Our waterways. Our future.

Filtration
StormFilter® | Jellyfish Filter® | Filterra®
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Stormwater Filtration

The right stormwater solution for every site

The Stormwater360 UrbanGreen Staircase simplifies the process of integrating a water sensitive urban design (WSUD) that achieves your runoff goals. Its aims are to manage stormwater runoff close to the source and to replicate the site’s pre-development hydrology, as much as possible.

The first step in the design process is to select the runoff management practices that best suit your site, such as infiltration and harvesting. Particular attention also needs to be given to pre-treatment needs. If the entire design storm cannot be retained through runoff reduction methods, a best management practice (BMP) is required to manage the balance. Finally, a detention system is selected to address any outstanding downstream erosion.

Highly effective pollutant removal

Meeting pollutant reduction goals for stormwater runoff typically requires a technology that is highly effective at removing solids and associated pollutants. In most cases, the technology must also be capable of removing dissolved pollutants such as metals, nitrogen and phosphorus.

By combining a variety of media and filtration systems, Stormwater360 can help you meet these pollutant removal objectives through products such as the Stormwater Management StormFilter, which has helped meet the most stringent stormwater requirements of hundreds of sites in urbanised areas of countries such as Australia, New Zealand and the United States of America.
Selecting an appropriate filtration system

The performance and longevity of media filtration systems is governed by a number of variables that must be carefully considered when evaluating systems. These variables include the type of media used and its gradation as well as its hydraulic loading rate. Understanding these variables requires careful testing and the development of performance and longevity data to support proper filter design.

Media surface area

Filtration flow rates are typically expressed as a surface area specific operating rate such as L/s/m² of surface area. Lower specific operating rates translate to better performance and longer maintenance cycles. Specific operating rates higher than 2 L/s/m² of media surface area negatively impact performance and longevity.

Surface versus radial cartridge filtration

When assessing filtration systems, it is important to consider whether filtration occurs primarily at the media surface or throughout a bed of media, such as with radial-cartridge filters. All else equal, radial-cartridge filters are longer lasting, since pollutants are captured and stored throughout the bed, as opposed to predominantly on the media surface. Radial cartridge filters capture more mass of pollutants per unit area of filter surface. Surface filters, such as sand or flat bed media filters, are prone to rapid failure through clogging. Pollutants are prone to occluding the media surface, which will then require frequent back washing or more costly and intensive maintenance.
Media hydraulic conductivity and flow control

Filtration media is able to pass more flow per unit of media when it is new than when it has been in operation for a while. With time, pollutants accumulate in the media bed and reduce its hydraulic capacity. It is critical that filtration devices are designed with excess hydraulic capacity to account for this loss. Also, while finer media gradations remove finer particles, they have a lower hydraulic capacity and occlude more rapidly. High performance and superior longevity can be achieved by controlling the flow through a more coarse media bed.

Performance: Laboratory testing

While laboratory testing provides a means to generate hydraulic and basic performance data, it should also be complemented with long-term field data. Laboratory performance trials should be executed with a fine sediment gradation such as Sil-Co-Sil 106, which has a median particle size of 22 microns. Testing with coarser gradations is not likely to be representative of field conditions.

Performance: Field testing

Long-term field evaluations should be conducted on all filtration devices. As a minimum, field studies should generally comply with the Technology Acceptance Reciprocity Partnership (TARP) or the Technology Assessment Protocol – Ecology (TAPE) in the USA, as no recognised protocols exist within Australia. To be considered valid, all field monitoring programs should replicate local pollutant concentrations including soluble fractions together with rainfall, and should be peer reviewed by a reputable third-party.

Understanding the hydraulics of the media selected is a key factor in determining the effectiveness of the filtration system in achieving site-specific pollutant removal objectives.

Stormwater360 has undertaken such field testing in Kuranda, Australia, with the assistance of Queensland University of Technology and James Cook University.

