Tree canopy to shade, cool water
- Stable vegetated banks, floodplains free of encroachment
- Clear water
- Native flora and fauna -- abundant and diverse
- Lack of pollutants



Unhealthy Stream Characteristics

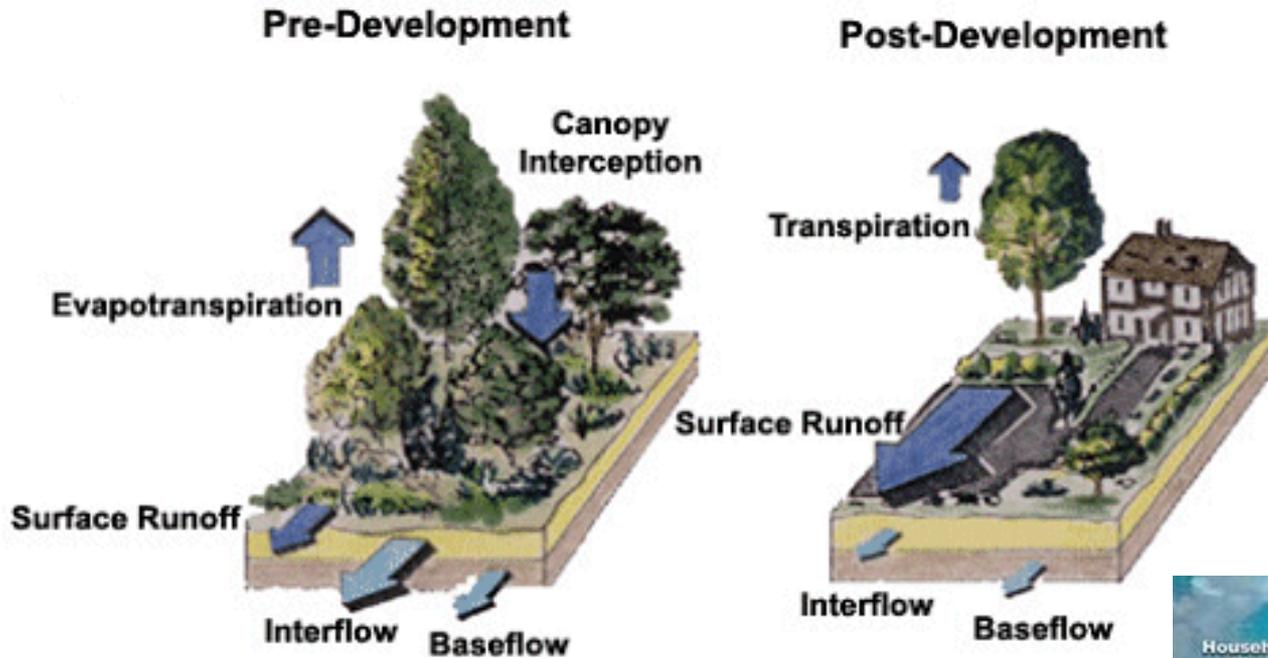
- Lack of vegetation and patchy growth, with bare ground showing
- Vegetation dominated by upland plants and noxious weeds
- Streambanks eroding, severely undercut, or sloughing off
- Silt covers stream bottom, stream water is muddy or murky

These characteristics of degraded riparian areas reflect their inability to protect water quality and provide critical habitat for wildlife.



This is “old” Blacks Run in Purcell Park.

