



Department of Public Works and Environmental Services

# Technical Bulletin

**Subject: Stormwater Management Ordinance  
Guidelines for Implementation**

**Date: May 6, 2014 No.: 14-08**

**Summary:** This bulletin is intended to address a number of questions related to implementation of the County Stormwater Management Ordinance (Ordinance) and associated amendments to the Public Facilities Manual (PFM).

**Effective Date:** Immediately.

**Background:** On January 28, 2014, the Fairfax County Board of Supervisors adopted the new Ordinance and related amendments to the PFM, as well as amendments to other chapters of the County Code. The Ordinance and related amendments implement the Virginia Stormwater Management Act (Va. Code Ann. § 62.1-44.15:24, et seq.) and Virginia Stormwater Management Program (VSMP) Regulation (9VAC25-870 et seq.). The Ordinance is effective July 1, 2014.

County staff and industry representatives have been meeting to discuss technical issues related to implementing the Ordinance and PFM amendments. The workgroup identified various code sections and issues that could benefit from additional clarification. This guidance is intended to address those questions that have been identified to date.

**Guidelines:** A detailed guidance document, *Guidelines for Implementation of the Stormwater Management Ordinance*, is attached. This document is intended only as guidance and not as a substitute for the actual text of the code. Please note that the information contained in the guidelines and this technical bulletin is based on staff's current understanding of the regulatory intent of the provisions of the state regulations. Subsequent regulatory changes and/or additional regulatory guidance from DEQ could affect the content of the guidelines and this document. The County will update these policies and interpretations if necessary.

If you have any questions, please contact the Site Code Research and Development Branch at **703-324-1780, TTY 711**.

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Attachment: *Guidelines for Implementation of the Stormwater Management Ordinance*

**Guidelines for Implementation of the Stormwater  
Management Ordinance**

May 6, 2014

**Introduction:**

On January 28, 2014, the Fairfax County Board of Supervisors adopted the new Stormwater Management Ordinance of Fairfax County (SWMO) and related amendments to the Public Facilities Manual (PFM), as well as amendments to other chapters of the County Code. The new Ordinance and related amendments implement the Virginia Stormwater Management Act (Va. Code Ann. § 62.1-44.15:24, et seq.) and Virginia Stormwater Management Program (VSMP) Regulation (9VAC25-870 et seq.). The SWMO becomes effective July 1, 2014.

County staff and industry representatives have been meeting to discuss issues related to the implementation of the ordinance and associated amendments. The team has identified various code sections and issues that could benefit from additional clarification. This guidance is intended to answer questions identified to date. This document is intended only as guidance and not as a substitute for the actual text of the code.

**Issue 1: Rational Method Computations**

**Question:** Can the Rational Method still be used under the new SWMO?

**Answer:** Yes.

**Applicable Code Sections:** SWMO § 124-4-6.D and E, PFM Table 6.4, § 6-0803

**Background/Discussion:** Yes. The recent PFM amendments have not altered PFM Table 6.4 which identifies the Rational Method as an acceptable hydrology for drainage areas smaller than 200 acres or for designing retention/detention facilities with drainage areas smaller than 20 acres.

**Issue 2: Rainfall Amounts**

**Question:** Will the rainfall amounts be updated for the unit hydrographs?

**Answer:** The rainfall data from the Vienna Station in NOAA Atlas 14 should be used for the NRCS method. Below are the rainfall intensities for a 5-minute time of concentration during a 1-year, 2-hour storm for use with the Rational Method. The rates for other times of concentration for this storm will be forthcoming.

Time (min)	Intensity (in/hr.)
0	0.00
5	4.50
10	2.90
15	2.15
20	1.72
25	1.42
30	1.21
35	1.06
40	0.91
45	0.83
50	0.73
55	0.68
60	0.61
65	0.56
70	0.51
75	0.46
80	0.40
85	0.36
90	0.31
95	0.26
100	0.21
105	0.16
110	0.10
115	0.05
120	0.00

**Applicable Code Sections:** SWMO § 124-4-6A, PFM Table 6.6.

**Issue 3: Rainfall Hydrograph**

**Question:** What unit hydrograph should be used?

**Answer:** Designers using the NRCS methodology should obtain data from [NOAA Atlas 14](#)'s Vienna Station. Staff is developing hyetographs for the 1-year, 2-year, 10-year, and 100-year 24-hour storms to replace the current NRCS Type II distribution which is not consistent with NOAA Atlas 14. Designers using the Rational Method can continue to use PFM Table 6.6.

