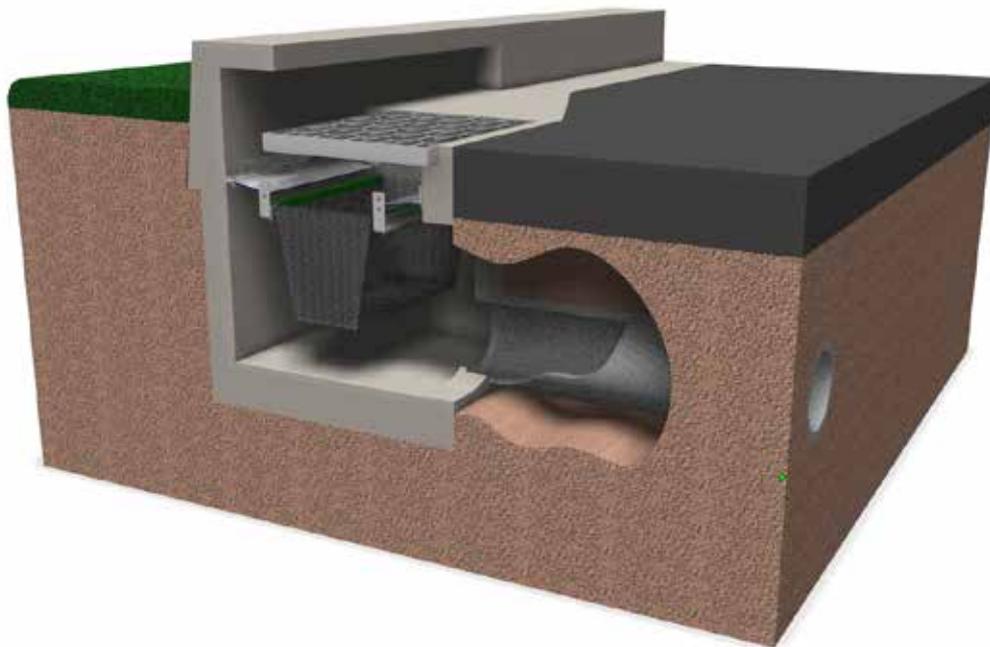


Ecosol™ Litter Basket Technical Specification



environmentally engineered
for a better future



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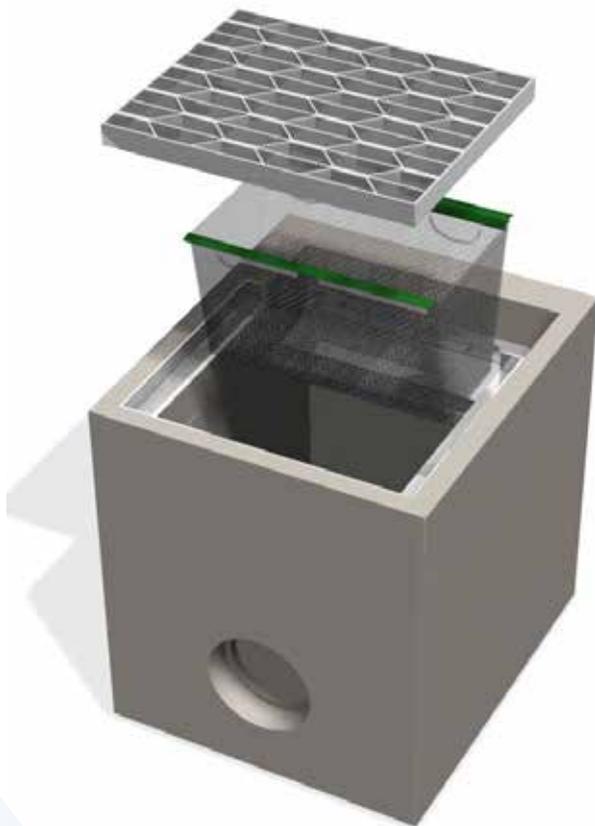
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1.0 Introduction

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 (WQOs). An integral element to any good WSUD design is primary treatment or pre-screening of stormwater flows to remove coarse sediment and gross pollutants prior to downstream secondary or tertiary treatment systems such as bio retention filters or wetlands.

