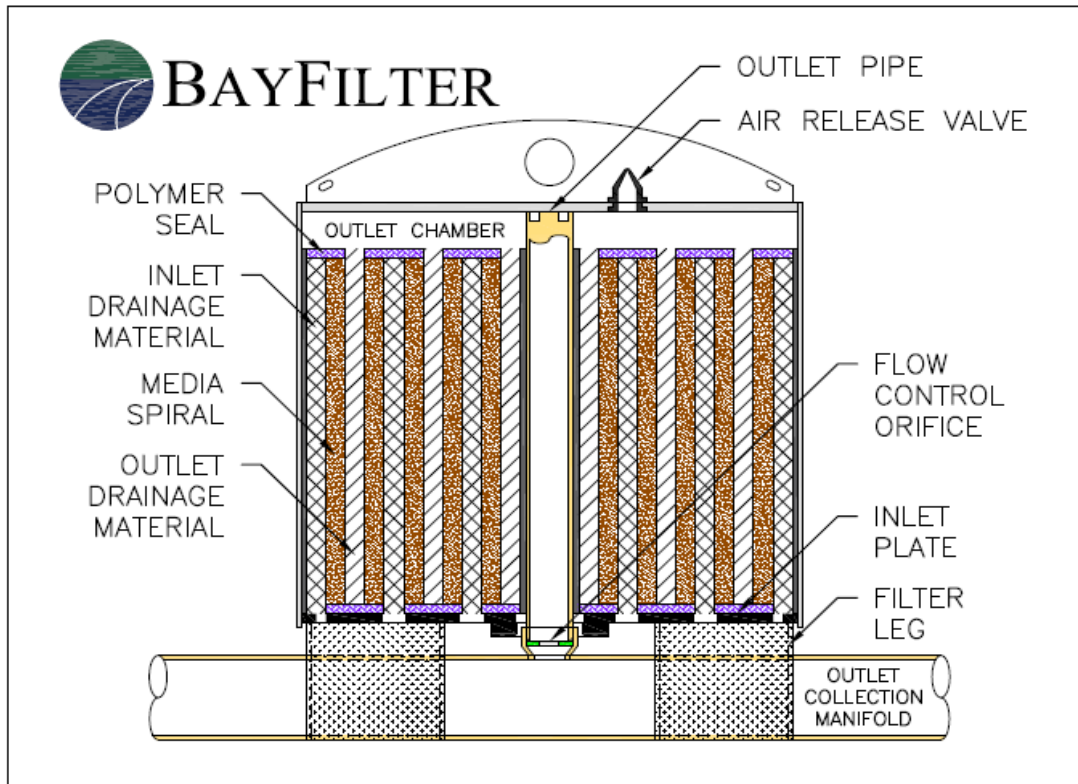


Manufactured Treatment Device (MTD) Registration

1. Manufactured Treatment Device Name: *BayFilter™ Stormwater Cartridge System*



2. Company Name: *Baysaver Technologies, LLC*

Mailing Address: *1030 Deer Hollow Drive*

City: *Mount Airy*

State: MD Zip: *21771*

3. Contact Name (to whom questions should be addressed): *Brian Rustia*

Mailing Address: *5941 Innisvale Drive*

City: *Fairfax Station*

State: VA Zip: *22039*

Phone number: *866-405-9292*

Fax number: *866-397-2505*

E-mail address: *brian.rustia@ads-pipe.com*

Web address: *www.baysaver.com*

4. Technology

Specific size/capacity of MTD assessed (include units): *Bayfilter system is sized by cubic feet per second (cfs) or gallons per minute per square foot (gpm/sq ft) of filter area media. Baysaver has various filter cartridge size configurations (i.e., vertical heights)*

and flow rates (i.e., gallons per minute – gpm) and is sized depending on the application. We recommend a maximum loading rate of 0.5 gpm/sq ft for our current filtering devices.

