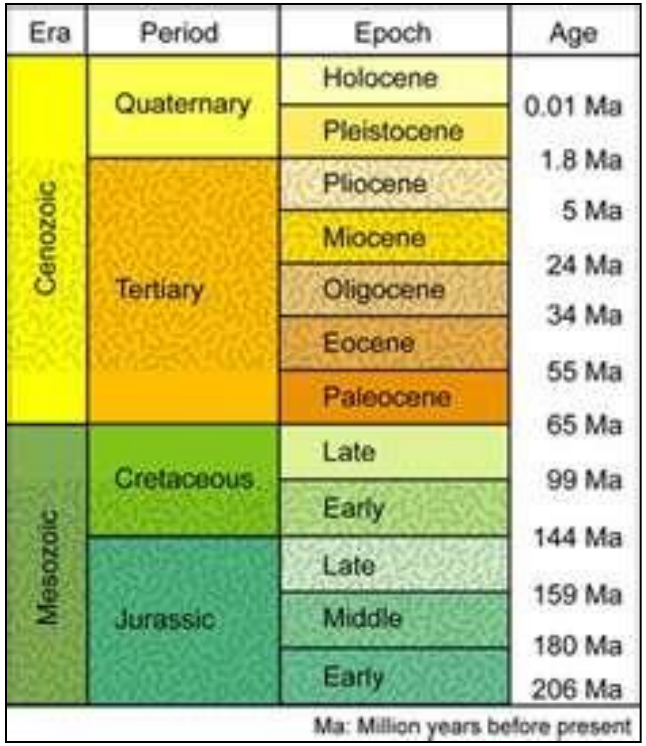
An Overview of the Revised Virginia Stormwater Management Permitting Regulations

Environment Virginia

April 10, 2012

J. Douglas Fritz

What a Long, Strange Trip Its Been



Era	Period	Epoch	Age
Cenozoic	Quaternary	Holocene	0.01 Ma
		Pleistocene	1.8 Ma
	Tertiary	Pliocene	5 Ma
		Miocene	24 Ma
		Oligocene	34 Ma
		Eocene	55 Ma
		Paleocene	65 Ma
Mesozoic	Cretaceous	Late	99 Ma
		Early	144 Ma
	Jurassic	Late	159 Ma
		Middle	180 Ma
		Early	206 Ma

Ma: Million years before present

The Soil and Water Conservation Board passed a motion authorizing the development of the first NOIRA on July 21, 2005.

The regulations were completed in two separate regulatory actions:

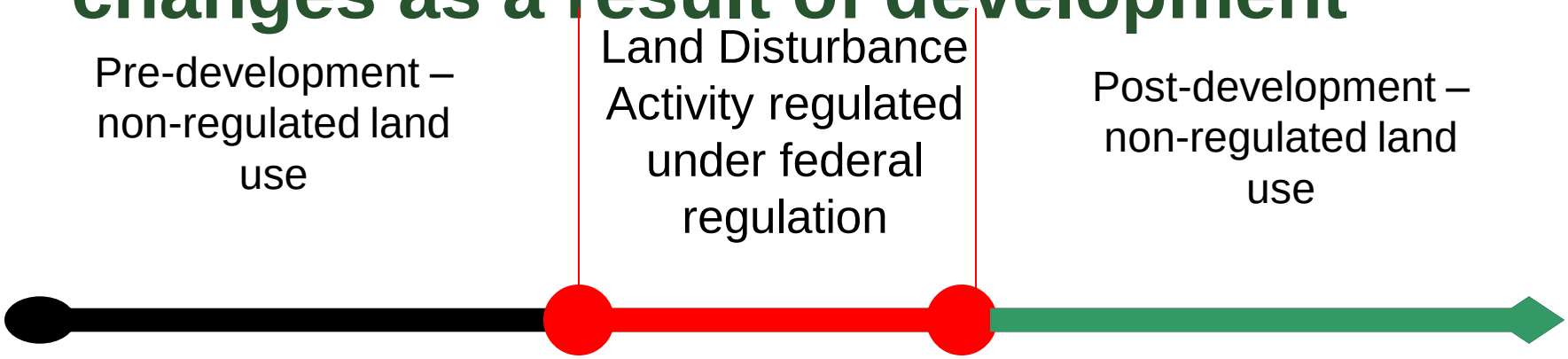
- Parts 1, 2 and 3-Definitions, Technical Criteria and Local Programs, effective September 13, 2011.
- Part 13-Fees, effective February 3, 2010

Both actions included delayed implementation or grandfathered provisions.

