



Challenges and Solutions  
Using Low Impact Development  
Lake George, NY  
May 5, 2011

# The Runoff Reduction Method

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# About the Center for Watershed Protection

Non-profit 501(c)3, non-advocacy organization

Work with watershed groups, local, state, and federal governments

Provide tools communities need to protect streams, lakes, and rivers

20 staff in MD, VA, NY

[www.cwp.org](http://www.cwp.org)



# Traditional Stormwater Approaches



Focused primarily on managing stormwater quantity and, perhaps, quality, and relied heavily on traditional stormwater management practices to mitigate, rather than prevent the negative impacts of watershed development.

If we can use all of these...



NE 35<sup>th</sup> Pl & Siskiyou St.



# why do we always get these?



# We've been asking for it!

We encourage large volume detention facilities with our Post-Construction Stormwater Ordinances and Criteria:



- Flood Control
- Channel Protection
- Water Quality

# What are we asking for?

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- Conventional Stormwater Management Criteria
  - Flood Control
    - Detention for 10, 25, 100 year storm events
  - Channel Protection
    - Extended Detention of 1-year, 24-hour storm
  - Water Quality
    - Capture and treat “first flush” (0.5” or 1.0” of runoff)

# Test Your Knowledge

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What are the top 5 reasons that low impact or better site design stormwater practices are not implemented on development projects?

1

2

3

4

5



# Why Runoff Reduction?

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- Directly addresses the *hydrologic* impacts of land conversion.
- Encourages *LID* design techniques
- Decreases the size of large structural practices such as ponds and wetlands.

# Runoff Reduction Processes

Runoff Reduction is not just infiltration!

- ✓ Infiltration
- ✓ Canopy Interception
- ✓ Evaporation
- ✓ Transpiration
- ✓ Rainwater Harvesting
- ✓ Extended Filtration



# Technical Memorandum

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## The Runoff Reduction Method

[www.cwp.org](http://www.cwp.org)

“Publications and Goods” tab

“Free Downloads” tab

Stormwater Publications



# First: Reduce Stormwater Runoff By Design

- Better site planning & design techniques
  - Preserve natural areas
  - Conservation design
  - Reduce clearing & grading limits
  - Reduce roadway widths
  - Use alternative cul-de-sacs
  - Promote redevelopment
  - And more...



[www.cwp.org](http://www.cwp.org) >  
Online Store >  
Better Site Design

# Second: Reduce Volume of Post-Construction Stormwater Runoff

- Small-scale, distributed practices
  - Soil restoration
  - Downspout disconnection
  - Rain gardens/small bioretention areas
  - Rainwater harvesting
  - Permeable pavement
  - Green Roofs
  - Natural Drainageways
  - Vegetated Channels
  - Site Reforestation
  - Buffers



# Third: Capture & Treat Remaining Stormwater Runoff

- Larger-scale, engineered practices
  - Stormwater ponds
  - Stormwater wetlands