Range of drainage areas served by MTD (acres): *Non-Applicable (N/A), Bayfilter cartridge system is a modular and scalable system sized to treatment cfs entering the treatment vault/manhole.*

Include sizing chart or describe sizing criteria: *See above, 0.5 gpm/sq ft of filter media area is our recommendation for this submittal.*

Intended application: on-line or offline: *Both, special consideration should be taken for in-line applications with little to no pretreatment and/or upstream detention components. Most filtering devices recommend some level of pretreatment to protect premature fouling of the filtering media by such things as high sediment loads, debris, and hydrocarbons.*

Media used (if applicable): *Bayfilter cartridges contain a blend of zeolite, perlite, activated alumina, and in some cases silca sand depending on the stormwater pollutants targeted for removal.*

5. Warranty Information (describe, or provide web address):

All Products manufactured by BaySaver Technologies are warranted for a period of one (1) year to be free of any material and manufacturing defects. This applies only to Separators and Filter Cartridges manufactured by BaySaver Technologies and does not include Precast Concrete Components or other Components not manufactured by BaySaver Technologies. This warranty is limited to providing a replacement unit (the same or equivalent) and does not include any installation or other costs associated with its replacement. This warranty does not extend to product defects or system failures due to improper installation, lack of maintenance, or improper system design.

6. Treatment Type

- Hydrodynamic Structure
- Filtering Structure*
- Manufactured Bioretention System
Provide Infiltration Rate (in/hr):
- Other (describe):

7. Water Quality Treatment Mechanisms (check all that apply)

- Sedimentation/settling*
- Infiltration
- Filtration (specify filter media)*
- Adsorption/cation exchange*
- Chelating/precipitation
- Chemical treatment
- Biological uptake

Other (describe):

8. Performance Testing and Certification (check all that apply):

Performance Claim (include removal efficiencies for treated pollutants, flow criteria, drainage area): *80 % TSS, > 50% TP removal at 0.5 gpm/ sq ft of filtering media. Note: The test data submitted exceeds these values.*

Specific size/Capacity of MTD assessed: *0.5 gpm/sq ft of filtering media*

Has the MTD been "approved" by an established granting agency, e.g. New Jersey Department of Environmental Protection (NJDEP) , Washington State Department of Ecology, etc.

No

Yes; For each approval, indicate (1) the granting agency, (2) use level if awarded (3) the protocol version under which performance testing occurred (if applicable), and (4) the date of award, and attach award letter.

<http://www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html>

Table of Bayfilter Major National Approvals

<i>Agency</i>	<i>Level of award</i>	<i>Protocol Used</i>	<i>Date of Award</i>	<i>Award letter</i>
<i>Maryland Dept. of Environment</i>	<i>Stand Alone Water Quality Use</i>	<i>TARP Protocol, Approved for TP and TSS</i>	<i>January 2008</i>	<i>See attachment</i>
<i>NJCAT/DEP</i>	<i>Interim Certification</i>	<i>TARP-TSS</i>	<i>July 2008</i>	<i>See attachment</i>
<i>WDOE</i>	<i>General Use</i>	<i>TAPE Protocol- TSS Basic Treatment</i>	<i>August 2011</i>	<i>See WDOE website at: www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html</i>
<i>WDOE</i>	<i>Conditional Use</i>	<i>TAPE Protocol- Enhanced and TP</i>	<i>December 2014</i>	<i>See WDOE website at: www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html</i>
<i>WDOE</i>	<i>General Use</i>	<i>TAPE Protocol -TP</i>	<i>Pending ^{*1} (Summary Data and Report provided)</i>	<i>Pending, Report submitted July 2014</i>

**1 Tape Testing at initial site did not have sufficient Phosphorus load for enough qualifying events (Influent TP between 0.1 mg/l and 0.5 mg/l). Testing was moved to another site which provided enough qualifying events. This testing yielded TP removal rates of over 75%.*

Was an established testing protocol followed? Yes

No

Yes, (1) Provide name of testing protocol followed- *TARP and TAPE where applicable*
(2) List any protocol deviations: *None*

Provide the information below and provide a performance report (attach report):

See Attached, Richard Montgomery High School (RMHS) Report.