Longevity

It is essential that loading trials be conducted to evaluate the longevity of a media filter. These trials must be executed with “real” stormwater solids and not silica particles. Reliance on silica particles to assess longevity grossly overstates the loading capacity of the media and the results of such trials should not be relied on. Knowing how much mass a media filter can capture before failure allows it to be sized for a desired maintenance interval by estimating the pollutant load that will be delivered to the filter.

Maintenance

The primary purpose of the media filtration system is to filter out and prevent pollutants from entering our waterways. Like any effective filtration system, these pollutants must be periodically removed to restore the system to its full efficiency and effectiveness. Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. Similarly, the system should be inspected after major storm events.

Stormwater360 offers a number of suitable maintenance plans for all our stormwater products. Visit www.stormwater360.com.au or call us on 1300 354 722 to discuss the most suitable plan for your system.
The Stormwater Management StormFilter

Removing the most challenging target pollutants

The Stormwater Management StormFilter is a best management practice (BMP) designed to meet stringent regulatory requirements. It removes the most challenging target pollutants – including fine solids, soluble heavy metals, oil, and total nutrients (inc. soluble) – using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and through product enhancements the design continues to be refined for ease of use.

Why StormFilter is the best filter available

**Superior hydraulics**
- External bypass – protects treatment chamber from high flows and ensures captured pollutants are not lost during low frequency, high intensity storm events
- Multiple cartridge heights – minimises head loss to fit within the hydraulic grade line and shrink system size, reducing installation costs
- Multiple StormFilter configurations in use across the country

**Reliable longevity**
- One-of-a-kind self-cleaning hood – prevents surface blinding, ensures use of all media, and prolongs cartridge life
- Customised maintenance cycles – fewer maintenance events compared to similar products, which reduces costs over the lifetime of the system
- 12 years of maintenance experience – predictable long-term performance comes standard

**Proven performance**
- Only filter on the Australian market tested within Australia achieving best practice guidelines, for TSS, TP and TN
- Qualifies for a minimum 2 EMI 5 Green star credits
- Achieve water quality goals with confidence – easy approval speeds development assessment process
- 8th generation product – design refined and perfected over two decades of research and experience

**Maximising your land use and development profitability**

StormFilter systems are utilised in below ground systems. The advantages this offers over above ground systems includes:
- Land space saving that enable an increase in development density and reduce sprawl
- The potential to add car parking, increase building size, and develop out parcels

In addition, StormFilter’s compact design reduces construction and installation costs by limiting excavation.
Media options

Our filtration products can be customised using different filter media to target site-specific pollutants. A combination of media is often recommended to maximise pollutant removal effectiveness.

**PhosphoSorb™** is a lightweight media built from a Perlite-base that removes total phosphorus (TP) by adsorbing dissolved-P and filtering particulate-P simultaneously.

**Perlite** is naturally occurring puffed volcanic ash. Effective for removing TSS, oil and grease.

**Zeolite** is a naturally occurring mineral used to remove soluble metals, ammonium and some organics.

**GAC (Granular Activated Carbon)** has a micro-porous structure with an extensive surface area to provide high levels of adsorption. It is primarily used to remove oil and grease and organics such as PAHs and phthalates.

Cartridge options

With multiple cartridge heights available, you now have a choice when fitting a StormFilter system onto your site. The 69cm cartridge provides 50% more treatment than the previously standard 46cm cartridge, which enables you to meet the same treatment standards with fewer cartridges, and via a smaller system.

If you are limited by hydraulic constraints, the low drop cartridge provides filtration treatment with only 0.55m of headloss.

### Cartridge flow rates

<table>
<thead>
<tr>
<th>Cartridge Type</th>
<th>Hydraulic Drop</th>
<th>Treatment Capacity (/l/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.7 l/s/m²</td>
</tr>
<tr>
<td>StormFilter 69cm</td>
<td>0.93 m</td>
<td>0.71</td>
</tr>
<tr>
<td>StormFilter 46cm</td>
<td>0.70 m</td>
<td>0.47</td>
</tr>
<tr>
<td>StormFilter Low Drop</td>
<td>0.55 m</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Selecting cartridge height

- **Small Footprint**: 0.93 m
- **Low Drop**: 0.55 m
- **Footprint/system size**

Note: Indicated media are most effective for associated pollutant type. Other media may treat pollutants, but to a lesser degree.

