

Module 2

Basic Stormwater Principles

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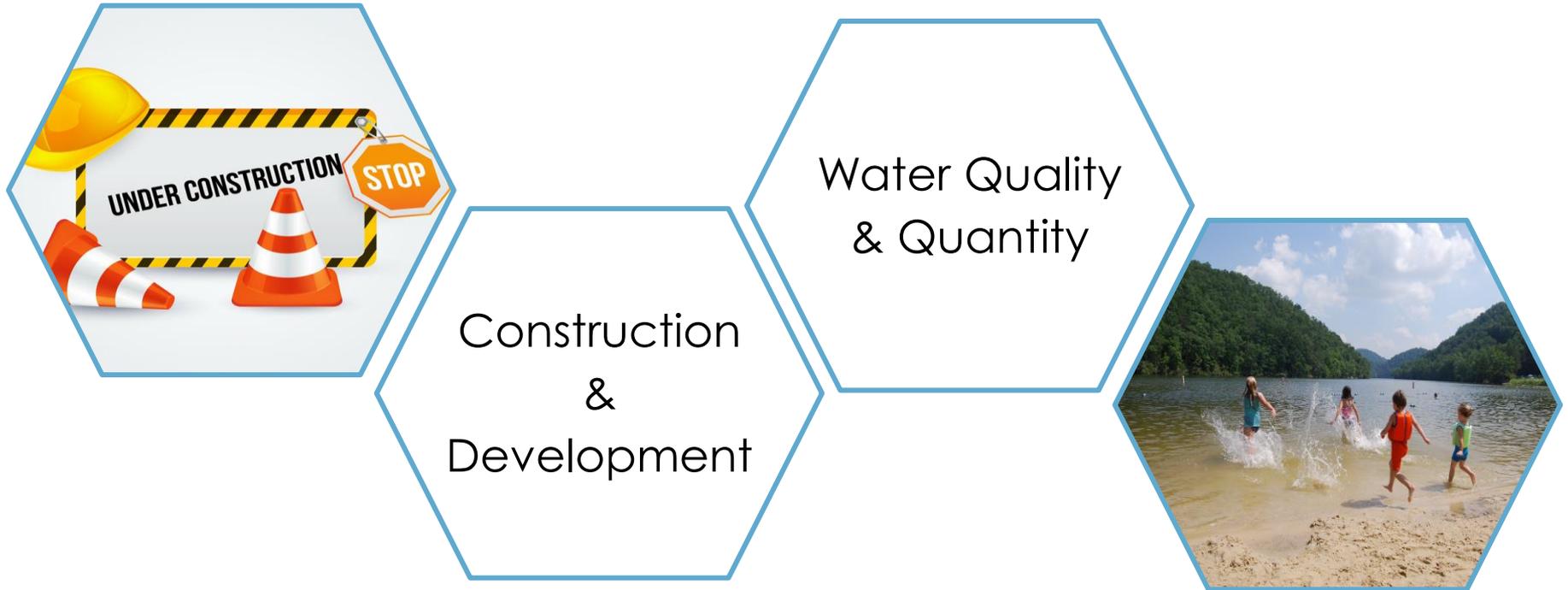
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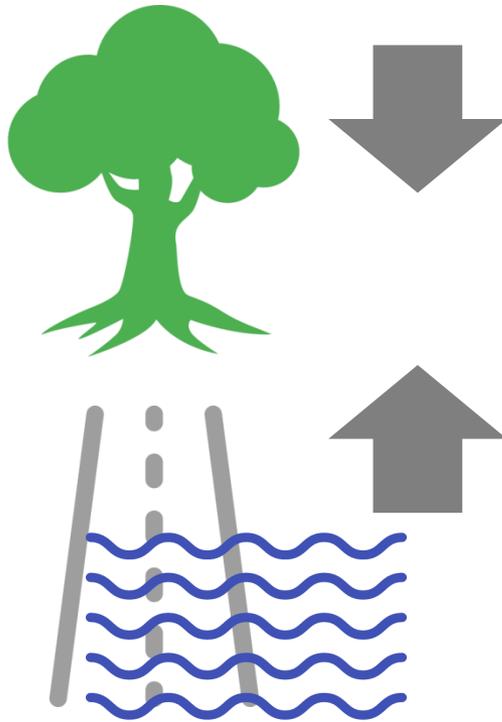
Module 2a.

