Atlantis®
GREEN CITIES FOR LIFE

Product Version

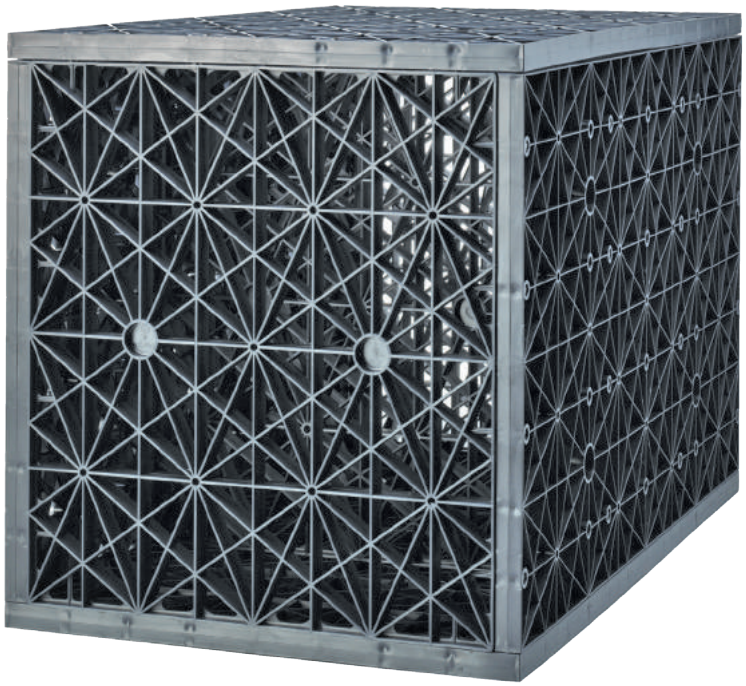
Flo-Tank® XD

Document ID

15-05-2017 PM/CU

Flo-Tank®

MODULAR UNDERGROUND TANK SYSTEM



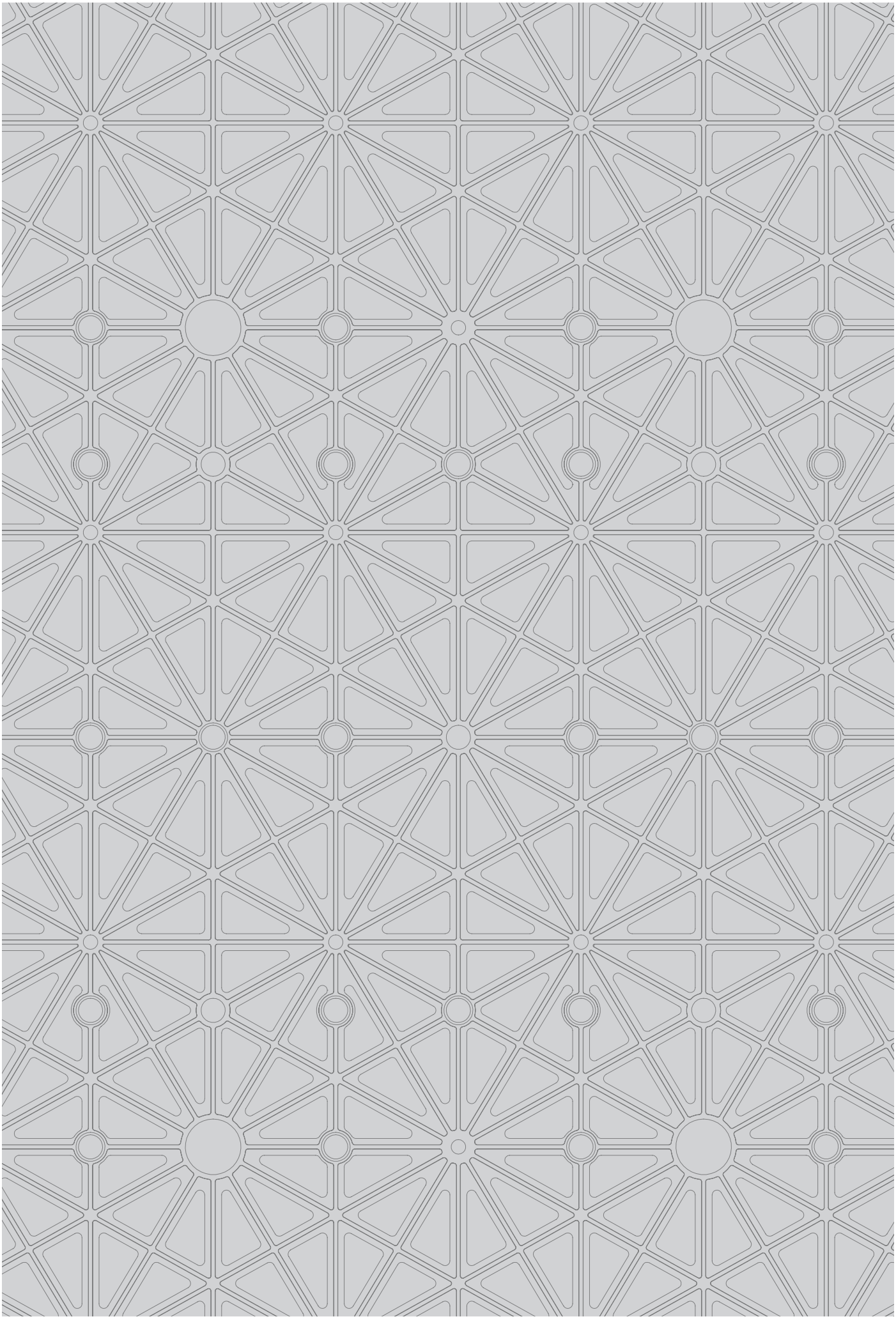
APPLICATIONS COVERED:

- Infiltration Tanks
- Re-use Tanks (Rainwater Harvesting Tank)
- O.S.D (On site Detention Tanks)

Assembly & Installation Guide

2017

www.atlantiscorporation.com.au



Contents

Additional Materials Required

Backfill Materials

- Washed River Sand (Technical specifications available upon request)
- Aggregate / Gravel 20mm (3/4”) (Technical specifications available upon request)
- Growing Media, in accordance to local guidelines.

Other Materials

- Duct Tape
- Firestone Butyl Tape or equivalent (For pipe boot connections to liner)
- Stainless Steel Pipe Clamps
- PVC Pipes

Machinery

- Hand Held Compactor
- Excavation Machinery
- Equally distributed load light vehicle (PT-30/50 Terex or similar)

Geo Membranes

- Hydrophilic Geotextile
- Geo Grid, BX-1200 or equivalent if specified by engineer.
- Plastic Liner
  - 0.75 mm (0.03”) HDPE (Suitable for welding)
  - 1 mm (0.04”)HDPP (Suitable for welding)

Pre Filtration Devices

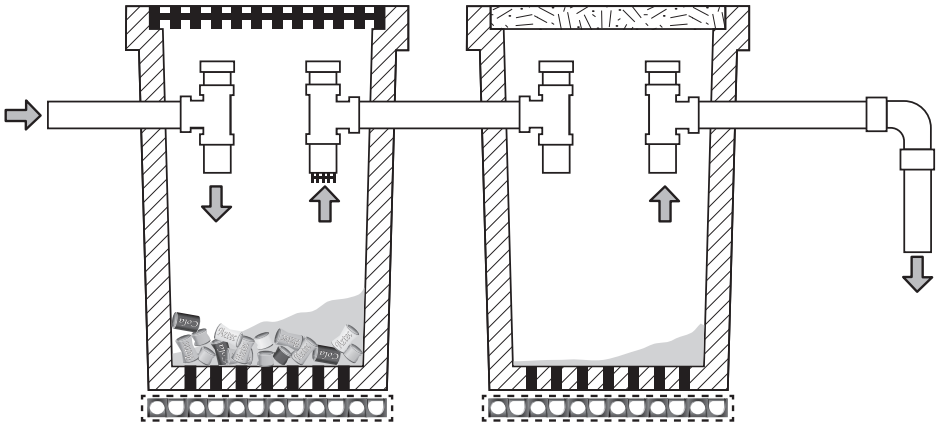
- Atlantis Flo-Screen® small
- Atlantis Flo-Screen® large
- Standard Sediment and Gross Pollutant Trap
- Expanded steel mesh, galv. /zinc coated (Maximesh RH3030 or equiv.)
- Proprietary Sediment, Grease and Gross Pollutant Traps from various manufacturers
- Infiltration Swales with Flo-Tank® or Flo-Channel® for optimum flush-out.

Atlantis Flo-Screen® filtration units

These in line filters are designed to remove gross pollutants, such as vegetation matter and silt from roofs and stormwater pits before allowing water to enter the Atlantis tank system.

Double Pit Design Sediment & Gross Pollutant Trap for Commercial Applications

This in line filter removes gross pollutants and sediments from entering the Atlantis modular tank system. It is assembled on site from standard stormwater components commonly available in the market place. This pit design is scalable to suit the flow requirements of the project.



1. THE DESIGN AND PRE-CONSTRUCTION PROCESS

I. ADHERENCE TO LOCAL DESIGN STANDARDS

The tank system has to be engineered to achieve the hydraulic function as per local requirements and national design standards (AS3500: Plumbing and Drainage for Australia and New Zealand). Hydraulic modelling and calculations are to be undertaken and the plans prepared and approved for construction.

Structural Engineering design plans must provide adequate Partial Factors of Safety for static and dynamic loads as relevant per AS4678: Earth Retaining Structures, AS2566: Buried Flexible Pipelines, AS5100: Bridge Design, AS1170: Structural Design Actions and all standards deemed appropriate for buried rainwater tanks or water channel systems. For International Design Guidelines refer to CIRIA C680: Structural design of modular geocellular drainage tanks.

