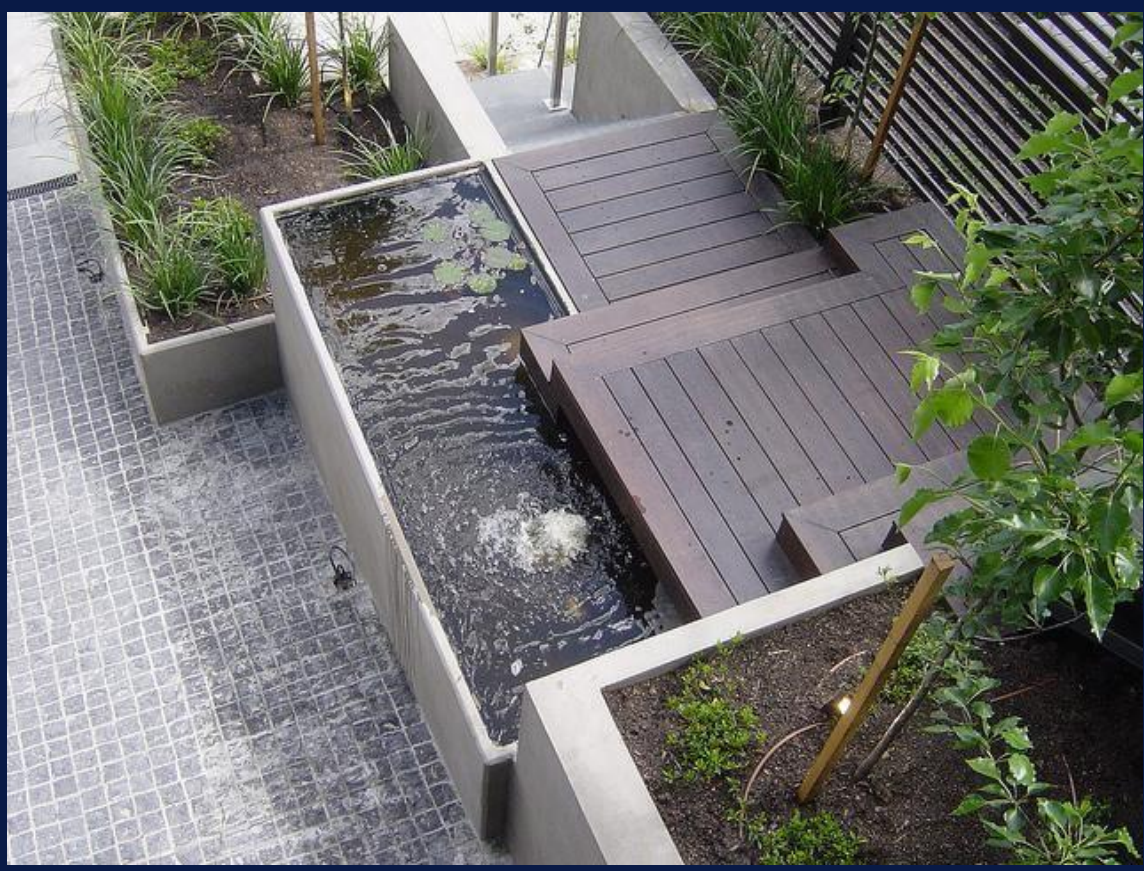
landscape tanks®



INSTALLATION

LANDSCAPE TANKS™ INSTALLATION INSTRUCTIONS

Disclaimer
Landscape Tanks™ is a manufacture of a modular, hybrid, interconnecting retaining wall and water storage, quick install, concrete tank system. We are not builders, engineers, landscapers or plumbers. All goods are sold ex-works. We don't attend sites or advise on site appropriateness (or circumstances) or installation arrangements. All advice provided in this document needs to be read in this context.

SITE PREPARATION AND PLANNING

a. Council Ordinances / Transportation / Legislation

Ensure compliance with all;

a. Council ordinances / permits etc (as required); and
b. determine whether traffic management is necessary.

b. Access

Ensure there is;

a. appropriate truck street access (including adequate turning, if required) and parking (for unloading);
b. adequate site access from the street unloading site to the intended tank positioning. A minimum of 2.4mtrs width and height is a good guide (for land-based lifting equipment); and
c. no impediments to safe installation, e.g. trees, powerlines, wet conditions, underground services etc.

c. Plan

Choose good operators, trades and select skills to match your circumstances. Determine the best installing sequence so that you have;

a. the least number of movements;
b. preferably, if possible, does not require equipment to pass near, past or around workers;
c. for economical purposes, where possible and safe, the installation is combined with other onsite lifting requirements / tasks; and
d. is logical and communicated to all parties involved in the installation.