The Ecosol™ Litter Basket provides effective primary treatment of stormwater flows at point of source. For many years the Ecosol™ Litter Basket has been seen as the industry standard for at-source filtration with its effectiveness proven over time both in the field and under strict laboratory conditions.



The system has been designed to provide a robust and durable, cost-effective at-source primary treatment system that captures and retains solid pollutants at drainage entry points.

In developing this innovative 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 design; and
- cost-effective maintenance regime.

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

1.1 How And Why The Ecosol™ Litter Basket Works

The Ecosol™ Litter Basket captures pollutants at drainage entry points and consists of a capture basket and an overflow by-pass flap(s). The basket is fitted below the invert of the gutter and inside the drainage inlet pit and importantly does not obstruct flow in the outlet pipe. Solid pollutants enter the Ecosol™ Litter Basket with the stormwater from roadside or other run-off areas, such as car parks. The incoming flow and the pollutants aquaplane across the flap(s) into the capture basket. The filtered stormwater then passes into the drainage network without any head/hydraulic loss through the unit.



As the basket approaches 90% full, the by-pass flap(s) begins to open in response to the incoming flow. Once the basket is 100% full the pressure of the incoming flow forces open the by-pass flap(s), allowing the excess flow, to enter the drainage system through the by-pass openings. This effectively eliminates the likelihood of flooding, a common fault with other at-source systems. Even when in by-pass, the captured pollutants are not remobilised and are retained in the capture basket.



2.0 Ecosol™ Litter Basket Credentials

Ecosol has commissioned a range of tests to confirm not only product performance but also to help with further research and development work. In 1996, the University of South Australia, a National Australian Testing Authority (NATA)-approved testing body, tested the Ecosol™ Litter Basket. Its full-size Roadway Surface Drainage Rig was used to carry out a series of tests in two stages on the Ecosol™ Litter Basket. These tests measured the capture performance of the unit in both on-grade and sag situations for a range of flows containing full-size, real-life solid pollutants. The testing confirmed the unit's ability to capture 97% of pollutants greater than the filtration mesh size.

The testing also focused on determining whether the unit had any hydraulic impact on the flows entering the pit. It found that the Ecosol™ Litter Basket did not reduce the pit's inlet capacity, a key benefit, especially as the unit is often installed in road side entry pits where any level of flooding would be unacceptable. The Ecosol™ Litter Basket also has a by-pass overflow that effectively eliminates the risk of flooding.

In 2012 Ecosol engaged the University of Adelaide (ENGTEST The school of civil, environmental and mining engineering) to undertake further independently laboratory hydraulic and capture efficiency testing on the improved Ecosol™ Litter Basket design. Additionally they also undertook a comprehensive peer review of all prior and current Ecosol™ Litter Basket field and laboratory testing reports to comprehensively determine its performance specification. Reference – "Performance Review of the Ecosol™ Litter Basket at-source solid pollutant filter (report dated 9 May 2013).



3.0 Warranty And Life Expectancy



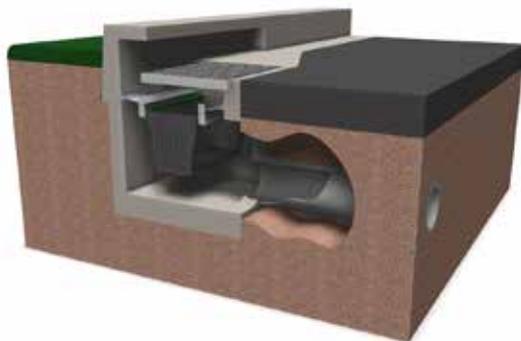
The Ecosol™ Litter Basket has a one-year warranty covering all components and workmanship. Urban Asset Solutions Pty Ltd will rectify any defects that fall within the warranty period. The warranty does not cover damage caused by vandalism and may be invalidated by inappropriate cleaning procedures or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

4.0 Key Features And Benefits

The Ecosol™ Litter Basket captures and retains a range of pollutants at entry points to the drainage network. Easily installed into most types of side entry pits, also known as gully pits or catch-pits, it retains more than 97% of pollutants greater than 600µm and in the field it has been found to collect much smaller particles, including fine sediments.

