

Enviromodule™ 2
DESIGN AND INSTALLATION GUIDE

Assembly
Excavation
Installation
Backfilling
Pipe Connections
Design Examples
Structural Design

ausdrain
STORMWATER SOLUTIONS

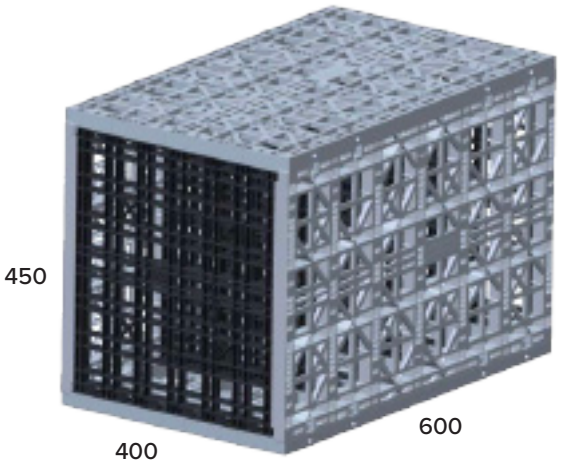
CONTENTS

PRODUCT SPECIFICATIONS

ENVIROMODULE™ 2

Specifications

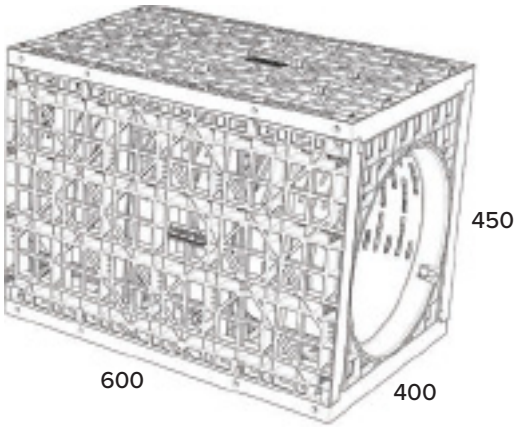
Length	800mm
Width	400mm
Height	450mm
Weight	5 - 8kg
Void Area	95%
Storage Volume	102 litres
Material	Recycled polypropylene



EnviroModule™

Compressive strength tonnes/m²

Module type	Top		End
Standard duty 3 braces	18.1	15.2	20.4
Extra duty 4 braces	22.0	17.5	19.3
Heavy duty 5 braces	24.3	19.2	20.9
Flushmax	17.0	14.3	16.0



Flushmax Module™

Design and Installation Specifications

Module Orientation: EnviroModules must be oriented and installed with the 450mm side positioned vertically to achieve optimal structural integrity.

Load-Bearing Capacity: Standard duty modules are designed for use in non-trafficable or landscaped areas.

Trafficable Applications: Extra duty and heavy duty modules are engineered for installation beneath trafficable zones. For specific backfilling and pavement guidelines, refer to the structural design section.

Buoyancy Consideration: Tanks must be installed above the peak groundwater level to prevent buoyancy-related issues at all time.

Lateral Load Assessment: On sloped terrains or near embankments, increased lateral forces must be considered. Tanks should be positioned outside the zone of influence if necessary.

Ventilation Requirements: Each tank must be equipped with one or more vents to facilitate the expulsion of air.

Pre-Filtration Systems: Effective stormwater pre-filtration is crucial for tank integrity. Pre-filtering devices such as in line filters, filter pits with mesh screens, EnviroSump units, and/or Gross Pollutant Traps must be implemented before water enters the tank.

Load Specifications: The compressive strength values provided represent the maximum short-term uniformly distributed load for the modules.

Factor of Safety: Structural design calculations incorporate a Factor of Safety (FOS) of 10, ensuring long-term stability and reliability.

Construction Traffic Restrictions: Heavy construction vehicles, including but not limited to concrete mixers, cranes, and fully laden delivery trucks, are prohibited from traversing the tank area during and after installation.

STEP 1

ASSEMBLY

Ausdrain EnviroModules are delivered in flatpack form on pallets. Each pallet will be labelled EnviroModule Side, EnviroModule Brace or a combination of both. Flushmax modules are delivered already pre-assembled.

The estimated assembly time is approximately 2 minutes per module. This inludes the time to remove the bundles of sides and braces from the pallet, assemble the modules and stack them ready for installation.

There are three types of EnviroModules depending on the project requirements:

- Standard duty modules are suitable for installation in landscaped and non-trafficable areas.
- Extra duty and heavy duty modules are suitable for trafficable areas and where greater depth of cover is required.

Refer to the design specification or contact an Ausdrain representative for the module type relevant to your project.

Useful tips

- Set up a sturdy workbench to assemble the modules on.
- A rubber mallet is useful for assembly.
- Assemble the modules close to the installation area to avoid extra handling.
- Ensure that you assemble the modules with the correct number of braces for each module type:
  - Standard duty = 4 sides/ 3 braces
  - Extra duty = 4 sides/ 4 braces
  - Heavy duty = 4 sides/ 5 braces.

STEP 1

ASSEMBLY INSTRUCTIONS

Step 1

Place one of the sides (large panel) on a solid flat surface with the locating pins facing upwards.

Step 2

Position a second and third side upright on to the locating pins

Step 3a - Standard duty module

Insert 3 braces (small panels) by sliding down the internal sleeves of the 2 sides.

Step 3b - Extra duty module

Insert 4 braces (small panels) by sliding down the internal sleeves of the 2 sides.

Step 3c - Heavy duty module

Insert 5 braces (small panels) by sliding down the internal sleeves of the 2 sides.

