

# ATTACHMENT 1

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## Manufactured Treatment Device (MTD) Registration

### 1. Manufactured Treatment Device Name:

FocalPoint High Performance Modular Biofiltration System (HPMBS)

### 2. Company Name: Convergent Water Technologies, Inc.

Mailing Address: 1930 Aldine Western Road

City: Houston

State: Texas Zip: 77038

### 3. Contact Name (to whom questions should be addressed): Corey Simonpietri

Mailing Address: 2831 Cardwell Road

City: Richmond

State: VA Zip: 23234

Phone number: 804-400-9490

Fax number: 804-743-7779

E-mail address: [corey@acfenv.com](mailto:corey@acfenv.com)

Web address: [www.acfenvironmental.com](http://www.acfenvironmental.com)

### 4. Technology

Specific size/capacity of MTD assessed (include units):

Ratio of filter bed area to impervious drainage area of 0.4%

Range of drainage areas served by MTD (acres):

The system is a low impact development\environmental site design practice and as such promotes decentralized treatment (i.e., treating closer to the source). It can also be deployed as an end of pipe solution with the appropriate pretreatment and energy dissipation controls. The system is scalable to drainage areas ranging from 0-5 acres and can be expanded to larger areas as demonstrated by our DOT roadway projects in Missouri and Texas.

Include sizing chart or describe sizing criteria:

*Sizing requirements:* Consistent with the Virginia Stormwater Management Regulations, the system is sized to capture and treat the first flush of runoff or water quality volume (WQV), that is generally defined as the first 1" of runoff from impervious surface. The FocalPoint HPMBS field based assessment, monitored to Technology Acceptance Protocol – Ecology (TAPE), was sized to treat a 1" runoff volume (WQV) prior to bypass and results in a ratio of 0.40% (44 sq. ft of filter bed area to 10,890 sq. ft. of impervious drainage area) and a ponding volume above the practice equal to 20% of the WQV. The ponding volume is a function of several variables and may be decreased or increased depending on the filter bed area.

*Necessary soil characteristics:* There are typically no requirements for the native soils surrounding the system and we use a non-woven geotextile separation layer and underdrain. If the system is designed to exfiltrate\infiltrate into native soils, appropriate design consideration is given with respect to infiltration bed sizing. The FocalPoint HPMBS underdrain promotes infiltration because it can be easily expanded horizontally and vertically.

*Pretreatment:* Pretreatment of runoff entering a FocalPoint HPMBS is recommended to trap coarse sediment particles before they reach and prematurely close the filter bed. Pretreatment measures must be designed to dissipate velocities and spread water out over a 2 to 4 ft width. Many pretreatment options are available and include manufactured systems like the RainGuardian or non-propriety systems like stone aprons\diaphragms, grass filter stripes and level lip spreaders.

*Hydraulic grade line requirements:* All low impact development or environmental site design practices such as FocalPoint HPMBS are constrained by the invert elevation of the existing conveyance system to which the system discharges (i.e., the bottom elevation needed to tie the underdrain from the FocalPoint HPMBS into the stormdrain system. In general, 3.5 ft of elevation above this invert is needed to accommodate the required ponding and filter system depths. If the system does not include an underdrain or if an inverted or elevated underdrain design is used, less hydraulic head may be required.

*Ponding depth:* The recommended surface ponding depth is 6 to 24 inches and is ideal for streetscape, mostly permeably tree boxes and stormwater planters. Minimum and maximum surface ponding depths are 3 inches and 36 inches, respectively. When greater ponding depths are utilized the design must consider safety issues; for example, fencing requirements, aesthetics, viability and survival of plants and erosion and scour of side slopes. It should be noted these same considerations are typical of traditional low flow bioretention practices.

*Side Slopes:* Typically 3:1 or flatter. In highly urbanized or space constrained areas, a drop curb design or precast panel wall structure can be used to create a stable, vertical side wall. These drop curb designs should not exceed a vertical drop of more than 12 inches, unless safety precautions such as railing, walls, grating, etc. are included.

*Depth to groundwater:* The system should be separated from the water table to ensure that groundwater does not inundate the filter bed. A separation distance of 2 feet is recommended between bottom of excavated FocalPoint HPMBS area and the seasonally high ground water table.

*Utility requirements:* The system is typically drained to a conventional closed pipe drainage system or can be piped directly to a conveyance channel or drainage course.

*Applications:* The manufacturer of FocalPoint HPMBS recommends the technology for the following land uses: Roadways, high-use sites, commercial, industrial, and residential runoff areas.

Intended application: on-line or offline:

Can be designed for both on-line and off-line systems

Media used (if applicable):

FocalPoint HPMBs uses high flow rate biofiltration media as developed by Convergent Water Technologies, Inc. The advanced high flow rate engineered media utilizes physical, chemical and biological mechanisms of the soil, plant and microbe complex to remove pollutants found in stormwater runoff. Infiltration rates at 100 inches per hour overcome the challenges of clogging and flooding while minimizing space requirements.