ZPG™ media, a proprietary blend of zeolite, perlite, and GAC.
Configurations and applications

The StormFilter technology can be configured to meet your unique site requirements. Here are a few of the most common configurations, however many other configurations are available. A Stormwater360 engineer can assist you evaluate the best options for your site or you can find out more by downloading the StormFilter Configuration Guide from www.stormwater360.com.au

Upstream treatment configurations

The following suite of StormFilter configurations are easily incorporated on sites where WSUD is recommended. These low-cost, low-drop, point-of-entry systems also work well when you have a compact drainage area.

GullyPit StormFilter

Combines a gullypit, a high flow bypass device, and a StormFilter cartridge in one shallow structure.

- Treats sheet flow
- Uses drop from the inlet grate to the conveyance pipe to drive the passive filtration cartridge
- No confined space required for maintenance

Gully inlet

- Accommodates kerb inlet openings from 900 to 3000mm long
- Uses drop from the kerb inlet to the conveyance pipe to drive the passive filtration cartridges

Linear grate

- Can be designed to meet volume based sizing requirements
- Can be installed in place of and similar to a typical gullypit
- No confined space entry required for maintenance
- Accommodates up to 29 StormFilter cartridges

Infiltration/retrofit configuration infiltration

- Provides treatment and infiltration in one structure
- Available for new construction and retrofit applications
- Easy to install
- Re-charge groundwater and reduces run-off
Roof runoff treatment configuration

Down pipe
- Easily integrated into existing gutter systems to treat pollution from rooftop runoff
- Fits most downpipe configurations and sizes; single or dual-cartridge models available
- Treats up to 1300 m² of rooftop area per dual-cartridge system

Downstream treatment configurations
Conventional stormwater treatment involves collecting, conveying and treating stormwater runoff with an end-of-pipe treatment system before discharging off-site. StormFilter configurations suitable for these applications are listed below and can be engineered to treat a wide range of flows.

Peak diversion
- Provides off-line bypass and treatment in one structure
- Eliminates material and installation cost of additional structures to bypass peak flows
- Reduces the overall footprint of the treatment system, avoiding utility and right-of-way conflicts
- Internal weir allows high peak flows with low hydraulic head losses
- Accommodates large inlet and outlet pipes (up to 900 mm) for high flow applications

Vault / manhole
- Treats small to medium sized sites
- Simple installation – arrives on-site fully assembled
- May require off-line bypass structure

High flow
- Treats flows from large sites
- Consists of large, precast components designed for easy assembly on-site
- Configurations available, include, Panel Vault and Cast-In-Place

Volume
- Meets volume-based stormwater treatment regulations
- Captures and treats specific water quality volume (WQv)
- Provides treatment and controls the discharge rate
- Can be designed to capture all, or a portion, of the WQv
Filtration for low drop sites

Designing for limited drop

In some cases, site constraints limit the hydraulic drop that is available to drive the passive filtration cartridges. Following are a variety of solutions to either create the required drop or work around the limited drop without impacting the performance of the system.