Step 4

Place the 4th side on top. A few taps by hand or with a rubber mallet will ensure that the sides and braces are securely locked into place and the module assembly is completed.

STEP 2

EXCAVATION AND BASE PREPARATION

Excavation and Base Preparation Guidelines

Tank Dimensions: Refer to the project plan or specification for the precise dimensions (L×W×H) of the AUSDRAIN tank.

Pit Excavation: Excavate the pit to accommodate the tank dimensions, ensuring a minimum clearance of 300mm on each side, 100mm for the base, and the necessary depth for the cover to the finished surface level.

Compaction Allowance: If hand-held compaction devices will be used for compacting the backfill around the tank, ensure the pit width provides adequate space for the equipment on each side, plus an additional margin to prevent contact with the geotextile and/or liner.

Trapezoidal Excavation: It is recommended to excavate the pit in a trapezoidal shape to minimize lateral pressure on the tank and reduce the risk of excavation sidewall collapse.

Safety Measures: The excavation should be benched in accordance with workplace safety regulations, with a ladder or ramp for access. A safety fence should be erected around the perimeter of the pit, and appropriate safety or warning signs should be displayed.

Base Preparation: Prepare the base by laying a 100mm layer of coarse washed river sand or clean granular material. Spread the material evenly, level the base, and compact it to a minimum of 95% standard dry density using a hand-held plate compactor. For tanks installed in trafficable areas, compaction should achieve 100%.

Soft Ground Considerations: When installing the tank in soft ground, a compacted road base layer is required to provide a solid foundation. The bearing capacity of the modular tank is dependent on the integrity of the prepared base. It is advisable to integrate subsoil drainage into the installation design, utilizing 30mm or 50mm HexCell drainage cells. This application enhances water management around the tank, preventing hydrostatic pressure buildup and promoting efficient drainage. Incorporating HexCell drainage ensures long-term stability and functionality of the tank system, particularly in areas with high water tables or poor soil drainage conditions.

STEP 3

INSTALLATION

Methods of installation

a. Rainwater harvesting – residential

b. Rainwater harvesting – commercial

c. On-site detention

d. Infiltration

e. Flushmax

Note: Refer to the design specification for the installation method applicable to your particular project.

Important Information

- Check that the modules have been assembled as per the assembly instructions with the correct number of sides and braces for each module type.
- The modules must be installed with the 450mm side in the upright position for maximum strength. Do not turn the modules on their side or end.
- Ensure adequate drainage is installed around the tank and/or dewatering devices to prevent the tank from floating in the event of rainfall during installation.
- Each tank should be fitted with an overflow or vent to prevent a vacuum from water filling or emptying from the tank.
- Pre-filtration of stormwater is an essential part of each system. An Ausdrain EnviroSump or GPT should be installed prior to water entering the tank. Galvanised mesh screens must be installed within each pit over the inlets to the tank.
- EnviroModules must be handled with care. Do not throw or drop the modules during installation.
- Ensure there is a minimum 300mm overlap of the geotextile and liner.
- Geotextile and liners should be secured down to prevent being blown by the wind.
- Set up a string line from one corner of the excavation along two sides of the tank so that the modules can be aligned.

STEP 3

INSTALLATION

a. Rainwater harvesting - residential

1. Assemble the modules as per the instructions for the relevant module type.
2. Place a layer of protection fabric on the compacted base and sides of the pit allowing for a minimum 300mm overlap. There should be sufficient fabric to surround the base, sides and top of the tank.
3. Place the liner base above the fabric layer and align the liner according to the tank dimensions.
4. Place an additional layer of fabric on the inside of the liner.
5. Using a 150mm hole saw cut the required number of modules equal to the height of the tank in the same position to create a continuous opening for insertion of the sump pipe.
6. Cut a length of 150mm PVC pipe to tank height and slot with holes to allow water to freely flow in and out of the pipe.
7. Slide the pipe into the opening of the modules and place the stack of modules in the required position for the suction line.
8. Install the assembled modules tightly together within the liner around the stack of modules with the sump.
9. Attach a 150mm Ausdrain connector on top of the sump.
10. Attach the inlet and outlet using Ausdrain 90mm or 150mm connectors. At this stage you should also position the EnviroSump ready for connection.

STEP 3

INSTALLATION

11. Wrap the modules with fabric and pull up the sides of the liner. Cut an X in the liner and fabric where the inlet/ outlets are. (Refer to the section on pipe connections)

12. Place the liner cap over the top of the tank and cut an X in the liner for the 150mm sump connector and stretch over the connector. Repeat the instructions for pipe connection.

13. Cut a piece of 150mm pipe to extend from the sump connector to finished surface level and fit with an end cap.

14. Drill a hole through the 150mm pipe below surface level for the suction line.

15. Fit the suction line inside the pipe and using an elbow install a length of pipe with a foot valve to the base of the tank.

