Biolytix BioPod (BF6) Wastewater Treatment System

Service Manual

ONLY to be used by Authorised Biolytix Technicians who have appropriate bio- hazard inoculation, confined space and other hazard management and PPE training and certification. Un-qualified and un-trained people **must not** attempt to undertake Biolytix Filter servicing.

Hazards

The following list shows the hazards associated with filter servicing.

a. Electrocution hazard.
b. Confined space hazard if entering the filter tank
c. Bio-hazard from potentially infectious material associated with handling wastewater and effluent. **Note**: Needles & sharp objects hazard. Appropriate inoculation of workers is advised
d. Trip/fall hazard associated with working on top of a tank with a sloping lid, which could be wet, and over an open filter bed.
e. Environmental contamination hazard from sewerage overflow in the event of filter failure.
f. Low risk potential drowning hazard within the tank during failure conditions.
g. Manual handling/lifting hazard if filter bags need to be moved around in the bed or to remove bags or non-compostable items from the filter bed.
h. Lone worker hazard

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GENERAL INSTRUCTIONS

This manual should be used in conjunction with the Biolytix service report check-sheet. A service report sheet should be completed and returned to Biolytix with an invoice after either a scheduled service visit to a filter or unscheduled visits. If invoices are received at Biolytix without a service report the invoice will remain unpaid until the completed report form is received.

Scheduled visits

Biolytix will notify technicians when a scheduled service is due on a filter. On return of your invoice and service report to Biolytix we enter the details into our database and print a condensed version of the report and send a copy to the council and a copy to the client.

Unscheduled visits

An unscheduled visit results from an alarm event or a call to the technician from Biolytix or the client.

When to invoice Biolytix

Biolytix pays technicians according to a standard schedule of rates on filters that are under a Biolytix warranty. You should return an invoice with a service report to Biolytix directly after completing any work that we have requested you to do.

If you are not certain if a Biolytix clients has a warranty in place you should call Biolytix to verify. If you complete works on a Biolytix filter and the filter is not under warranty we will return the invoice to you and ask that you invoice the client directly.

Courtesy call to clients

Prior to a visit to site you should always let the client know your intentions to visit and make arrangements for an appropriate time for the visit. You should also leave a calling card to let them know you have been.

Communication with clients on faults

When communicating with clients on faults you should be certain that you discuss technical matters in relation to moving parts. If you find a fault that you are uncertain of you should seek clarification from Biolytix and not make any assumptions that may alarm the client.

Irrigation

A standard annual service includes a flush and check of the irrigation field. Biolytix warranties do not extend to the irrigation field or its components as they are not designed or installed by Biolytix. If you discover a fault within the field or maintenance work is required you must inform the client and invoice them directly if they would like you to complete this work.

Irrigation repair kit

Despite signage warning people not to dig in the irrigation area/s damage to irrigation systems can occur. For this reason all irrigation Kits are supplied with an irrigation lateral repair kit that is left with a filter to use in the event of damage to a dripper line etc. This equipment should be left under the valve box lid or in the care of the client.

Spare parts & equipment

Spare parts Available	Materials	Specifications		Supplier
Flood zone extension ring kit	PP	Everhard Industries		Biolytix
Tank lid with control box	PP	Everhard Industries		Biolytix
Tank Access cover	PP	Everhard Industries		Biolytix
Tank Inspection opening cover	PP	Everhard Industries		Biolytix
Pumpwell lid	PP	Biolytix		Biolytix
Water meter kit	Metal & Plastic	1” BSP Severn Trent with cam lock fittings		Biolytix
Electrical GPO	ABS & metal	10 amp 250V		Biolytix
Air pressure switch box	ABS & metal	250V NC pressure switch		Biolytix
Air pump	Plastic and metal	240V 340l/hr air flow		Biolytix
2 pin parallel plug	Plastic and metal	250V 10 amp		Biolytix
2 pin parallel socket	Plastic and metal	250V 10 amp		Biolytix
Standard 3 pin plug	Plastic and metal	250V 10 amp		Biolytix
3 pin round earth Plug	Plastic and metal	250V 10 amp		Biolytix
3 pin round earth Socket	Plastic and metal	250V 10 amp		Biolytix
irrigation pump Pedrollo NkM 2/1	Plastic and metal	240V 40m head		Biolytix
irrigation pump Pedrollo NkM 2/3	Plastic and metal	240V 70m head		Biolytix
Float switch	Plastic and metal	250 V 10 amp		Biolytix
Float switch swivel assembly	Plastic and metal	Biolytix		Biolytix
Push fit T 6 mm	Plastic and metal	Rated to 10Bar		Biolytix
DME bags	PP & PE	12 L volume		Biolytix
Flushing valve	PP & Rubber	1/2” BSP 3L/flush		Biolytix
DNL valves	Plastic & Metal	Heads of 2m, 5m, 15m		Biolytix
Dripper line	PE & plastic/ elastomer	Dripper spacings of 500mm, 600mm or 1m with dripper flow rate of 0.9l/hour, 1.6l/hr		Biolytix

