Stormwater Solutions Product Catalog

Biofiltration Products
Media Filters
Separator Products
Specialty Filters
Catch Basin Filters
Trash Screens
Replacement Media Products
Since 1999, Bio Clean has been leading the stormwater treatment industry and developing products to meet regulations and satisfy customer needs. What started out as a small family business in a California garage, has now grown into a corporation dedicated to providing reliable stormwater solutions. Through years of hard work, innovation, and dedication, the company has become an industry powerhouse with a portfolio of over a dozen products. Throughout the years our products have met and exceeded industry requirements and regulations for agency approvals. From trash screens to filter inserts, from bio filters to underground storage - Bio Clean is proven treatment stormwater technology.

Proven Stormwater Treatment Technology
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<td>Curb Gaurd</td>
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## Replacement Media Products

<table>
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<tr>
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The Modular Wetland System Linear™ (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system’s superior versatility makes it beneficial for a wide range of stormwater applications treating rooftops, streetscapes, parking lots, and industrial sites. The MWS Linear can be used for the following applications: industrial, residential, streets, parking lots, commercial, mixed use, agricultural, reuse, low impact development and waste water.

Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With its advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses nature’s ability to process, transform and remove even the most harmful pollutants.

Approvals

Washington State TAPE Approved
The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced and Phosphorus treatment at 1 gpm/ft² loading rate. The highest performing BMP on the market for all main pollutant categories.

DEQ Assignment
The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.

Maryland Department of the Environment Approved
Granted ESD (Environmental Site Design) status for new construction, redevelopment and retrofitting when designed in accordance with the Design Manual.

MASTEP Evaluation
The University of Massachusetts at Amherst - Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc and more.

Rhode Island DEM Approved
Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus and 30% Total Nitrogen.
Biofilter Products

Orientations

Side-By-Side
The Side-By-Side orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk.

Internal Bypass Weir (Side-by-Side Only)
The Side-By-Side orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system’s treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

External Diversion Weir Structure
This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

Flow By Design
This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

End-To-End
The End-To-End orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation.

DVERT Low Flow Diversion
This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications.

Flow Based Sizing

<table>
<thead>
<tr>
<th>Model#</th>
<th>Dimensions</th>
<th>Wetland Media Surface Area</th>
<th>Treatment Flow Rate (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWS-L-4-4</td>
<td>4’x4’</td>
<td>23 sq.ft.</td>
<td>0.052</td>
</tr>
<tr>
<td>MWS-L-4-6</td>
<td>4’x6’</td>
<td>32 sq.ft.</td>
<td>0.073</td>
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<tr>
<td>MWS-L-4-8</td>
<td>4’x8’</td>
<td>50 sq.ft.</td>
<td>0.115</td>
</tr>
<tr>
<td>MWS-L-4-13</td>
<td>4’x13’</td>
<td>63 sq.ft.</td>
<td>0.144</td>
</tr>
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<td>MWS-L-4-15</td>
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<td>76 sq.ft.</td>
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<td>MWS-L-4-17</td>
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<td>90 sq.ft.</td>
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</tr>
<tr>
<td>MWS-L-4-19</td>
<td>4’x19’</td>
<td>103 sq.ft.</td>
<td>0.237</td>
</tr>
<tr>
<td>MWS-L-4-21</td>
<td>4’x21’</td>
<td>117 sq.ft.</td>
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<tr>
<td>MWS-L-6-8</td>
<td>7’x9’</td>
<td>64 sq.ft.</td>
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<td>MWS-L-8-8</td>
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<td>MWS-L-8-20</td>
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<td>MWS-L-8-24</td>
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Volume Based Sizing

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<tr>
<th>Model #</th>
<th>Treatment Capacity (cu.ft.) @ 24-Hour Drain Down</th>
<th>Treatment Capacity (cu.ft.) @ 48-Hour Drain Down</th>
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<tbody>
<tr>
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<td>2280</td>
</tr>
<tr>
<td>MWS-L-4-6</td>
<td>1600</td>
<td>3200</td>
</tr>
<tr>
<td>MWS-L-4-8</td>
<td>2518</td>
<td>5036</td>
</tr>
<tr>
<td>MWS-L-4-13</td>
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<td>6261</td>
</tr>
<tr>
<td>MWS-L-4-15</td>
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<td>MWS-L-8-24</td>
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<td>30216</td>
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</tbody>
</table>
Biofilter Products

Advantages & Operation

1 Pre-Treatment

Separation
Trash, sediment and debris are separated before entering the pre-filter cartridges. Designed for easy maintenance access.

Pre-Filter Cartridges
Over 25 sq.ft. of surface area per cartridge. Utilizes BioMediaGREEN filter material. Removes over 80% of TSS & 90% of hydrocarbons. Prevents pollutants that cause clogging from migrating to the biofiltration chamber.

2 Bio Filtration

Horizontal Flow
Less clogging than downward flow biofilters. Water flow is subsurface. Improves biological filtration.

Patented Perimeter Void Area
Vertically extends void area between the walls and the WetlandMEDIA on all four sides. Maximizes surface area of the media for higher treatment capacity.

WetlandMEDIA
Contains no organics and removes phosphorus. Greater surface area and 48% void space. Maximum evapo-transpiration. High ion exchange capacity and light weight.

3 Discharge

Flow Control
Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media’s capacity. Extends the life of the media and improves performance.

Drain-Down Filter
The Drain-Down is an optional feature that completely drains the pre-treatment chamber. Water that drains from the pre-treatment chamber between storm events will be treated.

