April 2017

GENERAL USE LEVEL DESIGNATION FOR BASIC TREATMENT

For

BaySaver Technologies, LLC BayFilter™ System using BayFilter Cartridge (BFC)

Ecology’s Decision:

1. Based on BaySaver Technologies’ application submissions, Ecology hereby issues a Basic Treatment General Use Level Designation (GULD) for the BayFilter™.

   • As a stormwater treatment device for Basic treatment (TSS) removal.
   • The Basic Treatment GULD is for the BayFilter Cartridge (BFC) and is limited to the following maximum flow rate:
     a. BFC Cartridge maximum flow rate of 0.70 gpm/sq ft
        o 30 gpm (0.067 cfs) per cartridge (example dimensions: 28-inches in diameter, 29-inches tall (43 sq ft filter area))
           ▪ Canisters that provide 0.70 gpm per sq ft filter area, regardless of dimensions meet this requirement
        o Media Blend of Silica Sand, Perlite, and Activated Alumina

2. Ecology approves use of BayFilter™ Cartridges for treatment at the above flow rate per cartridge. Designers shall calculate the water quality design flow rates using the following procedures:

   • Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.

   • Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.

   • Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.
3. The GULD has no expiration date, but it may be amended or revoked by Ecology, and is subject to the conditions specified below.

Ecology’s Conditions of Use:

BayFilter™ units shall comply with these conditions:

1. Design, assemble, install, operate, and maintain BayFilter™ units in accordance with BaySaver Technologies’ applicable manuals and documents and the Ecology Decision.

2. Maintenance: The required inspection/maintenance interval for stormwater treatment devices is often dependent upon the efficiency of the device and the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a “one size fits all” maintenance cycle for a particular model/size of manufactured filter treatment device.

   - BaySaver recommends that the following be considered during the design application of the BayFilter Cartridge systems:
     - Water Quality Flow Rate
     - Anticipated Pollutant Load
     - Maintenance Frequency

   - A BayFilter System tested adjacent to construction activity required maintenance after 4-months of operation. Monitoring personnel observed construction washout in the device during the testing period; the construction activity may have resulted in a shorter maintenance interval.

   - Ecology has found that pre-treatment device prior to the BayFilter system can provide a reduction in pollutant loads on these systems, thereby extending the maintenance interval.

   - Test results provided to Ecology from other BayFilter Systems, including the above mentioned system that was evaluated again after construction activities had been completed, have indicated the BayFilter System typically has longer maintenance intervals, sometimes exceeding 12-months.

   - The BayFilter system contains filter fabric that is highly oleophilic (oil absorptive). When sufficient quantities of oils are present in the runoff, the oil and subsequent sediment particles may become attached to the fabric. As a result, it may compromise the maintenance interval of the BayFilter system. Oil control BMP’s should be installed upstream of BayFilter installations if warranted, and/or the BayFilter system should be inspected after any known oil spill or release.

   - Owners/operators must inspect BayFilter systems for a minimum of twelve months from the start of post-construction operation to determine site-specific inspection/maintenance schedules and requirements. Owners/operators must
conducted inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30.) After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections or the manufacturer’s anticipated maintenance interval, whichever is more frequent.

- Conduct inspections by qualified personnel, follow manufacturer’s guidelines, and must use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.

3. When inspections are performed, the following findings typically serve as maintenance triggers:

- Accumulated vault sediment depths exceed an average of 2 inches, or
- Accumulated sediment depths on the tops of the cartridges exceed an average of 0.5 inches, or
- Standing water remains in the vault between rain events.
- Bypass during storms smaller than the design storm.
- Note: If excessive floatables (trash and debris) are present, perform minor maintenance consisting of gross solids removal, not cartridge replacement.

4. Discharges from the BayFilter™ units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Advanced Drainage Systems - BaySaver
Applicant’s Address: 4640 Trueman Blvd
Hilliard, Ohio 43065

Application Documents:

- *Evaluation of MASWRC Sample Collection, Sample Analysis, and Data Analysis, December 27, 2008*
- NJCAT letter to BaySaver Technologies dated June 18, 2009 regarding Interim Certification.

**Applicant’s Use Level Request:**

- General use level designation as a basic treatment device in accordance with Ecology’s Stormwater Management Manual for Western Washington.