For long term design strengths contact Atlantis for creep factors. Also for any other technical enquiry contact Atlantis Technical Department.

II. GEOTECHNICAL FACTORS

Geotechnical factors that must be taken into consideration include ground water tables that vary seasonally, those soils that are prone to liquefaction, ground slope stability and soil movements etc.

All necessary geotechnical testing must be done during the design stage, testing type of substrates, depth of substrate layers, slope stability, moisture content, groundwater level etc. All such documents and reports are to be provided to the design engineering team.

Where it is expected the site is contaminated with high concentrations of acid, hydrocarbons or any other chemicals of high concentration, a site specific soil test on the nature of the substrate should be undertaken. Contact Atlantis for the Material Safety Data Sheet to see if the product is suitable for the tested substrate.

III. STRUCTURAL DESIGN

The excavation for Atlantis tank modules is defined by depth and area:

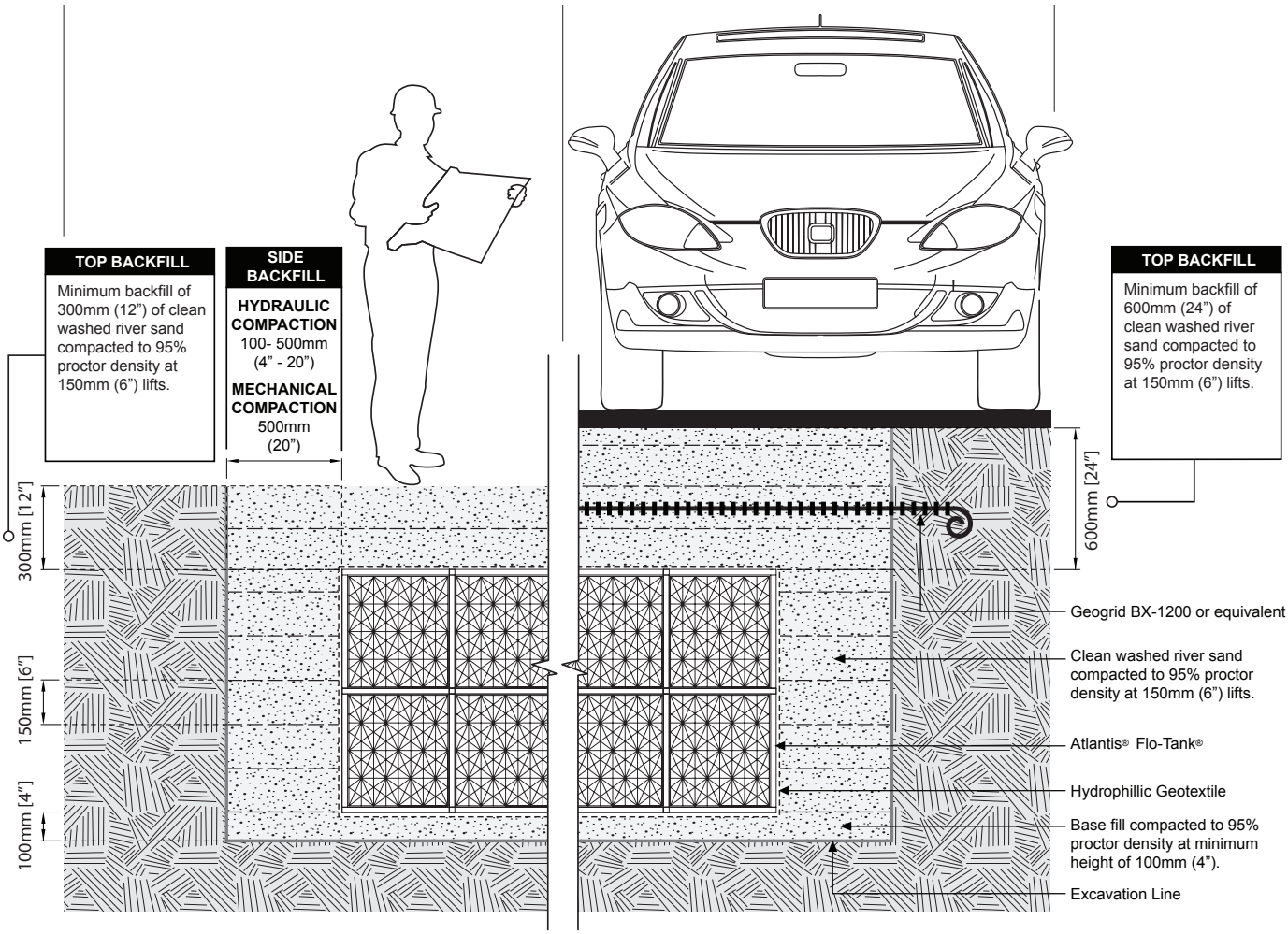
EXCAVATION DEPTH = Base Fill + Tank Height + Specified Backfill Height
EXCAVATION AREA = Tank Footprint + Minimum Side Backfill

Three factors influence the forces acting on a buried tank: i) type of load ii) the magnitude of the load and iii) the depth beneath ground level.

The soil weight and any permanent structure above the tank define the “dead load”. Traffic loads such as pedestrians, cars and trucks define the “live load”. A deeper excavation spreads the live load out more, however results in a heavier dead load due to more soil above. The shallower excavation although has a more concentrated live load will have less weight due to the soil. Looking at these factors (and several others factors in structural geotechnics), a safe working depth can be prepared.

The table below is a guideline for a standard 4 plate Atlantis Flo Tank. The traffic load is assumed for a 3 tonne, 2-axle car load. Please note that the Flo Tanks can be designed to easily withstand multiple axle trucks by increasing the top backfill depth and increasing the number of Internal plates in the Flo Tank. Please contact Atlantis Technical to help you design a system that caters for your site-specific requirements.

FILL	PEDESTRIAN TRAFFIC (MM	VEHICLE TRAFFIC (MM)
BASE	100	100
SIDE*	300	600
TOP BACKFILL**	300	600



***SIDE BACKFILL:**

For installations that have limited footprint available, 100mm (4") can be applied if approved by specifying engineer. Narrow side backfill must be compacted to 95%. For installations into reactive soils or clay a minimum of 500mm (20") side backfill is required.

****MAXIMUM BACKFILL:**

This depends on the type of Atlantis system used. Typically for a 9 plate Atlantis Flo Tank the maximum backfill is 4.0m, but there are other factors involved such as magnitude and type of load, type of backfill and its density etc. Please contact our technical department to take a look into your specific site requirements.

IV) ZONE OF INFLUENCE OF THE TANK

The zone of influence of the tank determines an area of soil, around the tank, that supports and influences it. For this reason it is important to look into the zone of influence and determine safe installation distances to structural footings and heavy traffic.

a) For Permanent surrounding structures.

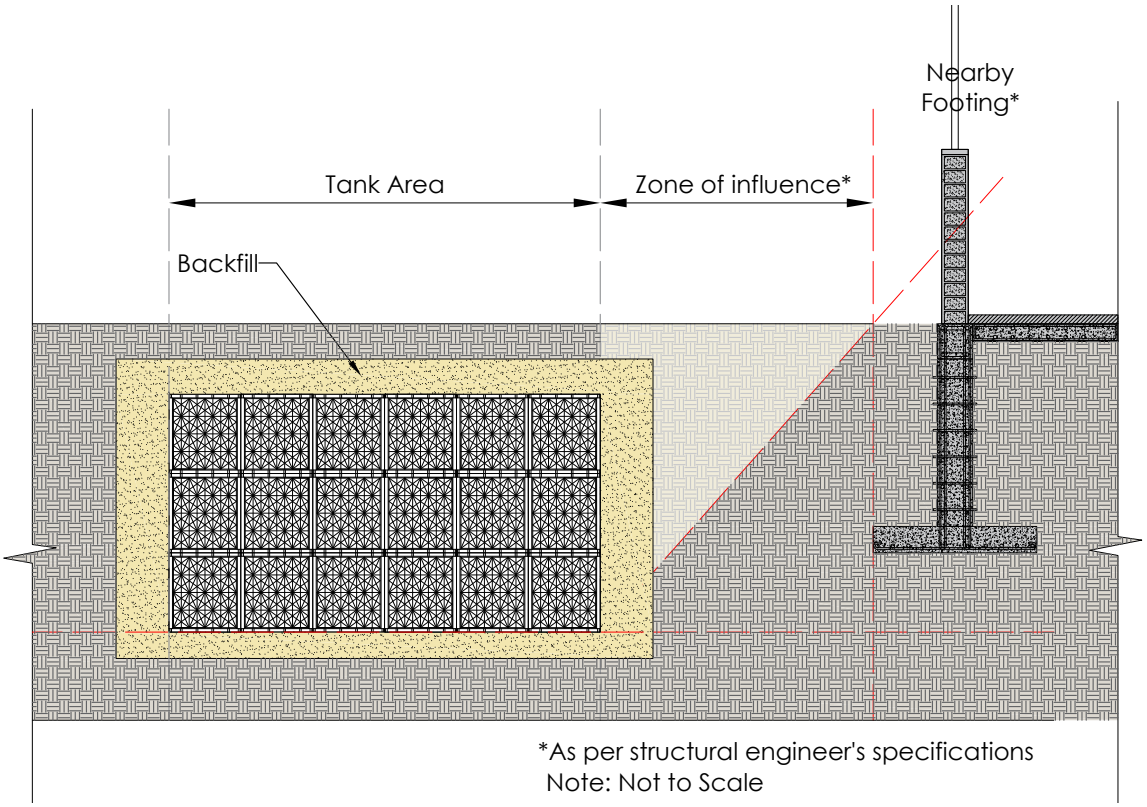
Before excavating please check soil types to determine the minimum distance of the excavation from existing structures. The table below provides a guideline for minimum setback to existing structures in different soil types. A structural engineer to be contracted to determine site specific setback between the tanks and the structural footing.

