Application for STEPP Concurrence of Verified Stormwater Hydrodynamic Separators

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The Stormwater Testing and Evaluation of Products and Practices (STEPP) program defines concurrence as acceptance of performance verification(s) performed by another entity. STEPP provides concurrence with verified Hydrodynamic Separators (HDS) that were tested using ASTM (American Society for Testing and Materials) protocols or protocols that are consistent with ASTM protocols. The applicable ASTM standard for HDS is the most recent version of ASTM C1746 - ***Standard Test Method for Measurement of Suspended Sediment Removal Efficiency of Hydrodynamic Stormwater Separators and Underground Settling Devices*.** For testing done through the New Jersey Corporation for Advanced Technology (NJCAT) and certified by the New Jersey Department of Environmental Protection, the applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device", dated January 1, 2021.

The STEPP concurrence process is illustrated in Figure 1. The proponent completes this application and submits it to STEPP. STEPP reviews the application for completeness. If the Application is accepted and an application fee has been received by STEPP from the HDS proponent, then a STEPP External Review Group (SERG) reviews the appropriate documents and recommends, to STEPP, whether the HDS be approved for concurrence. If necessary, STEPP may work with the proponent to address any issues or concerns. If STEPP staff and the SERG recommend concurrence, STEPP will send a concurrence letter to the proponent and will post the letter on the STEPP website. A STEPP decision document will be posted on STEPP's website.

An example concurrence application is contained in Appendix A.

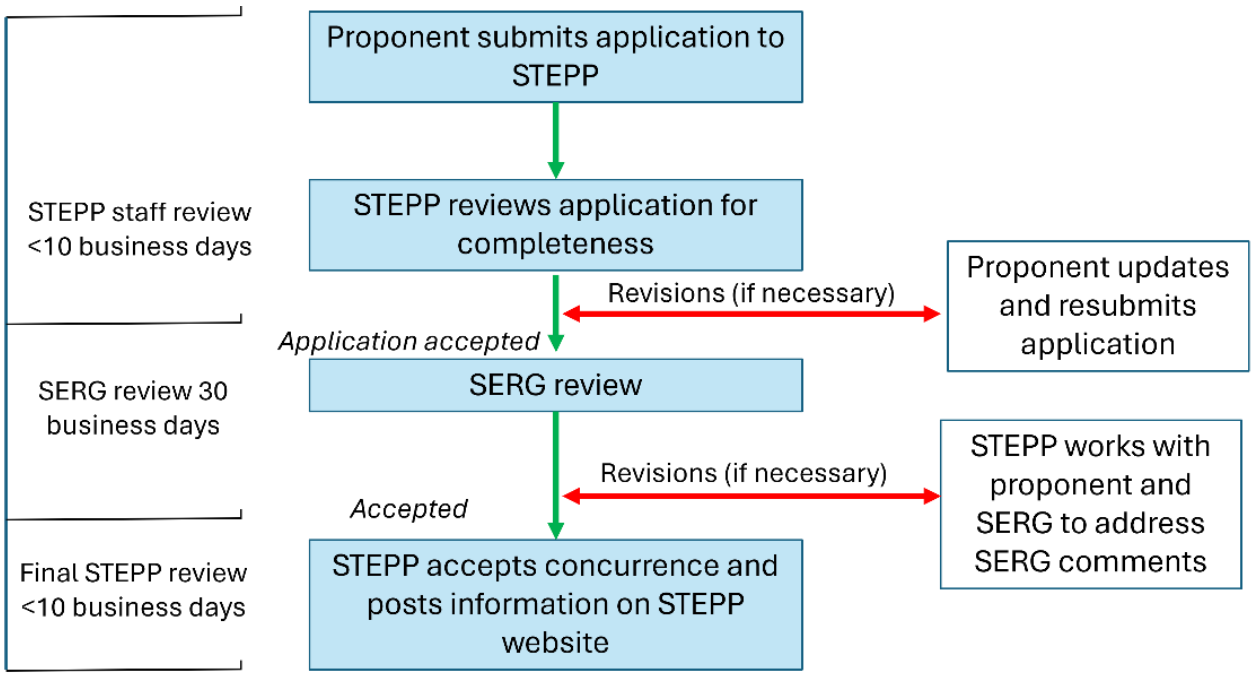


Figure 1: STEPP process for concurrence for an HDS Stormwater Control Measure (SCM) verified by others as being consistent with applicable ASTM standard(s).