The regulations are wide ranging

- Post development water quality and water quantity design criteria
- Stormwater pollution prevention plan requirements during construction
- Local program implementation and expectations
- Program funding

Stormwater criteria address land use changes as a result of development



The water quality and quantity design criteria are implemented in conjunction with the VSMP General Permit for Stormwater Discharges from Construction Activities. These criteria are based on separate State regulation from federal requirements.

Federal Effluent Limitation Guidelines(ELGs)

- The modified regulations codified the new federal ELGs.
- ELGs are applicable **during** the land disturbing activity.
- Their incorporation into regulation was **not optional**, as Virginia is an approved state and Virginia must be as at least as stringent as federal regulation.
- The implementation date will also be coordinated with the reissuance of the General Permit.

Post Development Water Quality Design Criteria

- Phosphorus remains the ‘Keystone Pollutant.’ A type of surrogate as exhibits some of the characteristics of particulate pollutants, as well, as those of soluble pollutants.

- A ‘different’ methodology was developed to determine compliance and more appropriately address the impacts of stormwater runoff.

- The regulations greatly increase how compliance can be met.

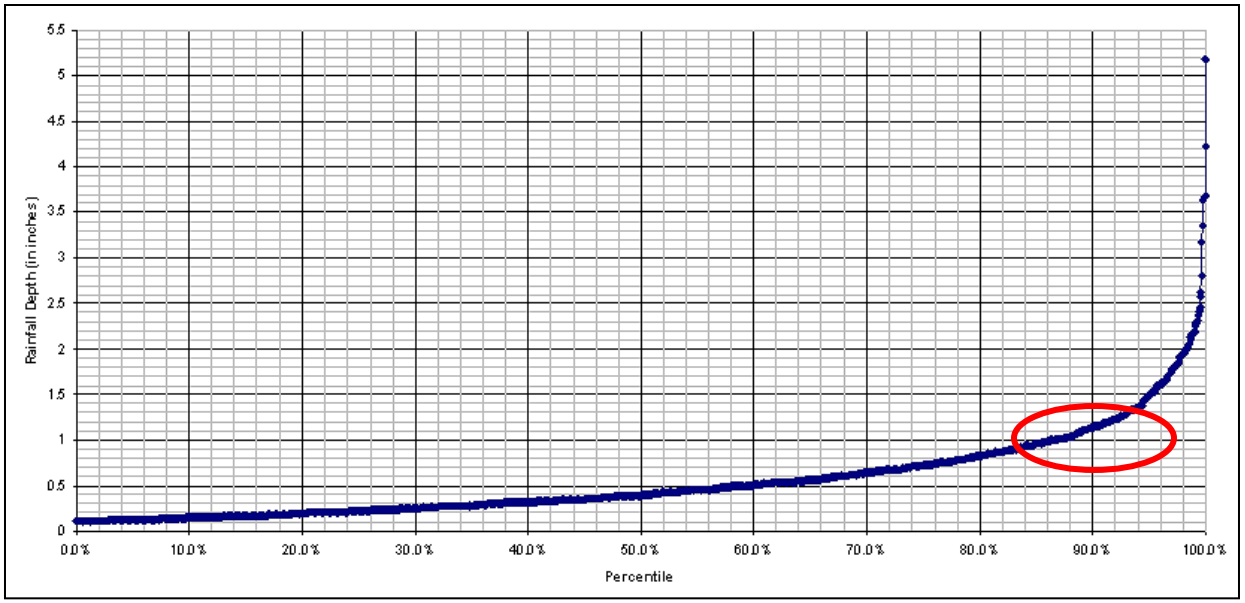
Differences between the Old and the New

Existing		New
Impervious Surface	**Land Use(s)**	Forest/Open Space, Turf, Impervious
0.5 inches of Runoff	**Event**	1.0 inches of Rainfall
Average land condition/ technology based	**New Design Criteria**	0.41 lbs./ac/yr P
10% reduction P	**Redevelopment Criteria**	<1 acre-10% Reduction P, >1 acre -20% Reduction P
Simple Method	**Compliance Methodology**	Runoff Reduction