# Test Your Knowledge

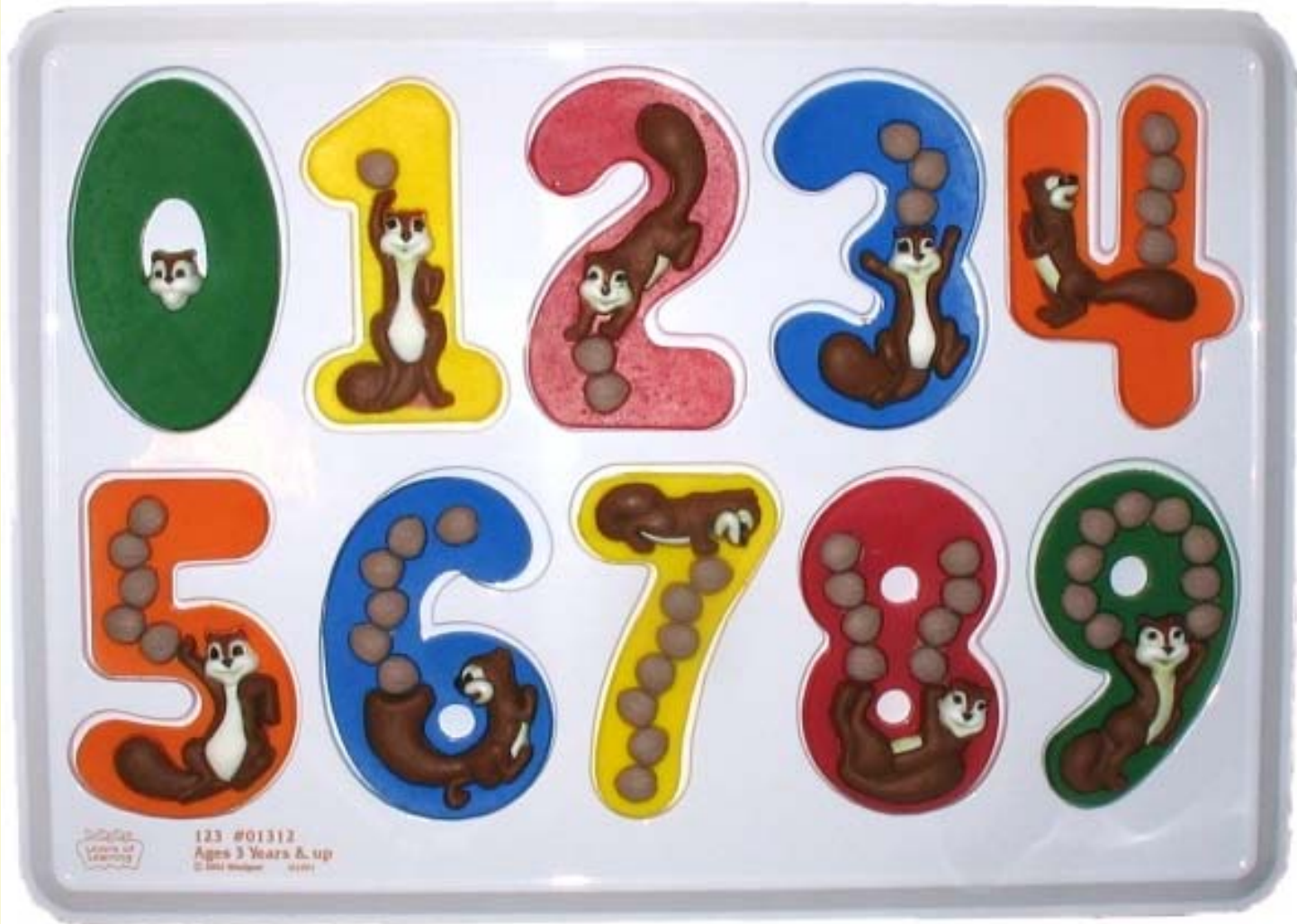
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Which is a fundamental difference between runoff reduction and “traditional” stormwater management?

The Runoff Reduction Method:

1. Does not allow traditional stormwater practices.
2. Forces designers to actually reduce the volume of runoff leaving a development site.
3. Doesn't address water quality.
4. Requires a rain garden on every property.

