



# CITY OF PORTLAND ENVIRONMENTAL SERVICES



1120 SW Fifth Avenue, Suite 613, Portland, Oregon 97204 ■ Mingus Mapps, Commissioner ■ Michael Jordan, Director

**January 25, 2021**

## **BES Stormwater Management Manual Approved Manufactured Stormwater Treatment Technology (MSTT)**

### **Bio Clean Environmental Services, Inc. Kraken Membrane Filter Stormwater Treatment System**

#### **City of Portland Decision:**

Per the requirements of the 2016 Stormwater Management Manual (SWMM), Bio Clean has demonstrated that the Kraken Membrane Filter is capable of meeting Portland's pollution reduction requirements if maintained adequately.

BES approves the device for use in the City of Portland on private property with the conditions contained in this document. The Kraken is not approved for use in the right-of-way, based on BES considerations about the logistical efficiency of the bureau's right-of-way maintenance operations for MSTTs, including the program changes (e.g. equipment and supplies) that would be required to service the Kraken.

#### **Background:**

As part of the application process, Bio Clean submitted the Washington State Department of Ecology (DOE) Technology Assessment Protocol (TAPE) Technology Evaluation Report for the device, including all appendices and performance monitoring data. The submittal demonstrates that with adequate maintenance the Kraken Membrane Filter is capable of meeting the City of Portland's pollution reduction requirements.

Bio Clean gave a technical presentation to City staff and the public on September 1, 2020. The presentation was followed by a technical interview with the City of Portland MSTT review committee to discuss water quality performance and other technical issues such as maintenance requirements.

Additional information is available online for this system, including:

- [Bio Clean website for the Kraken](#)
  - [State of Washington DOE TAPE Program Approval for the Kraken](#)
- Per the WA TAPE-program approval, the device has received the General Use Designation (GULD) for Basic Treatment at a hydraulic loading rate of 0.050 gpm/ft<sup>2</sup> of membrane.

### **Conditions of Use:**

1. All configurations covered in the WA TAPE approval for the Kraken Membrane Filter are approved for TSS removal. Selection of a specific configuration is the responsibility of the project designer.
2. Use of the Kraken does not exempt a project or site from required flow control requirements, operations and maintenance requirements, or other applicable requirements of the SWMM.
3. Bio Clean-certified providers should be utilized for activation, inspection and maintenance of the system.

### **Operations and Maintenance Requirements (Field Installations):**

The WA DOE General Use Level Designation for the Kraken, published in December 2019, provides a summary of available data concerning the frequency of maintenance required during field trials of the Kraken. (See [WA DOE Kraken GULD](#).) The document includes the following statement concerning issues to be addressed by the company: “Conduct hydraulic testing to obtain information about maintenance requirements on a site with runoff that is more typical of the Pacific Northwest.”

### **Project Designer Responsibilities:**

1. Ensure that the Conditions of Use are met.
2. Ensure the project meets all applicable requirements of the Portland SWMM, including the Stormwater Infiltration and Discharge Hierarchy.
3. Ensure the design and installation of the units are appropriate for the project goals, site conditions, long-term maintenance requirements, and any other site-specific design requirements.
4. Size units to meet the current Portland SWMM Presumptive Design Approach and pollution reduction requirements. The pollution reduction capacity is flow-based and assumes a treatment flow intensity of 0.19 inches per hour, with a 5-minute time of concentration, and a 0.90 runoff coefficient using the Rational Method with treatment rates based upon WA GULD approved flow rates. The treatment capacities for the Kraken Membrane Filter, based on those assumptions, are provided in Table 1. For sites with different times of concentration, different rainfall intensities may be appropriate.

**Table 1. Kraken Membrane Filter Sizing to Meet City of Portland  
Pollution Reduction Requirements**

Model #	Unit Size (ft)	Cartridge Capacity	Design Flow Rate (cfs)	Maximum Drainage Area (acres)
KF-2.5-4	2.5 x 4	4 to 8	0.151	0.88
KF-4-4	4 x 4	9 to 16	0.302	1.77
KF-4-6	4 x 6	17 to 24	0.454	2.65
KF-4-8	4 x 8	25 to 32	0.605	3.54
KF-8-8	8 x 8	33 to 48	0.907	5.30
KF-8-10	8 x 10	49 to 66	1.229	7.19
KF-8-12	8 x 12	67 to 78	1.474	8.62
KF-8-14	8 x 14	79 to 96	1.814	10.61
KF-8-16	8 x 16	97 to 114	2.155	12.60
KF-10-16	10 x 16	115 to 152	2.873	16.80

Sizing units to meet the current Stormwater Management Manual presumptive design approach and pollution reduction requirements. Each 30.75-inch-tall cartridge has 170 sq. ft. of surface area and a design flow rate of .019cfs.

- Each site plan must be reviewed by Bio Clean before the City of Portland can approve the unit(s) for site installation. A letter certifying the project has been designed to the manufacturer’s specification must be submitted to BES prior to approval of the building permit plan. The project designer is highly encouraged to work with Bio Clean prior to the appropriate review milestone to optimize placement and performance of the unit(s).
- If the project designer wishes to vary from these conditions of approval, the project designer must use the Performance Design Approach required by the SWMM.

**General Conditions:**

- BES may at any time suspend or revoke approval if the performance of the technology does not meet performance criteria, if there are changes to the TAPE certification, or the performance criteria change due to local, state, or federal pollution reduction standards.
- If any changes, updates, or revisions have occurred to the Kraken Membrane Filter, the applicant must obtain WA DOE TAPE GULD certification and re-apply following submission guidelines in effect at the time of the application.

**Revision History:**

Date	Action
January 25, 2021	The device was approved for use on private property in the City of Portland.