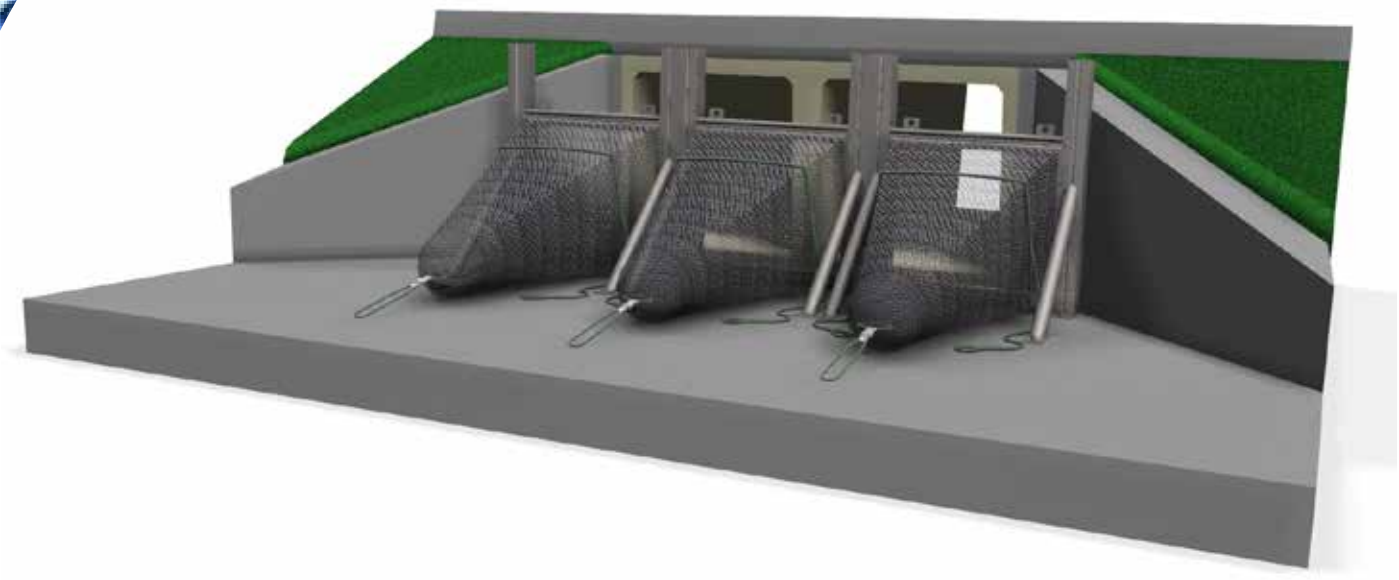
Ecosol™ Trash Rack
Technical Specification



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Contents

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1.0 Introduction

Increasingly stringent environmental best management practice requires planners and developers to apply a fit-for-purpose treatment train approach to stormwater treatment to achieve today's water quality objectives (WQO's).

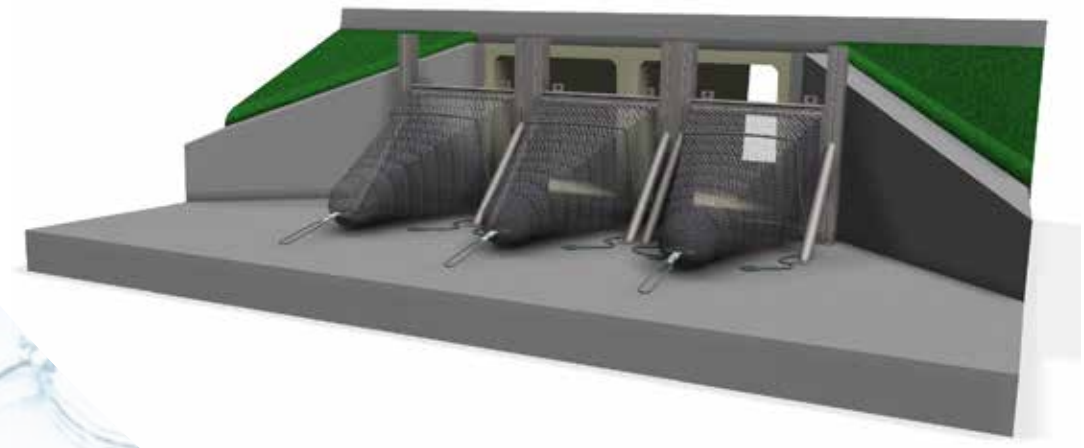
Urban Asset Solutions Pty Ltd has developed a standard modular trash rack system suitable for most applications. The Ecosol™ Trash Rack is a robust and modern primary treatment filtration system for use where there are cost or space constraints, or specialised cleaning equipment is not available. The unit captures and retains more than 93% of solid pollutants larger than the filtration net apertures, although, in practice, it has been found to collect much smaller particles, including fine sediments.

Easily installed, the Ecosol™ Trash Rack's simple design overcomes any adverse hydraulic impact traditionally encountered with generic, direct screening, trash racks that often block in first flush flows. By incorporating filtration nets into the design its operating life is significantly improved with an increased screening surface area and a larger pollutant holding capacity.

It can be installed not only end-of-line at almost any pipe outlet discharging to beaches, rivers, and creeks but also in-line within open channels.

Figure 1 – Ecosol™ four module and constructed trash rack system.