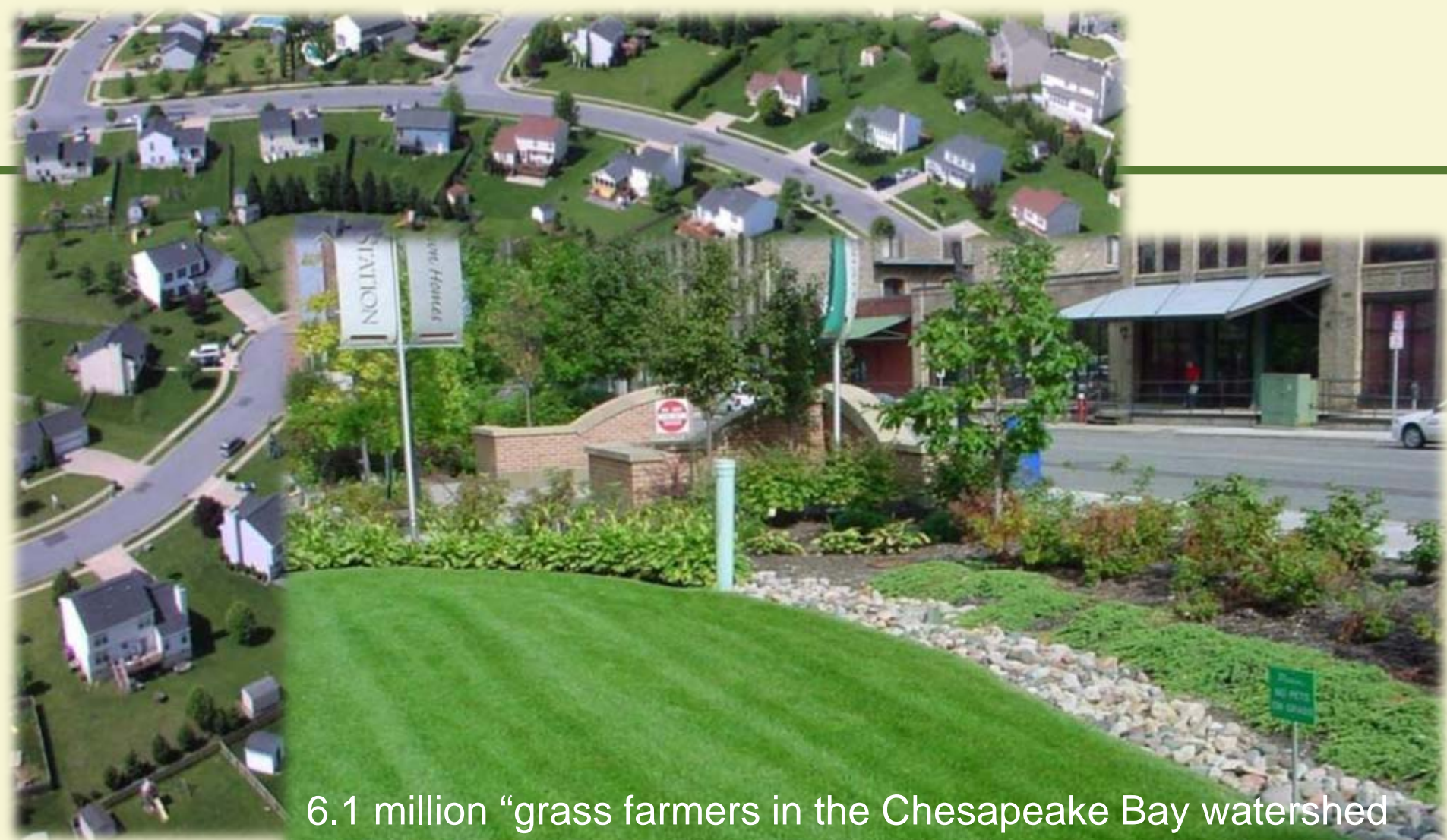
# Let's Do the Numbers...



# Runoff Reduction (RR) Method

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- Developed for Virginia - standards are based on Phosphorus Removal
- Calculates runoff volume from turf as well as impervious cover
- Assigns runoff reduction values to various practices
- Accounts for BMPs in series
- Applies runoff reduction practices to larger design storms



6.1 million “grass farmers in the Chesapeake Bay watershed  
Tending to 2.4 to 3.8 million acres (5.9% to 9.3%)  
Approx 75% of which is home lawns  
Influence turf management practices = influence water quality

# Treatment Volume: Site Runoff Coefficients (Rv)<sup>1</sup>

Cover	HSG A	HSG B	HSG C	HSG D
Forest	0.02*	0.03*	0.04*	0.05*
Managed Turf / Disturbed Soil	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

<sup>1</sup> Center for Watershed Protection – Technical Memorandum: The Runoff Reduction Method; 4/18/08