Return faulty parts to Biolytix

Biolytix supplies bags/packaging with the replacement parts that should be used to return faulty parts to Biolytix factory, if you do not have any bags please request. Return pumps in particular should be washed

down thoroughly then allowed to drain before being placed into the plastic bag inside the cardboard box that the new pump came in.

You must identify the client, and what your diagnosis of the fault was on the article you are returning.

Irrigation pumps that are removed from a Biolytix filter under warranty **must** be returned to our factory. If the faulty pump is not returned no factory warranty can be claimed by us and you will be invoiced for the cost of the replacement pump.

All faulty pumps are to be returned. You must tag the pump as indicated above and call **131821** and arrange for the pump to be picked up, they will charge Biolytix. You should do this as soon as possible on removing the faulty pump.

Air pumps and other faulty parts are to be returned via Australia Post. You can send the parcel "postage paid by receiver" from your post office. The parcel must be marked attention Warranty and tagged with your details and the clients.

Return address: TBA

Alarms & repairs

Once you are registered as an accredited service technician, you will receive alarms for filters that you install or service. Alarm notices will be sent directly to your mobile and email. We provide a 24 hour response time to clients for alarms or faults. That means that the client should be contacted within 24 hours and a site visit arranged within that time frame if it is urgent.

When you receive an alarm notice on SMS or e-mail you must call the client and ask:

a. Have you experienced a power outage?
b. Are you turning the power to the filter off?
c. Is there any audible noise?
d. Is there any odour?
e. Has the filter been overloaded due to a party, washing day etc?
f. Has the client noticed anything that may indicate that there is a problem with their filter?
g. You can ask the client to look down the Sump Inspection pipe to check if the effluent level is high?
h. You can ask the client to place their hand on top of the filter electrical box and a slight vibration should be felt to indicate that the air-pump is on.

If there are no obvious problems the alarm may only be due to a power failure, it may not be necessary to attend on site. To clarify if you should attend on site, please call and speak with Biolytix Field Service staff.

NOTE If a repeat alarm happens again at a regular interval it may indicate that the irrigation field is not working as it should be and the pump can not discharge the effluent fast enough during high loading events such as washing days to avoid triggering the alarm float switch. In this case the irrigation design problem will have to be addressed urgently or it could lead to filter bed failure due to repeated Geofabric flooding.

After you have dealt with the alarm notice you must let Biolytix know within 48 hours.

1. Call 1300 881 472 and speak to our Customer Service Representative to confirm the alarm has

been resolved. You must quote the alarm number to identify the alarm.

2. Respond to the alarm notice on your mobile by replying to that alarm SMS notice, or

Respond via email by replying to the email alarm notice that you received.

Structural Integrity Check

The tank is designed to receive, contain and treat **only** wastewater and it should not have storm-water or groundwater entering it as this may overload the irrigation area and make it boggy. Once installed the tank should not move up, down or tilt. Creatures should not enter or leave the tank through cracks or openings. The electrical box equipment must remain dry and isolated from wastewater generated corrosive gases. The sewer pipe entering the tank should grade down evenly to the tank. The pipes and conduits entering the tank must not leak or become kinked or broken.

What can go wrong?

1. Tank is installed too deep in the ground (Symptoms: Ground level around the tank is not 50mm below the inspection openings, water has flooded around and or entered the control box)
    a. The ground level must be 70 mm below the inspection openings on the lid and must drain away from the tank lid.
    b. If the water can not be made to drain away from 70mm below the inspection openings then a flood zone extension riser must be installed on the tank.
    c. This cost must be passed on to the installer who has failed to follow the installation instructions provided.

