



## FREQUENTLY ASKED QUESTIONS

# ecoAID

## Underground Stormwater Management

## About ecoAID®

ecoAID® is an underground modular stormwater system used for detention, infiltration or harvesting stormwater runoff. The system also provides stormwater treatment by utilising a 'Catch-All-Row' (C-A-R) as an internal gross pollutant and sediment trap. The dual function of stormwater collection and treatment allows the engineer to optimise the drainage layout by minimising the number of manhole pits, with the added benefit of omitting the need for external gross pollutant and sediment traps.

## General

### What is ecoAID®?

ecoAID® is a modular underground stormwater management system comprising the following components:

- ✓ ecoAID® EC1000 Chamber
- ✓ ecoAID® EC1000 End Cap
- ✓ Bidim® A24 non-woven geotextile (encapsulates entire system)
- ✓ Bidim® Filter Wrap non-woven geotextile (covers entire length of 'Catch-All-Row')
- ✓ Woven geotextile (laid along base of 'Catch-All-Row')
- ✓ 20 -50 mm Ø drainage rock (granite, RCC or scoria)
- ✓ Manhole inlet/access structures
- ✓ 100 mm Ø plastic stormwater breather pipe
- ✓ 150 mm Ø plastic stormwater equalisation pipe (optional)
- ✓ Impermeable thermoplastic liner (optional)

### **Where can I buy ecoAID®?**

Geofabrics are the sole distributor of the proprietary EC1000 Chambers, EC1000 End Caps, Bidim® and woven geotextiles. Geofabrics have branches throughout Australia including all major cities. Geofabrics do not supply drainage rock, inlet structures and breather/equalisation pipes.

### **Do the ecoAID® chambers come in more than one size?**

No. Currently the ecoAID® chambers come in one size. The size of chamber has been carefully designed to ensure most site requirements are met. The ecoAID® chambers can be double stacked to accommodate storage requirements when footprint constraints are encountered.

### **How much does the ecoAID® system cost?**

The supply cost along with the speed of installation means ecoAID® is an incredibly cost effective system when compared to conventional concrete tanks, soak wells and other proprietary stormwater systems on the market. The ecoAID® chambers, end caps and geotextile are manufactured in Australia so are not subject to fluctuating currency exchange rates and do not incur excessive transportation and customs clearance costs. Please contact a local Geofabrics representative for pricing information.

### **Where can I buy drainage rock, inlet structures and stormwater pipe?**

Drainage rock can easily be sourced from a local quarry or distributor. Manhole inlet/access structures and plastic stormwater pipe can be sourced from a local plumbing merchant or manufacturer.

## **Manufacture**

### **Where are the ecoAID® chambers and End Caps manufactured?**

The ecoAID® chambers and end caps are manufactured in Adelaide, Australia by Maxiplas. The chambers and end caps are injection moulded in a state-of-the-art ISO 9001 accredited manufacturing facility.

### **Is Recycled Crushed Rock (RCC) compatible with ecoAID®?**

Yes. The ecoAID® system has been load tested with recycled crushed concrete (RCC) for the embedment media and can provide the client with significant cost savings. RCC typically costs between \$10- \$25/tonne (subject to price of delivery) and is easily sourced from a local recycling facility.

### **What is the typical un-compacted density for Recycled Crushed Concrete?**

The typical un-compacted density for RCC is 1.3 t/m<sup>3</sup>.

### **What is the purpose of drainage rock?**

The drainage rock is an important component within the ecoAID® system as it provides both a structural mechanism and increases the system's storage capacity.

### **Where can I buy an impermeable thermoplastic liner from?**

Geofabrics supply a geocomposite impermeable liner called Enduraseal which can be installed on site by a competent contractor. Alternatively a liner can be purchased from and installed by a reputable lining company. Please contact a local Geofabrics representative for more details.

# Material Properties & Design Life

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## What are the ecoAID® chambers and end caps made from?

As per ASTM F2787 (standard practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers) the ecoAID® chambers and end caps are made from virgin polypropylene (PP) co-polymer with high impact and creep resistance.

## Why are the chambers and end caps not made from recycled polymer?

Recycled polymer can be unreliable in terms of quality and consistency.

## What is the in service design life of the ecoAID chambers and end caps?

The ecoAID® chambers and end caps have been assessed using 100 year creep values for both short term live loads and long term dead loads giving the system a 100 year in service design life.

## Why are the chambers and end caps made from polypropylene?

ASTM F2787 stipulates polypropylene because it provides high chemical and corrosion resistance, high tensile and impact strength, good surface hardness and dimensional stability, excellent abrasion resistance, low moisture absorption, high rigidity and is lightweight.