Figure 2 – Ecosol™ Nine module Trash Rack installation.



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1.0 Introduction Continued

The Ecosol™ Trash Rack consists of a structurally engineered stainless-steel frame with support legs and a removable heavy-duty UV-stabilised polyethylene filtration net that can be easily lifted out for cleaning and maintenance using a small crane truck. This overcomes the problem usually encountered with traditional, fixed direct-screen designs, which are often difficult and expensive to clean.

The system has been designed to provide a robust and durable cost effective primary treatment system that captures and retains solid pollutants conveyed in stormwater conduits.

In developing this innovative primary stormwater treatment system careful consideration has been given to durability, longevity, cost, and maintainability. Key commercial technical features include:

- low visual impact and energy footprint;
- designed hydraulics with proven performance and longevity;
- scalable, adaptable design; and
- cost effective maintenance regime.

This technical manual describes the operation and performance characteristics of the system.

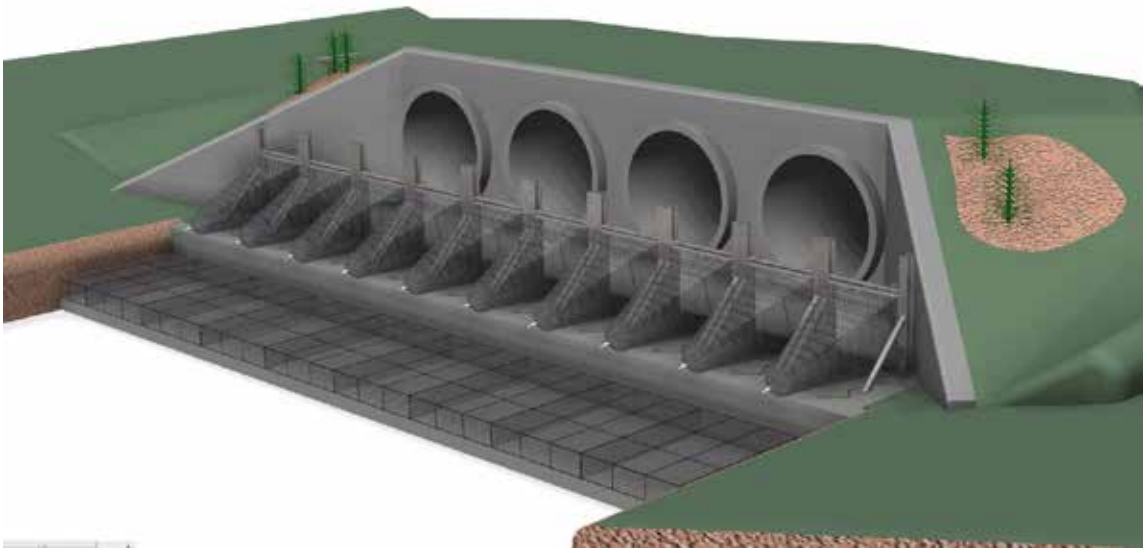

Figure 3 – Typical end-of-line application for the Ecosol™ Trash Rack.

2.0 How the Ecosol™ Trash Rack Works

The objective of stormwater treatment is to achieve a real, visible, and sustainable improvement in water quality. Pollution control measures, including Gross Pollutant Traps (GPTs), such as the Ecosol™ Net Guard, litter baskets, sediment basins, grass swales, infiltration systems, and sand filters all reduce the level and concentration of a variety of pollutants conveyed in stormwater runoff, thereby enhancing water quality.

The Ecosol™ Trash Rack is a modern, durable, primary filtration system that removes gross pollutants conveyed in stormwater runoff.

Once installed, under any flow, the unit will start capturing and retaining pollutants. The filtered stormwater passes through the net and downstream to the receiving waterway or to a secondary treatment system, after pre-screening by the Ecosol™ Trash Rack. It will continue to capture and retain gross pollutants until the filtration net reaches its designed holding capacity, or in the event of a major rain event, when excess flows will simply over top the system, as designed. This by-pass facility helps eliminate any adverse hydraulic impact or potential for flooding during peak flow storm events. After the rain event subsides the net should be inspected and if full, it should be emptied and repositioned.

The unit requires little, or no, structural change to the existing stormwater system, thereby reducing capital costs and minimising disruption to the general public during installation. One of the unit's key advantages is its ability to operate effectively in both partially submerged and tidal environments where it will continue to operate effectively without any remobilisation of captured pollutants larger than the net apertures.

3.0 Ecosol™ Trash Rack Credentials and Case Studies

Urban Asset Solutions Pty has always sought pro-actively to validate its products performance through independent laboratory and extensive field testing. The test results have been verified, where appropriate, by computer simulation and industry peers. The Ecosol™ Trash Rack has been trialled in many stormwater treatment applications around Australian and Malaysia. In 2012 the University of Adelaide (Engtest Civil, Environmental and Mining) completed extensive testing and measurements of the products netting capture efficiency, hydraulic performance and durability at varying flow rates.

In addition several case studies on the performance of the Ecosol™ Trash Rack have been completed and this section summarises the findings of three of these studies.

Namatijira Park - Wetlands

Melbourne Waters innovative plan to increase the capacity of the exisiting Clayton South Retarding Basin and construct a new wetland to treat stormwater flows from the Springs Road (5033), East Oakleigh (5041) and Clayton Road (5040) drains to help provide a real long term benefit to the water quality of Port Phillip Bay.

