

**INSTALLATION GUIDE  
OPERATION MANUAL  
SERVICE PROCEDURE**

EARTHSafe D10 WASTEWATER TREATMENT SYSTEM

# **INSTALLATION GUIDE**

# Earthsafe D10 Polymer Waste Treatment System

## A. PREPARING THE SITE

### INSTALLATION SUGGESTIONS

- See if you can site the tanks away from commonly used vehicular access, and also away from possible future use areas – paths, sheds, etc.
- When excavating or lifting, observe all appropriate safety procedures.
- Do not excavate alongside house or shed footings.
- Clearly mark out the tank excavation size and get the excavator operator to dig to the tank depth immediately to check if there is rock in the ground.
- For every 6 metres of drain line there should be 100mm of 'fall'. Keep the drain line shallow where it leaves the house to ensure enough tank inlet depth. **Check this depth at the proposed tank site before excavating.**

1. Once you have selected your site for the installation, mark out the excavation size with spray paint or similar marking device. The excavation for both tanks needs to be 1980 deep by 4600 long and 2600 wide, measured at the tank base.
2. The excavator operator can now excavate the pit.

### INSTALLATION SUGGESTIONS

- Get the excavator operator to place the topsoil and hard subsoil in two separate heaps. The good soil can be used for backfill and the subsoil removed from site.

3. Once the excavation is made, create an 80mm level layer of sand or similar material across the bottom of the pit where the tanks are to sit.
4. Remove the tank lids from top of tank stack and set aside, clear of the excavation.
5. With a suitable lifting device, Lift the aeration tank out of the primary tank and set aside with care. Ropes through four tank anchor holes can achieve this or a ratchet strap around the tank will act as a lifting point. Do Not use D shackles in tank holes.
6. Remove anchor pipes and 25mm sludge return pipes from aeration tank central chamber and set aside. Remove additional loose equipment from the tank and set aside (control box).

## B. PREPARING THE PRIMARY TANK

7. Using a good quality sealing compound, fit the 100mm inlet and outlet junctions onto the primary tank with screws provided. The junction is held against the inside of the hole with stainless screws from the outside.

## C. INSTALLING TANKS

8. It is possible to use four tank anchor point holes and with a lifting device first lower the primary tank into the hole with the inlet and outlet central to the ends of the excavation. **Check that the inlet opening will meet the drain line at the depth required. IMPORTANT!** Risers are available if necessary.
9. Glue the 2 short lengths of 100mm sewer into the outlet of the primary and the inlet of the aeration tank –the longer one on the primary outlet.
10. The rubber flexible coupling should now be pushed completely onto the longer outlet junction of the installed tank. The 2nd tank (aeration tank) should now be lowered into the hole in the same manner as the first.
11. Place the aeration tank with the inlet junction almost touching the outlet rubber connection of the first tank. Now slide the coupling onto the aeration tank inlet and secure the clamps to both tanks.

# Earthsafe D10 Polymer Waste Treatment System

12. You now should have the two tanks in the excavation lined up straight and level (stand at the end of the hole and look along the tank lid squares and see if they line up).

## D. FURTHER PREPARATION OF THE PRIMARY TANK

13. Take the 2 x 25mm lengths of PVC pipe and slip the end of each pipe through the small 25mm holes at the exit side of the primary tank on either side of the exit junction (they are a tight fit to seal against entry of ground water.)
14. Glue them into the opposite 25mm pvc tank sockets exiting the aeration tank and silicone seal around pipes where they leave the primary tank.
15. Cut the pipes to length as required and glue the 25mm T's onto the primary inlet ends vertically. Sit these glue T's into the top of the black tank inlet junction into the primary tank (see photo).
16. The sludge return pipes should now run all the way from the clarifier chambers back through to the inlet junction of the primary tank and be visible through the inlet inspection opening. As the sludge return flow is adjusted it can be observed through this opening.
17. Silicone the top edge of the primary tank and fit the primary tank lid using the screws provided. (M6) **(with the inspection openings above the tank inlet and outlets)** You may have to drill suitable pilot holes through the lid flange at the marked dimples.