Overview

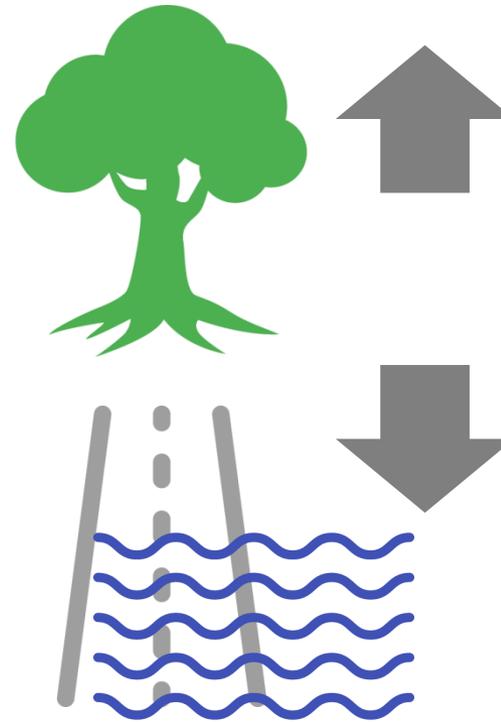
Program Administrators and SWM



Program Administrators and SWM



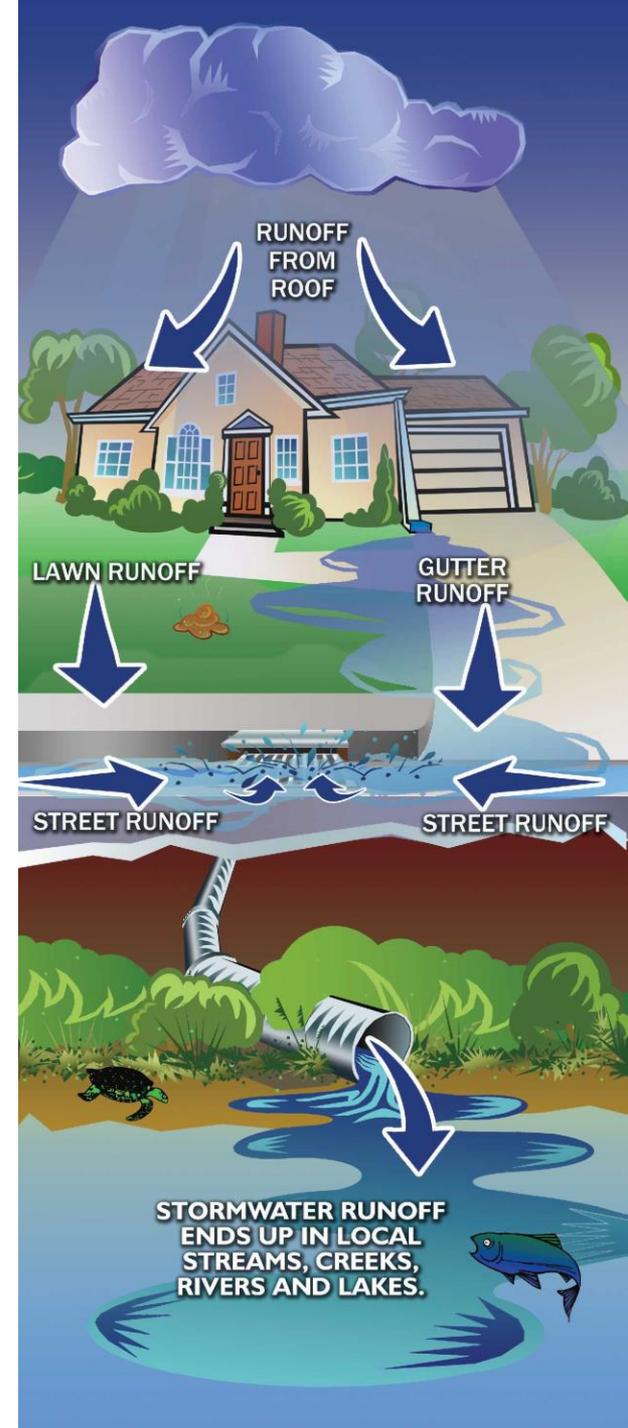
Conventional Development



VSMP

Stormwater Runoff

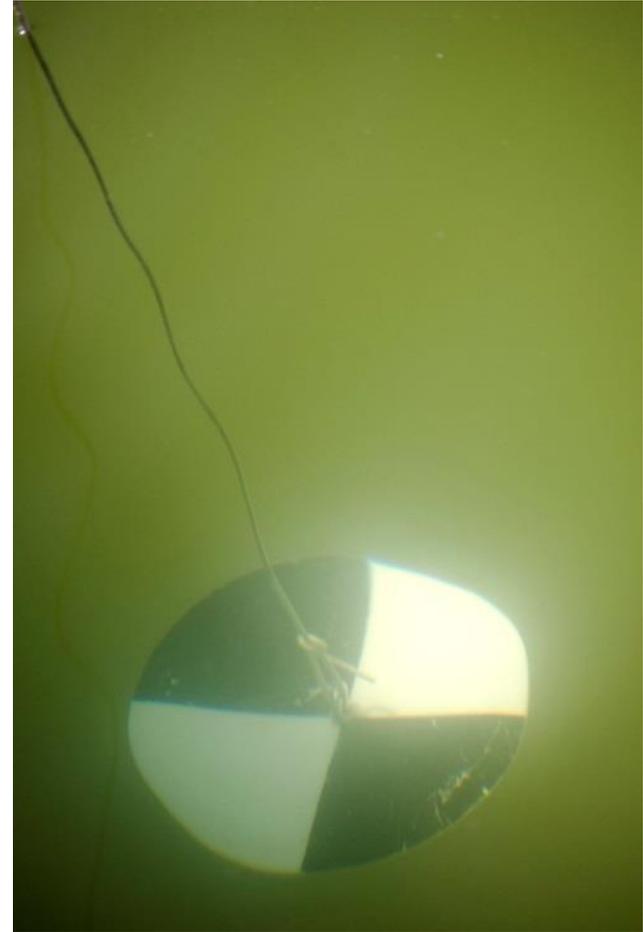
- **Precipitation exceeds the capacity of the ground to absorb water**
- **Picks up:**
 - Sediment
 - Trash
 - Oil
 - Fertilizers
 - Other pollutants



VSMP Technical Criteria

Water Quality

- Reduce pollutants carried offsite in stormwater runoff
- Establish threshold for total phosphorus



VSMP Technical Criteria

Water Quantity

- Channel erosion protection
- Flood protection



Compliance with the Part II B water quantity criteria satisfies minimum standard 19 of the Erosion and Sediment Control Regulations.



