NJCAT TECHNOLOGY VERIFICATION

StormTrap® SiteSaver® Hydrodynamic Separator

Removal Efficiency of Sediment with a Median Particle Size (d_{50}) of 175 Microns

StormTrap, LLC

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TABLE OF CONTENTS

Page

List of Tables **Page**

List of Figures **Page**

1. Introduction

Previous laboratory testing[1] has demonstrated that the SiteSaver® manufactured treatment device (MTD) developed by StormTrap® can achieve a weighted TSS removal rate of at least 50% based on the New Jersey Department of Environmental Protection (NJDEP) hydrodynamic separator MTD protocol. The sediment specified by NJDEP has a particle size range of 1 - 1000 µm and a median particle size (d_{50}) of 75 µm. Many jurisdictions across North America are interested in stormwater MTD removal performance of sediment with an alternative median particle size. Since there are no widely accepted models for predicting capture of sediment of a different particle size, additional testing was undertaken to look at capture of sediment with an alternative, much coarser, d_{50}.

The test program was conducted by the device manufacturer, StormTrap, LLC under the supervision and direction of Good Harbour Laboratories (GHL) staff. GHL is an independent water technology testing lab based in Ontario, Canada. The test protocol used was based on the New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device (January 2013). **However, there were several significant deviations from that protocol that disqualify it for NJDEP certification. Thus, the performance test report is submitted to NJCAT for verification only.** This verification report covers the StormTrap SiteSaver 1 (STSS-1) and the StormTrap SiteSaver 4 (STSS-4) hydrodynamic separators.

2. Description of Technology

SiteSaver® is a manufactured treatment device, developed by StormTrap, that improves the quality of stormwater runoff. The device contains and removes suspended particulates using an insert that promotes gravity settling and is housed within a concrete vault structure. The insert is comprised of settling plates, baffles, and weirs (**Figure 1**).

During normal operations, stormwater enters the device through an inflow pipe. The water then flows through the device until it reaches the inlet perforated baffle wall. Water then passes uniformly through the baffle wall into the inclined plate area via columns of four equally sized and spaced perforations. The quantity of columns is equal to the number of plates utilized. Water travels within the inclined plate area until it reaches the hydraulic relief weir. Once water reaches the hydraulic relief weir it passes through the hydraulic relief weir via columns of equally sized and spaced perforations that are identical to the perforations in the perforated baffle wall. After the water passes through the hydraulic relief weir the water then travels into the outlet pipe that is placed at the same elevation as the inflow pipe. The flow path is shown in **Figure 2A** using black and red arrows. The red arrows indicate when the water flow is within the inclined plates.

During high flow events, the hydraulic relief weir acts as an internal bypass. When flow exceeds the design capacity of the inclined plates the water's flow path still adheres to the flow described above; however, any additional flow larger than the capacity of the inclined plates is diverted above the hydraulic relief weir. The flow path of the water that exceeds the inclined plates capacity is shown in **Figure 2B** using white arrows.

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[1] NJCAT Technology Verification Report, SiteSaver® Stormwater Treatment Device. March 2019. (Ref. 3)

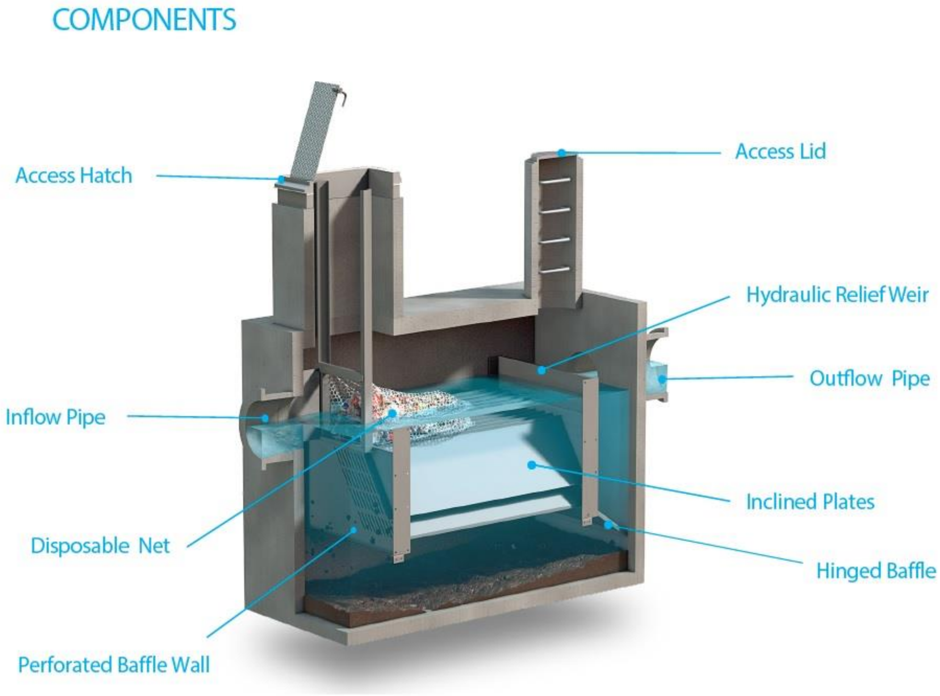

Figure 1 SiteSaver® Rendering

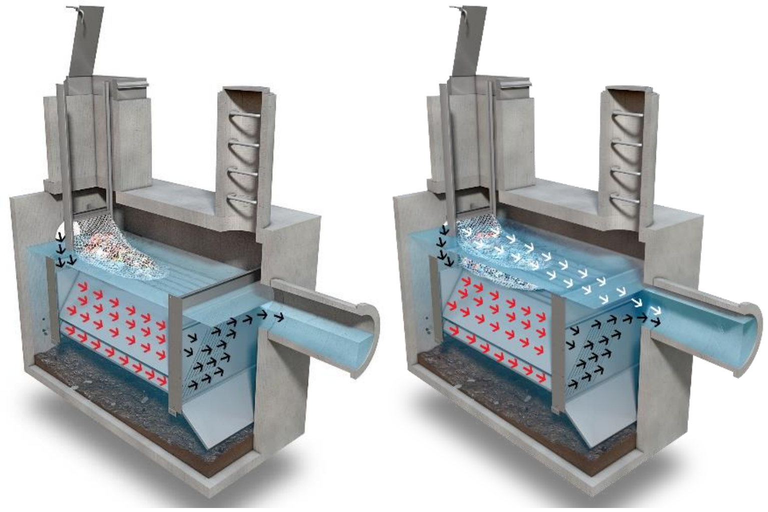

Figure 2A (Left) SiteSaver Flow Characteristics – Normal Flow Operation

Figure 2B (Right) SiteSaver Flow Characteristics – High Flow Operation

The hinged baffle is connected to the hydraulic relief weir and spans the entire width of the device and the length from the hydraulic relief weir to the wall of the chamber. The hinged baffle ensures that the flow paths described are maintained in order to avoid short circuiting of the device, minimizing resuspension of captured pollutants during bypass events.

SiteSaver also contains and removes gross pollutants, such as trash, debris and rubbish, using netting components that can also be housed within the same structure as the inclined plates, baffles and weir insert. If the netting component is utilized, the floating debris is captured within the net rather than the inclined settling plates to avoid clogging the plate insert with large debris. If oil is identified as a pollutant of concern, the SiteSaver unit can be equipped with a hydrophobic/oleophilic accessory to ensure that during a bypass event oil is not discharged.

3. Laboratory Testing

The test program, including sediment sampling, was conducted by the manufactured treatment device manufacturer, StormTrap, under the on-site supervision and direction of GHL staff. The two models that were tested were identical to commercially available units with the exception that they did not have a concrete hatch that would be associated with a unit installed below grade. The test units were the exact same units used for previous testing (Ref. 3). For performance testing, there was no need for the hatch and not having one in place in no way affected the test results. Prior to starting the performance testing program, a quality assurance project plan (QAPP) was submitted to and approved by NJCAT.

3.1 Test Setup

The treatment devices tested were full-scale, commercially available StormTrap SiteSaver units, the STSS-1 and the STSS-4; dimensional details are provided in **Table 1**. The units both had an identical sedimentation area of 84 ft^2 and a maximum treatment flow rate (MTFR) of 1.08 cfs (485 gpm) and 4.32 cfs (1940 gpm) respectively (Ref. 3). Physical exterior and interior dimensions are the same for all StormTrap SiteSaver models.

Table 1 SiteSaver® Dimensions

SiteSaver Models	MTFR (cfs)	50% Maximum Sediment Storage Volume (ft^3)	Oil Capacity (Gallons)[1]	Physical Exterior Dimensions			Physical Interior Dimensions			Effective Treatment Area[2] (ft^2)
				Length (ft)	Width (ft)	Depth (ft)	Length (ft)	Width (ft)	NWL to Floor Invert (ft)	
STSS-1	1.08	28	178	15	6.83	11.17	14	6	6.26	21
STSS-4	4.32	28	178	15	6.83	11.17	14	6	6.26	84

NWL – Normal Water Level

[1] When hydrocarbons are a pollutant of concern, it is recommended that absorptive oil booms are placed into the unit to prevent hydrocarbon wash out during high flow events in on-line installations. The testing did not include verification of this oil capacity nor the ability to capture and retain this oil quantity.

[2] The effective treatment area (ETA) is the horizontally projected area of the inclined plates (21 ft^2 per plate). The STSS-1 has one inclined plate; the STSS-4 has four inclined plates.

Both units were tested using the same test setup however they were tested at different times and in different locations. The STSS-4 was tested in March 2017 in a warehouse while the STSS-1 was tested in September 2017 in an open field. The test setup was a single-pass system filled with potable water; the test apparatus is illustrated in **Figure 3**. The setup was comprised of water reservoirs, pumps, receiving tank and flow and temperature sensors, in addition to the SiteSaver units. The maximum water capacity of the water supply tanks was 147,000 gallons.