For many years the Ecosol™ Litter Basket has been seen as the industry standard for at-source filtration with its effectiveness proven over time both in the field and under strict laboratory conditions. Consisting of a capture basket, reusable liner, and overflow bypass flap(s) the Ecosol™ Litter Basket is fitted below the invert of the gutter inside the drainage pit and, importantly, does not obstruct flow into the outlet pipe. The liner is easily removed and emptied during maintenance and comes in a range of filtration fabric sizes from 100µm to 3000µm, depending on the site requirements.

Key Features	Benefits
Hydraulics	<ul style="list-style-type: none"> • Minimal head/hydraulic loss • Does not affect stormwater inlet capacity • Treats 100% of incoming flow
Pollutant Capture and Retention	<ul style="list-style-type: none"> • Unique by-pass overflow eliminates flooding risk • More than 97% of solid pollutants > 600µm • Significant amounts of sediment and more than 40% TSS • No remobilisation of captured pollutants
Design	<ul style="list-style-type: none"> • Different sizes of filter media available for targeted pollutant capture • Able to be retro-fitted into existing pits or supplied in its own pit • Easily installed
Cleaning and Maintenance	<ul style="list-style-type: none"> • Dry storage of pollution thereby reducing risk of toxic fermentation • Pollutants not handled during cleaning
Environmental Impact	<ul style="list-style-type: none"> • Re-usable filter liner is easily removed for manual cleaning • Reduces sedimentation build-up • Visually unobtrusive



5.0 Key Dimensions

The Ecosol™ Litter Basket can be fitted to new and existing side entry pits (whether single, double, or triple in size), including those with non-standard inlets, outlets, and junctions. The table below shows the approximate dimensions and holding capacities for the most typical Ecosol™ Litter Basket applications. Holding capacities, treatable flow rates and by-pass capacities vary dependent on the site-specifics.

Stormwater Inlet Pit Description	Dimensions (Length x Width) ³		Holding Capacity (typical basket depth 450mm) ¹	Treatable Flow Rate (L/s) ²		By-pass Capacity	Static Head in By-pass
				200µm mesh	1.5mm mesh		
	Pit	Litter Basket	(m ³)	L/s	L/s		mm
Drainway	600 x 595	600 x 445	0.120	53	106	110	150
Single Grated Kerb Inlet (with Lintel)	600 x 600	600 x 450	0.121	53	106	110	150
	900 x 750	900 x 450	0.182	83	167	215	150
	900 x 900	900 x 600	0.243	83	167	215	150
	1200 x 600	2 x 600 x 450	0.243	103	212	220	150
Double Grated Kerb Inlet (with Lintel)	1200 x 900	2 x 600 x 600	0.324	103	212	430	150
	1800 x 600	2 x 900 x 450	0.364	106	220	230	150
	1800 x 900	2 x 900 x 600	0.496	106	220	440	150
	600 x 660	600 x 450	0.121	53	106	110	150
Single Side Kerb Inlet (with Lintel - no grate)	900 x 750	900 x 450	0.182	83	167	215	150
	900 x 900	900 x 600	0.243	83	167	215	150
	1200 x 600	2 x 600 x 450	0.243	103	212	220	150
Double Side Kerb Inlet (with Lintel - no grate)	1200 x 900	2 x 600 x 600	0.324	106	220	430	150
	1800 x 600	2 x 900 x 450	0.364	106	220	230	150
	1800 x 900	2 x 900 x 600	0.486	106	220	440	150
	600 x 600	600 x 450	0.121	53	106	110	150
Grated Field Inlet (no Kerb or Lintel)	900 x 750	900 x 450	0.182	83	167	215	150
	900 x 900	900 x 600	0.243	83	167	215	150
	600	437 x 437	0.085	54	108	120	150
Circular Inlet	750	558 x 558	0.140	92	184	172	150
	900	680 x 680	0.208	103	212	225	150
	1050	801 x 801	0.228	103	212	225	150

¹Holding capacities are largely determined by the existing inlet pit dimensions and the outlet pipe diameter but typically ranges from 120 - 364Kg at 100% full.