2. Tank is not installed level (Symptoms: one side of the tank is more than 40 mm lower than the other)
    a. Reinstall the tank.
    b. This cost must be passed on to the installer who has failed to follow the installation instructions provided.

3. Poor soil compaction around the tank (Symptoms: more than 50 mm subsidence of soil around the tank, inlet pipe can be dragged down so that it has negative fall as it enters the tank, electrical conduits or pipework can be broken or pinched, cables can be stretched or broken, tank can pop out of the ground)
    a. Dig down to at least uncover all pipework and conduits.
    b. Properly compact the soil with a mechanical compactor.
    c. Backfill and compact with soil in 200mm layers to the correct height
    d. Replace mulch to properly finish the tank.
    e. This cost must be passed on to the installer who has failed to follow the installation instructions provided.
4. Inlet is blocked (Symptoms: blockage is present in the inlet, inlet pipe is sloping the wrong way).
    a. Remove any non-biodegradable material and move the build up of material to the opposite side of the filter.
    b. Use a sewer router if necessary to clear any blockage in the inlet pipe.
    c. If roots are growing into the tank through the inlet pipe then fix the sewer pipe to remove the entry point for root intrusion.

5. Hold downs not installed correctly (Symptoms: tank lifts out of the ground in wet conditions)
    a. Reinstall the tank.
    b. This cost must be passed on to the installer who has failed to follow the installation instructions provided.

6. Sump Inspection pipe is not installed correctly and is allowing ground water and soil to enter the tank (Symptoms: There is water entering the emergency overflow pipe {in Pre 2005 systems an emergency overflow was provided about 700 mm down from ground level and this was designed to run out to ground level. If not installed with the correct fall it could drain water back into the tank instead).

7. The Sump inspection pipe is not properly pushed into the grommet at the base of the tank so soil and groundwater can enter the tank and effluent can leak into the ground. The sump has evidence of soil and clay sediment in it. There is grit or sand in the irrigation system)
    a. This is very difficult to fix without reinstalling the tank so ensure careful diagnosis is done.
    b. Contact Biolytix before proceeding with re-installation.

8. Lid not fitted correctly (Symptoms: water leaking in around the lid seal, roots penetrating in between the tank and the lid)
    a. Remove the access cover.
    b. Using a torch, check for evidence of water leaking in around the tank lid rim (e.g. soil staining or root penetration).
    c. If there is leakage into the tank:
        i. Remove soil from over and around the tank lid so that the lid can be removed, cleaned and resealed onto the tank.
        ii. If the tank lid has been removed it should be cleaned thoroughly and resealed by:
        iii. Remove and clean the lid and seal.
        iv. Dry the sealing surfaces and reinstall correctly, if necessary use a fresh neoprene gasket.
        v. Aligning the lid over the tank so that the inspection covers are above the inlet and adjacent to the overflow.
        vi. Aligning the arrows on the lid with the line on the tank, and screw holes on the lid with the ribs on the tank.
        vii. Installing the screws in pairs on opposite sides of the access lid, ensuring that all screws penetrate the ribs on the tank.

9. Access cover screws stripped (Symptoms: cant screw down the access cover properly or remove it easily)
    a. Install lid threaded inserts
    b. Replace cover with new screws

10. Inspection opening loose or missing (Symptoms: opening in the lid of the tank where creatures can get in and out).
    a. Replace missing inspection covers with new ones. Twist in a clockwise direction to lock in place.

11. Lid or tank cracked or broken (Symptoms: water, roots or creatures penetrating the tank or lid, leaks or wet spots around the tank if the tank is flooded).
    a. Weld or replace the damaged parts. If the tank can not be repaired it will have to be replaced.
    b. If the tank was damaged during installation (typically by sloppy excavator work or poor control of mechanical compactors,) it is the installer's responsibility and cost to fix it.