Once established, try not to (unnecessarily) deviate from the plan.

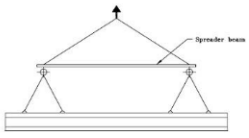
d. Installation Equipment

Choose the best unloading / installing equipment (telehandler, forklift, crane or crane truck etc) for your job. Coordinate and book your chosen installation equipment, factory pick up and transport, early. Chains & Jib.

Image of pin head lift

i. Tank weights are standard / small 1.7t, medium 2.4t & large 3.2t; planter weights are 0.85t standard and 1.1t deep.
ii. The tanks and planters have four (located on the top surface of the base), corner positioned "pin head lifts" also known as "swift lift pins", (see pin head lift image).
iii. All tanks and planters other than the large tank have 1.3t pins and require 1.3t lifting chains and knuckles. The large tanks have 2.5t pins and require 2.5t chains and knuckles.

a. OSD systems with HED (high early discharge) internal walls installed by the factory may require a spreader bar inserted prior to lifting to avoid damage to the internal concrete baffle (see image below).

Image of spacer bar 

b. Crane / Telehandler / Forklift / Excavator or Crane Truck.
Installers seem to prefer telehandlers (also known as Manitou or telescopic forklifts) for installation. Observations on each of the installation equipment options are provided in the table below.

Description / Heavy Lifting Equipment	Telehandler	Forklift	Crane Truck	Crane
4 Wheel Steering	✓	✗	✗	✗
4 Wheel Drive	✓	✗	✗	✗
2 Wheel Steering	✗	✓	✓	✓
2 Wheel Drive	✗	✓	✓	✓
Allows access under trees / power lines (3-4 mtrs clearance to lowest branches)	✓	✓	✗	✗
Lifting capacity is unaffected by distance from truck to tank placement site	✓	✓	✗	✗
Reach of more than 12 mtrs from lifting equipment	✗	✗	✗	✓
Suitable for soft and hard, flat or hilly surfaces	✓	✗	✗	✓
Suitable for hard, flat and slight inclines, only	✗	✓	✓	✗
Able to traverse large structures e.g. house / pools	✗	✗	✗	✓
Able to traverse small structures e.g. small sheds / ponds	✓	✗	✓	✓
Not limited by an established set up point, able to move around the site	✓	✓	✗	✗
Low cost	✓	✓	✓	✗

c. Tools
Ensure you have at one or more;
   i. spirit levels;
   ii. rake or other leveling device(s); and
   iii. string lines.

e. Soil Preparation

Ensure;
a. The tank site is cut and provides some “positioning” latitude.
b. Once cleared and cut, ensure the site has a firm natural material base, and no rubbish or plant waste.
c. Soil firmness is not less than 100 kPa. If the soil feels soft, consider consulting an engineer.
d. Includes a base of level and compact crushed rock (class 3), preferably permeable, to not less than 50mm depth. You need to be able to create a base with good even load distribution and substrate firmness of not less than 100 kPa.

f. Retaining Wall

Comply with all retaining wall engineering and load principals, including good practice back filling arrangements and drainage (water management) e.g. spoon drain, geofabric socked slotted pipe, back filled with crushed rock etc.

g. Damage Mitigation

a. Have timbers or steel sheet available for load distribution for protection of concrete paths, driveways, underground services etc.
b. “Dial before you dig”.
c. Use chains or slings, rated to or with capacity in excess of tank weights.
d. Identify and mark (if necessary) hazards e.g. overhead power lines etc.
e. Follow good workplace safety practices.

h. Trees

a. All concrete water tanks (or for that matter any and all concrete structures) need to be protected from tree roots. Roots that are left in-situ or left without management practices in place, may infiltrate and or lift and or undermine through the removal of moisture, your tanks.
b. Tree roots can extend 2-3 times the trees canopy. Its good practice to remove trees which could pose a long-term problem. If you remove a tree ensure decaying root waste is not present in your cutting or if present, is removed prior to tank placement.

i. Water Cleanliness

Filtering is best performed before water enters a tank, at heights and in places that are easily accessible. Removing the planters from tanks, especially when they are full of plants, to access the tanks for cleaning, is obviously, difficult and costly. Cleaning through the knockout is slow and may only be semi-effective. For the best water quality, consider the following matters.

a. Tree management
    i. Removal of over-hanging trees.
    ii. Leaf control through gutter guards, etc.
b. Filters
    i. A fabric filter, positioned at a height and in a place where it is, easily accessible.
    ii. Mesh (or equivalent) filter, positioned at a height and in a place where it is easily accessible.
    iii. Installation of flush diverters.
    iv. Other filtration methodologies.