## E. INSTALLING THE IRRIGATION PUMP

18. Take the irrigation pump from the fitting kit and fit the pump riser pump riser pipe (marked) onto it.
19. Lower the pump down into the central chamber below the stainless chain already attached in the tank lid.
20. Carefully attach the chain to the pump handle and allow the pump to hang vertically with the pump riser next to the **horizontal pump outlet** (marked).
21. Make sure the pump is positioned so that the float is free to rise and fall.
22. Cut the horizontal pump outlet to length (if required) and glue the connection. Make sure the riser union is tight.
23. Thread tape and fix the poly end connection in kit to the outside of the tank in position to take the irrigation line (25mm polymer, not provided).
24. Feed the pump power cable up through the large inspection cover hole and place to the side.

## F. FITTING THE CONTROL BOX

25. Locate the small inspection cover with the two holes in it and fit in place in **the lid opening on the aeration tank nearest to the primary tank**.
26. Fit both the irrigation pump lead and the high water float lead up through the small inspection cover. Seal around these leads with a split bung and silicone to prevent tank odours escaping.
27. Using the marked (air inlet) 15mm pipes fit the air assembly to the tank air manifold and present it up through the tank lid next to the electrical leads (see photo). It is now glued into the tank manifold fitting. Seal around this pipe with a split bung and silicone seal where it leaves the tank lid.
28. Take the control box and feed both the electrical cables up through the holes in the bottom and place the box on the tank lid in its position. Secure it to the tank lid with self-tapping screws. Both cables plus the 15mm air pie should protrude into the box and **should be sealed where they leave the tank lid. THIS IS IMPORTANT (see photo) or fumes will affect the pump.**
29. Plug the irrigation pump plug connection into an electrical outlet. Connect the high water float lead to the box electrical connection (see photo).

# Earthsafe D10 Polymer Waste Treatment System

## G. INSTALLING AIR PUMP & PREPARING CONTROL BOX

30. Place the air pump into the control box with its outlet facing towards the electrics and fit the rubber hose and elbow outlet to it.
31. Glue this elbow to the **15mm PVC air pipe** protruding up from the tank.
32. Push connect the small clear hose from the brass elbow fitting on to the air pressure switch on the electrics (black connection – see photo).
33. Ensure all box vents are fitted correctly.
34. The electrical connection to the box is usually brought into the box itself in flexible conduit and then looped into the junction box fitting (see diagram) Leave extra cable to allow for ground settlement. There is a conduit fitting below the electrical box.
35. **Make sure that the junction box breaker is left in the “ON” position.** Squirt some silicon into the end of the of the electrical conduit around the wires to prevent ground water from entering the electrical box.
36. Fit the air vent inspection opening cover to the outlet side of the aeration tank lid. Fit the strobe light to the centre of the control box lid (silicon under and see photo for where light plugs in to the electrical control) Secure the lid with screws provided.

## H. SECURING TANKS

***Note: Extra tie down ropes are included.  
In wet or unstable areas use them with extra pipe anchors.  
Tanks with “riser rings” must have extra pipe anchors.***

37. Securely tie the anchor ropes to the holes in the upper tank flutes and allow the looped ends to hang down.
38. Cap one end of the anchor pipes (100mm sewer included) and fill loosely with gravel / sand or suitable fill. Cap the other end (no need to glue).
39. Feed each anchor through the looped end of the anchor rope and allow them to hang down horizontally. Repeat this four times as shown in the diagram (see note above).
40. Fill the two tanks with water **BEFORE BEGINNING BACKFILLING** to prevent flotation and to give wall strength. **FILL THE CENTRAL CHAMBERS IN THE AERATION TANK FIRST!**
41. When backfilling around the tanks and over these ground anchors, do not dump a sudden large amount of fill on top of the anchor. Try to allow the fill to run around the anchors. In high rainfall or wet areas, use more anchors. It is often advisable to throw a half bucket of cement powder on top of each anchor, before continuing to fill above them. When soil moisture becomes present this will congeal and ensure a large anchor surface. **This is important on sites with poor soil structure.**
42. Use sand or similar around the sludge return pipe central junction pipe area if possible.
43. Extra care taken in properly anchoring the tanks will pay dividends. Expect the ground to ‘sink’ around the tanks as soil fill settles. **It often pays to keep some clean fill on site to top up this area.**
44. The tank lids can be partially buried however leave the soil at least 50mm below the small inspection openings to allow ground water to run off around the tank lids.

