

FocalPoint as an Acceptable Alternative Biofiltration Practice

In the last few years, most California cities have begun regulating the permanent stormwater BMPs that are required to be implemented with new construction or redevelopment projects. There is an overarching theme to the various Post-Construction Design BMP Manuals that have been recently published, which is, the requirement to utilize Low-Impact Development (LID) or Green-Infrastructure BMPs where at all possible.

Biofiltration areas are one of the most commonly known and referenced options for post-construction LID BMPs, yet California has far too few examples of successful biofiltration options. That's because traditional biofiltration systems take up too much space, get clogged easily, are difficult and cumbersome to maintain, and sometimes never worked in the first place. Convergent Water Technologies (<https://www.convergentwater.com>) and their regional distributors have a great solution for the problems seen with traditional biofiltration. The solution is FocalPoint High Performance Modular Biofiltration System (HPMBS).

FocalPoint's next generation biofiltration media is the key to its high performance. This advanced media technology provides high flow rates, pollutant removal rates consistent with traditional bioretention, and the option of increased removal characteristics for specific pollutant targets. Media flow-rate impacts system performance in all aspects, from scale and cost-effectiveness, to factors of safety, longevity and maintenance minimization. Infiltration flow rates for FocalPoint standard media exceed 100" per hour.

At 100" per hour, FocalPoint is able to meet and even exceed the pollutant reduction requirements set forth by municipalities. City Stormwater BMP Manuals typically define options for documenting compliance as an Alternative Biofiltration Practice. Along with satisfying the requirements of LID and proprietary media for alternative biofiltration options, the FocalPoint system is an acceptable alternative due to its third-party pollutant treatment performance consistent with performance levels associated with Technology Acceptance Protocol-Ecology certifications.

Using the city of San Diego as an example, the following performance results and testing protocols illustrate how and why FocalPoint is an ideal and acceptable alternative biofiltration system. Appendix F of the 2016 City of San Diego and San Diego County Stormwater BMP Manuals define several options for documenting compliance as an Alternative Biofiltration Practice. Since FocalPoint has third-party pollutant treatment performance of the system consistent with performance levels associated with Technology Acceptance Protocol-Ecology certifications, it falls under approved City and County Alternative Biofiltration Practice Criteria.

Many States certify third-party field evaluations performed according to TAPE and use the 80% TSS removal criteria established by TAPE. FocalPoint certifications of 80% TSS removal and enhanced nutrient removal (i.e., Total Phosphorus) are provided in the Table 1, below, for several regulatory agencies.

Table 1. A listing of State or Localities where BMP is currently approved for use

State/Locality	Approved Use	Performance
Florida Department of Environmental Protection (FLDEP)	Stand alone treatment, new construction for TSS and nutrient removal (based on lab and field data)	Per manufacturers spec
Harris County, TX Dept. of Engineering and Public Infrastructure	Stand alone treatment on new highway (green roads), commercial and residential construction (based on lab, field and local monitoring data)	Per manufacturers spec
Maine Department of Environmental Protection (MEDEP)	Stand alone treatment on new construction, meets requirements of General Standards of Chapter 500 (based on TAPE field testing)	80% TSS, 60% TP
Maryland Department of Environment (MDE)	Stand along treatment on new construction, micro-bioretenion and ESD practice (based on TAPE field testing)	80% TSS, 40% TP
New Hampshire Department of Environmental Services (NHDES)	Stand alone treatment on new construction according to Env-WQ 1500 - (based on TAPE field testing)	80% TSS
New York State Department Environmental Conservation (NYSDEC)	Stand alone treatment on new development (based on TAPE field testing and MDE approval)	80% TSS, 40% TP
Philadelphia Water Department (PWD) Engineering and Plan Review Dept	Stand alone treatment on all sites permitted by the agency (based on TAPE field testing)	85% TSS, less than 15 mg/L EMC Effluent
Virginia Department of Environmental Quality (VDEQ)	Stand alone treatment on new construction (based on TAPE field testing)	80% TSS, 50% TP

City of San Diego Flow Thru Proprietary Practice Criteria

Appendix B.6.2.2 of the 2016 City of San Diego Stormwater BMP Manual provides criteria for selecting flow thru proprietary treatment BMPs. This includes meeting the performance standard in Table B.6-3 below as certified through third-part, field scale evaluation. It is important to note that there is no exclusion of other field scale verification of 80% TSS.

