

Module 2
Introduction to the Clean Water Act and
resulting Stormwater Regulations



Module 2a.
Clean Water Act and resulting Stormwater
Regulations



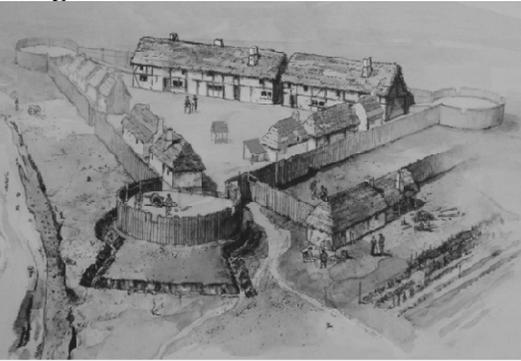
**Stormwater Management in
Virginia**



Stormwater Management in Virginia

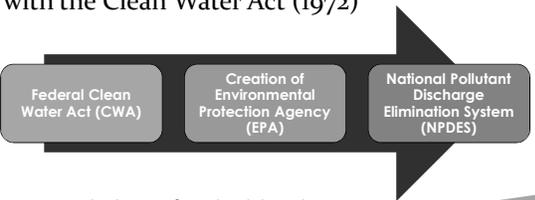
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Stormwater Management in Virginia

Stormwater Management originates with the Clean Water Act (1972)



Federal Clean Water Act (CWA) → Creation of Environmental Protection Agency (EPA) → National Pollutant Discharge Elimination System (NPDES)

Stormwater discharges from land disturbing activities are permitted under the Construction General Permit (GP) through NPDES



Stormwater Management in Virginia

The 1987 Water Quality Act added section 402 (p) to the Clean Water Act, requiring that EPA issue National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharges

- 1990 Phase I regulations (≥5 acres)
- 2003 Phase II regulations (≥ 1 acre)



Stormwater Management in Virginia

- 1960's – flood control (property protection)
- 1973: VESCL, MS-19 (stream protection)
- 1988: Chesapeake Bay Preservation Act addresses water quality (Bay restoration)
- 2005: water quality and quantity required for all sites receiving coverage under the construction general permit for stormwater



What's new with Stormwater

ESC

2012

Consolidation Bill
VESCP
Plan Review
MS-1, MS19

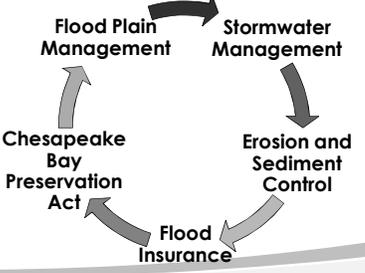
Stormwater

2014

Cities, counties, and towns with MS4 programs **must** adopt

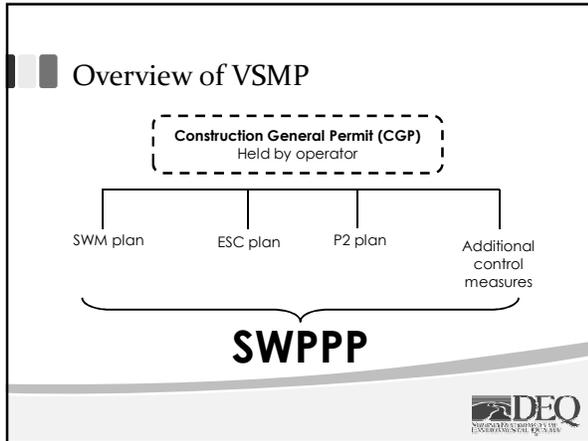


What's New



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graph TD; A[Flood Plain Management] --> B[Stormwater Management]; B --> C[Erosion and Sediment Control]; C --> D[Flood Insurance]; D --> E[Chesapeake Bay Preservation Act]; E --> A;
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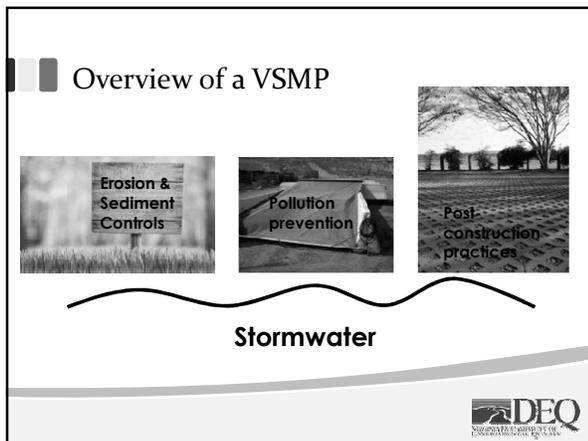