Virginia Runoff Reduction Method

- Water quality compliance tool
 - New development
 - Redevelopment

Environmental Site Design

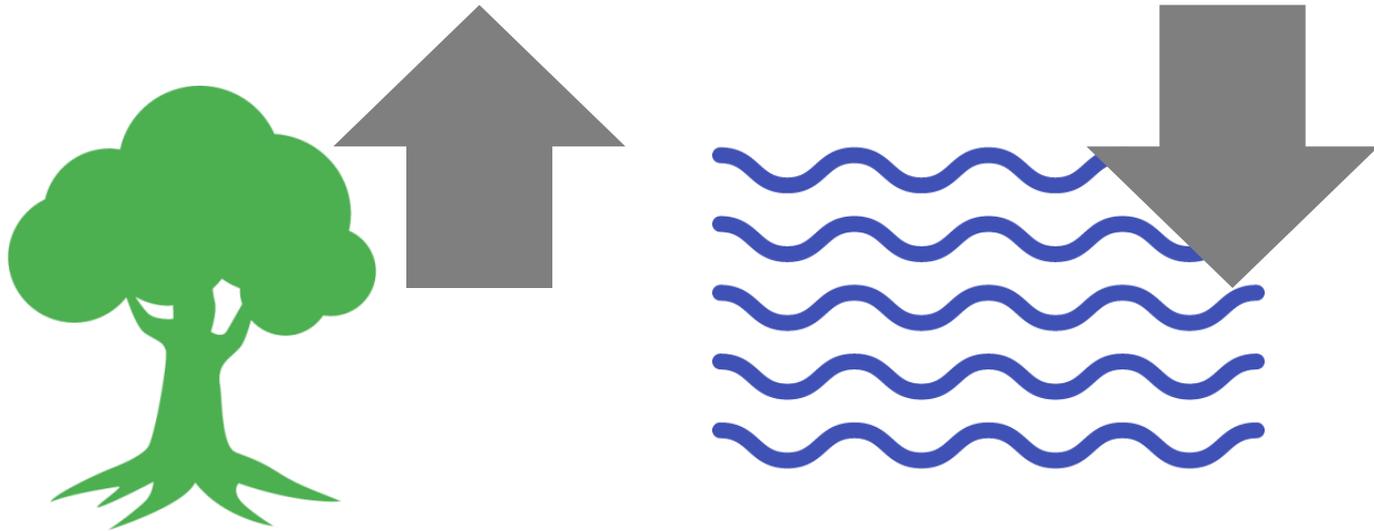
- Mimic natural runoff characteristics
- Minimize impacts of development on water quality and quantity

Best Management Practices (BMPs)

- Reduce stormwater runoff and/or
- Remove pollutants from stormwater



Summary



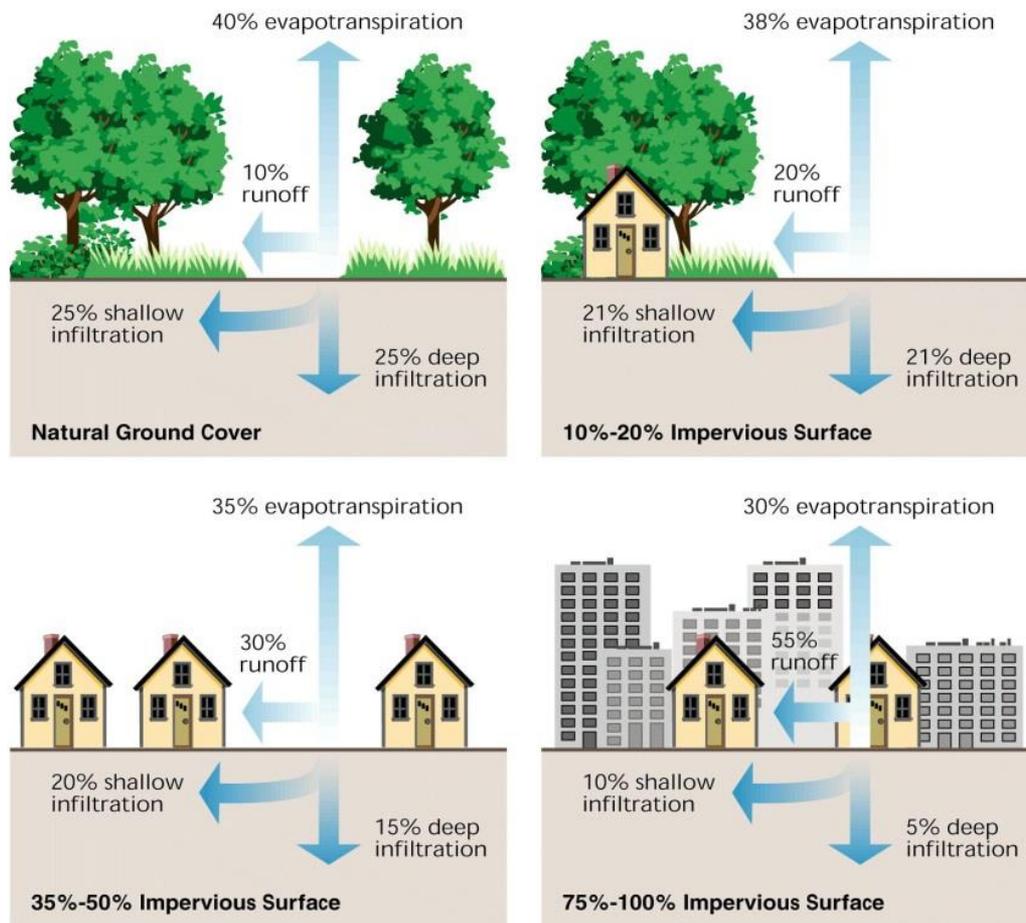
Summary

- Minimize land cover changes
- Use Environmental Site Design
 - Enhances natural functions of resources
 - Reduces runoff leaving the site

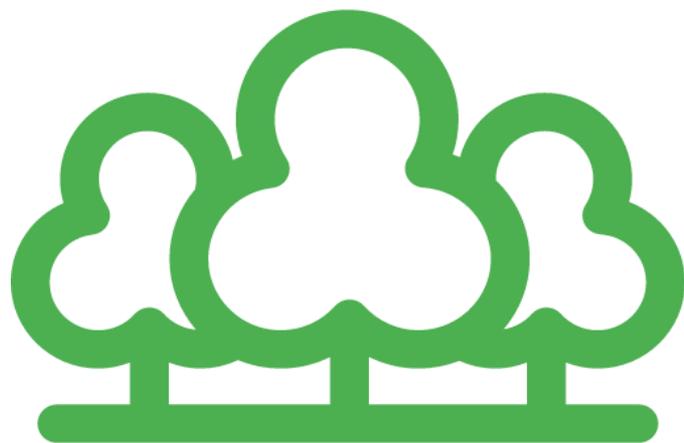
Module 2b.