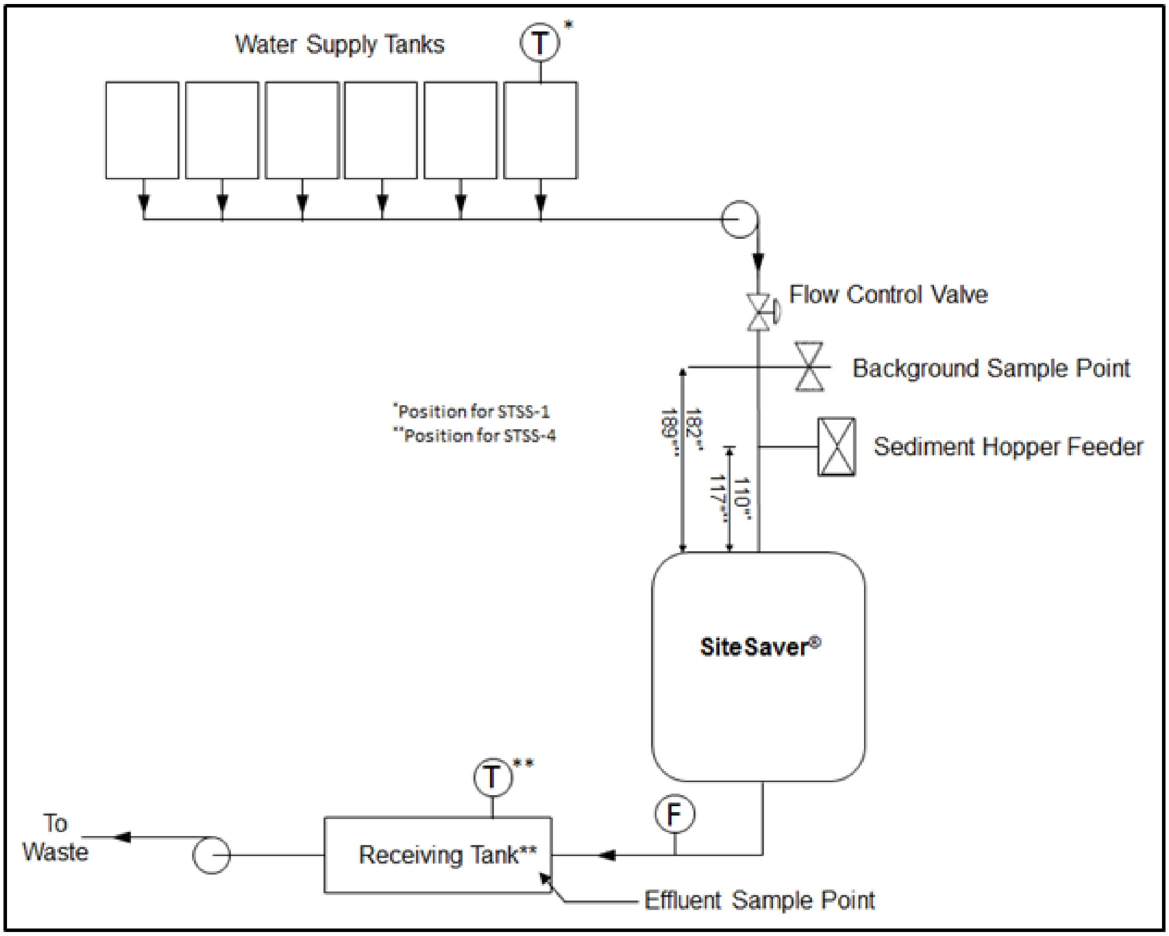

Figure 3 Test Flow Apparatus

Water Flow and Measurement

From the water supply tanks, water was pumped using a centrifugal pump through a 24″ SDR17 HDPE line to the SiteSaver. The flow rate was controlled using a gate valve located on the discharge side of the pump. Flow measurements were made with a Greyline Instruments area-volume flow meter (Model AVFM 5.0) equipped with a data logger. The flow sensor, indicated by "F" in **Figure 3**, was located in the 24″ effluent line of the SiteSaver and the data logger was configured to record a flow measurement once every minute.

Water flow exited the SiteSaver and terminated with a free-fall. For the STSS-4 test (completed indoors), the effluent stream emptied into the Receiving Tank and then was sent to waste while for the STSS-1 test (completed outdoors), the effluent emptied directly to waste.

Sample Collection

Background water samples were collected in clean containers from a sampling port located approximately 8 pipe diameters (182” for the STSS-1 and 189” for the STSS-4) upstream of the SiteSaver. The sampling port was controlled manually by a ball valve (**Figure 4**) that was opened approximately 5 seconds prior to sampling. Background as well as effluent water samples met or exceeded the minimum sample volume requirement.

Effluent samples were also grabbed by hand. The effluent pipe drained freely into the Receiving Tank or the ground and the effluent sample was taken at that point (**Figure 5**).

Figure 4 Background Sampling Point

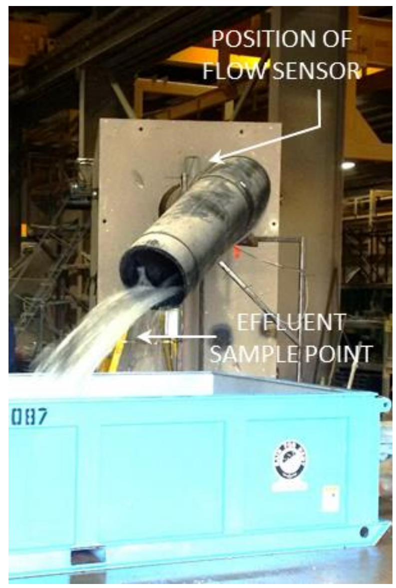

Figure 5 Effluent Sampling Point

Duplicate samples were taken for both background and effluent. The primary set was analysed and reported while the second set was held by the testing lab in case there was a need for an investigation following an aberrant result.

Other Instrumentation and Measurement

Effluent water temperature, indicated by “T” in Figure , was measured using a MadgeTech temperature data logger, Model MicroTemp. The data logger was configured to record a temperature reading once every minute. For the STSS-1 test the temperature data logger was located inside one of the influent water storage tanks while for the STSS-4 test, it was in the receiving tank.

Run and sampling times were measured using a NIST traceable stopwatch, Control Company Model 1042.

Sediment addition occurred through the crown of the inlet pipe (**Figure 6**), approximately 5 pipe diameters from the SiteSaver inlet. The sediment feeder was an ACRISON Model W105Z Dry Solids Feeder with a 3-cubic foot hopper. The sediment feed samples that were taken during the run were collected in 1000-mL jars and weighed on an analytical balance (Veritas M1203i).

Figure 6 Sediment Addition Point

3.2 Test Sediment

Removal Efficiency Test Sediment

The test sediment used for the removal efficiency study was commercially available silica sediment supplied by AGSCO Corporation, generally referred to as #10, but labeled #100-140. Two batches of sediment were used lot #01031724199 was used for the STSS-4 testing in March and lot #083017 was used for the STSS-1 testing in September. Three composite samples were taken from each lot.

To create the composite sample, 3 scoops were taken from every bag in the lot, with one scoop going into each of three 5-gallon buckets. For the STSS-4 testing each of the three buckets was mixed by rolling and shaking. The contents of the first bucket were poured onto the center of a metal plate. Using a ruler, the pile was quartered then one quarter was split into halves. One half was sent for particle size analysis (PSD) analysis, the other was retained. For the STSS-1 the samples from the bags were scooped into a large horizontal blade mixer from Sunbelt rentals and mixed for ~12 minutes. The contents of the mixer were sampled by scooping into three buckets. Care was taken to sample different parts of the mixer. The contents of the buckets were split as before.

The final samples were sent to Interra, in Bolingbrook, IL, for PSD analysis using the methodology of ASTM method D422-63(2007). The test results are summarized in **Table 2** and **Table 3** and shown graphically in **Figure 7** and **Figure 8**.

Table 2 Particle Size Distribution of STSS-4 Removal Efficiency Test Sediment

Particle Size (μm)	Test Sediment Particle Size (% Finer)					Difference from NJDEP Spec. (%)
	NJDEP Spec.	Sample 1	Sample 2	Sample 3	Test Sediment Average	
1000	100	100.0	100.0	100.0	**100.0**	0.0
500	95	100.0	100.0	100.0	**100.0**	+5.0
250	90	94.3	94.4	93.9	**94.2**	+4.2
150	75	37.1	37.5	37.7	**37.4**	+37.6
100	60	8.6	8.9	9.0	**8.8**	+51.2
75	50	3.4	3.7	3.8	**3.6**	+46.4
50	45	2.0	2.0	2.0	**2.0**	+43.0
20	35	1.2	1.2	1.2	**1.2**	+33.8
8	20	-	-	-	-	-
5	10	-	-	-	-	-
2	5	-	-	-	-	-
d_{50} (μm)	<75	173	172	172	**172**	

Table 3 Particle Size Distribution of STSS-1 Removal Efficiency Test Sediment

Particle Size (μm)	Test Sediment Particle Size (% Finer)					Difference from NJDEP Spec. (%)
	NJDEP Spec.	Sample 1	Sample 2	Sample 3	Test Sediment Average	
1000	100	100.0	100.0	100.0	**100.0**	0.0
500	95	100.0	99.9	100.0	**100.0**	+5.0
250	90	93.8	94.0	94.0	**93.9**	+3.9
150	75	32.0	32.1	37.0	**33.7**	+41.3
100	60	4.2	4.1	5.2	**4.5**	+55.5
75	50	1.3	0.9	1.5	**1.2**	+48.8
50	45	1.3	0.9	1.4	**1.2**	+43.8
20	35	1.3	0.9	1.4	**1.2**	+33.8
8	20	-	-	-	-	-
5	10	-	-	-	-	-
2	5	-	-	-	-	-
d_{50} (μm)	<75	179	179	173	**177**	