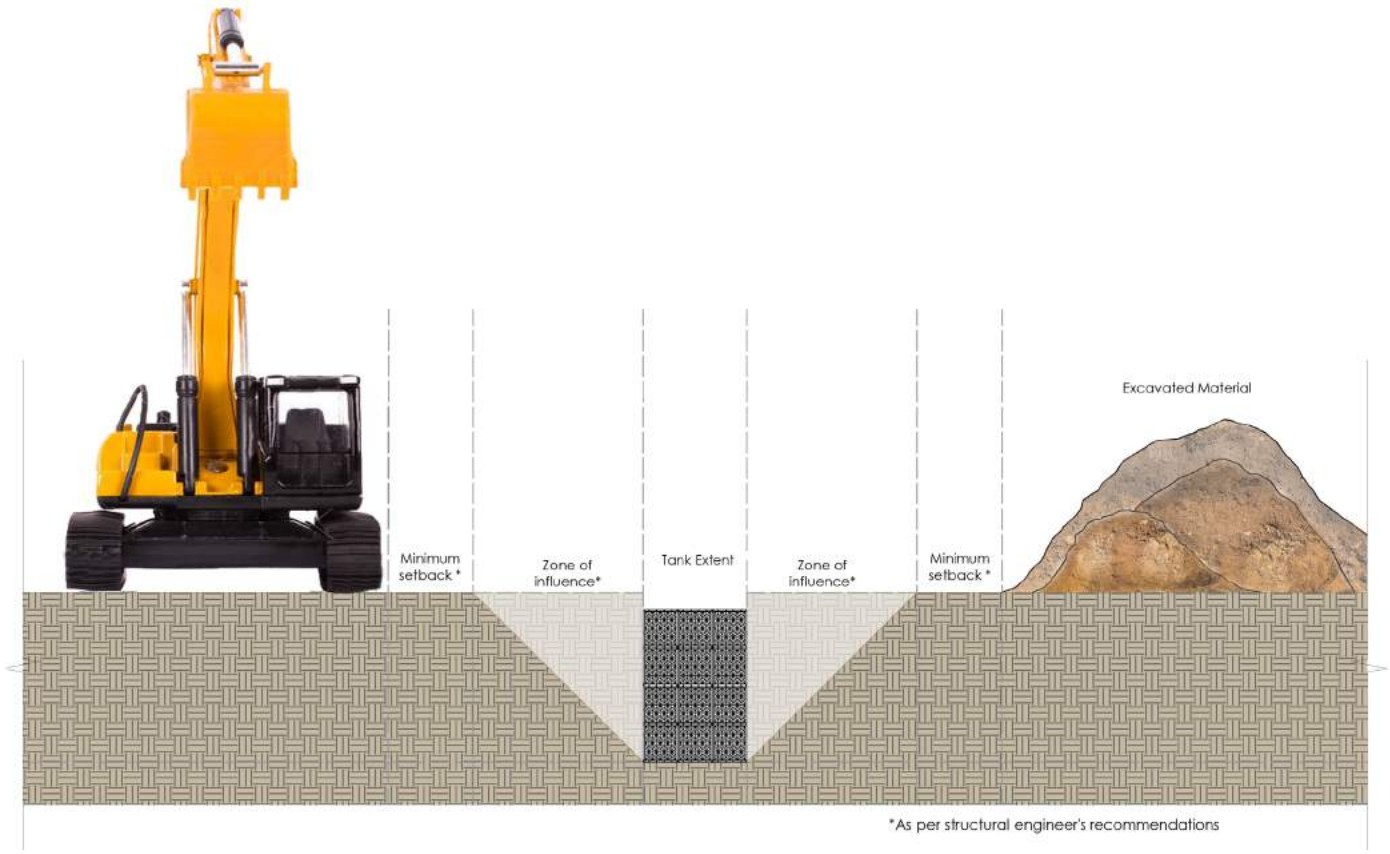
Soil Type	Typical Hydrailic Conductivity (cm/s)	Typical Hydraulic Conductivity (mm/hr) (inches/hr)	Modification Factor (U)	Minimum setback distances from structures and boundaries (m) (ft)
Sand	5.00E- 03	180 (7.08”)	0.5	1.0 (3.28 ft.)
Sand Clay	1.00E-03 - 5.00E-03	36 - 180 (1.42 - 7.08”)	1.0	2.0 (6.56 ft.)
Weathered of Fractured Rock	1.00E-04 - 1.00E-03	3.6 - 36 (.14 - 1.42”)	-	2.0 (6.56 ft.)
Medium Clay	1.00E-04 - 1.00E-03	3.6 - 36 (.14 - 1.42”)	2.0	4.0 (13.12 ft.)
Heavy Clay	1.00E-06 - 1.00E-04	0.036 - 3.6 (0.0014 - 0.14”)	2.0	5.0 (16.40 ft.)

b) For Construction equipment and machinery.

The structural engineer is to determine the zone of influence and the safe distance of heavy machinery and plants from the excavation. In some cases a ground support system may be required and designed by the structural engineer.

All construction traffic, excavated material, plants and heavy equipment are to be clear of the limits of excavation determined by the zone of influence until the project is completed and approved by engineer or project manager in charge.





2. THE CONSTRUCTION OF THE ATLANTIS SYSTEM

Review Atlantis installation procedures thoroughly, if in doubt contact Atlantis Technical support team at technical@atlantiscorp.com.au or call Atlantis on +61 2 9417 8344 on Australian Eastern Standard time between 8:30am and 5 pm Monday to Friday.
Visit the website https://www.timeanddate.com/worldclock/australia/sydney for current time difference from your location.

Carefully plan and coordinate the installation of the Atlantis system with other work on the project such as grading, excavation works, utilities installation, construction of access roads, site compaction and erosion management. The following documents shall be submitted to the builders on site: Geotechnical testing report and all relevant design information (elevation plans, site photos, hydrological/hydraulic studies etc.)

I. THE CONSTRUCTION OF THE ATLANTIS SYSTEM

Installation must be performed only by skilled and competent contractors with satisfactory record of performance and quality on underground installations. Multiple contractors may need to be employed for the overall job.

Contractors must adhere to the Atlantis installation guidelines and engineering specifications. If the plans or drawings conflict with our installation guide, please notify our technical department.

II. CONSTRUCTION & SITE TRAFFIC

Keep all construction traffic away from the limits of excavation determined by the zone of influence calculations until the project is completed and final surface materials are in place as approved by engineer or project manager in charge. Also mechanical plant and storage of materials (including excavated material) or any other heavy loads should not be located in the ‘zone of influence’ of an excavation.

III. EXCAVATION

In any excavation project, intelligent planning is mandatory. All excavations should take into account adjacent structures and how the excavation can affect existing footings, pipelines and services already buried underneath the ground. Before engaging in excavation the following must be looked at:

- Refer to a site-specific latest survey and ensure the survey includes an area beyond the site of interest and into properties directly adjacent in all sides of the excavation. This will give the location of all existing buried structures, footings, pipes & underground tanks etc.

- Contact **DBYD** (Dial Before You Dig) before excavation. For non-Australian locations contact any service that provides locations and types of all services and utilities beneath the ground.

- For geotechnical complexities such as slope stability (working excavations on slopes), material instability and groundwater pressures and how these may exacerbate the effect of the excavation on surrounding structures, a geotechnical engineer must be contacted prior to excavation. If it is found the excavation for the tanks will effect the stability of surrounding structures the excavation MUST NOT BE STARTED.

- Any ground support system must be designed by a competent person i.e. geotechnical engineer or structural engineer.

All activities of earthworks must be documented, namely:

1. Investigation and Planning: Includes surveys that determine existing services, footings, trees etc. Discussions with neighbouring sites regarding easements and the construction itself. Works-as-Expected survey.

2. Design and Specification: Engineering plans & documentation, Geotechnical investigation reports

3. Construction: Includes DBYD, meeting of relevant parties documentation.

3. MISCELLANEOUS

I. HYDROPHILIC GEOTEXTILE

For all applications, the geotextile should be HYDROPHILIC. The molecular properties of Hydrophilic geotextiles attract and absorb water. Geotextiles that are HYDROPHOBIC repel water due to the molecular structure and are not encouraged for use with Atlantis products. Having a geotextile that is hydrophobic will cause problems with flow, especially if the product is used in channelling large quantities of water.

A simple test to determine whether the geotextile is Hydrophilic is to use a square piece of geotextile 150mm (6”) in size. Take the geotextile sample and place it over a drinking cup. Use tape to secure it around the cup to form a spanned surface. Then place a few drops of water onto the surface. If the geotextile immediately attracts the water and allows the water to drain through it is Hydrophilic. If the water sits on top of the geotextile and forms droplets it is Hydrophobic. Hydrophobic geotextiles may require a head of pressure to perform however they are NOT suitable for use with Atlantis products.

For specification the designer/specifier can simply call up as “Geotextile as per Atlantis recommendations”.

II. POST CONSTRUCTION SIGNAGE

Where there is high risk of failure, damage to tanks or to other existing structures ensure there is permanent signage stating the location, extent and maximum load allowed above the tanks.