The works entailed construction within the Melbourne Water owned Clayton South Retarding Basin and adjoining Kingston City Council Namatijira Park. Under the Stormwater Quality Offsets Program, Melbourne Water committed to constructing a wetland to reduce nitrogen loads from catchment based inputs into Port Phillip Bay.

Funding for the project has been achieved from developer contributions, Melbourne Water floodplain services and the Commonwealth of Australia where best practice stormwater quality objectives have been met on site.

An integral part of this project was to provide essential pre-screening of stormwater flows. Urban Asset Solutions Pty was approached by the project contractors Fulton Hogan to provide a solution that was effective and efficient to maintain. Urban Asset Solutions Pty provided its client with its modern, modular, custom designed and built Ecosol™ Trash Rack.

"The main purpose for the primary treatment system in this project is to increase the quality of water by stopping as much gross litter from flowing into the bay and this is exactly how it seems to be working" Patrick Beraun, Site Engineer. Melbourne Water - Waterways Alliance.

3.0 Ecosol™ Trash Rack Credentials and Case Studies Continued

Water Proofing the West, Old Port Road

The Old Port Road median consists of wetlands and Aquifer Storage and Recovery (or ASR) which comprises a multiple objective stormwater scheme with water reuse, water quality improvement, and environmental enhancements all whilst reducing flood risk.

Old Port Road Wetland Civil Construction Works included:

- Wetland civil construction works;
- Upgrade of vehicular and pedestrian crossovers;
- Pipeline infrastructure works to distribute water;
- Replacement of box culverts under Tapleys Hill Road intersection and relocation of gas main; and
- Installation of a Ecosol™ Trash Rack.

As part of this project Urban Asset Solutions Pty were pleased to provide a customisable primary treatment solution. After detailed consultation with Aurecon (Project Engineers), Bardavcol Pty Ltd (Principal contractors) and the City of Charles Sturt (Asset Owners) and in particular their asset management division, Urban Asset Solutions Pty Ltd designed a nine module stainless steel Trash Rack, incorporating into the design a fibre glass access walkway and removable fall protection barriers for ease of maintenance, whilst ensuring all of councils occupational health and safety concerns were met.

The Ecosol™ Trash Racks are a cost effective and efficient prescreening system for the wetlands and will capture gross pollutants until the nets reach their designed holding capacity, or in the event of a major rain event, when excess flows are designed to simply over top the system. This by-pass facility helps eliminate any adverse hydraulic impact or potential for flooding during peak flow storm events.

Urban Asset Solutions Pty scope of works included the provision of a structural engineered design, manufacture, installation and commissioning. With the majority of works completed off-site at Urban Asset Solutions Pty stainless steel fabrication factory, all elements of the trash rack system were pre-fabricated for simple installation on site. The actual on-site works were completed within three working days. Key to Urban Asset Solutions Pty success for the project was careful planning, design and implementation whilst working in close consultation with our client.

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3.0 Ecosol™ Trash Rack Credentials and Case Studies Continued

Litter Categories	Sum of Total
Food & Beverage	1233
General Domestic	511
Industrial/construction related	746
Recreation/Tourism waste	2
Road side waste	0
Smoking related	158
Unknown	151
Grand Total	2801

Site 1 Retained Pollutant Composition and volume (3rd March 2013 - 29th april 2014)

Litter Categories	Sum of Total
Food & Beverage	1630
General Domestic	556
Industrial/construction related	462
Recreation/Tourism waste	2
Road side waste	7
Smoking related	450
Unknown	158
Grand Total	3265

Site 2 Retained Pollutant Composition and volume (3rd March 2013 - 29th april 2014)

Mackay Regional Council Primary Treatment SQIDS Overview

Mackay Regional Council is intent on achieving a quality of water flowing from the urban area of Mackay that meets the local community social and economic values as well as protecting and enhancing the ecological value of our Urban Waterways. Mackay Regional Council has undertaken a number of projects to improve the quality and quantity of stormwater runoff from the Mackay urban sub-catchments.

Recently Council engaged the services of Urban Asset Solutions Pty Ltd to install several Ecosol™ Trash Rack systems to assist achieve a noticeable reduction in marine debris being discharged from these urban tributaries. Marine debris has been correctly identified as a key threatening process under the Australian Government's Environmental Protection and Biodiversity Conservation Act 1999. Preventing land-based litter from becoming marine debris is of the up most importance with up to 80% of marine debris originating from land based sources (UNEP 2009 'Marine Litter: A global challenge').

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3.0 Ecosol™ Trash Rack Credentials and Case Studies Continued

The aim was to provide custom designed and built Stormwater Quality Improvement Systems that would improve the quality of water discharged from urban stormwater drains and importantly could be easily maintained by Council. Working in close consultation with Council, Urban Asset Solution Pty Ltd designed, installed and commissioned a series of modular Ecosol™ Trash Racks that efficiently prevents significant volumes of gross litter form entering the waterways. The design needed to be robust, efficient at capturing and retaining large volumes of gross litter at high flow velocities and also easily maintainable. The final installed stainless steel system proved efficient within only a few days of its installation.

Data source for four separate sites compliments of Mr Richard Brown, Mackay Regional Council.

