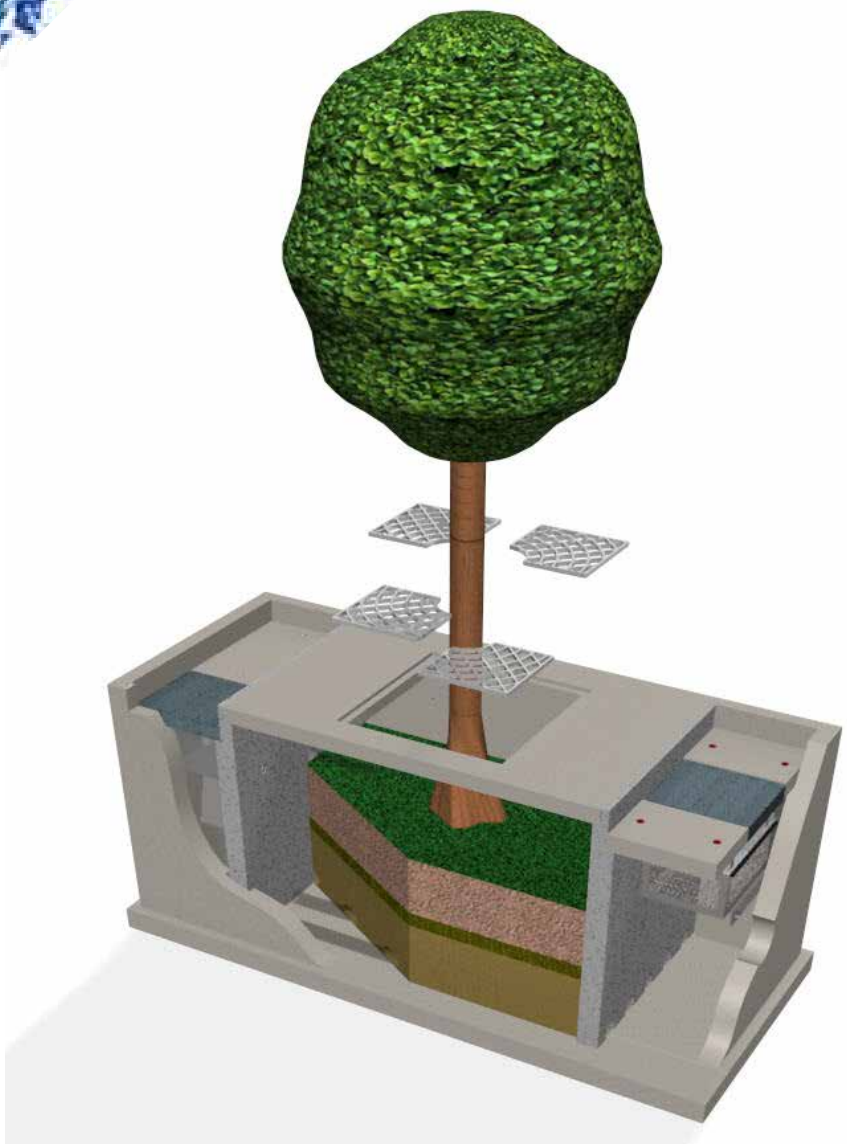
# Ecosol™ Bio Filter Maintenance Guide



environmentally engineered
for a better future

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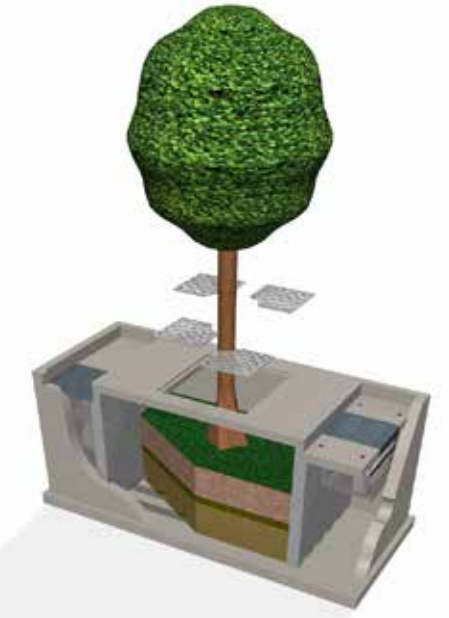
The Ecosol™ Bio Filter has been designed specifically for easy onsite cleaning and maintenance.