**Applicant’s Performance Claims:**

- Removes and retains 80% of TSS based on laboratory testing using Sil-Co-Sil 106 as a laboratory stimulant.
- Removes 42% of dissolved Copper and 38% of dissolved Zinc.
- Expected to remove 50% of the influent phosphorus load.

**Ecology’s Recommendations:**

- BaySaver Technologies, Inc. has shown Ecology, through laboratory and field testing, that the BayFilter™ System using BayFilter Cartridge (BFC) is capable of attaining Ecology’s Basic Treatment goals.

**Findings of Fact:**

- Based on field testing in Vancouver, WA, at a flow rate less than or equal to 30 gpm per canister, the BayFilter™ system demonstrated a total suspended solids removal efficiency of greater than 80% for influent concentrations between 100 and 200 mg/l and an effluent concentration < 20 mg/l for influent concentration < 100 mg/l.
- Based on laboratory testing, at a flowrate of 30 GPM per filter, the BayFilter™ system demonstrated a total suspended solids removal efficiency of 81.5% using Sil-Co-Sil 106 with an average influent concentration of 268 mg/L and zero initial sediment loading.
- Based on laboratory testing, at a flowrate of 30 GPM per filter, the BayFilter™ system demonstrated a dissolved phosphorus removal efficiency of 55% using data from the Richard Montgomery High School field-testing. The average influent concentration was 0.31 mg/L phosphorus and zero initial sediment loading.
• Based on data from field-testing at Richard Montgomery High School in Rockville, MD the BayFilter system demonstrated a Cu removal efficiency of 51% and 41% for total and dissolved Cu respectively. Average influent concentrations are 41.6 µg/l total and 17.5 µg/l dissolved.

• Based on data from field-testing at Richard Montgomery High School in Rockville, MD the BayFilter system demonstrated a Zn removal efficiency of 45% and 38% for total and dissolved Cu, respectively. Average influent concentrations are 354 µg/l total and 251 µg/l dissolved, respectively.

Other BayFilter™ Related Issues to be Addressed By the Company:

1. BaySaver should continue monitoring the system for a longer period to help establish a maintenance period and to obtain data from additional qualified storms. Conduct testing to obtain information about maintenance requirements in order to come up with a maintenance cycle.

2. Conduct loading tests on the filter to determine maximum treatment life of the system.

3. Conduct testing to determine if oils and grease affect the treatment ability of the filter. This should include a determination of how oil and grease may affect the ion-exchange capacity of the system if BaySaver wishes to make claims for phosphorus removal.

4. BaySaver should develop easy-to-implement methods of determining when a BayFilter system requires maintenance (cleaning and filter replacement).

5. BaySaver must update their O&M documents to include information and instructions on the “24-hour draw-down” method to determine if cartridges need replacing.
Technology Description: Download at www.BaySaver.com

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Revision History

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<tr>
<th>Date</th>
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<tbody>
<tr>
<td>April 2008</td>
<td>Original use-level-designation document</td>
</tr>
<tr>
<td>February 2010</td>
<td>Revision</td>
</tr>
<tr>
<td>August 2011</td>
<td>GULD awarded for Basic Treatment</td>
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<tr>
<td>April 2012</td>
<td>Maintenance requirements updated.</td>
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<tr>
<td>August 2012</td>
<td>Revised design storm criteria</td>
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<tr>
<td>December 2012</td>
<td>Revised contact information and document formatting</td>
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<tr>
<td>December 2013</td>
<td>Revised expiration and submittal dates</td>
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<tr>
<td>December 2014</td>
<td>Revised Inspection/maintenance discussion, Updated cartridge descriptions</td>
</tr>
<tr>
<td>January 2015</td>
<td>Revised discussion for flow rate controls</td>
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<tr>
<td>December 2015</td>
<td>Revised Expiration date</td>
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<tr>
<td>January 2016</td>
<td>Revised Manufacturer Contact Information and expiration date</td>
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<tr>
<td>January 2017</td>
<td>Revised Expiration, QAPP and TER due dates</td>
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<tr>
<td>April 2017</td>
<td>Updated to create separate ULDs for the BayFilter™ using BayFilter Cartridge (BFC) and the BayFilter™ using Enhanced Media Cartridge (EMC)</td>
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