



Guidance on Manufactured Treatment Devices as Pretreatment for Underground Storm Water Management Systems

NPDES Construction General Permit #OHC00005 (CGP) lists an underground storm water management system (USWMS) in both of the following configurations as a standard post-construction best management practice (BMP) approved for general use:

- a USWMS providing extended detention coupled with a pretreatment practice 50 percent effective at capturing total suspended solids (TSS); and
- a USWMS providing infiltration coupled with a pretreatment practice 80 percent effective at capturing TSS.

The pretreatment TSS removal efficacy of either 50 or 80 percent must be verified through laboratory or field testing as detailed in the Alternative Post-Construction BMP Testing Protocol section of the CGP. Ohio EPA anticipates that a manufactured treatment device (MTD) will often be proposed as pretreatment for a USWMS and that designers, as well as regulated communities, will rely on the MTD certification programs referenced in the CGP to verify compliance with the CGP.

Extended Detention Versus Infiltration

If a USWMS is designed to detain the entire water quality volume (WQv) below the outlet of the system and infiltrate it into the soil, or to receive runoff reduction credit or Big Darby watershed groundwater recharge credit, a pretreatment practice with an 80 percent TSS removal rate is required to protect the infiltrating surface from clogging.

If the USWMS captures the WQv, provides the required sediment storage and includes an outlet sized to provide extended detention, a pretreatment practice with a 50 percent TSS removal rate is required. USWMS designed for extended detention may utilize a pretreatment practice verified at 50 percent TSS removal rate and still provide the opportunity to infiltrate a portion of the WQv.

Verifying Acceptable Pretreatment

Ohio EPA recommends using the State of New Jersey Department of Environmental Protection (NJDEP) certification program to confirm that a pretreatment MTD meets the CGP requirements. The NJDEP's test protocol is comparable to the laboratory testing protocol in the CGP. MTDs with test results certified by NJDEP for 50 percent TSS removal efficacy are acceptable to Ohio EPA for pretreatment of USMS providing extended detention. An MTD certified by NJDEP for 80 percent TSS removal efficacy is acceptable to Ohio EPA for pretreatment of USMS providing infiltration or extended detention.

The NJDEP certification letter should be reviewed to assure applicable design conditions, excluding those specific to the State of New Jersey, are met. For example, the maximum treatment flow rate (MTFR) for the selected MTD should equal or exceed the Ohio's water quality flow (WQF) for the MTD's drainage area. Only MTD models or sizes included in the certification letter should be considered approved unless the certification letter specifically approves a method to scale additional models or sizes.

The CGP further indicates Ohio EPA will accept field test results certified under the State of Washington, Technology Assessment Protocol - Ecology program (TAPE). It should be noted that not all MTDs listed as certified by TAPE have undergone field testing comparable to the CGP requirements. Only an MTD certified by TAPE with **General Use Level Designation for Basic Treatment** is acceptable to Ohio EPA for pretreatment at 80 percent TSS efficacy. MTFR, hydraulic loading, drainage area and other relevant design criteria associated with the TAPE certification should be followed.

NJDEP- and TAPE-certified MTDs as of July 15, 2019 are listed in Table 1 and Table 2. The most current lists can be found at: nj.gov/dep/stormwater/treatment.html and ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies.

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Hydraulic Sizing

Most MTDs treat storm water as it is received with little or no detention and as such, must be able to achieve the required TSS removal when subject to the WQF. The WQF must be determined in accordance with the CGP for the contributing drainage area and calculated time of concentration (tc) to the pretreatment MTD. The MTD model or size, or number of filter units, must have a treatment flow rate equal to or exceeding the WQF.

If there are multiple inlets into the USWMS, each inlet must include pretreatment sized accordingly. Flow may be divided equally among multiple pretreatment practices installed in parallel at any inlet.

Sizing Example

A USWMS is designed to provide extended detention of the WQv. One inlet to the system drains 0.50 acres of pavement with a calculated tc of five minutes and will be pretreated using a MTD that NJDEP has certified for 50 percent TSS removal. The NJDEP certification letter approves the MTD sizes to the following criteria:

MTD Size	NJDEP 50% TSS MTR (cfs)
#2	0.35
#4	1.15
#6	3.75
#8	5.85

The required WQF for this inlet is calculated as: $WQF = CIA = 0.95 * 2.37(\text{in/hr}) * 0.50 (\text{ac}) = 1.13 (\text{cfs})$. The #4 unit with a MTR of 1.15 cfs exceeds the WQF and is acceptable for pretreatment on this inlet.