See Attached, WDOE Interim TER Report

For lab tests: *N/A, RMHS report and WDOE study were field tests.*

- i. Summarize the specific settings for each test run (flow rates, run times, loading rates) and performance for each run:
- ii. If a synthetic sediment product was used, include information about the particle size distribution of the test material:
- iii. If less than full-scale setup was tested, describe the ratio of that tested to the full-scale MTD:

For field tests:

- i. Provide the address, average annual rainfall and characterized rainfall pattern, and the average annual number of storms for the field-test location: *RMHS Testing: 250 Richard Montgomery Dr., Rockville MD 20852. Rainfall depths of the first 20 monitored storm events ranged from 0.24 to 3.04 inches, the site is representative of rainfall patterns seen in Virginia. WDOE Testing: Two Sites: Grandview Place Apartments, 19420 Southeast 20th Street in Vancouver, Washington. Rainfall depths of the qualifying events ranged from 0.20 to 0.39 inches. The Woodinville Sammamish test site is located at/near the intersection of 175th Street and 131st Ave NE. in Woodinville, Washington. Rainfall depths of the ten qualifying events at Woodinville ranged from 0.20 to 0.94 inches.*
- ii. Provide the total contributing drainage area for the test site, percent of impervious area in the drainage area, and percentages of land uses within the drainage area (acres): *RMHS site: 3.62 acres, 83% is impervious, and 17% is vegetated. 100% of the area is classified as urban, commercial-institutional use. Grandview site: 9.9 acres, but only 1.35 acres of this site drains into the Bayfilter vault and the area is classified as urban, commercial-institutional use. For the Woodinville site: the total site is 52 acres and it all drains into the Bayfilter vault, the acreage is 49 acres is impervious, and 3 acres are considered vegetated. The site is considered urban, commercial-institutional use.*
- iii. Describe pretreatment, bypass conditions, or other special circumstances at the test site: *For RMHS: A Bayseparator unit was used for pretreatment, sampling equipment was located around the Bayfilter to evaluate the performance of the filter independently. The system was designed to treat the Water Quality volume and bypass larger events around the Bayfilter system. For Grandview: no device*

was used for pretreatment, sampling equipment was located around the Bayfilter to evaluate the performance of the filter independently. The system was designed to treat the Water Quality volume and bypass larger events around the Bayfilter system. For Woodinville: A 5K Bayseparator unit was used for pretreatment, sampling equipment was located around the Bayfilter to evaluate the performance of the filter independently. The system was designed to treat the Water Quality volume and bypass larger events around the Bayfilter system.

- iv. Provide the number of storms monitored and describe the monitored storm events (amount of precipitation, duration, etc.): *For RMHS: 20 storm events qualified, See Table 6-1 on page 20 of the report for more detailed precipitation/duration data. For Grandview 8 storm events qualified, and for Woodinville 10 storm events qualified, see the TER report for more detailed information on precipitation and duration.*
- v. Describe whether or not monitoring examined seasonal variation in MTD performance: *No seasonal variation observed for either testing location (MD or WA).*
- vi. If particle size distribution was determined for monitored runoff and/or sediment collected by the MTD, provide this information: *For RMHS: PSD was conducted four times during the study, See Discussion on Page 29 and 30 along with information on Figure 6-1 and Table 6-10. For Grandview and Woodinville, PSD information is detailed in Tables 27 and 28 of the report.*

9. MTD History:

How long has this specific model/design been on the market? *8 years (2006)*

List no more than three locations where the assessed model size(s) has/have been installed in Virginia. If applicable, provide permitting authority. If known, provide latitude & longitude:

- *Potomac Yard, Alexandria, VA- City of Alexandria;*
- *Fordson Place, Alexandria- Fairfax County;*
- *Fort Lee Army Base, Hanover, VA- Prince George County*

List no more than three locations where the assessed model size(s) has/have been installed outside of Virginia. If applicable, provide permitting authority. If known, provide latitude & longitude:

- *Harmony Place, Bowie Maryland, Prince Georges' County;*
- *Paint Branch High School, Burtonsville, Maryland, Montgomery County;*
- *Woodinville, Washington State DOE.*

10. Maintenance:

What is the generic inspection and maintenance plan/procedure? (attach necessary documents): *Immediately after installation and construction closeout, followed by 6 months after initial installation, and then followed by annual inspections. See attachment.*

Is there a maintenance track record/history that can be documented?

No, no track record.

Yes, track record exists; (provide maintenance track record, location, and sizing of three to five MTDs installed in Virginia [preferred] or elsewhere):

- *Archstone 12, Rockville, Maryland; Last Maintained: May, 2013, System Installed October, 2008*
- *Richard Montgomery High School, Montgomery County, Maryland; Last Maintained June 2013; System Installed December 2008.*
- *Trinity Church, William Street, Fredericksburg, VA; Last Maintained April 2010, Mini Filter Drain Down Modules changed out (not filters), System Installed June 2009*

Recognizing that maintenance is an integral function of the MTD, provide the following: amount of runoff treated, the water quality of the runoff, and what is the expected maintenance frequency for this MTD in Virginia, per year?