Water Quality Storm Event

DCR evaluated rainfall at five different sites around VA to arrive at the 1" average:

- Washington Reagan Airport
- Richmond Airport
- Lynchburg
- Bristol
- Harrisonburg

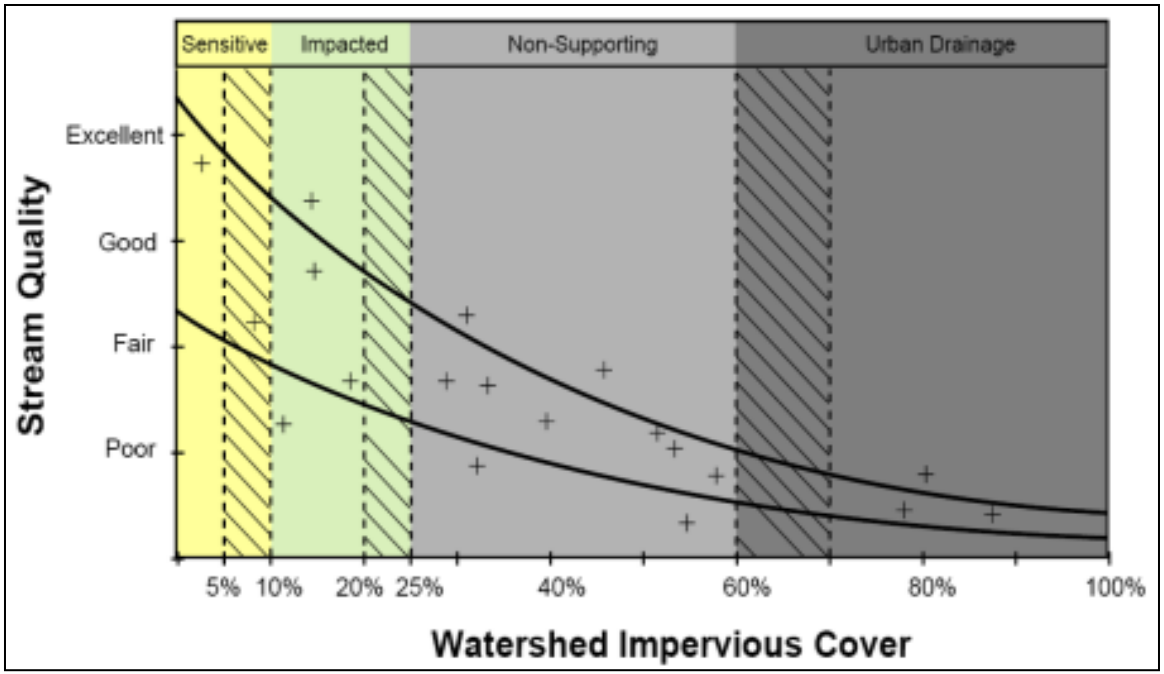


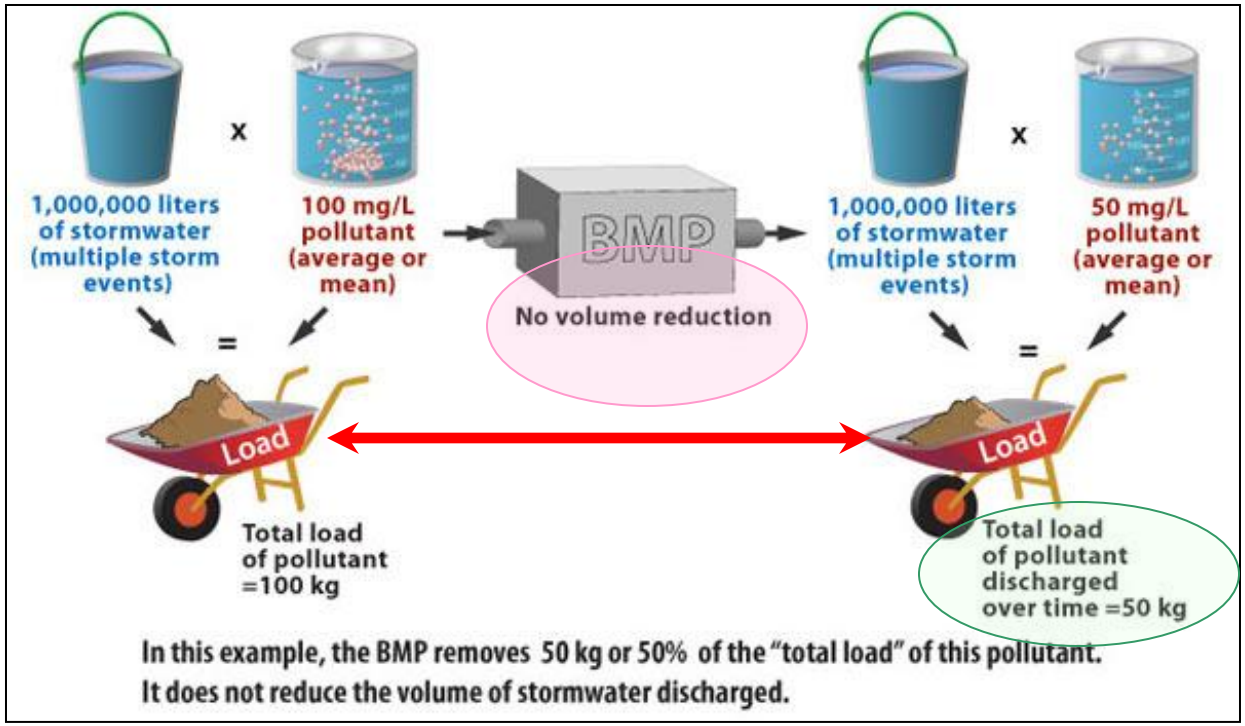
