

# VAPSS TECHNICAL MEETING

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Gainesville , VA





# But Stormwater Can Be A Resource

A Wonderful Resource





# pennies from heaven



By ALETA BURCHYSKI  
PHOTOS BY JIM KENNEDY

**W**HEN RAIN IS IN THE FORECAST, MODERN DEVELOPER AND ARCHITECT BOB PINEO LISTENS FOR THE SOUND OF RAIN HITTING THE METAL ROOF OF HIS HOME NEXT TO RIVERVIEW CEMETERY. FOR MOST OF US, IT MEANS A SOGGY, GLOOMY DAY AND A SHORT-LIVED BREAK IN THE HUMIDITY DURING SUMMER; BUT FOR PINEO AND HIS FAMILY IT MEANS CLEAN CLOTHES, FLUSHING TOILETS, AND A LUSH GARDEN WHEN THE SOIL STARTS TO DRY UP AGAIN.

Both eco-minded architects, Pineo and his wife Betsy Roettger designed their home in 2006 with one of the most fundamental eco-friendly concepts in mind: rain water harvesting. The Pineos invested around \$6,000 in the water system, plus the cost of excavating to install the 1,700 gallon tank. Now their efficient roof slope and gutter system does all the work. The water isn't potable, the technical term for water that is safe to drink, but it's perfect for all





# Virginia's Stormwater Management Regulations Compliance:

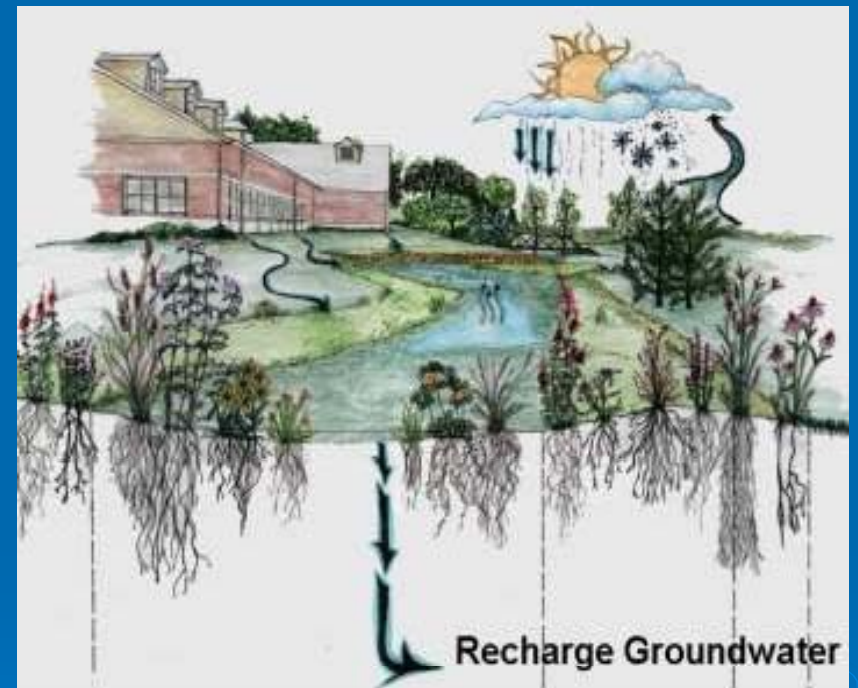
## RUNOFF REDUCTION METHOD

Ved P. Malhotra P.E.



# Runoff Reduction (RR)

**Runoff reduction** is defined as the total volume reduced through canopy interception, soil infiltration, evaporation, rainfall harvesting, engineered infiltration, extended filtration or evapotranspiration at small sites





# RUNOFF REDUCTION METHOD

Runoff Removal more effective  
than Treatment of Runoff

Volume- based Hydrology now

Move away from peak flow





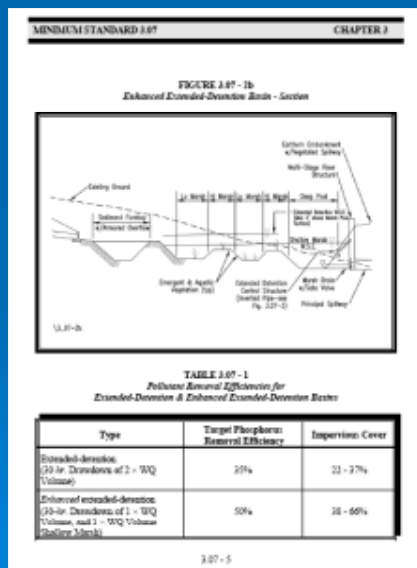
# A New Stormwater Approach:

1. Site Load Standard – 0.28 pounds/acre/year for Total Phosphorus
2. More options for stormwater practices and overall site design
3. Treating impervious cover + managed turf to better control nutrients
4. Stormwater BMP planning & compliance spreadsheet