Maintenance on the Bayfilter cartridge is site dependent, as different sites produce different pollutant volumes and types. A recent evaluation by AAA Stormwater Management Facilities Repair Group has produced an estimate of an average of 4 to 5 year life. BaySaver recommends assuming an average maintenance interval of between 3-5 years from a moderate to light anticipated pollutant load respectively.

Total life expectancy of MTD when properly operated in Virginia and, if relevant, life expectancy of media:

One hundred plus (100+) years, or the life of the concrete structure. BayFilter systems are always restored to an "as new" condition when fully maintained and cartridges are replaced. The cartridges are exchanged and the vault fully cleaned at each maintenance, this is important because many filtration practices collect pollutants deep in the media, but do not change the entire media layer at maintenance, unless this "less than as new" maintenance procedure is tested there can be no assurance that the device continues to operate at design efficiencies after this type of maintenance.

For media or amendments functioning based on cation exchange or adsorption, how long will the media last before breakthrough (indicator capacity is nearly reached) occurs?

This is non-applicable for Bayfilter cartridges, no breakthrough can occur, and the system is maintained to "as new" condition with each maintenance operation. The

BayFilter cartridges will stop flowing / filtering when total maintenance has been disregarded and effluent flow rate falls off rapidly. This prevents release of pollutants due to pipe-lining or media breakthrough, and provides a clear indicator that the cartridges must be exchanged.

For media or amendments functioning based on cation exchange or adsorption, how has the longevity of the media or amendments been quantified prior to breakthrough (attach necessary performance data or documents)?

As the BayFilter matures, the efficiency increases slightly, which is a clear indicator that breakthrough does not occur. Other than testing over a one year period, there has been no longer term testing of the BayFilters TP removal, ionic exchange capacity. Considering that the TP removal data increases over time (longer use) there is no indication that the ionic capacity is a limiting factor. Extreme loads of dissolved TP, that would not be expected in stormwater may cause the media to reach ionic saturation, however since this level of loads are extraordinary and unexpected in normal conditions no further ionic capacity testing has been performed.

Is the maintenance procedure and/or are materials/components proprietary?

Yes, proprietary

No, not proprietary, filters can be changed by anyone

Maintenance complexity (check all that apply):

Confined space training may be required for maintenance of some systems

Liquid pumping and transportation

Specify method: *Standard Vector Truck*

Solids removal and disposal

Specify method: *Conventional Landfill*

Other noteworthy maintenance parameter (describe):

11. Comments

Include any additional explanations or comments:

The Bayfilter technology has been submitted nationally for use as an advanced stormwater device. New Jersey, Washington, and Maryland are the major states we have sought approval for use. Currently, we are in the final stage of achieving our General Use Level Designation (GULD) Phosphorus, Enhanced (Metals), and O&G for the Bayfilter in Washington State using the TAPE protocol. We have included the final report of the Phosphorus Data for this Virginia submittal.

We have not met the TARP threshold of enough qualifying storms with sufficient Dissolved Copper loads to meet the WDOE Enhanced treatment levels (Dissolved Zinc has been met). With the Pacific Northwest is now in its "Dry Season" and more qualifying storms are unlikely until late September 2014. BaySaver has submitted to Washington State Department of Ecology (WDOE) the Technical Evaluation Report (TER) for a GULD approval for TP as well as Oils and Grease as the TAPE Testing exceeds those performance thresholds.

If Virginia is going to accept TP data from any source other than WDOE, we believe that this report should be considered as evidence that the BayFilter exceeds the requirements for obtaining the interim 50% TP removal rating.

12. Certification

Signed by the company president or responsible officer of the organization:

“I certify that all information submitted is to the best of my knowledge and belief true, accurate, and complete.”

Signature: 

Name: Brian Rustia

Title: Eastern Division Manager

Date: July 10, 2014

NOTE: All information submitted to the department will be made publically accessible to all interested parties. This MTD registration form will be posted on the Virginia Stormwater BMP Clearinghouse website.