State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHILIP D. MURPHY
Governor

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Lt. Governor

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SHAWN M. LATOURETTE
Commissioner

June 23, 2021

Walter Stein, P.E.
Jensen Water Resources
521 Dunn Circle
Sparks, NV 89431

Re: MTD Lab Certification
StormVault BioFiltration with Sierra Blend
Online Installation

TSS Removal Rate 80%

Dear Mr. Stein:

This revised certification letter supersedes the Department's prior certification dated May 5, 2020. This revision was completed as a result of a change to the company name (formerly Jensen Stormwater Systems), and the development of an updated maintenance manual. No other modifications were made to this certification.

The Stormwater Management rules under N.J.A.C. 7:8-5.2(f) and 5.2(j) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Jensen Water Resources (Jensen) has requested a Laboratory Certification for the StormVault Biofiltration with Sierra Blend ("SVBF") system.

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated April 2020) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the StormVault Biofiltration with Sierra Blend stormwater treatment unit by Jensen at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2 gpm/ft^2 of effective filtration treatment area.

2. The SVBF stormwater treatment unit shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 7 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 11.3 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the SVBF. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.jensenprecast.com/water-resources/product/biofiltration-systems/ for any changes to the maintenance requirements.

6. For an MTD to be considered "green infrastructure" in accordance with the March 2, 2020 amendments to the Stormwater Management rules at N.J.A.C. 7:8, the MTD must meet the GI definition noted at amended N.J.A.C. 7:8-1.2. Specifically, the MTD shall (1) infiltrate into the subsoil; and/or (2) treat stormwater runoff through filtration by vegetation or soil. The SVBF can be configured in two different manners, either as an open top planter box for shrubs, other smaller plants, or as a grated tree box; or it can be configured as an underground treatment vault fed by a subsurface inlet pipe. Any configuration that uses a bio-filtration media and can be configured "above ground" and incorporate a tree box, planter box, or shrubs, etc., would meet the GI definition. Any MTD with bio-filtration media that would be placed "below ground" as a vault without any vegetation can be considered GI (for NJ purposes) only if the device infiltrates the entire Water Quality Design Storm into the subsoil. Further, the below ground device (vault) would need to meet the NJDEP Stormwater BMP Manual conditions of having the soil below the MTD meet the minimum tested infiltration rate of one inch per hour, have at least two feet of separation from the seasonal high water table, and infiltrate into the subsoil.

7. Sizing Requirement:

   The example below demonstrates the sizing procedure for the SVBF:

   Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using an SVBF. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The selection of the appropriate model of SVBF is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the SVBF in this example is 0.25 acres. Based upon the information in Table 1 below, all of the SVBF models would be able to treat runoff without exceeding the maximum allowable drainage area.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes
i = 3.2 in/hr (page 21, Fig. 5-10 of Chapter 5 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs (354.58 gpm)
(Note: 1 cfs = 448.83 gpm)

Given the site runoff is 0.79 cfs and based on Table 1 below, the minimum size unit to be used to treat the runoff without exceeding the MTFR is the Model SVBF 10 x 20.

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below:

Table 1. StormVault BioFiltration with Sierra Blend (SVBF) Model MTFRs and Maximum Allowable Drainage Area.

Configuration	**Dimensions (ft)**	**Media Surface Area (ft^2)**	**MTFR (cfs)**[1]	**Maximum Allowable Drainage Area (acres)**
SVBF Unit	3 x 5	15.00	0.07	0.28
	4 x 4	16.00	0.07	0.30
	4 x 6.5	26.00	0.12	0.48
	4.5 x 8.5	38.25	0.17	0.71
	5 x 5	25.00	0.11	0.48
	5 x 10.5	52.50	0.23	0.97
	6 x 6	36.00	0.16	0.67
	6 x 8	48.00	0.21	0.89
	6 x 12	72.00	0.32	1.33
	6 x 15	90.00	0.40	1.67
	8 x 8	64.00	0.29	1.19
	8 x 10	80.00	0.36	1.48
	8 x 16	128.00	0.57	2.37
	10 x 20	200.00	0.89	3.70