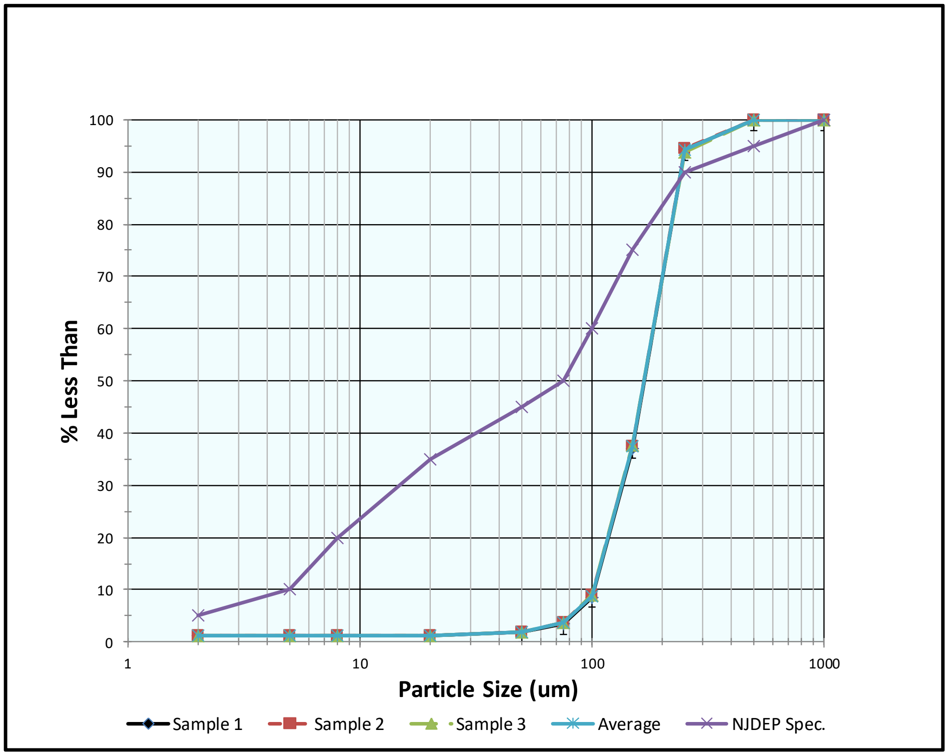

Figure 7 Particle Size Distribution of STSS-4 Removal Efficiency Test Sediment

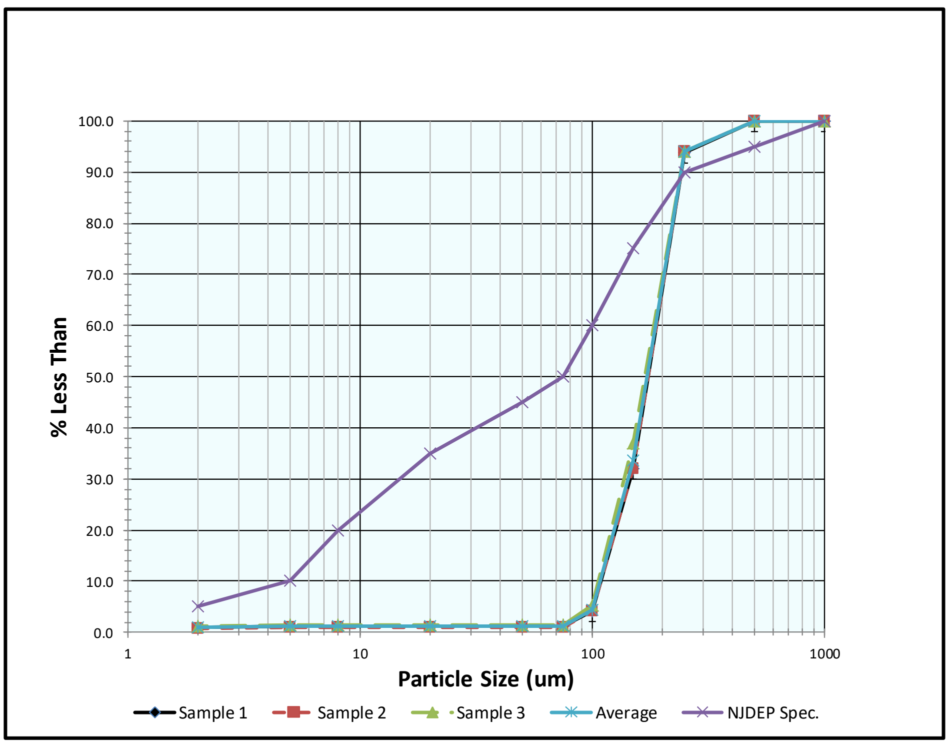

Figure 8 Particle Size Distribution of STSS-1 Removal Efficiency Test Sediment

Scour Test Sediment

The test sediment used for the scour study (50-1000 µm) was supplied by AGSCO Corporation as a single, pre-blended batch, lot #101316 (STSS-4) and lot #061518 (STSS-1). For the STSS-4, three separate composite samples were created by randomly sampling 50% of all the bags received. For the STSS-1, the sediment was transferred from bags into 10 buckets to facilitate the loading of the STSS sump. Each bucket was randomly sampled during the transfer to create three separate composite samples.

The composite samples were well blended and quartered. One of the quarters from each composite was split in two, half was retained, and the other half was sent to Interra for particle size distribution analysis. The test results are summarized in **Table 4** and **Table 5** and shown graphically in **Figure 9**. The scour test sediment was finer than the sediment required by the NJDEP test protocol for scour testing performance and much finer than the influent sediment PSD. This mismatch is a result of the very coarse influent sediment PSD employed.

Table 4 Particle Size Distribution of STSS-4 Scour Test Sediment

Particle Size (µm)	Test Sediment Particle Size (% Passing)				NJDEP Specification (Minimum % Passing)
	Sample 1	Sample 2	Sample 3	Average	
1000	100.0	100.0	100.0	**100**	100
500	97.7	97.8	97.4	**97.6**	90
250	68.2	67.9	68.9	**68.3**	55
150	52.0	52.1	52.8	**52.3**	40
100	29.5	29.4	31.3	**30.1**	25
75	14.8	14.9	15.5	**15.1**	10
50	12.0	12.0	10.1	**11.4**	0

Table 5 Particle Size Distribution of STSS-1 Scour Test Sediment

Particle Size (µm)	Test Sediment Particle size (%passing)				NJDEP Specification (minimum % Passing)
	Sample 1	Sample 2	Sample 3	Average	
1000	100.0	100.0	100.0	100.0	100
500	96.2	96.1	96.2	96.2	90
250	64.1	64.8	65.4	64.8	55
150	46.8	47.8	47.5	47.4	40
100	33.0	34.0	33.7	33.6	25
75	21.9	22.5	22.2	22.2	10
50	11.0	12.0	11.0	11.3	0

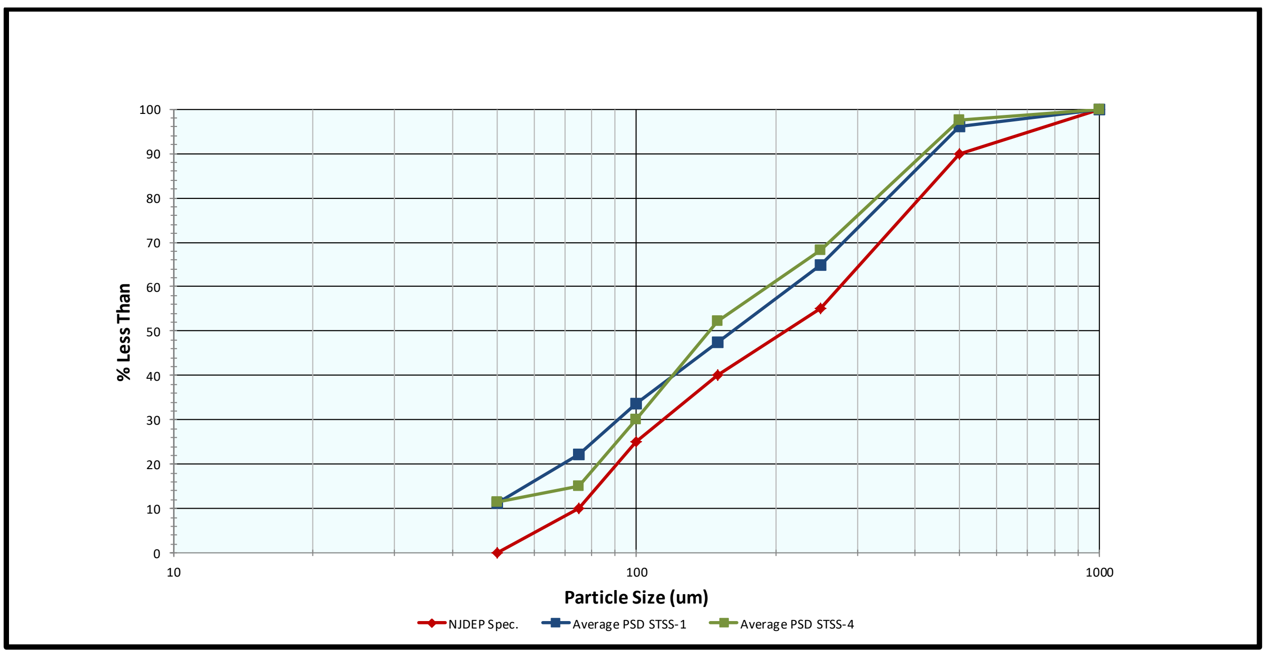

Figure 9 Average Particle Size Distribution of Scour Test Sediment

3.3 Removal Efficiency Testing

Removal testing was conducted on clean units with a false floor installed at the 50% collection sump sediment storage depth of 4-inches above the device floor. Removal Efficiency Testing was based on Section 5 of the NJDEP Laboratory Protocol for Hydrodynamic Sedimentation MTDs. However, the goal of this study was to demonstrate sediment capture efficiency of the StormTrap at the previously determined MTFR (Ref. 3); therefore, testing was only completed at a flow rate of 1,940 gpm for the STSS-4 and 485 gpm for the STSS-1, at a target influent sediment concentration of 200 mg/L. To demonstrate repeatability, the test was completed three times for each unit.