III. INFLOW WATER QUALITY

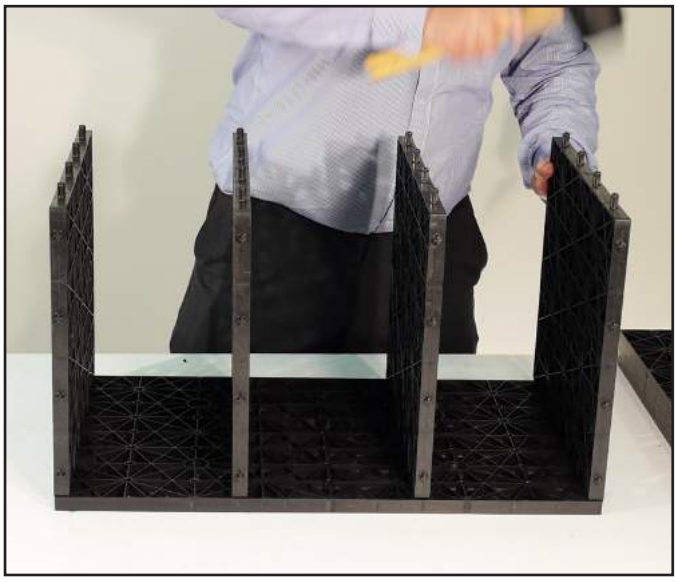
All water entering the system must be filtered, free of gross pollutants, silts, grit, sediments, oils and chemicals that can cause deterioration of the system, as the following chemicals: Benzene and derivatives, Acenaphthene Benzo-perylene, Carbon, Tetrachloride, Heptane, Kerosene Mineral Oil (White), Nitric Acid, Sulphuric Acid and Toluene chemicals are not recommended for polypropylene.

The design engineer is responsible for determining the nature of pollutants in the inflow water; they are then to devise the appropriate filtration device. Contact Atlantis Technical department to help choose the best filtration devices and techniques for the particular job.

Contact Atlantis for the maintenance schedule for our products.

Flo-Tank® Module Assembly Guide

Atlantis Flo-Tank® modules are shipped as flat pack components that need to be assembled into modules on site.



Module Assembly Time

The time required to build a 4 plate configuration Flo-Tank® modules are as follows:

Mini	=	1 minutes
Single	=	1 minutes
Double	=	2 minutes
Triple	=	4 minutes
Quad	=	6 minutes
Penta	=	7 minutes

NOTE: Completed tank modules should be staged as close to the installation area as possible, in order to avoid excessive handling.

Flo-Tank® Strength Configurations

Atlantis tank modules can be configured to suit your project design life requirements.

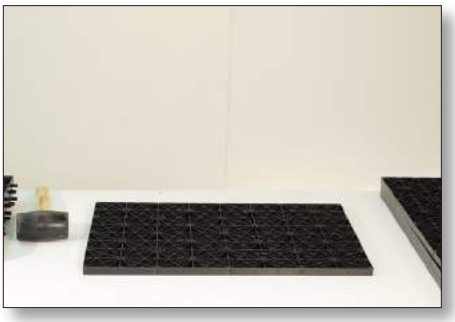
4 PLATE CONFIGURATION

5 PLATE CONFIGURATION

7 PLATE CONFIGURATION

9 PLATE CONFIGURATION

Flo-Tank® 4 plate module assembly.



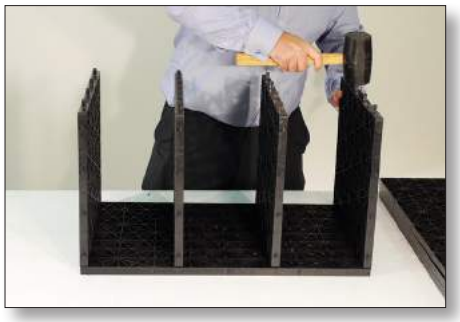
Place large plate onto work bench.

Align small plate pins with the holes on the large plate.

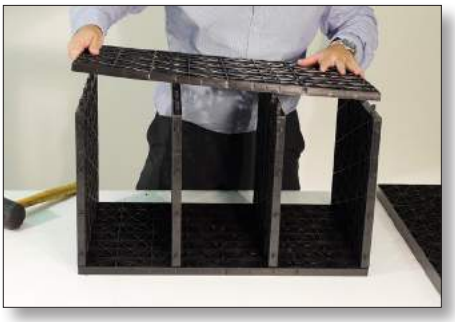
Insert small plate into large plate.

Position the 2nd small plate and insert into the large plate.

Repeat the insertion process for the small plates.

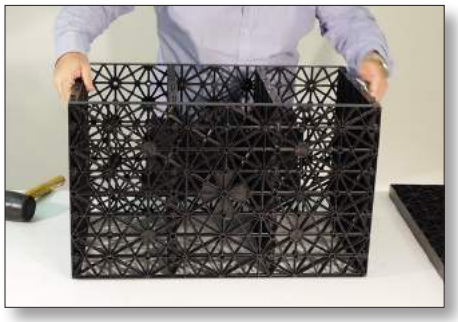


Firmly insert the small plates into the large plates.



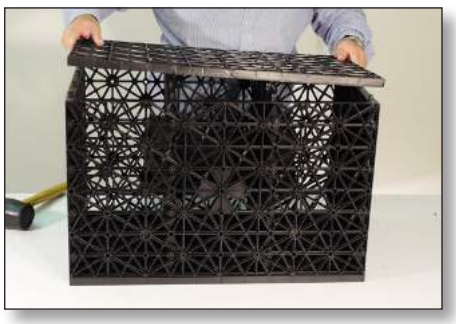
Align the pins on the small plate with the top large plate and insert into place.

Use a rubber mallet to hammer the pins to ensure a tight fit.



Flip the Flo-Tank® module onto its side.

Place the large plate on top of the semi assembled module and fit into place. Use a rubber mallet to securely fit the pins into place.

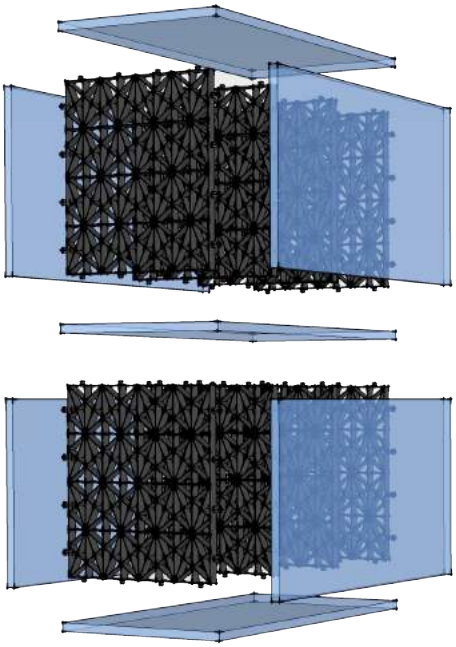


Flip the module over again and repeat the last step.

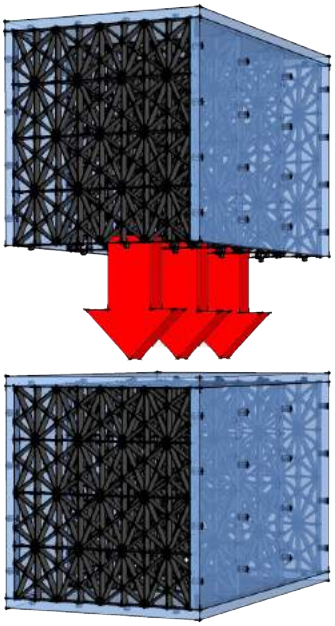
Completed Flo-Tank® module.

Flo-Tank® Double, Triple, Quad and Penta Assembly Guide.

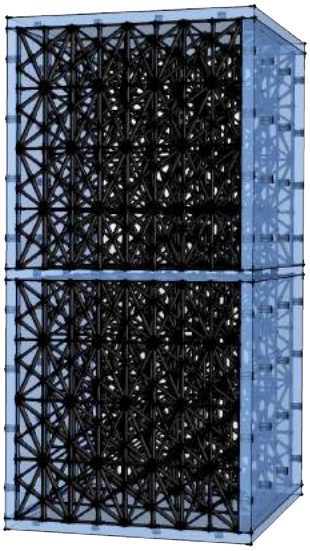
The Atlantis Flo-Tank® modules can be configured into taller modules by simply attaching an additional module on top of a single module. Tall Flo-Tank® modules use a common plate in between. The additional modules must be constructed without a bottom plate. The exposed pins are used to clip into the single module.