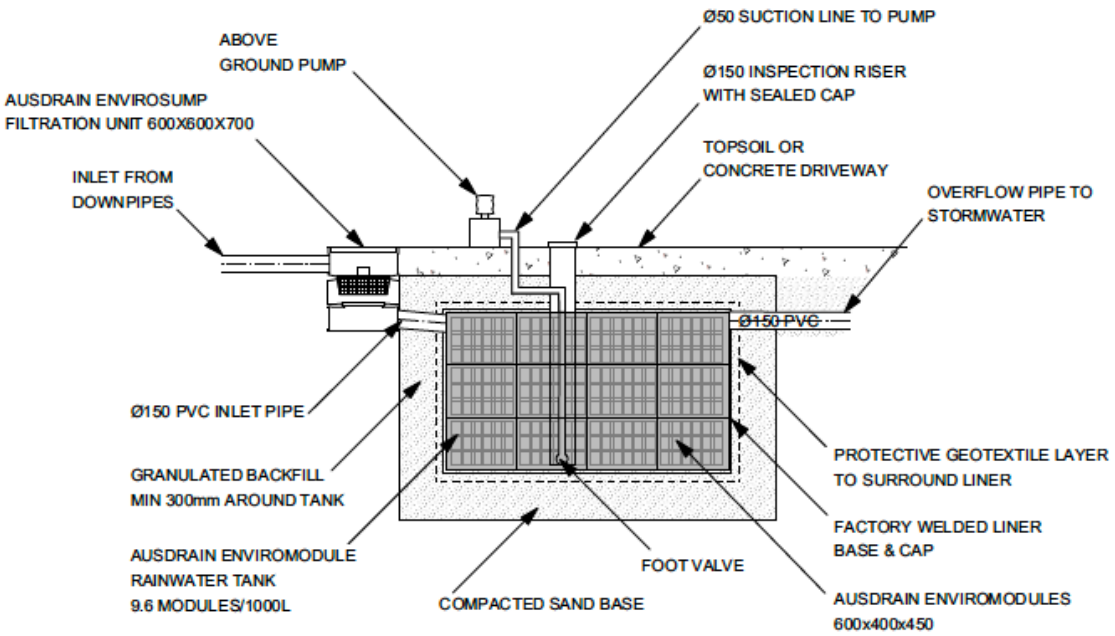
16. Connect inlet and outlet pipes including connection to the EnviroSump and check all connections.

17. Duct tape the liner cap to the liner base and surround the tank fully in protection fabric.

18. Backfill the tank using clean granular fill and compact. Do not backfill with gravel, rock or any material that contains sharp objects.

19. If installing under a trafficable area refer to the section on structural design for backfilling and pavement requirements.

Design example: Rainwater harvesting tank – residential



Please note:
AUSDRAIN EnviroModules are made from recycled plastic. Water stored in the AUSDRAIN tank is not recommended for drinking and should be used for non-potable purposes only. Food grade plastic modules must be specified for potable tanks.

STEP 3

INSTALLATION

b. Rainwater harvesting - commercial

1. Assemble the modules as per the instructions for the relevant module type.

2. Place a layer of protection fabric on the compacted base and sides of the pit allowing for a minimum 300mm overlap. There should be sufficient fabric to surround the base, sides and top of the tank.

3. Place the liner base above the fabric layer and align the liner according to the tank dimensions.

4. Place an additional layer of fabric on the inside of the liner. There should be sufficient fabric to surround the base, sides and top of the tank.

5. Position the discharge control pit(s) adjacent to the tank location and knock out or drill holes in the pit(s) for the connection of pipework. Note the invert of the outlet pit should be lower than the invert of the tank to act as a sump for the suction line.

6. Install the assembled modules on top of and beside one another to create the structure of the tank. The modules should be placed tightly against each other to minimise any gaps.

7. Connect Ausdrain pipe connectors where required ready for the connection of inlets and outlets.

8. Surround the modules with the inner layer of protection fabric. Cut an X in the fabric where the connectors are and stretch the fabric over the connectors. Seal with duct tape.

STEP 3

INSTALLATION

9. Pull the impermeable liner base up the sides and secure the overlap to the top of the tank.

10. Cut out the liner where the connectors are equal to the size of the pipe and follow the steps for pipe connection using the pipe boots and/or connectors provided.

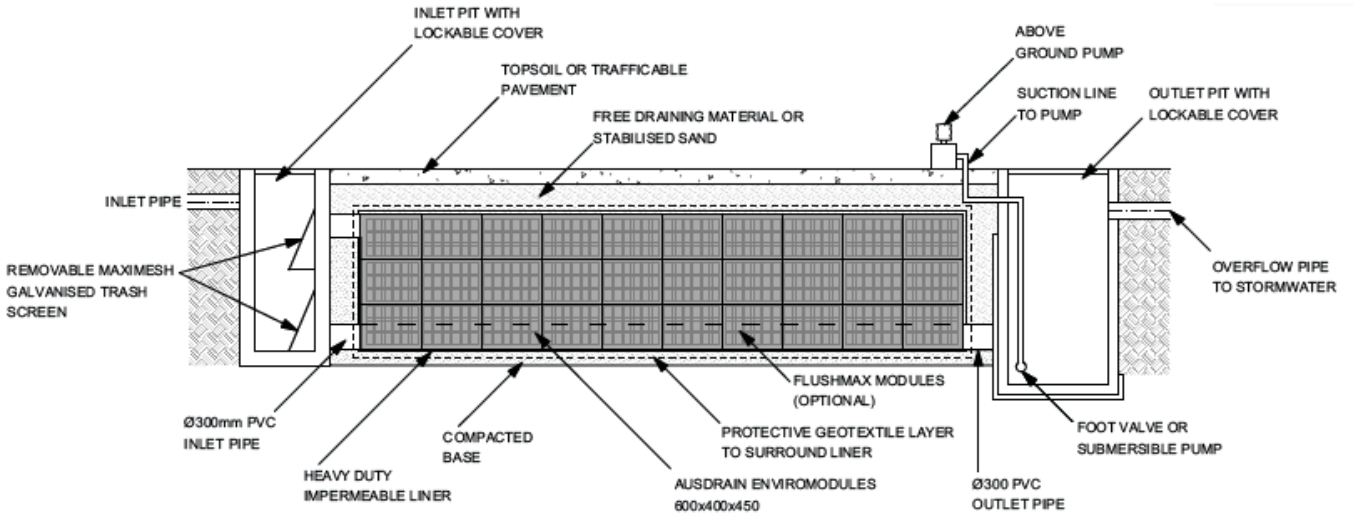
11. Place the liner cap over the top of the tank and overlap the sides of the base with the cap liner. Secure the liner cap to the base using duct tape.