12. Electrical conduits can leak water, water vapor or gasses into the electrical box (Symptoms: evidence of water having entered the control box. Discoloration of the inside of the control box from H_2S gas, condensation on the lid of the control box, air pump failed with water inside it or the felt filter is wet, corrosion of the electrical wires or terminals, conduits not sealed properly with silicone as instructed in installation manual)
    a. Seal conduits properly with silicone sealant (use plenty and ensure it flows around all wires to give a deep and thorough water and gas tight plug.
    b. If the box is seriously damaged replace it.
    c. If it was not sealed properly with silicone then the installer is responsible for the cost of repair as they did not follow clear installation instructions.
    d. **DO NOT TIGHTEN SCREWS WITH DRILL AS THIS WILL SPLIT CONTROL BOX LID.** Cracked control boxes will not be covered under warranty.

13. Lid is not fitted correctly to the pumpwell (Symptoms: lid is loose fitting and not sealed onto the pump-well. There is organic contaminants in the sump or evidence of leakage of raw wastewater down the side of the pump-well {it should be clean inside the pump-well)
    a. If a pump is installed:
        i. Turn off power at the control box.
        ii. Remove the camlock fitting and elbow from the pump riser.
        iii. Undo the pump riser gland.
        iv. Remove the cover from the pump well.
    b. Shine a torch down the pump well and visually check that no effluent or wastewater is bypassing into the pump well or over the top rim of the pump well.
    c. If by passing is evident:
        i. Check the loading rate and/or use of toxic chemicals by the operators for the possibility of hydraulic overload or system poisoning.
        ii. If hydraulic overload or system poisoning is suspected, contact Biolytix.
        iii. Ensure the cable glands and cover seal are sound.
    d. Clean the pump intake.
    e. Re-install the pump in the reverse order.

Complete Section QC001 on the Biolytix Service Checklist.

Effluent Quality Check

The purpose of the BioPod is to treat wastewater, safely isolate biologically hazardous human waste products it contains, and remove contaminants in it so the water can be safely discharged to the dispersal system. The effluent of a properly operated and maintained BioPod achieves a BOD below 20 mg/L and a TSS below 30 mg/L, complying with AS/NZS 1546.3:2008 and with the Queensland Plumbing and Wastewater Code. To ensure trouble free operation of a subsurface irrigation system, it is important that the system consistently achieves this effluent quality.

Both BOD and TSS are not easy or cheap parameters to test in the field. We have found from experience that Turbidity, Dissolved Oxygen combined with pH and temperature measurements are a low cost and instantly available range of surrogate tests that, if within the limits we specify below, will correlate very well with BOD and TSS.

To collect a sample, refer to the effluent sampling procedure:

1. Measure the turbidity of the sample using the supplied portable turbidity measuring sighting tube.
   - Lock the 2 parts of your turbidity tube together.
   - Hold the tube vertically so you can view downwards.
   - Gradually pour the sample that you have already collected down the inside surface of the tub until the black markings at the bottom of the tube are no longer visible.
   - Record the measurement from the marking on the side of tube and record on the service checklist. BF6 results obtained should be < 10 NTU**.** If the results are greater than or equal to 20 NTU, contact Biolytix as it most likely means there is poor lower bed aeration or overloading or both.
   - Rinse out the tube with fresh water and return to its box to minimize damage to the tube.
2. Measure the **DO** according to the manufacturer's instructions in the supplied kit. Please ensure that you return the instructions to the box for future guidance. Record the DO outcome on the service checklist. (For more professional service techs we strongly recommend using a DO meter for about $1500 as these are much quicker and more accurate than the DO test kits)
3. Measure the ***ph*** according to manufacturer's instruction in the supplied kit and record the results on the checklist. (For more professional service techs we recommend using a Dick Smith Deluxe Digital pH meter for about $85 as these are quicker and more accurate than the paper pH strips)
1. Measure the temperature of the effluent sample using the supplied thermometer. (For more professional service techs we recommend using a Wide Range IR Thermometer with Laser Marker available from Dick Smith for about $120 as these can give accurate temps for the filter bed and sump from a distance without needing to touch the bed
5. Complete Section QC005 on the Biolytix Service Checklist.