The test sediment was sampled 6 times per run to confirm the sediment feed rate. Each sediment feed rate sample was a minimum of 100 mL and collected in a 1000-mL jar.

Effluent grab sampling began following three MTD detention times after the initial sediment feed rate sample was taken. The time interval between sequential samples was 1 minute; however, when the test sediment feed was interrupted for measurement, the next effluent sample was collected following three MTD detention times from the time the sediment feed was re-established. A total of 15 effluent samples were taken during each run.

Background water samples were taken with the odd-numbered effluent samples.

As specified in the NJDEP test protocol, analysis of Total Suspended Solids (TSS) samples was done in accordance with ASTM D 3977-97(2013) "Standard Test Methods for Determining Sediment Concentrations in Water Samples" and reported as Suspended Sediment Concentration (SSC).

3.4 Scour Testing

For the scour tests, the false floor was removed from the sump of the test units and sediment was loaded and leveled at a depth of 4 inches. Measurements were taken at multiple locations by GHL staff to confirm the sediment depth. The final height of the sediment was at an elevation equivalent to 50% of the maximum sediment storage capacity of the MTD. After loading of the sediment, the units were gradually filled with clear water, so as not to disturb the sediment, to the invert of the inlet pipe. The filled STSS-4 unit was allowed to sit overnight before the scour test was started while the STSS-1 was allowed to sit for approximately 69 hours.

The scour test for the STSS-4 was conducted at a flow rate of 4200 gpm, over two times the MTFR. To achieve this flow, a larger pump was required. The DV200c pump was replaced with a 12″ X 12″ DV-300i centrifugal pump, rated for 6,900 gpm. Additionally, the AVFM flow sensor was relocated to the inlet pipe, through the opening used for sediment addition for the removal efficiency test (**Figure 10**). It was necessary to move the flow sensor because the very high flow rate used in the scour test created an unstable flow pattern in the outlet pipe. The scour test for the STSS-1 was conducted at a flow rate of 1050 gpm and did not require any modification to the test flow apparatus shown in **Figure 3**.

During the scour test, the water flow rate and temperature were recorded once every minute. Testing commenced by gradually increasing the water flow into the system until the target flow rate was achieved (within 5 minutes of commencing the test). Sampling of background and effluent was completed as per the removal efficiency test.

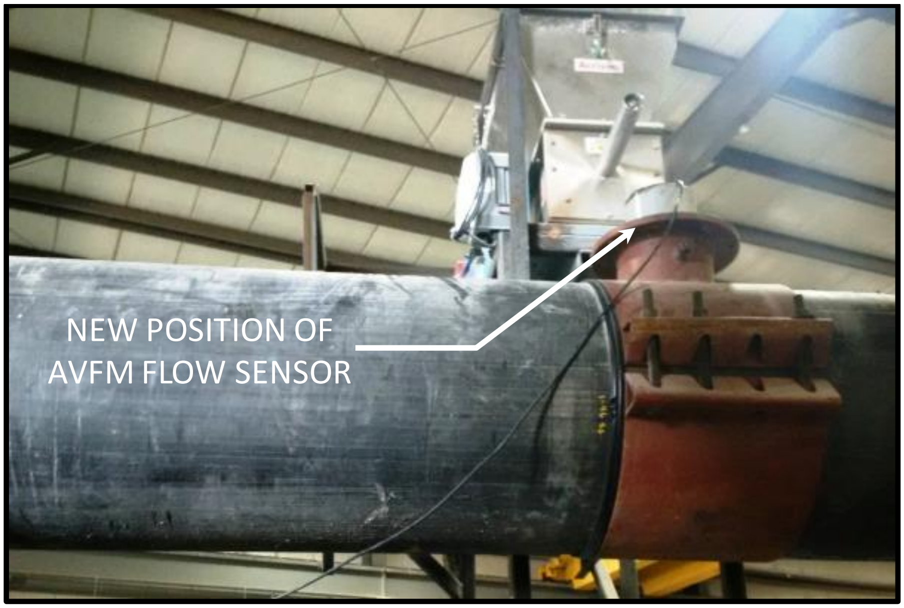

Figure 10 Position of AVFM Flow Sensor for STSS-4 Scour Test

4. Performance Claims

The following are the performance claims made by StormTrap, LLC and established via the laboratory testing conducted for the StormTrap SiteSaver-4 (STSS-4) and SiteSaver-1 (STSS-1) Hydrodynamic Separators.

Total Suspended Solids (TSS) Removal Rate

The MTFR TSS removal rate of the STSS-4 using sediment with a median particle size (d_{50}) of approximately 172 µm was determined by running at the 100% MTFR (4.32 cfs or 1940 gpm) three times. The STSS-4 achieved an average TSS removal rate of 98.0%. The MTFR TSS removal rate of the STSS-1 using sediment with a d_{50} of approximately 177 µm was determined by running at the 100% MTFR (1.08 cfs or 485 gpm) three times. The STSS-1 achieved an average TSS removal rate of 99.6%.

Maximum Treatment Flow Rate (MTFR).

The STSS-4 unit had a total sedimentation area of 84 ft^2, and a maximum treatment flow rate (MTFR) of 4.32 cfs (1940 gpm).

The STSS-1 unit had a total sedimentation area of 84 ft^2 and a maximum treatment flow rate (MTFR) of 1.08 cfs (485 gpm).

Maximum Sediment Storage Depth and Volume

The maximum sediment storage depth is 8” which equates to a maximum of 56 ft^3 of sediment storage volume. Some states require sediment removal when the sediment depth reaches 50% of capacity (28 ft^3).

Sedimentation Area

The sedimentation area is 84 ft^2 for all models.

Detention Time and Wet Volume

The wet volume for both units is 3,934 gallons. The detention time is dependent upon flow rate and varies for each model size.

Online Installation

Based on the laboratory scour testing SiteSaver qualifies for online installation, since the average adjusted effluent TSS concentration was less than 20 mg/L per the NJDEP Laboratory Protocol requirement.

5. Supporting Documentation

To support the performance claims, copies of the laboratory test reports, including all collected and measured data; all data from performance evaluation test runs; spreadsheets containing original data from all performance test runs; all pertinent calculations; etc. were made available to NJCAT for review. It was agreed that as long as such documentation could be made available upon request that it would not be prudent or necessary to include all this information in this verification report. All supporting documentation will be retained securely by GHL and has been provided to NJCAT.

5.1 Removal Efficiency Testing

STSS-4

Three removal efficiency test runs were completed at the target flow rate of 1,940 gpm for the STSS-4; the target influent sediment concentration was 200 mg/L.

The total water volume and average flow rate per run were calculated from the data collected by the flow data logger, one reading every minute. The average influent sediment concentration for each test flow was determined by mass balance. The amount of sediment fed into the auger feeder during dosing, and the amount remaining at the end of a run, was used to determine the amount of sediment fed during a run. The mass of the six feed rate samples was subtracted from the total mass fed prior to calculating the influent concentration. The mass of the sediment fed was divided by the volume of water that flowed through the MTD during dosing, the volume that flowed during feed sample collection was subtracted, to determine the average influent sediment concentration for each run.

Six feed rate samples were collected at evenly spaced intervals during the run to ensure the rate was stable. The COV of the samples were < 0.10 per the NJDEP protocol. The feed rate samples were also used to calculate an influent concentration to double check the concentration calculated by mass balance.

The average effluent sediment concentration was adjusted for the background sediment concentration. In cases where the reported background sediment concentration was less than 2.0

mg/L, 2.0 mg/L was used in calculating the adjusted effluent concentration. For effluent samples that did not have a corresponding background sample, the background value was interpolated from the previous and subsequent samples.

Removal efficiency for each test run was computed as follows:

$$Removal\ Efficiency\ (\%) = \left(\frac{\begin{matrix} Average\ Influent \\ Concentration \end{matrix} - \begin{matrix} Adjusted\ Average \\ Effluent\ Concentration \end{matrix}}{\begin{matrix} Average\ Influent \\ Concentration \end{matrix}} \right) \times 100\%$$

The sampling schedule for all three runs is shown in **Table 6** and the data collected for each run is presented in **Table 7** to **Table 15** and **Figure 11** to **Figure 13**.