12. Connect inlet and outlet pipes to the tank where required.

13. Surround the tank completely with the outer layer of protection fabric and secure ready for backfilling.

14. Install the suction line or submersible pump within the pump pit in preparation for water harvesting requirements.

Design example: Rainwater harvesting tank – commerical



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STEP 3

INSTALLATION

c. On-site detention tank

1. Assemble the modules as per the instructions for the relevant module type.

2. Place a layer of protection fabric on the compacted base and sides of the pit allowing for a minimum 300mm overlap. There should be sufficient fabric to surround the base, sides and top of the tank.

3. Place the liner base above the fabric layer and align the liner according to the tank dimensions.

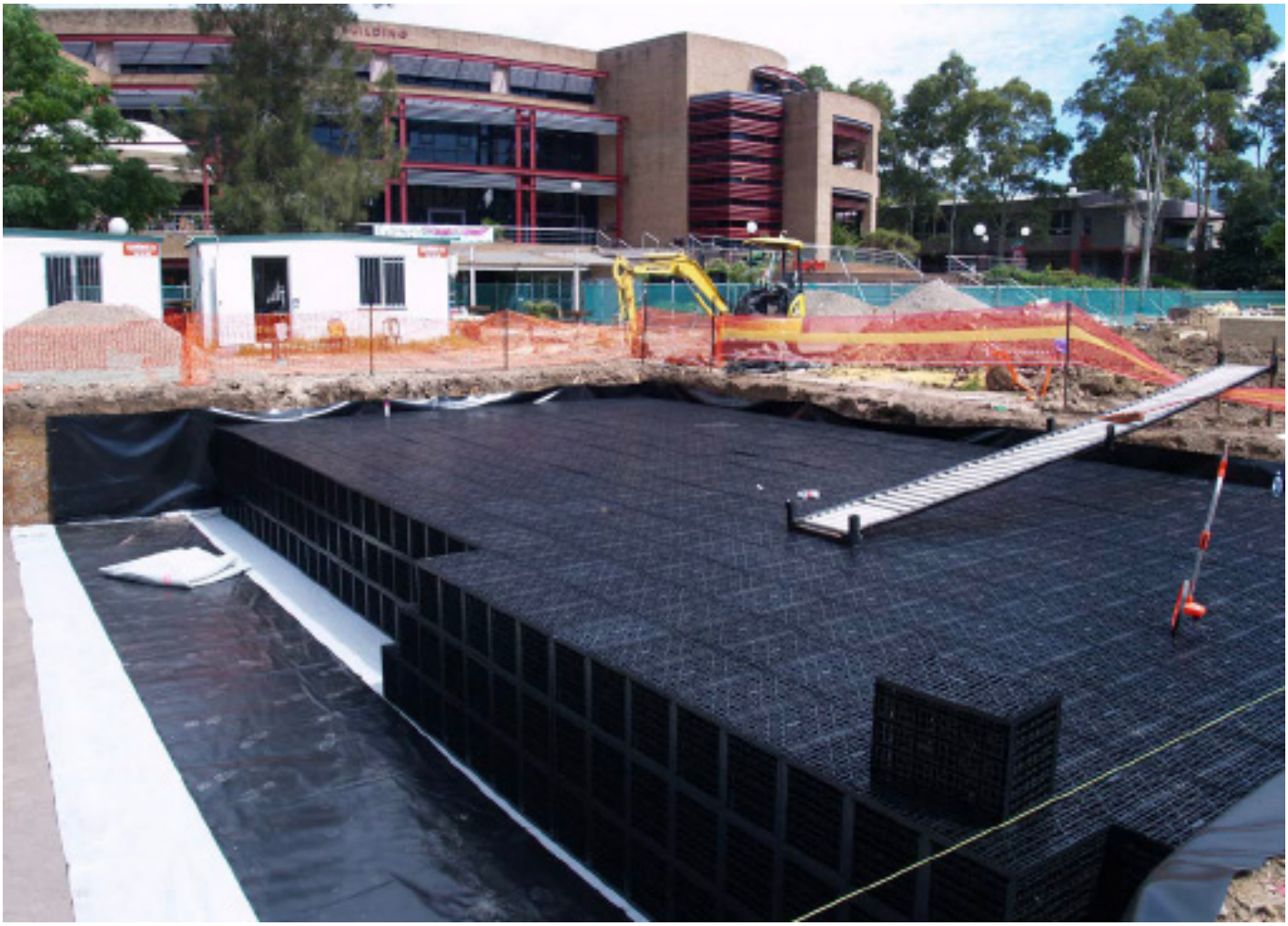
4. Place an additional layer of fabric on the inside of the liner. There should be sufficient fabric to surround the base, sides and top of the tank.

5. Position the discharge control pit(s) adjacent to the tank location and knock out or drill holes in the pit(s) for the connection of pipework.

6. Install the assembled modules on top of and beside one another to create the structure of the tank. The modules should be placed tightly against each other to minimise any gaps.

7. Connect Ausdrain pipe connectors where required ready for the connection of inlets and outlets.

8. Surround the modules with the inner layer of protection fabric. Cut an X in the fabric where the connectors are and stretch the fabric over the connectors. Seal with duct tape.