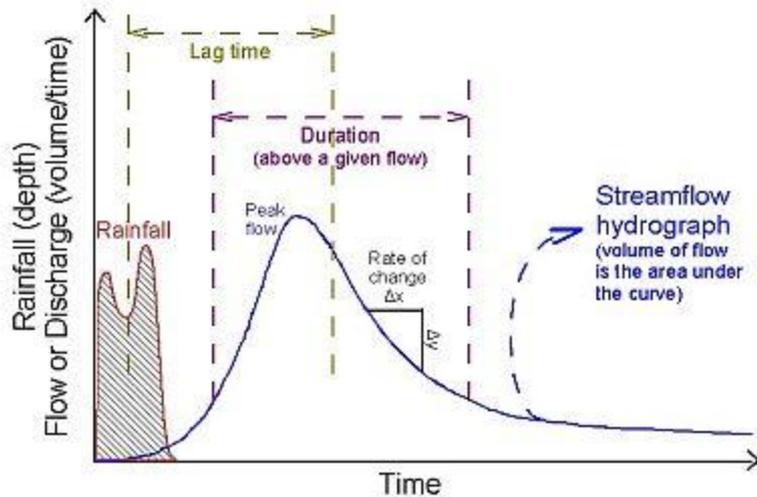
Water Balance



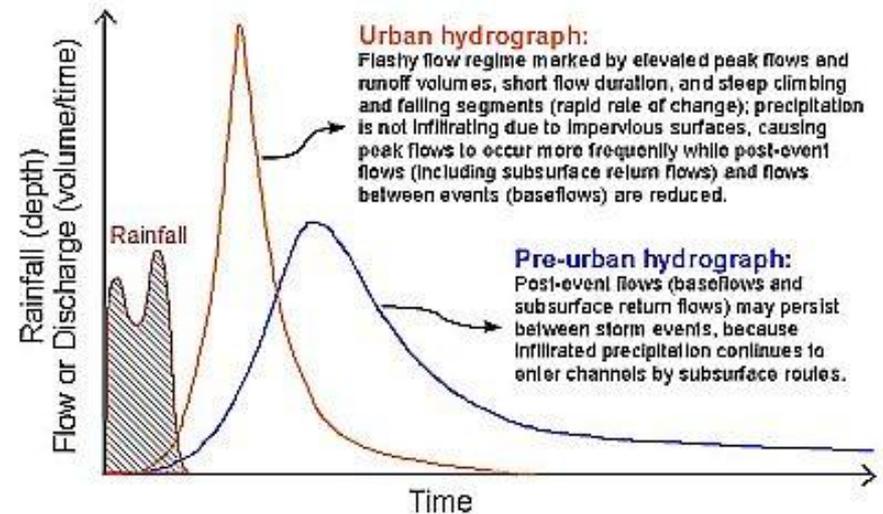
- Development
 - Increases impervious cover and water runoff
 - Disrupts natural water balance
 - Decreases groundwater recharge



Rainfall and Stream Flow



A single-event flow hydrograph.



Hydrographs showing generalized flow conditions for a stream before and after urbanization.

Benefits of Riparian Buffers

- **Removes pollution** – Buffers can help remove some non-point source pollution through absorption.
- **Increased property values** – Buffers can increase property values by as much as 20% by providing natural enhancements.
- **Reduced erosion** – Plants and their roots reduce runoff and stabilize soil.
- **Air quality improvement** – Trees and shrubs absorb airborne pollutants and return oxygen to the atmosphere for our use.
- **Decreased cooling costs** – Trees can provide summer shade.
- **Noise reduction** – Trees and shrubs can muffle urban noises.
- **Wildlife habitat and viewing** – Wildlife depends upon mixed woodlands for food, habitat and travel corridors.
- **Groundwater recharge** – Buffers absorb excess water increasing groundwater recharge and reducing flood volume.

Adapted from: Got Buffer? Brochure by Virginia Department of Conservation & Recreation.

Who's Responsible?

We All Are!