**Applicable Code Sections:** SWMO § 124-4-4 and 6.C, Amended PFM § 6-1305.9.

**Background/Discussion:** It is possible that a single site might use more than one hydrologic method or rainfall data set on a single plan submission. A future PFM amendment will standardize the rainfall data to NOAA Atlas 14 for all hydrologic methods.

#### **Issue 4: Design Storms**

**Question:** Is there a conflict between the PFM § 6-1302.1, which requires detention of the 10-year 2-hour storm and the ordinance requirement to design to the 24-hour storm event?

**Answer:** The PFM is consistent with the State regulations.

**Applicable Code Sections:** PFM § 6-1301.5, PFM § 6-1302.1, Virginia Stormwater Management Program (VSMP) Permit Regulations § 9VAC25-870-72.D and 72.E.

**Background/Discussion:** Virginia Stormwater regulation § 9VAC25-870-72.D and 72.E gives the County authority to allow the Rational Method and Modified Rational Method for evaluating peak and volumetric flows for drainage areas equal to or less than 200 acres. Detention facilities may be designed for either the 2-hour storm or 24-hour storm. NRCS hydrology is preferred and acceptable for all applications except for certain types of floodplain studies. However, the Rational method or Modified Rational Method may be used for the design of retention or detention facilities having a contributing drainage area of 20 acres or less. This practice aligns with the County's current policy. The Virginia Runoff Reduction spreadsheet is an additional tool available which adjusts the curve number based on the 24-hour storm. However, the reduced Curve Number is generally not acceptable for the design of downstream conveyance infrastructure such as roadway culverts, bridges, floodplain determinations, etc.

#### **Issue 5: Virginia Runoff Reduction Method**

**Question:** How should a designer account for offsite area that will be treated by onsite facilities in the Virginia Runoff Reduction Method (RRM) spreadsheet? Will credit be given for treating offsite flows?

**Answer:** You may take compensatory credit for treating runoff from offsite areas provided that the offsite area will not be captured and treated by an upstream BMP in the future. The RRM spreadsheets do not have the ability to discriminate onsite from offsite drainage areas. Designers will need to submit two spreadsheets: one for onsite only, which determines the required phosphorus reduction, and a second that combines onsite and offsite flow. If treating offsite flow for compensatory credit, a designer must use one spreadsheet for onsite area only and a second spreadsheet to evaluate the BMP performance in treating the combined on and offsite areas. The net compensatory treatment amount can then be determined by subtracting the onsite result from the combined result. Alternatively, the second spreadsheet could be used to determine the phosphorus reduction provided for the offsite areas only and that amount added to the phosphorus reduction provided for the onsite areas. The total phosphorus reduction would then be compared to the required reduction.

**Applicable Code/PFM Sections:** SWMO § 124-4-3.A

**Background/Discussion:** The ordinance requires that water quality compliance be demonstrated using the RRM spreadsheet, which is available as a download from the DEQ stormwater web page. Since the current versions of the spreadsheets do not have the ability to discriminate onsite drainage from offsite drainage, the method above is recommended.

#### **Issue 6: Virginia Runoff Reduction Method**

**Question:** The RRM spreadsheet is limited to five drainage area tabs. What should the designer do if there are more than five drainage areas?

**Answer:** More than one spreadsheet must be used if the total number of drainage areas being analyzed exceeds five. Designers should determine a logical way to divide the site into drainage and sub-drainage areas that work using multiple spreadsheets.

**Applicable Code Sections:** SWMO § 124-4-3 and 4.

**Background/Discussion:** The ordinance requires that water quality and quantity (channel and flood protection) compliance be demonstrated using the RRM spreadsheet, which is available as a download from the DEQ stormwater web page. The RRM workbook is a locked spreadsheet limited to five drainage area tabs and additional tabs cannot be added.

#### **Issue 7: Virginia Runoff Reduction Method**

**Question:** What part of the state RRM workbook should be included on the plans?

**Answer:** All of the RRM spreadsheets in the workbook, including the Site Data tab, Drainage Area tab(s), Water Quality Compliance tab, Channel and Flood Protection tab, and Summary tab, should be included on the plans.

**Applicable Code Sections:** SWMO § 124-4-3.A

**Background/Discussion:** The ordinance requires that water quality compliance be demonstrated using the RRM, which is available as a download from the DEQ stormwater web page. Since this is a new way of demonstrating compliance with the ordinance and the state regulation, plan reviewers will need to see all of the input and output data as part of the plan.