Construction General Permit

Developers/builders (site \geq 1 acre or part of a common plan of development) need to:

1. Apply for Permit Coverage under the General Permit
→ Submit a Registration Statement with Payment
2. Develop a SWPPP:
 - a) SWM Plan
 - b) ESC Plan
 - c) P² Plan
 - d) TMDL

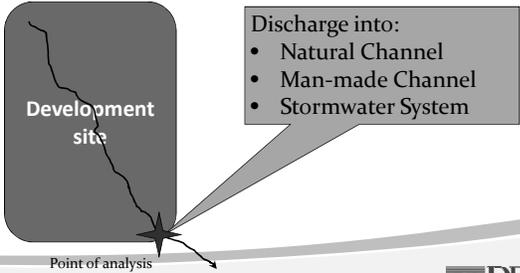


Comprehensive Site Stormwater Management

- During development
 - Erosion
 - Sediment export
 - Flooding
 - Contamination
- Post development
 - Quality
 - Quantity



Remember?

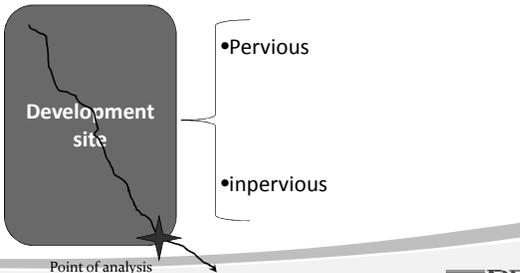


Discharge into:

- Natural Channel
- Man-made Channel
- Stormwater System



Remember?



- Pervious
- Impervious



Remember?

Development site

Point of analysis

MS-19

Virginia Stormwater Management Handbook
First Edition
1998
VOLUME I

DEQ
DEPARTMENT OF ENVIRONMENTAL QUALITY

Then

Nuisance

= Dispose quickly

DEQ
DEPARTMENT OF ENVIRONMENTAL QUALITY

**New Look at Site Development
(post development)**

Development site

Point of analysis

Runoff Reduction

Virginia Stormwater BMP Clearinghouse

DEQ
DEPARTMENT OF ENVIRONMENTAL QUALITY

New Look at Site Development (post development)

The diagram shows a dark grey rounded rectangle labeled "Development site" with a black line representing a stream flowing from the top left towards the bottom right. A starburst icon marks the "Point of analysis" at the bottom of the site. A bracket on the right side of the site lists three strategies: "Impervious", "Managed Turf", and "Forest/Open Space". Below the site, a grey curved line represents the ground surface, with an arrow pointing to it labeled "Runoff Reduction". The DEQ logo is in the bottom right corner.

- Impervious
- Managed Turf
- Forest/Open Space

Point of analysis

Runoff Reduction



Valuable Resource (if managed wisely)

Now

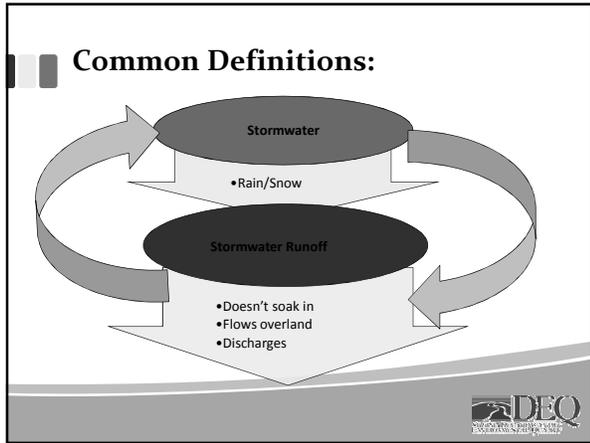
- = supply underground aquifers (drinking water)
- = provide additional source of non-potable water
- = can prevent/minimize damage to public and private resources