Litter Categories	Sum of Total
Food & Beverage	396
General Domestic	321
Industrial/construction related	2549
Recreation/Tourism waste	0
Road side waste	0
Smoking related	122
Unknown	227
Grand Total	3615

Site 3 Retained Pollutant Composition and volume (3rd March 2013 - 29th april 2014)

Litter Categories	Sum of Total
Food & Beverage	1053
General Domestic	921
Industrial/construction related	534
Recreation/Tourism waste	0
Road side waste	6
Smoking related	373
Unknown	344
Grand Total	3231

Site 4 Retained Pollutant Composition and volume (3rd March 2013 - 29th april 2014)

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4.0 Warranty and Life Expectancy

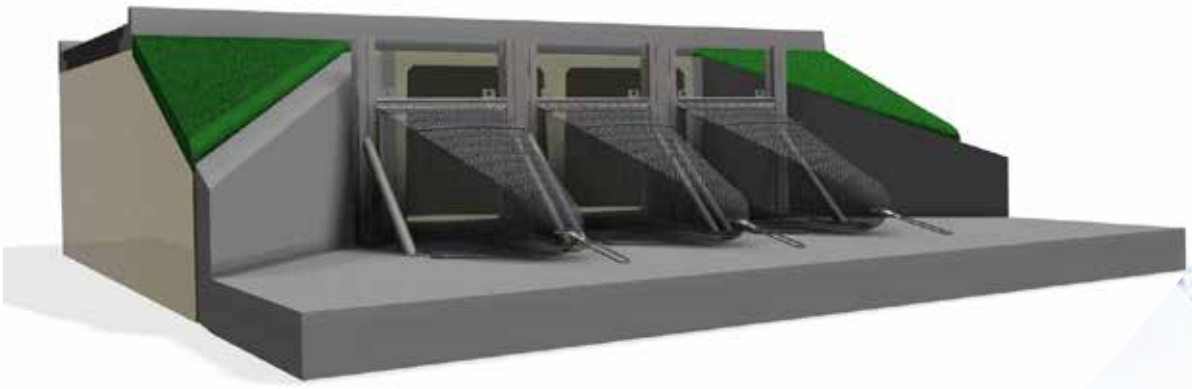
The Ecosol™ Trash Rack has a one-year warranty covering all components and workmanship. Urban Asset Solutions Pty Ltd will rectify any defects that fall within the warranty period. The warranty does not cover damage caused by vandalism and may be invalidated by inappropriate cleaning procedures or where the unit i not cleaned with the recommended frequency. The Ecosol™ Trash Rack is designed to meet strict engineering guidelines and manufacturers guarantees and is one of the most durable primary treatment systems available. The stainless steel components have a life expectancy of 15 years while the filtration net has a life expectancy of 5 years providing appropriate maintenance practices are employed.

5.0 Safety Considerations

The simple, yet effective design of the Ecosol™ Trash Rack reduces OH&S risks as most of the work is undertaken in a controlled factory environment. The unit arrives to site complete and ready for installation reducing significantly on-site time, an important factor given the costs associated with delays that can be caused by inclement weather.

6.0 Environmental Impact

Urban Asset Solutions Pty Ltd is accredited to ISO 14001 (Environment) and undertakes all manufacturing and construction within the requirements of this Standard.



7.0 Key Features and Benefits

The Ecosol™ Trash Rack is a robust and modern primary treatment stormwater filtration system for use where there are cost or space constraints, or specialised cleaning equipment is not available. The unit captures and retains more than 93% of solid pollutants larger than the netting apertures although, in practice, it has been found to collect much smaller particles, including fine sediments. The Ecosol™ Trash Rack has many features and benefits, some of which are listed below:

Key Features	Benefits
Hydraulics	• Minimal head/hydraulic loss • 100% treatable flow rate up to the designed TFR • Over-topping by-pass design eliminates the risk of flooding
Pollutant Capture and Retention	• Filtration net available in 50mm and 115mm aperture sizes • Captures and retains more than 93% of Gross Pollutants • No remobilisation of captured pollutants larger than the filtration net apertures
Design and Construction	• Operates in dry, tidal, and partially submerged environments • Robust design ensures the unit can withstand peak flows without being damaged • Ideal for locations with limited space or where there are significant cost constraints • Easily installed with minimum risk or disruption to the public • Simple design with durable, corrosive-resistant materials • Modular design easily scaled up to suit any size headwall or channel • Can be retrofitted to almost any existing stormwater system • Product is made in-house thereby reducing lead times significantly
Cleaning and Maintenance	• Easily cleaned using small crane truck • Removable filtration net makes access easy for cleaning and maintenance • Pollutants do not need to be handled during cleaning
Environmental Impact	• Effective pre-screening as part of a treatment train to achieve water quality objectives • Positive effect on natural ecosystem by improving water quality • Unit can be housed in its own pit underground with little effect on the site aesthetics
Tried and Tested	• Independently Tested • Meets all relevant indusry standards and guidelines

Table 1 - Ecosol™ Trash Rack Key Features and Benefits

8.0 Key Product Dimensions and Flow Capacities

Table 2 highlights the key performance specifications for typically-sized single module Ecosol™ Trash Rack units to suit cylindrical pipes up to 1050mm and for box culverts up to 900mm wide by 900mm high. Figures quoted are for single units only, for multi-units systems simply multiply the figures by the number of single units modules required for your site, as an indicative guide

