VADEQ MANUFACTURED TREATMENT DEVICE SUBMITTAL

PREPARED BY:

CONVERGENT WATER TECHNOLOGIES
13810 HOLLISTER RD
HOUSTON, TX 77086

PREPARED FOR:

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

FEBRUARY 2022

TABLE OF CONTENTS

February 24, 2022

Robert E. Cooper
Office of Stormwater Management
Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 23218

SUBJECT: FocalPoint High Performance Modular Biofiltration System (HPMBS)
Proprietary Best Management Practice Submission

Dear Mr. Cooper,

Convergent Water Technologies (Convergent) in conjunction with its local value-added reseller, Ferguson Waterworks (formerly ACF Environmental) request review of the FocalPoint HPMBS (FocalPoint) for assignment of a total phosphorus (TP) removal efficiency and inclusion on the Virginia Stormwater BMP Clearinghouse list of approved filtration devices.

A brief recap of the system, updated performance claim and sizing criteria are included as follows:

Description of the FocalPoint and its Method of Operation

FocalPoint is a modular, high performance biofiltration system that often works in tandem with other integrated management practices (IMP). Contaminated stormwater runoff enters the biofiltration bed through a conveyance swale, planter box, or directly through a curb cut or false inlet. Energy is dissipated by a rock or vegetative dissipation device and is absorbed by a 3-inch layer of aged, double shredded hardwood mulch, with fines removed, on the surface of the biofiltration media.

As the water passes through the mulch layer, most of the larger sediment particles and heavy metals are removed through sedimentation and chemical reactions with the organic material in the mulch. Water passes through the biofiltration media where the finer particles are removed, and numerous chemical reactions take place to immobilize and capture pollutants in the soil media.

The cleansed water passes into the underdrain/storage system and remaining flows are directed to a stormwater conveyance system or other appropriate discharge point. Once the pollutants are in the media, bacteria begin to break down and metabolize the materials and the plants begin to uptake and metabolize the pollutants. Some pollutants such as heavy metals, which are chemically bound to organic particles in the mulch, are released over time as the organic matter decomposes to release the metals to the feeder roots of the plants and the cells of the bacteria in the media where they remain and are recycled. Other pollutants such as phosphorus are chemically bound to the soil particles and released slowly back to the plants and bacteria and used in their metabolic processes. Nitrogen goes through a variety of very complex biochemical processes where it can ultimately end up in the plant/bacteria biomass, turned to nitrogen gas or dissolves back into the water column as nitrates depending on soil temperature, pH and the availability of oxygen. The pollutants ultimately are retained in the mulch, media and biomass with some passing out of the system into the air or back into the water.

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 are given with respect to infiltration bed sizing.

Pretreatment: Pretreatment of runoff entering a FocalPoint 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 PRETX and Rain Guardian or non-propriety systems like stone aprons\diaphragms, pocket forebays, grass filter stripes and level lip spreaders.

Hydraulic grade line requirements: All low impact development or environmental site design practices such as FocalPoint 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 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 12 inches and is ideal for streetscapes, mostly permeably tree boxes and stormwater planters. Minimum and maximum surface ponding depths are 3 inches and 18 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 either using an impermeable liner or physical separation (leaving at least 2 ft from bottom of system to seasonal high groundwater 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 recommends the technology for the following land uses: Roadways, commercial, industrial, and residential runoff areas.

Physical Description:

The System is comprised of the following elements and depicted in Figure 1.

Open Cell Underdrain: A modular, high infiltration rate 'flat pipe' underdrain/storage system which is designed to directly infiltrate or exfiltrate water through its surface. The modular underdrain overcomes the limited collection capacity of traditional stone and pipe underdrains. A 90% open surface area collects water significantly faster and can be extended below for additional volume.

Separation Layer: A wide aperture mesh layer is utilized to prevent bridging stone from entering the underdrain system. The separation layer utilizes the concept of 'bridging' to separate the biofiltration media from the underdrain without the use of geotextile fabrics. The use of geotextile fabrics within an infiltration device can lead to clogging; by eliminating the need for a geotextile fabric, the potential for clogging is greatly reduced.

High Flow Media: 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 of at least 100 inches per hour overcome the challenges of clogging and flooding while minimizing space requirements.