Parameter	Required range	Troubleshooting	Notes
Temperature	15C - 35C	Cold or hot climates will affect this reading, as may recent use of a dishwasher or hot bath etc.	Many chemical and biological reactions are affected by temp. The effluent temperature does not necessarily indicate the filter bed temperature.
Dissolved Oxygen	Greater than 2	A low DO could indicate a lack of aeration of the filter bed, so in Pre-Sept 2010 units install a lower bed air line in any unit that has a DO of less than 2 mg/L	DO is Temperature dependant - DO decreases as temp increases and oxygen solubility is negatively correlated with the amount of dissolved solids.
Turbidity	Under 20 NTU	This is an indirect indicator for suspended solids and BOD. A high turbidity is an indication that the filter bed performance is compromised. If not already present, Install a lower bed air line and test bed pressure with a manometer. (see Bed Maintenance section below)	A high concentration of light absorbing materials such as activated carbon and dissolved colour causing substances may have a negative interference on turbidity. Suspended and dissolved solids affect turbidity. Perform test in field where possible.
pH	Between 5 & 8.	If less than pH 5 then add 2 kg of ground limestone to the filter bed around the inlet zone. If greater than 8 investigate the use of caustic household cleaners especially dish-washing machine powders, and recommend changing to surfactant based products.	This is the range that worms are able to survive & reproduce. pH is temperature dependant.

Offsite analysis

No offsite analysis should be undertaken unless Biolytix has instructed you to do so; use the Effluent Sampling Procedure in the event that it is required.

1. Only take a sample for offsite analysis if the local regulatory authority requires this, or if it has been agreed with Biolytix that off-site analysis is required.
2. Record results of analysis in Section QC005 of the Biolytix Service Checklist.

Filter Bed Check

The BioPod filter bed is the most important part of the treatment process. It screens out the solid waste entering the tank and allows the water to pass through. It should always remain open, aerobic and free-draining, and worms and other soil organisms should thrive and breed in the bed. A healthy population of worms will keep excavating small tunnels through the humus that is created from the raw wastes they process it and so the bed becomes a moist sponge like filter media with a large lung like aerobic treatment capacity.

What can go wrong?

1.

1. Bed surface swamped with too much raw organic waste (Symptoms: there is a layer of un-decomposed organic/faecal matter over the bed that is slimy and/or non-porous, perhaps with liquid ponding in low points, few if any worms are visible on the surface of the bed, it may also have a significant odour associated with the mass or raw wastes)
    a. The system may be overloaded;
        i. Investigate the actual organic loading on the system
            A. number of people using the system on a regular basis (10 people max)
            B. number of people using the system for peak events and the number of peak events
            C. Take a digital photo of the bed surface and send the file to service@biolytix.com.au.
        ii. If the system is clearly overloaded advise the owners that they must upgrade its capacity to suit the loading, for example by adding an additional BioPod (i.e. 'manifolding') and/or by increasing the dispersal system size. Note that, in some jurisdictions, it may not be possible to add additional BioPods. In all cases, council approval will be required.
        iii. If the system loading appears to be OK but there are reasonable grounds to doubt the loading information supplied by the owners, then the actual loading may need to be measured using a flow meter and/or BOD load monitoring.
            A. Contact Biolytix to arrange this monitoring
    b. If there is more than a 30 mm buildup of raw faecal material:
        i. Have the buildup of organic material removed or pumped out in a manner approved by the relevant authority.
        ii. Re-inoculate the bed by placing about 1kg of worms together with supplied bedding material into the inlet side of the tank.
    c. If there is less than 30mm of faecal material buildup on the bed:
        i. Shovel the excess organic matter to the opposite side to the inlet on top of a layer of DME bags.
        ii. Adjust the HME Bags so that the upper bed is free draining.
        iii. Re-inoculate the bed.
        iv. If the system loading appears to be OK there may be bed conditions that inhibit biological activity – refer to section 2 below.
    d. The System has a low organic breakdown rate due to poor biological activity:
        i. Further diagnostics are required to determine the reason for poor biological activity.
        ii. Measure the filter bed surface temperature at several points preferably with a digital IR Thermometer as recommended above.
        1A. If average filter bed surface temperature is more than 35°C.

- Too hot for most species of worms who cease to breed and thrive above 35 °C

- Ensure the system is fully shaded for most of the day.
- Confirm that the soil temperature at 1m depth in the shade is less than 30 °C for that site.
- Sumatran cockroaches (or equivalent organisms that can operate at higher temperatures) can be added into the filter to support the ecosystem living in it.

