

# City of Fairfax, Dept. of Public Works

## Stormwater Program Specialist

- Responsibilities
  - Plan Review
  - Virginia Stormwater Management Program (VSMP) Permits & Inspections
  - Stormwater Best Management Practices (BMP) Maintenance Program
  - Respond to drainage concerns



- Review Plans for;
  - Compliance with Virginia Erosion & Sediment Control standards.
    - Provides runoff/sediment controls during construction
    - Silt fence, construction entrances, sediment traps, etc.
  - Compliance with Virginia Stormwater Quality/Quantity standards.
    - Provides runoff and pollution control after construction
  - Consistency with BMP Clearinghouse specifications
  - Negative drainage impacts to adjacent properties
  - Maintainability & practicality of proposed BMP facilities
    - BMPs which require truck-mounted equipment to maintain need to be accessible.
    - Trees over certain BMP facilities will increase maintenance through leafy debris.

# BMP Clearinghouse

<http://vwrrc.vt.edu/swc/StandardsSpecs.html>

- An inventory of all approved BMP facilities, developed by DEQ and Virginia Tech.
- Includes proprietary and non-proprietary methods.
- The selection of the facility is up to the developer and their engineer. Public Works cannot require a particular type of BMP or deny the use of an approved BMP without justification.

Virginia Stormwater BMP Clearinghouse

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Virginia Stormwater BMP Clearinghouse  
Virginia Stormwater Management Program  
Virginia Department of Environmental Quality

Virginia Stormwater Regulatory Programs  
Virginia Runoff Reduction Method  
BMP Standards and Specifications  
Operation Inspection and Maintenance  
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## Virginia Approved Stormwater BMP Standards and Specifications

The Virginia Stormwater Management Program (VSMP) involves several types of permits issued to municipal separate storm sewer systems (MS4s) and those developing land in Virginia. In particular, the individual and general permits issued for management of stormwater discharges from MS4s involve the implementation of several programs aimed at reducing the amount of pollutants discharged from storm sewer systems operated by regulated government entities. Most MS4s have coverage under the General Permit for the Discharge of Stormwater from Small MS4s. To assist in implementation of appropriate BMPs to meet the requirements of the General Permit, EPA has developed a National Menu of Stormwater Practices divided into six categories of BMPs (first six types listed below). Each of these categories of BMPs is linked to a separate web page on this site that provides BMP standards and specifications, or to resources outside of this web site that describe in more detail and provide useful reference material pertaining to the applicable practices.

Links to BMP 'type' pages:

A - Post - construction BMP's

B - Construction BMP's (To be included when E&S regs and handbook are updated)

# BMP Clearinghouse Specifications

- Provides design applications, materials specifications, construction details, sizing calculations, inspection and maintenance guidelines.

VA DEQ STORMWATER DESIGN SPECIFICATION NO. 8

INFILTRATION

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## SECTION 4: TYPICAL DETAILS