## ***EXTRA INSTALLATION TIPS***

- *While the excavator is on site, get a 25mm poly line buried from the tank site to the irrigation area.*
- *Co-ordinate the electrician and the drainer to use the excavator for the trench for drain line and power cable.*
- *The electrician should allow for ground sinkage with his cable and fill the end of his conduit with silicon to prevent ground water leakage flowing to the box.*
- *The tanks **MUST** be filled with water before backfilling the excavation to prevent floatation and to keep them in shape.*
- *Leave power on to the system to enable to operate if the dwelling is occupied.*
- *Do not allow painters / cleaners etc. to dump paint chemicals etc into the drains while working on site.*

# **OPERATION MANUAL**



# Earthsafe D10 Polymer Waste Treatment System

The EARTHSAFE D10 wastewater treatment unit is produced in both concrete and polymer tanks however the internal chambers, operation and therefore maintenance procedure is essentially the same.

The system consists of a primary treatment tank or chamber of at least 3,000L in volume designed to receive all domestic liquid waste from toilet / basin / showers etc. The effluent is held within this tank for sufficient time for it to be anaerobically converted to liquid form by microbial digestion. Some heavier particles will settle out to the tank floor and some organic particles will form a crust on the water surface level. As new waste enters the tank, water will exit the tank by displacement. This water flows through an exit junction filter which keeps suspended solids within the tank for maximum anaerobic treatment time.

After the first stage of treatment the partially treated water enters a second tank or chamber of at least 3000L volume. This tank is divided into several smaller chambers that have different purposes within the treatment process. The aerobic chamber consists of the main tank itself and the incoming liquid is directed by a baffle in a clockwise direction around its circumference. As the water progresses it must pass through four (4) oxygenated areas and two (2) packs of biological contact media. Pumped air into these areas provides the necessary oxygen transfer to aerobic micro-organisms to allow them to thrive and consume the waste material as food. Many of these bacteria float freely in the water, however some need to attach themselves to the media sheet to be effective. Water must pass between this media material and this allows aerobic contact and treatment.

After aerobic treatment the water enters clarifier 1 which is designed to allow any remaining suspended solids to settle out or float to the surface. A sludge return that is air operated by the compressor will vacuum up silts from the floor of the chamber and return it as “activated sludge” to the primary tank inlet junction. The “activated sludge” contains aerobic bacteria and boosts the primary tank to control grease and fats. A similar process also works a skimmer to remove floating material and return it to the first oxygen zone for continual re-treatment.

Clarified water from this chamber now flows to clarifier 2 where a similar process takes place. During ‘low flow’ periods it may be that only clarifier 1 is operating however as flow increases dual clarification is automatically achieved.

The treated water now passes through a tablet chlorinator in which there is a weir positioned to force contact with chlorine tablets. Chlorinated water is directed through a 90mm vertical pipe toward the bottom of a retention chamber where it must exit through a series of holes ensuring thorough mixing of both treated water and chlorine residue. This mix is held within this chamber at design flows for sufficient time to ensure complete disinfection.

Note: for subsurface discharge it is permissible in some case to delete chlorination. (Check with local authorities) As the water levels rises a float switch will operate a submersible pump and discharge the treated water to a suitably prepared dispersal area.



## Earthsafe D10 Polymer Waste Treatment System

AS (advanced secondary discharge models) incorporate a horizontal filter pod in the outflow area of the second clarifier. This filter contains a natural aggregate through which the clarified water passes and in doing so achieves a higher level of BOD and S/S removal.

AS / NR (advanced secondary models with nutrient reduction) discharge the treated water to a final filtration polishing unit, similar in operation to a pool filter. This unit contains a commercial mix of natural aggregate designed to not only mechanically filter the flow but to reduce selected nutrients through an ionisation process.