2x to 3x More Surface Area Than Traditional Downward Flow Bioretention Systems
Configurations

Curb Type
The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.

Grate Type
The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the system’s pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.

Vault Type
The system’s patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the “pipe in” design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

Downspout Type
The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.
The WetlandMod™ system is built upon the concept of horizontal flow biofiltration, which was first introduced by the MWS Linear. Horizontal flow works with gravity, not against it, to prevent clogging, standing water and other problems associated with traditional downward flow bioretention systems. Bioretention systems have an inherent flaw, the force of gravity. As stormwater runoff carries pollutants into the system, including sediments and hydrocarbons, they are deposited on top of the bioretention media where it accumulates and quickly clogs the filter media. It has been documented that sediment accumulation from just a few storm events can completely clog a bioretention system. This leads to drastically reduced infiltration rates, expensive maintenance burdens, and safety issues associated with standing water, depressed landscaping and vector control.

The WetlandMod overcomes these challenges by utilizing pre-treatment, a horizontal flow bio-filtration bed, and orifice flow control. The initial surface of the media bed in the WetlandMod is oriented on a vertical plane, as opposed to horizontally, therefore running parallel with the force of gravity as opposed to perpendicular. This simple concept increases surface area, reduces BMP footprint, prevents clogging and leads to an enhanced overall system with lower maintenance costs. The WetlandMod can utilize various media blends to meet local stormwater bioretention media specifications. The system is also available with an organic-free WetlandMedia™ to prevent nutrient leaching and maximize pollutant removal.

This modular system provides the same treatment train concept as the industry leading Modular Wetland System Linear™ (MWS Linear) - screening, separation, & biofiltration combined with the capacity to reduce and control water volume in a more efficient way when compared to traditional downward flow bioretention systems.

Configurations

One of the biggest challenges of the implementation of LID and bioretention/biofiltration systems is the associated space requirements. The large space requirements of traditional bioretention systems can cause design and feasibility issues, increasing the overall cost to comply with local and state stormwater regulations. The WetlandMod marks the first technological breakthrough to address how we comply with these regulations. The goal of the system is to minimize footprint and land costs associated with traditional bioretention/biofiltration systems. This is achieved by utilizing horizontal flow technology and combining it with traditional downward flow, therefore maximizing the surface area for a given footprint.

Designed To Minimize Required BMP Footprint and Maximize Buildable Space

The WetlandMod system is constructed from modular precast concrete structures. The system comes standard with a curb-type pre-treatment structure, including internal bypass. The biofiltration chambers can be made in any length and shape (shown below) to allow for easy integration with parking lot island designs. The system comes in two standard widths, 4 feet (18” minimum media requirement - San Diego County) and 5 feet (24” minimum media requirement - Los Angeles County). Footprint Reduction Up To 61% Over Traditional Bioretention Systems (Example: Planter Boxes, Rain Gardens, Biofiltration).
Biofilter Products

Operation

Biofiltration Chamber

Patented perimeter void area maximizes surface area and minimizes footprint, saving space and money. The perimeter void area allows water to penetrate the media bed, not only from the top, but from all four sides.

Pre-Treatment Chamber Module

Pre-Treatment Chambers come standard with built-in curb inlets to intercept sheet flows from surrounding areas. The pre-treatment chamber is available with an optional internal bypass for high flows and it is easily accessible for quick maintenance. Trash, debris and sediments are isolated in a central location, minimizing maintenance requirements on the biofiltration chamber.

Sizing

<table>
<thead>
<tr>
<th>18&quot; Media Thickness</th>
<th>WetlandMod</th>
<th>Traditional Bioretention</th>
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<tbody>
<tr>
<td>Chamber Width I.D. (ft.)</td>
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<td>4.00</td>
</tr>
<tr>
<td>Cage Width (ft.)</td>
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</tr>
<tr>
<td>Void Width (ft.)</td>
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</tr>
<tr>
<td>Chamber Height Max (TC) (ft.)</td>
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<tr>
<td>Assoc. Cage Height Max (ft.)</td>
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<td>TC to Top of Cage Distance (ft.)</td>
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<td>Ponding Over Media (ft.)</td>
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<tr>
<td>Cage Width (ft.)</td>
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<td>n/a</td>
</tr>
<tr>
<td>Void Width (ft.)</td>
<td>0.33</td>
<td>n/a</td>
</tr>
<tr>
<td>Chamber Height Max (TC) (ft.)</td>
<td>4.40</td>
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</tr>
<tr>
<td>Assoc. Cage Height Max (ft.)</td>
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<td>n/a</td>
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<tr>
<td>TC to Top of Cage Distance (ft.)</td>
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<tr>
<td>Ponding Over Media (ft.)</td>
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<td>Chamber Height Min (ft.)</td>
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<tr>
<td>TC to Top of Cage Distance (ft.)</td>
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<td>Variable</td>
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<td>Footprint Reduction Provided</td>
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<td>MIN Surface Area per sq.ft.</td>
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<tr>
<td>Footprint Reduction</td>
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</table>
Biofilter Products

MWS Downspout

The MWS Downspout is an adaptation of our flagship MWS Linear and is designed to be used specifically as an above ground planter box for the treatment of roof runoff. The system is lightweight, available in various sizes and easy to install without the use of heavy equipment. The MWS Downspout offers a pre-treatment tray to collect leaves and debris for easy removal. The advanced biofiltration chamber offers maximum treatment capacity in a minimal footprint, making it an excellent choice for industrial sites looking to meet permit benchmarks for various pollutants, including dissolved metals.

