



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control

Division of Water Quality

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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 16, 2016

Zach J. Kent
Director of Engineering
Bio Clean Environmental Services, Inc.
398 Via El Centro
Oceanside, Ca 92058

Re: MTD Laboratory Certification
Kraken Stormwater Filtration System by BioClean Environmental Service, Inc.

TSS Removal Rate: 80%

Dear Mr. Kent:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) 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). BioClean Environmental Services, Inc. has requested a Laboratory Certification for the Kraken Stormwater Filtration System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced 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 for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the Kraken Stormwater Filtration System by BioClean Environmental Service, Inc., at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using to 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 1.11×10^{-4} cfs/sf (0.05 gpm/sf) of effective filtration treatment area.
2. The Kraken Stormwater Filtration System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6. below.
3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhance 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 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Kraken Stormwater Filtration System which is attached to this document. However, it is recommended to review the maintenance website at <http://www.biocleanenvironmental.com/kraken-operation-and-maintenance/> for any changes to the maintenance requirements.
6. Sizing Requirements:

The example below demonstrates the sizing procedure for a Kraken Stormwater Filtration System.

Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a Kraken Stormwater Filtration System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

The selection of the appropriate model of the Kraken Stormwater Filtration System is based upon both the MTFR and the maximum inflow drainage area. 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 Kraken Stormwater Filtration System in this example is 0.25 acres. Based upon the information in Table 1 below the Kraken Model KF-2.5-4 has a maximum inflow drainage area of 0.439 acres.

Maximum Treatment Flow Rate (MTFR) Evaluation:

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

time of concentration = 10 minutes
 $i=3.2$ in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
 $c=0.99$ (curve number for impervious)
 $Q=ciA=0.99 \times 3.2 \times 0.25=0.79$ cfs

Given the site runoff is 0.79 cfs and based on Table 1 below the KF-8-8 has a MTFR of 0.909 cfs. The KF-8-8 model is the smallest model approved that could be used for this site that would treat the impervious area without exceeding the MTFR.

The sizing tables corresponding to the available system models are noted below:

Table 1 KRAKEN FILTER MODEL MTFRs, SEDIMENT STORAGE CAPACITY AND MAXIMUM ALLOWABLE DRAINAGE AREA

Model	Number of Cartridges	Maximum Treatment Flow Rate, MTFR ¹ (cfs)	50% Maximum Sediment Storage Volume (ft ³)	Maximum Allowable Drainage Area Based on Loading ² (acres)
KF-2.5-4	8	0.152	1.37	0.439
KF-4-4	16	0.303	1.70	0.723
KF-4-6	24	0.455	2.59	1.099
KF-4-8	32	0.606	3.44	1.465
KF-8-8	48	0.909	8.38	2.623
KF-8-10	66	1.250	11.5	3.58
KF-8-12	78	1.477	13.4	4.219
KF-8-14	96	1.818	16.9	5.288
KF-8-16	114	2.159	19.9	6.203
KF-10-16	152	2.879	24.0	7.874

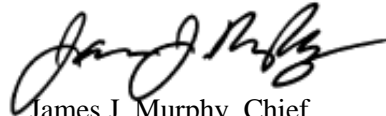
Notes:

1. Calculated based on 1.11×10^{-4} cfs/sf (0.05gpm/sf) of effective filtration treatment area
2. Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually

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 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 of the New Jersey Stormwater Best Management Manual.

If you have any questions regarding the above information, please contact Titus Magnanao, of my office, at (609) 633-7021.

Sincerely,

A handwritten signature in black ink, appearing to read "James J. Murphy". The signature is fluid and cursive, with the first name "James" being the most prominent.

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Kraken Filter Operation & Maintenance Manual