Table 6 STSS-4 Sampling Schedule

Runtime (min)	Sampling Schedule		
	Sediment Feed	Background	Effluent
0	1		
6.58		1	1
7.58			2
8.58	2	2	3
15.17			4
16.17		3	5
17.17	3		6
23.75		4	7
24.75			8
25.75	4	5	9
32.33			10
33.33		6	11
34.33	5		12
40.92		7	13
41.92			14
42.92	6	8	15
43.42	End of Testing		
MTD Detention Time = 2.028 minutes Sediment Sampling Time = 0.5 minutes			

Run #1:

Table 7 Water Flow and Temperature - STSS-4 Run #1

Run Parameters	Water Flow Rate (gpm)				Maximum Water Temperature (°F)
	Target	Actual	Difference	COV	
	1,940	1,895	-2.32 %	0.009	60.5
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

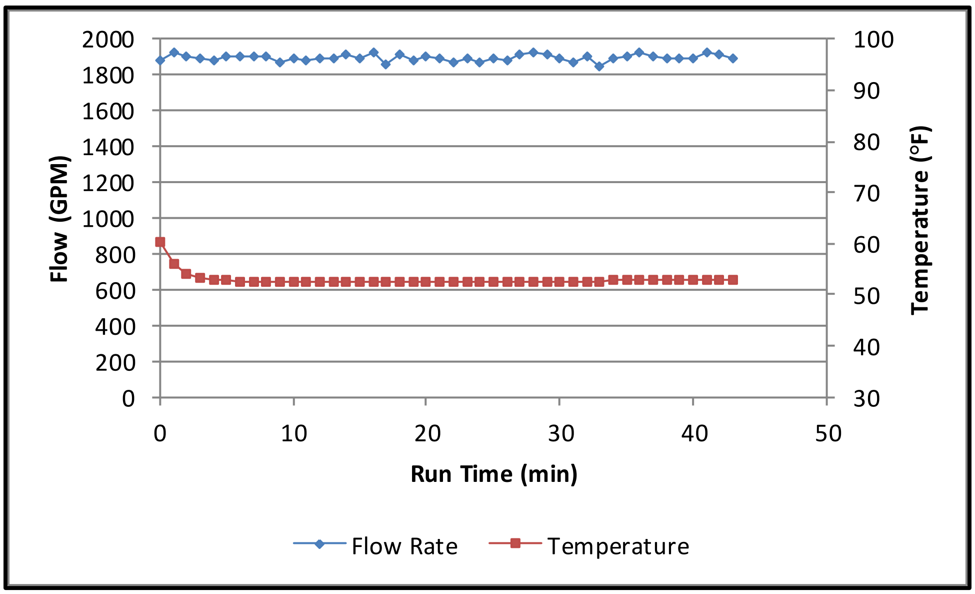

Figure 11 Water Flow and Temperature – STSS-4 Run #1

Table 8 Sediment Feed Rate Summary - STSS-4 Run #1

Sediment Feed (g) – Sampling Time 0.5 minutes		Sediment Mass Balance	
1	724.386	Starting Weight of Sediment (lbs.)	300.00
2	717.898		
3	730.598	Recovered Weight of Sediment (lbs.)	160.42
4	732.985		
5	718.170	Mass of Sediment Used (lbs.)	139.58
6	716.009	Volume of Water Through MTD During Dosing (gal)	76,538
Average	723.341		
COV	0.01	Average Influent Sediment Concentration (mg/L)	203.8*
QA/QC Limit	0.10 PASS	QA/QC Limit	180 – 220 mg/L PASS

*Corrected for sediment feed rate sample

Table 9 SSC and Removal Efficiency - STSS-4 Run #1

	Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	6.75	5.25	5.25	8.50	9.00	4.75	3.75	5.00	8.25	6.75	7.25	5.00	10.0	8.25	8.75
Background	5.50		3.00		2.25		4.25		2.25		2.00		2.25		2.50
Adjusted Effluent	1.25	1.0	2.25	5.90	6.75	1.5	0.0	1.75	6.0	4.65	5.25	2.90	7.75	5.90	6.25
Average Adjusted Effluent Concentration					3.9 mg/L			**Removal Efficiency**					**98.1%**		

Run #2:

Table 10 Water Flow and Temperature - STSS-4 Run #2

Run Parameters	Water Flow Rate (gpm)				**Maximum Water Temperature (°F)**
	Target	**Actual**	**Difference**	**COV**	
	1,940	1,916	-1.24 %	0.009	56.7
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

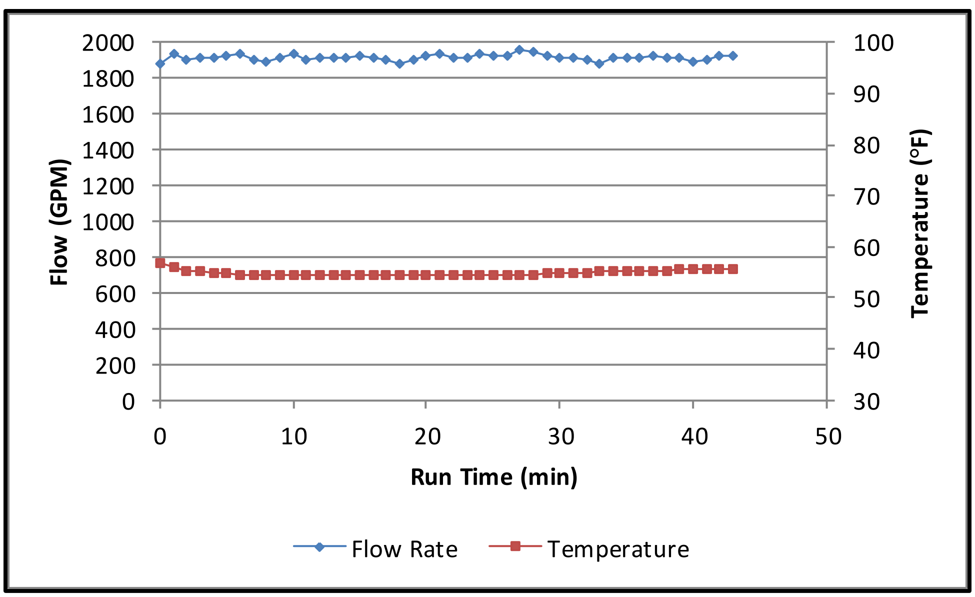

Figure 12 Water Flow and Temperature – STSS-4 Run #2

Table 11 Sediment Feed Rate Summary - STSS-4 Run #2

Sediment Feed (g) – Sampling Time 0.5 minutes		Sediment Mass Balance	
1	726.272	Starting Weight of Sediment (lbs.)	300.00
2	736.352		
3	749.465	Recovered Weight of Sediment (lbs.)	161.05
4	740.586		
5	739.004	Mass of Sediment Used (lbs.)	138.95
6	750.571	Volume of Water Through MTD During Dosing (gal)	77,398
Average	740.375		
COV	0.012	Average Influent Sediment Concentration (mg/L)	200.2*
QA/QC Limit	0.10 PASS	QA/QC Limit	180 – 220 mg/L PASS

*Corrected for sediment feed rate samples

Table 12 SSC and Removal Efficiency - STSS-4 Run #2

	Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	7.25	9.50	6.00	5.25	6.50	5.75	6.00	7.50	7.25	8.00	6.75	6.75	6.50	5.00	5.50
Background	2.00		2.00		2.00		2.00		2.00		2.00		2.00		2.00
Adjusted Effluent	5.25	7.5	4.0	3.25	4.5	3.75	4.0	5.5	5.25	6.0	4.75	4.75	4.5	3.0	3.5

Average Adjusted Effluent Concentration	4.6	**Removal Efficiency**	**97.7**

Run #3:

Table 13 Water Flow and Temperature - STSS-4 Run #3

Run Parameters	Water Flow Rate (gpm)				Maximum Water Temperature (°F)
	Target	Actual	Difference	COV	
	1,940	1,924	-0.825 %	0.007	54.2
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

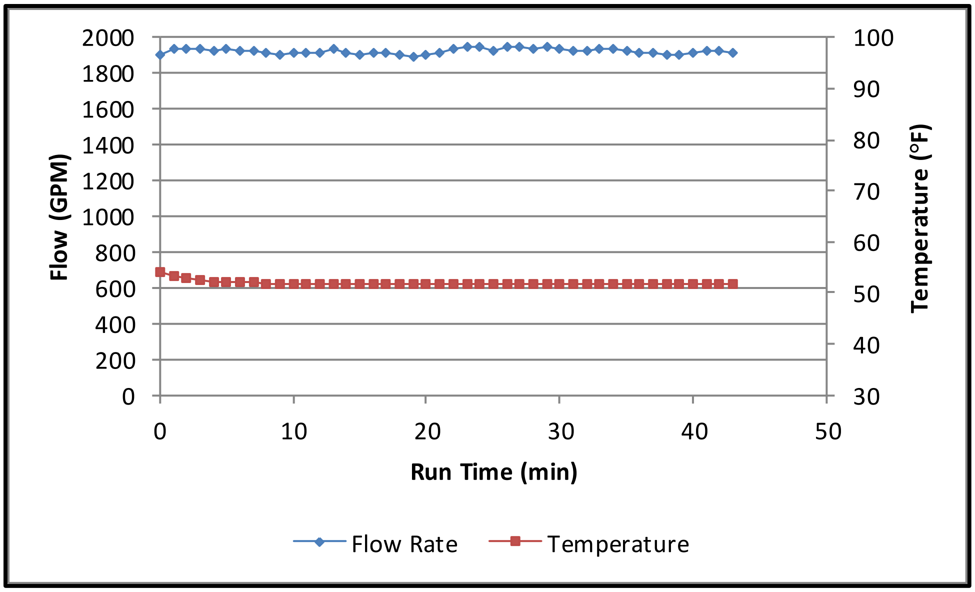

Figure 13 Water Flow and Temperature – STSS-4 Run #3

Table 14 Sediment Feed Rate Summary - STSS-4 Run #3

Sediment Feed (g) – Sampling Time 0.5 minutes		Sediment Mass Balance	
1	737.642	Starting Weight of Sediment (lbs.)	300.00
2	728.071		
3	721.55	Recovered Weight of Sediment (lbs.)	161.03
4	730.848		
5	732.374	Mass of Sediment Used (lbs.)	138.97
6	721.023	Volume of Water Through MTD During Dosing (gal)	77,716
Average	728.585		
COV	0.009	Average Influent Sediment Concentration (mg/L)	199.7*
QA/QC Limit	0.10 PASS	QA/QC Limit	180 – 220 mg/L PASS

*Corrected for sediment feed rate samples

Table 15 SSC and Removal Efficiency – STSS-4 Run #3

	Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	5.25	6.00	6.00	4.25	6.75	6.00	5.50	5.75	6.00	4.50	6.75	6.00	5.50	4.75	7.00
Background	2.00		2.00		2.00		2.00		2.00		2.00		2.00		2.00
Adjusted Effluent	3.25	4.0	4.0	2.25	4.75	4.0	3.5	3.75	4.0	2.5	4.75	4.0	3.5	2.75	5.0
Average Adjusted Effluent Concentration					3.7			**Removal Efficiency**					**98.1**		

STSS-1

Three removal efficiency test runs were completed at the target flow rate of 485 gpm for the STSS-1. The target influent sediment concentration was 200 mg/L and all other test parameters were the same as the STSS-4 test runs. The sampling schedule for all three runs is shown in **Table 16** and the data collected for each run is presented in **Table 17** to **Table 25** and **Figure 14** to **Figure 16**.