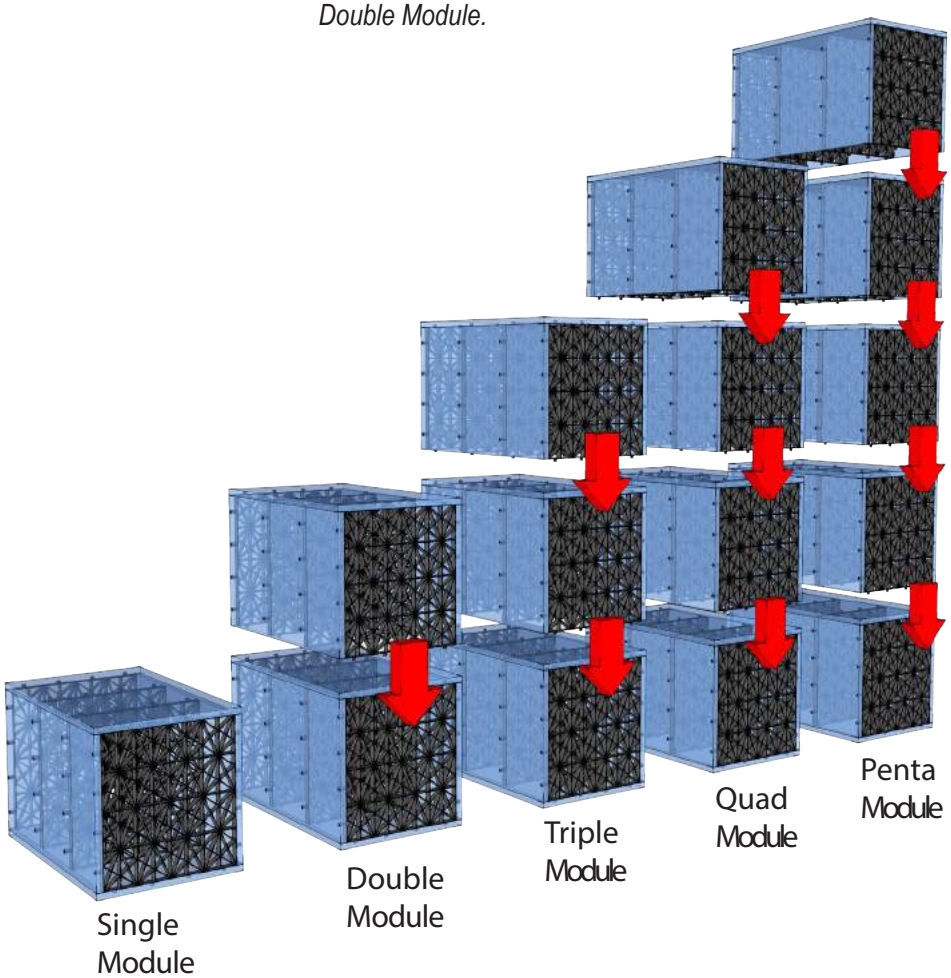
Exploded view of the Flo-Tank® Double Module.



Attaching the additional module to the Single Module to create a Double Module.



Completed Flo-Tank® Double Module.



STEP 1 - Excavate

Note: Please ensure a temporary perimeter fence is erected before excavation.

Prepare excavation as per geo technical engineer's specifications and/or as shown on engineering drawings.

Examine prepared excavation and conditions for level smoothness and compaction. Correct unsatisfactory conditions before commencement of base preparation layer.

NOTE:
Excavation size should be: tank size + minimum top, side and base backfill

STEP 1 - Excavate.

Check for the presence of soft or muddy soils. Insure the presence of a high ground water table is at least 1m (3ft) feet below the bottom of the Atlantis Tank structure at all times.

The excavation must be level before the base fill can be applied.

NOTE: Ground foundations with a clay profile are considered non-standard conditions. The design must be approved by a geotechnical engineer.

STEP 2: Prepare Base

Base Layer Installation

Apply a level base of 100mm - 200mm (4" - 8") of smooth clean washed river sand, free from lumps and debris or any other sharp materials and compact to 95% modified proctor density. Structural fill material, (sand and gravel) may be used to amend the structural capacity of the base layer.

The foundation should achieve a CBR of 3-5% and be checked by the authorised engineer.

STEP 2 - Prepare Base.

Backfill Materials

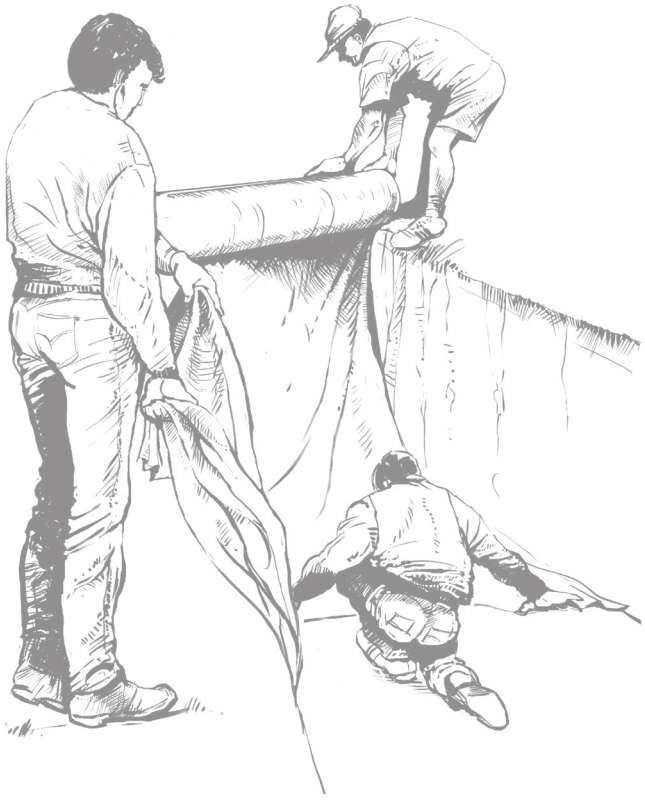
Either washed river sand or gravel of 19mm (3/4") in size is acceptable for base materials. Technical specifications are available upon request.

STEP 3: Place geotextile to wrap tank

Ensure the geotextile is hydrophilic. Refer to the geotextile guide lines for more information. Lay the geotextile into the excavation. Use sandbags or heavy objects to temporarily secure the geotextile at the top of the excavation to prevent the fabric from falling into the excavation.

Step 3 - Lay geotextile.

Over lap the edges by a minimum of 300mm (12”). Ensure 300mm of geotextile is available on the ends to wrap over the tank system.



RAINWATER & O.S.D TANKS ONLY

STEP 3 B: Laying the impermeable plastic liner along the base and up the sides.

Lay impermeable liner into the excavation and spread out evenly. Ensure the Impermeable liner is centred into position and that the minimum allowable overlap of 1m (3ft.) is available on all edges of the tank system to fold over the top of the tank system.

Take care not to tear or puncture the liner. Overlapping edges and joins should be welded by an experienced polyplastic welder. Tank configurations should have as few welded joins as possible.

STEP 3 C: Laying protective layer of geotextile

Lay geotextile fabric into the excavation as a protective layer between the impermeable liner and the Atlantis Flo-Tank® modules. Secure overlapping edges with duct tape.

STEP 4: Install Tank Modules

The boundaries of the tank is best carried out by surveyors to ensure a straight installation. The corner of the tank selected to begin the tank construction is located in the area where critical pipe connections need to be made.

Using the string lines as a guide, place the Flo-Tank® modules into the corner of the excavation following the string lines as a guide.

Continue the process of placing the Flo-Tank® modules in a sequential manner until all the modules are placed. Minor gaps (< 5mm - 1/4") between adjacent units or variations in height (< 5mm - 1/4") are acceptable.

STEP 5: Install Maintenance Ports

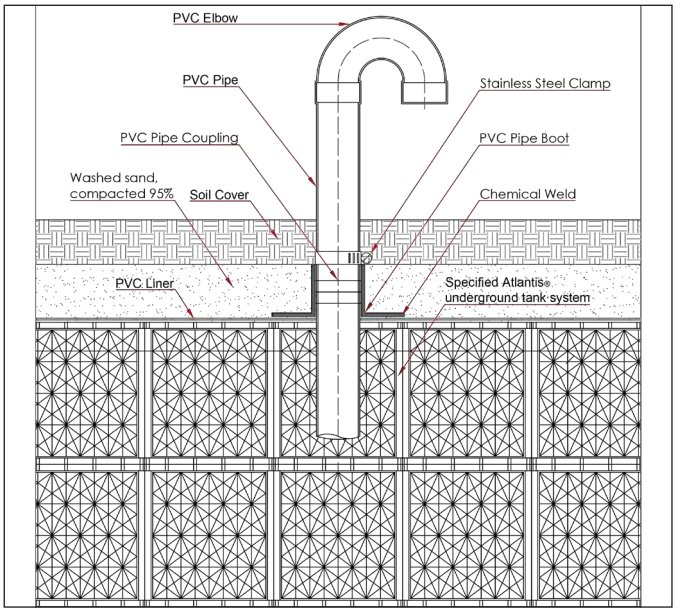
INSPECTION • MAINTENANCE • VENTILATION

Typically made from PVC pipe, these provide vertical access into the system. They should be long enough to sit on the bottom of the Flo-Tank® module, rising to the finished surface where they are capped.

For an effective and on-going underground water system a good maintenance design plan is needed.

Atlantis recommends two tools, which can help achieve a good long-term maintenance system. Ventilation ports & maintenance/inspection ports.

1. Ventilation pipes prevent vacuum formation when large quantities of water are withdrawn from the tanks. 2 x ventilation pipes can be installed in opposite sections of the tank. They should be placed in all underground tanks, whether for infiltration, detention or retention. The vent is drilled into the tanks in between the vertical plates using a reciprocating saw to cut the hole. See the section below.



The vent pipe is to be installed 1 metre from the inlet and the other on the opposite end of the tank, either near the outlet or overflow pipe.

The pipe must be 150mm diameter. It must be possible to remove the PVC elbow and use that as the maintenance access for vacuum trucks. An alternative vent pipe is a 4"-6" (100mm-150mm) diameter pipe capped with a PVC tank breather vent cap and/or slotted cover.

NOTE: When a vent is installed an overflow pipe must be used otherwise water will start escaping from the vent.

2. Maintenance ports are used as access openings for flushing the system and for inspection. Vacuum trucks can flush the system from sediment build up. These are highly recommended for large and small tank systems.

Figure 1 shows the maintenance port coming out from the Flo-Tank.

Figure 2 shows the 2D section with the pipe and concrete collar.