Influent Range	Criteria
20 – 100 mg/L TSS	Effluent goal ≤ 20 mg/L TSS
100 – 200 mg/L TSS	≥ 80% TSS removal
>200 mg/L TSS	> 80% TSS removal

The Convergent-ACF Alliance (ACFEnvironmental.com) commissioned a TAPE field study through a third-party consultant in October of 2014 and installed our system for field evaluation in July of 2015. The location of the field study was Campbell's Run Road in Pittsburgh, PA, a cold climate with mean annual rainfall of 38.9 inches per year. The area is characterized by the United States Natural Resource Conservation Service (NRCS) as a Type II rainfall distribution, which is indicative of intense-short duration rainfall events that produce greater runoff volumes than a Type I or IA rainfall distribution, characteristic of Washington State and Southern California. Therefore, our system sizing would be considered conservative on the high side compared to these States.

Results of this third-party field study can be found in the Final Technical Evaluation Report (TER) prepared to TAPE standards. A summary of our TSS pollutant removal performance relative to TAPE and Appendix Table B-6.3 performance criteria is summarized in the Tables 2, 3 and 4 below.

Table 2. Summary of Removal Efficiencies from TER

<p align="center">TABLE ES-1. SUMMARY OF REMOVAL EFFICIENCIES FOR PRIMARY CONSTITUENTS OF CONCERN – SUSPENDED SEDIMENT (TSS), TOTAL PHOSPHORUS (TP), TOTAL NITROGEN (TN)</p>						
Study Protocol	Constituents	^A Mean % Removal (Event Mean Concentration Based) for all Events ^B	^A Mean % Removal (Event Mean Mass Based) for all Events	Bootstrap 95% CI for mean % Removal [LCL, UCL] Concentration Based	Bootstrap 95% CI for mean % Removal [LCL, UCL] Mass Based	% Removal, Lab Based Column Study ^C
TAPE	Suspended Sediment (TSS)	84.4 (n=20)	91.4 (n=19)	[76.4, 91.4]	[87.5, 94.7]	91.2
TAPE	Total Phosphorus (TP)	52 (n=20)	72.5 (n=19)	[37.3, 67.6]	[63.9, 80.6]	66
TAPE	Total Nitrogen (TN) ^D	58.7 (n=16)	77.9 (n=15)	[45.4, 72.0]	[72.5, 83.2]	48.5

^A % Mean removals based on arithmetic average of pollutant % removals from all qualifying events
^B Flow-weighted composite samples were collected and the composite sample concentration defined as a volume-weighted average of the individual samples. Therefore, the Event Mean Concentration (EMC) flow-weighted composite samples are the concentration of a composite sample.
^C CEC Assessment of suspended solids and nutrient attenuation by the Virginia mixture of FocalPoint Biofiltration System via column testing, October 2014
^D For this study, there were negligible removals of nitrates. The reduction in TN is derived from the attenuation of the Kjeldahl Nitrogen portion of the influent concentrations