Rainfall Frequency Analysis from Reagan Int'l Airport

Basis for 0.41 lbs/ac/yr Phosphorus

Statewide Requirement Based on Percentage of Impervious Cover and State Soil Geographic Data Base average soil cover

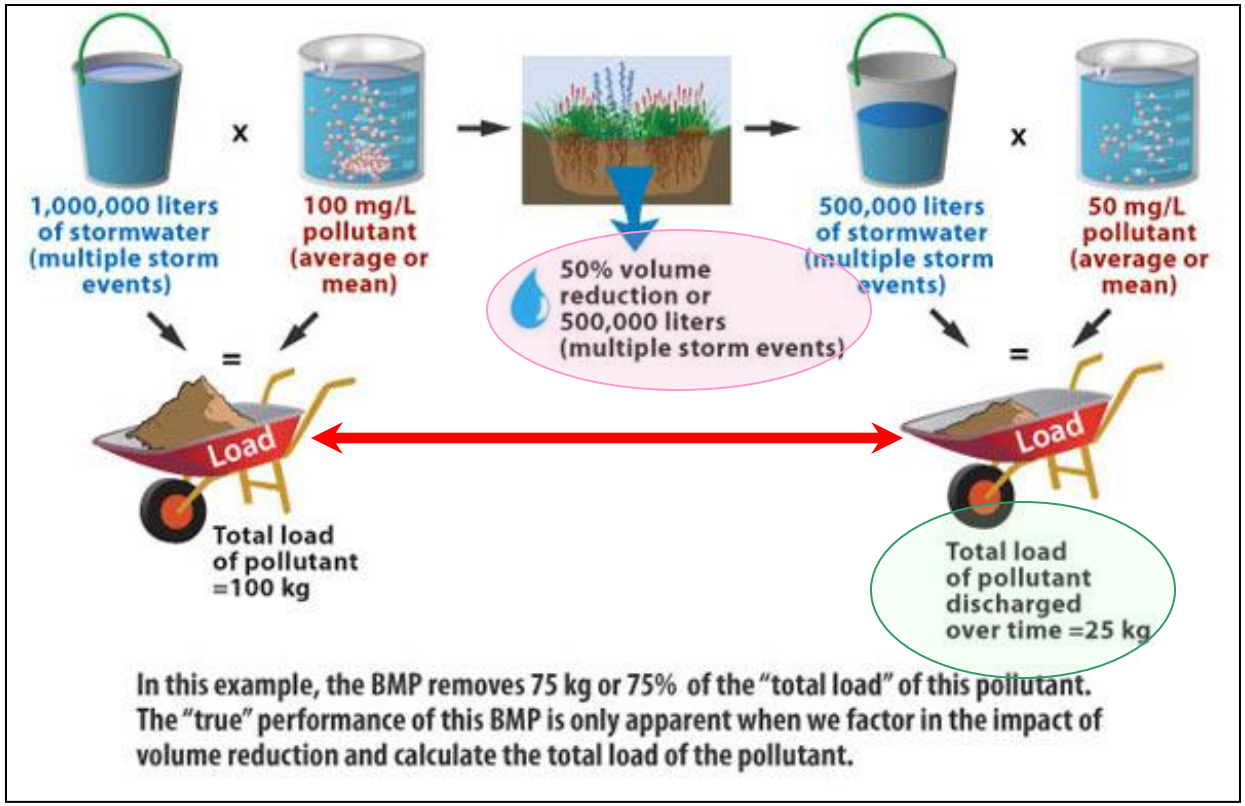
Assumes 10% impervious cover, 30% turf, 60% forest