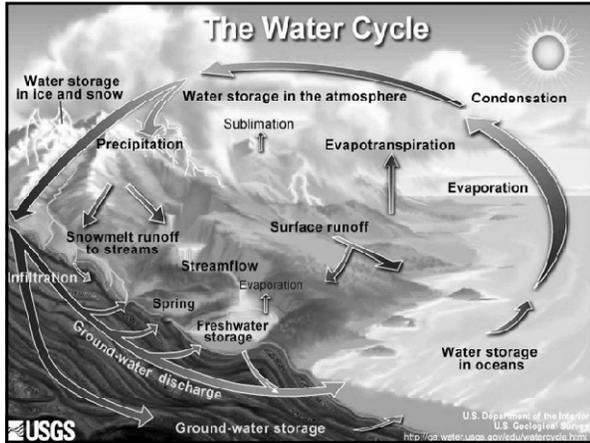


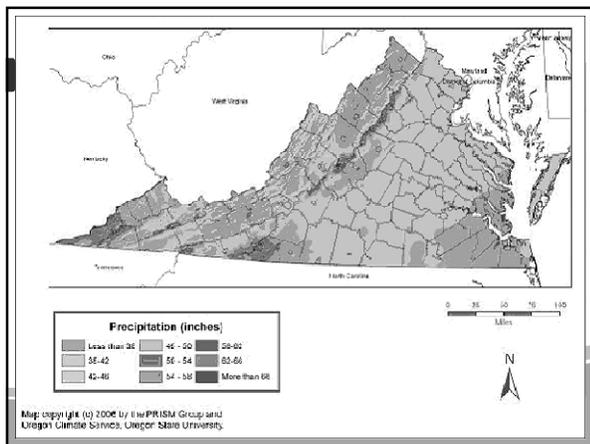
Module 2b.