This polishing unit may be “back flushed” by following the procedure outlined in the “maintenance procedure.” The (AS) advanced secondary model and the AS/NR model will also require a 12 monthly renewal of the filtration material inside the exterior polishing unit and the interior filtration basket.

These materials are available from ECO WATER via telephone on (07) 3865 3775, or via email at [ecowaterhol@gmail.com](mailto:ecowaterhol@gmail.com).

# **SERVICE PROCEDURE**

(SHOULD BE READ IN CONJUNCTION WITH THE OPERATION MANUAL)

# Earthsafe D10 Polymer Waste Treatment System

The service person should be familiar with the different compartments and components of the unit and should have a labelled drawing of the Earthsafe D10. (polymer or concrete model) to be serviced.

The polymer unit is a two-tank treatment unit comprising of a primary (anaerobic) tank and filter, and a secondary (aerobic) tank with dual clarifiers and a disinfection / pump well.

The concrete model has a single concrete case with polymer inner chambers as per the polymer model.

The service person should always maintain good hygiene and safety procedures and utilise all necessary equipment to achieve this.

1. Upon arriving at the site, make the owner aware of your presence (if possible) and identify yourself and your company.
2. Visually check the installation for any obvious signs of physical damage to any associated apparatus or electrical or pump connections to the unit – report.
3. Check for wet areas on odours – report.
4. Remove the control box lid and inspect that there are not insects or vegetation inside – if so, clean and ensure all vents are clear – report.
5. Visually check all electrical connections are dry and secure.
6. Listen to compressor run and note run sound and temperature.
7. Turn off compressor and remove and clean or replace air filter element.
8. Note with compressor off if low air pressure light activates.
9. The pump can now be tested for run pressure using a gauge and hose test kit.
10. The unit requires a pump of at least 80L/min capability to provide good aeration and drive both sludge returns as well as the skimmer (it is usually fitted with a compressor of 80L/min capability from factory). Too little aeration delivery causes poor oxygen transfer and poor treatment. Too high a back pressure indicates possible blocked air distributor legs. If this is indicated, remove the top air leg caps and flush with the flow of water from a hose for several minutes. **IF THIS PROCEDURE IS CARRIED OUT, THE AIR COMPRESSOR SHOULD BE REMOVED AND THE AIR CONNECTION BLOCKED TO PREVENT WATER FROM ENTERING THE PUMP OR BOX.**
11. Turn air compressor on and observe the aeration bubble pattern on the water surface. This can be adjusted using the air taps provided, however normally they should all be open fully. A dissolved oxygen meter should show a minimum reading of 2.5 ppm and up to 7.5ppm depending on where taken in the tank.
12. Visually check the colouration and condition of the treated water. If it is discoloured

## Earthsafe D10 Polymer Waste Treatment System

and smelly in the aeration tank and chambers it may be due to the homeowner using a product that contains chlorine, bleach or disinfectant of some type. If this is the case, the smell will be from dead bacteria. If use of the offending product is discontinued immediately, the system will usually recover with 24 hours. Advise the owner by report – check the contents of their laundry cupboard etc if they agree.

