

BENEFITS of the AQUA-FILTERTM TREATMENT TRAIN SYSTEM
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OBJECTIVE: This report documents the benefits that can be realized from the use of the treatment train design that is incorporated into the Aqua-FilterTM Stormwater Treatment System. These benefits are supported by long term independent field testing of an Aqua-FilterTM Model AF-5.3. The Aqua-FilterTM treatment train system includes the Aqua-Swirl[®] hydrodynamic separator as the upstream (pre-treatment) component and a filtration chamber as the downstream (secondary) component. The Aqua-Swirl[®] is designed to remove sediment, debris, floatables and free-floating oil, while the filtration chamber refines and polishes the stormwater quality prior to discharge into sensitive receiving waters by removing fine-grained particles.

TREATMENT TRAIN FIELD TESTING: Independent field testing of an Aqua-FilterTM Model AF-5.3 system included testing of the Aqua-Swirl[®] Model AS-5 component to determine performance expectations within the treatment train. Testing was conducted by AECOM at an urban shopping center in Silver Spring, Montgomery County, Maryland having a drainage area of 1.19 acres. Testing was initiated in March 2009 and five years after system installation. Field testing followed TARP Tier II protocols in association with New Jersey Corporation for Advanced Technology (NJCAT) verification and New Jersey Department of Environmental Protection (NJDEP) Field Test Certification. Analytical results indicate that the Aqua-Swirl[®] and Aqua-FilterTM achieved over 85 and 90% suspended sediment removal efficiency on a net annual basis by the TSS and SSC methods, respectively. Performance was measured over a range of operating rates up to 40 gpm/ft². Average influent concentrations exceeded mg/L, while average effluent concentrations were <15 mg/L. Influent sediment is classified as a clay loam having a median particle size <60 µm (silt sized particles). Maintenance of the systems is performed on an annual basis as required by the local stormwater management authority. The particulate material captured and retained in the swirl chamber following the final year of testing was documented to be a sandy clay.

BENEFITS ACHIEVED: The Aqua-FilterTM system design provides the following benefits for the treatment of stormwater runoff as opposed to those filtration systems that rely solely on filtration and do not incorporate pretreatment:

- Over 85% suspended sediment removal is provided by the Aqua-Swirl[®] pre-treatment component on a net annual basis against fine-grained particulate. The addition of the filtration component to the treatment train serves to provide over 90% sediment removal including the finer particulate.
- The water quality treatment provided by the pre-treatment swirl chamber serves to extend the filter life cycle, thereby significantly reducing operating expenses associated with the replacement of filter media.
- An extended filter life cycle afforded by the performance of the swirl chamber provides for cost-effective treatment by the Aqua-FilterTM treatment train system.
- The pre-treatment swirl chamber continues to achieve a high level of treatment to stormwater runoff when compared to those filtration systems that experience performance loss when the filter life cycle has extended beyond its performance claim capability.
- If the Aqua-FilterTM filtration chamber were to go into internal overflow mode due to an extreme flow rate condition, the swirl chamber would continue to provide significant treatment as demonstrated through field testing. This is opposed to those filtration systems that would be operating under external bypass conditions in similar conditions with little to no treatment being provided by the system.
- The swirl chamber has been demonstrated in the field to capture and effectively retain very fine-grained sediment. The low effluent concentrations from the swirl chamber (<20 mg/L) demonstrate that the Aqua-Swirl[®] does not scour. A lower effluent concentration from the filtration chamber demonstrates the higher level of treatment achieved by the Aqua-FilterTM system.