## Do the ecoAID® chambers and end caps come with a warranty?

Yes. The ecoAID® chambers and end caps come with a 10 year manufacturers product warranty.

# System Design Features

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## Can I connect a pipe through the side of the chambers?

Yes. The ecoAID® chambers have been designed and tested with dedicated lateral side ports to accommodate 100-150 mm Ø pipes. Lateral pipes are typically used to connect rows of chambers to assist with system equalisation and to accommodate design peak flows.

## How many lateral pipes do I need throughout the ecoAID® system?

Lateral pipes are typically used to connect the 'Catch-All-Row' with adjacent rows. This is to ensure large design peak flows (typically pipe Ø greater than 300 mm) can easily pass from the inlet row (C-A-R) into surrounding chambers. The actual amount of lateral pipes depends on the design peak flow entering the system and length of 'Catch-All-Row'. Please request a copy of our lateral pipe calculator to help determine the quantity of lateral pipes needed on your project.

## Do I need to design a manifold system?

No. The correct number of lateral equalisation pipes installed across the ecoAID® system will provide adequate flow distribution and cost savings. However, there is always an option to design ecoAID® utilising an inlet and outlet manifold system to convey peak flows to and from the chamber system without causing unacceptable backwater.

## Does the system require ventilation?

It is good practice to install a breather pipe along the inlet row (C-A-R) to help provide ventilation and allow for the system to breathe. Please refer to our air vent options standard detail for more information.

## Can the ecoAID® Chambers be installed on a curve?

Yes. The ecoAID® chambers have articulated joints and can be installed on a radius minimum 25 m. This is particularly useful on sports field applications or when ecoAID® is installed along a road side verge.



# System Design Considerations

## What is the minimum soil cover over the chambers in a trafficable area?

The minimum soil cover up to finished ground level over the chambers in a trafficable area is 600mm and is in keeping with AS 2566.1:1998 Buried Flexible Pipelines – Part 1: Structural Design recommendations to ensure situations where rutting or consolidation occur over the service life of any road structure are considered. However, the ecoAID chambers have been assessed with factored M1600 & W80 (AS5100.2) wheel/axle loads and typical service vehicle loadings with a minimum of 450 mm cover soil.

## What is the minimum soil cover over the chambers in a non-trafficable area?

The minimum soil cover up to finished ground level over the chambers in a non-trafficable area is 450 mm.

## What is the maximum soil cover up to finished ground level over the chambers?

The maximum soil cover up to finished ground level over the chambers is 2.5 m (trafficable and non-trafficable) and is associated with the long term dead load over the arches.

## What is the minimum rock bedding thickness?

The minimum rock bedding thickness is 150 mm (this can be increased as necessary)

## What is the minimum rock cover thickness?

The minimum rock cover thickness is 150 mm (this can be increased as necessary as long as the total finished soil cover up to finished ground level does not exceed 2.5 m).

## What is the minimum rock chamber spacing?

The minimum rock chamber spacing is 150 mm (this can be increased to improve chamber system live and dead load distribution to sub-grade soil).

## What is the minimum rock perimeter thickness?

The minimum rock perimeter thickness is 200 mm and typically 300 mm.

## Can the ecoAID® chambers be installed in a double layer configuration?

Yes. The ecoAID® system can be double stacked/built in two layers. The minimum storage depth for a double layered system is 2.06 m (i.e. 0.15 m + 0.68 m + 0.4 m + 0.68 m + 0.15 m). The minimum rock layer thickness between the bottom and top chamber is 400 mm and must have a layer of Tensar TX160 geogrid placed 200 mm above the bottom layered chamber (i.e. through the middle of this layer of rock). It does not matter if each layer is installed in the same direction or perpendicular to each other.

## Can the ecoAID® chambers be installed in more than two layers?

No. The ecoAID® system cannot be installed in more than two layers. This is because the maximum cover to finished ground level over any chamber is 2.5 m. If another layer was added, the bottom layer or third layer of chambers would have more than 2.5 m of earth cover and would exceed ecoAID's 2.5 m dead load limit.

## Is it possible to connect the inlet pipe into the upper and lower level of chamber rows?

Yes. The inlet pipes from the external drainage network can connect directly into the upper, lower or both layers of a double stacked ecoAID® system to meet design requirements.

## Can the system be designed without infiltration?

Yes. When the soil conditions on site or regulations prevent infiltration, the chamber system can be used with a thermoplastic liner. The liner can be installed along the base and sides of the chamber bed or can wrap around the entire ecoAID® system. Liners are typically used on detention and harvesting applications.