²The TFR varies dependent on the size of the Litter Basket, mesh apertures and percentage of fill for the individual baskets. For the purpose of providing indicative TFR's we have assumed a minimum 375mm diameter outlet and empty litter baskets.

³All Ecosol™ Litter Baskets installed in pits larger than 600mm in width are fitted with flow plates, removable capture baskets, optional hydrocarbon socks and include by-pass openings to cater for peak flow conditions.

6.0 Collection And Removal Efficiencies

Stormwater treatment is best when distributed across the catchment treating stormwater pollutants as close as possible to their point of source. The Ecosol™ Litter Basket provides a cost effective and efficient solution at point of source and has the highest treatable flow rate of any comparable system. In order to determine a meaningful characterisation of the Ecosol™ Litter Basket collection efficiency, an extensive verification phase was undertaken by Avocet Consulting Pty Ltd, Ecosol and EngTest (The University of Adelaide). To best summarise the capture efficiency results of extensive product testing a regression of the data points using a sigmoidal regression curve was selected as it provided a conservative fit to the wide scatter of data collected. Refer to figures 1 & 2 for testing results. Table 1 summarises these results

6.1 Particle Size Distribution Collection Efficiency

Pollutant Capture Efficiency PSD

Sieve Size (micron)	Capture Efficiency (200µm Filter Bag)	Capture Efficiency (1500µm Filter Bag)
2000 - 6000	97%	97%
600 - 2000	97%	77%
200 - 600	86%	37%
60 - 200	35%	8%
20 - 60	4%	1%

Table 1 – Ecosol™ Litter Basket typical particle size distribution results at designed Treatable Flow Rates.

6.2 Laboratory Testing Collection Efficiency Sigmoidal Regression Lines continued

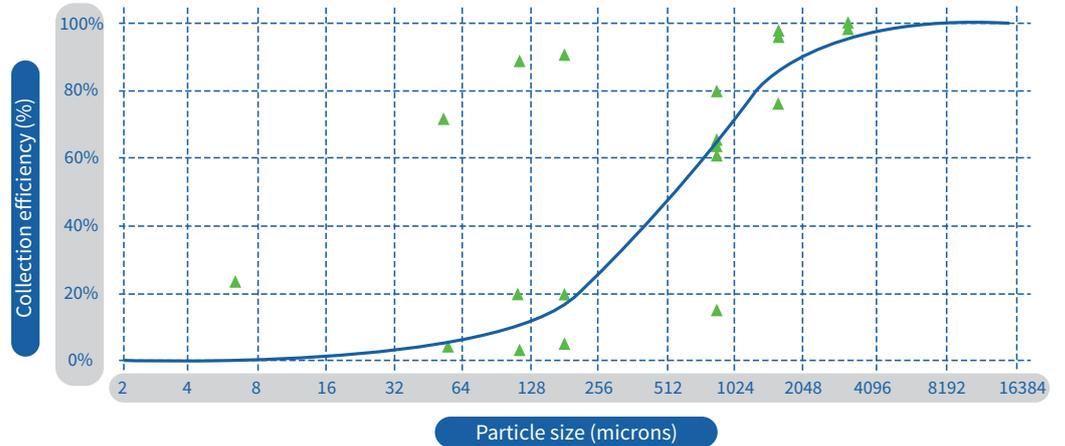


Figure 2 - Sigmoidal regression line for the Ecosol™ Litter Basket, with a 1500 micron filtration bag indicating high capture efficiencies for a range of particle sizes.