Model Ecosol Trash Rack	Pipe dia./ Box Culvert Height (mm)	Holding Capacity (m^3)	Designed Treatable Flow Rates (L/sec) at Grades up to 10%	Designed by-pass Capacity (L/sec) at grade up to					
				0.5%	1%	2%	5%	7%	10%
Cylindrical Pipe Units									
ETR 37	375	0.263	65	124	175	248	392	463	544
ETR 45	450	0.379	103	201	285	403	637	754	901
ETR 52	525	0.515	151	304	430	608	961	1137	1359
ETR 60	600	0.675	211	434	614	868	1372	1623	1941
ETR 67	675	0.853	282	594	840	1188	1879	2222	2675
ETR 75	750	1.053	369	787	1113	1574	2488		
ETR 82	825	1.274	468	1014	1435	2029			
ETR 90	900	1.518	582	1279	1809	2559			
ETR 105	1050	2.065	855	1351	1910				
Box Culvert Units (600mm wide)									
ETR B37 6	375	0.421	228	86	122	173	274	324	387
ETR B45 6	450	0.505	299	140	109	282	445	527	630
ETR B52 6	525	0.589	377	180	202	230	389	503	612
ETR B60 6	600	0.675	461	212	301	425	672	795	951
ETR B75 6	750	0.843	644	303	429	607	960	1136	1358
ETR B82 6	825	0.927	743	415	588	831	1315	1555	1859
ETR B90 6	900	1.012	820	550	779	1102	1742		
ETR B120 6	1200	1.180	960	709	1005	1420			
Box Culvert Units (900mm wide)									
ETR B37 9	375	0.632	342	86	122	173	274	324	387
ETR B45 9	450	0.750	449	140	109	282	445	527	630
ETR B52 9	525	0.884	566	180	202	230	389	503	612
ETR B60 9	600	1.012	691	212	301	425	672	795	951
ETR B75 9	750	1.264	966	303	429	607	960	1136	1358
ETR B82 9	825	1.390	1115	415	588	831	1315	1555	1859
ETR B90 9	900	1.518	1180	550	779	1102	1742		

Table 2 - Ecosol™ Trash Rack Key Dimensions and Flow Capacities

8.0 Key Product Dimensions and Flow Capacities Continued

Treatable Flow Rate

The table 2 provides an indicative guide of the products treatable flow rate relevant to pipe sizes. With an empty filtration net the resistance is negligible and therefore the treatable flow rate is higher. However when the filtration net is full of pollutants and impervious the treatable flow rate of the unit approaches zero and the unit starts to operate in by-pass as designed.

By-Pass Capacity

The Ecosol™ Trash Rack has been designed to cater for full pipe flow by-pass. That is worst-case scenario with the filtration net full and impervious. The by-pass capacity of the unit is determined by the depth of flow that can over top the system. For the purpose of providing some guidance table 2 provides some by-pass capacities based on conservative figures and assumed no backwater effect downstream of the unit.

9.0 Collection and Removal Efficiencies

Particle Size Distribution Collection Efficiency

In order to determine a meaningful characterisation of the products collection efficiency, an extensive verification phase was undertaken by Avocet Consulting Pty Ltd, Ecosol and EngTest (The University of Adelaide).

Particulate Size (Micron)	Capture Efficiency
2000 - 6000	20%
6000 - 16000	48%
>16000	90%

Table 3 – Typical PSD Collection efficiency for the 50mm and 115mm netting Ecosol™ Trash Rack products.

9.0 Collection and Removal Efficiencies Continued

Urban Asset Solutions Pty Ltd recognises that modelling of stormwater treatment systems is an integral part of WSUD engineering procedures today. To assist you with your next project we are pleased to provide you with some indicative capture efficiency values for the Ecosol™ Trash Rack System.

ECOSOL (MODULAR) TRASH RACK CAPTURE EFFICIENCY PERFORMANCE SUMMARY		
Pollutant	Capture Efficiency	Details
Gross Pollutants (GP)	93%	Capture efficiency of gross pollutants by volume (larger than the filtration netting apertures). Standard Netting consists of 50mm or 115mm apertures.

Table 4 – Suggested collection efficiency for the Ecosol™ Trash Rack products

The optimal collection efficiency for the Ecosol™ Trash Rack is at approximately 30 – 40% full. Accordingly, the removal of the constituents is dependent on the composition of the particles, and the bonding of the chemical constituents to the surface of the particles. Additionally the particle filtration performance of Ecosol™ Trash Rack is dependent on the body of pollutant forming a media already captured by the filter; therefore conservative capture efficiency ranges have been provided.

10.0 MUSIC Modelling Guidelines

These guidelines provide instruction to the creation and application of a treatment node for the Ecosol™ Trash Rack for the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The Ecosol™ Trash Rack can be modelled in MUSIC using the Gross Pollutant Trap Treatment node to represent the results derived from independent laboratory testing by the University of Adelaide (ENGTEST The school of civil, environmental and mining engineering). The guidelines apply to the creation of the treatment node within MUSIC v6.1.0.

10.0 MUSIC Modelling Guidelines Continued

Insert a GPT treatment node into your model by selecting “GPT” under the treatment nodes menu. When the node is created the node properties dialog is displayed. There are several changes that need to be made in this dialog.