Table 3. Summary of Individual Storm Removal TSS Efficiencies from TER

Event	TSS Influent EMC ⁽¹⁾ (mg/L)	TSS Effluent EMC ⁽¹⁾ (mg/L)	TSS Discrete Removal Efficiency ⁽²⁾ (%)
1	46.8	23.8	49%
2	48	16.6	65%
3	26.6	2.54	90%
4	197	24.4	88%
5	19.8	9.88	50%
6	4.9	2.5	49%
7	84.4	19.6	77%
8	31.2	8.91	71%
9	238	8	97%
10	142	4.8	97%
11	122	11.6	90%
12	51.8	3.6	93%
13	153	11	93%
14	1560	18.3	99%
15	602	20.7	97%
16	350	26.6	92%
17	260	14.5	94%
18	886	9	99%
19	862	10.5	99%
20	376	7.7	99%
	Inf Mean = 303.08 (n=20)	Eff Mean = 12.73 (n=20)	Mean RE = 96% (n=20)
<ul style="list-style-type: none"> • For all events with less than 100 mg/L influent, mean effluent is 10.92 mg/L, n=8 • For all events with 100-200 mg/L influent, mean removal efficiency is 92%, n=4 <p>For all events with > 200 mg/L influent, mean removal efficiency is 97%, n=8</p>			
1. Flow-weighted composite sampling of Event Mean Concentration (EMC)			
2. $[(\text{Influent EMC} - \text{Effluent EMC}) / (\text{Influent EMC})] \times 100$			

Table 4. Comparison of Field Study results to Performance Criteria

Influent Range	Criteria per City of San Diego Appendix Table B 6-3	Criteria Per TAPE	FOCALPOINT Results from 20 qualified events per TAPE Field Study
20-100 mg/L TSS	Effluent Goal < 20 mg/L TSS	95% upper confidence limit must be less than 20 mg/L	<ul style="list-style-type: none"> ✓ Effluent of < 20 mg/L ✓ 16.8 upper 95% confidence limit
100-200 mg/L TSS	≥ 80% TSS removal	95% lower confidence limit must be greater 80%	<ul style="list-style-type: none"> ✓ ≥ 80% TSS removal ✓ 88.3% removal for the 95% lower confidence limit
>200 mg/L TSS	≥ 80% TSS removal	95% lower confidence limit must be greater 80%	<ul style="list-style-type: none"> ✓ ≥ 80% TSS removal ✓ 95.2% removal for the 95% lower confidence limit

1. The proposed BMP is designed and maintained in a manner consistent with its performance certification.

The FocalPoint should be sized and configured based on our field study to include the following.

- a. *The FocalPoint system must be sized in accordance with the manufacturer’s latest field test results and manage the water quality event defined by the local jurisdiction using a combination of filter bed area, ponding depth and ponding volume.*
- b. *The surface area of the media within the FocalPoint must be a minimum of 174 square feet per 1 acre of impervious area treated (26 sq. ft. per 0.15 acres). The thickness of the media is to be at least 1.5 ft. (18 inches) and the recommend ponding volume above the FocalPoint will be 5 times the filter bed area (e.g., 5 CF of ponding volume to 1 SF of filter bed) or alternatively, 25% of the WQv.*
- c. *The FocalPoint system consists of five components that include: 1) an open cell underdrain; 2) a wide aperture separation mesh wrap around the underdrain; 3) a layer of clean washed, 3/8” diameter bridging stone; 4) advanced high flow rate engineered media with an infiltration rate of 100 inches per hour; and 5) double shredded hardwood mulch. These components are built from the bottom up to create a mostly permeable profile that measures 3 feet from bottom of underdrain to top of mulch.*
- d. *The ponding depth above the mulch surface is typically 6 to 12 inches and varies based on site conditions. An overflow outlet should be placed above the ponding depth.*
- e. *The FocalPoint system requires the establishment of vegetation that is tolerant of wet and dry conditions. Plants that are not performing as desired should be replaced as needed.*

Contact us today at 858-673-0966 for assistance with introducing FocalPoint as an alternative BMP to your local municipality. FocalPoint systems are designed and maintained in a manner consistent with its (TAPE protocols) performance certification; which will get you approval in even the most stringent of municipalities. FocalPoint will save you space and money on your biofiltration areas, and give you back building pads or parking spaces. It is 20% more efficient than traditional biofiltration, it doesn’t clog, and has high-performing pollutant-reduction rates. FocalPoint takes the outrageous cost and space requirements out of green-infrastructure.