'Traditional' BMP efficiencies do not take into account volume reduction

Many BMPs do not account for volume reduction



The Runoff Reduction Method recognizes volume reduction provides greater overall pollutant removal

Mass Balance Approach

The Runoff Reduction Method rewards the use of volume reducing BMPS

Table 1. Comparative Runoff Reduction and Nutrient Removal for Practices

Practice	Design Level	Runoff Reduction	TN EMC Removal[3]	TN Load Removal	TP EMC Removal	TP Load Removal[6]
Rooftop Disconnect	1[2]	25 to 50[1]	0	25 to 50[1]	0	25 to 50[1]
	No Level 2 Design					
Sheet Flow to Veg. Filter or Conserv. Open Space	1	25 to 50[1]	0	25 to 50[1]	0	25 to 50[1]
	2[5]	50 to 75[1]	0	50 to 75[1]	0	50 to 75[1]
Grass Channels	1	10 to 20[1]	20		15	23
	No Level 2 Design					
Soil Compost Amendment	Can be used to Decrease Runoff Coefficient for Turf Cover at Site. See the design specs for Rooftop Disconnection, Sheet Flow to Vegetated Filter or Conserved Open Space, and Grass Channel					
Vegetated Roof	1	45	0	45	0	45
	2	60	0	60	0	60
Rainwater Harvesting	1	Up to 90[3, 5]	0	Up to 90[3, 5]	0	Up to 90[3, 5]
	No Level 2 Design					
Permeable Pavement	1	45	25	59	25	59
	2	75	25	81	25	81
Infiltration Practices	1	50	15	57	25	63
	2	90	15	92	25	93
Bioretention Practices	1	40	40	64	25	55
	2	80	60	90	50	90
Urban Bioretention	1	40	40	64	25	55
	No Level 2 Design					
Dry Swales	1	40	25	55	20	52
	2	60	35	74	40	76

Non-point nutrient offsets

- State statute has authorized the use of non-point nutrient offsets to meet post development design criteria.
- The regulations basically restate the statute
- Offsets currently available only to projects in the Chesapeake Bay watershed.
- Based on a pound to pound delivered load to the Bay.
- Still ironing out the process.

Both the old and the new regulations expect specific pollutants be addressed when appropriate

The initial selection of phosphorus in the was not meant to exclude other pollutants from being targeted. ***In situations where other pollutants are identified as a problem***, such as from “stormwater hotspots”, those other pollutants should be addressed.

-The Virginia Stormwater Management Handbook

If a specific WLA for a pollutant has been established in a TMDL and is assigned to stormwater discharges from a construction activity, additional control measures must be identified and implemented so discharges are consistent with the assumptions and requirements of the TMDL.

-4VAC50-60-54. Stormwater pollution prevention plan requirements.

Addressing growth in the Chesapeake Bay

Summary of Allowable Loading Rate

Options and Potential Compromise

State-wide Requirement Based on Percentage of Impervious Cover and STATSGO average soil cover		Potential Compromise	Chesapeake Bay Requirement Based on "No Increase" from previous land uses	
5% impervious, 65% forest, 30% turf	0.30		0.51	36% forest, 64% agriculture
7.5% impervious, 62.5% forest, 30% turf	0.36	0.41	0.56	28% forest, 72% agriculture
10% impervious, 60% forest, 30% turf	0.41		0.56	29% forest, 71% agriculture

From Wetlands Solutions presentation at Virginia Stormwater Management Regulatory Advisory Panel Meeting, January 21, 2011

Post Development Water Quantity Design Criteria

Developed to protect the physical integrity of downstream receiving channels and preventing downstream flooding

Restored Receiving Channels

Runoff may not, in combination with other runoff draining to the channel, exceed design parameters of the restored channel system

Or

Peak discharge for concentrated flow to a *natural stormwater conveyance system* must be met.