Effects of Landuse on the Hydrologic Cycle

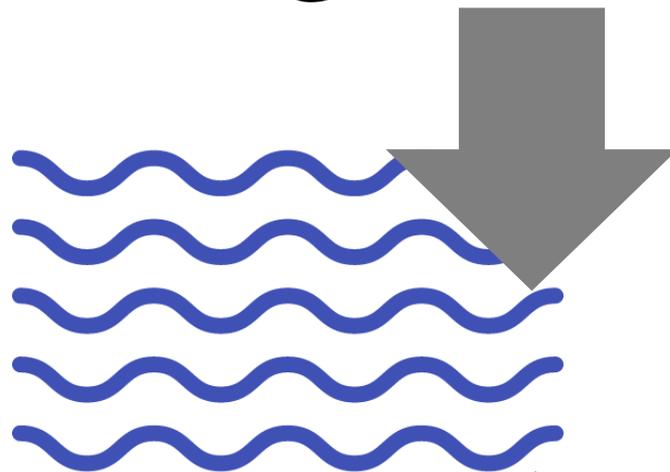
Reduced Evapotranspiration and Infiltration from Loss of Vegetation



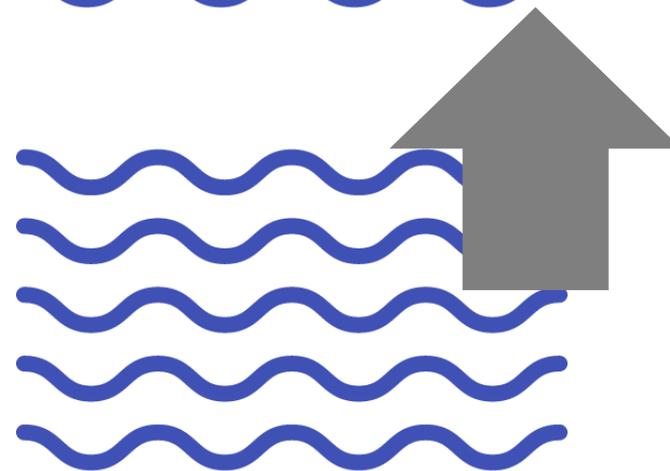
Reduced Evapotranspiration and Infiltration from Loss of Vegetation



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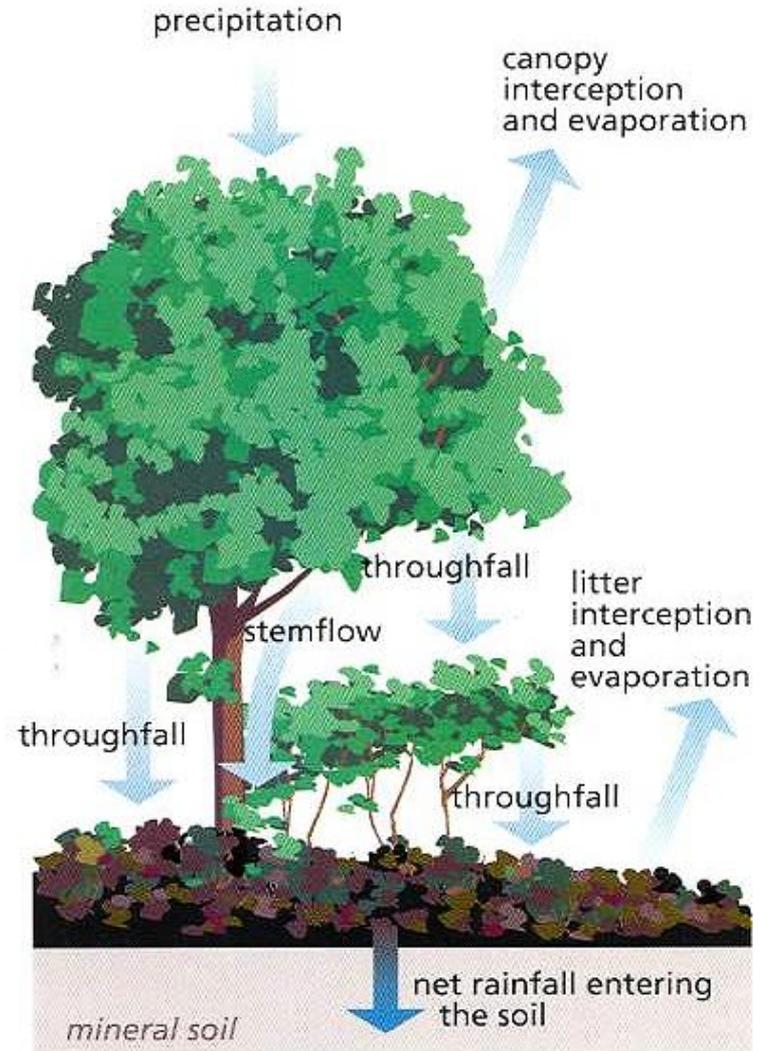
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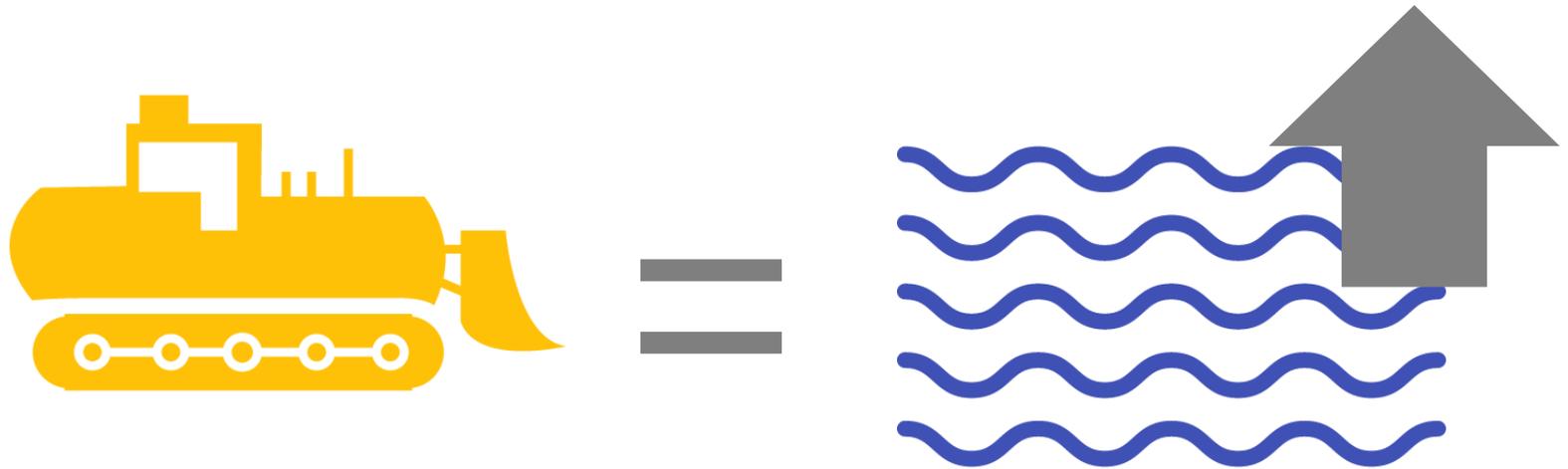
Reduced Evapotranspiration and Infiltration from Loss of Vegetation