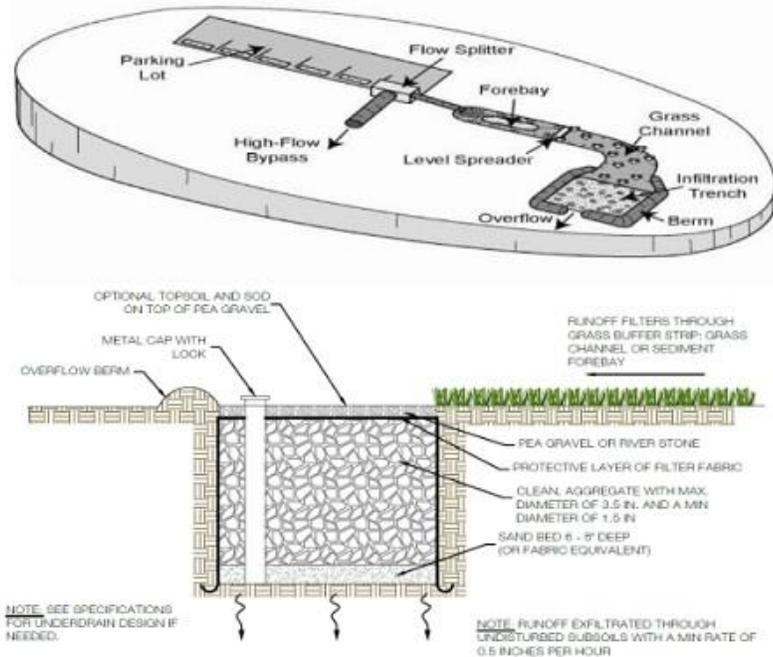


Figure 8.1. Infiltration Plan and Section

Table 8.1. Summary of Stormwater Functions Provided by Infiltration

Stormwater Function	Level 1 Design	Level 2 Design
Annual Runoff Volume Reduction (RR)	50%	90%
Total Phosphorus (TP) EMC Reduction <sup>1</sup> by BMP Treatment Process	25%	25%
Total Phosphorus (TP) Mass Load Removal	63%	93%
Total Nitrogen (TN) EMC Reduction <sup>1</sup> by BMP Treatment Process	15%	15%
Total Nitrogen (TN) Mass Load Removal	57%	92%
Channel and Flood Protection	<ul style="list-style-type: none"> <li>Use the RRM spreadsheet to calculate the Curve Number (CN) adjustment; OR</li> <li>Design for extra storage (optional; as needed) on the surface or in the subsurface storage volume to accommodate larger storm volumes, and use NRCS TR-55 Runoff Equations<sup>2</sup> to compute the CN Adjustment.</li> </ul>	

<sup>1</sup> Change in the event mean concentration (EMC) through the practice. The actual nutrient mass load removed is the product of the removal rate and the runoff reduction (RR) rate (see Table 1 in the Introduction to the New Virginia Stormwater Design Specifications).  
<sup>2</sup> NRCS TR-55 Runoff Equations 2-1 thru 2-5 and Figure 2-1 can be used to compute a curve number adjustment for larger storm events, based on the retention storage provided by the practice(s).  
 Sources: CWP and CSN (2008), and CWP (2007)

## SECTION 3: DESIGN TABLE

The major design goal for Infiltration is to maximize runoff volume reduction and nutrient removal. To this end, designers may choose to go with the baseline design (Level 1) or choose an enhanced design (Level 2) that maximizes nutrient and runoff reduction. To qualify for Level 2, the infiltration practice must meet all the design criteria shown in the right hand column of Table 8.2.

Table 8.2. Level 1 and Level 2 Infiltration Design Guidelines

Level 1 Design (RR:50; TP:25; TN:15)	Level 2 Design (RR:90; TP:25; TN:15)
<b>Sizing:</b> $T_v = [(Rv)(A)^{1/2}]$ – the volume reduced by an upstream BMP	<b>Sizing:</b> $T_v = [1.1(Rv)(A)^{1/2}]$ – the volume reduced by an upstream BMP
At least two forms of pre-treatment (see Table 8.6)	At least three forms of pre-treatment (see Table 8.6)
Soil infiltration rate 1/2 to 1 in./hr. (see Section 6.1 & Appendix 8-A); number of tests depends on the scale (Table 3)	Soil infiltration rates of 1.0 to 4.0 in/hr (see Section 6.1 & Appendix 8-A); number of tests depends on the scale (Table 3)
Minimum of 2 feet between the bottom of the infiltration practice and the seasonal high water table or bedrock (Section 4.5)	
$T_v$ infiltrates within 36 to 48 hours (Section 6.6)	
Building Setbacks – see Table 8.3	
All Designs are subject to hotspot runoff restrictions/prohibitions	

specification covers three scales of infiltration practices (1) Micro-infiltration (250 to 2,500 sq. ft. of CDA), (2) small-scale infiltration (2,500 to 20,000 sq. ft. of CDA) and (3) conventional infiltration (20,000 to 100,000 sq. ft. of CDA). The design, pretreatment and maintenance requirements differ, depending on the scale at which infiltration is applied (see Table 8.3 below for a summary).