Unless you make a significant filtering investment / effort, some contaminates and most dust will inevitably enter the tanks. The dust will either;

a) mix and dilute in the water becoming a taint which your pump will remove with the water it is dissolved in; or
b) settle to the bottom of the tank and in the great majority of cases, not affect storage or offtake.

Garden irrigation and pools make up a large portion of a household’s water consumption. If you apply the majority or all of your water storage to irrigation then the need to filter and the water cleanliness impetus, reduces. In an irrigation scenario, you would logically do (filter) what is needed for good pump maintenance and no more. Pools have their own filtration system and can remove dust (taints) and many other small contaminates. Like the irrigation scenario, do (filter) what is needed for good pump maintenance and no more.

j. Water Storage Maximisation

A large percentage of rain water collection in Australia is lost. Adoption of good water collection maximisation practices can make a significant difference to your mains water usage. Water maximisation practices include.

a. Ensuring collection from the largest proportion of the roofing space possible.
b. Many households have unnecessary rain water collection overflow to stormwater.

i. Be aware of upcoming rain events. Push irrigation harder prior to the event. Try to have your tank empty in preparation for the rain. Turn off irrigation for an equivalent period during and after the rain event. Installing a rain sensor will automate and reduce unnecessary irrigation after a rain event.
ii. Clean your filters regularly to remove debris and reduce the incidence of blockage and water filter overflow.

k. Water Level

To measure the level of water in your tanks, you can attach a piece of clear flexible tube to an unused pump outlet. Run the tube up and attached it to the wall of your tank. The level of water in your tanks will be visually apparent in the tube and measurable against the tank wall.

l. Warnings

a. The tanks weigh between 4.5 & 7.5 tonne when full of water. Implement good practices to conservatively and appropriately manage the tanks and their associated loads.
b. Seek engineering or professional advice before placing tanks;
   i. on or close to easements;
   ii. on or over telephone or electrical cables;
   iii. on or over gas or water lines;
   iv. next to or near large trees;
   v. to support or where they connect to pool walls, without appropriate engineering;
   vi. against structural / non-structural walls, without builder sign off;
   vii. across plumbing including but not limited to storm water and sewerage lines;
   viii. on or near trenches, without appropriate engineering;
   ix. on land that is known to be and or could become water ladened (a swamp etc) after heavy rains;
   x. onto decaying plant waste;
   xi. on building or residential rubbish;
   xii. on “fill”;
   xiii. below high tide water levels;
   xiv. not provisioning for the protection of the soil base beneath the angle of repose, or allowing soil to be eroded or firmness undermined by moisture etc;
   xv. above a basement or cellar, or where the weight of the tank and water bears directly onto an underground structure;
   xvi. directly onto concrete where the unevenness of the concrete concentrates loads at specific point(s), (we recommend, 50mm of compacted and levelled crushed rock / road base (class 3) or 30mm of grout or equivalent when placing a tank on concrete); and
   xvii. on a platform that is not level, other than minor gradients (up to 3 degrees) put in place for drainage.
c. Always, comply with the “angle of repose”, (generally or as specifically engineered), for all adjoining surfaces.
d. Ensure inflow water pipes (combined or singularly) do not exceed outflow pipe capacity. Disproportionate inflow to outflow capacity may lead to excess bearing / pressure on the equaliser seal(s) or your pump and or its fittings or worst case, turn your planter into a boat.
e. That you lift the tanks with appropriate equipment and capable operators. That you don’t traverse structures or people, without all the necessary safety planning and precautions in place.

Always comply with all Workplace Health and Safety requirements and always ensure all work is performed “conservatively” and on the basis of “best practice”.

f. Don’t assume concrete driveways or kerbing will carry the weight of equipment and or tanks. Where in doubt always distribute loads with timbers etc.
g. Never place the tanks on soil of less than 100 kpa firmness. If there is doubt, we recommend prudence through appropriate soil testing.
h. Ensure you and or your installer have / has, respectively, appropriate licenses and insurances in place.