Vegetation provides:

- Evapotranspiration
- Infiltration



Reduced Infiltration from Removal of Topsoil and Compaction of Subsoil



Reduced Groundwater Recharge and Reduced Stream Base Flows

More runoff = less groundwater recharge

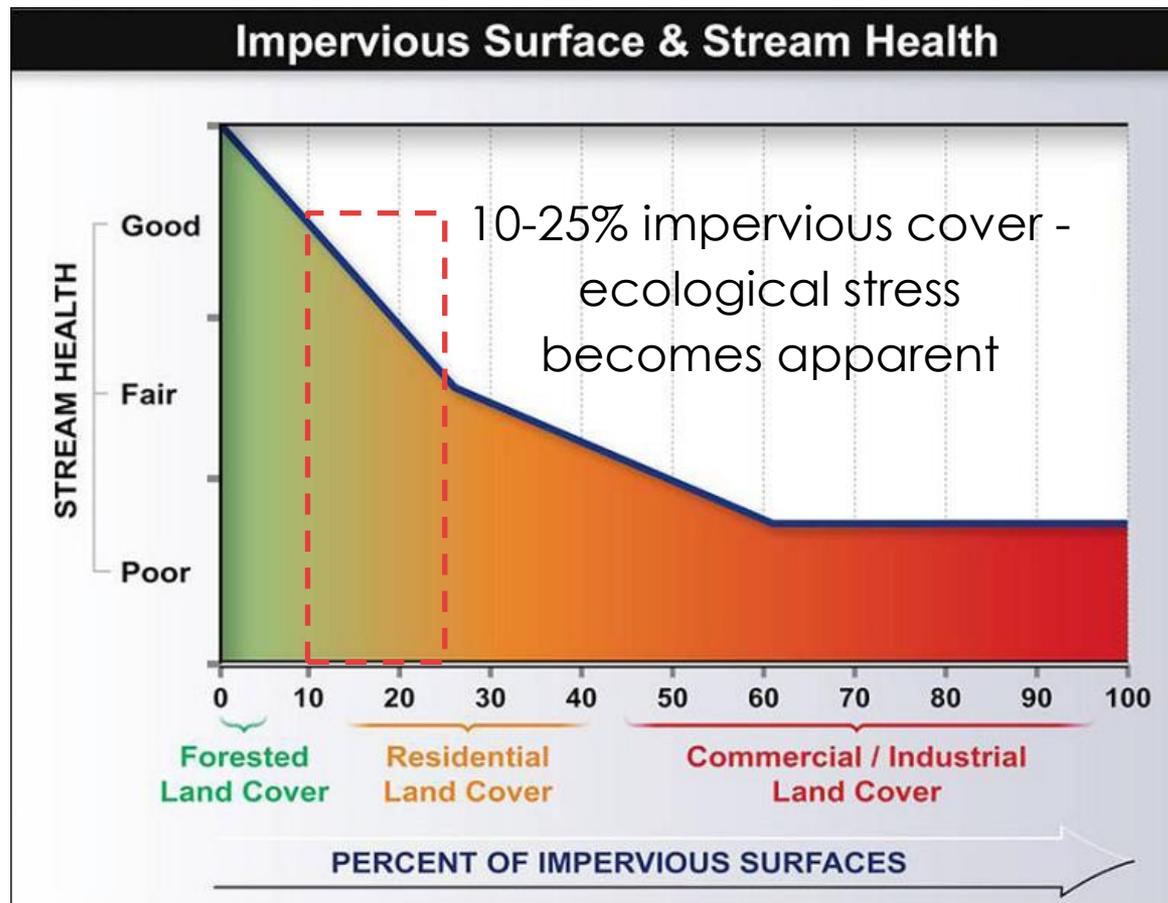
- **Base flow may diminish or cease**
- **Can affect water quality**