- Adjust the text in the Location box to read "Ecosol™ Trash Rack" plus any other relevant information (50mm or 115mm Aperture netting etc).
- Adjust the low flow bypass to reflect any flow (m3/sec) diverted away from the unit before treatment (usually zero).
- Adjust the high flow bypass to reflect the treatable flow rate (TFR values are detailed in table 2 (m3/sec) any higher flows will bypass treatment.

NOTES: Can be used to describe assumptions or location of reduction values for authority approvals.

Adjust the transfer function for gross pollutants selecting the pollutant and editing (right click on the function point) to reflect the input and output capture efficiencies (ce) of the treatment device. Table 5 provides the input and output values for the Ecosol™ Trash Rack based values for the Ecosol™ Trash Rack based on the use of a standard 50mm or 115mm Netting

Pollutant	Removal Rate (%)	Entered Input Value	Entered Output Value
Gross Pollutants (GP)	93	1000	70

Table 5 - Suggested collection efficiency for the Ecosol™ Trash Rack System

11.0 Cleaning and Maintenance

As with all filtration systems, the Ecosol™ Trash Rack should be cleaned regularly. The cleaning frequency, and the cost, depends heavily on the catchment size, type, and the quantity and quality of stormwater runoff conveyed to the system. One of the key advantages of the Ecosol™ Trash Rack is that a small crane truck can easily lift the individual filtration netting modules for cleaning thereby eliminating any manual handling risks and the need for specialised cleaning equipment. As the unit is generally a dry system there is a reduced likelihood of captured contaminants causing any significant adverse environmental impact or nuisance such as odours and putrefaction.

A key benefit of the Ecosol™ Trash Rack is not only its low capital cost but also its ongoing cleaning and maintenance cost. The Ecosol™ Trash Rack can be easily inspected visually to determine whether it needs cleaning. Urban Asset Solutions Pty Ltd recommends the unit is inspected every two months or after any major rain event to determine if it needs to be cleaned. Cleaning is recommended before the filtration net reaches its capacity to avoid flows bypassing the unit and discharging untreated stormwater to the receiving waterway. The figures below give a broad guideline about the catchment size and the number of cleans required annually for single module systems.

Ecosol (Modular) Trash rack Product Code	Pipe and Culvert Dimensions	Gross Pollutant Holding Capacities	Optimal Catchment Area (Ha)	Recommended Cleaning Frequency
Cylindrical Pipes	mm	m^3	Ha	Per Annum
ETR 37	375	0.263	0.95	1
ETR 45	450	0.379	1.30	1
ETR 52	525	0.515	1.80	1
ETR 60	600	0.675	2.40	1
ETR 67	675	0.853	3.00	1
ETR 75	750	1.053	3.70	1
ETR 82	825	1.274	4.50	1
ETR 90	900	1.518	5.50	1
ETR 105	1050	2.065	7.50	1

Table 6 Indicative cleaning intervals for the Ecosol™ Trash Rack on cylindrical outlets.

11.0 Cleaning and Maintenance Continued

Ecosol (Modular) Trash rack Product Code	Box Culverts Units (600mm wide)	Gross Pollutant Holding Capacities	Optimal Catchment Area (Ha)	Recommended Cleaning Frequency
Box Culverts	mm	m^3	Ha	Per Annum
ETR B37 6	375	0.421	0.15	1
ETR B45 6	450	0.505	1.80	1
ETR B52 6	525	0.589	2.10	1
ETR B60 6	600	0.675	2.40	1
ETR B75 6	750	0.843	3.00	1
ETR B82 6	825	0.927	3.30	1
ETR B90 6	900	1.012	3.60	1
ETR B120 6	1200	1.180	4.20	1

Table 7 Indicative cleaning intervals for the Ecosol™ Trash Rack installed on 600mm wide box culvert outlets.

Ecosol (Modular) Trash rack Product Code	Box Culverts Units (900mm wide)	Gross Pollutant Holding Capacities	Optimal Catchment Area (Ha)	Recommended Cleaning Frequency
Box Culverts	mm	m^3	Ha	Per Annum
ETR B37 9	375	0.632	2.30	1
ETR B45 9	450	0.750	2.70	1
ETR B52 9	525	0.884	3.00	1
ETR B60 9	600	1.012	3.60	1
ETR B75 9	750	1.264	4.50	1
ETR B82 9	825	1.390	4.90	1
ETR B90 9	900	1.518	5.70	1

Table 8 Indicative cleaning intervals for the Ecosol™ Trash Rack installed on 900mm wide box culvert outlets.

Cleaning frequencies are based on typical pollution loads of 0.280m³ /ha/year for gross pollutants generated on a typical fully developed urban catchment. Excludes coarse sediment pollutant loads.

All data provided in the above tables and figures are based on single module units with 2.5m net lengths. For multiple module units please consult with your local Urban Asset Solutions Pty Ltd representative.