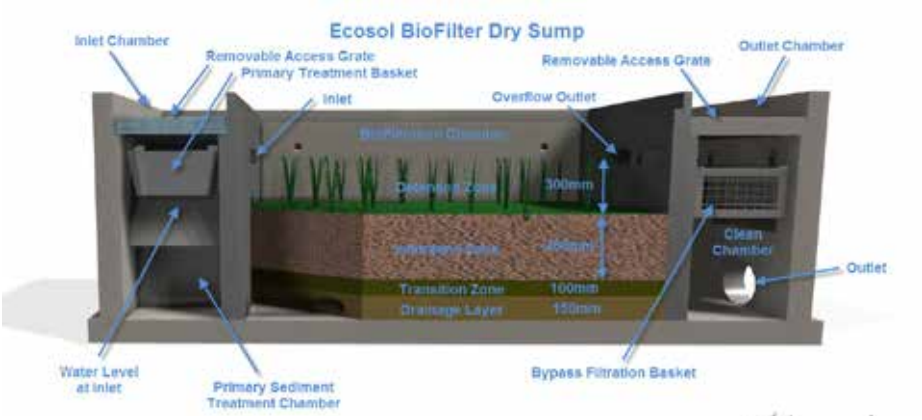


## 1.0 Introduction

The range of Ecosol™ Bio Filters provide a purpose designed and built storage pit where stormwater that is contaminated with pollutants is conveyed to the unit, filtered and then released at predetermined flow rates. The Ecosol™ Bio Filter by design enables gross litter to be pre-screened within the inlet chamber and suspended particulate matter conveyed to the Bio Filtration chamber to then be trapped and treated.

## 2.0 Key Dimensions and Components

The Ecosol™ Bio Filter is able to be custom designed to suit most applications however the below diagram and table provide a general guide on typical unit sizes and configurations.

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## 2.0 Key Dimensions and Components continued

| Ecosol Product Code | Approximate External Product Dimensions | | | | Designed Loading | Heaviest Lift | | Maximum Designed Treatable Flow Rate | Maximum Detention (ponding) Depth |
|---|---|---|---|---|---|---|---|---|---|
| | Length (m) | Width (m) | Depth below finished surface level (m) | | Class | Tonnes | | ml/s | (mm) |
| | | | Wet System | Dry System | | Wet System | Dry System | | |
| Bio Filter 600 | 4.500 | 1.950 | 1.825 | 1.525 | D | 13.0 | 11.0 | 825 | 300 |
| Bio Filter 750 | 5.550 | 2.250 | 1.825 | 1.525 | D | 17.0 | 13.0 | 1,320 | 300 |
| Bio Filter 900 | 6.450 | 2.550 | 1.825 | 1.525 | D | 24.0 | 17.0 | 1,936 | 300 |
| Bio Filter 1050 | 7.350 | 2.850 | 1.825 | 1.525 | D | 24.0 | 22.0 | 3,168 | 300 |

## 3.0 Monitoring

Under normal weather and operating conditions, your Ecosol™ Bio Filter should be checked, a minimum of every three months depending on quality and quantity of the inflow to the unit. Initially, Ecosol recommends that monitoring is undertaken monthly. Once the unit has been in operation for an extended period of time (say, 12 months) then the monitoring schedule can be adjusted to reflect the actual operating conditions specific to the catchment.

Under normal operating conditions the primary treatment basket and sediment chamber would normally require cleaning approximately every 3 months.

## 4.0 Cleaning and Maintenance Procedures

One of the key advantages of the Ecosol™ Bio Filter is that both the primary filtration chamber, and overflow chamber can be easily cleaned by vacuum method using an educator truck from surface level. This eliminates any risk associated with manually handling captured pollutants.

During the first two years of operation it is important to regularly monitor and maintain the secondary filtration chamber. Plant establishment during this period is critical to the performance of the Ecosol™ Bio Filter so good plant maintenance
and in some instances replanting may be necessary. Also, weed maintenance and scouring protection is integral in the early establishment phase.