Required information

1. Describe the test protocol used to verify the hydrodynamic separator (HDS). If the HDS verification is from NJCAT, the appropriate protocol is "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device", dated January 1, 2021.
2. Summary information
    a. Manufactured treatment device (MTD) type:
    b. Company:
    c. Product Name:
    d. Product (including technology description w photos/figures):
    e. Test protocol(s), including ASTM:
    f. Verified maximum treatment flow rate (gpm):
    g. Verified surface loading rate (gpm/ft^2):
    h. Test model size:
    i. Test model area (ft^2):
    j. Depth below invert (ft):
    k. Maximum storage depth (in):
    l. Maximum storage volume (ft^3):
    m. Particle size distribution:
    n. Scaling method:
        i. If the scaling method is not based on the horizontal footprint of the device, summarize testing of two models and the basis for the alternative method.
    o. Maximum scour test flow rate

p. TSS concentration at maximum scour test flow rate
q. Is the HDS certified for off-line configuration?
r. Configurations tested:

3. Table illustrating verified removal efficiencies

4. Removal efficiency curve formula and verified removal efficiency curve

5. Table summarizing particle size distribution and accompanying plot

6. Table summarizing results of head loss testing

7. Table summarizing results of scour testing

Appendix A – Example Completed Application Form

1. Describe the test protocol used to verify the hydrodynamic separator (HDS). If the HDS verification is from NJCAT the appropriate protocol is "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device", dated January 1, 2021.

   "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device".

2. Summary information
   a. Manufactured treatment device (MTD) type: **Hydrodynamic Separator**
   b. Company: **Clean Water Corporation**
   c. Product Name: **Steady Eddy**
   d. Product (including technology description w photos/figures): **StorClean**
   The Steady Eddy device removes suspended sediments by (describe unit processes and flow paths here. Insert photos/schematics below).

Insert image, photo, schematic

   e. Test protocol: **XXX January 1, 2021 HDS protocol**
   f. ASTM protocols: **ASTM E3332-23, Standard Test Method for Determining Trash and/or Debris Capture Performance of Stormwater Control Measures**
   g. Verified maximum treatment flow rate (gpm): **400**
   h. Verified surface loading rate (gpm/ft^2): **31.8**

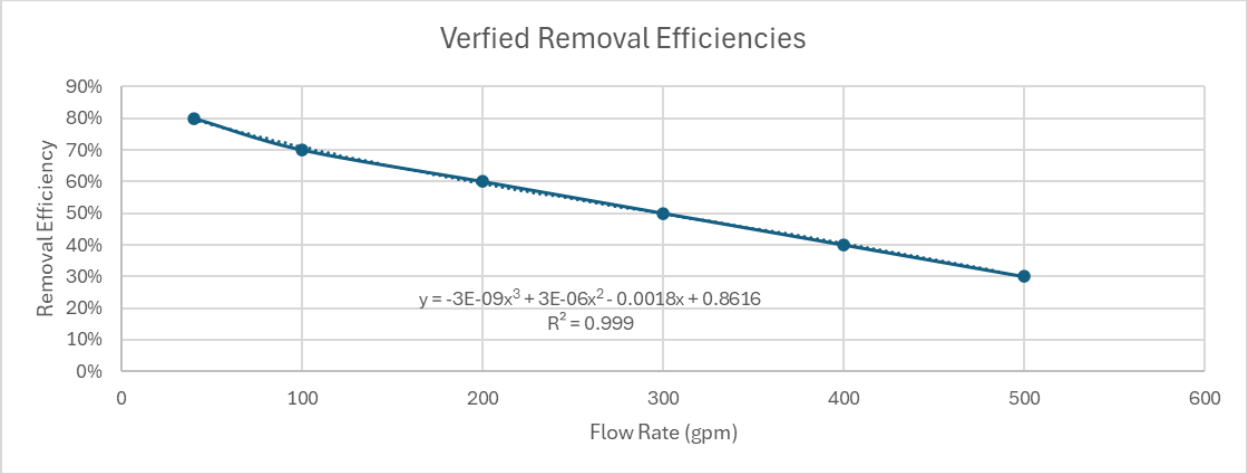
i. Test model size: **4 ft round**
j. Test model area (ft^2): **12.56**
k. Depth below invert (ft): **3**
l. Maximum storage depth (in): **18**
m. Maximum storage volume (ft^3): **9.4**
n. Particle size distribution: **the test sediment blend meets the specification as described in Section 4A of the 2021 New Jersey Protocol.**
o. Scaling method: **Horizontal footprint of the device**
p. Maximum scour test flow rate: **200% of the MTFR**
q. TSS concentration at maximum scour test flow rate: **17 mg/L**
r. Is the HDS certified for off-line configuration? **No**
s. Configurations tested (attach standard detail): **Steady Eddy Super Plus 4 foot round**