13. If water quality is reasonable, turn the no.1 clarifier sludge control on fully and allow the chamber to pump down 100mm or more. Observe the discharge through the inlet inspection in the primary tank until it is reasonably clear. Turn sludge control 'off'. Now remove the cap on top of the sludge return vertical pipe and adjust the air control until it just bubbles out in surges. Replace the cap and check that air/water is entering the primary inlet junction. It should return flow approx 25% of a pipe.
14. Observe the clarifier surface skimmer to see that small particles are being drawn in. This does not often need setting however if needed the air control should be turned off and then opened slightly until slight surface suction is achieved. Observe the discharge into the aeration tank. (There should only be a low flow).
15. Carry out the same procedure with clarifier no.2. This chamber does not have a skimmer and if needed break up any surface scum with a hose before turning on sludge return fully for a few minutes. Reset sludge return as for clarifier no.1.
16. Once every 12 months it may be necessary to insert a small vortex pump into each clarifier and scavenge the lower contents into the primary tank inlet opening. If a clear plastic tube is used you can observe when sludge transfer is complete.
17. If the water levels have been reduced substantially, top up both clarifiers with a hose.
18. Check the quality of the water in the pump well and that both high water float switches and pump float switch are operating freely.
19. With a suitable wire hook lift up the High water float and observe that the alarm light comes on. Lift up the pump float and allow the chamber to pump out down to the base of the pump. Check that the pump riser pipe is secure and that there are no leaks. Every 12 months remove the pump and hose clean it.
20. If a pump must be changed, the barrel union on the pump riser should be released taking care not to dislodge the o- ring) and the pump manoeuvred upwards by its pump riser. When in a secure position, carefully disconnect the stainless chain from the lower end D shackle (leave the chain in place).
21. Disconnect the electrical plug end of the lead and remove the split sponge hung from the floor of the control box. Carefully feed the plug down through the lid and out of the tank access hole. Remove the pump, pump riser and lead out of the tank to a flat, secure place. Unscrew the complete pump riser from the pump and fit to the new pump.
22. Replacement is a reversal of the above process. Make sure when the new pump is in place that its floats witch is free to operate in both "off" and "on" positions.



## Earthsafe D10 Polymer Waste Treatment System

23. Take a sample of water from the pump well and test for PH and clarity. PH should ideally be between 6.5 and 7.5 for optimum micro organism numbers. Report these readings.
24. Fill a clarity tube with this water and report the depth of visibility – report this in mm. Check to see if the irrigation water generally looks clean and odour free, report. A chlorine reading can also be taken here.
25. Remove the chlorine dispenser and recharge with chlorine tablets – replace. Do this away from the tank to avoid risk of dropping tablets into the system. Tablets used are sodium Hyperchlorite L90 type or equivalent.
26. Using a suitable hook, operate the pump float switch and observe its operation – report. Check the discharge area for blockages that may overload the pump – report. Report on general condition of this dispersal area, over grown / saturated etc.
27. Primary tank maintenance is generally confined to the cleaning of the tank exit filter. To do this, remove the exit inspection opening cover and carefully lift out the filter by its handle. Place the filter directly into a bucket and wash clean with a hose. Re-install filter. The contents of the bucket may be carefully emptied into the inlet inspection opening. (In concrete tanks the filter is inside the partition wall junction).
28. After a few years, sludge levels in the primary tank should be checked. Too much sludge and scum build-up within a primary tank causes decreased water volume and can affect the treatment process and discharge quality. If this is the case, the primary tank should be pumped out using a suction pump truck. Do not do this while ground conditions are saturated as tank flotation may occur! (On concrete tank models water levels need to be lowered alternately in 200mm increments from both sides of the partitions).
29. The suction hose should scavenged all silt off the floor of the tank and a large percentage of the floating scum. Leave a small amount of water and scum within the tank to continue the bacterial action and fill immediately with fresh water. (In concrete tank models 50% of the water can be left in the tank).
30. Turn off the irrigation pump lead switch inside the green control box. Partially fill the system irrigation chamber with a hose by directing the jet on to the chamber wall and allowing it to flow down. Turn the final filter top control handle over to “backflush” position and then turn the pump back on. Allow the backflush to be transferred to the primary tank. Observe the clear backflush port and note if the flow becomes clear. Repeat the procedure if necessary until it does (only models with an external filter).

### **IMPORTANT NOTE**

*Turn the handle control back to the “filter” position and ensure that the pump power is left on.*

31. Remove the horizontal mesh filter in the top of the second clarifier chamber by reaching in through the access hatch and sliding it rearward of it's pipe stub. Unhook the stainless “S” bracket off the clarifier wall and it will come with the filter basket. Tip out the basket aggregate contents into a plastic bag and dispose of it into a wheelie

# Earthsafe D10 Polymer Waste Treatment System

bin. Refill with coarse Earthsafe aggregate material up to the pipe stub level. For special nutrient applications please contact ECO Water for the supply of suitable aggregate (only applies on some models).