## How close can I install ecoAID® to footings or building lines when used as an infiltration tank?

Guidelines on minimum building setbacks required for infiltration tanks and soakwells vary across the country and it is the responsibility of the design engineer to determine these parameters. However, Australian Runoff Quality (Engineers Australia) recommends minimum distances from structures and property boundaries (to protect possible future buildings in neighboring properties) for different soil types.

## How do I design ecoAID® as a stormwater harvesting system?

The design of an ecoAID® harvesting system is a collaborative effort between the design engineer, Geofabrics and an irrigation and pump technology consultant. The engineer is responsible for overall design and site storage volume requirements, Geofabrics will provide advice on system sizing and configuration and the irrigation and pump consultant will provide advice on the type of pumping system required.

# Design Assistance

## How do I model the ecoAID® chambers in my software program?

ecoAID® chambers use a stage-discharge method similar to a surface pond. Geofabrics can provide incremental storage volume information for stage-storage volume modelling purposes. This information can be modified for your specific project and used on most software systems which have an input field that allows for entering elevations and volume (incremental or cumulative).

## Is there a system sizing calculator available?

Yes. Please ask a Geofabrics representative for a copy of our ecoAID® system sizing excel spreadsheet. When the required storage volume for the project site is known, the spreadsheet allows the user to establish system dimensions including number of rows, height, width and length necessary to achieve the specified storage volume requirement. The spreadsheet will also calculate the quantity of rock required and provide material quantities for pricing/budget purposes.

# Stormwater Quality & Treatment

## How does the system deal with contaminated stormwater?

ecoAID® utilises a treatment device called a 'Catch-All-Row' (C-A-R) which is a row of chambers connected to the inlet pit and is completely encased in geotextile filter fabric (woven & non-woven). The C-A-R acts as a sediment trap by retaining gross pollutants (litter e.t.c), a high percentage of total suspended Solids (TSS) and partially removing some nutrients such as phosphorous.

## How does the 'Catch-All-Row' work?

The 'Catch-All-Row' works by sedimentation and filtration. When stormwater is transported through the inlet pipe into the C-A-R the velocity of water reduces which allows suspended particles to settle out due to gravity. The effectiveness of the C-A-R in retaining particulates (e.g. sediment) also aids in the removal of some nutrients and even hydrocarbons as these type of pollutants tend to bind strongly to sediments and therefore do not escape from the C-A-R.

## What role does the woven geotextile play?

A strip of woven geotextile is placed under the entire length of C-A-R between the chambers and base stone. The tough woven geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure hosing.

## What role does the non-woven geotextile play?

The non-woven geotextile placed over the ecoAID® chambers/C-A-R provides a filter media for flows passing through the perforations in the sidewall of each chamber.

## Do Geofabrics provide a design suggestion service?

Yes. Geofabrics provide a free in house design suggestion service. We work closely with our customers to produce project specific design suggestion drawings based on project information such as connecting pipe invert levels, finished ground levels and required storage capacity. The design suggestion drawing must be reviewed by the design engineer and once approved can be used on site to assist with the installation process.

## Does the 'Catch-All-Row' deal with total petroleum hydrocarbons?

Although the C-A-R partially deals with total petroleum hydrocarbons it is recommended as part of best management practice to introduce an oil-water separator and treatment device up stream of the ecoAID® system.

## Does the 'Catch-All-Row' require a trash screen inside the upstream inlet structure?

The C-A-R will capture gross pollutants, debris and litter, however, an optional and complimentary trash screen located at the entrance to the C-A-R may be used to.

## Can the 'Catch-All-Row' be modelled in MUSIC?

Yes. The C-A-R can be modelled in MUSIC. Please speak with a Geofabrics representative for more information.

## Can ecoAID® be used as part of a treatment train?

Yes. The ecoAID® system can form part of an extensive treatment train network. The system can be used as a primary treatment device or alternatively ecoAID® can be used to function as both a primary and secondary treatment device and may compliment other treatment measures in meeting local regulations and pollutant reduction targets.

# Structural

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## **Has ecoAID® been assessed to a particular standard?**

Yes. ecoAID® has been designed, manufactured and structurally tested to ASTM F2787 (Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers). It is extremely important for any underground and load bearing stormwater collection system to be assessed to a recognised standard as this protects the end user and ensures the system is suitable to be installed under Australian roads and car parks.

## **Do the ecoAID® chambers need re-testing on all new projects?**

No. The ecoAID® chambers are manufactured from virgin polymer so the material properties are consistent and will not change from batch to batch. Therefore, all new production of chambers and their properties will perform in the same way as those chambers which were used during the original analysis and testing program. As long as the design loads (AS 5100.2) or system cover requirements do not deviate from those within ecoAID's structural assessment then no new testing is required.