Table 1. StormVault BioFiltration with Sierra Blend (SVBF) Model MTFRs and Maximum Allowable Drainage Area (continued)

Configuration	Dimensions (ft)	Media Surface Area (ft^2)	MTFR (cfs)[1]	Maximum Allowable Drainage Area (acres)
SVBF with Internal Bypass	3 x 5	14.91	0.07	0.28
	4 x 4	15.91	0.07	0.29
	4 x 6.5	25.91	0.12	0.48
	4.5 x 8.5	38.16	0.17	0.71
	5 x 5	24.91	0.11	0.46
	5 x 10.5	52.41	0.23	0.97
	6 x 6	35.80	0.16	0.66
	6 x 8	47.80	0.21	0.89
	6 x 12	71.80	0.32	1.33
	6 x 15	89.80	0.40	1.66
	8 x 8	63.80	0.28	1.18
	8 x 10	79.80	0.36	1.48
	8 x 16	127.80	0.57	2.37
	10 x 20	199.80	0.89	3.70

1. Calculated based on 2.0 gpm/ft^2 (0.004 cfs/ft^2) of effective filtration treatment area.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Anthony Robalik of my office at anthony.robalik@dep.nj.gov.

Sincerely,

Gabriel Mahon

Gabriel Mahon, Chief
Bureau of NJPDES Stormwater Permitting & Water Quality Management
Division of Watershed Protection and Restoration
New Jersey Department of Environmental Protection

Attachment: Maintenance Plan

cc: Richard Magee, NJCAT

StormVault Biofiltration

(SVBF)

OPERATION & MAINTENANCE MANUAL

<u>Prepared For</u>
Project Name:
Project Location:
Date:

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PROJECT INFORMATION
FOR
STORMVAULT BIOFILTRATION (SVBF) UNITS

Project:

Location:

Subject:

SWTU: **STORMVAULT BIOFILTRATION (SVBF) UNITS**

Model: **SVBFXX-XX**

INTRODUCTION

The ***StormVault BioFiltration*** (***SVBF***) stormwater treatment unit (SWTU), is a bioretention manufactured treatment device (MTD) designed for the treatment of stormwater runoff. Using the proprietary ***Sierra Blend*** engineered bio-soil media, the ***SVBF*** captures and removes pollutants from stormwater including total suspended solids, heavy metals, nutrients, gross solids, trash and debris, and petroleum hydrocarbons. Many of these pollutants are regulated by local, state, and/or federal government(s) who limit the allowable level of pollutants in stormwater runoff discharging from a site. Due to the high hydraulic surface loading rate capacity of the ***Sierra Blend*** bio-soil media, the ***SVBF*** system is able to treat more stormwater in a smaller footprint than conventional bioretention systems.

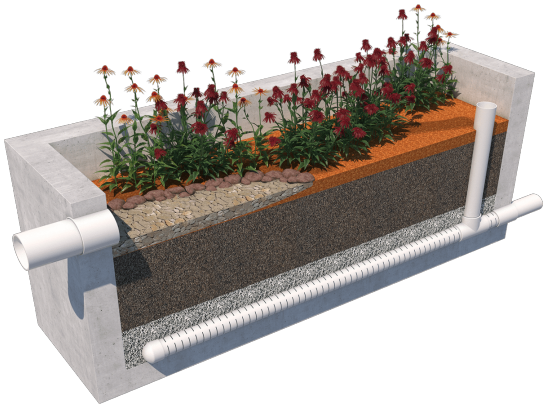
DEPLOYMENT CONFIGURATIONS

The ***SVBF*** comes in many standard sizes and is available in several different deployment configurations. Depending on the deployment configuration, units may have additional parts or chambers that will need to be inspected and maintained. In addition to the standard model featuring only the treatment chamber, other deployment configurations may include an inlet and outlet chamber separated by a high-flow bypass weir, as well as an underground vault model without vegetation. However, inspection and maintenance across all deployment configurations should remain consistent and generally follow the same procedures.