Water discharge quality from a “standard” Earthsafe D10 model under normal load conditions and operated correctly will be;

20mg / L BOD      30mg / L S/S      less than 100cfu / 100ml

The water discharge quality from an Earthsafe D10AS / NR models under normal load conditions and being operated correctly will be;

BOD	less than or equal to 10mg / L
S/S	less than or equal to 10mg / L
Cfu	less than or equal to 10 / 100ml
AS /NR = Total Nitrogen	less than or equal to 10mg / L
AS / NR = Total Phosphorous	less than or equal to 5mg / L

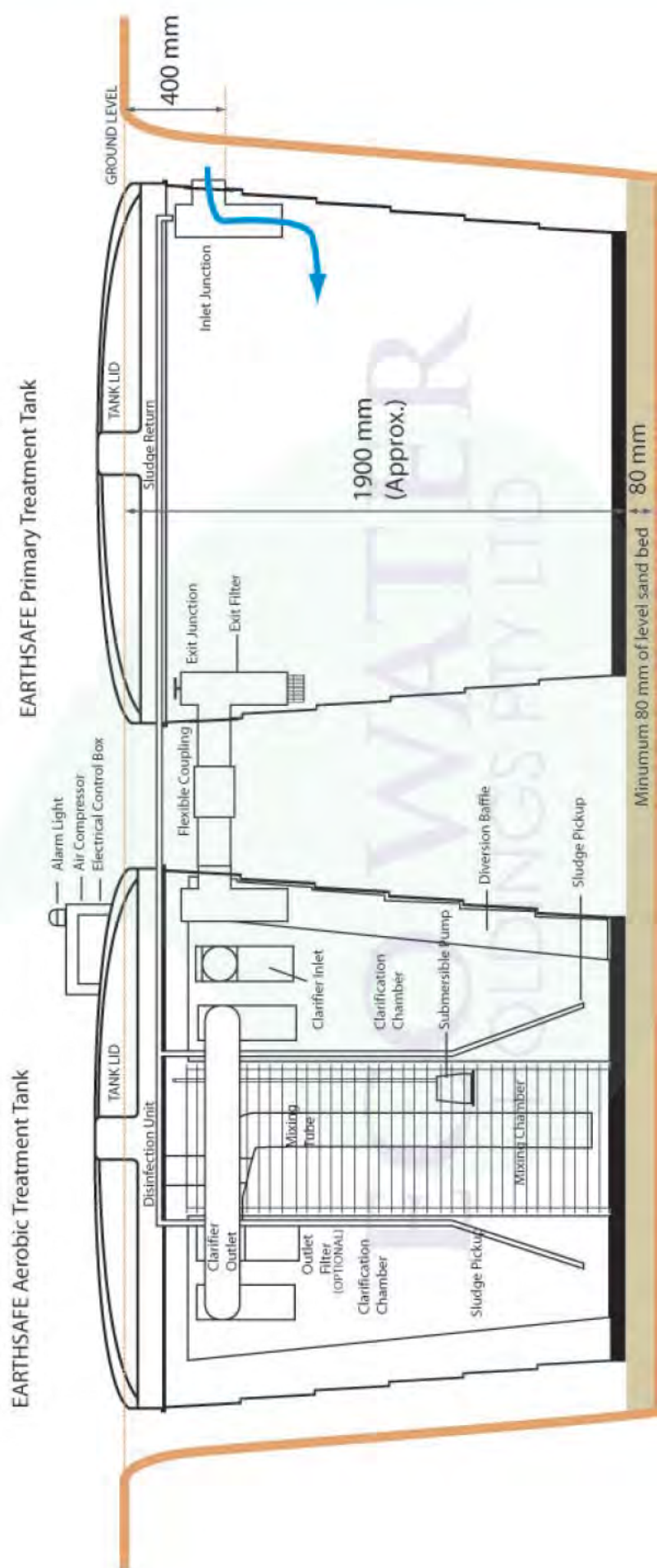
The above practices are a general guide to the maintenance procedures of the Earthsafe system. For further information please contact the factory (07) 3865 3775.