1B. If the average filter bed surface temperature is less than 15°C:

- The filter bed may be too cold.
- Insulate the Lid of the tank.
- Cover the tank lid and surrounding soil with thick bark mulch or similar outdoor insulation material.
- Provide warmer source water (solar heating) to increase the thermal mass of the wastewater entering the system (this is particularly relevant for schools or public toilets operating off tank water in cold or alpine climates).

iii. Toxic conditions in the filter bed – refer below.
iv. The filter bed may not have enough air available for good respiration – refer below.
v. The system may be too wet for good biological activity - refer to point 2 below as anaerobic decomposition in a flooded filter is very slow.

2. Filter bed may be too wet (Symptoms: Water ponding on the bed surface for more than a few minutes after a toilet is flushed, bags floating on the surface of the bed, a “tide mark” on the side wall of the tank as evidence of the level of flooding of the system, the alarm log on the installation history should show unresolved alarm events if the alarm has been working)

a. check that the alarm is working:
   i. If not fix the alarm as per alarm section below.
   ii. Discuss the responsibility for rectification with Biolytix before further action.
b. Check that the pump is working correctly:
   i. Discharge from the sump is at 10L/min or more when connected to the irrigation system.
   ii. If not fix the discharge blockage or pump operational fault before proceeding.
c. The system may be hydraulically overloaded:
   i. Number of people using the filter should be 10 or less.
   ii. Peak daily hydraulic loading rate should be less than 1600l/day.
   iii. Peak 12 weekly event loading rate should be less than 2150 L/day for less than 5 days.
   iv. Check the water usage in the house (water meter reading is the most reliable if possible).
   v. If hydraulic overloading is suspected then arrange to install a Severn Trent water meter and Tiny Tag Data Logger.

2A. Call Biolytix to authorize this first as there may be other factors causing the above symptoms such as:

- Blocked upper bed (See below)
- Blocked geofabric (See below)
- Blocked filter discharge to irrigation (See below)
- Anaerobic lower bed (See below)

3. Blocked upper bed - Upper bed pores can become blocked with too much fine organic matter washing into the pores faster than the worms present can process them (Symptoms: surface flooding evident as for section 1 above, or a layer of un-decomposed faecal matter on the surface

of the bed is evident as in section 1 above, or bed air flow resistance pressure as measured using a manometer is more than 380 mm water pressure, or effluent being discharged to irrigation has a DO of less than 2 mg/L, or the lower bed is not flooded)

a. Remove plastic and other non-biodegradable waste that has accumulated in the surface of the bed over time
    i. Using thick gloves and a Biohazard bag, remove sanitary pads, synthetic tampons and any other obvious plastic material or non-compostable material that is on the surface of the bed.
    ii. Dispose of this refuse in a manner approved by the local authority
    iii. if this is not removed it will gradually block the bed drainage and aerobic capacity
b. Adjust the DME & HME bags in the upper bed so that drainage is improved.

c. Undertake a compressed air blast of the bed.
    i. If there is only one air line, install a lower bed air line as described below.
    ii. Blast the bed with the full air flow from a standard 12 CFM air compressor (with a 20 L or more compressed air storage tank) directly to the lower bed air line.
    iii. Allow the pressure to build in the air compressor tank to the cut out pressure then connect to the air line at the full flow possible through the air line.
    iv. Measure the pressure using a manometer.
    v. This procedure should be repeated a few times until the manometer reading is no more than 380 mm of water head.

4. The system may have had toxic chemicals put into it at one time or may have an ongoing input of a toxic material. (Symptoms: little or no worm activity - lift 3 DMEs within 600mm of the inlet and check that there are at least 20 adult worms visible on the underside of each bag, pH is below 5 or above 8, chemical smell in the filter tank, unusually coloured material in the tank, poor drainage through the bed.) If there is any unusual biological activity, or lack of activity, photograph the area and Send the photos to Biolytix
    a. Worms and other soil life in the ecosystem can be poisoned by toxic chemicals
        i. reduced biological activity and in particular burrowing activity by worms has a negative impact on both drainage and hence bed aeration
    b. Try to determine if there is any toxic material being added to the system.
        i. The Owner's Manual lists toxic household chemicals and other pollutants that must not be disposed of into the system. Check that the client is adhering to these instructions.
        ii. It is difficult and expensive to analyze for the range of chemicals that could be causing toxicity problems, so your nose and experience with what a normal bed should look and smell like are the best guide.
    c. If toxic chemicals or other problem pollutants were or are being added, make sure the clients are aware that they will have to pay for any repairs to the bed that is necessary.