INSTALLATION

a) Base Preparation

a. Cut the sites soil until you establish a firm base of not less than 100 kPa.
b. Ensure all contaminants, (rubbish and plant waste) have been removed.
c. Ensure you have not traversed structures, water, sewer, electrical (see “warnings” above for a full list).
d. Add and compact to 50mm depth, crushed rock or road base class 3 (preferably 20mm sizing and permeable) and screed off to level.

b) Placement

a. Survey and mark your starting point.
b. Place your first tank. Check the tank is level. If not level, lift and rake out crushed rock, replace the tank and check its level. Repeat as necessary.
c. After obtaining a level placement.
    i. Its good practice to lift the tank and visually check for high (smooth compacted) and low (rough appearance) points and correct if necessary.
    ii. Check the tank does not rock under manual labour.
d. For the second and subsequent tanks.
    i. Repeat the placement and leveling process.
    ii. Leave a 2mm gap between tanks as an expansion joint, (you can fill the gap with a polyurethane sealant, for example “Sikaflex” or equivalent).
e. After placing two or more tanks you can install the internal plumbing. All necessary internal plumbing is supplied with the tanks. When safe to do so;
    i. check and clear all seals of debris;
    ii. preferably, apply a small amount of lubricant (silicone spray or diluted detergent etc) to each seal;
    iii. insert the 50mm chamfered pressure pipe through the equaliser seals located at the bottom of your tanks;
    iv. give the pvc pipe a giggle, this allows the seals to “sit”;
    v. to maximise tank storage capacity we supply an elbow and pipe to raise the water overflow point close to the top of the tank. Position the pipe and elbow in the appropriate seal and face the opening of the elbow to the sky. It is preferable for the elbow to be kissing the side of the tank. This gives your plumber the largest amount of pipe play externally for effecting a connection to your stormwater.
f. Planter
    i. Before placing the planter, ensure all internal plumbing is in place.
    ii. Determine which direction you wish the planter to drain.
    iii. Planter placement
        1. The top of the tank is the narrowest / weakest point on the tank, excessive force will damage it.
        2. Ensure the planter drain is oriented correctly.
        3. The planter (if proud) needs to be “middled” and any difference shared over the tank evenly. If not middled, the end point difference can compound over

subsequent tanks and lead to the last planter not being able to be placed on your last or next tank.

4. You can place “packers” to level out small planter / tank undulations / variations. The shadow line can be chalked if desired to hide any gaps but remember not to seal the tank completely. If you make your tank airtight it will become a pressure or vacuum capsule with water movement. Unnecessary pressure or vacuums will lead to water leaks and or seal failure.
5. Heat / expansion forces can move / creep the planter by millimeter(s) over time despite good purchase between the planter and tank and despite correct installation. The tongue and groove connection between your tank and planter won’t allow the planter to move more than a small amount.

g. Knockouts

There are “knockouts” (see image) in, on average, half the planters which allow you to inflow from roof surfaces via the planter top.

h. Planter Drainage
   i. The planter needs to drain to maintain good plant health. To reduce the chance of drainage failure, we recommend;
      1. placing crushed rock (5kgs) into the recessed collection area; and
      2. a geotextile sock around the drain exit point.
   ii. If you wish to stop waste water discharge from seeping down the side of your tank; you can insert standard 20mm PVC pipe into the exit bore and provide for an overhang to allow water to drip away from the tank, (to capture all water exiting the planter the PVC pipe you insert will need to be sealed with a silicone bead in the exit channel).

i. Seals **(Important Notice, please read this section carefully)**
   i. Weight on Seals

   The seals will move to the point of least resistance and in doing so move to suit tank manufacturing or soil base variations (changes), while maintaining good waterproof purchase on PVC pipes. For longevity of your seals, to maintain the best waterproof profile and to comply with our warrantee terms;

      1. **All charged lines to and from tanks must be installed in accordance with Australian Standard AS/NZS 3500 (plumbing), in particular, pipes need to be properly supported and not hanging off seal(s).**
      2. **Lines to pumps and the pumps themselves need to be, independent of the seal, supported to the combined weight of the pipe, water it contains and pump. The seal should do no more than softly hold the pipe in the tank.**
      3. **The seal shouldn’t be subject to anything other than mild vibration.**
      4. **Connective pipe between tanks should be protected from falling soil, other heavy matter or pressure. Dust, leached salt, fine sand or concrete flakes are fine. Excessive weight may over time destroy a seal(s) waterproof capacity.**
      5. **The angle of pipes entering tanks needs to be at, as far as is practicable, 90 degrees to the tank surface. The pipe should not be allowed to touch the tank wall creating a lever and pinching the seal.**
      6. **Pipe entering a seal should not be able to twist over time creating a lever.**
      7. **Ensure that pvc pipe inserted into a seal(s) is / are;**
         a. **“AS NEW” and the external surfaces are smooth and free from scratches or grooves etc.**
         b. **The external surface is free from glue, grease or silicone etc.**
         c. **Has not been sanded or altered other than the chamfered end(s).**
         d. **Has chamfered smooth end(s).**
         e. **That all pvc chards produced in cutting pipe have been removed.**