\*Forest coefficient adjusted for assessing compliance

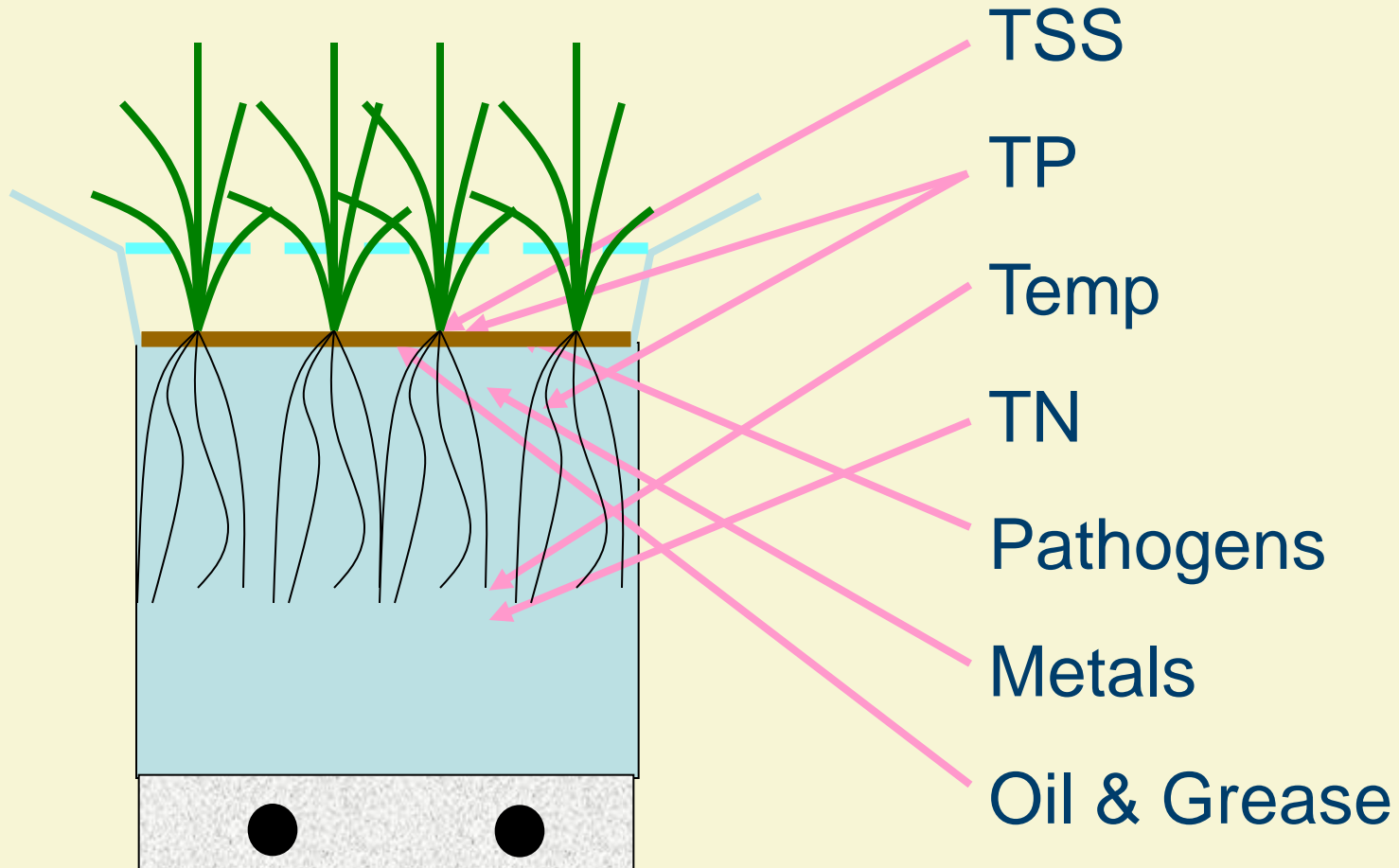
Pitt et al (2005), Lichter and Lindsey (1994), Schueler (2001a, 2001b, 1987), Legg et al (1996), Pitt et al (1999), and Capiella et al (2005)