6.3 Field Testing Particle Size Distribution Data

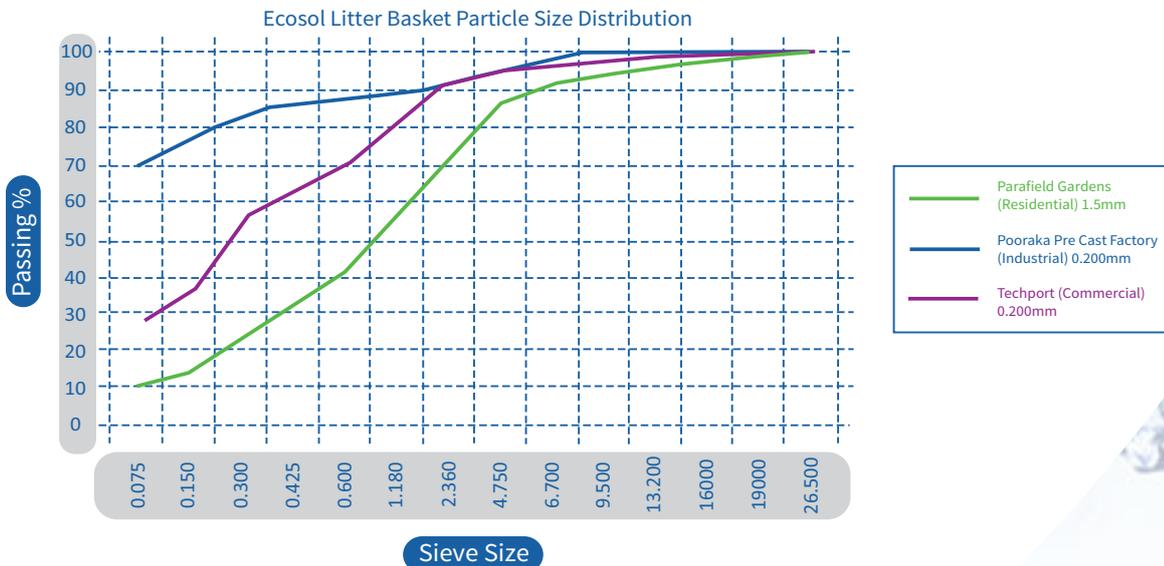


Figure 3 - Field testing Particle size distribution data for three separate product installations.

6.4 Summary Product Collection Efficiency Data

In recent years modern Water Sensitive Urban Design (WSUD) objectives and principles now applied to most urban development's require more onerous water quality objectives (WQOs) specifically targeting the removal of suspended solids, nitrogen, phosphorus and heavy metals. The Ecosol™ Litter Basket is an integral part of the treatment train providing essential pre-screening of stormwater flows, and when used in conjunction with other treatment measures such as swales or sand filters will achieve target water quality objectives.

Performance Criteria ¹	Capture Efficiency (Up to) (200µm Filter Bag)	Capture Efficiency (Up to) (1500µm Filter Bag)
Gross Pollutants (>600µm)	97%	77%
Total Suspended Solids (TSS) (20 - 600µm)	41%	15%
Total Phosphorous (TP)	39%	15%
Total Nitrogen (TN)	11%	4%
Heavy Metals	6%	2%
Total Petroleum/Hydrocarbon	20%	7%

¹ Figures quoted are mean collection efficiency statistics based on available product testing data. It is important to note that the water quality CE values are indicative of potential field CEs given that Ecosol™ Litter Basket provides physical screening and the removal of chemical constituents is therefore largely dependent on the chemical composition of the particles and the bonding of these chemical constituents to the surface of the particles.

6.5 Products Options



To enhance the product capture efficiencies other filter medias can be incorporated into the design.

Hydrocarbon booms installed within the Ecosol™ Litter Basket will provide additional protection against oil or fuel spills in wet conditions.

Reactive filtration media pillows installed at the base of the basket will provide improved capture efficiencies for heavy metals, total nitrogen, total phosphorous, turbidity and suspended solids.