For large tank systems over 10,000L, it is recommended to use multiple maintenance ports: one for every 25,000L of volume. Each maintenance port will be drilled into the tanks from above and through each tank and terminate at the bottom plate of the bottom-most tank.

FIGURE 1

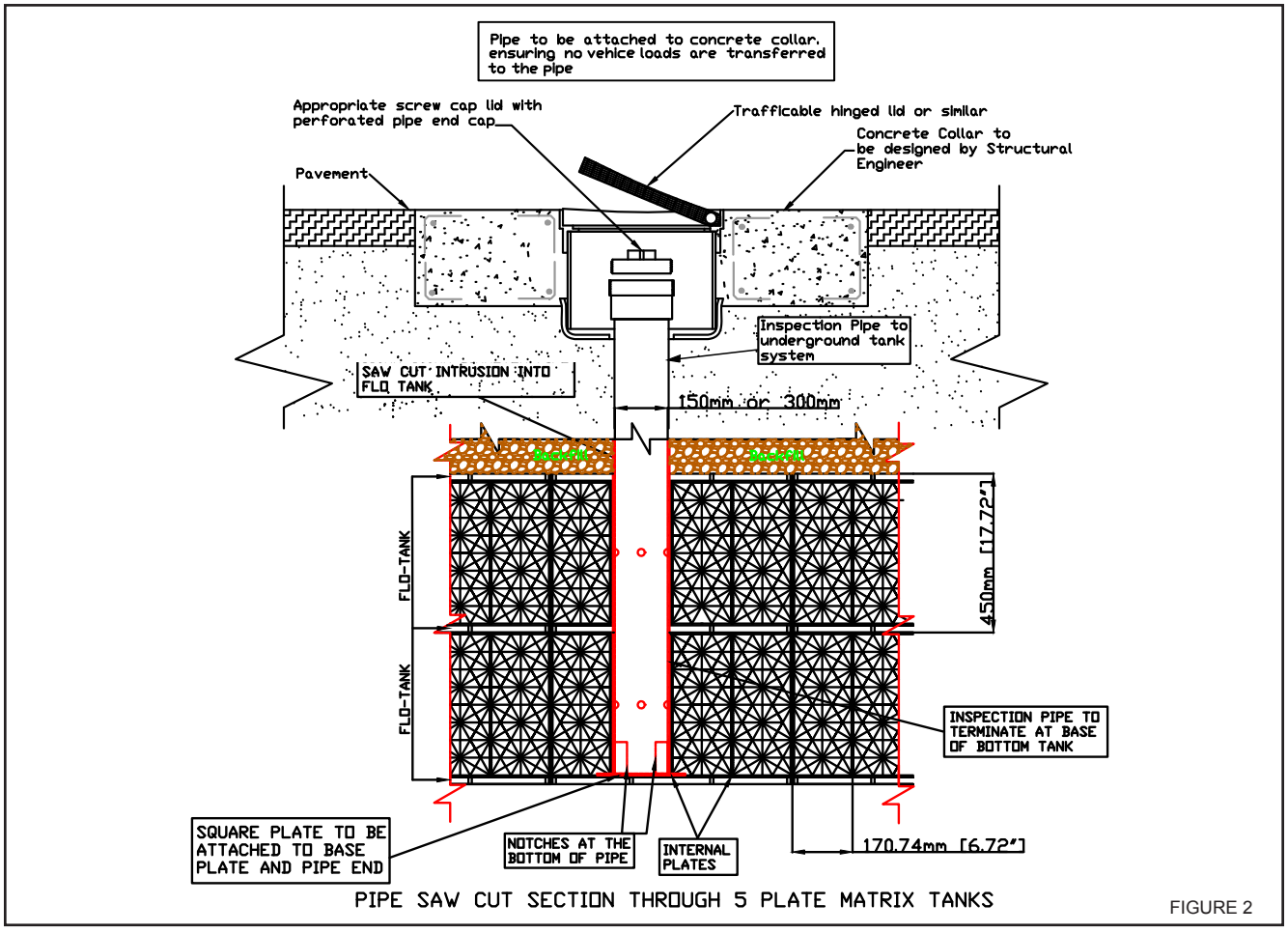


FIGURE 2

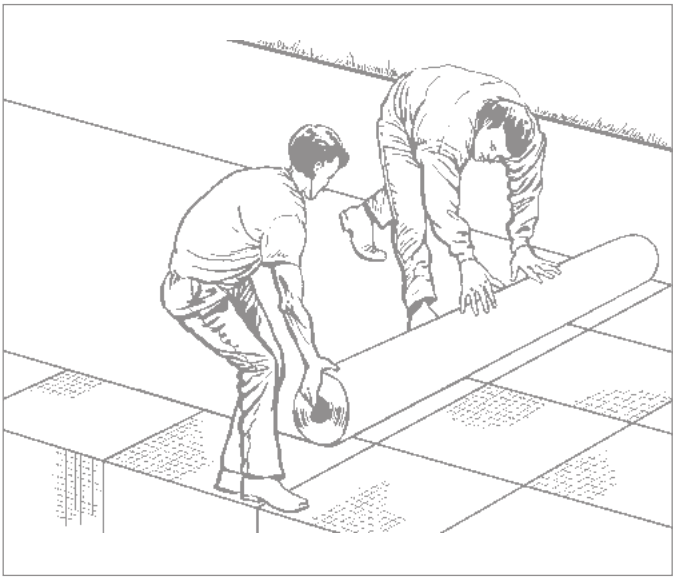
NOTE: After the installation, ensure the pipes are capped to prevent debris from entering the system.

STEP 6 A: Wrap Tank in Geotextile

Wrap Geotextile placed in Step 3, over the Flo-Tank® modules.

Seal all the seams and joins of the geotextile using duct tape. There should be a minimum of 300mm (12”) overlap at the joins and seams.

Sealing the system insures that backfill materials are kept out of the system.



Put utility tape on all corners of the tank to determine sub-surface location in the future.

RAINWATER & O.S.D TANKS ONLY

STEP 6 B: Seal System with Liner

Position and fold the Impermeable Liner over the constructed tank system and completely seal the system with quality hot welded overlaps.

Wrap tank modules in hydrophilic geotextile.

Position and fold the impermeable liner over the tank construction, overlapping the edges by 1m (3 ft.) and completely seal the system.

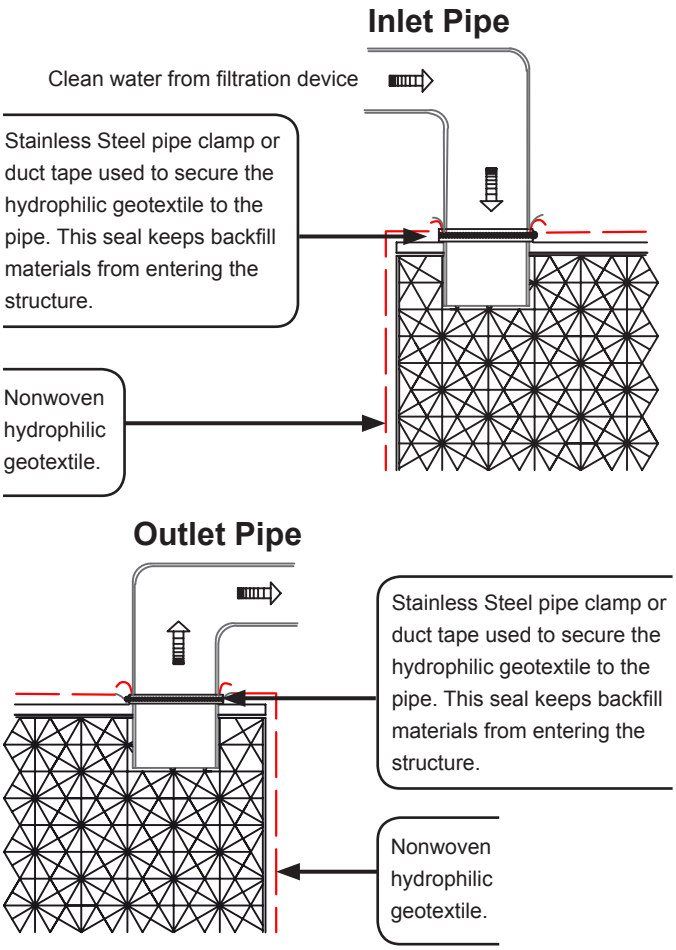
STEP 6 C: Installation of Pipe Boot

Install pipe boot to liner according to the detailed instructions found on **page 22** of this manual.

STEP 7 A: Connect Inlet / Outlet Pipes

IMPORTANT: All water entering the Atlantis system must be filtered by an approved filtration device. Raw stormwater containing gross pollutants and heavy sediments must be kept out of the Atlantis system.

Typical Pipe Inlet Outlet Connection



Pipe connections can be made anywhere on the top of the Flo-Tank® modules.
Wherever a pipe must pass through the geotextile, cut an “X” in the geotextile, pull the four flaps back over the pipe. Use duct tape to seal around the pipe, then attach stainless steel clamp to securely fasten the connection.

Inlet and outlet pipes should not be greater than 225mm (9”) in diameter.

Pipes can also be installed using a pipe boot and securing it to the membrane. (See pages 22-23)

Note: Flo-Tank® tank systems should not be activated or brought on-line until construction is completed and the site is stabilized. This will prevent construction debris and heavy sediments from contaminating the system.

Step 1 - Cut an X shape into the geotextile. Ensure the cut is slightly smaller than the pipe for a tight fit.

Step 2 - Lift the cut flaps of the geotextile.

Step 3 - Use a hole saw attachment on a power drill to cut the opening on the tank module.

Step 4 - Position the pipe into the opening.