Table 8.3. The Three Design Scales for Infiltration Practices

Design Factor	Micro-infiltration	Small-Scale Infiltration	Conventional Infiltration
Impervious Area Treated	250 to 2,500 sq. ft.	2,500 to 20,000 sq. ft.	20,000 to 100,000 sq. ft.
Typical Practices	Dry Well French Drain Paving Blocks	Infiltration Trench Permeable Paving <sup>1</sup>	Infiltration Trench Infiltration Basin
Min. Infiltration Rate	1/2 inch/hour		
Design Infil. Rate	50% of measured rate		
Observation Well	No	Yes	Yes
Type of Pretreatment (see Table 8.6)	External (leaf screens, grass filter strip, etc)	Vegetated filter strip or grass channel, forebay, etc.	Pretreatment Cell
Depth Dimensions	Max. 3-foot depth	Max. 5-foot depth	Max. 6-foot depth
UIC Permit Needed	No	No	Only if the surface width is less than the max. depth
Head Required	Nominal: 1 to 3 feet	Moderate: 1 to 5 feet	Moderate: 2 to 6 feet
Underdrain Requirements?	An elevated underdrain only on marginal soils	None required	Back up underdrain
Required Soil Tests	One per practice	One (1) per 1,000 sq. ft. of surface area or max. two (2) per practice.	One per 1,000 sq. ft. of surface area.
Building Setbacks	5 feet down-gradient <sup>2</sup> 25 feet up-gradient	10 feet down-gradient 50 feet up-gradient	25 feet down-gradient 100 feet up-gradient

<sup>1</sup> Although permeable pavement is an infiltration practice, a more detailed specification is provided in Stormwater Design Specification No. 7.  
<sup>2</sup> Note that the building setback of 5 feet is intended for simple foundations. The use of a dry well or french drain adjacent to an in-ground basement or finished floor area should be carefully designed and coordinated with the design of the structure's water-proofing system (foundation drains, etc.), or avoided altogether.

**Site Topography.** Unless slope stability calculations demonstrate otherwise, infiltration practices should be located a minimum horizontal distance of 200 feet from down-gradient slopes greater than 20%. The average slope of the contributing drainage areas should be less than 15%.

**Practice Slope.** The bottom of an infiltration practice should be flat (i.e., 0% longitudinal slope) to enable even distribution and infiltration of stormwater, although a maximum longitudinal slope of 1% is permissible if an underdrain is employed. Lateral slopes should be 0%.

- Clearinghouse includes Proprietary & Non-Proprietary BMP Facilities.
- Proprietary – Ex; Filterra, StormFilter, StormTech Chambers
  - Can maximize usable space in areas with little open space.
  - Can be more costly to install and maintain. Proprietary parts & materials.
- Non-Proprietary – All specifications provided openly in the BMP Clearinghouse. Common materials.



# Virginia Stormwater Management Permit & Inspections

- A VSMP Permit is required for all Land Disturbing Activities which exceed 2,500sq.ft. LDA's which are 1AC or more are also transmitted to DEQ.
- A Stormwater Pollution Prevention Plan (SWPPP) is required for all LDA greater than 2,500sq.ft except for a single family development
  - SWPPP is a site specific plan for controlling pollutants during construction.
- Public Works maintains inventory of VSMP permits, handles correspondence with DEQ, and permit termination.
- BMPs that were constructed are added to City's inventory when permit is terminated.

# VSMP Inspections

- Inspections during construction of BMP facilities to ensure they are built per approved plans.