7.0 MUSIC Modelling Guidelines

These guidelines provide instruction to the creation and application of a treatment node for the Ecosol™ Litter Basket for the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The Ecosol™ Litter Basket can be modelled in MUSIC using the Generic Treatment node to represent the results derived from independent laboratory testing and field testing by the University of South Australia and 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 v6.0.4

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™ Litter Basket" plus any other relevant information (200µm or 1500µm).
- 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 page 6) (L/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 each pollutant selecting the pollutant and editing (right click on the function point) the input and output values on the graph below to reflect the capture efficiencies (ce) of the treatment device. Table 2 provides the input and output values for the Ecosol™ Litter Basket based on the use of a 200µm-filter liner. Table 6 provides the input and output values for the Ecosol™ Litter Basket based on the use of a standard 1500µm filter liner

Pollutant	Removal Rate (%)	Entered Input Value	Entered Output Value
Total Suspended Solids (20 - 600µm)	41	1000	590
Total Phosphorus	39	1000	610
Total Nitrogen	11	1000	890
Gross Pollutants (>600µm)	97	1000	30
Heavy Metals	6	n/a	n/a
Total Petroleum/Hydrocarbons	20	n/a	n/a

Table 2 - Ecosol™ Litter Basket - 200 µm Filter liner, input and output values.

7.0 MUSIC Modelling Guidelines Continued

Pollutant	Removal Rate (%)	Entered Input Value	Entered Output Value
Total Suspended Solids (20 - 600µm)	15	1000	850
Total Phosphorus	15	1000	850
Total Nitrogen	4	1000	960
Gross Pollutants (>600µm)	77	1000	230
Heavy Metals	2	n/a	n/a
Total Petroleum/Hydrocarbons	7	n/a	n/a

Table 3 - Ecosol™ Litter Basket -1500 µm Filter liner, input and output values.

Once the transfer functions have been defined for each of the pollutants the node has been fully defined. When completed the properties window can be closed by clicking the “Finish” button.

For further assistance in sizing or specifying a system for your next project please complete the form in Appendix 1 and forward to your local Urban Asset Solutions Pty Ltd representative

8.0 Monitoring

Under normal weather and operating condition your Ecosol™ Litter Baskets should be checked a minimum of every two - three months depending on the quality and quantity of the inflow to the unit and immediately following a major storm event. Initially, Urban Asset Solutions Pty Ltd recommends that monitoring is undertaken monthly. 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.

9.0 Cleaning And Maintenance

During the first two years of operation it is important to regularly monitor and maintain each unit to better determine long-term maintenance regimes. All elements within the Ecosol™ Litter Basket have been designed for easy safe and cost efficient cleaning by either manual basket removal or vacuum method. Please refer to the product maintenance guide for full cleaning and maintenance procedures.

The figures in the table below give a broad guideline about the optimal catchment size, and the number of cleans required annually based on typical expected urban pollutant loads.

Optimal Catchment Size (Ha)	Recommended cleaning frequency based on optimal catchment sizes and typical pollutant loads (per annum)
Up to 0.2	Typical Developed Urban Catchment 2
Up to 0.3	2-3
Up to 0.5	3-4



One of the key advantages of the Ecosol™ Litter Basket is that it can be cleaned by vacuum method using street sweeping vehicles. This is safe and cost efficient.

10.0 Applications And Configurations

The Ecosol™ Litter Basket is an at-source filtration system that is ideal for capturing solid pollutants in a variety of locations but is especially effective in built-up areas, so-called “hot spots” such as shopping precincts and restaurant strips.

The ability to retro-fit the Ecosol™ Litter Basket into existing pits means that drainage lines serving pollutant-generating catchments, such as schools, shopping precincts, and central business districts, can be targeted for treatment cost efficiently.



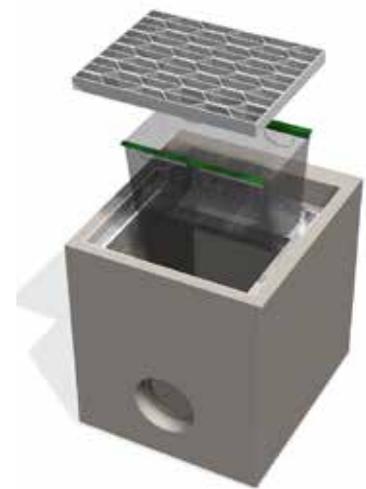
Shopping Centre



Residential Development

Treatment-train Approach

As no one measure can treat all of the pollutants generated from a typical development a treatment-train approach to stormwater management is always preferable. This involves using a range of treatment measures, working together, to achieve improved water quality. The Ecosol™ Litter Basket operating as a pre-screening system in a treatment train provides essential primary treatment thereby enhancing the operating life of secondary and tertiary treatment systems.