Table 16 STSS-1 Sampling Schedule

Runtime (min)	Sampling Schedule		
	Sediment Feed	Background	Effluent
0	1		
25.33		1	1
26.33			2
27.33	2	2	3
52.65			4
53.65		3	5
54.65	3		6
79.98		4	7
80.98			8
81.98	4	5	9
107.30			10
108.30		6	11
109.30	5		12
134.63		7	13
135.63			14
136.63	6	8	15
137.63	End of Testing		
MTD Detention Time = 8.108 minutes Sediment Sampling Time = 1 minute			

Run #1:

Table 17 Water Flow and Temperature - STSS-1 Run #1

Run Parameters	Water Flow Rate (gpm)				Maximum Water Temperature (°F)
	Target	Actual	Difference	COV	
	485	479.65	-1.10	0.011	79
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

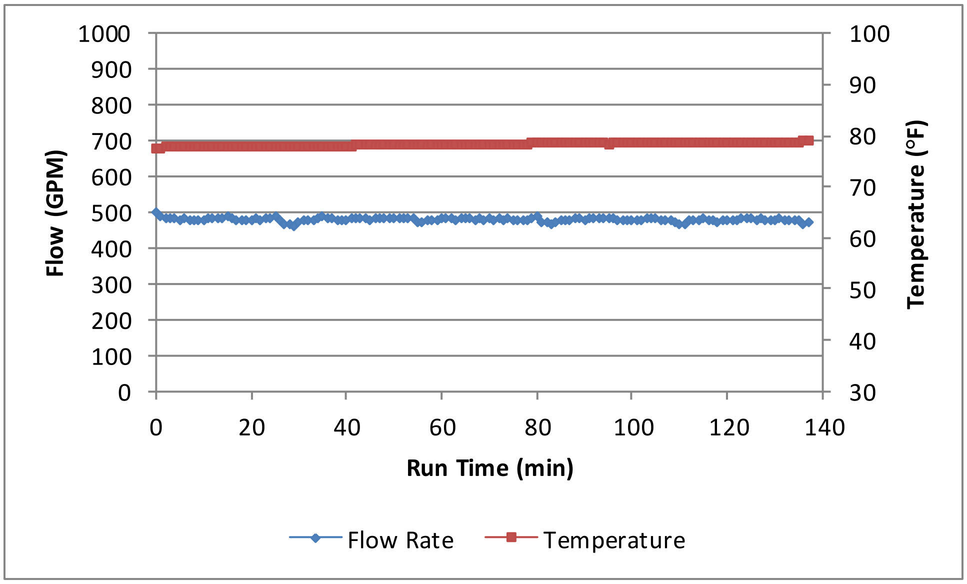

Figure 14 Water Flow and Temperature – STSS-1 Run #1

Table 18 Sediment Feed Rate Summary - STSS-1 Run #1

Sediment Feed (g) – Sampling Time 1.0 minutes		**Sediment Mass Balance**	
1	373.979	Starting Weight of Sediment (lbs.)	300.00
2	383.595		
3	355.977	Recovered Weight of Sediment (lbs.)	185.41
4	359.099		
5	380.092	Mass of Sediment Used (lbs.)	114.59
6	360.140	Volume of Water Through MTD During Dosing (gal)	63172
Average	368.814		
COV	0.032	Average Influent Sediment Concentration (mg/L)	208.4*
QA/QC Limit	0.10 PASS	QA/QC Limit	180 – 220 mg/L PASS

*Corrected for sediment feed rate samples

Table 19 SSC and Removal Efficiency - STSS-1 Run #1

	Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	3.40	3.20	3.20	3.80	3.20	2.80	3.40	2.00	2.60	3.80	3.20	2.00	2.60	3.20	3.40
Background	2.00		2.00		2.00		2.00		2.00		2.00		2.00		2.00
Adjusted Effluent	1.40	1.20	1.20	1.80	1.20	0.80	1.40	0.00	0.60	1.80	1.20	0.00	0.60	1.20	1.40
Average Adjusted Effluent Concentration					1.05 mg/L			**Removal Efficiency**					**99.5 %**		

Run #2:

Table 20 Water Flow and Temperature - STSS-1 Run #2

Run Parameters	Water Flow Rate (gpm)				Maximum Water Temperature (°F)
	Target	Actual	Difference	COV	
	485	483.16	-0.380	0.013	74
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

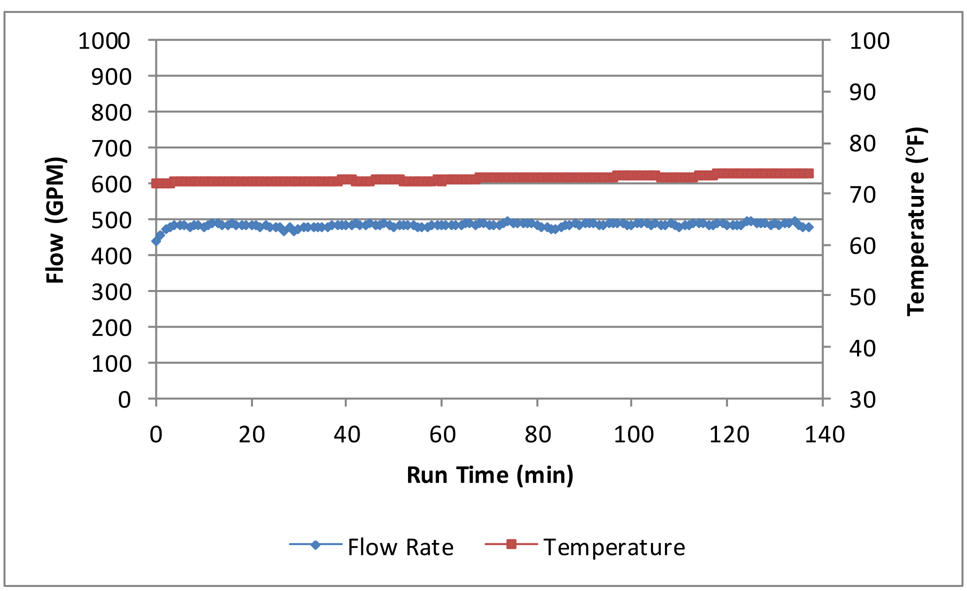

Figure 15 Water Flow and Temperature – STSS-1 Run #2

Table 21 Sediment Feed Rate Summary - STSS-1 Run #2

Sediment Feed (g) – Sampling Time 1.0 minutes		Sediment Mass Balance	
1	369.773	Starting Weight of Sediment (lbs.)	300.00
2	389.273		
3	388.228	Recovered Weight of Sediment (lbs.)	151.96
4	394.609		
5	361.027	Mass of Sediment Used (lbs.)	114.03
6	366.010	Volume of Water Through MTD During Dosing (gal)	63687
Average	378.153		
COV	0.038	Average Influent Sediment Concentration (mg/L)	205.4*
QA/QC Limit	0.10 PASS	QA/QC Limit	180 – 220 mg/L PASS

*Corrected for sediment feed rate samples

Table 22 SSC and Removal Efficiency - STSS-1 Run #2

	Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	3.00	2.80	2.20	3.60	1.60	1.60	2.00	2.80	2.20	2.60	2.20	3.00	3.00	2.00	2.40
Background	2.20		2.00		2.00		2.00		2.00		2.00		2.00		2.00
Adjusted Effluent	0.80	0.70	0.20	1.60	0.00	0.00	0.00	0.80	0.20	0.60	0.20	1.00	1.00	0.00	0.40
Average Adjusted Effluent Concentration					0.50 mg/L			**Removal Efficiency**					**99.8%**		

Run #3:

Table 23 Water Flow and Temperature - STSS-1 Run #3

Run Parameters	Water Flow Rate (gpm)				Maximum Water Temperature (°F)
	Target	Actual	Difference	COV	
	485	469.19	-3.26	0.018	70
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

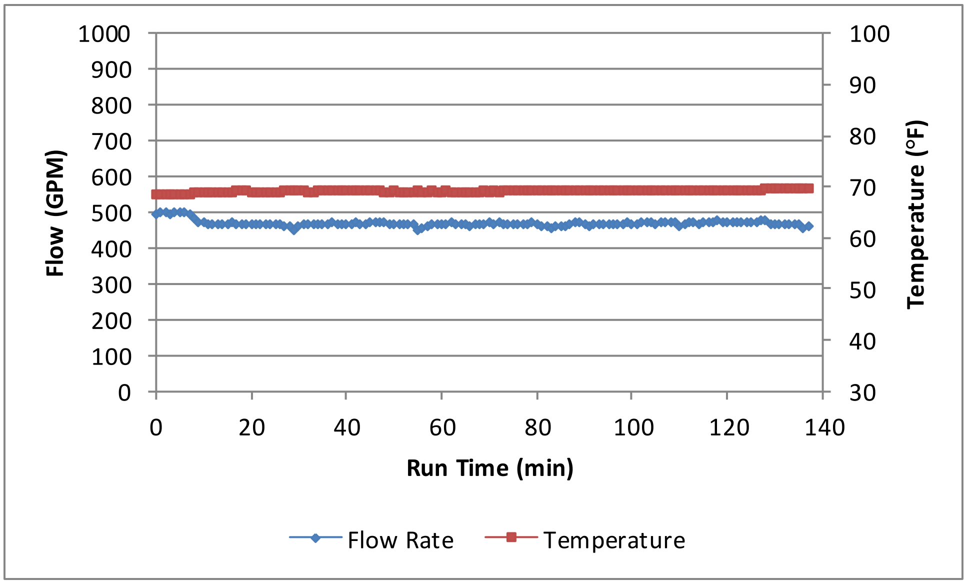

Figure 16 Water Flow and Temperature – STSS-1 Run #3

Table 24 Sediment Feed Rate Summary - STSS-1 Run #3

Sediment Feed (g) – Sampling Time 1.0 minutes		**Sediment Mass Balance**	
1	370.680	Starting Weight of Sediment (lbs.)	300.00
2	367.609		
3	365.240	Recovered Weight of Sediment (lbs.)	187.56
4	389.628		
5	382.244	Mass of Sediment Used (lbs.)	112.44
6	364.246	Volume of Water Through MTD During Dosing (gal)	61791
Average	373.275		
COV	0.028	Average Influent Sediment Concentration (mg/L)	208.8*
QA/QC Limit	0.10 PASS	QA/QC Limit	180 – 220 mg/L PASS