#### **Issue 8: Requirement for Guardrail on Endwalls**

**Question:** There appears to be a conflict in height requirements between the PFM and the Virginia Uniform Statewide Building Code. Which specification applies?

**Answer:** When more than one standard applies, the greater requirement or higher standard is required.

**Applicable Code Sections:** PFM § 1-0501, § 6-1111.13.

**Background/Discussion:** The requirement for a guardrail, fence or other protective device on endwalls near pedestrian walkways or residences where the vertical drop is 2 feet in height or greater seems to be more stringent than the requirements in the Virginia Uniform Statewide Building Code where guards are required when the vertical drop is more than 30 inches. Requirements can differ between local, state and federal authorities. The strictest, or most conservative, requirement will apply. For pedestrian walkways, in addition to the requirements in PFM Chapter 8, the endwall requirements in PFM Chapter 6 and the accessibility standards of the USBC will also apply. For walkways on public property that will be maintained by VDOT, the pedestrian walkways must also conform to VDOT standards.

### **Issue 9: BMP Proprietary BMP Pollutant Removal Efficiencies**

**Question:** When will the approved efficiencies for proprietary BMP facilities be available?

**Answer:** DEQ is responsible for listing approved proprietary BMPs at the [Virginia Stormwater BMP Clearinghouse](#). DEQ has not provided an official timeline for listing approved Manufactured Treatment Devices (MTDs).

**Applicable Code Sections:** SWMO § 124-4-3.B

**Background/Discussion:** The state regulations do not permit the County to establish BMP efficiencies. Proprietary BMPs are not approved for use until they are listed at the [Virginia Stormwater BMP Clearinghouse](#). DEQ has indicated they will issue guidance in spring of 2014 that will describe a process for approving MTDs and assigning pollutant removal credits. MTDs meeting the criteria of the guidance will then be listed on the Clearinghouse webpage.

### **Issue 10: Design Specification for Reforestation**

**Question:** When using reforestation is the entire Virginia DEQ Stormwater Design Specification No. 4 used or just the specification's Appendix A?

**Answer:** The entire Virginia DEQ Stormwater Design Specification No. 4 should be used when designing for reforestation.

**Applicable Code Sections:** Amended PFM § 1311.1C.

**Background/Discussion:** While there are times when the in-situ soils will support reforestation, soil testing is necessary to determine when compost amendments are required.

### **Issue 11: Using Reforestation as a BMP**

**Question:** How can a designer take BMP credit for reforestation?

**Answer:** The reforested area (acres) should be accounted for in the “Forest / Open Space” cells under Post –Development Land Cover on the RRM workbook Site Data tab. The reforested area will reduce the site’s weighted runoff coefficient and phosphorus load therefore reducing the required phosphorus reduction that needs to be achieved by BMPs.

**Applicable Code Sections:** PFM Table 6.5, Amended PFM § 6-1311, VA DEQ Stormwater Design Specification No. 4.

**Background/Discussion:** Reforestation is not included as a separate BMP in the RRM but does provide computational benefit toward achieving the phosphorus reduction goal. Using reforestation as a land cover type lowers the weighted site  $R_v$  and therefore reduces the phosphorus loading and reduces the amount of phosphorus reduction required to meet the target loading. It also reduces the site’s average CN, which provides benefits toward meeting the channel protection requirements.

### **Issue 12: Vegetated Roof**

**Question:** Why does the amended PFM include two paragraphs that say that vegetated roofs cannot be used on single-family dwelling units?

**Answer:** PFM § 6-1310.2B was amended to change the reference from “Subdivision or Zoning” to “Stormwater Management” Ordinance, to correspond to the change in requirements applicable to single-family units subject to the County’s subdivision or site plan regulations. PFM § 6-1310.2C was amended to change the reference from “Chesapeake Bay Preservation” to “Stormwater Management” Ordinance, to correspond to the change in requirements applicable to dwellings on lots that are not subject to the County subdivision regulations (e.g. nonbonded subdivisions where the minimum lot size is five acres).

**Applicable Code Sections:** SWMO §§ 124-4-3 and -4, Amended PFM § 6-1310.2B and C.

**Background/Discussion:** Vegetated roofs cannot be used for stormwater management credit to meet either the water quality and quantity requirements of the Stormwater Management Ordinance. However, the ordinance does not prohibit a vegetated roof on a single-family dwelling, if an owner wishes to construct it without stormwater credit.

### **Issue 13: Vegetated Roof Design Specifications**

**Question:** Is there a discrepancy between state and County specifications for the depth of media?

**Answer:** No. Both the PFM and the Virginia DEQ Stormwater Design Specification No. 5 list the same range of media depths for intensive and extensive vegetated roofs.