STEP 3

INSTALLATION

9. Pull the impermeable liner base up the sides and secure the overlap to the top of the tank.

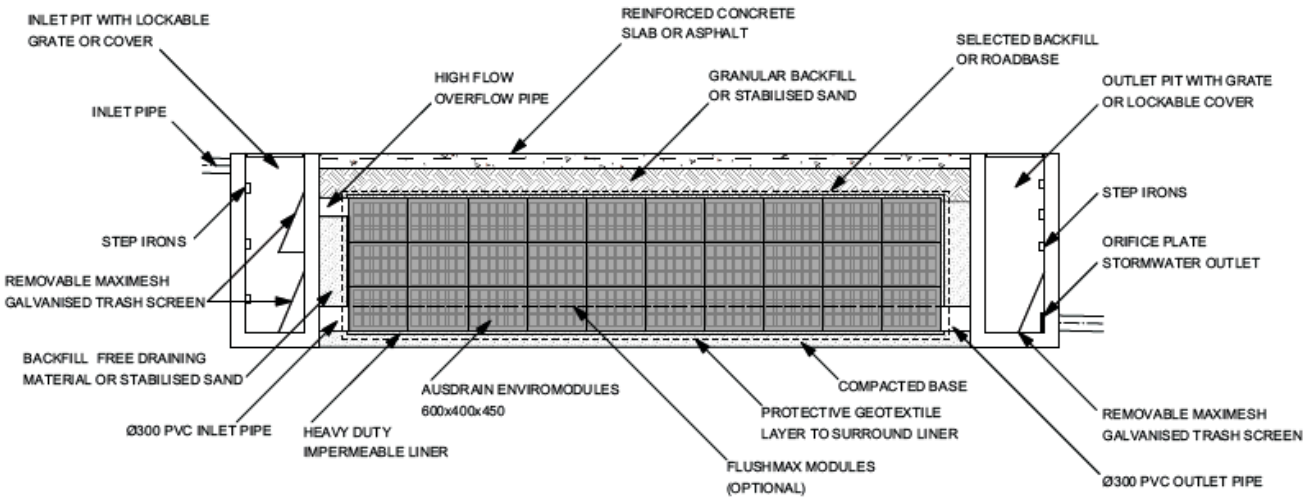
10. Cut out the liner where the connectors are equal to the size of the pipe and follow the steps for pipe connection using the pipe boots and/or connectors provided.

11. Place the liner cap over the top of the tank and overlap the sides of the base with the cap liner. Secure the liner cap to the base using duct tape.

12. Connect inlet and outlet pipes to the tank where reqired. Fit the orifice plate within the pit in the location of the outlet pipe to stormwater. Ensure that maximesh screens are bolted to the inside of the pit over the tank inlet and orifice plate.

13. Surround the tank completely with the outer layer of protection fabric and secure ready for backfilling.

Design example: On-site detention tank – under carpark or driveway



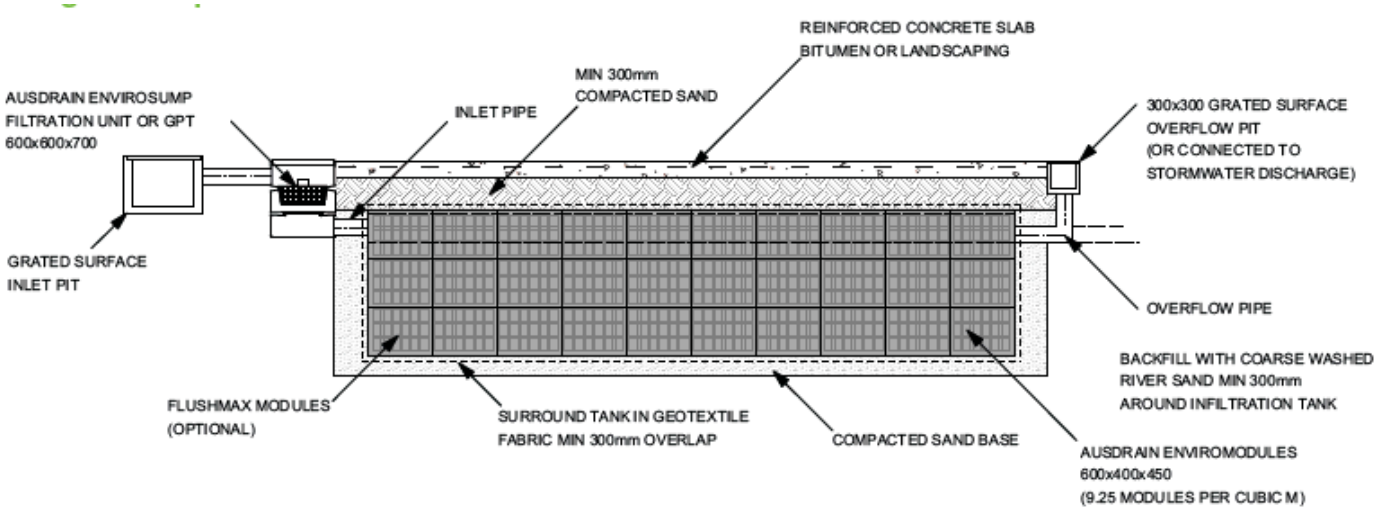
STEP 3

INSTALLATION

d. Infiltration tank

1. Assemble the EnviroModules as per the instructions for the relevant module type.
2. Place a layer of geotextile on the compacted base and to the sides of the trench with sufficient geotextile to cover the top of the tank. Ensure there is a minimum of 300mm overlap for the geotextile.
3. Install the assembled modules on top of and beside one another to create the structure of the tank. The modules should be placed tightly against each other to prevent any gaps.
4. Connect Ausdrain pipe connectors where required ready for the connection of inlets, outlets and inspection points.
5. Cut an X in the fabric at the location of each pipe so that the fabric can stretch over the pipe connector.
6. Surround the tank completely with the geotextile fabric ensuring a minimum 300mm overlap. It is recommended to secure the fabric to prevent any movement. Ensure there are no gaps in the fabric as this will allow backfill material to subside into the tank.
7. Secure the fabric around all of the pipe connections using duct tape and an adjustable stainless steel band clamp. Check each connection prior to backfilling.