1. **In summary.**
    a. **The seals need to be free and able to move and adapt to changing conditions.**
    b. **Accumulated excessive weight on any seal over time will reduce the seal(s) waterproofing capacity.**
    c. **If there is a risk of a pipe applying loads (including vibration) to a seal, manage possible stresses by adding a flange and or bracket or other mechanism to the pipe to prevent those loads being transferred onto the seal.**
    d. **Do not insert old or damaged or contaminated (glue etc) pvc pipe into a seal(s).**
    e. **Ensure the pipe used has a good / smooth surface for the seal to bind too.**
2. **Non-conformance to general plumbing standards or any of these terms, may result in a leak which will be difficult to attend too and or potentially not be covered by our warrantee.**

ii. Movement of Seals
The seals are not designed to handle repetitive or continual movement. Once the pvc pipe is in position repetitive movement either in and out, shaking, vibration, movement up and down, needs to be avoided.

iii. Connecting PVC Pipe
The 100mm & 150 seals are manufactured to fit (seal to) standard “stormwater” pipe of the relevant corresponding dimensions (114.1 and 160.5mm, respedtively, outer diameter). The 50mm seal is manufactured to fit (seal to) high pressure 50mm PVC pipe (class 12). The seals fit the outer dimensions of these prescribed PVC pipes, only.

iv. Fitting PVC Pipe to a Seal
Inserting PVC pipe into a seal will require some pressure / force. Unnecessary or excessive friction from movement of the pipe into and out of the seal, (other than at installation), may wear the seal’s surface and affect the ability of the seal to get appropriate purchase on the PVC pipe. Preferably, lubricate (silicone spray or diluted detergent etc) pipe prior to insertion into a seal. After insertion, gently for a second or two, giggle the pipe so the seal sits square and isn’t convex nor concave. Do nothing that would pinch or abnormally stretch a seal. The seal’s inner most surface needs to have good, even and unhindered purchase on the PVC pipe. Do not use a lever or hard surface (screwdriver etc) to move the seal over the pipe end.

j. Backfilling
Care should be taken when backfilling.
    i. Compacting of retained soil more than the natural soil profile may overload and compromise the seals.
    ii. Dropping soil onto PVC pipe which isn’t supported appropriately can transfer load along the pipe onto the seal and subsequently over time, destroy the seal’s waterproof characteristics.

c) Ventilation

You can seal the gap between the planter and tank for aesthetic purposes. If you use a polyurethane (sikaflex etc) the finish will be able to be painted. **It’s important that you only seal the minimum number of joins necessary to give you your desired aesthetic outcome. For effective operation of the tank it needs to be able to breath.** Air needs to escape as water fills the tank(s) and air needs to move into the tank while the pump is operating. If you completely seal your tank(s) you may create a vacuum / pressure cabinet under pump / filling, which will work against the seals in your tank(s).

d) Tolerances

The tanks are hand made in a precision engineered mould and have a tolerance of plus or minus 2mm. Concrete shrinks a very small amount after curing. It is normal for some connections between the planter and tank to be tight or loose. Manoeuvring to get a good fit and slight differences across your tanks, is normal.

e) Curvature

There is a 4mm curvature of the sides and ends of the tanks which will be evident after installation. You can fill gaps (if necessary / required) by filling them with a polyurethane or equivalent sealant.

f) Alignment

For alignment to other adjoining and existing structures, remember, the soil under the tanks may settle over the first 6 to 12 months, normally and consistently, as would occur for the soil type and conditions that are present in your area.

g) Shadow Lines

We don't recommend shadow lines or gaps between tanks more than a couple of millimetres. Our general retaining wall engineering is calculated based on no gap or little or no gap existing. A gap will increase retained earth loads and also may place downward stress on the equaliser seals over time. Neither of these two factors is desirable.

h) Finishes

You can apply any finish to the tanks that you can apply to concrete (bag, render, tile, paint, stencil etc). To apply a finish, follow the same rules you would if you were applying the same finish to any other vertical concrete (hard) surface.

i) Repairs

Concrete is easy to repair using any readily available retail concrete repair kit. If you have a choice between an epoxy resin or mortar based repair kit we would recommend the resin. Resins are able to stand loads and be drilled in within short periods of application and resist cracking. Before you select a repair kit, understand it is difficult to match resin and tank colours, closely.

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Last Updated Jan 2024