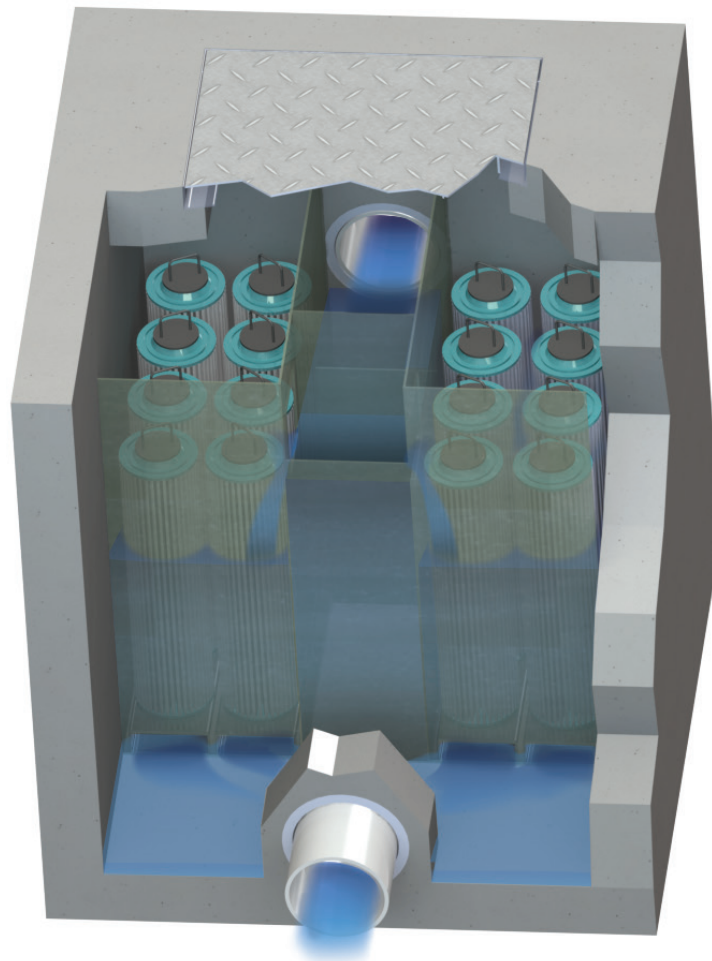
c: Chron File
Richard Magee, NJCAT
Vincent Mazzei, DLUR
Gabriel Mahon, BNPC
Ravi Patraju, NJDEP

THE **KRAKEN**

FILTER™



OPERATION & MAINTENANCE



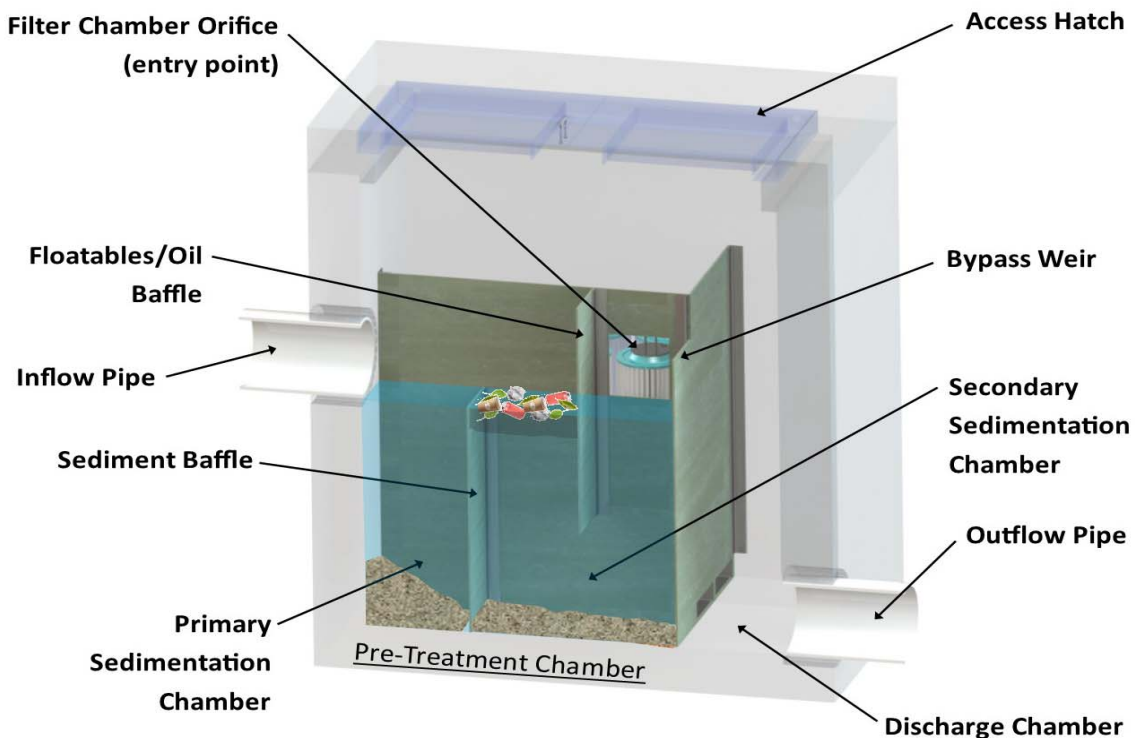
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P 760-433-7640
F 760-433-3176