Design example: Infiltration tank



STEP 3

INSTALLATION

e. Flushmax

1. Assemble the EnviroModules as per the instructions for the relevant module type.

2. Identify the row(s) of Flushmax on the plan and align the 600mm side of the Flushmax modules with the 600mm side of the adjacent EnviroModules. Note: For rainwater harvesting and on-site detention tanks the Flushmax row must be at the base of the tank. For infiltration tanks the Flushmax row must be at the top of the tank.

3. Place the geotextile and liner (if required) on the compacted base allowing enough to cover the sides and top of the tank.

4. Place the pre-assembled Flushmax modules from end to end of the tank within the liner and/or geotextile layers and butt together.

5. Place all remaining EnviroModules on either side of the Flushmax row(s). Note: for multiple rows of Flushmax ensure they are separated by at least one row of EnviroModules.

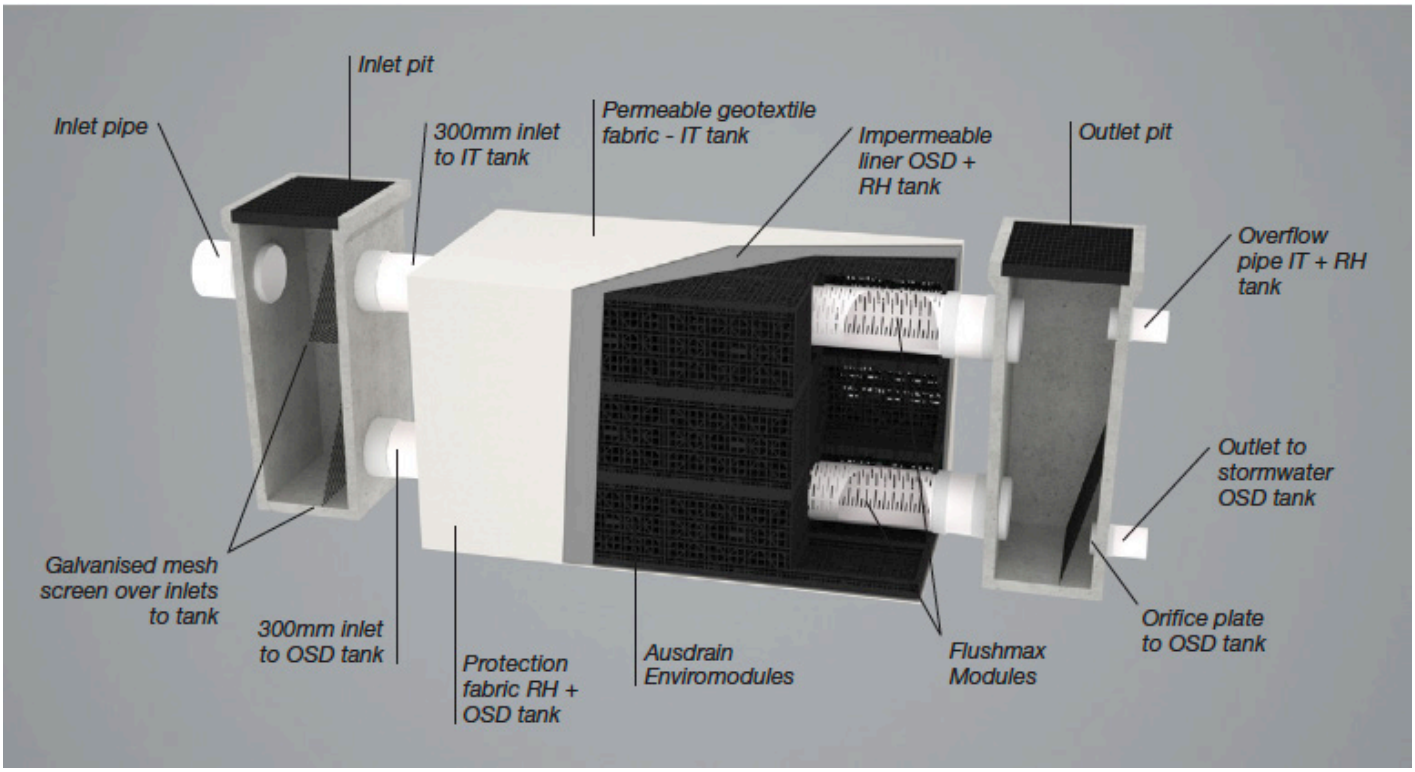
6. Connect a piece of 300mm PVC pipe to the inlet and outlet of the Flushmax rows for connection to the inlet and outlet pits.

7. Install all remaining EnviroModules to complete the tank structure.

8. Cut an X in the geotextile and 300mm diameter hole in the liner where the inlet and outlet pipes are to allow them to fit through. Wrap the impermeable liner and/or geotextile completely around the tank allowing the 300mm inlet/outlet pipes to protrude.

