COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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Secretary of Natural Resources

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Director

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July 3, 2014

Mr. Chris French
Stormwater Regulatory Manager
11352 Virginia Precast Road
Ashland, Virginia 23005

Re: Assignment of Percent Removal Efficiencies for Total Phosphorus

Dear Mr. French,

Thank you for your submittal of the Manufactured Treatment Device (MTD) Registration Form and supporting documentation for the Filterra® Bioretention Systems. The MTD information provided (Appendix A) was reviewed for the purpose of assigning a pollutant removal efficiency for total phosphorus. This review was performed in accordance with the Guidance Memo Number 14-2009 titled "Interim Use of Stormwater Manufactured Treatment Devices (MTDs) to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria, Part IIB Water Quality Design Requirements". The review process included the analysis of the documents submitted and any other publically available reports.

The documents submitted provided descriptive information about the Filterra® Bioretention Systems, the maintenance plans, and performance studies. The data provided within the contents of the submitted performance study included drainage area size and land cover, storm event and runoff parameters, event mean concentrations (EMC) of selected nutrients, metals, and sediment, and performance results. The performance data received was analyzed by calculating the removal efficiencies for each storm event sampled for TP and then computing the mean of the removal efficiencies for that study period. This method of analysis was applied to all data received in order to achieve a consistent analytical process to aid in the assigning of removal efficiencies. A summary of the results is provided in Appendix B. The removal efficiency is based on the analysis of publically available documentation and no proprietary information was used to determine the removal efficiency.

Consistent with Guidance Memo Number 14-2009, Filterra® Bioretention Systems, a Division of Americast, Inc. is receiving an EMC percent TP removal efficiency of 50%. As stated in the guidance memo, this information will be posted on the Virginia Stormwater Clearinghouse website. This MTD and the assigned removal efficiency can be manually added into Virginia Runoff Reduction spreadsheet to demonstrate compliance with the Runoff Reduction Method.

In response to your request to deviate from the removal efficiencies contained in the Guidance Memo number 14-2009, the Department reviewed research on the performance reliability of MTDs as well as the removal efficiencies that other states are assigning to MTDs. Based upon this information DEQ determined it is not appropriate to approve TP removal efficiencies greater than contained in the guidance. Scientific research on MTDs is considered fairly recent when compared to the abundance of data and length of time that non-proprietary BMPs have been studied. Even with the wealth of data on non-proprietary BMPs, the assigned removal efficiency for any given non-proprietary BMP is variable and problematic. Research on MTDs is subject to the same problems of testing and performance reliability as non-proprietary BMPs except to a greater extent, because the extensive research has not occurred. DEQ believes that capping the percent removal efficiency in accordance with the guidance until final procedures are developed will prevent an over estimation of MTD performance.

If you have any questions regarding this information, please contact Robert E. Cooper, P.E. at (804) 698-4033 or e-mail at Robert.Cooper@deq.virginia.gov.

Sincerely;

Fred K. Cunningham
Director
Office of Water Permits

Appendix A-Documents

1) Manufactured Treatment Device (MTD) Registration
2) Letter to DEQ regarding Filterra MTD
3) Technical Evaluation Report-Filterra System Phosphorus Treatment and Supplemental Basic Treatment Monitoring (not in its entirety)
4) Field Evaluation of the Filterra® Stormwater Bioretention Filtration System –May 24, 2006
5) Additional Field Testing and Statistical Analysis of the Filterra® Stormwater Bioretention Filtration System-March 28, 2007
6) Field Testing and Statistical Analysis of the Filterra® Stormwater Bioretention Filtration System-Executive Summary
7) Filterra® Field Flow Rate Evaluation Report-November 6, 2008
8) Technical Evaluation Report-Filterra System Phosphorus Treatment and Supplemental Basic Treatment Monitoring-Appendix K (Individual Storm Reports for Sampled Storm Events.
9) NJCAT Technology Verification- Filterra® Bioretention System, Americast INC. – March 2014 (Link provided in e-mail)
10) Table 1: Filterra® Quick Sizing Table (Virginia)
11) Letter-Terraflume Hydraulic Test, Filterra® Bioretention System, Ashland, Virginia April 2, 2013
12) Letter-Hydraulic Testing of RD-45V 10 inch Filterra® Roof Drain System
13) Letter-Hydraulic Testing of RD-90-GNBP-1 Filterra® Roof Drain System
14) Precast Filterra® with Sedimentation Chamber Detail
15) Filterra Boxless® Typical Detail
16) 8X4 Precast Filterra® Internal Bypass-Pipe with 6" PVC Piped In Detail
17) 8X4 Precast Filterra® Internal Bypass-Pipe with 8" PVC Piped In Detail
18) 8X6 Precast Filterra® Internal Bypass-Pipe with 10" PVC Piped In Detail
19) Filterra Internal Bypass Curb with Terraflume Junction Chamber Model Detail
20) Precast Filterra Internal Bypass-Curb with Terraflume Detail
21) Individual Storm Report form Appendix K (item 8) Updated

Appendix B-Study Results

Data from Technical Evaluation Report- Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Monitoring

Storm Date	Influent EMC (mg/l)	Effluent EMC (mg/l)	*Discrete Removal Efficiency (%)
1/8/2013	0.084	0.034	60
1/23/2013	0.047	0.035	26
1/24/2013	0.039	0.028	28
1/26/2013	0.031	0.022	29
1/28/2013	0.329	0.06	82
1/29/2013	0.169	0.02	88
2/22/2013	0.105	0.057	46
2/24/2013	0.126	0.04	68
2/28/2013	0.088	0.029	67
3/6/2013	0.041	0.023	44
3/12/2013	0.09	0.025	72
3/14/2013	0.146	0.025	83
3/16/2013	0.061	0.025	59
3/19/2013	0.127	0.032	75
4/5/2013	0.175	0.051	71
4/5/2013	0.524	0.05	90
4/10/2013	0.044	0.034	23
5/11/2013	0.293	0.09	69
5/21/2013	0.069	0.032	54
5/22/2013	0.239	0.033	86
6/12/2013	0.084	0.056	33
6/19/2013	0.062	0.048	23
4/7/2010	0.105	0.042	60
4/27/2010	0.126	0.06	52
		Mean	58

*Efficiency = 100 x (1-Effuent EMC/Influent EMC)

Data from Additional Field Testing and Statistical Analysis of the Filterra® Stormwater Bioretention Filtration System-March 28, 2007

Storm Date	Influent EMC (mg/l)	Effluent EMC (mg/l)	*Discrete Removal Efficiency (%)
11/12/2004	0.75	0.076	90
3/27/2005	0.086	0.082	5
4/3/2005	0.22	0.16	27
5/19/2005	0.043	0.031	28
5/24/2005	0.2	0.063	69
6/13/2005	0.13	0.066	49
6/29/2005	0.35	0.22	37
7/13/2005	0.16	0.11	31
11/16/2005	0.085	0.056	34
11/29/2005	0.75	0.076	90
10/22/2005	0.082	0.063	23
10/25/2005	0.15	0.1	33
11/16/2005	0.096	0.062	35
11/29/2005	0.097	0.1	-3
12/6/2006	0.76	0.17	78
12/12/2006	0.46	0.1	78
12/13/2006	0.55	0.17	69
1/9/2007	0.48	0.11	77
1/11/2007	1.97	0.17	91
1/12/2007	0.4	0.14	65
		Mean	50

*Efficiency = 100 x (1-Effuent EMC/Influent EMC)