Rural Land Use



Alternative
Water
for Cattle



Fencing



Conservation Tillage



Plant Trees

Urban Land Use



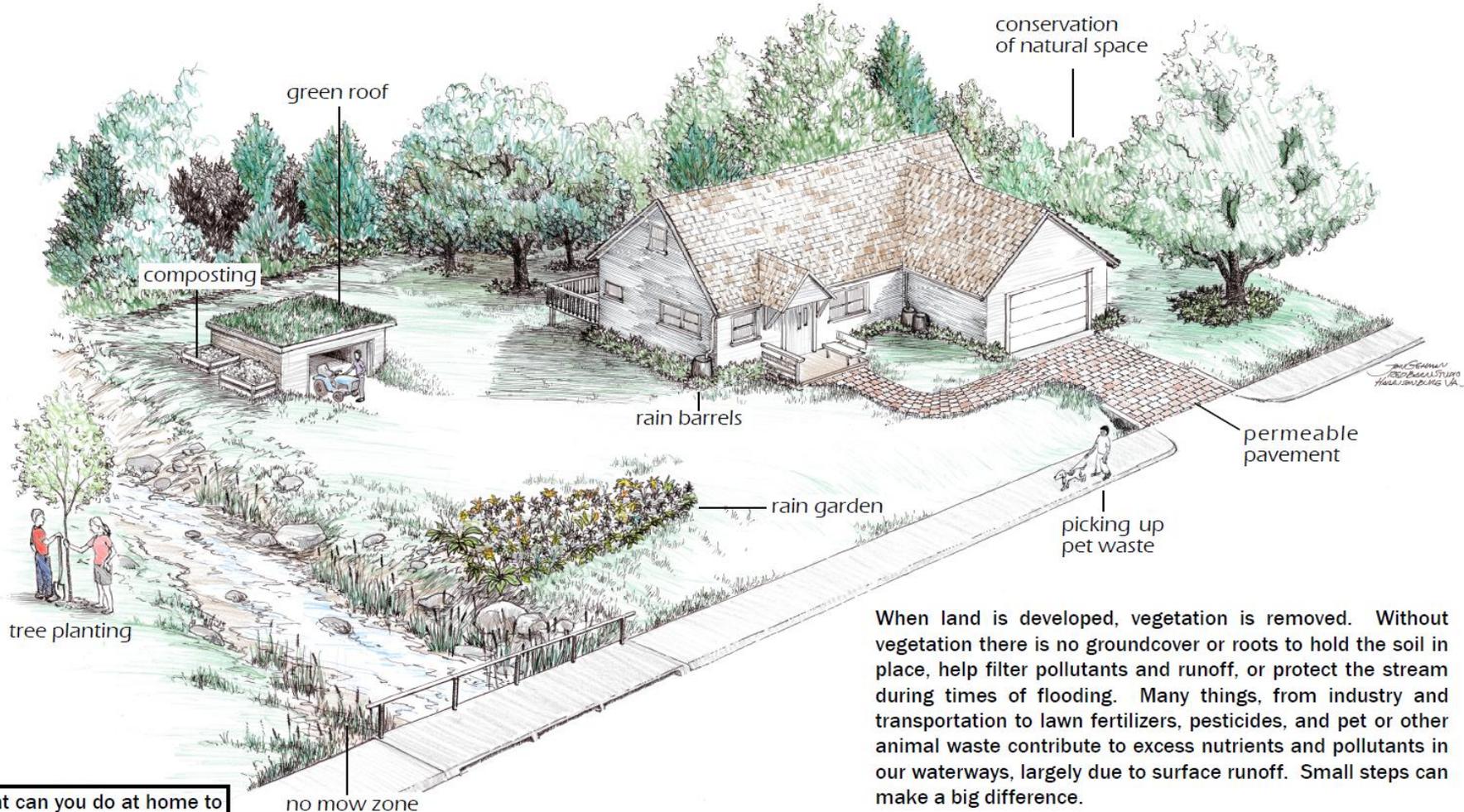
City of Harrisonburg

BLACKS RUN: WATER QUALITY AT HOME

You don't have to live next to a stream to help improve water quality.

We all live downstream from someone and someone lives downstream of us.

We depend on each other to make the right choices to protect our water and waterways.



What can you do at home to help improve water quality?

When land is developed, vegetation is removed. Without vegetation there is no groundcover or roots to hold the soil in place, help filter pollutants and runoff, or protect the stream during times of flooding. Many things, from industry and transportation to lawn fertilizers, pesticides, and pet or other animal waste contribute to excess nutrients and pollutants in our waterways, largely due to surface runoff. Small steps can make a big difference.