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## 4.0 Cleaning and Maintenance Procedures continued

Steps to be followed for the cleaning of the primary filtration unit and overflow chamber of your Ecosol™ Bio Filter are as follows:

### Prior to cleaning day

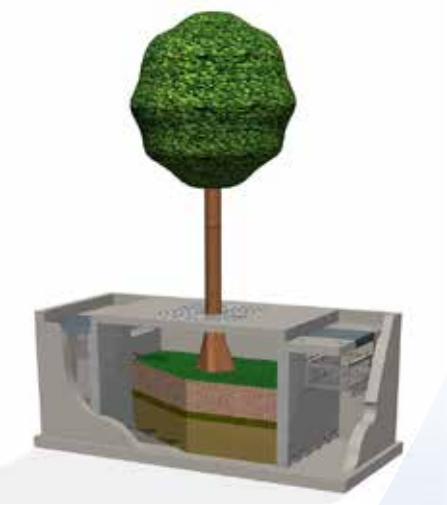
It is important that, prior to commencing a clean, you confirm all plant and equipment is available and operational with service records and pre-start checklists available. It is also recommended that weather conditions for the day of the proposed clean be confirmed as the clean can only be completed in dry weather conditions.

Ensure that you:

- Advise all concerned parties of the proposed date and time the clean is to take place
- Load all equipment
- Obtain approvals from the appropriate authorities
- Complete a safe work method statement for the work to be undertaken.

Site establishment

- Review and amend as necessary and sign off the safe work method statement
- Ensure that all access points are exposed and accessible
- Ensure that barricades and mesh covers are provided at all working areas and that signs are in place to prevent injuries to public or staff
- Ensure all working areas are safe and all equipment, including hoses and machinery are in place and ready for operation
- Ensure all plant and equipment is positioned within the area allocated or adjacent to the unit
- Commence recording cleaning data on the attached form provided



Opening access covers

When lifting the covers care should be taken to avoid falling into the openings and lifting should be in accordance with the manual handling code of practice to avoid back injury.

Steps to open the access covers:

- Open all surface access lids to the primary filtration unit and the overflow chamber using the lifting keys provided
- Place barricades around the openings not being used
- Open the inlet access grate first to remove gross pollutants from the primary filtration basket

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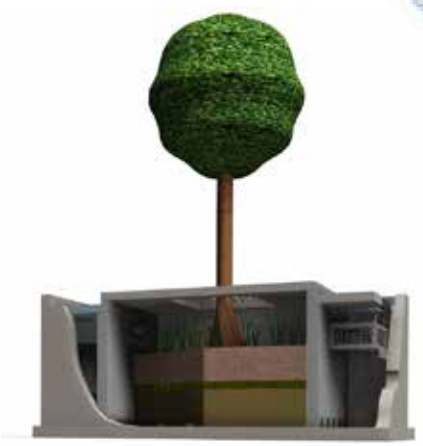
## 4.0 Cleaning and Maintenance Procedures continued

Removal of Gross Pollutants

The primary filtration basket is designed to capture and retain gross pollutants. This should be cleaned first.

- Start the vacuum truck and position the vacuum hose over filtration basket
- Lower snorkel into the basket and by moving the vacuum hose over the trapped material all gross pollutants
- Once all visible pollutants have been removed from the filtration basket lift snorkel and stop vacuum truck



Cleaning of the sedimentation chamber within the primary filtration unit

As the sedimentation chamber is a wet sump cleaning by vacuum truck is required.

- Remove manually the primary filtration basket now it has been cleaned of all pollutants
- Start the vacuum truck and position snorkel over the sedimentation chamber
- Lower snorkel into the chamber and by moving the vacuum hose over the trapped material commence removal of all captured and retained pollutants
- Once all visible pollutants have been removed from the sedimentation chamber lift snorkel and stop the vacuum truck
- Reposition the primary filtration basket and access covers to this chamber

Cleaning of the overflow/clean chamber

The overflow chamber similar to the primary filtration inlet chamber consists of a filtration basket designed to capture and retain any gross pollutants conveyed to the overflow chamber in peak by-flow conditions. The steps to be followed are:

- Start the vacuum truck and position snorkel over filtration basket
- Lower snorkel into the basket and by moving the vacuum hose over the trapped material commence removal of gross pollutants
- Once all visible pollutants have been removed from the filtration basket lift the vacuum hose and stop the vacuum truck