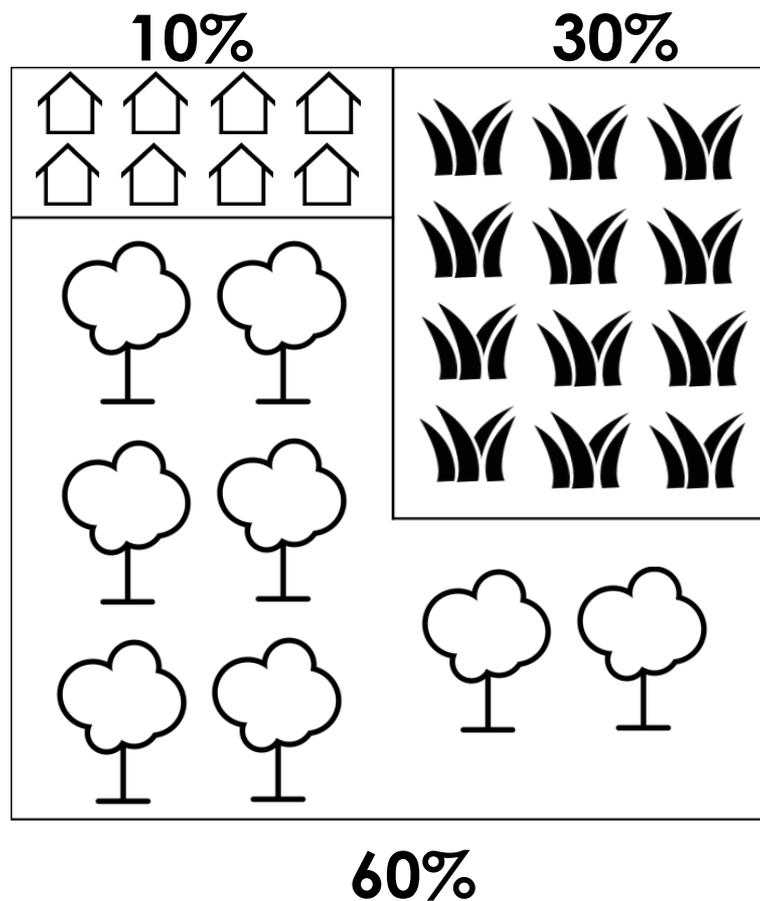
Reduced Infiltration from Built or Traditional Drainage Systems