*Corrected for sediment feed rate samples

Table 25 SSC and Removal Efficiency - STSS-1 Run #3

	Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	2.20	2.20	3.20	3.60	3.20	2.60	2.60	3.20	3.00	3.80	4.80	3.40	3.80	3.40	3.00
Background	2.00		2.00		2.00		2.00		2.00		2.00		2.00		2.00
Adjusted Effluent	0.20	0.20	1.20	1.60	1.20	0.60	0.60	1.20	1.00	1.80	2.80	1.40	1.80	1.40	1.00
Average Adjusted Effluent Concentration				1.20 mg/L			**Removal Efficiency**					**99.4%**			

***Excluded data* –** One run had to be terminated before completion (6 background samples and 12 effluent samples) due to a flow measurement malfunction and the incomplete data are not included above. This required an additional run which is included in the 3 runs reported above.

5.2 Scour Testing

Scour testing was conducted in accordance with Section 4 of the NJDEP Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation MTD. Testing was conducted at target flow rates of 4,200 (STSS-4) and 1,050 (STSS-1) gpm, over 200% of the maximum treatment flow rate (MTFR).

Scour testing began by increasing the flow rate to the target flow within a 5-minute period. Effluent and background samples were taken from the same locations as for the removal efficiency test, starting less than 5 minutes after flow was initiated. The sampling frequency for the STSS-1 is summarized in **Table 26** and the sampling frequency for the STSS-4 is summarized in **Table 27**. Water flow and temperature for the STSS-1 and STSS-4 scour tests are summarized in **Table 28** and shown on **Figure 17** and **Figure 18**.

Table 26 Scour Test Sampling Frequency for the STSS-1

Sample/ Measurement Taken	Run Time (min.)														
	0	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**
Effluent	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Background	X		X		X		X		X		X		X		X

Note: The Run time of 0 minutes is the time the 1st set of samples was taken, following the flow equilibration period.

Table 27 Scour Test Sampling Frequency for the STSS-4

Sample/ Measurement Taken	Run Time (min.)															
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
Effluent		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Background	X		X		X		X		X		X		X		X	

Note: The run time of 0 minutes is the time the 1st background sample was taken, following the 4-minute flow equilibration period.

Table 28 Water Flow and Temperature – STSS-1 and STSS-4 Scour Test

Scour Test	Water Flow Rate (GPM)				Maximum Water Temperature (°F)
	Target	Actual	Difference	COV	
STSS-1	1,050	1,151	9.6	0.004	71.6
STSS-4	4,200	4,180	-0.4%	0.017	57.6
QA/QC Limit	-	-	±10% PASS	0.03 PASS	80 PASS

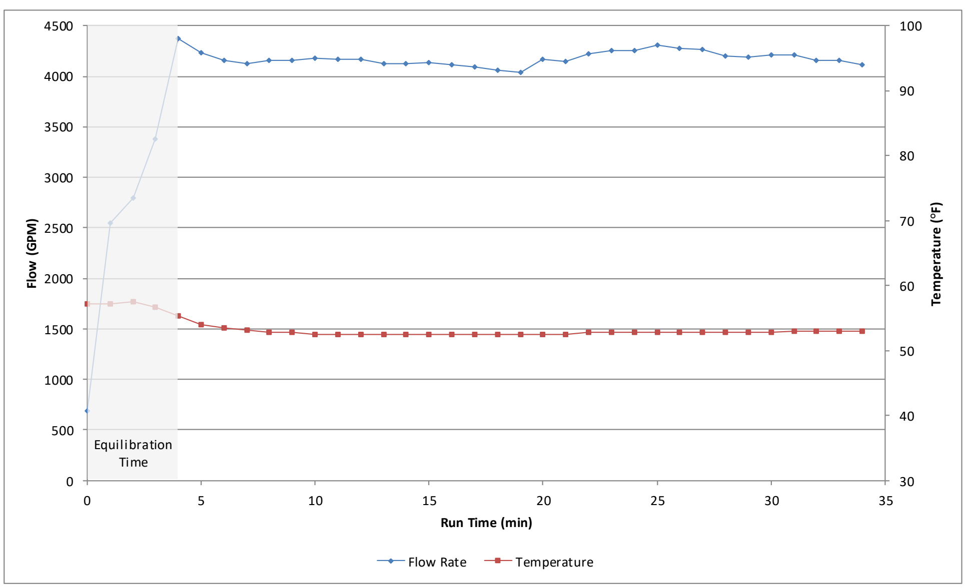

Figure 17 Water Flow and Temperature for STSS-4 Scour Test

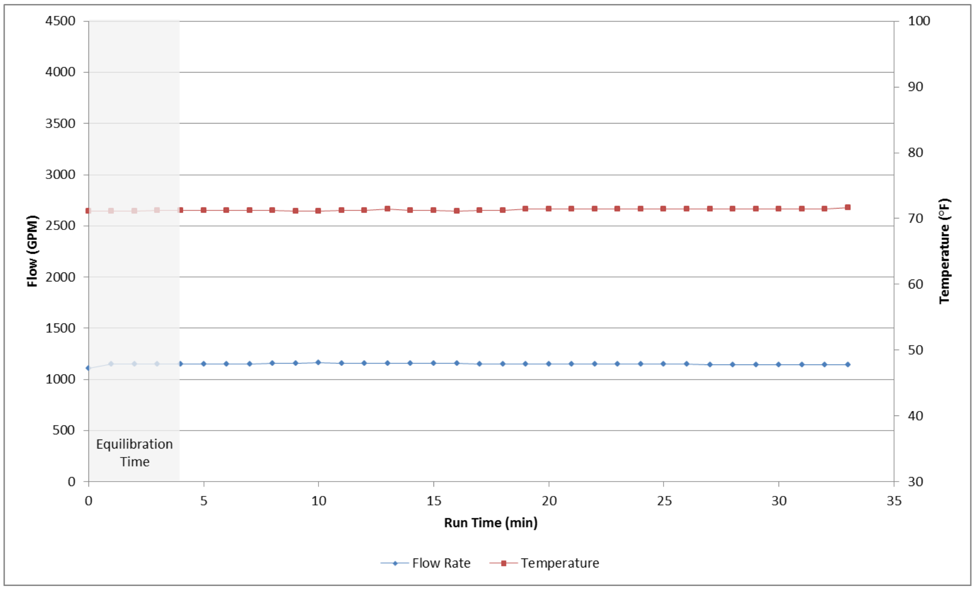

Figure 18 Water Flow and Temperature for STSS-1 Scour Test

The effluent and background SSC results are reported in **Table 29** and **Table 30**. The adjusted effluent concentration was calculated as:

$$Adjusted\ Effluent\ Concentration\ \left(\frac{mg}{L}\right) = Initial\ Concentration - Background\ Concentration$$

For effluent samples that did not have a corresponding background sample, the background value was interpolated from the previous and subsequent samples. The average adjusted effluent concentration was 7.0 mg/L for the STSS-4 and 12.1 mg/L for the STSS-1; therefore, when operated at 200% of the MTFR, the StormTrap SiteSaver meets the criteria for online use.

Table 29 Suspended Sediment Concentrations for STSS-4 Scour Test

	Scour Suspended Sediment Concentration (mg/L)															
Sample #		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent		13.3	13.5	12.0	12.5	8.50	10.3	9.60	11.0	9.50	8.50	7.50	8.50	8.00	7.75	6.00
Background	3.5		2.4		2.5		3.0		2.75		2.75		2.5		3.0	
Adjusted Effluent		10.4	11.1	9.55	10.0	5.75	7.30	6.75	8.25	6.75	5.75	4.90	6.00	5.25	4.75	3.00
Average Adjusted Effluent Concentration							**7.0 mg/L**									

Table 30 Suspended Sediment Concentrations for STSS-1 Scour Test

	Scour Suspended Sediment Concentration (mg/L)														
Sample #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Effluent	38.4	27.8	23.0	18.6	15.4	11.6	11.6	9.6	8.2	8.0	8.4	8.2	7.8	6.8	7.6
Background	2.0		2.0		2.0		2.0		2.0		2.0		2.0		2.0
Adjusted Effluent	36.4	25.8	21.0	16.6	13.4	9.6	9.6	7.6	6.2	6.0	6.4	6.2	5.8	4.8	5.6
Average Adjusted Effluent Concentration	**12.1 mg/L**														

6. Maintenance Plans

Regular inspections are recommended to ensure that the system is functioning as designed. Please contact your Authorized SiteSaver Representative if you have questions regarding the inspection and maintenance of the SiteSaver system. SiteSaver does not require entry into the system for maintenance; however, it is prudent to note that prior to entry into any underground storm sewer or underground structure, appropriate OSHA and local safety regulations and guidelines should be followed.

