Chesapeake Bay Watershed, Stormwater, and Environmental Justice

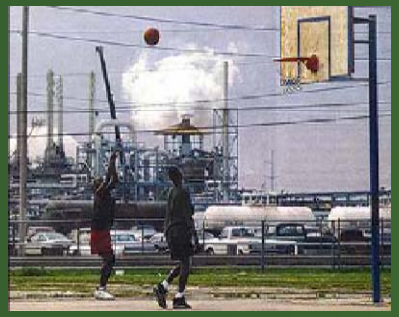
Richmond, VA

November 9, 2010

U.S. Environmental Protection Agency

What is Environmental Justice?

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.




…everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, work.

The Clean Water Act:
The Objective

"to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The Clean Water Act: *The Goals*

- Eliminating the discharge of pollutants into navigable waters; and
- Achieving interim water quality that will protect fish, shellfish, and wildlife while providing for recreation ("fishable and swimmable") in and on the water whenever attainable.

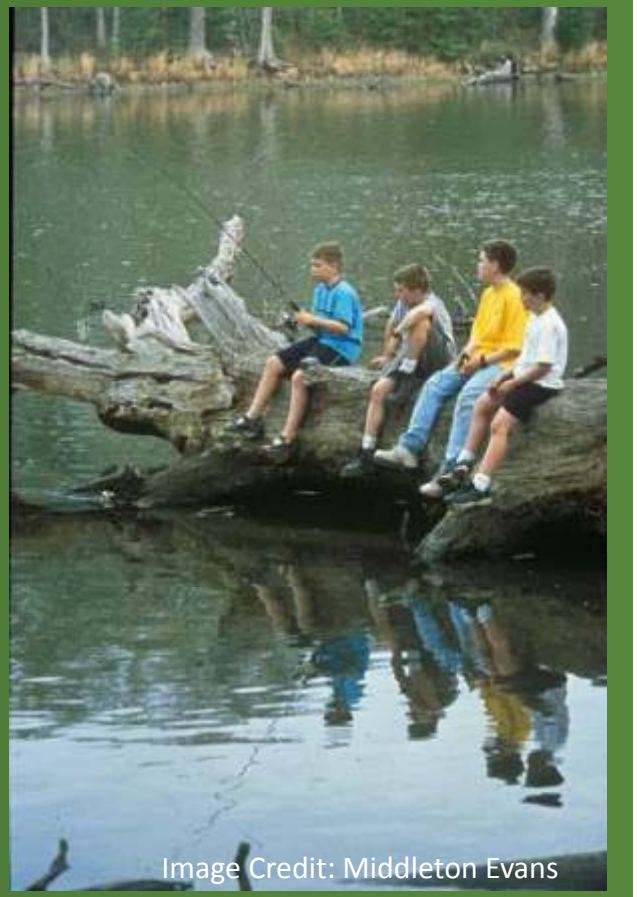


Image Credit: Middleton Evans

The Clean Water Act: *The Tools*

National Pollutant Discharge Elimination System (NPDES) permitting program authorizes and regulates certain discharges (§ 402), including stormwater discharges.

Background

- On December 28, 2009, EPA issued a Federal Register Notice announcing a national rulemaking to establish a program to reduce stormwater discharges from new development and redevelopment and make other regulatory improvements to strengthen its stormwater program.
- One of the preliminary considerations included exploring specific stormwater provisions to protect sensitive areas.

Purpose of Today's Discussion

- Today's discussion will focus on:
  - EPA's preliminary considerations for stormwater requirements within the Chesapeake Bay watershed;
  - Concerns you have regarding stormwater management in your community;
  - Ways EPA can better help your community achieve its stormwater goals; and
  - Tools and resources that your community needs to successfully manage stormwater.

