AquaShield™
STORMWATER TREATMENT SOLUTIONS
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AQUA-SWIRL® AS-5 SEDIMENT RETENTION

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AQUA-TECH REPORT 12.7

Purpose

This report documents the particle size distribution (PSD) of the sediment retained in the swirl chamber during the Aqua-Swirl® Model AS-5 field test.

PSD Characterization

In order to determine the PSD of the solids that had settled and retained within the swirl chamber since the prior maintenance event in Fall 2010, three sediment samples were collected on October 13, 2011. Samples were collected on the influent side, center and effluent side of the accumulated sediment layer. The PSD analysis was performed by the serial filtration method. Table 1 below summarizes the PSD of samples retained in the swirl chamber. The influent side, center and effluent side locations were measured to be three, six and two inches thick, respectively. As designed, the vortex motion of water within the swirl chamber provides for the capture of sediment and retention toward the center of the chamber.

Table 1
Captured Sediment PSD in Swirl Chamber

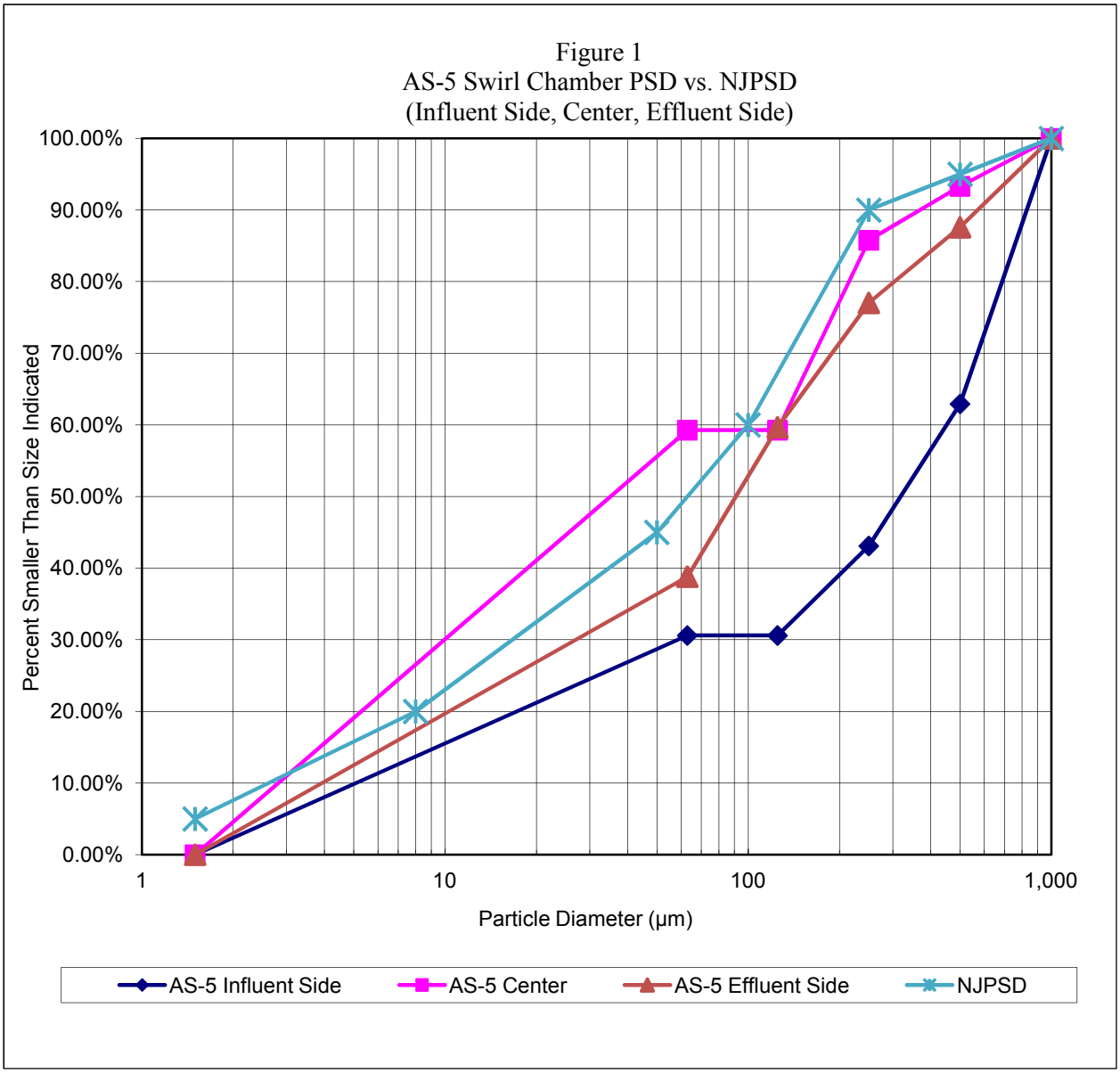
% Finer than Each Filter						
Sample ID	Filter Size (µm)					
	1,000	500	250	125	63	1.5
SWIRL Influent (side)	100.00%	62.93%	43.10%	30.60%	30.60%	0.00%
SWIRL Center	100.00%	93.32%	85.80%	59.29%	59.29%	0.00%
SWIRL Effluent (side)	100.00%	87.61%	77.04%	59.69%	38.81%	0.00%
Average	100.00%	81.29%	68.65%	49.86%	42.90%	0.00%

The swirl chamber PSD data indicates that the solids retained within the tested Aqua-Swirl® can be classified as a sandy clay textured sediment. Average particle sizes from the three swirl chamber sediment samples exhibited 43% silt (2 to 63 µm), 26% very-fine to fine-grained sand (>63 to 250 µm), 12% medium-grained sand (>250 to 500 µm) and 19% coarse sand (>500 to 1,000 µm).

From Figure 1 it is evident that the coarsest particles accumulate on the influent side of the swirl chamber. This would be expected as the coarser material would fall out of suspension first upon entering the chamber. The center sample exhibits the finest material in the swirl chamber. The vortex motion within the swirl chamber would serve not only to allow for a thicker accumulation of sediment in the chamber, but would also allow the finer grained material to circulate toward the center of the chamber over time.

Figure 1 also includes the New Jersey Department of Environmental Protection laboratory test sediment specification for hydrodynamic separators (NJPSD). It is event that the center and effluent side samples closely approximate that NJPSD gradation. Furthermore, 60% of the center sediment accumulation is finer grained than the NJPSD. Thus, the AS-5 is capable of not only a high rate of sediment capture, but also retains fine-grained, silt sized sediment over the recommended one year maintenance cycle.

Figure 1
AS-5 Swirl Chamber PSD vs. NJPSD
(Influent Side, Center, Effluent Side)



Conclusions

The sediment pile within the swirl chamber is consistent with the Aqua-Swirl® performance design such that sediment accumulates toward the center of the device over time. As demonstrated in Aqua-Tech Report 12.5, sediment is effectively retained within the swirl chamber during the testing period as demonstrated by low effluent sediment concentrations. In addition, approximately 60% of the accumulated sediment in the center of the Aqua-Swirl® is finer grained than the NJPSD laboratory standard demonstrating a high level of performance achieved by the Aqua-Swirl® Stormwater Treatment System.