Man-Made Receiving Channel

Channel must convey peak flow rate of post-development 2-year 24-hour storm without causing erosion of the man-made system.

Or

Peak discharge for concentrated flow to a *natural stormwater conveyance system* must be met.

Discharges to Natural Receiving Channels

Maximum peak flow rate from post-development 1-year, 24-hour storm must be calculated either:

- Using the Energy Balance Equation

Or

- Using another methodology demonstrated by the local SWM program to achieve equivalent results and approved for their use by the Board.

Energy Balance

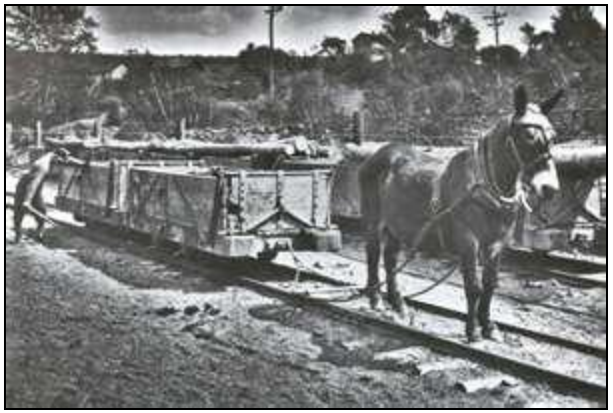
- Energy Balance Equation models dynamic that stream channels are formed naturally in response to both peak discharge *AND* volume of discharge.

- The basic principal of Energy Balance is that the product of the peak flow rate times the runoff volume in the pre-development condition should be proportional to the same product in the post-development condition.

The objective is to control erosive flows.

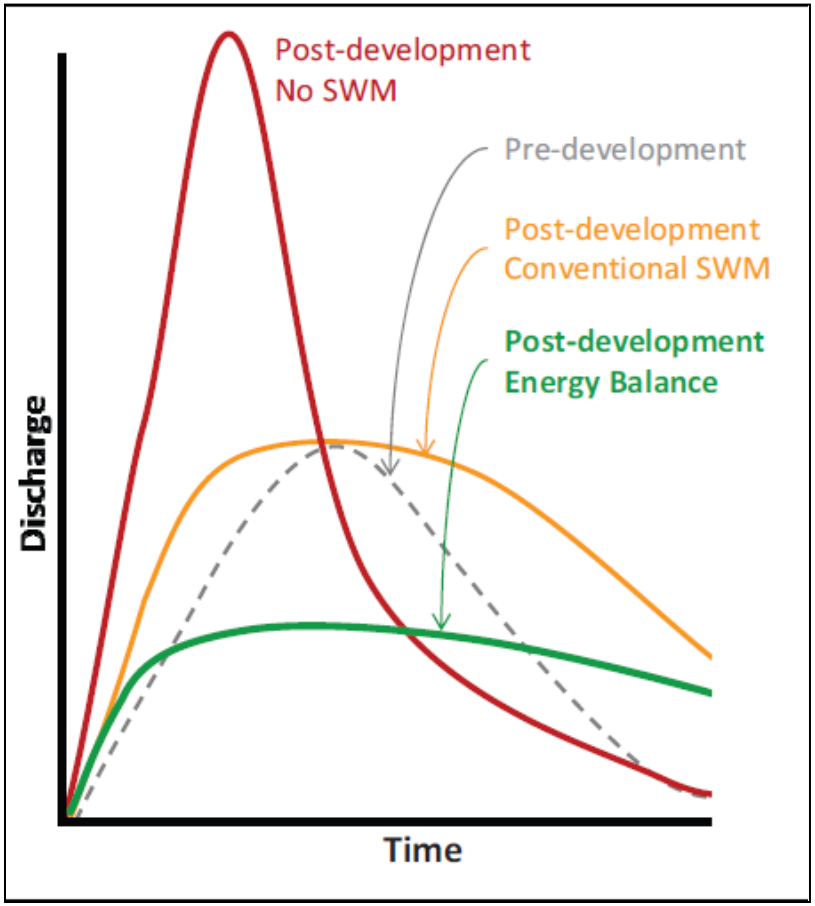
- When water flows in a channel, a force is developed that acts in the direction of flow on the channel bed.