Stormwater Challenges

1. Increased amounts of stormwater and pollutants…

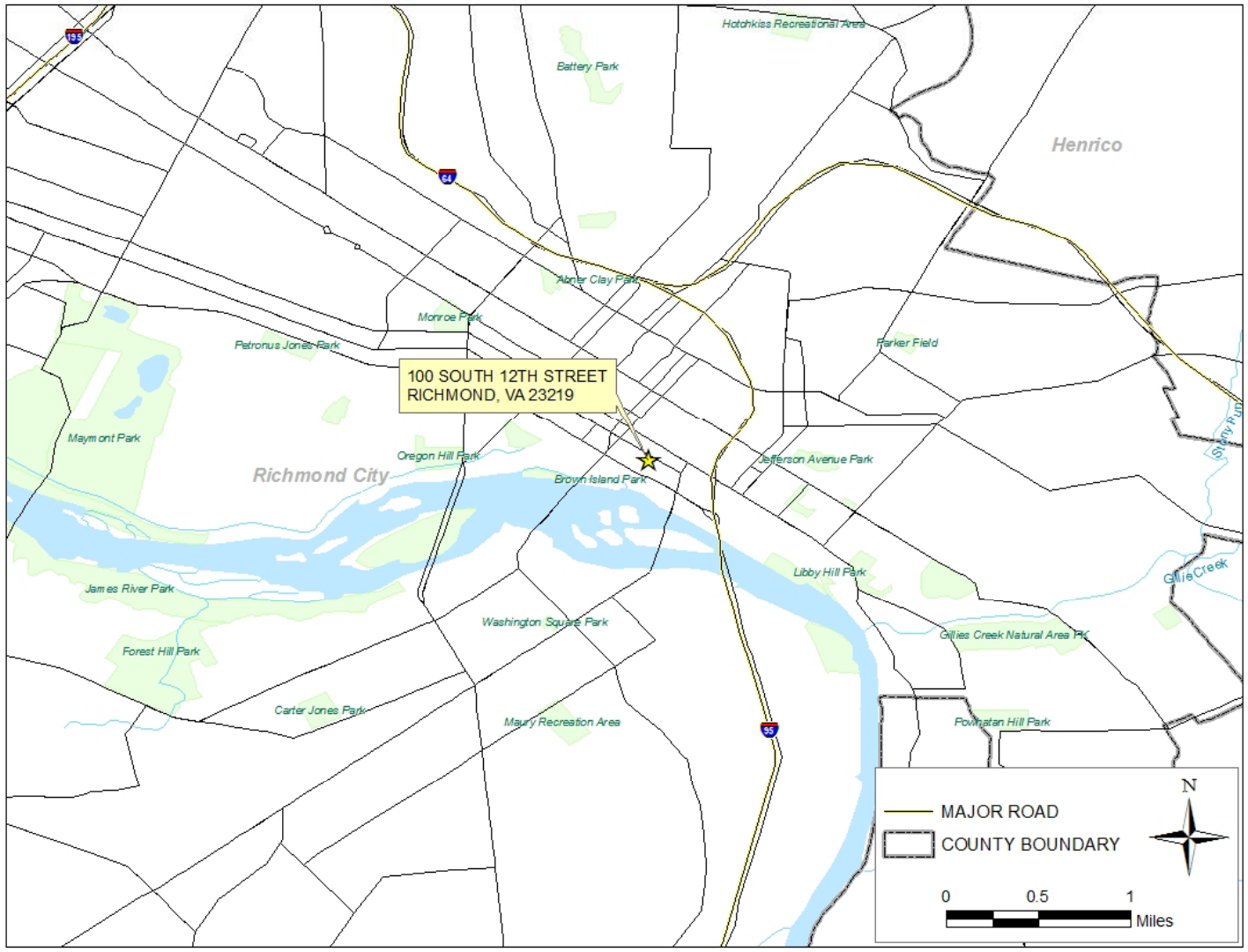
2. Enter the municipal separate storm sewer system (MS4) or a nearby waterbody…

3. Which can lead to stream degradation and increased pollutants entering waterbodies

Why is stormwater a problem?