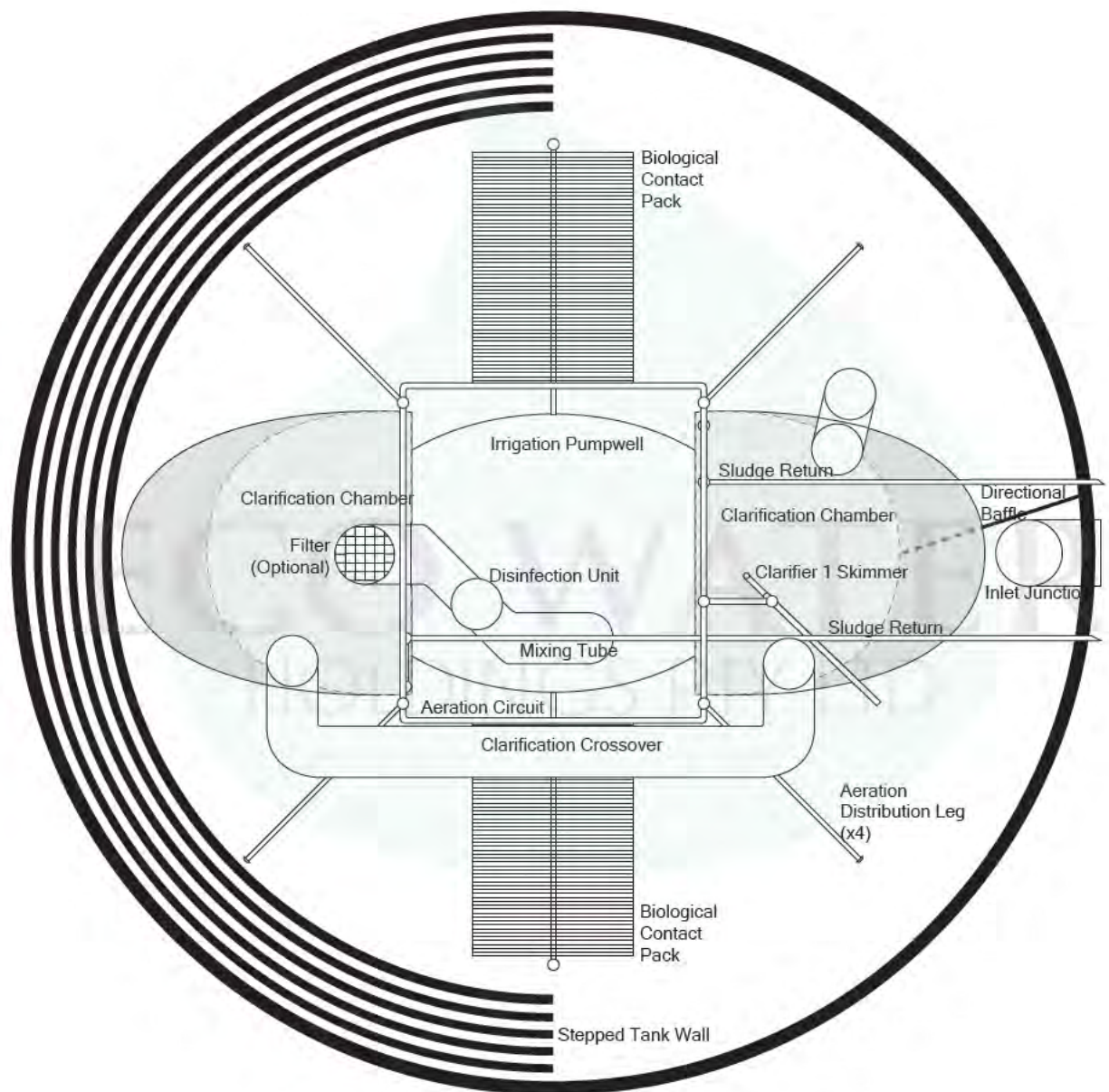
# Earthsafe D10 Polymer Waste Treatment System