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

The system is warranted for 1-year provided its installed and activated to specification. All FocalPoint Systems are protected in-place by a 'cap & seal' system (see Installation Guide) until the project site is stabilized. At this time the FocalPoint System is activated and a Hydraulic Conductivity Test is administered (see FocalPoint HPMBs Specification of O&M Guide). This pass/fail test demonstrates that the system is performing properly. If the system does not pass this test, it is to be removed, replaced, and re-tested. This process is documented in the FocalPoint Specification (Section 3 C.4 on page 3). Further, all systems are maintained by the vendor for the first year to ensure that plants are properly established. Long-term maintenance agreements are available.

**6. Treatment Type**

- Hydrodynamic Structure
- Filtering Structure
- Manufactured Bioretention System  
Provide Infiltration Rate (in/hr): 100 in/hour
- 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):

- 1) Total Suspended Solids (TSS) removal of 86% as defined as the change in average event mean concentration (EMC) between the influent runoff and effluent runoff. TSS influent EMCs ranges from 4.9 to 238 mg/L from the field test site. Average hydraulic operating conditions for each storm event ranged from 7 to 157% of design capacity.
- 2) Total Suspended Solids (TSS) mass load removal of 88% as defined as the change in

- average event mean mass load between the influent runoff and effluent runoff.
- 3) Average 30% runoff volume reduction, defined as the change in influent volume and effluent volume.
  - 4) Total Phosphorus (TP) average event mean concentration and mass load reductions were 52% and 59%, respectively. The TP event mean concentration of the influent ranged from 0.121 mg/L to 0.424 mg/L.

Specific size/Capacity of MTD assessed:

The FocalPoint HPMBs field based assessment, monitored to Technology Acceptance Protocol – Ecology (TAPE), was sized to treat a 1” runoff volume (WQV) prior to bypass and results in a ratio of 0.40% (44 sq. ft of filter bed area to 10,890 sq. ft. of impervious drainage area) and a ponding volume above the practice equal to 20% of the WQV.

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.

Was an established testing protocol followed?

**No**

**Yes,** (1) Provide name of testing protocol followed, (2) list any protocol deviations:

Field: Quality Assurance Project Plan based on Technology Acceptance Protocol – Ecology (TAPE) for field evaluation of FocalPoint HPMBs

Lab: Laboratory Protocol to Assess Total Suspended Solids Removal Efficiencies for the FocalPoint System (No Deviations Noted).

Provide the information below and provide a performance report:

Attachment 2 - Technology Evaluation Report of our TAPE Level Field Study

Attachment 3 - TSS Laboratory Removal Results Summary Report

For lab tests:

- i. Summarize the specific settings for each test run (flow rates, run times, loading rates) and performance for each run: Flow Rates –  
 Mean flow rate of 0.7 gpm/ft<sup>2</sup> of filter area  
 Mean run time per column replicate = 19 minutes  
 Solids mass loading of 4,500 mg per 10 liter column run
- ii. If a synthetic sediment product was used, include information about the particle size distribution of the test material:  
 Sil-Co-Sil 106 (Attachment 4)
- iii. If less than full-scale setup was tested, describe the ratio of that tested to the full-scale MTD:

3% of full-scale bioretention surface area per column test; full-scale setup for the FocalPoint profile (3 ft), including an 18" thick media layer in each column

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:

The FocalPoint HPMBBS field study was conducted at the parking lot of a warehouse facility owned by Civil & Environmental Consultants, Inc. (CEC) located on Campbells Run Road in Pittsburgh, PA.

The average annual rainfall in Pittsburgh is approximately 40 inches and the rainfall pattern is Type II according to the USDA-NRCS rainfall distributions for the United States. This correlated very well with Virginia.

- 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): 100% impervious area, 0.25 acres
- iii. Describe pretreatment, bypass conditions, or other special circumstances at the test site: In-line system, bypass consists of an overflow weir a few inches above the maximum ponding depth for the WQV.
- iv. Provide the number of storms monitored and describe the monitored storm events (amount of precipitation, duration, etc.): The system as installed in July of 2015 and has experienced 57 days with measurable precipitation. The total rainfall depth for the study period to date is 18.24 inches. Of the 57 wet weather events, there have been 12 qualified events as defined by TAPE. The amount of precipitation and duration of each qualifying event is provide in the TER.
- v. Describe whether or not monitoring examined seasonal variation in MTD performance: Yes, the monitoring period has extended through late summer, fall and early winter.
- vi. If particle size distribution was determined for monitored runoff and/or sediment collected by the MTD, provide this information: Yes, per TAPE protocol PSD shall be determined by Method ASTM D3977. We have run this method for two of the 12 events and determined the majority of material in the runoff are clays and silts (Method B) with the remainder being fine to coarse sand (below 250 microns).

**9. MTD History:**

How long has this specific model/design been on the market?