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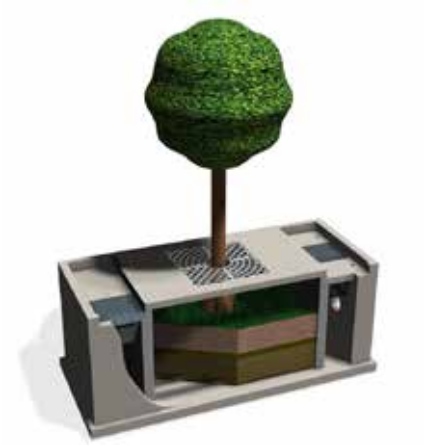
## 4.0 Cleaning and Maintenance Procedures continued



Maintaining your biofiltration chamber

- Remove any litter (if any) from within the vegetative area
- Check the condition of the plants to ensure appropriate density and remove any weeds
- Replant as necessary
- Check for any erosion and restabilise and replant as necessary
- Check that all inlet flow points and overflow points are free of debris and sediment build-up
- Mulch as required

Site demobilization

- Complete the cleaning report accordingly
- Using long handle access cover lifters, lift all access covers back into position
- The vacuum truck must be packed up and leave site to dispose of all captured pollutants at an approved waste facility
- The vacuum truck to be used for the transportation of the stormwater silt must be licensed with the EPA under the Waste Disposal Act. At the landfill depot, the location of the specific area of the landfill site used for the disposal of the silt must be identified and recorded
- Load all other plant, equipment and hand tools ensuring the site is restored to its original condition

Please note:
It is recommended that the unit be cleaned at a minimum of twice yearly and regularly inspected. Failure to regularly clean and maintain your Ecosol™ Bio Filter may invalidate the warranty and may reduce its performance efficiency. Should the Ecosol™ Bio Filter require any remedial works please contact your nearest Ecosol office.

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## 5.0 Reporting

After each clean and inspection it is important that all data is recorded for use in ongoing asset management activities. A cleaning report should be prepared that details as a minimum the following information

- Site location
- Date and time of the clean
- Duration of the clean
- Volume or weight of material removed
- Composition of the captured material e.g sediment, vegetation, and litter
- Details of any remedial work undertaken or required at a later stage

Reporting of the above information is included in the cost of any clean undertaken by Ecosol please refer to the next section for more details.

## 6.0 Ecosol Monitoring, Cleaning, and Maintenance Service

Ecosol has a very competitive cleaning service using a.vacuum truck for the removal of all captured pollutants. After each clean we provide a full report detailing the volume and type of pollutants removed. We believe that it is in your best interest for Ecosol 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.

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## 7.0 Maintenance Summary Sheet

| Item | Activity | Reccomended Frequency |
|---|---|---|
| **Inlet primary treatment chamber** | Remove by either manual or vaccum method all captured and retained gross pollutants from within the pre-screening inlet litter basket. | Every 3 months or immediately after a rain event. |
| | Remove by vaccum method all captured and retained hydrocarbons and settled coarse sediment from within the inlet primary treatment chamber. | Every 3 months or immediately after a rain event. |
| **Tertiary treatment chamber (Bio Filtration)** | Regularly check for agal biofirms that may develop on the surface of the filter media leading to clogging. | Every 3 months or immediately after a rain event. |
| | Monitor ponding levels and infiltration rates following a rain event. | Every 3 months or immediately after a rain event. |
| | Remove any sediment build-up and scarify the filter media surface when necessary. | Every 3 months. |
| | Check for evidence of preferrential flow paths or scouring and replace filter media and place rock protection to eroded areas as required. | Every 3 months. |
| | Check mulch and ensure even distribution and that it is clear of plant stems and replace as necessary. | Every 3 months. |
| | Inspect plant health and cover. Remove any weeds and water plants if necessary. | Every 3 months. |
| **Outlet (overflow) chamber** | Remove by either manual or vaccum method all captured and retained gross pollutants from within the overflow litter basket. | Every 3 months or immediately after a rain event. |
| | Remove from the overflow chamber by vacuum method any build-up of debris or sediment. | Every 3 months or immediately after a rain event. |
| **Structural Components** | Inspect all structural elements to ensure structural integrity. | Annually. |
| | Ensure all inlets, outlets and overflows from the system are free from debris. | Annually. |