11.0 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 a successful outcome.

Given the wide range of pit types, sizes, and configurations, Urban Asset Solutions Pty Ltd provide a complete turnkey service inclusive of site measure, manufacture and installation on-site to suit each individual stormwater inlet pit. This flexibility, when compared to other off-the-shelf, supply-only products, means the client can be assured of a unit that not only has proven performance but also one that is ideally suited to the particular needs of the site. The unit's unique design enables it to maximise holding capacities for the many different types of pits without impeding on the hydraulic design characteristics of the inlet pit.



Urban Asset Solutions Pty Ltd has a very competitive cleaning service. After each clean we provide a report detailing the volume and type of pollutants removed. 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 clean and maintain your unit are 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.

12.0 Accreditation

Urban Asset Solutions Pty Ltd is accredited to AS/NZS ISO 1400 (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.

13.0 Supplier 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

Appendix 1

Ecosol™ Litter Basket 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		
Asset Owner:		Asset ID:
Unit Location :		UAS Ref:
Date:	Time:	Product Code: Ecosol™ Litter Basket
Inspected By:		

Project and Site Information	
Project Name:	
Project Address:	
Type of Development/Catchment Type	
Pollutant Removal Targets (%): Site Water Quality Objectives (WQO's)	Gross Pollutants (>2000µm) Total Suspended Solids (20 – 2000µm) Total Phosphorus Total Nitrogen Heavy Metals Total Petroleum/ Hydrocarbon Other
Local Authority:	
Proposed Number of Ecosol™ Litter Baskets required:	
Inlet pit type & typical dimensions (e.g. Grated side entry pit 900 x 600mm)	
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

Appendix 2

References

Dr. F.P Nejad, Dr.A. Zecchin, Dr.M Lambert (2013) - Performance Review of the Ecosol Litter Basket at-source solid pollutant filter - School of Civil Environmental and Mining Engineering. The University of Adelaide.

Prof J.R. Argue, D Pezzaniti (1996) Evaluation of the RSF 100 and RSF 200 Gross Pollutant Traps - Full scale laboratory testing on the performance of the Ecosol Litter Basket on sag and grade test utilising the road surface drainage test rig – Urban Water Resources Centre, University of South Australia.

Prof J.R. Argue, D Pezzaniti (1996) Evaluation of the RSF 100 Gross Pollutant Trap – Stage 2 - Full scale laboratory testing on the performance of the Ecosol Litter Basket on sag and grade test utilising the road surface drainage test rig – Urban Water Resources Centre, University of South Australia.

Dr.A Wallace (2003) Hydraulic and Strength review of the RSF 100 pollutant traps (Ecosol Litter Basket) primary stormwater filter -Avocet Consulting Pty Ltd.

Dr.A Wallace (2012) Experimental determination of collection efficiency of Ecosol Litter Basket primary stormwater filter - Avocet Consulting Pty Ltd.

A Attwood (2011) Physical and Chemical Assessment of Gross Pollutants Captured in Ecosol Stormwater Retention Products, Field sampling and analysis at three active site installations - LabSA Pty Ltd.

Upper Parramatta River Catchment Trust (2000) Stormwater Pit Pollutant Trap Monitoring – Maintenance and monitoring of Stormwater Pit Pollutant Traps. [www. uprct.nsw.gov.au/cleanstreams](http://www.uprct.nsw.gov.au/cleanstreams).

M.Liebman, M.Brown, E. Garraway, C.Jones (2004) Kiama CBD's stormwater treatment and reuse project – Storm Consulting Pty Ltd "Kiama Municipal Council".

J.Chrispin (2003) Assessing Different At-Source Stormwater Treatment Devices in Hobart – Sullivans Cove and Brooker Highway Performance Trials – Hobart City Council.