**Applicable Code Sections:** Amended PFM § 6-1310.3B, VA DEQ Stormwater Design Specification No. 5

**Background/Discussion:** The confusion arises from the fact that break point for media depth between the Level 1 and Level 2 designs is 4 inches (listed only in the VA design specification) and the break point for media depth between extensive and intensive systems is 6 inches (listed in both the VA design specifications and the PFM).

#### **Issue 14: Determining the Runoff Curve Number for Vegetated Roof**

**Question:** There appears to be a computational error when using the RRM Worksheet (Channel and Flood Protection tab) to calculate an adjusted Runoff Curve Number (CN) for vegetated roofs. Can a designer use hand calculations to account for vegetated roofs in the adjusted CN?

**Answer:** Yes. Weighted average CN calculations are allowed in calculating post development hydrology for a vegetated roof. However, the following PFM requirements will still apply:

1. Rational Method: For hydrologic computations using the Rational Method, the runoff coefficient “C” values for vegetated roofs in Table 6.5 shall be used.
2. NRCS Method: For hydrologic computation using NRCS method in Vegetated Roof, the Curve Number “CN” shall be based on the values specified on PFM § 6-0802.1.
3. Virginia Runoff Reduction Method Worksheet shall still be used to show compliance with the water quality control requirements.

**Applicable Code Sections:** PFM Table 6.5, VA DEQ Stormwater Design Specification No. 5

**Background/Discussion:** The ordinance and amended PFM require using the RRM Worksheet to show compliance with the water quality control requirements. The spreadsheet also provides an adjusted CN on the Channel and Flood Protection tab that can be used in channel protection analysis. But, hydrologic computations for vegetated roof using the spreadsheet does not yield the same result as when calculated manually based on the Curve Number (CN) values provided in PFM § 6-0802.1. Designers may use hand calculations using the CN values in the PFM.

#### **Issue 15: Slope Restriction on Infiltration Practices**

**Question:** How do we apply the 15% slope restriction for BMPs that utilize infiltration?

**Answer:** Unless slope stability calculations demonstrate otherwise, infiltration practices may not be located on slopes steeper than 15%. The average slope of the contributing drainage area and the area directly downgradient of the facility may not be steeper than 15%. Infiltration practices should be a minimum of 200 feet horizontally from any downgradient slope greater than 20% according to Virginia DEQ BMP Design Spec No. 8. Any steeper slopes both upgradient and downgradient of the facility shall be evaluated by a geotechnical engineer.

**Applicable Code Sections:** PFM § 6-1303.2H, § 6-1307.2E, VA DEQ Stormwater Design Specification No. 8

**Background/Discussion:** Some soil types have a lower value for the internal angle of shearing resistance. The typical angle of repose of saturated loam and silt would be as low as 20%. Steeper slopes around an infiltration practice make upstream and downstream slopes vulnerable to shear failure. But, a geotechnical evaluation of the slopes for every infiltration practice would be a costly option for homeowners and developers. Establishing a general limitation of 15% slope requirement for infiltration practices based on the soil properties has been a safe and practical approach. The topographic conditions requirements have been in the Virginia Stormwater Management Handbook since 1999 and the location and siting requirements have been requirements in Fairfax County since 2007 (see Letter to Industry #07-04). However, the Director may approve a PFM modification to allow infiltration practices on steeper slopes if the site-specific slope stability analysis demonstrates that soil conditions are acceptable.

### **Issue 16: Extended Detention Dry Pond**

**Question:** Can existing dry ponds that don't meet the new design criteria of Virginia DEQ Stormwater Design Specification No. 15 for extended detention dry ponds (yet were originally designed to provide water quality controls) be considered a BMP facility for redevelopment projects? If so, what removal efficiency will be assigned?

**Answer:** DPWES is awaiting word from DEQ on how to address this question. In the interim, until the County receives guidance from DEQ, no phosphorus reduction credit will be given for existing dry ponds.

**Applicable Code Sections:** SWMO § 124-4-2, PFM Table 6.3.

**Background/Discussion:** Under the Clearinghouse design specification, extended detention facilities are assigned 15% phosphorus removal efficiency. The current VA design specification for extended detention facilities is essentially the same as the old enhanced extended detention facility VA design specification which was credited with 50% phosphorus removal efficiency. The old extended detention facility design was credited, by the state, with 35% phosphorus removal efficiency. Given the above removal efficiencies, it would seem unlikely that DEQ would credit an extended detention facility with more than a very minimal removal efficiency (10% at most). Additionally, the redevelopment criteria require 10% or 20% phosphorus reduction from existing conditions in addition to what is provided by existing controls. Given the above, it would not be prudent to assume any phosphorus reductions for facilities not meeting current requirements in analyzing redevelopment.