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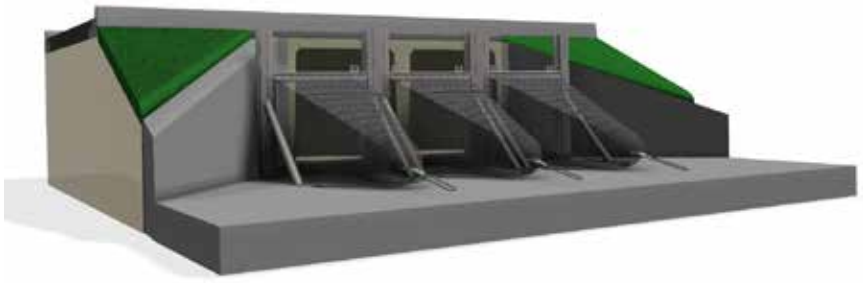
11.1 Monitoring

Under normal weather and operating conditions, your Ecosol™ Trash Rack should be checked a minimum of every two months depending on the quality and quantity of the inflow to the unit. Initially, Urban Asset Solutions Pty Ltd recommends that monitoring is undertaken monthly or at least after each major rain event. Once the unit has been in operation for an extended period of time (say, 24 months) then the monitoring schedule can be adjusted to reflect the actual operating conditions specific to the catchment.

11.2 Asset Management Services

Urban Asset Solutions Pty Ltd l has a very competitive, monitoring, maintenance and cleaning service. We believe that it is in your best interests for Urban Asset Solutions Pty Ltd staff to clean and maintain the unit, not only because we are specialists, but also because proper monitoring and maintenance enhances the unit life significantly. Should you use another company to clean the unit, or undertake this work yourself, we request that it be conducted according to Urban Asset Solutions Pty Ltd specifications. Otherwise, you may invalidate your warranty, as damage caused by inappropriate cleaning procedures is not covered. The advantages of using Urban Asset Solutions Pty Ltd to monitor, clean and maintain your system is that you get:

- regular inspections of your unit;
- a comprehensive cleaning service with removal and disposal of all captured pollutants;
- a detailed report provided on completion of each clean;
- trained and experienced staff; and
- remedial work completed, if required.



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12.0 The Ecosol™ Trash Rack System Applications and Configurations

The Ecosol™ Trash Rack is suitable for most applications. It is a robust and modern primary treatment filtration system for use where there are cost or space constraints, or specialised cleaning equipment is not available.

The Ecosol™ Trash Rack is usually installed, downstream of pipe or box culvert outlets or across open channels as an engineered free-standing device. It is suitable for installation at single or multiple pipes outlets and headwalls or even large open channels.

Efficient pre-treatment

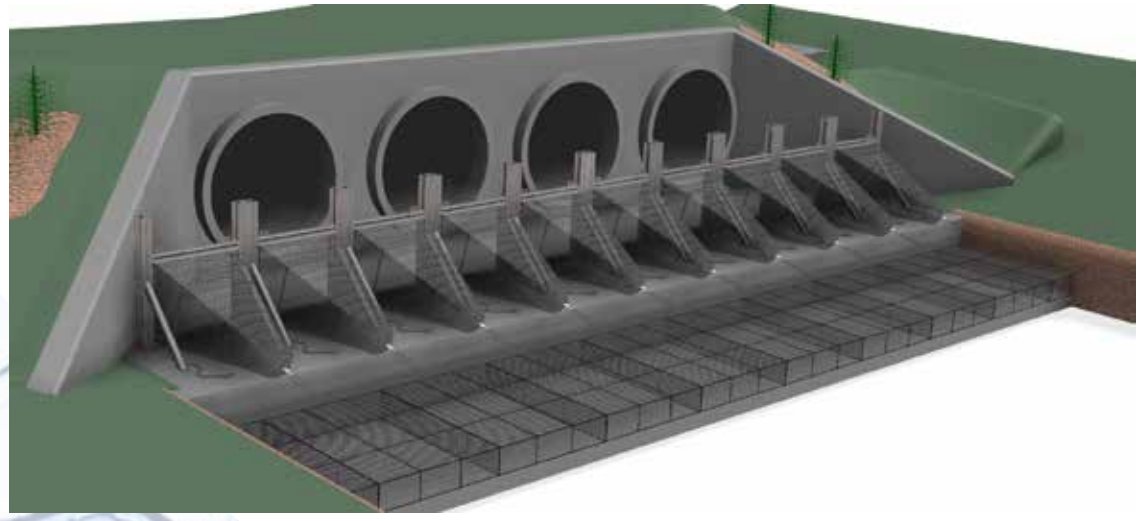
The Ecosol™ Trash Rack is generally located upstream of a swale, wetlands or detention basins providing essential primary treatment of stormwater runoff. Further the system also act as a flow dissipater thereby reducing flow velocities. This enhances the operational life of downstream treatment measures.

Cost effective stormwater treatment solution

The Ecosol™ Trash Rack fills a gap in the available technologies for stormwater filtration. It is especially useful in those situations where there are space or cost constraints or restricted access for the specialised cleaning equipment as needed with higher-end filtration systems.

Diverse design provides a simple stormwater treatment solution

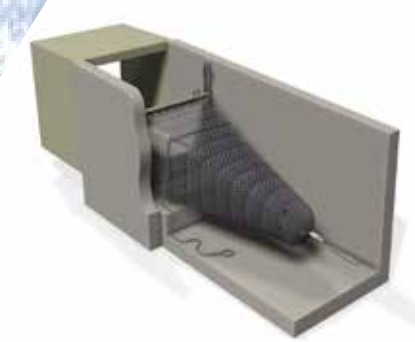
Often the Ecosol™ Trash Rack is located at drainage outlets that discharge to beaches, rivers and creeks. Its modular design enables to be configured to suit most stormwater discharge points. It can also be installed in open channel applications, where conventional Stormwater Quality Improvement Devices (SQID,s) are either cost prohibitive or too large to install and the proposed location.