The ***SVBF*** unit consists of a precast concrete vault layered with 3-inches of plant stabilization mulch/media, 18-inches of the ***Sierra Blend*** bio-soil media, and 6-inches of bridging stone above

the underdrain piping, with an internal or external high-flow bypass. Different deployment configurations of the unit are available to better serve the requirements and needs of a specific site. Deployment configurations include a planter box with an open top more suited for shrubs and grasses to better mimic a natural swale, a tree box with or without a grated curb inlet, a tree well consisting of an adjacent tree well with open bottom to promote mature tree root growth, and an underground vault with a subsurface inlet pipe. All of these deployment configurations can be deployed with block-outs in the bottom of the vault to promote infiltration and groundwater recharge.

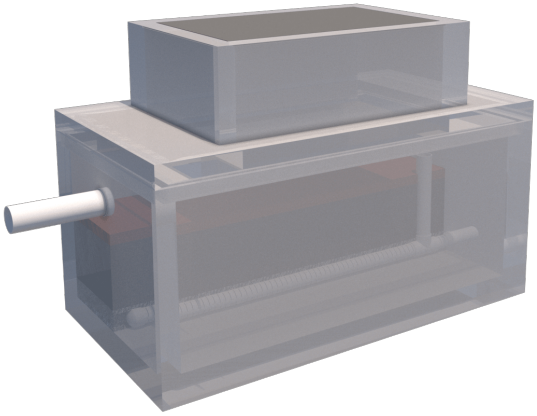
The following illustrations depict the various possible deployment configurations of the ***SVBF*** unit.



Planter Box Model

Tree Box Model

Tree Well Model



Underground Vault Model

OPERATIONS

The ***SVBF*** unit is a non-mechanical, self-operating system that will function anytime there is flow within the drainage system. The plant stabilization mulch/media, the ***Sierra Blend*** bio-soil media, and the bridging stone are arranged in layers within the chamber with stormwater gravity flowing downward through these layers. The plant stabilization mulch/media layer consists of hardwood mulch and/or large stone riprap and serves as pretreatment, removing the trash, debris, and large sediment while increasing moisture retention, erosion control, and flow dissipation across the treatment chamber. The ***Sierra Blend*** bio-soil media treats the stormwater, removing fine and suspended sediment, heavy metals, and nutrients. The bridging stone, the gravel base beneath the ***Sierra Blend*** bio-soil media bed ensures even drainage. Treated stormwater enters an underdrain pipe, infiltrates into the ground, or splits between both.

A system bypass allows the ***SVBF*** unit to continue to operate in high-flow situations without washing out or scouring the pollutants already trapped in the system. After the water quality treatment flow depth is reached, excess flow spills over a bypass weir or overflow pipe and is directly discharged along with treated flows. Flows greater than the water quality treatment flow rate of a unit will cause ponding within the unit.

An external bypass consists of a separate catch basin or other external bypass structure located further downstream from the unit.

INSPECTION

NEW INSTALLATIONS – Jensen recommends a visual inspection of the unit every 6-months or for every 10-inches of rainfall, whichever comes first, but regular inspections during the first two to three years of operation will help to establish a site-specific frequency for future inspections and maintenance. During these regular inspections, light maintenance procedures such as clearing out trash and debris caught in the plant stabilization mulch/media and inlet grates or tending to vegetation can be completed. Clearing out trash and debris will prevent obstructions to the inlets and ensure the unit is operating at its maximum capacity. It is recommended to inspect the system after each major storm event during the first several months of the rainy season.

ONGOING OPERATION – The system should be routinely inspected to ensure that all grates and drains are free of blockage. After several storm events, inspections should look for signs of erosion of or accumulation of sediment in the plant stabilization mulch/media layer. If the plant stabilization mulch/media has been displaced due to flows and the ***Sierra Blend*** bio-soil media layer is visible, or heavy accumulation of sediment is apparent in the plant stabilization mulch/media layer, the steps outlined in the maintenance section should be followed to ensure that the ***SVBF*** unit is able to continue to operate at maximum capacity.