## **What vehicles can be used over the system?**

ecoAID® has been assessed to AS 5100.2 factored design loads which means the system can accommodate heavy vehicle/truck loads up to 16 tonne per axle and tyre contact pressures up to 800 kPa. When structural design of chambers is in accordance with AS 5100.2, structural adequacy can be presumed for a wide range of vehicles and axle configurations.

## **What role does drainage rock play in providing system strength?**

The system draws its strength from the rock embedment placed either side and above the ecoAID® chambers via the concept of soil arching- whereby the load is transferred to and carried by the surrounding rock backfill, but not the chambers themselves.

## **Why are the ecoAID® chambers corrugated with a parabolic inner profile?**

The ecoAID® chambers utilise a corrugated rib profile to ensure arch stiffness whilst minimising the amount of polymer material used (manufacturing cost saving). The arch design incorporates a true parabolic inner profile meaning the corrugation varies radially around the chamber with the cross sectional area greatest at the shoulders. This enhances the strength of the chamber as local buckling forces are typically greatest at the 45 degrees (shoulder) and also optimises load shed via soil arching.

# Maintenance

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## **How is the ecoAID® system serviced, cleaned out and maintained?**

The ecoAID® system can only be cleaned when a 'Catch-All-Row' is in use. The C-A-R must be directly connected to a catch basin, manhole or other access structure. The C-A-R can be cleaned with Jet-Vac equipment from street level. The jet nozzle is deployed into the C-A-R and washes the silt, sediment and gross pollutants trapped in the C-A-R back to the access structure. The vacuum hose can then remove the sediment from the manhole or access structure.

## **How often does the ecoAID® system need to be maintained?**

An accurate maintenance interval can be determined by regular, logged inspections, recommended at no more than 6 monthly intervals initially. If a layer of silt and sediment deposited on the bottom of the 'Catch- All Row' is between 100-125mm thick maintenance is recommended. Sediment levels can be monitored through the vertical inspection port, but cannot be cleaned through the inspection port. Alternatively inspection can be carried out from street level via the access manhole structure.

# Transportation

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## **How are the ecoAID® chambers and end caps delivered to site?**

30no. ecoAID® chambers and 4no. end caps are strapped to a 1.3 m x 1.2 m pallet. The end caps sit comfortably onto the pallet under the chambers. The pallets which are stored inside the warehouse are loaded onto a truck or semi-trailer by a fork lift and tines. The pallets are then sent to site.

## **Do I need to provide unloading facilities on site to remove chambers from delivery truck?**

It is the contractor's responsibility to provide unloading equipment on site. Typical unloading equipment would be an excavator or bob cat with tines.

# Installation

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## **Do the ecoAID® chambers require pre-assembly prior to placement?**

No. The chambers arrive on site palletised and are ready for placement into the excavation pit.

## **How do I connect the chambers? Do I need special tools?**

The chambers are fitted together by overlapping the last corrugation. The chambers have direction arrows moulded into the top of the chambers. No special tools, glue, fasteners or screws etc. are required.

## **How many people are required to lift each chamber into place?**

Each chamber weighs 15kg meaning only one person is required to safely pick up and move a chamber around site and into position.

## **What is the typical installation rate for chamber placement into the excavation?**

There are 30no. chambers per pallet.

Therefore, with 2 no. laborers it takes approx. 8 minutes to lay 30 arches (1 pallet)

\*Please note, this is subject to pallets of chambers being relatively close to final position in excavation.

## **What is the typical installation rate for placement of drainage rock into the excavation?**

Typical rates for placing the rock bedding and embedment into the excavation is 250m<sup>3</sup>- 300 m<sup>3</sup>.

\*Please note, this is only suggestive and actual outputs may be affected by a number of different factors including contractors own efficiencies, type of machinery used, weather disruptions and easy access to and around the site.

## **Can heavy machinery traverse the ecoAID chambers during construction?**

During construction, the acceptable vehicle loads over the system can vary depending on the amount of cover over the system, and if paving has been completed. Since construction plant have many options and configurations, it is best to evaluate each type individually. Please refer to the 'acceptable construction vehicle loads' table in our ecoAID® installation guidelines document.

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<b>MELBOURNE</b> <b>(03) 8586 9111</b>	<b>SYDNEY</b> <b>(02) 8785 8800</b>	<b>NEWCASTLE</b> <b>(02) 4951 2688</b>	<b>COFFS HARBOUR</b> <b>(02) 6653 5706</b>	<b>PERTH</b> <b>(08) 6305 0561</b>	<b>ADELAIDE</b> <b>(08) 8162 5855</b>
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