Advantages and Performance

- Lightweight and durable fiberglass construction
- High-flow rates and maximum surface area
- Proven pollutant removal for TSS, bacteria, metals and nutrients
- Easily retrofitted to treat existing building roof runoff
- Available in various textures and colors
- Can be configured for inflow piping, allowing it to be pumped into
- 8 year warranty

- Custom sizes available
- Fits in shallow catch basins
- No nets or geofabrics
- 15+ year user life
- No replacement costs as found with fabric filters
- Meets LEED requirements
- Proven in the field to reduce pollutant concentrations below industrial benchmarks
- Up to 86% removal of dissolved zinc
- Up to 65% removal of dissolved copper
- 85% TSS removal
- 64% removal of total phosphorus & 45% of total Kjeldahl nitrogen
Biofilter Products

**Operation**

1. Trash and debris are separated (for easy removal) before entering the Sediment Storage Chamber.

2. Runoff passes through the Debris Collection Tray and enters the Sediment Storage Chamber to capture TSS.

3. As water builds in the Sediment Storage Chamber, it processes through the system’s patented horizontal flow biofiltration bed to remove dissolved and particulate metals and nutrients along with other pollutants of concern.

**Maintenance**

- The Debris Collection tray allows for fast and easy maintenance.
- The Sediment Storage Chamber is easily accessible for removal of accumulated material.

**Installation**

- All models are delivered fully assembled and can be installed in less than 15 minutes.
- Once the unit is set in place, it is ready for operation.

**Specifications**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Model Height (ft.)</th>
<th>Treatment Flow Rate (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWS-D-3-5</td>
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<tr>
<td></td>
<td>2.5</td>
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<td></td>
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<td></td>
<td>3.0</td>
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<tr>
<td></td>
<td>3.5</td>
<td>0.120</td>
</tr>
</tbody>
</table>
The Kraken Filter’s membrane filter cartridge provides high flow rates and over 170 sq. ft. of surface area. This much surface area allows it to operate at a loading rate of only 0.05 gpm per sq. ft. to ensure maximum performance and minimum maintenance. The Kraken Filter’s low loading rate successfully overcomes high maintenance requirements and frequent clogging issues often found in other filter systems advertising high loading rates. Each membrane filter cartridge is lightweight, washable, reusable and more sustainable than typical granular filled media cartridges. By eliminating the need to purchase new granular media and dispose of spent media, the Kraken Filter provides lower life-cycle and maintenance costs. Each filter cartridge is equipped with easy-to-grab handles and is pressure fitted, allowing it to be quickly removed, washed clean and re-attached without the use of tools.

**Advantages and Performance**

- No granular media replacement
- High flow rates & maximum surface area
- Loading rate of 0.05 gpm/ sq.ft. for minimal maintenance
- Membrane filter cartridges can be easily removed & cleaned by hand
- Built-in pre-treatment chamber captures trash, sediments, debris and hydrocarbons
- Filter cartridge dries out between storm events to prevent bio-film growth which can cause clogging and other performance issues
- NJDEP On-line Installation approved
- 89% TSS removal (NJCAT PSD)
- >50% phosphorous removal (expected; varies with particle size)
- >50% total metal removal (expected; varies with particle size)
- 90% TPH (expected)
- 99% trash removal

This state-of-the-art system utilizes advanced membrane filtration, ensuring a high level of removal for not only TSS, but also metals, trash, nutrients and hydrocarbons.

**Treatment Stages**

**Pre-Treatment**

To reduce loading on the membrane cartridge, runoff is initially passed through the pre-treatment chamber to capture trash, hydrocarbons and sediments. Once runoff is pre-treated it is directed to the filter chambers for primary treatment.

**Membrane Filtration-Fill Up**

During the fill up process a riser tube prevents flow through the membrane cartridge until the water level nears the top of the cartridge. This ensures loading is evenly distributed over the vertical height of the cartridge.

**Membrane Filtration- Peak Capacity**

As the water level reaches the top of the membrane cartridges, flow through will begin. The riser tube creates an upward flow path within each cartridge to increase performance. Treated water then passes down the riser tube and collects in the underdrain manifold and flows to the discharge chamber.

**Bypass**

An optional internal bypass is available with most system configurations. When flows exceed the treatment capacity of the system the water level rises and goes into bypass. High flows are conveyed from the pre-treatment chamber directly to the discharge chamber to prevent scouring of fine sediments captured within the filtration chamber.
Figure 1 Explanation:
1- Pretreatment chamber
2- Inflow pipe
3- Floatable/oil baffle
4- Sediment baffle
5- Primary separation chamber
6- Access hatch
7- Filter chamber (entry point)
8- Secondary separation chamber
9- Discharge chamber
10- Outflow pipe

Figure 2 Explanation
1- Filtration chamber
2- Kraken membrane filter cartridge
3- Under-drain manifold
4- Cartridge handle for easy removal
5- Internal bypass weir (optional)
6- Outlet to discharge chamber

Specifications

<table>
<thead>
<tr>
<th>Model Sizing</th>
<th>Structure Size (ft x ft)</th>
<th>Cartridge Capacity</th>
<th>Max Media Surface Area (sq ft)</th>
<th>Treatment Flow Capacity (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KF-2.5-4</td>
<td>2.5' x 4'</td>
<td>4 to 8</td>
<td>1360</td>
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<tr>
<td>KF-4-4</td>
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<td>KF-4-6</td>
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<td>KF-4-8</td>
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See design manual for list of all models. Many other models and structure sizes are available for higher flows. Please contact us for more details.