A second inlet drains 1.00 acres with a tc of eight minutes, with a WQF calculated as: $WQF = CIA = 0.95 * 2.04(\text{in/hr}) * 1.00 (\text{ac}) = 1.94 (\text{cfs})$. A #6 unit meets the MTR.

Additional Considerations

In addition to a verified TSS removal efficacy, a properly designed pretreatment practice will minimize the quantity of sediment, floatables, oils and grease that reach the underground storage system where they will become difficult to remove and subject to resuspension, as well as minimize clogging of any infiltration surface. The *Rainwater and Land Development Manual* specification on pretreatment MTDs and USWMS should be consulted for additional design considerations.

Designers must consider the long-term performance of a BMP. Pretreatment MTDs typically have limited storage capacity for accumulated material, therefore a viable **Operation and Maintenance Plan** with a specific inspection and cleaning schedule is vital to long-term performance.

Please note a regulated MS4 may have additional or more stringent requirements and should be consulted prior to selection of a pretreatment practice.

Contact

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TABLE 1: Manufactured Treatment Devices Certified by NJDEP and TAPE for 80 percent TSS Removal for Pretreatment of USWMS Providing Infiltration. (as of 7/2019)

NJDEP	TAPE (General Use, Basic Treatment)
Aqua-Filter™ Stormwater Filtration System Model AF-3.48 Round with Perlite Media by AquaShield, Inc.	BayFilter w/EMC Media by BaySaver Technologies
Aqua-Filter™ Stormwater Filtration System with Perlite Media by AquaShield, Inc.	MWS-Linear Modular Wetland by BioClean Environmental Services, Inc.
BayFilter™ Enhanced Media Cartridge by BaySaver Technologies, LLC	StormFilter using PhosphoSorb Media at 1.67 gpm/sq ft by CONTECH Engineered Solutions, LLC.
Biopod™ Biofilter with StormMix Media by OldCastle Precast Inc.	Stormfilter using ZPG Media by CONTECH Engineered Solutions, LLC.
Filtrerra Bioretention System by Contech Engineered Solutions	Filtrerra System by CONTECH Engineered Solutions, LLC.
Kraken Stormwater Filtration System by BioClean Environmental Service, Inc.	Filtrerra Bioscape by CONTECH Engineered Solutions, LLC.
PerkFilter™ Media Filtration System by Oldcastle Precast, Inc.	Media Filtration System by CONTECH Engineered Solutions, LLC.
StormKleener™ Cartridge System by Lane Enterprises	Up-Flo Filter w/ Filter Ribbons by Hydro International
Stormwater Management StormFilter by CONTECH Stormwater Solutions, Inc.	FloGard Perk Filter by Oldcastle Precast, Inc.
Up-Flo Filter by Hydro International	BioPod Biofilter with Curb Inlet by Oldcastle Precast, Inc.
Up-Flo Filter with 450R Ribbon Media by Hydro International	StormGarden Modular Stormwater Bio-filtration System by Rotondo Environmental Solutions
	ecoStorm plus by Watertectonics, Inc.

TABLE 2: Manufactured Treatment Devices Certified by NJDEP for 50 percent TSS Removal for Pretreatment of USWMS Providing Extended Detention. (as of 7/2019)

NJDEP
Aqua-Swirl By AquaShield, Inc.
BaySaver Barracuda by BaySaver Technologies, LLC
Continuous Deflective Separator (CDS) Unit by CONTECH Stormwater Solutions, Inc.
Debris Separating Baffle Box by BioClean Environmental Services, Inc.
Downstream Defender by Hydro International, Inc.
Dual Vortex Separator by Oldcastle Stormwater Solutions
First Defense HC (FDHC) Stormwater Treatment Device by Hydro International, Inc.
HydroStorm Hydrodynamic Separator by Hydroworks® LLC.
Jensen Deflective Separator (JDS) by Jensen Stormwater Systems
Nutrient Separating Baffle Box® (NSBB) with Hydro-Variant Technology Stormwater Treatment Device by Suntree Technologies, Inc.
SiteSaver Stormwater Treatment Device by Fresh Creek Technologies, Inc.
SciClone™ Hydrodynamic Separator by BioClean Environmental Services, Inc.
SiteSaver Stormwater Treatment Device by StormTrap, LLC
StormPro Stormwater Treatment Device by Environment 21, LLC
Terre Kleen™ Hydrodynamic Separator by Terre Hill Stormwater Systems