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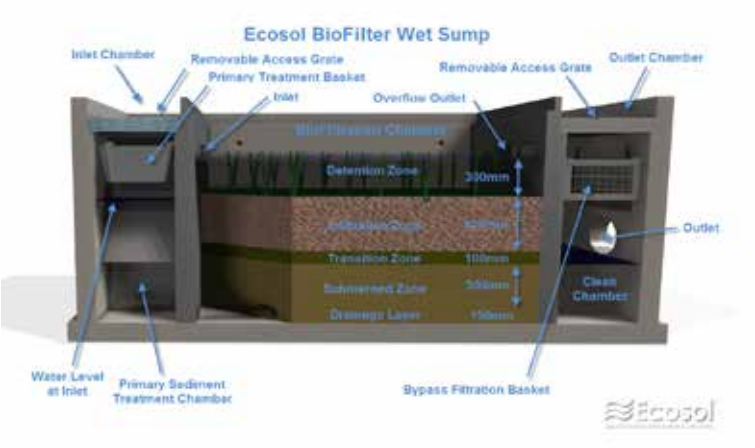
## 8.0 Filtration Media Details

Should the Bio Filtration media require replacing the following section confirms the recommended media layer depth and specifications for your unit to achieve optimal infiltration and product performance efficiencies.

OPTION 1 - WET SUMP Ecosol™ Bio Filter (Total Filter Depth 1250mm from outlet baffle invert allowing for a 300mm deep detention zone) Minimum drop through system is 800mm




| Filter Media Details | | | | | | |
|---|---|---|---|---|---|---|
| Ecosol Product Code | Detention Zone | | Infiltration Zone | | Transition Layer | |
| | Volume | Ponding Depth | Volume of Material | Material Layer Depth | Volume of Material | Material Layer Depth |
| Bio Filter 600 | 1,125L | 300mm | 1.50m³ | 400mm | 0.375m³ | 150 |
| Bio Filter 750 | 1,782L | 300mm | 2.38m³ | 400mm | 0.594m³ | 150 |
| Bio Filter 900 | 2,646L | 300mm | 3.53m³ | 400mm | 0.882m³ | 150 |
| Bio Filter 1050 | 4,320L | 300mm | 5.80m³ | 400mm | 1.440m³ | 150 |

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## 8.0 Filtration Media Details continued

| Filter Media Details continued | | | | |
|---|---|---|---|---|
| Ecosol Product Code | Submerged Filter Media Zone | | Drainage Layer | |
| | Volume | Material Layer Depth | Volume of Material | Material Layer Depth |
| Bio Filter 600 | 1.125m³ | 300mm | 0.562m³ | 150mm |
| Bio Filter 750 | 1.782m³ | 300mm | 0.891m³ | 150mm |
| Bio Filter 900 | 2.646m³ | 300mm | 1.323m³ | 150mm |
| Bio Filter 1050 | 4.320m³ | 300mm | 2.160m³ | 150mm |

OPTION 1 - WET SUMP Ecosol™ Bio Filter

Detention Zone

The Ecosol™ Bio Filter is designed to have a maximum detention zone of 300mm depth .

Infiltration Zone

This is the top layer for filter media (in the unsaturated zone). This should be well graded material consisting of a Bio Retention Filter Media. It should have particle size ranges present from 0.075 to the 4.75mm sieve (as defined by AS 1289.3.6.1 – 1995) and should be certified to the FAWB and Healthy Waterways guidelines. The recommended depth of the infiltration zone for the Ecosol™ Bio Filter is 400mm.

Transition Layer

The transition layer shall consist of clean well graded sand material containing <2% fines. The transition layer depth is typically 100mm consisting of a Bio coarse sand.

Submerged Filter Media Zone (optional to wet sump systems only)

The filter media (in the submerged zone) should be well graded consisting of sand and carbon source. It should have particle size ranges present from 0.075 to the 4.75mm sieve (as defined by AS 1289.3.6.1 – 1995) and should be at a typical depth of 300mm above the underdrain collection pipes.