Approvals

Based on Max Cartridge Capacity
Media Filter Products

AN UP FLOW MEDIA FILTER

Water Polisher

This patented design provides double chambered separation to remove large to fine sediments from stormwater runoff. This configuration prevents clogging challenges found in downward flow media filters. The Water Polisher includes an oil skimmer containing hydrocarbon booms to capture and permanently retain oils and grease. The design of the skimmer allows the booms to float up and down with the changing water level for enhanced performance. The up flow filter utilizes an advanced drain down system that allows for passive backwash of the media following each storm event. Backwashing the media removes accumulated particulates from the surface, preventing clogging. Backed by an 8 year unlimited warranty, the up flow filter assembly is constructed with 100% high grade stainless steel for superior durability and longevity. The Bio Clean Water Polisher is a favored solution nationwide among civil engineers, municipalities and developers for its simple media replacement procedures and internal bypass option.

Advantages and Performance

- Dual-stage treatment (separation & media filtration)
- 2 chambered separation for pre-treatment
- Up flow technology minimizes maintenance
- Minimal fall requirements
- Easily installed on-line (internal bypass)
- Passive self-cleaning technology
- 85% removal of TSS (Sil-Co-Sil 106)
- 70% removal of phosphorus
- 99% removal of oils & grease
- 72% - 98% removal of copper, lead & zinc
- 68% removal of bacteria (fecal coliform)

The Bio Clean Water Polisher is an advanced stormwater treatment system utilizing an up flow media filter with built-in pre-treatment.

Treatment

As water enters, head pressure builds behind the internal weir to generate the force needed to operate the up flow filter. The water passes over the first separation chamber, settling out sediment. As it passes to the second separation chamber, it encounters an oil skimmer which removes hydrocarbons before water is forced under the skimmer and into the up flow filter chamber. As water rises up it is forced through the media filtration bed for primary treatment before exiting the system.

Passive Self-Cleaning

Once flow into the system subsides, the water level in the system will start to fall. When it reaches the upper effluent side of the up flow filter it can no longer discharge. The remaining water within the filtration media is forced downward as the drain down filters continue to treat and discharge stormwater. This passive back wash action releases pollutants that would otherwise contribute to long-term clogging and performance issues.
Media Filter Products

Installation

Low Pick Weights
Delivered in a top and bottom to minimize weight.

1 Hour Set Time
Internal components are installed prior to delivery.

Minimal Excavation
The bottom of the structure is less than 3.5 ft. from the invert of the pipe.

Operation

• Sediment Chambers – Maximizes TSS removal and eliminates scouring during high flow conditions

• Oil Skimmer & Booms - Collects hydrocarbons and controls flow velocity to improve up flow filter performance

• Up Flow Filter - Removes fine TSS, metals, nutrients and bacteria with an advanced absorptive media filtration bed

• Passive Self-Cleaning - Up Flow Filter is passively backwashed with drain down filters

Water Polisher PLUS (WP-PLUS)
Includes enhanced pre-treatment and internal bypass

Self-Contained Treatment Train with Bypass
The Water Polisher PLUS provides three-chambered hydrodynamic separation for enhanced overall performance and longevity. A secondary internal weir extending to the ceiling provides internal bypass, allowing for on-line installation.

Bio Clean Water Polisher PLUS

Other Treatment Trains

Stores trash, debris and organics in the same system for centralized maintenance and easier access.
• Shallow profile minimizes maintenance cost
• Less shoring
• Single structure

Trash, debris and organics are captured in a separate system requiring extra maintenance.
• Two structures required
• High excavation costs
• Extra shoring
• Challenging with shallow ground water

Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Treatment Capacity (cfs)</th>
<th>Sediment Storage Capacity (cf. ft.)</th>
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<td>WP-4-6.5-72</td>
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<td>WP-8-16-96</td>
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</tbody>
</table>

Based on 18” driving head Sediment chambers
The Bio Clean Nutrient Separating Baffle Box (NSBB) is an advanced stormwater treatment system utilizing screening and hydrodynamic separation to capture pollutants. The patented screening system, suspended above the sedimentation chambers, captures and stores trash and debris in a dry state. Dry state storage of trash and debris minimizes nutrient leaching, bacterial growth, bad odors and allows for easier removal. The NSBB's triple chamber design provides higher removals of total suspended solids over a wide range of particle sizes, including the finest particles. Fine sediments carry large amounts of heavy metals, nutrients and other harmful pollutants. The patented deflector shield system ensures no scouring of captured sediments during high flow. This feature allows the system to be installed in-line, thus eliminating the need for diversion structures. The oil skimmer with hydrocarbon booms traps and absorbs oil into a polymer based media for permanent removal. In use since 1994, it is a widely accepted stormwater treatment solution among civil engineers, municipalities and developers nationwide.

### Advantages and Performance
- Dual stage treatment (screening & separation)
- Enhanced 3 chambered separation
- Proven not to scour
- Separates trash & debris from sediment & water
- Easily installed in-line (low head loss)
- 87% removal of TSS
- 99% removal of oils & grease
- 71% removal of turbidity

### Operations
- Filtration Screen – Collects and stores trash, debris, organsics and oxygen demanding substances above standing water in a dry state
- Turbulence Deflectors – Prevents re-suspension of captured pollutants
- Sediment Chambers – Maximizes TSS removal and eliminates scouring during extreme flow rates
- Skimmer and Boom - Collects hydrocarbons and controls flow velocity which improves removal efficiency

### Applications
- Commercial
- Residential
- Retrofit
- Pre-treatment for:
  - Reuse systems
  - Infiltration basins
  - Bioretention & swales
  - Detention basins
  - Wet ponds
  - Media filters

Lake Tahoe, CA

Retrofit and new construction
**Separator Products**

**During Storm Events**
Trash, debris and organics are captured in the filtration screen as sediments settle to the bottom chambers. Hydrocarbons are removed and absorbed by the boom.

