ENVIRONMENTAL

Module

2

Design and Installation Guide

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PRODUCT SPECIFICATIONS

ENVIROMODULE™ 2

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Length</td>
<td>600mm</td>
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<tr>
<td>Width</td>
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<tr>
<td>Height</td>
<td>450mm</td>
</tr>
<tr>
<td>Weight</td>
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</tr>
<tr>
<td>Void area</td>
<td>95%</td>
</tr>
<tr>
<td>Storage volume</td>
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<tr>
<td>Material</td>
<td>Recycled polypropylene</td>
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Compressive strength tonnes/m²

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<tr>
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<th>Side</th>
<th>End</th>
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<tr>
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<td>Flushmax</td>
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<td>10.7</td>
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Design and installation recommendations

1. EnviroModules must be specified and installed with the 450mm side in the upright position to ensure maximum strength.
2. Standard duty modules are suitable for installation in landscaped or non-trafficable areas.
3. Extra duty and heavy duty modules are suitable for installation under trafficable areas. Refer to the structural design section for backfilling and pavement requirements.
4. Tanks must be installed above the peak water table level to avoid any potential buoyancy issues.
5. Where tanks are installed on hillsides or adjacent to an embankment, consideration must be given to the increased lateral load exerted on the tank and if necessary the tank should be located outside the zone of influence.
6. Each tank should be fitted with a vent or vents to enable discharge of air.
7. Pre-filtration of stormwater is an essential part of each tank system. In line filters including filter pits with mesh screens, EnviroSump filtration units and/or Gross Pollutant Traps are required to pre-filter water prior to entering the tank.
8. Compressive strength values represent the maximum short term evenly distributed load for the modules.
9. Structural design calculations are based on an FOS of 10 to ensure long term design stability.
10. Heavy construction traffic, including, but not limited to concrete mixers, cranes and fully laden delivery trucks are not permitted over the tank during or after installation.
Ausdrain EnviroModules are delivered in flat-pack 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 includes 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

1. Refer to the plan or specification for the dimensions (L×W×H) of the AUSDRAIN tank.

2. Excavate the pit allowing for the dimensions of the tank and a minimum of 300mm to each side of the tank, 100mm for the base and required depth of cover to finished surface level.

3. Note if hand held compaction devices are to be used to compact the backfill on the sides of the tank, allow sufficient width for the equipment to compact to each side plus an additional allowance to avoid contact with the geotextile and/or liner.

4. It is recommended to excavate the pit in the form of a trapezoid. This will assist in reducing potential lateral pressure on the tank and prevent the sides of the excavation from subsiding.

5. The pit should be benched in line with workplace safety regulations and a ladder or ramp provided for access. A suitable safety fence should be erected around the perimeter of the excavated area and safety or warning signs provided.

6. To prepare the base lay a 100mm layer of coarse washed river sand or clean granular material. Evenly spread the material to level the base and compact to a minimum of 95% standard dry density using a hand held plate compaction method. If installing the tank under a trafficable area compaction should be 100%.

7. Where the tank is installed in soft ground a layer of compacted road base will be required to establish a solid base for the tank to sit on. Remember that the bearing capacity of the modular tank is only as good as the base it is installed on.
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.
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.
### STEP 3

**INSTALLATION**

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.

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 – commercial**

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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

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.
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. 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 steel 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 200mm 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**

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

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<tr>
<th>Application Type</th>
<th>Module Type</th>
<th>Max Height Modules (mm)</th>
<th>Min/Max Cover Depth (mm)</th>
<th>Max Depth to Base of Tank (mm)</th>
<th>Min Cover Over Tank (mm)</th>
<th>Min Topsoil/Backfill (mm)</th>
<th>Min Road Base (mm)</th>
<th>Asphalt (mm)</th>
<th>Concrete (mm)</th>
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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/m² 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 31kn over 0.16×0.16M
6. Live load for heavy vehicle is 30kn over 0.16×0.16M
7. Loads are distributed downwards at 45 degrees
8. 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. Concrete stabilised sand
7. Compacted fill or topsoil
8. Compacted road base
9. Asphalt
10. Re-enforced concrete slab
**Medium vehicles**
Carparks and driveways limited to vehicles of 10000kg GVM.

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

**Heavy vehicles**
Carparks and driveways limited to vehicles of 42500kg GVM. (Max speed 5kph)

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

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