- Increased stormwater volume can cause flooding, scouring and sewer overflows.
- Stormwater pollutants:
  - Cause beach closures and swimming illnesses through bacterial contamination
  - Impact fisheries through excess:
    - Sedimentation (smothering fish eggs),
    - Nutrients (reducing available dissolved oxygen)
    - Metals (preventing a health risk to people who eat the fish)
    - Temperature (temperature of stormwater runoff, affecting cold-water fish and other biota)
- Stormwater pollutants can also increase the costs of treating drinking water supplies

Stormwater Challenges in Richmond, VA



Stormwater Challenges in Richmond, VA

Waterbodies in Richmond are impaired for a variety of pollutants including:

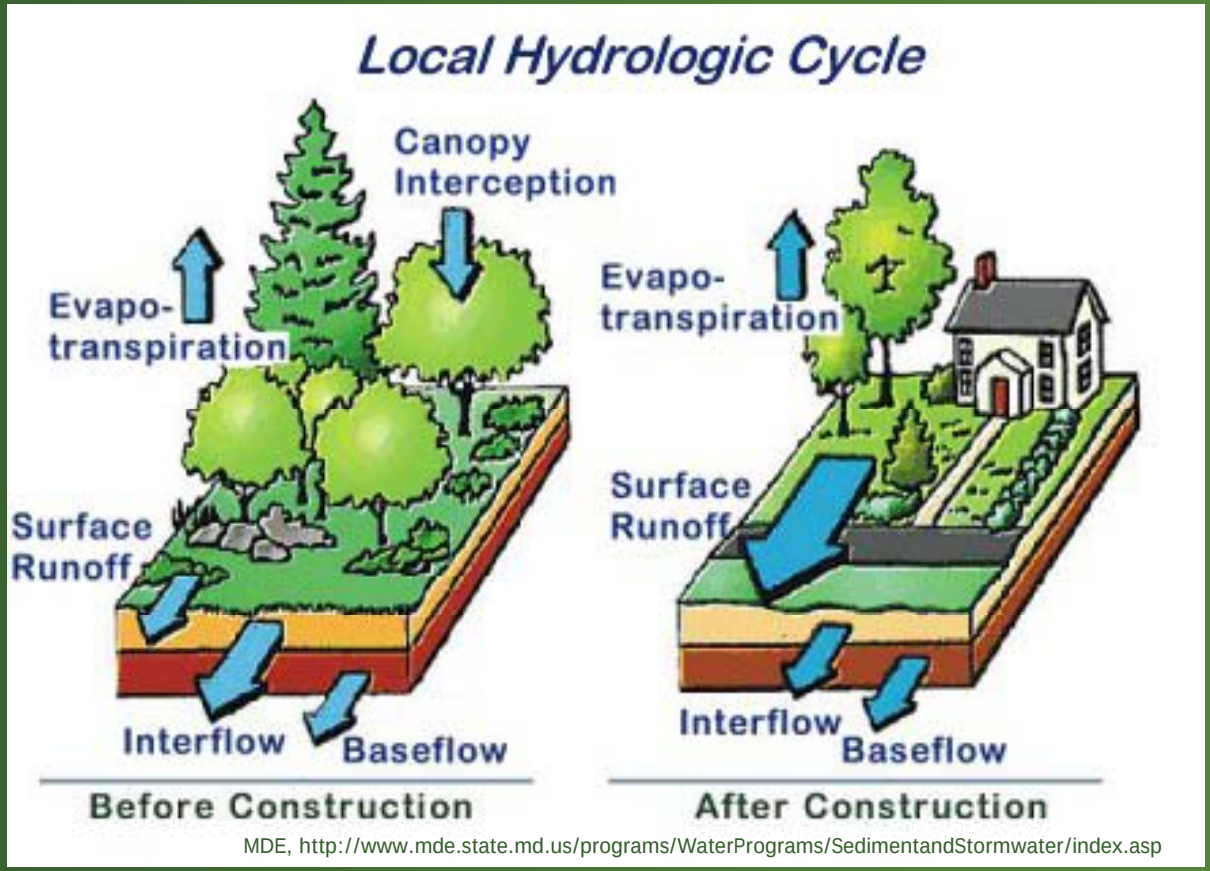
- *E. coli*
- Fecal coliform
- Benthic macroinvertebrates
- Dissolved oxygen
- Mercury and PCB(s) in fish tissues
- pH
- Temperature, water
- Chloride
- Lead
- Copper
- Ammonia, Un-ionized
- Nitrogen, Nitrate

Virginia's Probable Sources of Impairments for Threatened and Impaired Rivers and Streams (2008)

Probable Source Group	Miles Threatened or Impaired
Urban-Related Runoff/Stormwater	1931.2
Non-Point Source	1883.7
Hydromodification	342.2
Municipal Discharges/Sewage	228.8
Construction	4.8

http://iaspub.epa.gov/waters10/attains_index.control?p_area=VA

Alteration of Hydrologic Cycle



MDE, http://www.mde.state.md.us/programs/WaterPrograms/SedimentandStormwater/index.asp

All water has a perfect memory and is forever trying to get back to where it was.