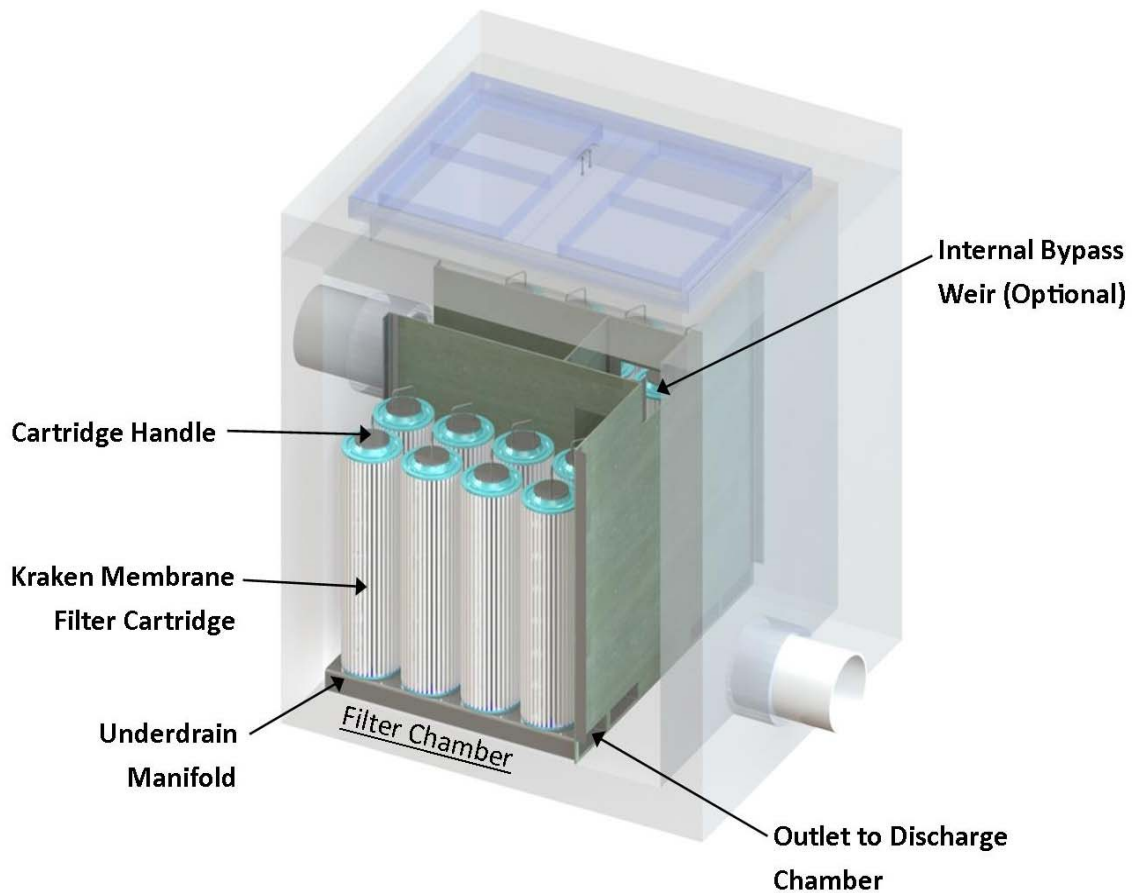
OPERATION & MAINTENANCE

The Kraken® Filter is designed at a minimal loading rate of only 0.05 gpm/sq ft of media surface to maximize longevity and minimize maintenance requirements. This is lower than any other system available. Passive backwash and pretreatment also help to minimize system maintenance requirements. The Kraken® Filter has proven to be able to handle up to at least 18 months sediment loading with no maintenance or loss of treatment capacity assuming 600 pounds of sediment per acre of impervious surface annually.

Yet, as with all stormwater BMPs inspection and maintenance on the Kraken® Filter is necessary. Stormwater regulations require that all BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. This is recommended because pollutant loading and pollutant characteristics can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding on roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided. Without appropriate maintenance a BMP will exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.



Pre-Treatment Chamber Diagram:



Filter Chamber Diagram:

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the Kraken® Filter:

- Bio Clean Environmental Inspection Form.
- Flashlight.
- Manhole hook or appropriate tools to access hatches and covers.
- Appropriate traffic control signage and procedures.
- Measuring pole and/or tape measure.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system.





Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Kraken® Filter are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long term inspection and maintenance interval requirements.

The Kraken® Filter can be inspected through visual observation without entry into the system. All necessary pre-inspection steps must be carried out before inspection occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Once these access covers have been safely opened the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the system through the access hatches. If minimal light is available and vision into the unit is impaired utilize a flashlight to see inside the system and all of its chambers.
- Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, filter chambers, discharge chamber or outflow pipe. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of floatable debris accumulated in the pre-treatment chamber. Record this information on the inspection form. Next utilizing a tape measure or measuring stick estimate the amount of sediment accumulated in the primary and secondary sedimentation chambers. Record this depth on the inspection form. Through visual observation inspect the condition of the filter cartridges. Look for excessive build-up of sediments on the surface and any build-up on the top of the cartridges. Record this information on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges.
- Obstructions in the system or its inlet or outlet.



