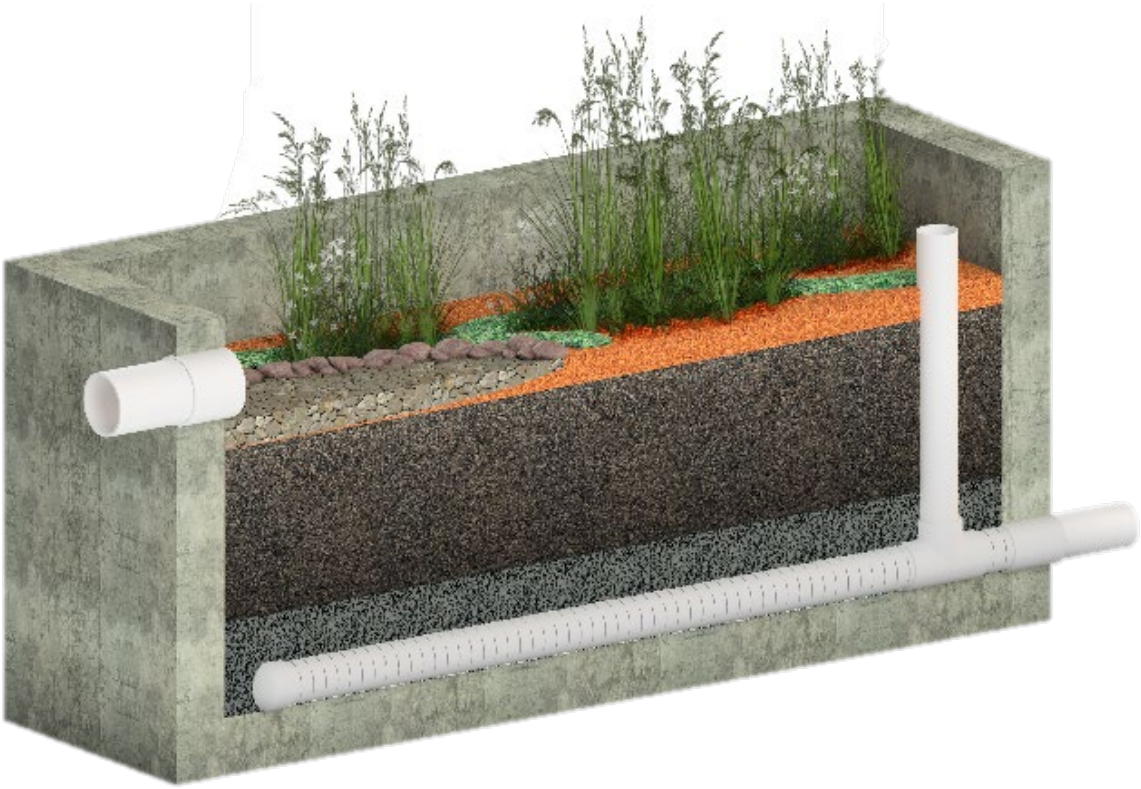
StormVault Biofiltration

(SVBF)

OPERATION & MAINTENANCE MANUAL



JENSEN® WATER RESOURCES

Prepared For
Project Name:
Project Location:
Date:

Table of Contents

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.

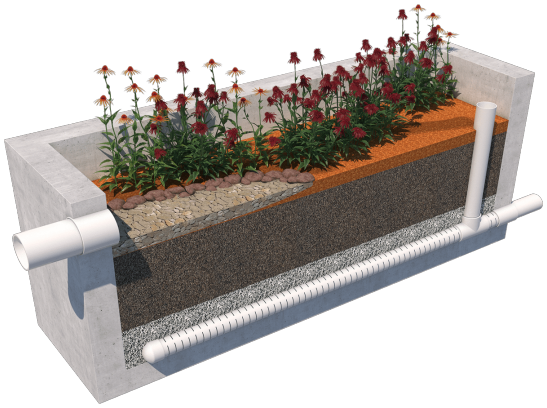
DEPLOYMENT CONFIGURATIONS

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.

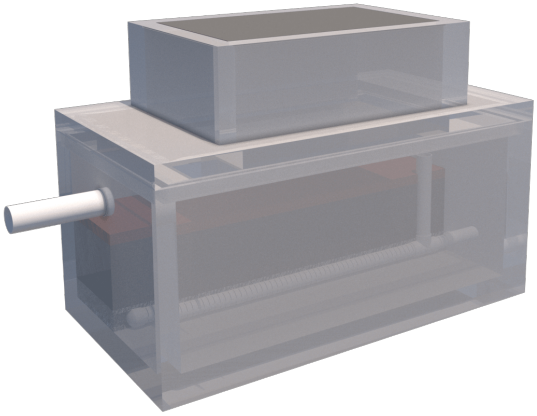
The following illustrations depict the various possible deployment configurations of the ***SVBF*** unit.



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