- This force, which is simply the pull of water on the wetted area, is known as the “tractive force.”



The Energy Balance Method

- The longer and stronger the force acts, the more sediment is moved.
- The Energy Balance Method relies on Q, discharge as cubic feet/second)



Energy Balance Equation

$$Q_{Developed} \leq I.F. \times (Q_{Pre\text{-}developed} \times RV_{Pre\text{-}developed}) / RV_{Developed}$$

Under no condition may $Q_{Developed}$ be greater than $Q_{Pre\text{-}developed}$, nor may $Q_{Developed}$ be required to be less than that calculated in the equation:

$(Q_{Forest} \times RV_{Forest}) / RV_{Developed}$, where:

I.F. (improvement factor) = 0.8 for sites > 1 ac. or 0.9 for sites ≤ 1 ac.

QDeveloped = Allowable **peak flow rate** of runoff from developed site

RVDeveloped = **Volume of runoff** from site in developed condition

QPre-developed = Peak flow rate of runoff from site in pre-developed condition

RVPre-developed = Volume of runoff from site in pre-developed condition

QForest = Peak flow rate from site in forested condition

RVForest = Volume of runoff from site in forested condition

Flood Protection

Concentrated stormwater flow must be released into a stormwater conveyance system and must meet the appropriate criteria, demonstrated using acceptable hydrologic and hydraulic methods:

Discharge into a system that does not have localized flooding during a 10-yr, 24-hr storm event

- The receiving conveyance system confines the post-development peak flow from the 10-year 24-hour storm *within* the *conveyance system* (includes flood fringe).
- Local SWM program may allow detention to be used to meet this requirement.

Discharge into a system that has localized flooding during a 10-yr, 24-hr storm event

- Receiving conveyance system confines post-development peak flow from 10-year 24-hour storm *within* the conveyance system.

Or

- Release post-development peak flow rate for 10-year 24-hour storm that is *less than* the pre-development peak flow rate for that same storm event.

Part III of the Virginia Stormwater Management Program Regulations

- Delegates legal authorities to local governments for plans approval, compliance and fee collection.
- Ensures, at a minimum, compliance with water quality design criteria and VSMP General Permit through the use of local ordinances.
- **DOES NOT** delegate VSMP permit issuance to local governments.
- VSMP General Permit will need to be creative in how this is structured.

When can a locality begin implement the new regulations?

- §10.1-603.3 of the Code of Virginia establishes time frames for **adoption** of local stormwater management programs and requires consistency with "regulations adopted in accordance with provisions of this article."

- The technical criteria in Part II A and Part II B shall be **implemented** by a stormwater program administrative authority when a VSMP General Permit for Discharges of Stormwater from Construction Activities has been issued that incorporates such criteria. Until that time, the required technical criteria shall be found in Part II C.

4VAC50-60-45. Implementation date.

Fees Discussion

- Fees were based on local implementation costs PLUS DCR oversight and support costs.
  - Fifty-six local governments provided cost data.
- The shared fees DO NOT take money away from that dedicated for local implementation.
- Local government implementation statewide does not does not change DCR's oversight and support costs.
- See the Discussion Document on Department Fees published September 8, 2008.

Grandfathering (4VAC50-60-48)

Private land-disturbing activities where the following was approved by a locality prior to July 1, 2012 and VSMP coverage will not be obtained by July 1, 2014:

1. A currently valid proffered or conditional zoning plan; preliminary or final subdivision plat; preliminary or final site plan, zoning with a plan of development; or any document determined by the locality as being equivalent;

2. With an approved layout; and,

3. The approved document must include sufficient information (calculations) to ensure compliance with Part II C (existing regulations)

Grandfathering is also applicable to certain public projects based on type of funding and when the project was funded or if DCR had approved a plan prior to July 1, 2012.

Time limit on applicability of approvals (4VAC50-60-47.1.)

- The approved post development design is valid for construction only for the remaining portion of the General Permit cycle under which it was originally permitted (up to 5-years) **PLUS** two additional permit cycles (10-years) unless:
  - VSMP permit coverage lapses (failure to reapply)

    or

  - Two additional permit cycles have passed
- Portions of the project not under construction are required to meet any new technical criteria adopted since original permit coverage was issued.

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