- Excessive accumulation of floatables in the pre-treatment chambers in which the length and width of the chamber behind oil/floatables skimmer is fully impacted.
- Excessive accumulation of sediment in the primary sedimentation chamber of more than 18" in depth.
- Excessive accumulation of sediment in the secondary sedimentation chamber of more than 6" in depth.
- Excessive accumulation of sediment in the filter chambers of more than 3" on average.
- Substantial build-up of sediments on the filter membrane of the filter cartridges which will have a very dark appearance indicating the membrane may be fully saturated with sediment.

Maintenance Equipment

While maintenance can be done fully by hand it is recommended that a vacuum truck be utilized to minimize time requirements required to maintain the Kraken® Filter:

- Bio Clean Environmental Maintenance Form.
- Flashlight.
- Manhole hook or appropriate tools to access hatches and covers.
- Appropriate traffic control signage and procedures.
- Measuring pole and/or tape measure.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system. Entry into the system will be required if it is determine the cartridge filters need washing/cleaning.
- Vacuum truck.
- Trash can.
- Pressure washer.

Maintenance Procedures

It is recommended that maintenance occurs at least three days after the most recent rain even to allow for drain down of the system and any upstream detention systems designed to drain down over an extended period of time. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Cleaning of the pre-treatment chamber can be performed from finish surface without entry into the vault utilizing a vacuum truck. Once all safety measures have been set up cleaning of the pre-treatment chamber can proceed as followed:



- Using an extension on a boom on the vacuum truck position the hose over the opened access hatch and lower into the center of the primary sedimentation chamber. Remove all floating debris, standing water and sediment from the chamber. A power washer can be used to assist if sediments have become hardened and stuck to the walls or the flow of the chamber. Repeat the same procedure for the secondary sedimentation chamber. This completes the maintenance procedure required on the pre-treatment chamber.

If maintenance is required on the filter cartridges the following procedure can be followed after maintenance on the pre-treatment chamber is performed:

- Following rules for confined space entry use a gas meter to detect the presence of any hazardous gases. If hazardous gases are present do not enter the vault. Following appropriate confined space procedures takes steps, such as utilizing venting system, to address the hazard. Once it is determined to be safe enter utilizing appropriate entry equipment such as a ladder and tripod with harness.
- Once entry into the system has been established the maintenance technician should position themselves to stand in the pre-treatment chamber. From here the removal of the cartridges can commence.
- Each cartridge is pressure fitted in place and includes a handle for easy removal. To remove a cartridge simply grab the handle and pull straight up. It may be required to gently shift pressure from side to side while pulling up to break the pressure seal. Removal of the cartridge should be done by hand with minimal effort and requires no tools.
- Once the cartridges are removed they should be lifted out from the vault and brought up to finish surface for cleaning. Using a large garbage can and a standard garden hose (low pressure nozzle) each cartridge should be rinsed off from the outside to remove accumulated sediments and debris. Once each cartridge is rinsed it should be placed to the side for re-installation.
- Each filter chamber should be power washed and vacuumed clean before re-inserting the cleaned cartridges.
- After all cartridges have been washed they can be replaced back into the vault. To replace each cartridge simply slide cartridge over each pressure fitted coupler. Push down on the handle to ensure the cartridge has been fully seated and the bottom of the cartridge is making contact with the floor.
- The last step is to close up and replace all access hatch lids and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.

Maintenance Sequence



Remove Access Hatches Set Up Vacuum Truck to Clean The Pretreatment Chamber.



Insert Vacuum Hose in the Sedimentation Chamber and Vacuum Out All Trash, Sediment and Standing Water.



Assess the Condition of the Filter Cartridges and Determine If Cleaning is Required.



To Wash Cartridges Remove from Vault. Place Over Trash Can and Use a Garden Hose to Spray Clean.



Once Cleaned Install Back Into the Vault. This Completes Maintenance. Ensure Access Lids are Properly Replaced.

For Maintenance Services or Replacement Media Please Contact Us At:
 760-433-7640
info@biocleanenvironmental.com



Inspection and Maintenance Report Bio Clean Kraken Filter

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone () - _____

Inspector Name _____ Date ____ / ____ / ____ Time _____ AM / PM

Type of Inspection Routine Follow Up Complaint Storm Storm Event in Last 72-hours? No Yes

Weather Condition _____ Additional Notes _____

For Office Use Only

(Reviewed By) _____

(Date) _____
 Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Vault	Model #	Sediment Accumulation Sedimentation Chambers (lbs) & Filter Chambers (lbs)	Condition of Filter Cartridges & Were Filter Cartridges Cleaned	Structural Notes	Operational Per Manufactures' Specifications (If not, why?)
	Lat: _____ Long: _____					
	Lat: _____ Long: _____					
	Lat: _____ Long: _____					

Comments: _____