## 8.0 Filtration Media Details continued

OPTION 1 - WET SUMP Ecosol™ Bio Filter

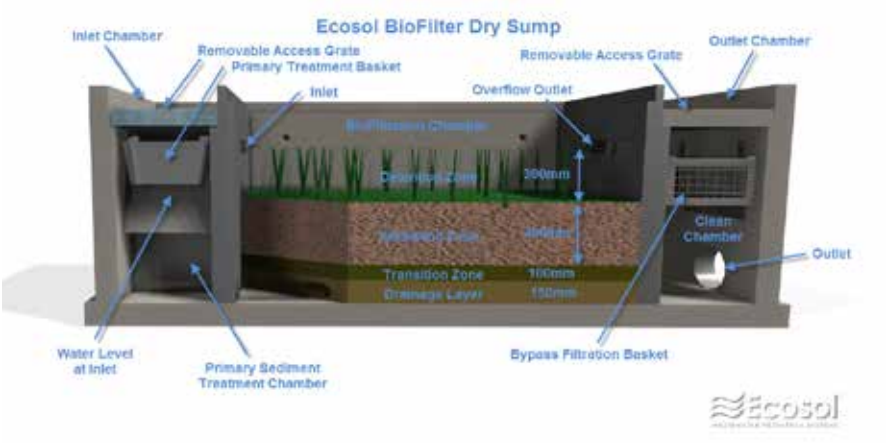
Drainage layer

The drainage layer consists of clean washed, fine gravel such as 2 – 5mm washed screenings and is designed to avoid migration of the filter media layer material into the drainage layer. The drainage layer collects the treated stormwater and conveys it to the submerged filter zone, it should have an approximated depth of 150mm.

Underdrain Collection Pipes

The Under Drain Collection Pipes consists of 100mm diameter class 400 slotted or perforated collection pipes. This has been specifically designed and modelled to ensure that water is able to freely drain away from the filtration media thereby not adversely affecting its performance. In addition they are protected with a drain coil filter sock. Please refer to the above table for unit specific figures.

OPTION 2 - DRY SUMP Ecosol™ Bio Filter (Total Filter Depth 950mm from outlet baffle invert to outlet pipe invert) Minimum drop through system is 950mm.

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## 8.0 Filtration Media Details continued

| Filter Media Details | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ecosol Product Code | Detention Zone | | Infiltration Zone | | Transition Layer | | Drainage Layer | |
| | Volume | Ponding Depth | Volume of Material | Material Layer Depth | Volume of Material | Material Layer Depth | Volume of Material | Material Layer Depth |
| Bio Filter 600 | 1,125L | 300mm | 1.50m² | 400mm | 0.375m² | 100 | 0.562m² | 150mm |
| Bio Filter 750 | 1,782L | 300mm | 2.38m² | 400mm | 0.594m² | 100 | 0.891m² | 150mm |
| Bio Filter 900 | 2,646L | 300mm | 3.53m² | 400mm | 0.882m² | 100 | 1.323m² | 150mm |
| Bio Filter 1050 | 4,320L | 300mm | 5.80m² | 400mm | 1.440m² | 100 | 2.160m² | 150mm |

OPTION 2 - DRY SUMP Ecosol™ Bio Filter

Detention Zone

The Ecosol™ Bio Filter is designed to have a maximum detention zone of 300mm depth .

Infiltration Zone

This is the top layer for filter media (in the unsaturated zone). This should be well graded material consisting of a Bio Retention Filter Media. It should have particle size ranges present from 0.075 to the 4.75mm sieve (as defined by AS 1289.3.6.1 – 1995) and should be certified to the FAWB and Healthy Waterways guidelines. The recommended depth of the infiltration zone for the EcosolTM Bio Filter is 400mm.

Transition Layer

The transition layer shall consist of clean well graded sand material containing <2% fines. The transition layer depth is typically 100mm consisting of a Bio coarse sand.

Drainage Layer

The drainage layer consists of clean washed, fine gravel such as 2 – 5mm washed screenings and is designed to avoid migration of the filter media layer material into the drainage layer. The drainage layer collects the treated stormwater and conveys it to the underdrain pipes and has a typical depth of 150mm (above the underdrain collection pipes) for a dry sump system. Please refer to the above table for unit specific figures.

## 8.0 Filtration Media Details continued

Underdrain Collection Pipes

The Under Drain Collection Pipes consists of 100mm diameter class 400 slotted or perforated collection pipes. This has been specifically designed and modelled to ensure that water is able to freely drain away from the filtration media thereby not adversely affecting its performance. In addition they are protected with a drain coil filter sock. Please refer to the above table for unit specific figures.

## 9.0 Life Expectancy

The Ecosol™ Bio Filter is designed to meet strict engineering guidelines and manufacturers guarantees. The stainless steel components have a life expectancy of 20 years while the precast concrete pit 50 years, providing appropriate maintenance practices are employed.