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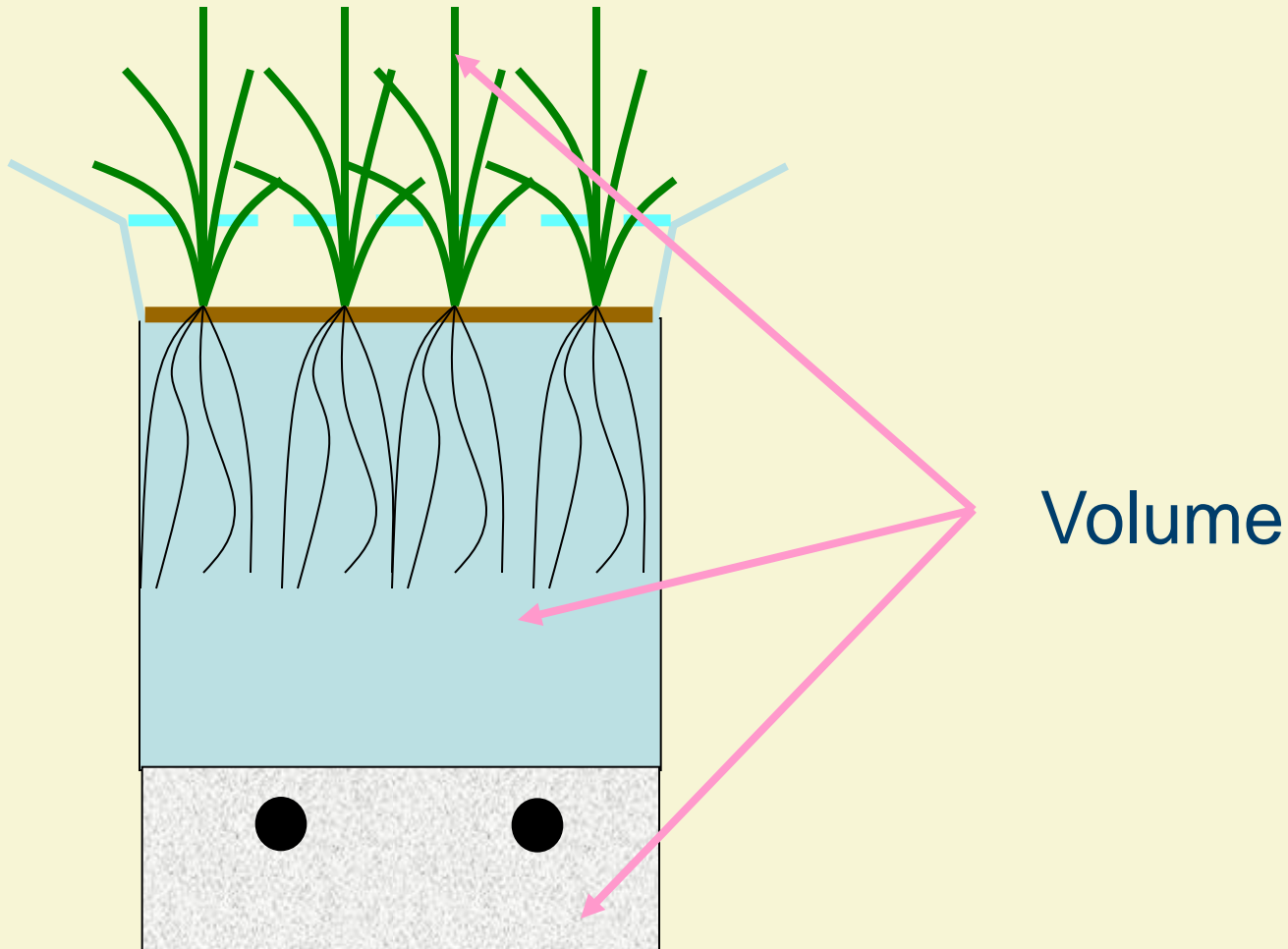
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# Where are pollutants removed?



# Where is Volume removed?



# Stormwater Practices Differ Sharply in Ability to Reduce Runoff Volume



Wet Ponds, ED Ponds  
and Constructed  
Wetlands and Filters  
Reduce Runoff Volumes  
by zero to 10%



Bioretention, Infiltration,  
Dry Swales, Soil  
Amendments,  
disconnection, and Related  
Practices Reduce Runoff  
Volumes by 50 to 90%

# Test Your Knowledge

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Which pollutant removal mechanisms does the runoff reduction method account for?