Three Years

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:

- 1) Reveille Church; Cary St @ Malvern; Richmond, VA
- 2) Settler’s Market; Settler’s Market Blvd in New Town; Williamsburg, VA
- 3) Auburn High School; 4163 Riner Rd; Riner, VA

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:

- 1) Bagby Street Reconstruction, Houston, TX (Greenroads Silver Certified)
- 2) Southeast Tennis and Learning Facility, Washington DC (DOEE approved)
- 3) Sligo Road Retrofit, Silver Spring, MD (Montgomery County approved)

**10. Maintenance:**

What is the generic inspection and maintenance plan/procedure? (attach necessary documents):

An Operation and Maintenance Plan is included as part of Attachment 2 – Technical Evaluation Report

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):

See Attachment 5 – Representative Maintenance Log

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?

- Runoff treated is probabilistic in nature. The FocalPoint HPMBs is sized to treat the WQV consistent with the VA Stormwater Management Handbook. The amount of water treated can be hydraulically modeled using an acceptable Hydrology & Hydraulic computer model like HydroCAD or the TR-55 based ACF-FocalPoint Sizing Calculator which was calibrated by way of our TAPE based field study
- The quality of the discharge will be consistent with effluent observed in our TAPE level field study.

- Inspections are required every 6 months, with maintenance typically necessary every 6 to 12 months.

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

FocalPoint HPMBs is a biofiltration/bioretention system. These living systems can last indefinitely unless they become contaminated or are neglected from an operation and maintenance standpoint. Contamination can come from things like chemical, fuels spill, or excessive erosion/sedimentation occurring from unstabilized areas.

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?

FocalPoint HPMBs are living systems. The media incorporates no specialized components or amendments which have a finite lifespan. It utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex, involving numerous unit processes including cation exchange and adsorption among others, to remove pollutants typically found in urban stormwater runoff. No "breakthrough" is expected as long as system and plants remain healthy.

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)?

FocalPoint HPMBs are living systems. The media incorporates no specialized components or amendments which have a finite lifespan. It utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex, involving numerous unit processes including cation exchange and adsorption among others, to remove pollutants typically found in urban stormwater runoff. No "breakthrough" is expected as long as the system and plants remain healthy.

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

- Yes, proprietary
- No, not proprietary

Maintenance complexity (check all that apply):

- Confined space training required for maintenance
- Liquid pumping and transportation

Specify method: NA

- Solids removal and disposal

Specify method: Typically hand-raked

Other noteworthy maintenance parameter (describe):

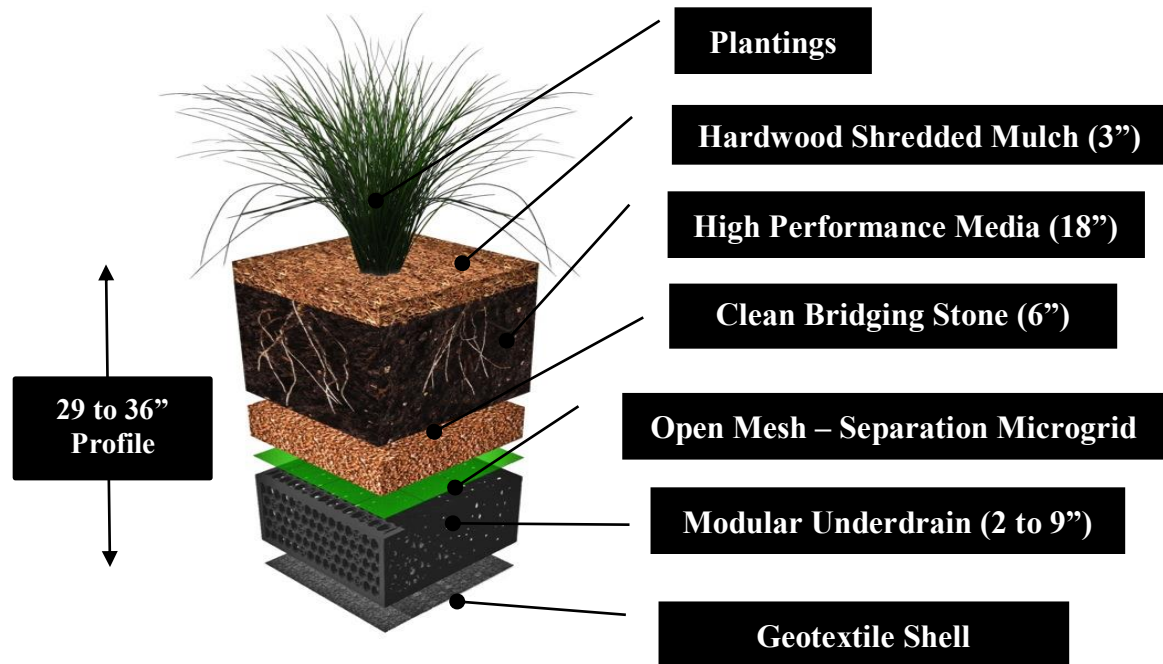
Remove & replace mulch, trim plantings.



## 11. Comments

Include any additional explanations or comments:

Two beneficial attributes of the system include: 1) runoff reduction because of the boxless construction; and 2) design versatility in seasonal high groundwater table conditions whereby the underdrain and ponding depths could be modified without sacrificing media performance to accommodate a 29" vertical profile as opposed to a standard 36" vertical profile.



## 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: Robert C. Adair

Title: President

Date: February 24, 2016

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.