Step 5 - Slide the pipe through the hole and into the final position.

Step 6 - Use duct tape to secure the geotextile then place stainless steel clamp to secure the connection.

STEP 8: Backfill Sides

Side backfill can range in width from 200mm (10”) to 500mm (20”) for standard applications. If you have a minimal footprint and have to limit your side fill please contact our technical department for directions.

For installations into reactive soils or clay a minimum of 500mm (20”) side backfill is required.

Step 8 - Backfill Sides

Side backfill must consist of clean washed river sand, free from lumps and debris or any other sharp materials. Backfill materials containing clay should NEVER be used.

Compact side fill in 150mm (6”) lifts and compact to 95% proctor density. Each compacted lift must be constructed on all sides of the tank structure before the next lift can be constructed. Use a powered mechanical compactor to compact the lifts. Vibration from compactor will help eliminate minor gaps between Flo-Tank® modules.

When using a mechanical compactor cover the side of the tank system with a sheet of plywood to protect the fabric and tank modules from damage. Move the plywood sheet as the compactor moves.

STEP 9: Backfill Top

When the side backfill reaches the top of the tank structure the backfill process can commence. When placing backfill materials be careful to avoid damage or displacement of the tanks and geotextile fabric. Excavator equipment shall remain clear of the excavation. Material shall not be dropped vertically on the tank from a distance greater than one-foot.

Backfill around the sides of the tank system first, compacting material to 95% proctor density with a vibratory plate compactor, in 150mm (6”) lifts. Keep the compactor clear of the tank structure, geotextile and liners.

Step 9 - Backfill Top

Exercise care when placing the first 150mm (6”) lift on Matrix® Tank. Spread material using a lightweight powered mechanical compactor or roller*. The next 150mm (6”) lift may be placed using lightweight equipment with tracks. Place at least 500mm (20”) of material and blade down to 300mm (12”), where required, then compact to 95%.

* For large scale projects, spread the backfill material with a low ground pressure skid steer loader (i.e. Posi Track)

MINIMUM BACKFILL UNDER CONCRETE SLAB for lightweight traffic load: A minimum of 100mm of top backfill can be applied when specified under a 150mm reinforced concrete slab. Seek approval from a structural engineer.

MAXIMUM BACKFILL: This depends on the type of Atlantis system used. Typically for a 9 plate Atlantis Flo Tank the maximum backfill is 4.0m, but there are other factors involved such as magnitude and type of load, type of backfill and its density etc. Please contact our technical department to take a look into your specific site requirements.

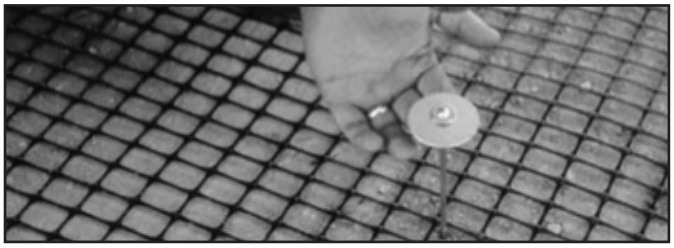
STEP 10: Place Geogrid (optional)

Geogrid is required for load-bearing applications such as systems placed below parking lots.

Geogrid should be BX-1200 or equal and should extend 1m (3ft.) beyond the excavation footprint.

STEP 10 - Install BX-1200 geogrid.

Overlap all edges by 500mm (20”) or as recommended by manufacturer or engineer. Continue backfilling to recommended levels in 150-300mm (6”-12”) lifts with compaction to 95%.



STEP 11 - Site Final Cleaning

Perform final cleaning of work and remove all excess material, debris and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

STEP 12 - Surface Materials

Place surfacing materials such as ground covers, shrubs or paving materials over the structure with care to avoid displacement of cover fill and damage to surrounding areas.

STEP 13 - Erect Perimeter Fencing

Following completion of the work, mark the perimeter of the system footprint and place temporary fencing to restrict heavy traffic or impact above the system until construction of the site is complete.

STEP 14 - Permanent Perimeter

When necessary install permanent signs that display warnings of maximum loads allowable over the tank installation.

Permanent bollards (traffic post) can also be installed to prevent any traffic from entering the tank location.

STEP 15 - System Commissioning / Bringing the System Online

Direct all site stormwater runoff away from the installation area during construction. The installation area shall not receive any run off. To maintain the area provide temporary erosion control devices and landscaping that minimizes the entry of silts and clay into the infiltration installation area.

For Rainwater Harvesting & O.S.D Detention Tanks ONLY

Step 7 B: Installation of Pipe Boot to Liner

Liner Preparation
When installing pipe boots it is important that the liner is flat against the modules without creases or wrinkles and the surface is clean and dry. The liner should now be secured against the crates in its final location.

Determine Position of Pipe and Cut Out Hole In Liner
With the pipe in place, carefully cut the liner around the pipe and remove the section of liner.

Prepare Final Position of Pipe
Slide the pipe boot over the pipe, then position pipe at its final location and fix into place with compacted backfill. It is important that the pipe does not move after the pipe boot is bonded to the liner as this movement may break the seal or damage the pipe boot causing failure.

Mark Flange Position
Slide the flange of the pipe boot against the liner, then mark the liner around the flange with a felt tip marker.

Primer Application
Slide the pipe boot back along the pipe out of the way. Then, with the application pad supplied, apply a good thick bead of primer 100mm (4”) wide around the inside of the line. Overlap the line by about 10mm (0.4”) Even out the primer with the pad as much as possible so there is a uniform thickness. Allow the primer to flash off till touch dry. This should be less than 10 minutes depending on the ambient temperature.

Position Flange
When the primer is touch dry slide the pipe boot back into place lining up the edge with the primer. Carefully remove the backing paper from one edge of the flange then push the flange against the primer making sure that there are no wrinkles in the liner or flange.

Install Flange
Tightly rub the back of the flange making sure that all of the flange is bonded to the liner. It may be a good idea to install a thin sheet of plywood or similar substance between the crates and the liner to give a firm backing. Repeat this process for the other 3 sides of the pipe boot flange always making sure that there are no wrinkles or folds in the liner or pipe boot flange. Give the flange a good firm rub making sure that there are no bubbles in the bond and that the flange is firmly bonded to the liner. Remove the plywood.

Apply Sealant to Flange
With the tube of sealant supplied, apply a bead of sealant around the outside of the flange about 15mm (0.6”) wide.

Sealing the Pipe Boot to the Pipe
Put a bead of sealant between the pipe boot and the pipe then apply a stainless steel pipe band around the pipe boot and pipe.

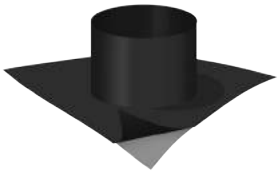
Wrap Protective Layer of Duct Tape Around Pipe Clamp
To protect the pipe boot from the sharp edges of the pipe clamp it is a good idea to run a couple of layers of duct tape around the pipe boot prior to installing the pipe clamp.

Self Adhesive Pipe Boot Instructions page

Materials needed

White marker

Box cutter



Self adhesive pipe liner booth

Sealant

Metal hose clamps

1. Clean the area where the boot is to be installed

2. Trace the edge of the boot onto the tank liner

3. Cut the opening for the pipe

4. Prepare the area of the boot flange with a polypropylene glue

5. The area is ready when the surface is dry to the touch

6. Peel the back corner of the flange to expose the sticky side

7. Mount the boot liner starting from the corner.

8. Insert the pipe and push all the way against the tank

9. Apply the sealant between the liner and the PVC pipe.

10. Move the clamp over and around the boot and tighten

DESIGN CHECKLIST

The following checklist is strictly for the use of a certified engineer who has been given the authority to design for the project in which the tanks will be used.

Atlantis system specified:

☐ Infiltration

☐ Harvesting (Reuse).
Impermeable liner required

☐ On Site Detention (OSD)
Impermeable liner required

		YES	NO
1.	**Have Project Drawings and a Geo-technical Report been provided?** **If NO:** *Please contact an engineering consulting firm to obtain a geotechnical report and relevant project sections, and then continue completing the rest of the form.*	☐	☐
2.	**Have expected loads been incorporated into the design?** Vertical Dead Load: _____ kPa / _____ psi Vertical Live Load: _____ kPa / _____ psi Vertical Combination / Uniformly distributed loads (UDL): _____ kPa / _____ psi Lateral Load: _____ kPa / _____ psi Uplift Load: _____ kPa / _____ psi Diagonal Load: _____ kN / _____ lb **According to AS4678, AS1170.1. AS 2566.1, AS 5100, AUSTROADS, BS EN 1997-1:2004 and CIRIA C680*	☐	☐
3.	**Have the following requirements been considered?** Top Cover/backfill: _____ m / _____ (ft) Setback / Adjacent structure at: _____ m / _____ (ft) **Please review minimum top cover according to AS2566.1 and AS3500 and minimum setback according to Engineers Australia (2003-2006) in Atlantis technical specification*	☐	☐
4.	**Is there presence of high water table?** **If YES:** *please specify distance from level* _____ m / _____ (ft)	☐	☐
5.	**Are there any nearby hills or steep slopes?** **If YES:** *How far from the tank perimeter?* _____ m / _____ (ft) *What is the slope gradient?* _____ **Please note that the coefficient of earth pressure may be greater in presence of nearby hills. Atlantis does not recommend tank installations near hills or steep slopes.*	☐	☐
6.	**Main soil type present on the site, identified in geotechnical report?** **Soil type:** ☐ Coarse sand ☐ Sandy loam ☐ Sandy clay ☐ Clay ☐ Other: _____	☐	☐
6.1	**Is there presence of soft soils (such as clay) and/or the tank will be used as a foundation system?** **If YES:** *Please check settlements and bearing capacity of soils.*	☐	☐
7.	**Design Life of the project:** ☐ 20 years ☐ 30 years ☐ Other: _____		
7.1	**Has a creep reduction factor been taken into account for compressive strength capacity?** ** According to AS4678*	☐	☐
7.2	**Is the tank height greater than 1.6m (5.3 ft)? and/or** **Is the tank located at depth greater than 4m (13.1 ft)?** **If YES to either:** *Creep reduction factor should be taken into account for lateral strength capacity according to CIRIAC680.*	☐	☐