Insert or attach standard detail

3. Table illustrating verified removal efficiencies

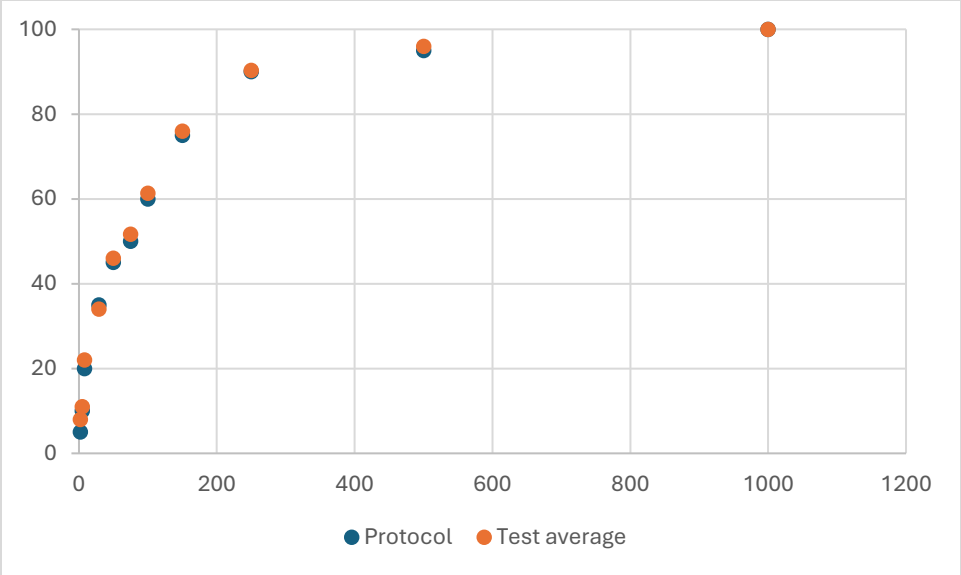
Removal Efficiency Results Over the Range of Tested Flow Rates						
% of Verified MTFR	Flow Rate (gpm)	Surface Loading Rate (SLR) (gpm/sf)	Removal Efficiency (%)	Retained Sediment in Inlet Pipe (%)	Weighting factor (%)	Weighted Removal (%)
10%	40	3.2	80%	0%	0%	0%
25%	100	8	70%	0%	25%	17.50%
50%	200	15.9	60%	0%	30%	18.00%
75%	300	23.9	50%	0%	20%	10.00%
100%	400	31.8	40%	0%	15%	6.00%
125%	500	39.8	30%	0%	10%	3.00%
						54.50%

4. Removal efficiency curve formula and verified removal efficiency curve



5. Particle size distribution

Particle Size Distribution Analysis Results for the Test Sediment						
Particle size (um)	**% Finer**				**Test sediment average**	**Diff. from protocol**
	Protocol	**Sample 1**	**Sample 2**	**Sample 3**		
1000	100	100	100	100	100	0
500	95	98	94	96	96	1.0
250	90	91	90	90	90.3	0.3
1350	75	77	76	75	76	1.0
100	60	63	60	61	61.3	1.3
75	50	53	50	52	51.7	1.7
50	45	46	46	46	46	1.0
29	35	34	35	33	34	-1.0
8	20	21	22	23	22	2.0
5	10	11	9	13	11	1.0
2	5	7	8	9	8	3.0



6. Head loss testing

Head Loss Results			
Flow(gpm)	**Inlet h (in)**	**Outlet h (in)**	**Delta h (in)**
0	0	0	0
10	2.7	1.4	0.5
20	3.7	2	0.7
50	6	3.1	1.1
100	6.9	3.5	1.3
200	10.4	5	2.1
300	10.9	5.3	2.2
400	13.9	6.9	2.8

7. Scour testing

Scour Testing Results			
Scour testing effluent sample #	**Measured Effluent SSC (mg/L)**	**Expanded background SSC (mg/L)**	**Adjusted Effluent SSC (mgL)**
Eff-1	0.5	1.1	0
Eff-2	1.3	0.8	0.5
Eff-3	6.8	0.5	6.3
Eff-4	8.9	0.5	8.4
Eff-5	10.2	0.5	9.7
Eff-6	11.6	0.5	11.1
Eff-7	8.4	0.5	7.9

Eff-8	11	0.8	10.2
Eff-9	11	1.1	9.9
Eff-10	6.5	0.8	5.7
Eff-11	8.2	0.5	7.7
Eff-12	7.9	0.5	7.4
Eff-13	8.7	0.5	8.2
Eff-14	6.8	0.5	6.3
Eff-15	3.7	0.5	3.2
Avg	**7.4**		**6.8**
Max	**11.6**		**11.1**