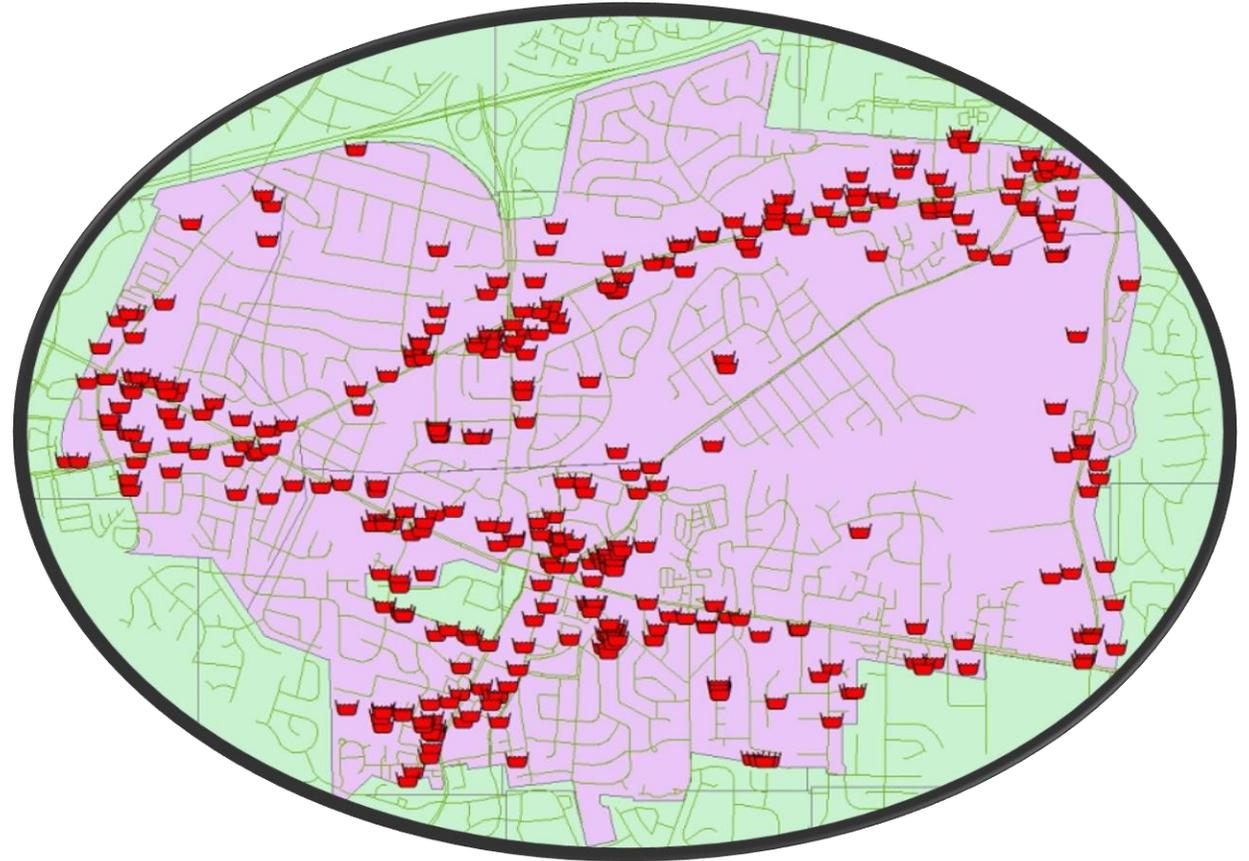
# VSMP Inspections

- Periodic inspections during construction;
  - Compliance with the approved SWPPP
  - E&S and pollutant controls are in place and functioning.
  - Ex; collection pits for concrete wash waters



# BMP Maintenance Program

- Property owners are responsible for maintenance of their BMP facilities.
- Currently there are 344 private and 32 public BMP facilities in the City. This number will grow by about 30 facilities each year through construction of new facilities during development.
- Public Works contracts with a 3<sup>rd</sup> party consultant to provide inspections of all BMP facilities annually.



- Reports from the consultant are reviewed by Public Works and sent to the property owners. The inspection report will detail any maintenance required by the property owner.
- Public Works assists the property owner in understanding how their facility works, the maintenance requirements, suggestions to extend the maintenance intervals and reduce maintenance costs. On request, Public Works will review maintenance proposals.



# Drainage Concerns

- Common concerns;
  - Ponding/constantly wet yard
  - Wet basements
  - Neighbor has made changes which have negative impacts. Ex; roof drain pipes redirected to the property line, berms installed across a drainage path. Civil matter between private parties.