Use the attached Inspection & Maintenance Log in Appendix A, to help determine whether maintenance is needed.

Inspection Equipment

The following is a list of equipment for the simple and effective inspection of ***SVBF*** systems:

- Appropriate clothing (pants and shoes, gloves, safety vest, hard hat, etc.)
- Traffic control equipment (Traffic cones, signage, etc.)
- Manhole hook or crowbar
- Inspection & Maintenance Log or other recording method
- Flashlight
- Tape measure
- Trash grabber
- Shovel, rake, and broom
- Pruners
- Trash can/bag.

Inspection Procedure

All necessary pre-inspection steps including traffic control or pedestrian detours must be carried out. Access to underground, closed top ***SVBF*** units can be reached through the access hatch, grate or manhole frame and cover. When access has been safely established the following inspection procedure should begin:

- Record the date, time, and inspector on the day of inspection as well as the job location and model designation
- Observe and record the level of the scum line if any
- Clean off a section of the scum line on the side wall
- Inspections of the internal components can, in most cases, be accomplished through observations from the ground surface
- Check the inlet structures for any unwanted objects or obstructions and remove them
- Record and photograph any observations in the provided inspection form

- Observe the inside of the ***SVBF*** for trash, debris, or displacement of the plant stabilization mulch/media and ***Sierra Blend*** bio-soil media layers

- Observe the SVBF for "light", "medium", or "heavy" sediment loading within the plant stabilization mulch/media layer

    - For "light" loading, the sediment is difficult to distinguish amongst the plant stabilization mulch/media with the plant stabilization mulch/media appearing new

    - For "medium" loading, the sediment is apparent and may be concentrated in some areas, but the probing of the plant stabilization mulch/media reveals lighter loads beneath the first inch of plant stabilization mulch/media

    - For "heavy" loads, sediment is apparent across the entire top layer as well as beneath the first inch of plant stabilization mulch/media

- Finalize the inspection report with the designated manager to determine required maintenance

- It must be noted that closed top ***SVBF*** units may be considered confined space environments and only properly trained personnel possessing the necessary safety equipment should enter the unit to perform maintenance and/or inspection in adherence with the requirements of a confined space entry permit.

MAINTENANCE

The schedule for the maintenance of the ***SVBF*** unit should be established based on the results of the routine inspections outlined in the previous section.

Maintenance Equipment

In addition to the equipment necessary for inspection, the following equipment is recommended for performing maintenance on the ***SVBF*** unit:

- Traffic control equipment (Traffic cones, signage, etc.)

- Vactor truck as necessary.

Maintenance Indicators

From observations noted during previous inspections, the following items may be indications that the ***SVBF*** unit needs maintenance:

- The visual presence of a scum line on the wall above the plant stabilization mulch/media layer that is higher than the crest of the bypass weir or overflow pipe is a general indicator that the filter bed has operated in bypass mode and the ***Sierra Blend*** bio-soil media may be plugged
- Damage to the concrete structure
- Damaged or missing grates
- Obstruction of the curb inlet or inlet rack
- Water stagnation in the biofiltration chamber more than a full day after a rainfall event
- Invasive vegetation growth
- Excessive trash and debris, especially plastics
- Heavy sediment load present in the plant stabilization mulch/media or top of ***Sierra Blend*** bio-soil media
- Excessive erosion of the plant stabilization mulch/media or ***Sierra Blend*** bio-soil media.

Maintenance Procedure

Cleanout of the ***SVBF*** unit at the end of a wet season is recommended to ensure captured trash, debris, sediment, and invasive vegetation do not compromise the unit's functionality or harm plant housed in it.