Mulch: Shredded hardwood mulch acts as a pre-treatment mechanism by preventing trash, sediments and particles from entering the system. Removal and replacement of mulch is necessary only every 6-12 months and is the only maintenance requirement for the entire system. Maintenance cycles may be extended with the implementation of upstream pretreatment.

Plants: Native Plants are best suited as they adjust well to periodic droughts and temperature extremes. The media contains 10% by volume peat moss. Over the years the decaying mulch, roots, fungi, bacteria and organic inputs from stormwater runoff add to the organic mix as it evolves as more natural soil strata. Soil moisture is maintained through the use of peat moss and mulch.

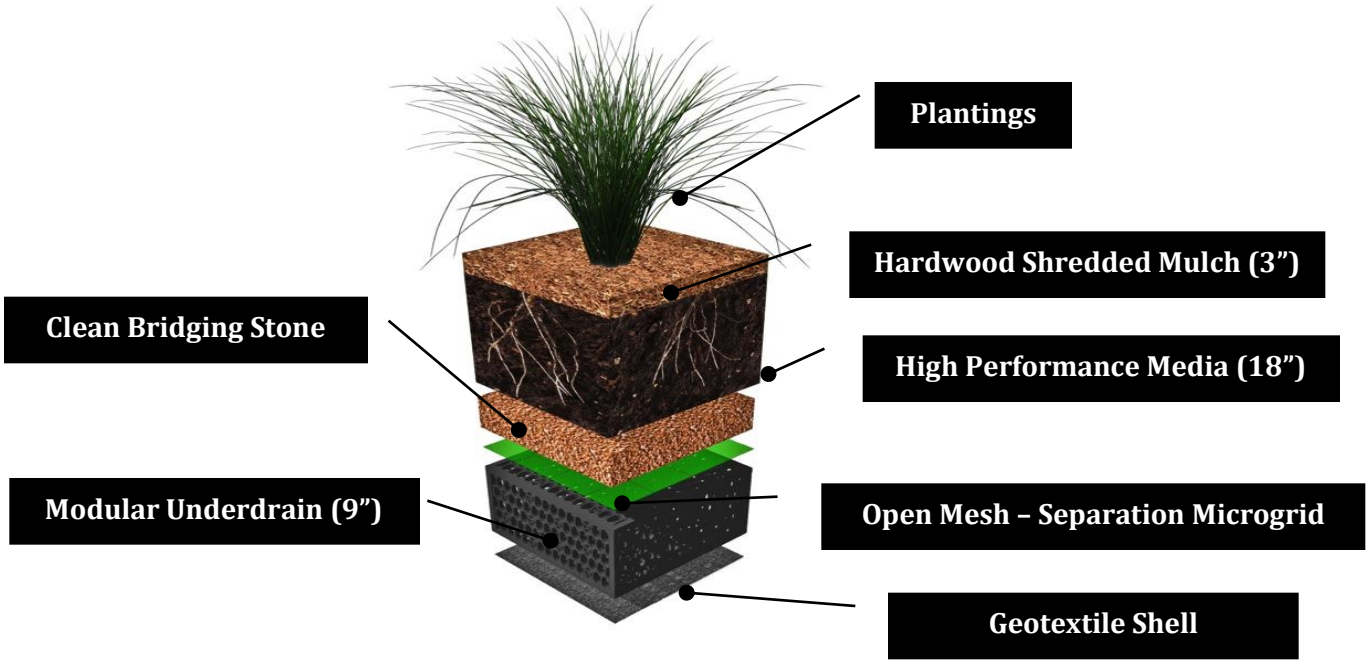

Figure 1. Typical cross section of a FocalPoint system

Acceptance of FocalPoint HPMBS

Please consider this a formal request to include FocalPoint on the list of approved filtering devices at 50% TP removal efficiency.

Closing:

Thank you for your time and consideration. We look forward to your response to our request for approval of this innovative technology.

Sincerely,

W. Scott Gorneau, P.E.
Vice President
Convergent Water Technologies
sgorneau@convergentwater.com
207.831.2795

cc Jason Bailey, P.E. – Urban Green Infrastructure Engineering Manager
Rob Woodman, P.E. – National Manager, Ferguson Waterworks