## AERATION TANK

## PRIMARY TANK



## AERATION TANK - OVERVIEW



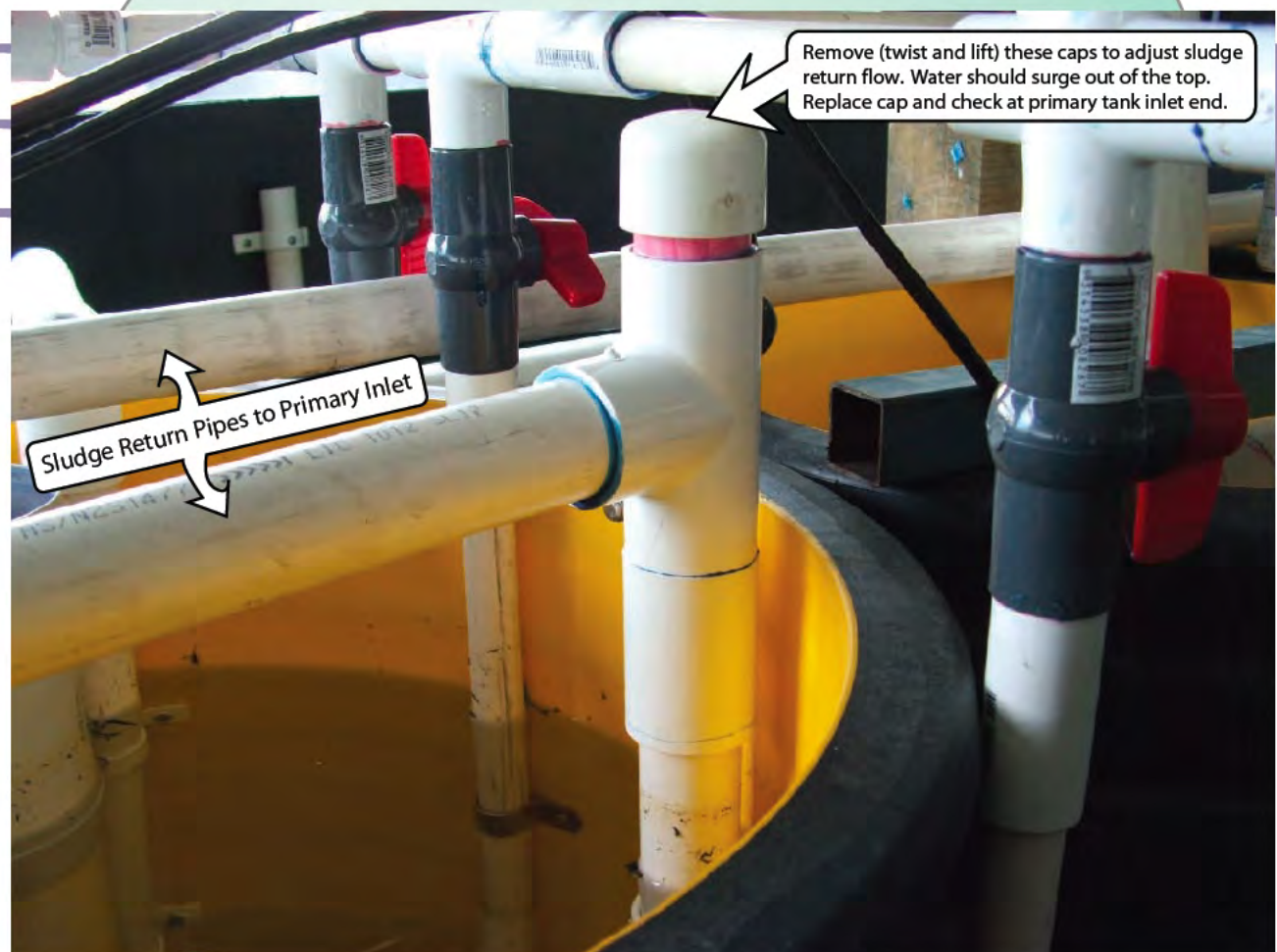


# Earthsafe D10 Packaged Unit

Two tanks, two lids, one control box, ready for delivery.











Control Box Position