<table>
<thead>
<tr>
<th>Solutions for Low Drop Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site modifications</strong></td>
</tr>
<tr>
<td><strong>Reduce pipe slope</strong></td>
</tr>
<tr>
<td>Use an alternate pipe material with a lower Manning’s n value for a portion of the site and reduce the pipe slope.</td>
</tr>
<tr>
<td><strong>Reduce pipe cover</strong></td>
</tr>
<tr>
<td>Use controlled density fill (CDF) at the front-end of the conveyance system to minimise pipe cover and raise the conveyance system. CDF, a method of pouring concrete with fine aggregate (sand vs. gravel) around pipe, allows the use of most pipe materials with limited cover.</td>
</tr>
<tr>
<td><strong>Drain inlet treatment</strong></td>
</tr>
<tr>
<td>Substitute several shallow inlet configurations for the single end-of-pipe system. Shallow options include the Catchpit/Gullypit StormFilter, CurbInlet StormFilter, Manhole StormFilter and the Linear StormFilter. These systems still require the normal drop (0.7m for 46cm cartridges) but utilise the drop into the conveyance system to drive the cartridges.</td>
</tr>
<tr>
<td><strong>Provide pumping system</strong></td>
</tr>
<tr>
<td>Stormwater360 offers the Integrated Pumping System (IPS), which can be designed in tandem with filtration system sizing.</td>
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</tbody>
</table>
The Jellyfish Filter is a stormwater quality treatment technology featuring high surface area and high flow rate membrane filtration at low driving head. By incorporating pretreatment with light-weight membrane filtration, the Jellyfish Filter removes floatables, trash, oil, debris, TSS, fine silt-sized particles, and a high percentage of particulate-bound pollutants; including phosphorus and nitrogen, metals and hydrocarbons.

The high surface area membrane cartridges, combined with up flow hydraulics, frequent backwashing, and rinsable/reusable cartridges ensures long-lasting performance.

**Features**
- High surface area, high flow rate membrane filtration
- Highest design treatment flow rate per cartridge (5 L/S)
- Low driving head (typically 460 mm or 300)
- Lightweight cartridges with passive backwash
- Field performance verified

**Benefits**
- Long-lasting and effective stormwater treatment
- Compact system with a small footprint, lower construction cost
- Design Flexibility, lower construction cost
- Easy maintenance and low life-cycle cost
- Superior pollutant capture with confidence

**Applications**
- Urban development
- Highways, airports, seaports, and military installations
- Commercial and residential development, infill and redevelopment, and stormwater quality retrofit applications
- Industrial Sites

Kerb inlet Jellyfish Filter is installed in a commercial development.
Configurations

The Jellyfish Filter is available in a variety of configurations. Typically, 457 mm of driving head is designed into the system. For low drop sites, the designed driving head can be less.
Inspection and Maintenance

Inspection and maintenance activities for the Jellyfish Filter typically include:

- Visual inspection of deck, cartridge lids, and maintenance access wall
- Vacuum extraction of oil, floatable trash/debris, and sediment from manhole sump.
- External rinsing and re-installing of filter cartridges.
- Replacement of filter cartridge tentacles as needed. Cartridge replacement intervals vary by site; replacement is anticipated every 2-5 years.

Inspection Frequencies:

- A minimum of two inspections during the first year of operation to assess the sediment and floatable pollutant accumulation, and to ensure proper functioning of the system.
- Inspection frequency in subsequent years is based on the inspection and maintenance plan developed in the first year of operation. Minimum frequency should be once per year.
- Inspection is recommended after each major storm event.
- Immediately after an upstream oil, fuel or other chemical spill.
What is Filterra?
Filterra is an engineered biofiltration device with components that make it similar to bioretention in pollutant removal and application, but has been optimised for high volume/flow treatment in a compact system. Its small footprint allows Filterra to be used on highly developed sites such as landscaped areas, parking lots, and streetscapes. Filterra is adaptable and can be used alone or in combination with other treatment technologies such as EnviroPod or StormFilter.

How Filterra Works?
Stormwater runoff enters the Filterra system through a kerb-inlet opening and flows through a specially designed filter media mixture contained in a landscaped modular container. The biofiltration media captures and immobilises pollutants; some of these pollutants are then decomposed, volatilised and incorporated into the biomass of the Filterra system’s micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container, where the treated water is discharged. In areas where runoff reduction and infiltration are mandated or desirable, Filterra can be paired with other Stormwater360 products such as ChamberMaxx to provide even greater alignment with WSUD/GI goals.

Features and Benefits

1. Best Value
Filterra offers the most cost effective stormwater treatment system, featuring low cost, easy installation and simple maintenance.