- A. Infiltration
- B. Evapotranspiration
- C. Filtering
- D. Sediment Settling
- E. All of the Above

# Runoff Reduction (RR) Method

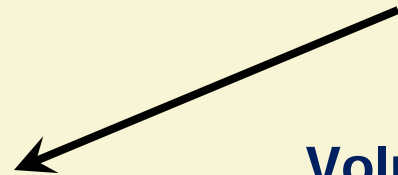
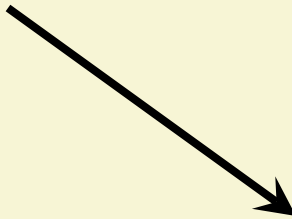
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# Practices in Series



**Irreducible Load?**



**Volume Reduction?**

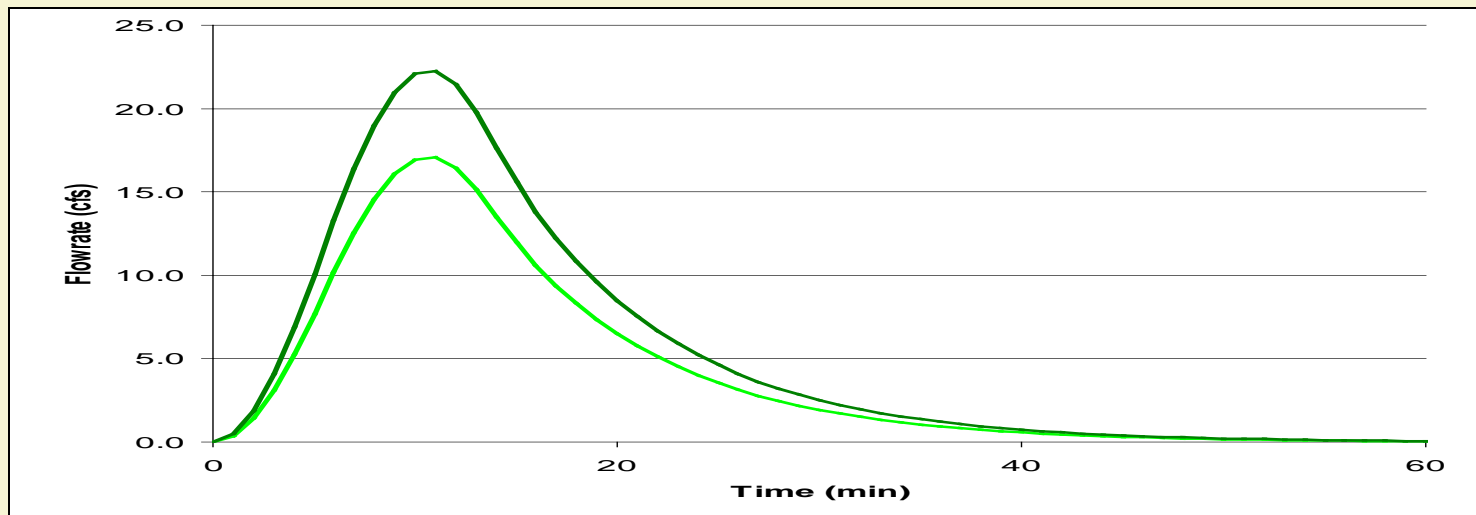
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# Curve Number Reduction

1. Calculate Curve Number and Site Runoff Volume
2. Subtract Runoff Reduction Volume Achieved from Site Runoff Volume
3. Determine Reduced Curve Number based on Reduced Site Runoff Volume



# New York State

- Overview of Application
  - “Water Quality Volume” based on impervious cover.
  - “Runoff Reduction Volume” added in the 2010 manual.
  - Outlines the process of Stormwater Management.
  - “Credits” system for Green Infrastructure Practices.
  - Runoff Reduction values for Traditional Stormwater Practices.



# Questions?

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