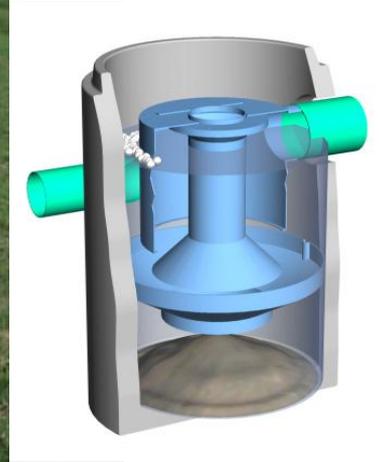
Example Post-Construction BMPs



Underground



Hydrodynamic separator



Filtration



Underground detention



Example Restoration Projects



Stream Restoration

Poplar Springs - Before & After



Area Treated (acres)	Phosphorous Removal (lbs/yr)	Nitrogen Removal (lbs/yr)	Sediment Removal (tons/yr)
230.4	7.5	141	1.25

Outfall Restoration

Dolly Madison Library – Before



Outfall Restoration

Dolly Madison Library – During & After



Drainage Area (acres)	Phosphorous Removal (lbs/yr)	Nitrogen Removal (lbs/yr)	Sediment Removal (tons/yr)
5.4	7.5	68.6	1.2



Detention Basin Retrofits

Sycamore Ridge - Before & During



Area Treated (acres)	Phosphorous Removal (lbs/yr)	Nitrogen Removal (lbs/yr)	Sediment Removal (tons/yr)
78.4	38	202	9.4

Low Impact Development

Walt Whitman Middle School – Rain Gardens



Area Treated (acres)	Phosphorous Removal (lbs/yr)	Nitrogen Removal (lbs/yr)	Sediment Removal (tons/yr)
1.29	2.2	4.7	0.6

A Local Government Perspective

Current Stormwater Issues

- **MS4 Permit** – Municipal Separate Storm Sewer System
 - www.harrisonburgva.gov/stormwater
- Blacks Run/Cooks Creek TMDL – Total Maximum Daily Load
- **Chesapeake Bay TMDL**
- Federal Rule Making
- **State Stormwater Regulations**
 - dcr.state.va.us/stormwater_management/stormwat.shtml
 - Virginia Stormwater BMP Clearinghouse
- Dam Regulations
- Flooding & FEMA
- Virginia Nutrient Management Trading

A few Challenges

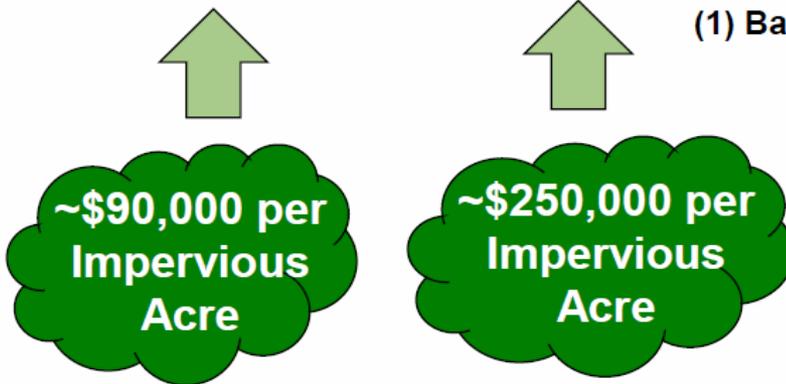
- State and EPA BMP efficiencies don't match
- Property Challenges
 - Local governments do not own a lot land (only 20-25%)
 - Land acquisition takes time and expense
- EPA's Water Reuse Assumption
 - What changes to reuse regulations needed? Treatment?
 - What would be the impact on water utilities?
- Cost to install, operate, and maintain BMPs - unknown funding source - Stormwater Utilities?

Total Estimated Capital Costs

based on EPA TMDL Retrofit Assumptions

Community	Preliminary Estimated Capital Cost to Comply with EPA TMDL Allocations			Capital Cost per Equivalent Residential Unit ⁽¹⁾
	BMP Costs (Millions)	Storage & Reuse Costs (Millions)	Total (Millions)	
Lynchburg	\$233	\$122	\$355	\$4,700
Fairfax	\$1,825	\$686	\$2,511	\$5,600

(1) Based on ERU of 2,000 sf



Presentation to Virginia Municipal Stormwater Association, October 14, 2011

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Thank You

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