**Between Storm Events**
Trash, debris and organics are stored in a suspended screen system allowing pollutants to dry out between storm events. This eliminates septic conditions and prevents leaching of plant based organics into water.

**Comparison Results**

**Bio Clean's Hydrodynamic Separator (NSBB)**
Stores trash, debris & organics in screening system separated from water below.

- Shallow Profile Minimizes Maintenance Cost
  - Less shoring
  - Perfect for areas with high ground water

**Separation Prevents:**
- Odor
- Bacterial growth
- Nutrient leaching
- Septic conditions

**Other Separators**
Trash, debris & organics are captured and stored in standing water.

- This promotes nutrient leaching, bad odors, bacterial growth, and complicates maintenance.

  - High excavation cost
  - Extra shoring
  - Challenge with shallow ground water

**Specifications**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Surface Loading Area (sq.ft.)</th>
<th>Storage Capacity (cu.ft.)</th>
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<td>NSBB-3-6-72</td>
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<td>NSBB-4-6.5-72</td>
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<td>NSBB-4-8-84</td>
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<td>NSBB-8-12-84</td>
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<tr>
<td>NSBB-11-16-114</td>
<td>176</td>
<td>857</td>
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</table>
The Bio Clean Downspout Filter is the industry’s leading solution for treatment of roof runoff. This technology is used to treat commercial and industrial roof tops along with high-rise buildings, parking structures and residential buildings. Available in 3 sizes, this filter can easily adapt to downspouts 2” to 12” in diameter. The filter comes standard with rubber boots that allow for easy installation to the downspout. Proven since 2003, the Bio Clean Downspout Filter has been used on hundreds of installations throughout the United States. All internal components are constructed of stainless steel. The sleek in-line design allows the filter to be used in tight spaces. Approved by the IAPMO, this filter can meet all your roof runoff needs.

Advantages and Performance

- 10 year warranty
- No nets or geofabrics
- Sleek in-line design
- High treatment flow rate
- High bypass flow rate
- Low cost
- 93% removal of TSS
- 87% removal of hydrocarbons
- Effective at removing metals, nutrients and bacteria
  (media type)
Specialty Type Filter Products

Operation

High Flow Bypass

Water Flow Path

Adapters

Bypass Flow Path

Treatment Flow Path

Maintenance Handles (for easy removal)

Plascoat Filter Housing

Stainless Steel Filter Cartridge

BioSorb Hydro-Carbon Boom

Specification Table

<table>
<thead>
<tr>
<th>Model #</th>
<th>Inlet ID (dia., in.)</th>
<th>Filter OD (dia., in.)</th>
<th>Storage Capacity (cu.ft.)</th>
<th>Filter Flow (gpm)</th>
<th>Bypass Flow (gpm)</th>
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<td>12.75</td>
<td>0.77</td>
<td>1145</td>
<td>2264</td>
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</tbody>
</table>

Applications

Easily adapts to square or rectangular downspouts
- Commercial
- Residential
- Parking structures
- Mixed use

Fits In-line with iron, steel or plastic pipe

Specifications

Approvals
The Bio Clean Media Flume Filter is a stormwater pollution control device designed to capture high levels of trash, organics and hydrocarbons. Available with various absorptive media, these filters provide full coverage and easily fit in any drainage flume, channel or culvert. Its horizontal flow design allows it to treat sheet flows and other surface flows with no vertical drop from entry to discharge. A perfect solution for flat projects. The Media Flume Filter is designed specifically for removing hydrocarbons and other contaminants from sheet flows. It contains a series of media booms that absorb oils, grease and various other contaminants from the passing runoff. The booms are easily replaced through a top hatch. Available in various sizes and custom made to fit any size or shape flume, channel or culvert. All components are extremely durable and backed by an 8 year warranty.

Advantages and Performance

- Easy maintenance
- Quick installation
- 8 year warranty
- Customized configurations and sizes
- 83% removal of oils & grease
- 87% removal of total petroleum hydrocarbons (TPH). Tested with BioSorb hydrocarbon absorbent

Available with other media (perlite, activated charcoal, alumina) for removal of various pollutants
Specialty Type Filter Products

Applications

- Concrete flumes
- Culverts
- Sidewalk under drains
- Adaptable to rectangular or curved bottom drainage channels
- Access hatch for easy media replacement

Operation

Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Filter Width (in.)</th>
<th>Treatment Flow (cfs)</th>
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<tbody>
<tr>
<td>BC-MFF-12</td>
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<td>BC-MFF-18</td>
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<td>BC-MFF-24</td>
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<tr>
<td>BC-MFF-60</td>
<td>60</td>
<td>1.30</td>
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</table>
The Bio Clean BioGard Pre-Filter is a stormwater pollution control device designed to capture high levels of trash, organics and hydrocarbons. The filter basket can be removed within seconds to dispose of captured debris.

The filtration system is equipped with an coarse upper screen and a finer bottom screen for capturing various particle size pollutants. The bottom perimeter of the filter system is fitted with a media boom for enhanced hydrocarbon and TSS removal.