2. Aesthetics
Landscaping enhances the appearance of your site making it more attractive while removing pollutants.

3. Maintenance
Maintenance is simple and safe (no confined space access), and the first year is FREE with the purchase of every unit.

4. Versatile
Filterra is ideal for both new construction and urban retrofits in both private and public sites as well as:

- Streetscapes
- Parking lots
- Highways
- Urban settings
- Subdivisions
- Industrial settings
Filterra is offered in multiple configurations to meet site specific needs. These configurations make Filterra a versatile yet effective stormwater treatment option with a low life-cycle cost. For the first time, there is a proprietary WSUD treatment technology for publicly located and owned assets.

**Filterra Internal Bypass - Kerb**
The Filterra Internal Bypass – Kerb, incorporates a kerb inlet treatment chamber and internal high flow bypass in a single structure. This eliminates the need for a separate bypass structure and enables placement on grade or in a “sag” or “sump” condition.

**Filterra Internal Bypass - Pipe**
The Filterra Internal Bypass – Pipe, treats stormwater runoff from rooftops or other sub-grade sources such as area drains. Higher flows bypass the biofiltration treatment system via an overflow/bypass pipe design.

**Filterra - Street Tree**
The Filterra Street Tree accommodates trees larger than the standard small-medium-sized trees used in standard Filterra units. These larger trees can provide benefits to site landscape designs on canopy cover, tree count, or percentage of green area.

**Filterra - Sediment Chamber**
The Filterra Sediment Chamber includes a pre-treatment chamber that provides settling for debris and sediment, meeting water quality volume temporary hold requirements in some jurisdictions, and provides a treatment-train feature to a standard Filterra.

**Filterra - Recessed Top**
The Filterra Recessed Top allows for a seamless integration of Filterra into the landscape design with pavers, mulch, sod, or even architectural concrete.

**Filterra - StormFilter Overflow**
The Filterra StormFilter overflow combines the standard Filterra Internal Bypass System with a StormFilter cartridge configured to treat the internal overflow of stormwater during higher flows.
Filterra® In the Field

We make it easy! The Filterra system is delivered to the job site with all components except plant and mulch.

Filterra – Installation

- Bioretention system sealed from construction sediment.
- Contractor off-loads top and vault separately.
- Set vault to grade on suitable subgrade, pipe up, backfill, set top.

Filterra – Activation

- Contractors: Do NOT remove throat plate nor tree grate covers.
- Vegetation selection guidance based on your climate zone.
- Stormwater360 certified providers conduct on-site activation with installation of mulch and plant.

Filterra – Maintenance

- The first year of maintenance is included with every system.
- Maintenance is low-cost, low-tech and simple:
  - Remove trash, sediment, and mulch.
  - Replace with a fresh layer of 3” of mulch.
  - Can be done by landscape contractor.
  - No confined space entry.
Next steps

Learn more
For more detailed technical information about Stormwater360 products and solutions, visit www.stormwater360.com.au

Connect with us
With more than 15 years experience in developing, installing and maintaining innovative and efficient site-specific stormwater management solutions, Stormwater360’s highly qualified engineers and consultants can assist you with every aspect of your stormwater project.

Whether it’s an initial in-house technical presentation, a request to inspect and clean your existing facility, or assistance with designing a specific stormwater management solution for your site, simply complete the enquiry form at stormwater360.com.au or call 1300 354 722 to speak to a Stormwater360 consultant.

Start a project
If you are ready to begin a project, our engineering team will provide you with everything you need, from a free preliminary design to MUSIC modelling, CAD drawings to maintenance frequency and associated costs schedules. To find out more, simply visit www.stormwater360.com.au and complete the Design Information Request form.

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Stormwater Management StormFilter is a licensed trademark of Stormwater360 Australia.

Jellyfish Filter Australian Patent No. 2008,286,748
Stormwater360 supplies and maintains a complete range of filtration, hydrodynamic separation, screening and oil/water separation technologies.

Call 1300 354 722

www.stormwater360.com.au