The following maintenance activities should be performed during each service:

- Inspection of treatment system and housing structure
- Removal of any material or debris blocking flow into and through the unit
- Removal of trash and debris from plant stabilization mulch/media and visible flow paths
- Raking or replacement of plant stabilization mulch/media layer
    - ***Sierra Blend*** bio-soil media replacement should only be necessary after an oil or chemical spill clean-up or when the filter has become totally occluded with fines or possibly biofouling
- If vegetation is planted:
    - Pruning of vegetation
    - Replacement with new vegetation if current vegetation is in poor health for aesthetic purposes

- Ensure irrigation system is functional

- Disposal of any trash or debris collected.

If the ***Sierra Blend*** bio-soil media appears plugged due to the presence of a prominent scum line on the vault wall above the crest of the bypass:

- Remove the plant stabilization mulch/media layer, which should be replaced if necessary

- Rake the top of the ***Sierra Blend*** bio-soil media in ¼ to ½-inch depth passes until the original ***Sierra Blend*** bio-soil media is observed and to break any cementitious crust that may have formed

- Again, remember to clean off a section of the scum line on the side wall as an operational reset for future indicator measurements

If operations continue to appear to be in bypass condition:

- Replace any ***Sierra Blend*** bio-soil media that was removed and replace plant stabilization mulch/media

- Again, remember to clean off a section of the scum line on the side wall

If bypass events still appear to continue:

- Remove ***Sierra Blend*** bio-soil media as necessary until no more incoming sediment is observed within this media, exposing the underdrain pipe if necessary and replace all ***Sierra Blend*** bio-soil media if necessary

- Wash or replace the underdrain bridging stone layer

- Clean and place new ***Sierra Blend*** bio-soil media and plant stabilization mulch/media.

Replacement of the ***Sierra Blend*** bio-soil media is done either with hand tools or a mini excavator.

CLEANOUT AND DISPOSAL

Cleanout of the unit primarily involves the removal of trash and sediment from the unit. Trash and debris can be removed from the curb inlet, inlet rack, and the biofiltration chamber manually with tools such as rakes, shovels, brooms or by Vactor trucks if required.

- Disposal of material from the ***SVBF*** unit should be in accordance with the local municipality's requirements. Typically, the removed solids can be disposed of in a similar fashion as those materials collected from sump catch basins or manholes

- If any of the unit's parts previously mentioned under the inspection section are damaged or missing, or ***Sierra Blend*** bio-soil media is needed for replacement, please contact Jensen Water Resources

  Jensen Water Resources
  521 Dunn Circle
  Sparks, NV 89431
  Toll Free: (877) 649-0095
  Fax: (775) 440-2013

RECORDS OF OPERATION AND MAINTANACE

The owner shall maintain annual records of the operation and maintenance of the ***SVBF*** unit to document the effective maintenance of this important component of a site's stormwater management program.

The attached Inspection & Maintenance Log in Appendix A, is suggested and should be retained for a minimum period of three years.

Appendix A

Inspection & Maintenance Log

StormVault BioFiltration (SVBF)

ANNUAL RECORD OF OPERATION AND MAINTENANCE

OWNER _____

ADDRESS _____

OWNER'S REPRESENTATIVE _____ **PHONE** _____

SVBF MODEL DESIGNATION _____ **DATE** _____

SITE LOCATION _____

INSPECTIONS:

DATE & INSPECTOR	SCUM LINE LEVEL	INLET AND OUTLET INTEGRITY	STANDING WATER/ TRASH AND DEBRIS	MULCH AND EROSION	CONDITION OF VEGETATION	OBSERVATIONS OF FUNCTION

CLEANOUT:

DATE	SCUM LINE LEVEL	TRASH AND DEBRIS REMOVAL	MULCH MEDIA REPLACED (Y/N)	VEGETATION PRUNED REPLACED (Y/N)	METHOD OF DISPOSAL OF MULCH, MEDIA, TRASH AND DEBRIS, AND VEGETATION	OBSERVATIONS OF FUNCTION

MAINTENANCE:

DATE OF INSPECTION AND OBSERVATIONS: _____

_____

CERTIFICATION: _____ **TITLE:** _____ **DATE:** _____

Appendix B

Site Location Plans

Appendix C

Plan & Profile Drawings