This filter is a perfect pre-treatment device to be used in conjunction with bioswales, bio retention systems, infiltration basins and detention basins. Placed prior to the BMP in a flume, channel or culvert, this filter will remove pollutants that cause clogging of bioretention soils, therefore reducing the service and maintenance costs associated with these non-proprietary BMPs. Available in various sizes and custom made to fit any size or shape flume, channel or culvert. All components are extremely durable and backed by an 8 year warranty.

**Advantages and Performance**

- 5 minute maintenance
- Simple installation
- 8 year warranty
- Custom sizes available
- Protects bio retention systems from:
  - trash
  - sediments
  - hydrocarbons
- 100% removal of trash
- 83% removal of oils & grease
- 87% removal of petroleum hydrocarbons
**Applications**

Enhances performance of any biofiltration system

- Bioswales
- Bioretention systems
- Infiltration basins
- Concrete flumes
- Culverts
- Sidewalk under-drains

**Specifications**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Filter Width (in.)</th>
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<tr>
<td>BC-BG-60</td>
<td>60</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**Operation**

- Rubber Seal
- Removal Handle (for easy cleaning)
- BioSorb Hydrocarbon Boom
- Coarse Screen (retains trash)
- Fine Screen (removes sediments)
- Protective Fiberglass Cover

100% trash capture

Standard configurations
*Available in various sizes
The Bio Clean Curb Inlet Filter (CIB) is best known for its patented ‘Shelf System’. The shelf directs water flow into the filter which is positioned directly under the manhole for easy access. Used exclusively by numerous cities and counties for its easy maintenance and 15 minute cleaning time, the ‘Shelf System’ eliminates the need for confined space entry and allows it to be serviced with a standard vacuum truck or by lifting the basket through the manhole. The ‘Shelf System’ makes this filter the preferred choice of maintenance crews nationwide. This industry leading filter and shelf system are constructed of UV coated marine grade fiberglass and high grade stainless steel. Its multi-level screening and hydrocarbon media captures everything from oils and grease to sediments, foliage and litter. Our manufacturing capabilities allow us to make these filters and shelf systems in any size. This filter is easily adaptable to any size and style of catch basin.

**Advantages and Performance**

- 93% removal of TSS
- 84% removal of turbidity
- 85% removal of nitrates
- 79% removal of zinc
- 32% removal of BOD
- 8 year warranty
- Works in any size catch basin
- No nets or geofabrics
- 15+ year user life
- Meets LEED requirements
- Patented shelf system
- Fiberglass construction
- Internal bypass

**Applications**

- Parking Lots
- Roadways

Superior design maximizes debris capture & retention

Easy maintenance access
**Catch Basin Filter Products**

**Operation**

During wet weather events, water and debris enter through the curb opening and are directed along the patented shelf system. The hydrocarbon boom removes grease, oils and hydrocarbons from the water as it passes over and through. Trash and debris are collected for easy removal in the debris retention screen. The debris retention screen offers multi-level filtration through the medium and fine screen. Water then travels down into the catch basin to be released through the outflow pipe.

**Specifications**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Treatment Flow (cfs)</th>
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**Installation and Maintenance**

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**Approvals**

- City and County of Honolulu
- County of San Diego

Includes the patented 'Shelf System'
Allows the filter to be cleaned in 15 minutes or less
The Bio Clean Round Curb Inlet Filter (R-GISB) is a favorite amongst cities and municipalities nationwide. Many agencies have chosen this system as their standard due to its quick cleaning time and large storage capacity. Its patented ‘Shelf System’ allows cleaning to be done in less than 15 minutes, and its larger storage capacity of 3.85 cubic feet allows for maximized cleaning intervals and minimized attention required by maintenance crews. The modularized design of the ‘Shelf System’ for curb inlets makes it adaptable to any size or type catch basin. Its multi-stage filtration screens allow this device to meet “Full Trash Capture” requirements by removing 100% of trash and debris 5 mm and greater. Made of marine grade fiberglass and high grade stainless steel, these filters come in standard and custom designs. This filtration system addresses a wide array of pollutants including trash and debris, sediments, TSS, nutrients, metals and hydrocarbons.

Advantages and Performance

- 8 year warranty
- Works in any size catch basin
- No nets or geofabrics
- 15+ year user life
- Meets LEED requirements
- Patented shelf system
- Fiberglass construction
- 74%-86% removal of TSS
- 54% removal of oils & grease
- 57%-71% removal of phosphorus
- 56%-60% removal of nitrogen

Operations

- Manhole Cover
- BioSorb Hydrocarbon Boom
- Debris Retention Screen
- Coarse Screen
- Medium Screen
- Fine Screen
- Bypass Flow Path
- Treatment Flow Path
- Curb Opening
- Bypass Weir
- Patented Shelf System
- Outflow Pipe
Operations

The Bio Clean Round Curb Inlet Media Filter (RGISB-MF) is an advanced level filtration device designed with a multi-layered media filter for increased removal efficiencies.