- Toni Morrison

The Chesapeake Bay Watershed

- Over 64,000 square miles of land drain into the Chesapeake Bay or its tributaries
- Major urban areas include:
  - Baltimore, MD
  - Harrisburg, PA
  - DC
  - Annapolis, MD
  - Richmond, VA
  - Hampton Roads, VA (Norfolk-Virginia Beach)

Stormwater Management

Then…

~AND~

Now

Direct Conveyance to Surface Waters

Big Basins








Era of the Big Basin

Stormwater management designs that manage only discharge rates can exacerbate the problem.

Natural systems respond to runoff volumes, frequencies, durations and temperatures as well.

Paradigm Shift:
Moving away from the curb and gutter, big basin approach

- Shift from the concept of moving stormwater as far away as quickly as possible in large, buried collection and conveyance systems.

- Shift towards the concept of managing stormwater the way mother nature would do it: where it falls; plants & soils.

Green Infrastructure Approaches Mimic Natural Hydrologic Site Conditions

Infiltration - Evapotranspiration - Capture & Use


US Department of Transportation Headquarters
Washington DC

- Protecting areas with natural ecological functions
- Amended soils
- Impervious cover removal
- Bioretention
- Permeable pavements
- Green roofs
- Cisterns & rain barrels
- Trees & expanded tree boxes
- Reforestation & restoration
- Infill & Redevelopment
- Parking & street designs
- Water Conservation