9. Secure the geotextile with duct tape around the pipes and clamp using a stainless bsteel adjustable band clamp. If using an impermeable liner, fit the self-adhesive pipe boot over the inlet and outlet pipes as per the instructions provided.

10. Connect the 300mm inlet/outlet pipes to each adjacent pit. A galvanised maximesh screen should be bolted over the inlet pipe.



STEP 4

BACKFILLING

Backfill and compaction

1. Backfill with clean granular fill to the sides and top of the tank. For infiltration tanks, use coarse washed river sand 0.5 to 2mm particle size to act as a filter around the geotextile and prevent clogging of the fabric. Do not backfill with rock, blue metal or any material that may contain sharp elements that could damage the liner and/or geotextile.

2. For medium to heavy vehicle loads it is recommended to backfill with concrete stabilised sand (minimum 5% concrete) to the sides and 200omm on top of the tank. Note: Do not use stabilised sand around infiltration tanks with geotextile.

3. If backfilling with granular fill or sand compact the sides in lifts of 300mm using a hand held compaction device. Avoid contact of the equipment with the sides of the tank. If a plate compactor cannot be used ensure that sufficient manual compaction is performed including watering.

4. Continue backfilling on top of the tank in 300mm lifts to 95% standard dry density for landscaped areas and 100% for trafficable areas. A minimum of 300mm cover must first be applied and only light machinery on tracks used to backfill and compact the tank until at least 600mm of cover has been achieved. The remaining cover should be placed and compacted in 300mm lifts to the maximum permitted depth using machinery on tracks up to 8 tonnes.

5. For flexible pavements, use a smooth single drum roller up to 5 tonnes to compact road base and bitumen. Minimum cover depths must first be applied.

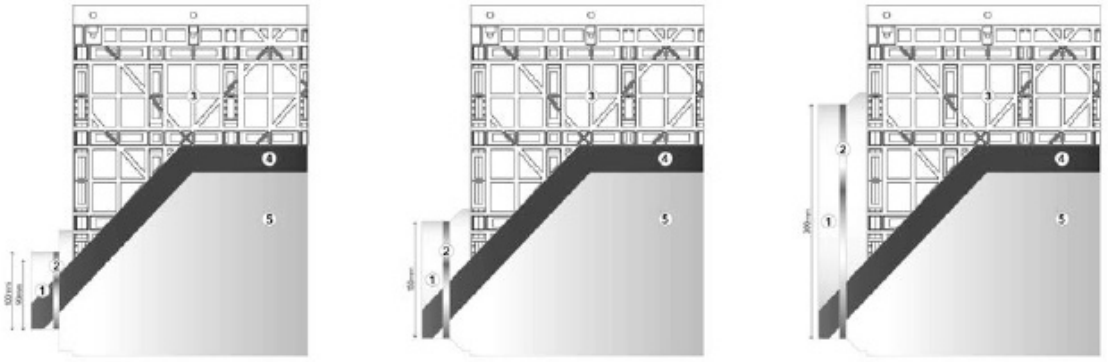
6. If extra duty or heavy duty modules have been installed light vehicle traffic including cars and vans up to 2.5 tonnes can traffic over the tank provided the minimum compacted cover depth is 600mm.

7. Heavy construction traffic is strictly not permitted over the tank after installation. Tanks designed for heavy vehicle traffic will require stabilised sand backfill and re-enforced concrete pavements. Refer to the section on structural design p18.

PIPE CONNECTIONS

Legend

1. Pipe connector
2. Band clamp
3. EnviroModule
4. Liner
5. Geotextile



a. 90/100mm and 150mm PVC Connector
b. 300mm Flushmax Connector
c. Pipe Boots – made to order

a. 90/100mm & 150mm PVC pipe connector

1. Locate the connector on the module and mark the opening.
2. Cut or drill a hole into the module the size of the inside diameter of the pipe and snap the connector into place.
3. Pull the impermeable liner and/or geotextile over the flange and cut an X in the material(s) slightly larger than the pipe.
4. Stretch the material(s) over the connector to create a boot.
5. Secure the material around the connector with duct tape and an adjustable stainless steel band clamp.

b. 300mm Flushmax connector

1. Position the Flushmax module at the inlet and if required at the outlet.
2. Cut a 300mm stub of 300mm PVC pipe and connect to the module.
3. Pull the geotextile over the pipe and cut an X slightly larger than the pipe. If using an impermeable liner follow the instructions for the installation of pipe boots.
4. Stretch the geotextile over the connector to create a boot.
5. Secure the fabric with duct tape and an adjustable stainless steel band clamp.

c. Pipe boots – made to order

1. Position a stub of the inlet/outlet pipe and cut a hole in the module up to a max 225mm pipe. Note: If using the Flushmax connector, the module will not require cutting.
2. Pull the liner flat against the modules and ensure there are no creases and the surface is clean and dry.
3. Cut a hole in the liner equal to the outside diameter of the pipe.
4. Position the pipe boot and align with the hole then mark around the flange of the pipe boot.
5. Apply a thick bead of primer around the inside of the marked area and 10mm to the outside of the line. Even out the primer so there is a uniform thickness and allow to dry for at least 10 minutes.
6. Position the pipe boot and remove the backing paper from one edge of the flange. Push the flange against the primer making sure there are no wrinkles in the flange or liner. Rub the back of the flange making sure that all of the flange is bonded to the liner. Repeat this process for the other 3 sides.
7. Apply a 15mm wide bead of sealant (Sikaflex) around the outside of the flange.
8. Insert the stub of pipe ensuring that it protrudes from the pipe boot and run a bead of sealant between the pipe boot and the pipe.
9. Run duct tape around the outside of the pipe boot and secure the pipe boot to the pipe using an adjustable stainless steel band clamp.