Installation & Maintenance

![Image of installation and maintenance](image)

Performance

- 85% removal of fine TSS
- 69% removal of dissolved phosphorus
- 95% removal of copper
- 87% removal of lead
- 95% removal of zinc
- 90% to 95% removal of oils & grease
- 68% removal of faecal coliform (bacteria)

Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Treatment Flow (cfs)</th>
<th>Bypass Flow (cfs)</th>
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Specifications

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<th>Bypass Flow (cfs)</th>
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</thead>
<tbody>
<tr>
<td>BC-RGISB-MF-22-24</td>
<td>2.4</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

Higher flow rate models available
The Bio Clean Grate Inlet Filter (GISB) for catch basins has been keeping property owners in compliance since 1994. Preferred by public agencies and backed by an 8 year unlimited warranty, this easy to install filter has been chosen because of its durability and easy maintenance. Constructed of UV coated marine grade fiberglass and high grade stainless steel, it is built to last longer than any other filter brand. The multi-stage filtration provides three different sieve size filtration screens to optimize filtration and water flow. The filter is equipped with a hydrocarbon media boom and deflector shield protected bypass to eliminate scouring. The filter is designed for grated inlets of any size and depth, and can be custom built to meet specific project needs. Screen size and media type can be modified to remove specific pollutants.

Advantages and Performance

- 8 year warranty
- Custom sizes available
- Fits in shallow catch basins
- No nets or geofabrics
- 15+ years user life
- No replacement costs as found with fabric filters
- Meets LEED requirements
- 74%-86% removal of TSS
- 54% removal of oils & grease
- 57%-71% removal of phosphorus
- 56%-60% removal of nitrogen
Operation

The Bio Clean Grate Inlet Media Filter (GISB-MF) is an advanced level filtration device designed with a multi-layered media filter for increased removal efficiencies.

Performance

- 85% removal of fine TSS
- 69% removal of dissolved phosphorus
- 95% removal of copper
- 87% removal of lead
- 95% removal of zinc
- 90% to 95% removal of oils & grease
- 68% removal of faecal coliform (bacteria)

Applications

- Parking Lots
- Roadways
- Bioswale Bypass Structures

Specifications *Standard Grate Inlet Filter Unit

<table>
<thead>
<tr>
<th>Model #</th>
<th>Treatment Flow (cfs)</th>
<th>Bypass Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC-GISB-12-12-12</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>BC-GISB-18-18-18</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>BC-GISB-24-24-24</td>
<td>3.7</td>
<td>4.4</td>
</tr>
<tr>
<td>BC-GISB-36-36-24</td>
<td>5.8</td>
<td>13.4</td>
</tr>
<tr>
<td>BC-GISB-48-48-18</td>
<td>6.6</td>
<td>13.3</td>
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</tbody>
</table>

Specifications *Grate Inlet Media Filter Unit

<table>
<thead>
<tr>
<th>Model #</th>
<th>Media Treatment Flow (cfs)</th>
<th>Screen Treatment Flow (cfs)</th>
<th>Bypass Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC-GISB-MF-12-12-12</td>
<td>0.007</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>BC-GISB-MF-18-18-18</td>
<td>0.02</td>
<td>0.5</td>
<td>0.8</td>
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<tr>
<td>BC-GISB-MF-24-24-24</td>
<td>0.04</td>
<td>0.9</td>
<td>4.4</td>
</tr>
<tr>
<td>BC-GISB-MF-36-36-24</td>
<td>0.17</td>
<td>1.8</td>
<td>13.4</td>
</tr>
<tr>
<td>BC-GISB-MF-48-48-18</td>
<td>0.35</td>
<td>2.4</td>
<td>13.3</td>
</tr>
</tbody>
</table>
The Watergate ARS is a revolutionary automatic retractable screen that blocks trash and debris from entering storm drains during dry weather events and light to moderate rain flows. During these periods the screen remains closed and locked to allow removal of trash and debris by routine street sweeping operations. During periods of increased flow and heavy rain, the screen will unlock and open to allow runoff into the storm drain to prevent flooding. When the water flow subsides, the screen will return to the closed and locked position. The Watergate ARS features a patented front-pivot design to bias the screen toward the closed position and provide for more effective closing and locking. The positive closing force vastly reduces the possibility of debris becoming trapped under the screen and preventing it from fully closing and locking.

**Advantages and Performance**

- Patented front-pivot design provides a natural positive closing force - Superior to springs, magnets and counter weights found in traditional units
- Receptors in the control arms allow the Watergate ARS to manually lock open from the street. A simple push upward on the screen returns the unit to normal operation
- Simplicity of design makes for a more cost-effective solution - Only 5 individual fabricated parts, 8 total
- Routine street sweeping is the only maintenance required
- Built-in 1-inch to 2-inch top overflow
- Remains closed and locked during normal runoff and light rain

**Specifications**

- All parts are Type 304 Stainless Steel
- The Screen uses the industry standard 0.75 inch holes in a perforated pattern, which is 50% open
- Built-in 0.75 inch diameter stainless steel child protection bar
- Due to the high tolerance of fabrication utilizing laser and CNC turret, no adjustment points are needed
Operation

Closed & Locked Position
During dry weather flows and light to moderate rain, the Watergate prevents trash and debris from entering the catch basin. This allows routine street sweeping maintenance to address trash before it enters the storm drain system.

Open & Unlocked During Increased Flow
During heavy rain events, increased water flows will unlock the Watergate’s screen, allowing it to open only as far as necessary to allow runoff to enter the catch basin and prevent flooding while still blocking larger trash and debris. This patented design intelligently prevents clogging and flooding issues often found with fixed screen systems. After any storm event, the screen will return to the closed and locked position automatically.

Maintenance

Routine street sweeping is the only maintenance necessary. The Watergate ARS will remain closed and locked during routine street sweeping and is not affected by the sweeping brushes.

For added peace of mind, the Watergate ARS can be manually locked open before large storm events. This lock is easily engaged and disengaged by hand, via receptors in the control arms.