Declining Watershed Health from Increased Imperviousness



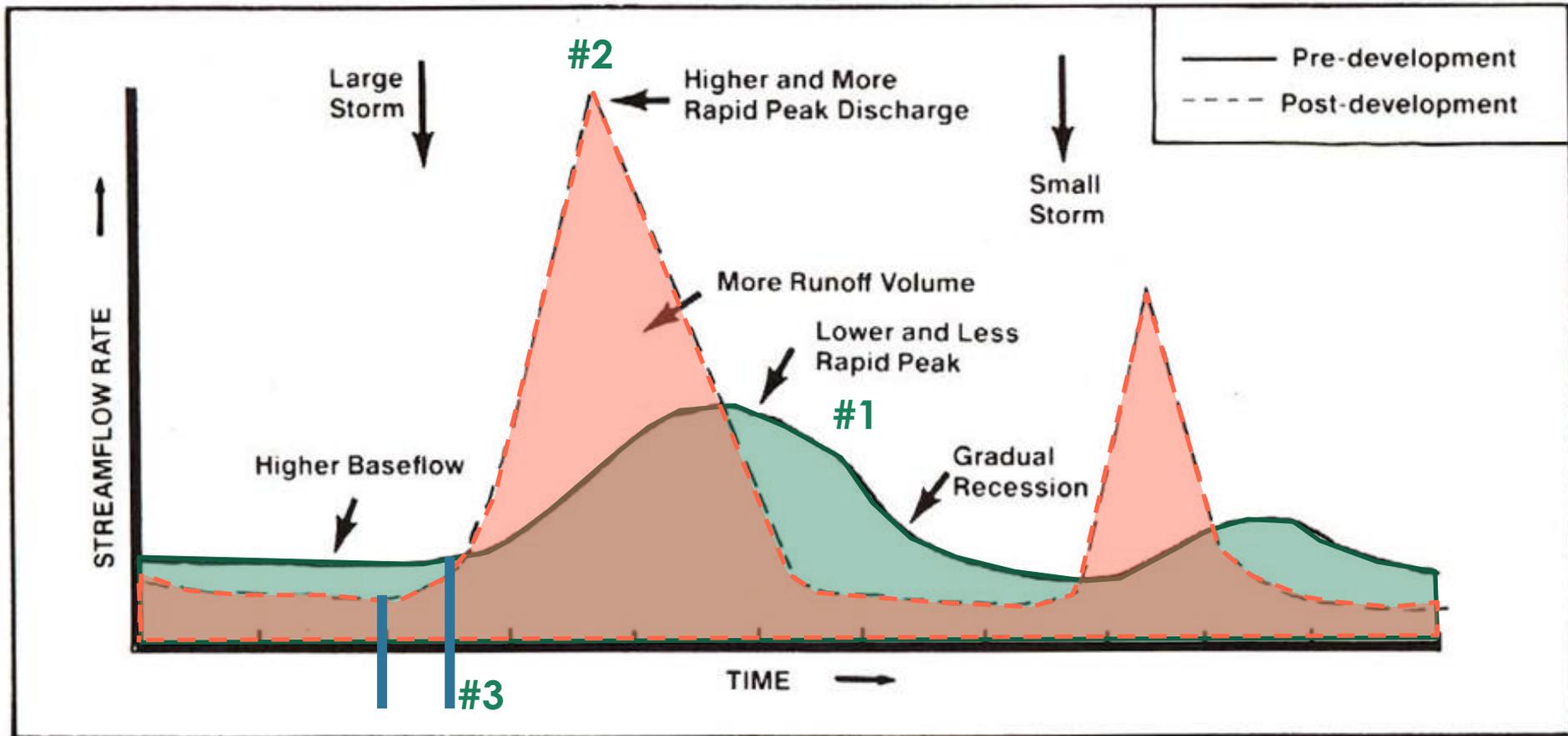
Landuse and the Runoff Reduction Method



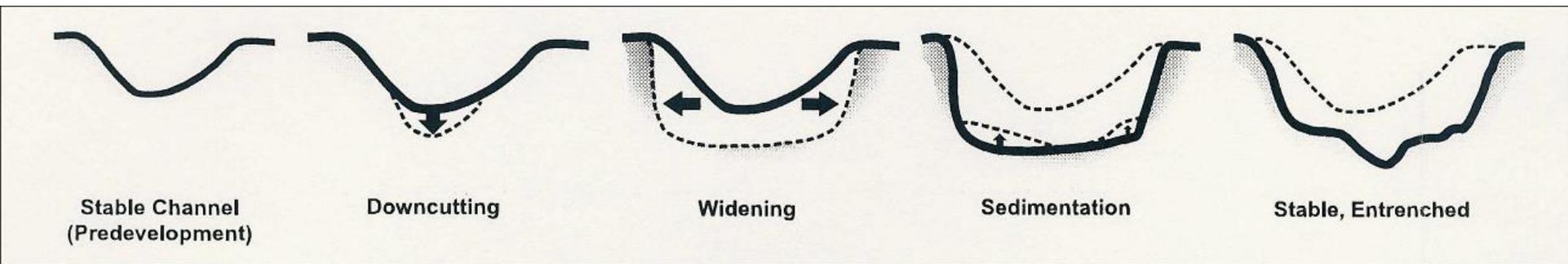
Module 2c.

Impact of Stormwater Runoff on Stream Channels and Flooding

Impacts on Stream Channels and Flooding



Changes to a Stream



Landuse and Part II B Quantity

- Maintain after-development runoff rate of flow and characteristics that replicate, as nearly as practicable, the existing pre-development site characteristics
- Make improvements where channel erosion and/or flooding already occur

Module 2d.

15 Non-Proprietary BMPs

BMPs

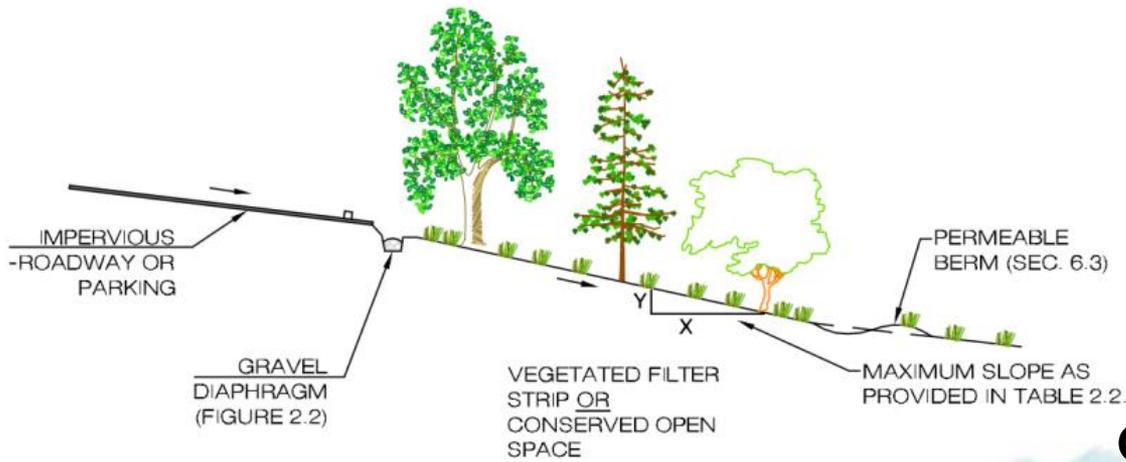
- Reduce stormwater runoff and/or
- Remove pollutants from stormwater runoff