Why erosion and sediment control and stormwater management matter

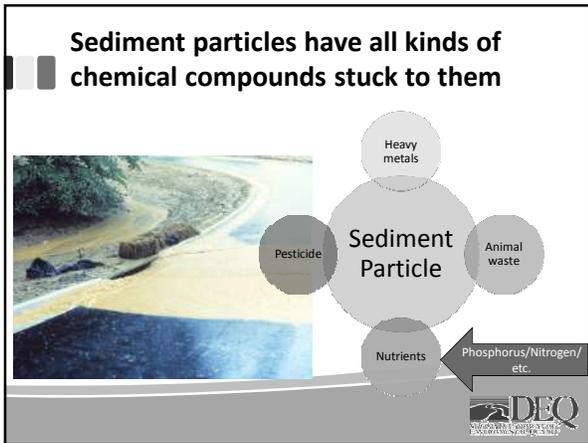


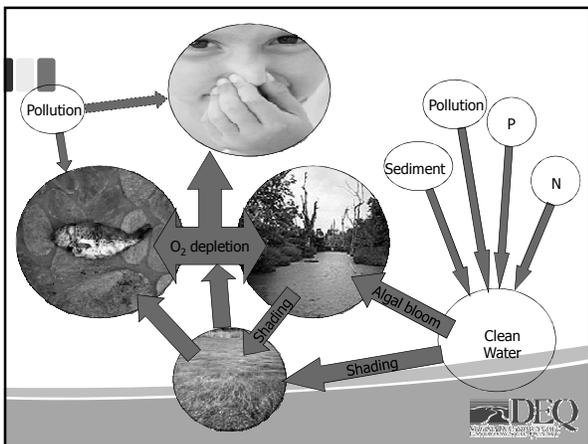


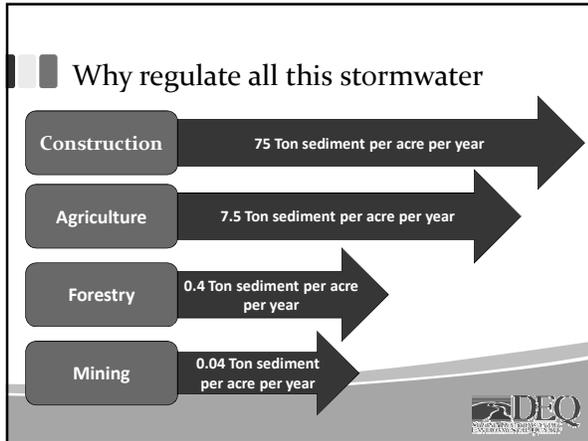






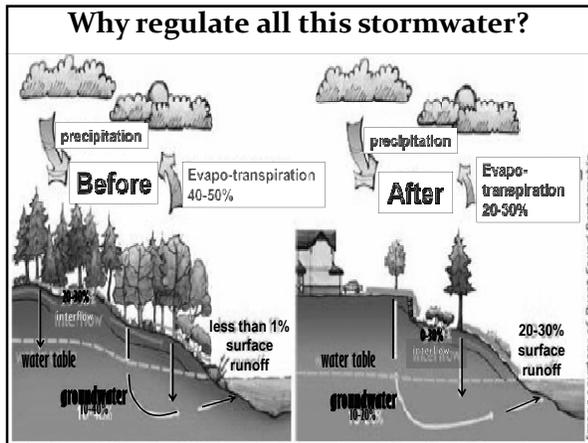


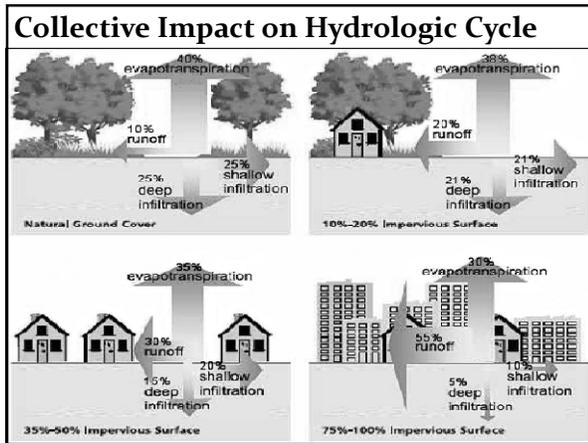


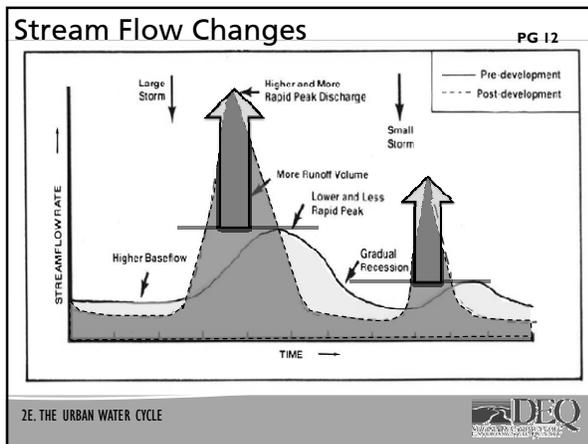


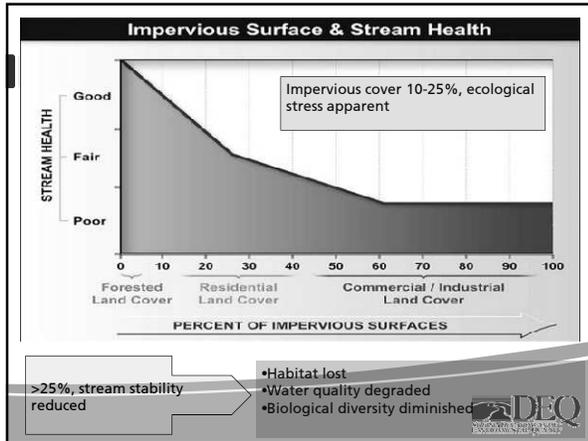












Stream Impacts

High Stormwater Volume and Velocity



- More impervious surfaces lead to less ground infiltration, more higher energy runoff
- Increased stream volumes and flow rates, flooding, more erosion