Durable enough to handle routine street sweeping.
The Bio Clean Curb Guard is the first line of defense for inlets against debris and litter. The Curb Guard is made of 100% stainless steel, and it has a unique recessed design that sets the device back into the opening of a curb a few inches for better flow. The flat mounting bracket is flush with the curb, making it tire safe and ideal for street sweeping operations. The Curb Guard provides 100% coverage of the basin and opens during low flows. It can assist your city or county with trash TMDL compliance, and is available in any length and various heights. The Curb Guard can be used on streets, parking lots, culvert drains, recycling facilities and industrial inlets. It retrofits any existing basin and is easy to remove.

**Advantages and Performance**

- First line of defense for inlets
- Structural BMP that prevents debris and litter from entering storm drains
- Retrofits any existing basin
- Allows nuisance and high flows to pass through
- Easy to remove
- Tire and street sweeping truck safe design
Applications

• Streets
• Parking lots
• Culvert drains
• Recycling facilities
• Industrial

High Effectiveness

The Curb Guard can be constructed using various sized perforations to meet state and local requirements. By providing 100% coverage of the basin opening during low flows the Curb Guard can assist your city or county with Trash TMDL compliance.

Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Length</th>
<th>*Flow rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC-CG-4</td>
<td>4’</td>
<td>1.53 cfs</td>
</tr>
<tr>
<td>BC-CG-6</td>
<td>6’</td>
<td>2.29 cfs</td>
</tr>
<tr>
<td>BC-CG-7</td>
<td>7’</td>
<td>2.29 cfs</td>
</tr>
<tr>
<td>BC-CG-10</td>
<td>10’</td>
<td>3.82 cfs</td>
</tr>
<tr>
<td>BC-CG-12</td>
<td>12’</td>
<td>4.59 cfs</td>
</tr>
</tbody>
</table>

NOTE: Available in Any Length and Various Heights
*Flow Rate based on manufacturer recommended 50% clogging factor

Recessed Design

The Bio Clean Curb Guard has a unique recessed design that sets the device back into the opening of a curb a few inches for better flow. The flat mounting bracket is flush with the curb making it tire safe and ideal for street sweeping operations.
Bio Clean’s BioSorb Booms are the industry’s leading solution for controlling oil contamination in stormwater runoff. These booms are used to control and absorb oil and hydrocarbons on any surface, including water. It can control oil spills and slicks in harbor dock areas as well as residential and industrial areas. Available in 2” and 3” diameters, booms of any length and custom sizes and configurations are available upon request. BioSorb’s oil absorbing polymers will not absorb water, which lends the material a unique usefulness for separating and collecting hydrocarbons from water mixtures. The polymer can commonly absorb from 20% to 200% or more of its own weight in chemical or petroleum derived liquids. BioSorb becomes dry to the touch shortly after absorption.

**Advantages**

- Controls and absorbs oil and hydrocarbons on any surface, including water
- Controls oil spills and slicks in harbor and dock areas
- Controls oil contamination in stormwater runoff
- Removes oil contamination from plant process water
- Cleans up fuel spills on highways
- Absorbs hydrocarbon vapors and fumes

Bio Clean offers numerous types of replacement media for various stormwater treatment systems.

**How Are BioSorb Oil Absorbing Polymers Unique?**

BioSorb oil absorbing polymers function by first attracting hydrocarbons to the surface of the polymer to absorb the liquid, followed immediately by internally absorbing the media into its structure. BioSorb oil absorbing polymers will not absorb water, which lends the material a unique usefulness for separating and collecting hydrocarbons from water mixtures. Most notably, the polymer can commonly absorb from 20% to 200% or more of its own weight of chemical or petroleum derived liquids. Furthermore, because of the unique absorption characteristic of the material, BioSorb becomes dry to the touch shortly after absorption.

**Applications**

- Stormwater filters
- Concentrate carrier material for liquid additives
- Removing oil or chemicals from contaminated water streams
- Industrial work area collection mats
- Spill containment and collection
- Odor barrier/collector for flavor oils and fragrances
- Collection of Volatile Organic Compounds (VOC’s)
The Modular Wetland System utilizes a proprietary blend of bioretention media that outperforms standard sand filters, bioretention systems and standard subsurface flow wetlands. WetlandMEDIA™ provides greater plant growth, moisture retention, evapo-transpiration, and pollutant removal while traditional bioretention media, consisting of compost/organics and sand, has been known to have negative effects – leaching nutrients.

**Advantages**

- No organics
- Removes phosphorus
- 48% void space
- Greater surface area
- Maximum evapo-transpiration
- High ion exchange capacity
- Light weight

BioMediaGREEN™ is an amazing material changing the way we think of filtration media. Most systems utilize a granular media that needs to be contained, is heavy in weight and difficult to replace.

In contrast, BioMediaGREEN comes in lightweight blocks making it inexpensive to ship and simple to replace. This particular media is present in a few capacities within the MWS Linear stormwater system. First, it is utilized in the pre-treatment stage within the pre-filter cartridges. There is over 25 sq.ft. of surface area per cartridge, and the media itself removes over 80% of TSS and 90% of hydrocarbons. Another ultimate advantage of the pre-filter cartridges are that they prevent pollutants that cause clogging from migrating to the main stage, the biofiltration chamber.

Second, the plant propagation layer of media bed on the surface of the MWS Linear creates a hearty layer that supports and sustains vegetation.

**Advantages**

- Made of various oxides to promote ion exchange of dissolved pollutants
- 80% void space allows for double the contact time compared to granular media
- Excellent physical filtration and hydraulic capacity
- Perlite can also be used