# Stormwater BMP Choices

## ➤ What we do now

- BMP options from Regulations & Blue Book



## ➤ What is proposed

- Site design & conventional BMPs in Handbook & Clearinghouse, supported by spreadsheet
- BMP performance = Runoff reduction + Pollutant removal
- Use of “treatment train”

# Treating Impervious Cover & Managed Turf Areas

## ➤ What we do now

- Nutrient loads based on impervious cover



## ➤ What is proposed

- Nutrient loads & treatment volume based on impervious cover + managed turf
- Incentives to preserve forest cover

# BMPs: Level 1 & 2 BMP Designs

DRAFT VTA DCR STORMWATER DESIGN SPECIFICATIONS No. 8: BIORETENTION

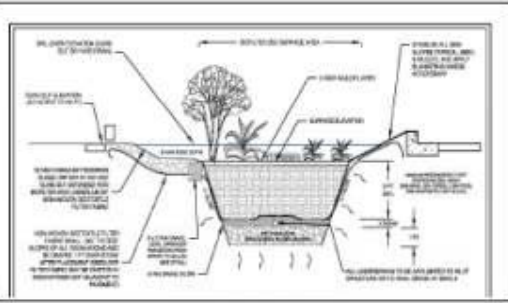


Figure 2. Bioretention Section

SECTION 10: MATERIAL SPECIFICATIONS

Table 6: Bioretention Material Specifications

Material	Specification	Notes
Fiber Media Composition	Fiber Media to contain: <ul style="list-style-type: none"> <li>• 85-88% sand</li> <li>• 8-12% soil fines</li> <li>• 3-5% organic matter in form of leaf compost</li> </ul>	Volume of fiber media based on 110% of plan volume to account for settling or compaction.
Fiber Media Testing	3-inches less than 30 CECs greater than 10. The media should have an infiltration rate of 1-2 in/hr	Procured from approved fiber media vendors
Mulch Layer	Aged, shredded hardwood bark mulch	A 1-3 inch layer on the surface of the filter bed.
Alternative Surface Cover	A 1-3 inch layer of river stone or pea gravel to suppress weed growth, or turf cover	
Topsoil For Turf Cover	3 inch surface depth of loamy sand or sandy loam texture, with less than 5% clay content, corrected pH to 6-7, and organic matter content of at least 2%	
Filter Fabric	Non-woven geotextile fabric with flow rate of >110 gallons/minute/sq. ft. (e.g., Geotex 351 or equivalent). Apply to sides only; use on bed ONLY in hotspot or karst areas!	
Choking Layer	1-4 inch layer of sand over a 1-inch layer of choker stone (typically #8 or #89 washed gravel) over the underdrain stone	

Bioretention 27 of 39 6/24/18

- Level 1: good, standard design
- Level 2: enhanced design to boost nutrient removal

Table 1: Summary of Stormwater Functions Provided by Bioretention Areas

Stormwater Function	Level 1 Design	Level 2 Design
Annual Runoff Reduction	40%	80%
Phosphorus Removal <sup>1</sup>	25%	50%
Nitrogen Removal <sup>1</sup>	40%	60%
Channel Protection	Moderate RRv can be subtracted from CPv	
Flood Mitigation	Partial. Reduced Curve Numbers and Time of Concentration	

<sup>1</sup> Change in event mean concentration (EMC) through the practice. Actual nutrient mass load removed is the product of the removal rate and the runoff reduction rate and will be higher than these percentages, as calculated using the Runoff Reduction Spreadsheet Methodology.  
Sources: CSN (2008) and CWP (2007).



# Water Quality Standard

## ➤ What we do now

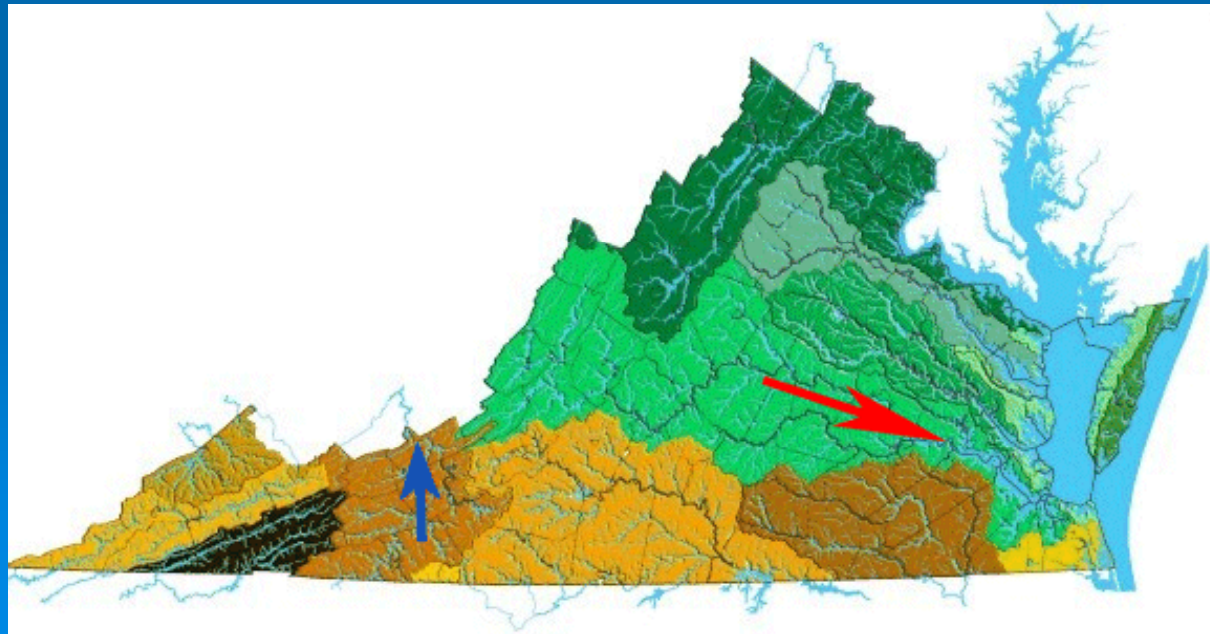
- Total phosphorus (TP) as keystone
- Most sites meet average land cover condition (0.45 lbs/acre/year)
- Redevelopment requires 10% phosphorus reduction