STRUCTURAL DESIGN

Structural design table

		A	B	C	D	E	F	G	H
Application	**Module Type**	**Max height modules (mm)**	**Min/max cover depth (mm)**	**Max depth to base of tank (mm**	**Min cover over tank (mm)**	**Min topsoil/ backfill (mm)**	**Min road base (mm)**	**Asphalt (mm)**	**Concrete (mm)**
Landscaped / non-trafficable	Standard	1800	300/1200	2100	100	200	N/A	N/A	N/A
	Extra	1800	300/1500	2500	100	200	N/A	N/A	N/A
Light vehicle Up to 2500 kg GVM	Extra (asphalt)	1800	600/1200	3000	300	N/A	260	40	N/A
	Extra (concrete)	1800	600/1200	3000	450	N/A	N/A	N/A	150
Medium vehicle Up to 10000 kg GVM	Heavy (asphalt)	1800	800/1200	3000	300	230	230	40	N/A
	Heavy (concrete)	1800	600/1200	3000	300	150	N/A	N/A	150/200

Note:
All applications require a compacted base of 100mm.
For heavy vehicle applications concrete slab must extend 1m to all sides of the tank.

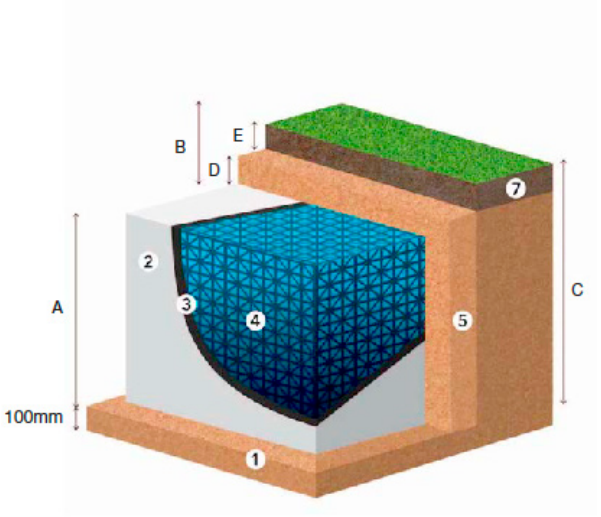
Structural assumptions

1. Vehicle definitions as per Australian standard AS1170.1
2. Max weight of soil cover 20kn/m^3 for saturated sand
3. Live load for landscaped area 3kpa allows for crowd loads
4. Live load for light vehicle is 13kn over 0.3×0.3M
5. Live load for medium vehicle is 24kn over 0.16×0.16M
6. Loads are distributed downwards at 45 degrees
7. Calculations are based on an FOS of approx. 10 times

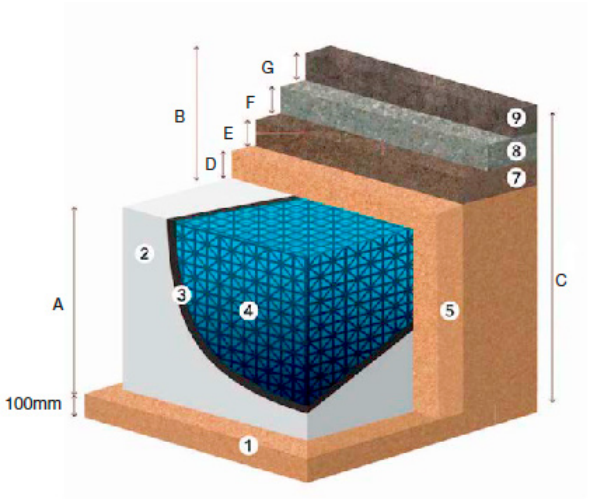
Legend

1. Compacted base
2. Geotextile or protection fabric
3. Heavy duty liner
4. EnviroModules
5. Coarse washed river sand or clean granular material
6. Concerete stabilised sand
7. Compacted fill or topsoil
8. Compacted road base
9. Asphalt
10. Re-enforced concrete slab

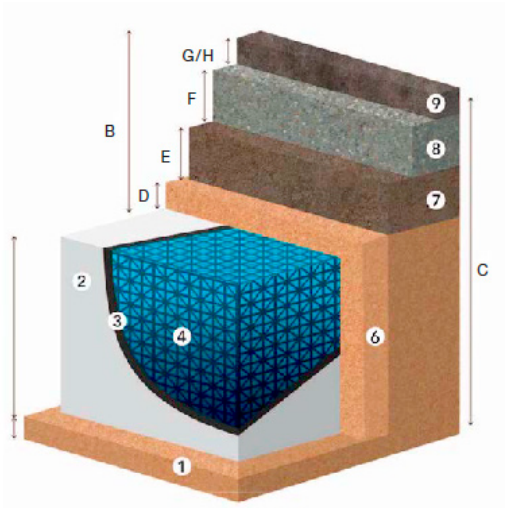
Landscaped (non-trafficable)
Pedestrian applications and lightweight maintenance machinery.



Light Vehicles
Carparks and driveways limited to vehicles of 2500kg GVM.



Medium Vehicles
Carparks and driveways limited to vehicles of 10000kg GVM.



Manufactured from 100% environmentally friendly recycled plastics

For more in-depth information about AUSDRAIN™ and the products the company provides contact:

T 1300 287 372
F 1300 329 372
E enquiries@ausdrain.com

PO Box 164
Cammeray NSW 2062
Australia

1300 AUSDRAIN (1300 287 372)
(Toll free within Australia)

or visit
www.ausdrain.com