Rooftop (Impervious Area) Disconnection

1. Simple disconnection
2. Disconnection leading to another BMP

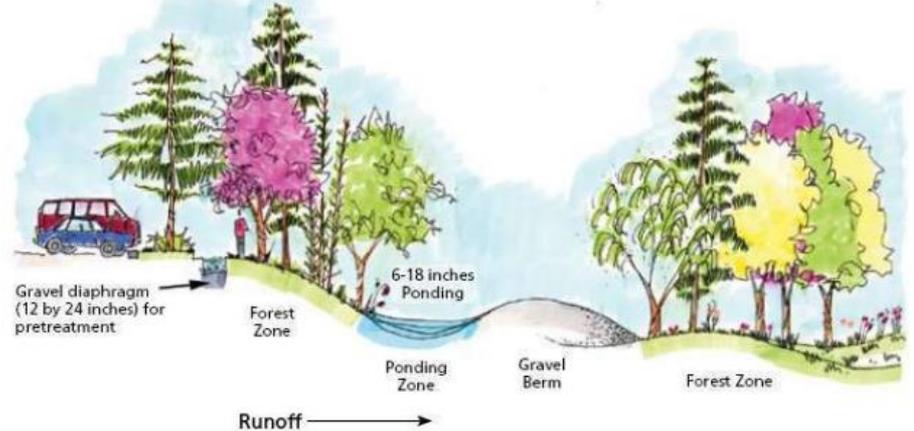


Sheet Flow to Vegetated Filter Strip or Conserved Open Space



Vegetated filter strip

Conserved open space



Grass Channels



Soil Compost Amendments



Vegetated Roofs

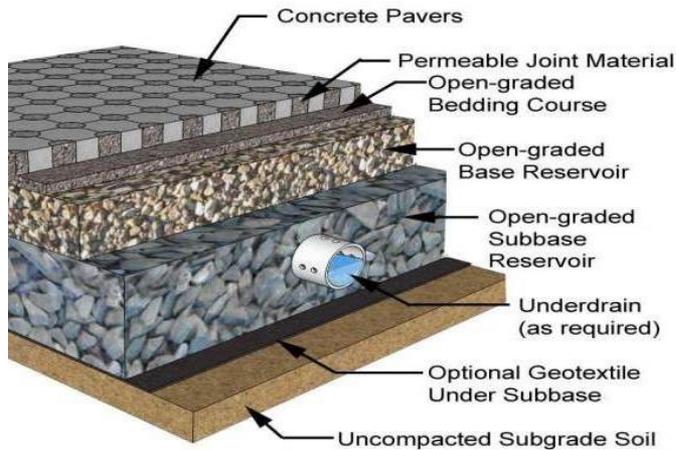
- Intensive
- Extensive



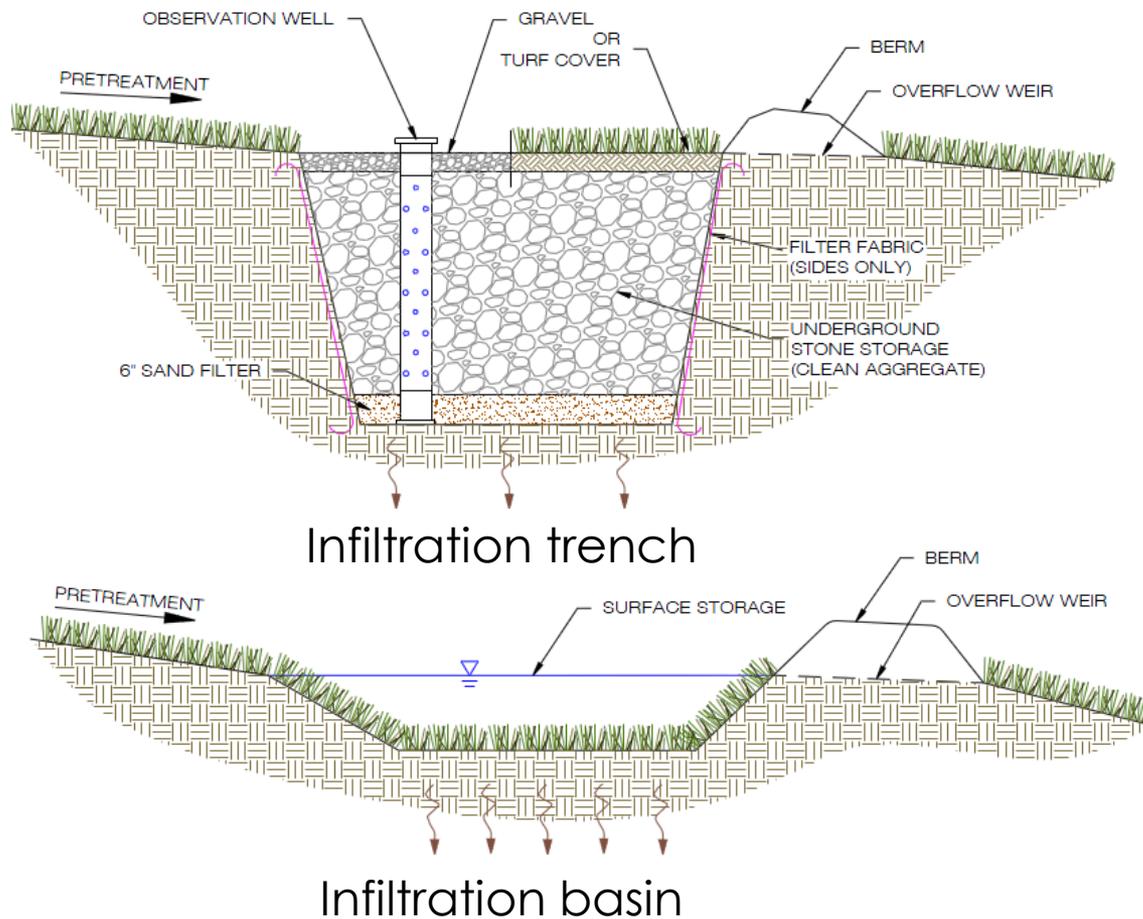
Rainwater Harvesting



Permeable Pavement



Infiltration



Bioretention Basins



Dry Swales



Wet Swales



Filtering Practices



Constructed Wetlands



Wet Pond



Extended Detention Pond



Module 2e.

Summary

Summary

- Water quality
 - Protect waterways from pollutants
- Water quantity
 - Protect channels from erosion
 - Protect channels from flooding

Questions?

Photo credits

Center for Watershed Protection: Slides 33, 39

Chesapeake Bay Program: Slides 7, 34, 35, 38

Chesapeake Bay Stormwater Training Partnership: Slide 21

Chesapeake Stormwater Network: Slide 38

Chris Bruekner: Slide 34

Fairfax County: Slide 32

Federal Interagency SWRG: Slide 16

Maryland DOT: Slide 32

Montgomery County, MD: Slide 32

Montgomery County PDC: Slide 39

NCDENR: Slide 6

NEMO: Slide 36

Seuss: Slide 39

Stormwater Maintenance LLC: Slide 32

VA DGS: Slide 38