

Filterra Flow Based Sizing Based on the Virginia SWM Handbook, July 2013

Sizing Basis:

The sizing for the Filterra system under the new Virginia regulations is based on the methodology outlined in Chapter 11 of the Virginia Stormwater Management Handbook, July 2013. The NRCS Runoff Equation, equation 11.3 (as well as equations 11.4, 11.5, and 11.6) in the handbook is utilized to determine a water quality flow rate for the drainage area in question. To validate the sizing, the following parameters were assumed:

Design Parameters:

Design Storm = 1.0" Rainfall (As outlined in the VA SWM Handbook)
 Design Storm Type = SCS Type II 24-hr.
 Filterra Media Flow Rate = 140"/hr
 Site Drainage Area = 0.329 ac
 Percent Impervious = 100%
 Time of Concentration = 5 min
 Allowable Ponding in Filterra = 9"
 Filterra Model Size Analyzed = 13x7 (Treats 0.29 cfs at 140"/hr)

Design Summary:

Based on equation 11.3, the required treatment flow rate for this drainage area is 0.48 cfs. Utilizing the HydroCAD Software, a matching hydrograph can be derived (Figure 1).

This storm can then be routed through an appropriately sized Filterra unit, in this case a 13x7. Because the Filterra system can provide up to 9" of ponding, some flow attenuation is possible and the Filterra system is able to accommodate a portion of the water quality volume in the head space and release it at the system's design flow rate. The hydrograph in Figure 2 illustrates this concept. In this example, the 68 cf stored represents the upper portion of the hydrograph between 0.29 cfs and 0.48 cfs.

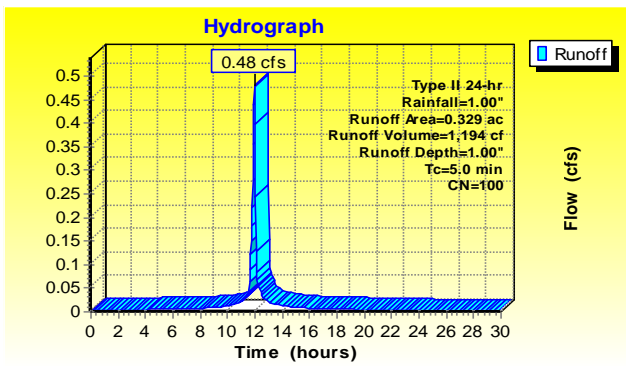


Figure 1. Inflow rate during the 1.0" rainfall WQ Storm event.

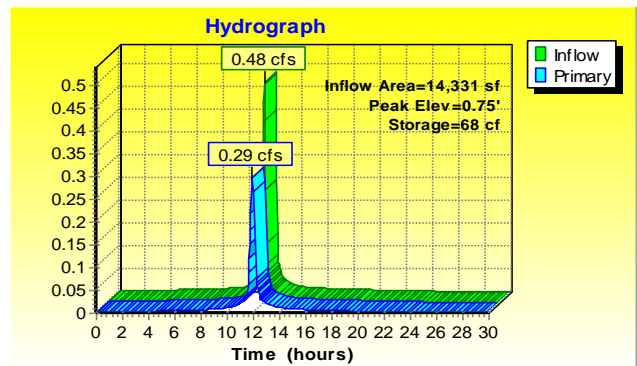


Figure 2. Inflow rate during the WQ Storm Event compared with the Filterra outflow rate, accounting for 9" ponding within the unit.

This approach is scalable and can be completed for all Filterra sizes. Table 1 identifies the maximum impervious drainage area to each Filterra unit based on this methodology. Additionally, for drainage areas that are not fully impervious, the treated Water Quality Volume has been provided so that sizing can be compared to the WQv generated from the VRRM Spreadsheet. Please contact your Contech Stormwater Consultant or Stormwater Design Engineer for more information.

Table 1. Filterra Sizing based on the Virginia SWM Handbook, July 2013.

| System Size (ft) | Treatment Flow Rate at 140"/hr (cfs) | Maximum Impervious Drainage Area When Fully Ponded (CN=100) (ac) | Max WQv Based on the VRRM Spreadsheet (cf) | Outlet Pipe Size |
|------------------|--------------------------------------|--|--|------------------|
| 4x6 / 6x4 | 0.08 | 0.087 | 300 | 4" PVC |
| 4x8 / 8x4 | 0.1 | 0.116 | 400 | 4" PVC |
| 6x6 | 0.12 | 0.13 | 448 | 4" PVC |
| 6x8 / 8x6 | 0.16 | 0.174 | 600 | 4" PVC |
| 6x10 / 10x6 | 0.19 | 0.217 | 748 | 6" PVC |
| 6x12 / 12x6 | 0.23 | 0.26 | 897 | 6" PVC |
| 7x13 / 13x7 | 0.29 | 0.329 | 1,135 | 6" PVC |

Notes:

- Boxes are standard depth from rim to outlet: 3.54' for Standard Offline, 4.0' for Internal Bypass Curb. Contact Contech for information on Internal Bypass - Pipe systems.
- A standard PVC pipe coupling is cast into the wall for easy connection to discharge piping
- Dimensions shown are internal.
- Contact Contech for site specific sizing or other box size options.