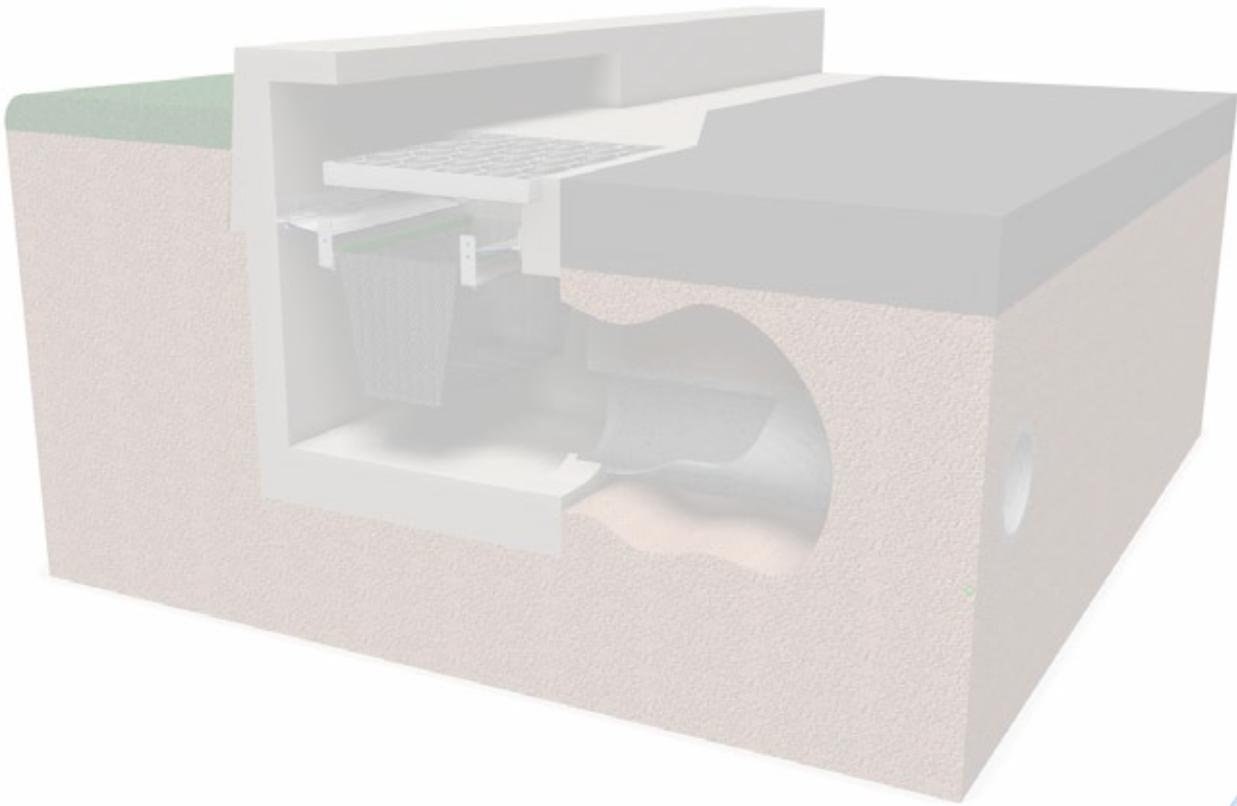
J. Lewis (2002) Effectiveness of Stormwater Litter Traps for Syringe and Litter Removal for Melbourne Water Corporation – Cooperative Research Centre for Catchment Hydrology.

I. Jackson (2002) Stormwater Quality Improvement Project Monitoring report June 2001 – January 2002 At-Source RSF 100 Solid Pollutant Filters – Great Lakes Council.

A.Macklin (2012) Ecosol Litter Basket Water Quality Testing- Filtration Basket Capture Efficiency, Laboratory testing and analysis of pollutant retention and chemical composition using various filter basket medias - Ecosol Pty Ltd.

N.Watson (2005) Performance Report Ecosol RSF 100 Basket Installations Tauranga New Zealand – Cleaning maintenance and monitoring report of litter basket installation in the Tauranga City Council CBD – Ecosol (NZ) Wastewater Filtration Systems Pty Ltd.

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