## ➤ What was proposed

- TP basis for compliance
- Load limit tied to Tributary Strategy goals = 0.28 lbs/acre/year (TP)
- Redevelopment requires 20% phosphorus reduction compared to predevelopment

➤ What is proposed

- TP basis for compliance
- 0.28 lbs/acre/year for Bay watershed
- 0.45 lbs/acre/year for non-Bay areas and sites <1 acre in Bay watershed
- Redevelopment 10% P reduction on sites <1 acre, 20% P reduction on sites > 1 acre
- UDA qualified local programs must establish standards between 0.28 and 0.45



# Less of This





# More of This





# More of This



# More of This





Rain  
Garden







Parking Lot Rain Garden





Porous Pavement



Green Roof



Rain Barrel





Cistern





	A	B	C	D	E	F	G	H	I	J	K
1	<b>DRAFT Virginia Runoff Reduction Method Worksheet -- Beta Version -- 03/04/09</b>										
2	<b>Site Data</b>										
3											
4	<b>Site Name:</b>										
5											
6	data input cells										
7	calculation cells										
8	constant values										
9											
10	<b>1. Post-Development Project &amp; Land Cover Information</b>										
11											
12	<b>Constants</b>										
13											
14	Annual Rainfall (inches)	43									
15	Target Rainfall Event (inches)	1.00									
16	Phosphorus EMC (mg/L)	0.26									
17	Target Phosphorus Load (lb/acre/yr)	0.28									
18	P <sub>i</sub>	0.90									
19											
20	<b>Land Cover (acres)</b>										
21		<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>					
22	Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00					
23	Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	0.00	0.00					
24	Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00					
25		<b>Total</b>				0.00					
26											
27	<b>R<sub>v</sub> Coefficients</b>										
28		<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>						
29	Forest/Open Space	0.02	0.03	0.04	0.05						
30	Managed Turf	0.15	0.20	0.22	0.25						
31	Impervious Cover	0.95	0.95	0.95	0.95						
32											
33											
34											
35	<b>Land Cover Summary</b>										
36	Forest/Open Space Cover (acres)	0.00									
37	Weighted R <sub>v</sub> (forest)	0.00									
38	% Forest	#DIV/0!									
39	Managed Turf Cover (acres)	0.00									
40	weighted R <sub>v</sub> (turf)	0.00									
41	% Managed Turf	#DIV/0!									
42	Impervious Cover (acres)	0.00									
43	R <sub>v</sub> (impervious)	0.95									
44	% Impervious	#DIV/0!									
45	<b>Total Site Area (acres)</b>	0.00									
46	<b>Site R<sub>v</sub></b>	#DIV/0!									
47											
48	<b>Post-Development Treatment Volume (acre-ft)</b>	#DIV/0!									
49	<b>Post-Development Treatment Volume (cubic feet)</b>	#DIV/0!									
50	<b>Post-Development Load (TP) (lb/yr)</b>	#DIV/0!									
51	<b>Total Load (TP) Reduction Required (lb/yr)</b>	#DIV/0!									
52											
53											
54											
55											

# Example: Residential

- Site Area: 20 Acres
- Impervious Area: 6 Acres
- Turf: 8 Acres
- Forest/Open Space: 6 Acres

# Example: Residential

- Site Area: 20 Acres
- Impervious Area: 6 Acres
- Turf: 8 Acres
- Forest/Open Space: 6 Acres
- Rain garden: 2 Acres to Bioretention # 1
- Porous Pavment: 1 Acre to Bioretention # 1
- Bioretention # 1: 4 Acres

# For More Info:

Visit the DCR website:

See the Stormwater Parts 1,2,3, and 13 tab  
at: <http://www.dcr.virginia.gov/lawregs.shtml>

or contact

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