## 10.0 Warranty

All Ecosol™ Bio Filtration systems is covered by a twelve-month warranty provided the unit is maintained and cleaned with the frequency, and using the method, recommended in this maintenance guide.

## 11.0 Supplier and Technical Product Contract Details

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

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## 12.0 Ecosol™ Bio Filter Cleaning and Maintenance Inspection Form

| | | |
|---|---|---|
| Asset Owner: | | Asset ID: |
| Unit Location : | | Ecosol Ref: |
| Date: | Time: | Product Code: Ecosol™ Bio Filter |
| Inspected By: | | |

### Visual Inspection

| Primary Treatment Chamber | Good | Fair | Damaged | Remarks |
|---|---|---|---|---|
| Condition of chamber components | | | | |
| % of fill | 90% | | | |
| Fore-bay Chamber | Good | Fair | Damaged | |
| Condition of chamber components | | | | |
| % of fill | 90% | | | |
| Biological Treatment Chamber | Good | Fair | Damaged | |
| Condition of plants | | | | |
| Condition of inlets and outlets | | | | |
| By-Pass Chamber | Good | Fair | Damaged | |
| Condition of chamber components | | | | |
| % of fill | 10% | | | |

### Comments :

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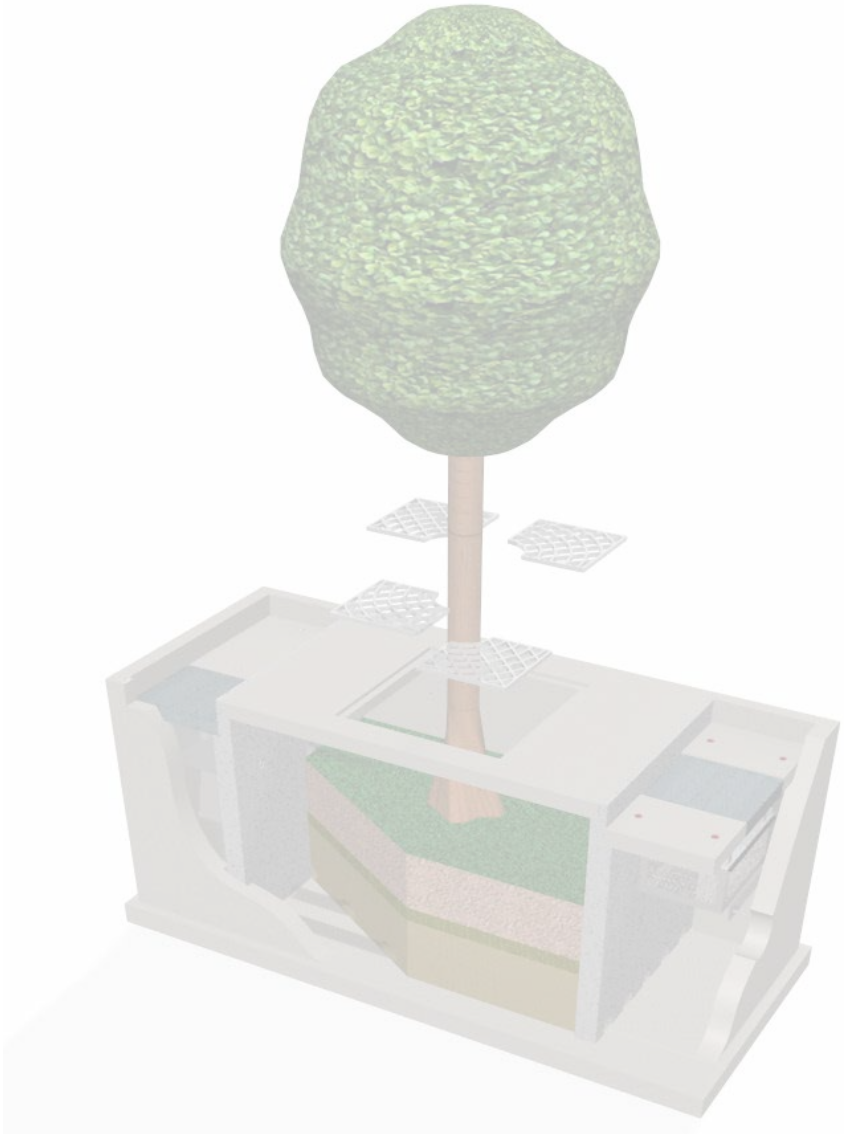

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