Bioinfiltration

Vegetated Swales

Rain Gardens

Pocket Wetlands

Permeable and Porous Pavements

Parking Lot Infiltration Areas

Curb Extensions



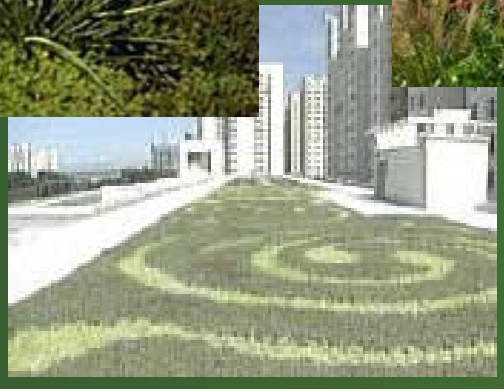






Planters

Green Roofs



Green Walls

Rainwater Harvesting & Use

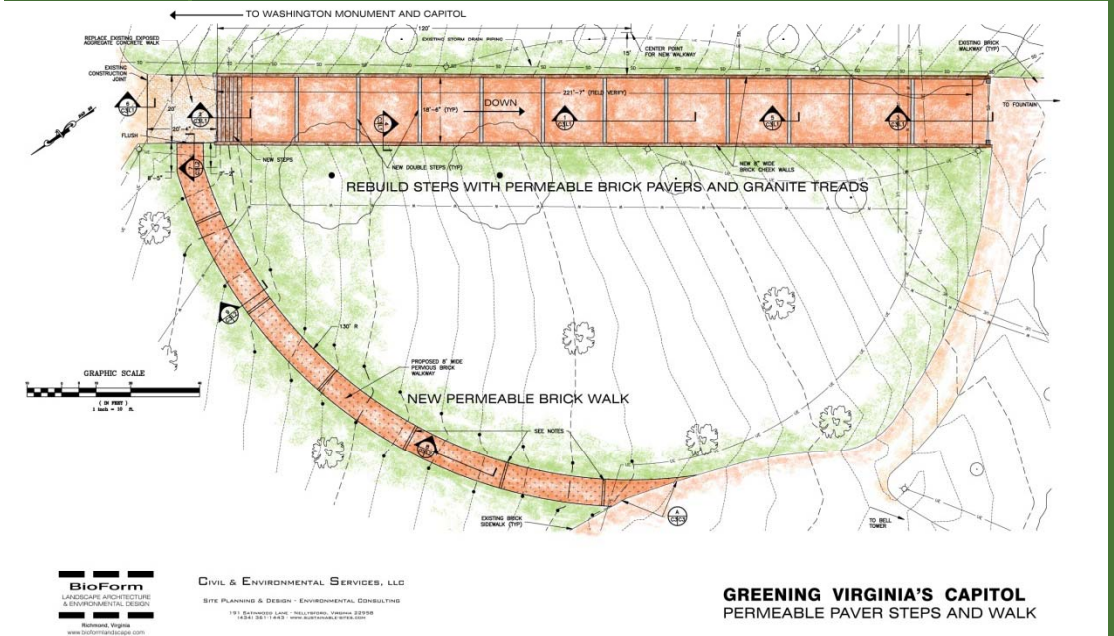
Vegetated Buffers & Landscaping

Green Infrastructure Benefits

- Cleaner water
- Stable hydrology/baseflow maintenance
- Reduced flooding
- Climate change mitigation and adaptation
- Cleaner air
- Reduced urban temperatures
- Jobs creation
- Water supply
- Energy savings
- Cost savings
- Habitat protection
- Community benefits: recreation, public health

Local Examples:
Green Capitol Project in Richmond

- Project will:
  - reduce stormwater flowing into Richmond's sewer system by 64%
  - reduce the amount of phosphorus in that stormwater by 69% and nitrogen by 70%



- Practices include rain gardens, porous brick pavers, green streets and rainwater harvesting.
- Project now under construction

http://greenvacapitol.org

Richmond Examples (Cont'd)

Before

After

5th Street Alleyway

Green Infrastructure Costs

- Prince George's County Subdivision built with half LID, half tradition stormwater measures saw significant savings from LID

Conventional Development Cost	Somerset LID Cost	Cost Savings	Percent Savings	Savings per Lot
$2,456,843	$1,671,461	$785,382	32%	$4,000

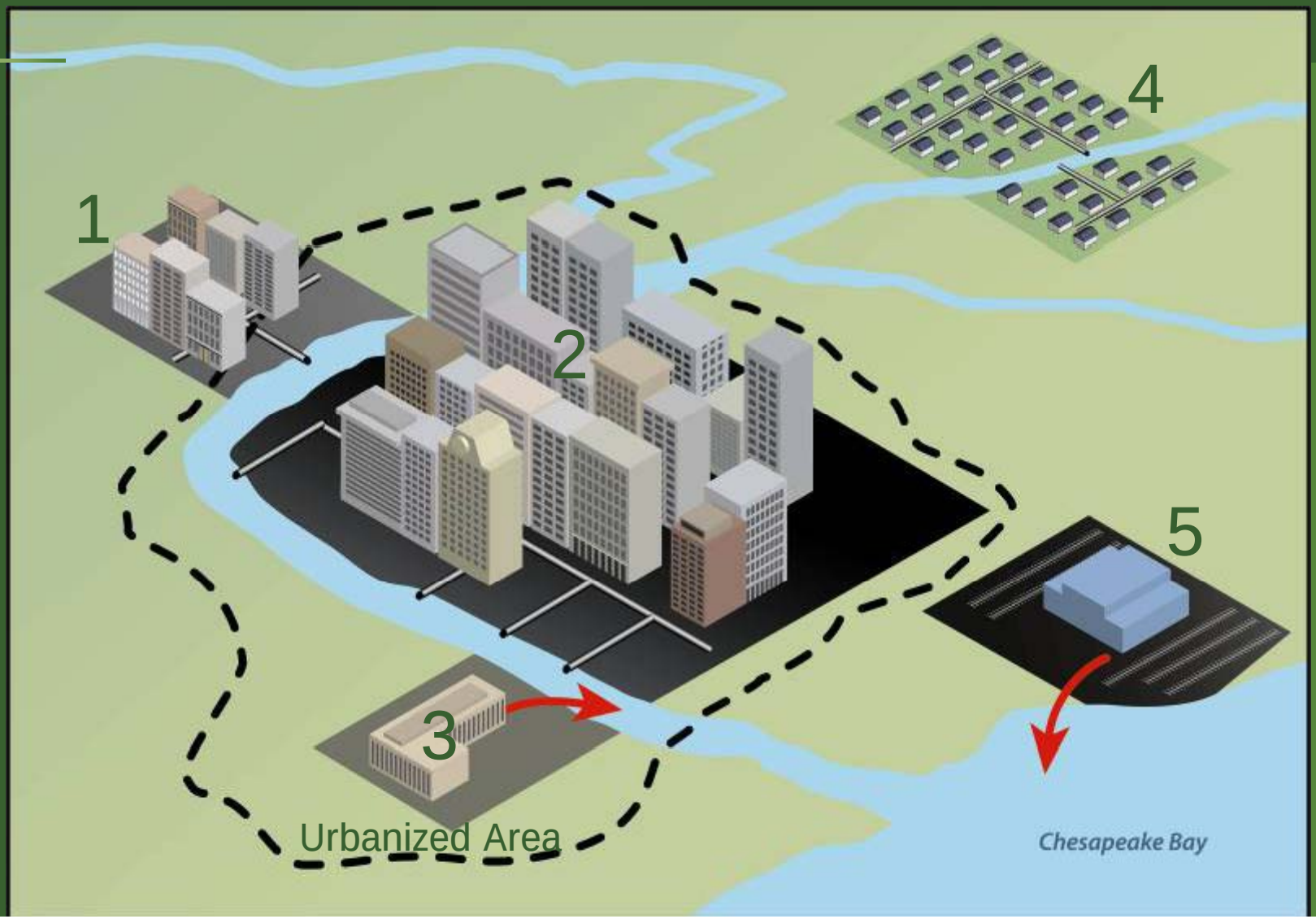
- Seattle, WA project redesigned a city block utilizing LID techniques