		YES	NO
8.	**Pre-treatment/filtration system:** ☐ Atlantis Large / Small Filter ☐ Gross Pollutant Trap (GPT) ☐ Biofiltration ☐ Other: _____ **If NO:** *The end-user is responsible for the performance of the tanks if there is not a pre-filtration system installed/specified.* **Note**: *Sediments, debris and contaminants must be kept out of the system.*	☐	☐
9.	**Backfill material specified?** ☐ Coarse washed river sand (less than 5% fines passing 75 micron sieve) ☐ Aggregate of angular material (up to 19mm - 3/4") ☐ Other: _____ *(Material graded to AS 1141)* **If NO:** *Please seek approval from a geotechnical/structural engineer as to what backfill should be used.*	☐	☐
10.	**Has an internal plate configuration been specified?** **If YES:** *Please select from the following:* ☐ 4 Plates ☐ 5 Plates ☐ 7 Plates ☐ 9 Plates ☐ Titan Tank	☐	☐
	10.1 **Is the strength capacity of the tank greater than the loads applied on it?**	☐	☐
11.	**Project was consulted upon and approved by qualified engineers**	☐	☐

Company: _____ Date: _____

Designer: _____ Signature: _____

Note: Atlantis products are manufactured by independent factories from high quality recycled materials, carefully selected and under strict quality control procedures. The strength could vary slightly due to raw material, country of manufacture, manufacturing process and external conditions.

INSTALLATION CHECKLIST

Atlantis system specified:

☐ Infiltration

☐ Harvesting (Reuse)
- ***Impermeable liner required***
- ***Always include section 4***

☐ On Site Detention (OSD)
- ***Impermeable liner required***
- ***Always include section 4***

	YES	NO
Does the P.O./ Batch Number match the designed load specified by the authorized engineer?	☐	☐

1. EXCAVATION

Note: *Please ensure a temporary perimeter fence is erected before excavation.*		YES	NO
a.	**Is the base compacted and leveled?** **If NO:** *Correct unsatisfactory conditions before commencement of base preparation layer.*	☐	☐
d.	**Are contaminated/acid soils and/or filling present? Is the site a landfill?** **If YES:** *Design must be approved by an authorised qualified engineer*	☐	☐
c.	**Are clay/soft/muddy soils and/or high water table present?** **If YES:** *Design must be approved by an authorised structural engineer*	☐	☐

2. GROUND FOUNDATION - BASE PREPARATION

		YES	NO
a.	**Does the foundation of the excavation have a minimum CBR of 3-5% in accordance with AS 1289.6.1.1?** **If NO:** *Design must be approved by an authorised structural engineer*	☐	☐
b.	**Is the base layer minimum meeting authorised engineer's depth requirements?**	☐	☐
c.	**Is the base well compacted according to AS 1289.5 and the site graded?**	☐	☐

3. GEOTEXTILE USE

		YES	NO
a.	**Is your geotextile hydrophilic?** **If NO:** *Ensure the geotextile is hydrophilic*	☐	☐
b.	**Is there enough overlap available to fold over the top of the tank?** **If NO:** *Ensure an overlap by a minimum of 300mm (12")*	☐	☐

4. OSD & REUSE INSTALLATION

		YES	NO
a.	**Is there enough overlap for the impermeable liner?** **If NO:** *Ensure overlap is available to fold over the top of the tank. Minimum overlap of 1m (3 ft.)*	☐	☐
b.	**Is there a geotextile layer to protect the liner?** **If NO:** *Ensure a geotextile/sand protection layer* **Note:** *Please consider the use of an extra strip of geotextile on the corners to protect the liner.*	☐	☐

5. INSTALLING ATLANTIS MODULES

		YES	NO
a.	**Are string lines around the boundaries to ensure straight lines** **If NO:** *Ensure the tanks are aligned according to original design* **Note:** *Best practices recommend that boundaries of the tank should be carried out by surveyors to ensure a straight installation.*	☐	☐
b.	**Are the modules stacked firmly against each other?** **If NO:** *Gaps should not be greater than 5mm (1/4").*	☐	☐

INSTALLATION CHECKLIST (Continued)

6. INSTALLING MAINTENANCE PORTS

		YES	NO
a.	**Inspection/Vent/Flushing Ports** **If NO:** *Atlantis tanks must be vented to prevent vacuum effect and may require specific maintenance according to the authorised engineer*	☐	☐

7. BACKFILLS

		YES	NO
a.	**Backfill material: Either Coarse washed sand with less than 5% fines passing 75micron sieve or Aggregate of angular material up to 19mm (3/4") or Other granular material graded to AS 1141?** **If NO:** *Any other backfill material must be approved by the authorised engineer* **Note:** *Backfill materials containing clay should never be used*	☐	☐
b.	**Backfill sides between 200-500mm (7.87" - 19.68")?** **If YES:** *Compact according to AS 1289.5* **If NO:** *Design must be approved by a structural engineer.* **Note:** *When backfilling and compacting, make sure that you do not pinch the liner or rub the compactor against the liner. Protect it with a plywood sheet 20mm (0.8") thick*	☐	☐
c.	**Is the top backfill meeting Australian Standards (or local standards) minimum cover requirements and not exceeding 4000mm (13.12ft)?** **If YES:** *Compact according to AS 1289.5* **If NO:** *Structural engineers' approval needed.* **Note:** *Ensure an equally distributed load light vehicle (i.e. Posi Track) is used to spread and level top backfill*	☐	☐
d.	**Placing and handling the backfill material: Is the backfill material placed alongside the excavation line around the tank?**	☐	☐

8. GEOGRID (Optional)

	YES	NO
If YES: *Ensure a minimum Overlap of 1m (3ft)* **Note:** *Tensar BX 1200 or similar*	☐	☐

9.PIPING

	YES	NO
Are pipes no greater than 225mm (9")? Inlet: _____ mm / (_____ ") Outlet: _____ mm / (_____ ") Overflow: _____ mm / (_____ ") Other: _____ _____ mm / (_____ ") **If YES:** *Installed according to Atlantis installation guidelines* **If NO:** *Ensure pipes greater than 225mm (9") do not penetrate the Tank structure.* **Note:** *Overflow according to AS3500.1*	☐	☐

INSTALLATION CHECKLIST (Continued)

10. PROJECT DOCUMENTS	YES	NO
Maintenance manual provided to the end user?	☐	☐
Handover Document provided to the end user?	☐	☐

11. SITE FINAL CLEANING	YES	NO
Has cleaning been arranged?	☐	☐

12. PERMANENT PERIMETER		YES	NO
a.	**Did you install signage to prevent any traffic from entering the location?** **If NO:** *Ensure a signage is present*	☐	☐

COMMENTS *(For quality and training purposes)*	YES	NO
After the excavation: _____ *Size / cross section / design matches the site* *Other:* _____ _____ _____	☐	☐

Company: _____ Date: _____

Designer: _____ Signature: _____

Note: Atlantis products are manufactured by independent factories from high quality recycled materials, carefully selected and under strict quality control procedures. The strength could vary slightly due to raw material, country of manufacture, manufacturing process and external conditions.

END USER CHECKLIST

NOTE: The tank is solely used for its purpose to temporarily detain or permanently store potable or treated stormwater

MAINTENANCE GUIDANCE OF PRE-TREATMENT/FILTRATION SYSTEMS

1.	**Monthly/after significant storm events**	
	a. No clogging at inlet/outlet structures/trash racks	☐
	b. Clean when there is excessive sediment build up in the pre-treatment device	☐
	c. Inspect, lubricate and conduct routine test to check reliability of pump(s)	☐
	d. Check condition and conduct function test of all pump starters and their controls including level control systems	☐
	e. No obstruction of maintenance access/openings	☐
	f. Access into the tank system is secure (out of bounds to public and unauthorised personnel)	☐
2.	**Yearly as required**	
	g. De-silting of the tank has been carried out, trash screens have been cleaned	☐
	h. Inspect, service, replace, lubricate and test performance of pump(s)	☐
	i. Check condition and conduct function test of all pump starters and controls including level control systems.	☐
	j. Replace faulty and worn out parts if required.	☐

INSTALL PERMANENT SIGNAGE

Signage Should Read:
CAUTION:
UNDERGROUND STORMWATER TANK BELOW Underlining maximum vehicle loads

Flo-Tank®

MODULAR UNDERGROUND TANK SYSTEM

Atlantis Corporation International Pty Ltd

PHONE: + 612 9417 8344
FAX: + 612 9417 8311
EMAIL: info@atlantiscorp.com.au
WEB: www.atlantiscorpation.com.au

NOTE: Atlantis products are manufactured from carefully selected recycled materials that meet or exceed Atlantis material specifications and product performance requirements. The strength of the recycled plastic can vary due to raw material composition, manufacturing process and reactions to external conditions and adverse chemicals. The selected recycled materials are batch tested to ensure adherence to Atlantis material specification and product performance requirements. All trademarks and Patents are the property of Astral Property Pty Ltd.