Pollutants in Stormwater Runoff



- Pollutants transported untreated to our waterways (nutrients, sediments, toxics, litter, debris, bacteria and pathogens, higher water temps)

Stream Impacts

Ecological Impacts



- Altered or lost habitats (aquatic, riparian)
- Reduced species richness and diversity
- Shift in ecological balance (aquatic food sources, opportunistic species)
- Red tides

Loss of Beneficial Uses



- Reduction in desirable fish species
- Shellfish contamination
- Contamination of drinking water sources
- Contamination of swimming beaches
- Loss of recreation and aesthetic value of state waters

Why Erosion and Sediment Control?

Law requires the *“effective control of soil erosion, sediment deposition, and nonagricultural runoff to prevent the unreasonable degradation of property, stream channels, waters and other natural resources.”*

Protect down-gradient properties from damage due to:

- a) Sediment deposition
- b) Damage due to increases in volume, velocity and peak flow rate



Module 2c.

The Erosion Process



Two Sources

- Geologic (30%)
- Accelerated (70%)

Five Stages

- Raindrop (90%)
- Sheet
- Rill
- Gully
- Channel

Four Contributing Factors

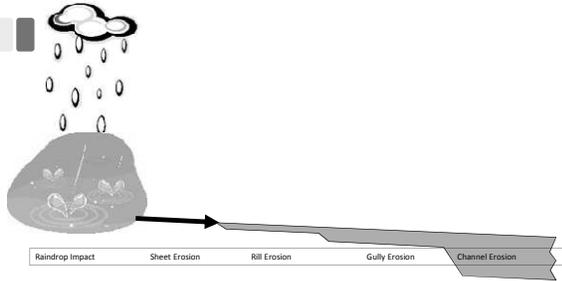
- Climate
- Soils
- Slope
- Ground cover



Geologic vs. Accelerated Erosion

Geologic	Accelerated
Natural Process	Caused by Humans - Agriculture, mining, forestry and development (land disturbance)
30%	70%
Water, wind, ice and gravity	<i>Water, wind, ice and gravity</i>

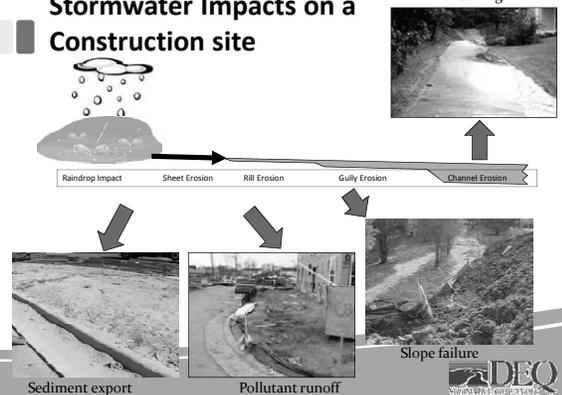


The five stages of water erosion in the landscape



Stormwater Impacts on a Construction site




Four Factors Influencing Erodibility

- Climate**
 - Precipitation
 - Frost
 - Wind
- Soil**
 - Structure
 - K-factor
 - Particle size distribution
- Topography**
 - Steepness
 - Length
 - Configuration
- Groundcover**

Erodibility = the vulnerability of a material to erosion



The End is Near!



Principles of Erosion & Sediment Control

Erosion Control - first line of defense.

“If there is no erosion, there can be no sediment.”

- Prevents damages associated with both erosion and sediment control
- The only practical approach in some instances (e.g., very fine sediments)

Ground Cover!



Principles of Erosion & Sediment Control

Sediment Control - backup for erosion control measures; second line of defense.

! Coordination of erosion control, sediment control and management of stormwater leaving the site is necessary for a well-integrated program!



Principles of Erosion & Sediment Control

Tier 1. Erosion Control (Vegetative)

Clean runoff from construction sites

Tier 2. Sediment Control (BMPs)