13.0 Turnkey Services

Urban Asset Solutions Pty Ltd design and estimating staff provide a dedicated management approach towards your project. In addition all staff are capable of liaising with the client, the consulting engineer, the contractor, and all other interested third parties to achieve successful outcome.

Urban Asset Solutions Pty Ltd provides a complete turnkey service from design,manufacture and installation to cleaning and maintenance for its product range and prides itself on providing its client with a cost effective, efficient service.



14.0 Accreditation

Urban Asset Solutions Pty Ltd is accredited to AS/NZS ISO 14001 (Environment) and AS/NZS 9001 (Quality). Our commitment to continuously improving our products and services is demonstrated by our ongoing accreditation for Quality and Environmental Management Urban Asset Solutions Pty Ltd is also committed to a safe environment for its employees. We are fully third-party accredited to AS/NZS 4801:2001 and OHSAS 18001.

15.0 Suppiler and Technical Product Contact Details

For any maintenance or technical product enquiries please contact:
Urban Asset Solutions Pty Ltd
Tel: 1300 706 624
Fax: 1300 706 634
Email: info@urbanassetsolutions.com.au

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Appendix 1

Ecosol™ Trash Rack Essential Information Form

To ensure your system is appropriately designed for its intended application and meets local water quality objectives it is essential that the following minimum information is provided:

Customer Details

Contact Person:

Company Name:

Phone:

Fax:

Email:

Project and Site Information

Project Name:

Project Address:

Type of Development/Catchment Type:

Catchment area (ha):

Impervious area fraction (%):

Pollutant Removal Targets (%):
Site Water Quality Objectives (WQO's)

- Gross Pollutants
- Total Suspended Solids
- Total Phosphorus
- Total Nitrogen
- Heavy Metals
- Total Petroleum/ Hydrocarbon
- Other

Local authority:

Device Location:

Treatable Flow Rate (L/s):

Designed Discharge (Peak ARI Flow Rate) L/s:

Other essential design or site relevant information:

Please forward the above information for your next project to your local Urban Asset Solutions Pty Ltd representative. On receipt Urban Asset Solutions Pty Ltd will model and design the most appropriately sized system to suit your application to assist you achieve the project Water Sensitive Urban design objectives.

Email: info@urbanassetsolutions.com.au
Fax: 1300 706 634

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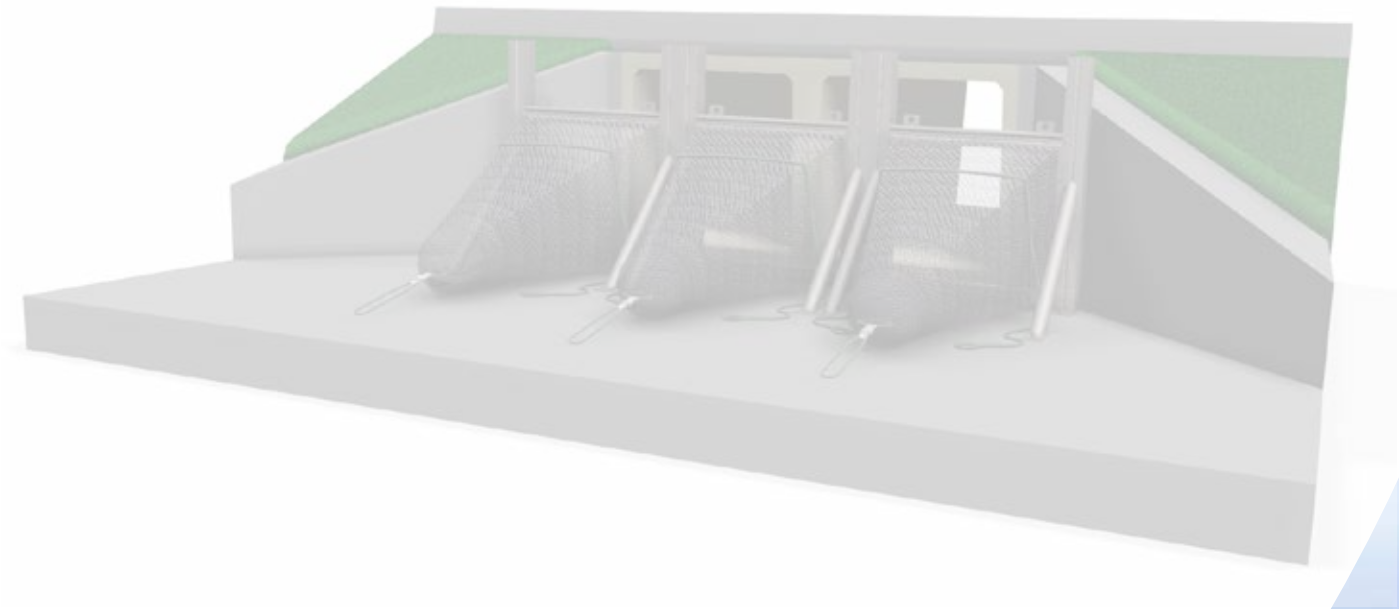

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