### **Issue 17: Extended Detention Ponds in Residential Areas**

**Question:** The use of wet ponds, extended detention ponds, and constructed wetlands in residential development is restricted to regional facilities or to residential developments where there are no other reasonable options available for compliance with the water quality control requirements. What does "no other reasonable option" mean and how would a designer demonstrate the no other reasonable option exists?

**Answer:** The DEQ design specifications and amended PFM consider ponds to be the final element in the roof-to-stream runoff reduction sequence. Alternative measures listed in the BMP Clearinghouse shall be considered in the site design process and after all other runoff reduction techniques have been exhausted, and if there is still a remaining water quality or channel protection volume to manage, pond options may be considered. Designers shall submit justification to the satisfaction of the Director as a part of Stormwater Pollution Prevention Plan (SWPPP). The documentation and justification may include any or all of the following:

1. All other runoff reduction opportunities have been exhausted and were found to be insufficient, leaving additional water quality or channel protection volume to manage.
2. The layout of the site with extended detention pond was approved as a part of development plan or preliminary plat and rearranging the stormwater management layout would require a proffer interpretation or would impact a tree save area(s) depicted on a development plan or preliminary plat.
3. Topography is such that other runoff reduction techniques are either not feasible due to the site constraints or are not sufficient to meet the water quality and detention requirements of the ordinance.

**Applicable Code Sections:** PFM § 6-1303.2H, VA DEQ Stormwater Design Specification No. 8.

**Background/Discussion:** Safety is the primary consideration for the County. The new design specifications incorporate permanent pools of water with depths that have traditionally been discouraged by the County for use in residential developments for that reason. The state BMP design specifications discourage wet ponds and standing pools in residential areas. Extended detention ponds have low or negligible removal for soluble pollutants, such as nitrate and soluble phosphorus so the use of ED alone generally results in the lowest overall pollutant removal rate of any single stormwater treatment option. The DEQ updated specification for extended detention ponds now requires a deeper permanent pool which presents a risk in residential areas. Amended PFM § 6-0301.4 allows dry ponds that do not include permanent pools of water in residential developments. The use of extended detention ponds with permanent pools in residential developments is restricted to regional facilities or to residential developments where there are *no other reasonable options* available for compliance with the water quality control requirements.

**Issue 18: Can I still apply for a 2-year and 10-year detention waiver? How does it affect the outfall analysis?**

**Answer:** Yes. An applicant may request an exception to the detention requirements of § 124-4-4.D, pursuant to § 124-6-1, provided the outfall is adequate.

**Applicable Code Section:** § 124-4-4.D, PFM § 6-0301.2, (PFM § 6-0301.3 effective June 30, 2014)

**Background/Discussion:**

Adequate outfall analyses and maps shall be provided at the time of the request. The outfall analysis for the project which is grandfathered or subject to time limits shall follow technical criteria of Article 5 of the ordinance and the outfall analysis for all other projects shall follow the technical criteria of Article 4. Among the various factors that need to be evaluated adequacy of outfall, type of outfall, location of the site in the watershed, topography, vegetation, increase in post development flow, and benefit of detention versus vegetation removal. Note that exceptions granted under Chapter 124 have additional non-technical requirements that must be met.

**Additional Resources:**

The County has issued other guidance and is developing additional resources to help clarify the ordinance and associated amendments. Among currently available resources are the following:

- County Web page for access to the adopted Ordinance and associated PFM and other code amendments: [www.fairfaxcounty.gov/dpwes/publications/pfm/amendments.htm](http://www.fairfaxcounty.gov/dpwes/publications/pfm/amendments.htm).
- County Web page for access to previously issued Technical Bulletins: [www.fairfaxcounty.gov/dpwes/publications/lti/](http://www.fairfaxcounty.gov/dpwes/publications/lti/). Technical Bulletin 14-04 and 14-06 have been issued to clarify the grandfathering and time limits provisions of the ordinance.

The County will continue efforts to address other issues which have been identified by industry representatives and will issue additional guidance, clarifications, and interpretations as necessary and when available.

If you have any questions, please contact the Site Code Research and Development Branch, at **703-324-1780, TTY 711.**