Inspection Scheduling

SiteSaver systems are recommended for inspection whenever the upstream and downstream catch basins and stormwater pipes of the stormwater collection system are inspected or maintained. This will economize the cost of the inspection if it is done at the same time. If inspected on an annual basis, the inspection should be conducted before the stormwater season begins to ensure that the system is functioning properly for the upcoming storm season.

Inspection Process

Inspections should be done such that enough time has lapsed since the most recent rain event to allow for a static water condition. Visually inspect the system at all manhole locations. For debris accumulation, visually inspect the netting component (if utilized) to determine bag capacity. For sediment accumulation, utilize a sediment pole to measure and document the amount of sediment accumulation. To determine the amount of sediment in the system first insert the pole to the top of the sediment layer and record the depth. Then, insert the pole to the bottom of the system and record the depth. The difference in the two measurements corresponds to the amount of sediment in the system. Eight-inches of sediment accumulation corresponds to the maximum sediment storage capacity. NJDEP requires sediment removal on or before it reaches a maximum depth of 4-inches (50% of the MTD's maximum storage depth). Finally, inspect the inlet pipe opening to ensure that the silt level or any foreign objects are not blocking the pipe.

Maintenance Process

Maintenance should be done such that enough time has lapsed since the most recent rain event to allow for a static water condition for the duration of the maintenance process. For floatable debris removal, remove the netting bag by lifting the bag by the netting frame moving it upwards along the netting support frame. Once the netting component is fully removed from the system, it should be properly disposed of per local, state, and federal guidelines and regulations. Typically, the netting component can be disposed of in a common dumpster receptacle. For sediment removal, the SiteSaver is designed with clear access at both the inlet and outlet. A vacuum truck, or similar trailer mounted equipment, can be used to remove the sediment, hydrocarbons, and water within the unit. For more effective removal it is recommended to use sewer jetting equipment or a spray lance to force the sediment to the vacuum hose. When the floor is sufficiently cleaned, fill the system back to its normal water elevation (to the pipe inverts) Finally, install a new net assembly by sliding the netting frame down the support frame and ensure the netting lays over the plate assembly. Secure the access openings and properly dispose of the sediment per local, state, and federal guidelines and regulations.

Proof of inspections and maintenance is the responsibility of the owner. All inspection reports and data should be kept on site or at a location where they will be accessible for years in the future. Some municipalities require these inspection and cleaning reports to be forwarded to the proper governmental permitting agency on an annual basis. Refer to your local and national regulations for any additional maintenance requirements and schedules not contained herein. Inspections should be a part of the standard operating procedure.

7. Statements

The following attached pages are signed statements from the manufacturer (StormTrap, LLC), the independent observer (Good Harbour Labs), and NJCAT. These statements are included to document that the requirements of the New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device (January 25, 2013) were followed with the exceptions as noted.

StormTrap

March 27, 2019

To: Dr. Richard Magee, Sc.D., P.E. BCEE
Executive Director
New Jersey Corporation for Advanced Technology (NJCAT)
c/o Center for Environmental Systems
Stevens Institute of Technology
One Castle Point
Hoboken, NJ 07030

Subject: Submittal of laboratory verification report for SiteSaver STSS-4 & STSS-1

Dr. Magee,

Previous laboratory testing has demonstrated that SiteSaver models can achieve a weighted TSS removal rate of at least 50% based on the New Jersey Department of Environmental Protection (NJDEP) hydrodynamic separator MTD protocol. Many jurisdictions across North America are interested in stormwater MTD removal performance of sediment with an alternative particle size distribution (PSD). Since there are no widely accepted models for predicting capture of sediment of a different particle size, additional testing was undertaken to look at capture of sediment with an alternative PSD. The subsequent testing conducted followed the protocol requirements specified within the "New Jersey Department of Environment Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device," dated January 25, 2013 with the following exceptions:

1) The TSS removal test utilized a readily available AGSCO silica sand (0-500 µm) rather than the PSD specified within the NJDEP protocol (0-1000 µm).

2) Scour testing results are based upon the NJDEP scour sediment at a flow rate that is 200% or greater than the tested MTFR.

3) Annualized weighted TSS removal efficiency was not utilized since it is specific to New Jersey climatic conditions and may not be applicable in other geographic regions; rather, one target flow rate was established, and three tests were conducted where the flows were within ±10% of the targeted flow rate. Removal efficiencies of each test were then calculated and averaged to determine the MTFRs and subsequent corresponding removal rates.

StormTrap LLC certifies that the protocol requirements of "New Jersey Department of Environment Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device," dated January 25, 2013, were met or exceeded with the exceptions listed above.

Sincerely,

StormTrap Inc.

Dan Fajman

General Manager – Water Quality

PHONE 815 941 4663 WEB www.stormtrap.com 1287 Windham Parkway
FAX 331 318 5347 EMAIL info@stormtrap.com Romeoville, Illinois 60446

Good Harbour Laboratories

April 10, 2019

Dr. Greg Williams, Managing Director
Good Harbour Laboratories Ltd.
2596 Dunwin Dr.
Mississauga, ON L5L 1J5

Dr. Richard Magee
Executive Director
New Jersey Corporation for Advancement of Technology

RE: Third party observation of testing of the StormTrap STSS-4® and STSS-1® using a coarse material with a median particle size (d_{50}) of 175 microns, following the procedure outlined in the **New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device (January 25, 2013)**

Dear Dr. Magee,

This purpose of this letter is to confirm that Good Harbour Laboratories staff, specifically Joe Costa, De Wu Zhang or I, witnessed all of the STSS-4 and STSS-1 testing that is included in the report **StormTrap® SiteSaver® Hydrodynamic Separator Removal Efficiency of Sediment with a Median Particle Size (d50) of 175 Microns (April 2019)**. Testing was conducted at the client's facility in Morris, Illinois from March 2017 to September 2017. Although the test location changed over the course of the testing program, from inside the clients facility to out in the yard, I can attest that all the testing was done in accordance with the above referenced protocol, as required by the **Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology, for use in accordance with the Stormwater Management Rules N.J.A.C. 7:8 (January 25, 2013).**

Prior to each round of testing we confirmed that the instrumentation being used was calibrated and we witnessed the blending of sediment delivered from Agsco directly to StormTrap. All sediment was sealed and unsealed under supervision. GHL staff also took physical measurements and pictures of the test set up.

During the testing we witnessed the sampling during every run and verified all mass measurements. We also verified all sample bottle labels and confirmed the chains of custody for all analyzed samples.

After the testing we reviewed all of the data, calculations and conclusions contained in the report. I can confirm that the report accurately represents what we observed. Furthermore, GHL has retained copies of the background data, field notes, analytical reports and calibration certificates, as well as the calculations, in an independent and secure location on the GHL server. This supporting information is available to you upon request.

In addition I, the undersigned, on behalf of GHL confirm:

-that we do not have any conflict of interest in connection to the contracted testing. Potential conflict of interest may arise in particular as a result of economic interests, political or national affinities, family or emotional ties, or any other relevant connection or shared interest;

-that we will inform NJCAT, without delay, of any situation constituting a conflict of interest or potentially giving rise to a conflict of interest;

-that we have not granted, sought, attempted to obtain or accepted and will not grant, seek, attempt to obtain, or accept any advantage, financial or in kind, to or from any party whatsoever, constituting an illegal or corrupt practice, either directly or indirectly, as an incentive or reward relating to the award of the contract.

Sincerely,

Greg Williams

Greg Williams, Ph.D., P.Eng.

CC: Dan Fajman, StormTrap LLC

Good Harbour Laboratories
T: 905.696.7276 | F: 905.696.7279
A: 2596 Dunwin Drive, Mississauga, ON L5L 1J5
www.goodharbourlabs.com

Center for Environmental Systems
Stevens Institute of Technology
Castle Point Station
Hoboken, NJ 07030-0000

May 8, 2019

Mr. Dan Fajman
General Manager-Water Quality
StormTrap
1287 Windham Parkway
Romeoville, IL 60446

Dear Mr. Fajman,

Based on my review, evaluation and assessment of the testing conducted on two StormTrap SiteSaver® Hydrodynamic Separators (Models STSS-4 and STSS-1)) by StormTrap on the removal efficiency of a sediment with a median particle size (d_{50}) of ~175 microns, observed by Dr. Gregory Williams, P.E. of Good Harbour Laboratories, Ltd., Mississauga, Ontario, 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" (NJDEP HDS Protocol) were met with the exceptions as noted below.

Test Sediment Feed -The mean PSD of the test sediment utilized for removal efficiency testing was significantly courser than the PSD criteria established by the NJDEP HDS protocol (175 µm vs 75 µm). Therefore the results should be interpreted with caution.

Removal Efficiency Testing – The New Jersey annualized weighted TSS removal efficiency was not utilized. Rather one flow rate (Maximum Treatment Flow Rate - MTFR) was targeted and three (3) runs were conducted at this flow rate to establish performance of the STSS-4 and the STSS-1 at the MTFR.

Scour Testing – Scour testing was conducted with the NJDEP scour test sediment PSD requirement exceeded, at a flow rate greater than the 200% MTFR requirement. It should be noted that the scour test sediment PSD was significantly finer than the influent sediment PSD. The scour sediment PSD would have more representative of the sediment removed had the influent sediment been used for the scour testing.

All other criteria and requirements of the NJDEP protocol were met. These include: flow rate measurements COV <0.03; test sediment influent concentration COV <0.10; test sediment influent concentration within 10% of the targeted value of 200 mg/L; influent background concentrations <20 mg/L; water temperature <80 ^{o}F; and adjusted scour effluent concentration <20 mg/L, qualifying the STSS-4 and STSS-1 for online installation.

Sincerely,

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

8. References

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