Item	Conventional Development Cost	SEA Street Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$65,084	$88,173	–$23,089	–35%	–11%
Stormwater management	$372,988	$264,212	$108,776	29%	50%
Site paving and sidewalks	$287,646	$147,368	$140,278	49%	65%
Landscaping	$78,729	$113,034	–$34,305	–44%	–16%
Misc. (mobilization, etc.)	$64,356	$38,761	$25,595	40%	12%
Total	**$868,803**	**$651,548**	**$217,255**	—	—

Require Additional Chesapeake Bay-only MS4 Provisions

- **Requirements related to turf management, pesticide usage, fertilizer usage, buffers, etc.**
- **Examples of existing fertilizer restrictions:**
  - **Annapolis, MD**
  - **Ann Arbor, MI**
    - Results: Phosphorus levels in the Huron River decreased an average of 28% after the ordinance was adopted.

Designate Additional Discharges to be Regulated



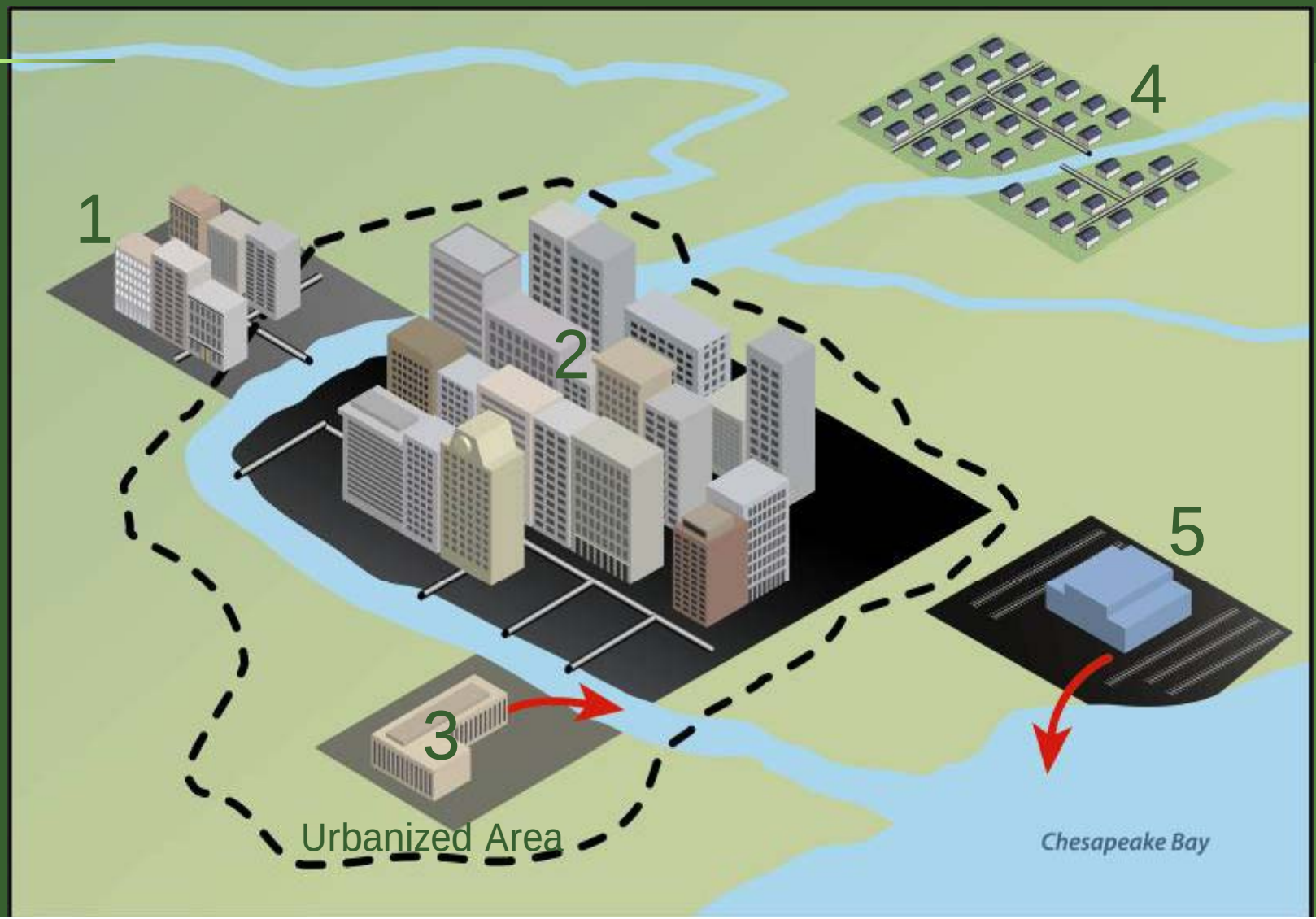
Establish New and Redevelopment Standards

- Standards for discharges from newly developed and redeveloped sites.
- Examples of existing standards are based on:
  - Minimum storm volume to be retained on site (e.g. first 1", 95th percentile storm event).
  - Limiting total impermeable surface
  - Percent removal of pollutants (e.g. 80% TSS)

Examples of 95th Percentile Storm Event in the Chesapeake Bay

City	95th Percentile Event Rainfall Total (in)	City	95th Percentile Event Rainfall Total (in)
Washington, DC	1.7	Williamsport, PA	1.4
Baltimore, MD	1.6	Lynchburg, VA	1.5
Salisbury, MD	1.7	Norfolk, VA	1.7
Binghamton, NY	1.2	Richmond, VA	1.7
Elmira, NY	1.2	Romney, WV	1.2
Harrisburg, PA	1.4		

Performance Standard Implementation



Require Retrofitting of Stormwater Management Controls with Improved Stormwater Control Measures

- Consider stormwater requirements for already developed areas
- Make retrofitting structural stormwater controls mandatory for existing development where water quality impairments exist

Summary

- Stormwater can have a significant impact on the Chesapeake Bay and its tributaries if not managed properly.
- The good news: There are a lot of options to improve stormwater management within the Chesapeake Bay watershed.
- Changes to the stormwater regulations will strengthen programs.

Feedback

- What do you see as effective and ineffective strategies for managing stormwater in your community?
- How can the federal government be a more effective partner in helping to manage stormwater in your community?
- What additional tools and resources would help your efforts to successfully address the impact of stormwater in your community?