



**Center for Environmental Systems  
Stevens Institute of Technology  
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Hoboken, NJ 07030-0000**

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Jim Murphy, Chief  
NJDEP  
Bureau of Non-Point Pollution Control  
Division of Water Quality  
Mail Code 401-02B, PO Box 420  
Trenton, NJ 08625-0420

Dear Mr. Murphy,

Based on my review, evaluation and assessment of the testing conducted on the Hydroworks HydroStorm (Model HS 4) hydrodynamic separator at the Alden Research Laboratory, Inc. (Alden), Holden, Massachusetts, under the direct supervision of Alden's senior stormwater engineer, James Mailloux, the test protocol requirements contained in the "*New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device (January 25, 2013)*" (NJDEP HDS Protocol) were met or exceeded. Specifically

*Test Sediment Feed*

The mean PSD of the test sediments comply with the PSD criteria established by the NJDEP HDS protocol. The removal efficiency test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification. The test sediment was shown to be slightly finer than the sediment blend specified by the protocol ( $<75\mu$ ); the test sediment  $d_{50}$  was 67 microns. The scour test sediment PSD analysis was plotted against the NJDEP scour test PSD specification and shown to meet the protocol specifications.

*Removal Efficiency Testing*

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the HydroStorm (HS 4), a 4-ft. diameter commercially available unit, to establish the ability of the HydroStorm to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the

target MTFR. The HS 4 demonstrated 50.1% annualized weighted solids removal as defined in the NJDEP HDS Protocol. The flow rates, feed rates and influent concentration all met the NJDEP HDS test protocol's coefficient of variance requirements and the background concentration for all five test runs never exceeded 20 mg/L (maximum of 8.9 mg/L).

### *Scour Testing*

To demonstrate the ability of the HydroStorm to be used as an online treatment device, scour testing was conducted at 228% of the MTFR which exceeds the 200% MTFR required by the NJDEP HDS Protocol. The scour test was conducted with the 50% capacity (6") false floor installed. An additional 4" of the 50-1000-micron test sediment was preloaded on top of the false floor, resulting in the unit being preloaded to the 83% storage capacity of 10".

The average flow rate during the online scour test was 2.01 cfs (903 gpm), which represents 228% of the MTFR (MTFR = 0.88 cfs). Background concentrations were <3.1 mg/L throughout the scour testing, which complies with the 20 mg/L maximum background concentration specified by the test protocol. Unadjusted effluent concentrations ranged from 10.9 mg/L to 30.3 mg/L, with an average concentration of 16.8 mg/L. When adjusted for background concentrations, the average effluent concentration was 14.6 mg/L. These results confirm that the HS 4 did not scour at 200% MTFR and meets the criteria for online use.

### *Maintenance Frequency*

The predicted maintenance frequency for all HydroStorm models is 50 months.

Sincerely,



Richard S. Magee, Sc.D., P.E., BCEE