5. Excess Humus (Symptoms: Humus build up to above the surface of the DME layer, inlet pipe can become backed up with organic matter, worms can migrate into the toilet bowl or water traps in the building)
    a. Remove full bags around the inlet zone.
    b. Swap them with opposite side bags.
    c. When all bags on the top layer are full stack them around the outer perimeter of the inside. of the tank and replace them with fresh DME bags.
    d. After 12 months of no direct contact with sewerage they can be removed and the matured worm

casts shaken out and buried in a garden bed trench at 300 mm deep (or according to state of local government regulations), then the bags can be reused as DME bags.

Diagnosis and treatment of Filter Bed Blockage (Hydraulic Failure)

The Biolytix filter bed can fail to drain from four main causes, all of which are related to the amount of air available to the biolytic organisms in the filter bed.

1. **Filter overloading** - too much water and/or organic matter.
2. **Slow Pump Out** - Pump cannot remove the water as fast as it comes into the sump.
3. **Failed Air Supply** to the filter bed which becomes anaerobic and slow to drain.
4. **Blocked Geofabric Filter** - partially or fully blocked pores in the filter cloth.

1. Filter Overloading Symptoms

i. A large amount of un-decomposed organic matter evident on the surface of the bed.
ii. Water ponding on the surface of the bed or bags floating with or without worms on top of the bags, but with air coming up through the water.
iii. No worm activity present.
iv. Evidence of flooding to well above the level of the pump-well lid and sometimes even into the control box.

Causes of Overload	Action
1. Too many (more than 10) full time people “Equivalent Persons” (EP) using the system and/or more than 1600 L/d wastewater.	Reduce the number of people using the facility or augment the capacity of the system to cope with the loading
2. Storm-water ingress through illegally connected down pipes or storm run-off into gully traps or grates.	Change the plumbing to remove all stormwater from the system.
3. Leaking cistern flush valves (can easily overload the system if not fixed)	Replace faulty cistern parts – saves a lot of water too.
4. Leaking taps, very long showers. (total water use must be under 1600 L/d	Ask clients to have any leaking taps fixed – Offer to install flow control devices on showers.
5. Too much food waste being put in (through an Insinkerator only) – more than 250 grams/ person/day.	Ask clients to limit the amount of food waste added.
6. System installed in a flood plain.	Contact Biolytix to discuss options for a tank extension.
7. Pump discharge line is disconnected inside the tank.	Replace any damaged fittings and refit the discharge line correctly.
8. No obvious causes but overloading is still the prime suspect.	Install a Severn Trent water meter and Tiny Tag data-logger on the outlet hose and monitor for some months.
9. Average filter bed surface temperature is less than 15°C – too cold for good worm activity.	Insulate the underside of the tank lid with PU foam and cover it with thick bark mulch to act as insulation

10. Average filter bed surface temperature is more than 35°C - too hot for good worm activity	Ensure the filter bed is fully shaded for most of the day Confirm that the soil temperature at 1m depth in the shade is less than 30 °C for that site Introduce Sumatran cockroaches (or equivalent organisms that can operate at higher temperatures) into the filter.
11. Filter bed may be too toxic for good biological activity.	Audit the chemicals used in the facility using the toxicity audit sheet and advise Biolytix of the outcome
12. Not enough air for good biological activity	See below under failed air supply

2. Slow Pump Out

If effluent in the sump is repeatedly and periodically above geofabric level of 380 mm (280 mm in pre 2005 units), then a combination of bubble point pressure in the sump, saturated geofabric or slime growth within the geofabric can eventually result in geofabric blockage. The alarm should go off every time the sump effluent level exceeds 330 mm. If there are alarms experienced almost every day or on “washing day”, then urgent attention should be given to determine the true cause of the slow discharge of effluent.

Causes of Slow Pump Out	Action
Pump float switch is sticking.	Adjust the float and or pump position to ensure the float and its cable move freely and do not touch the pump-well wall.
The flow through the pump is restricted or stopped. (replace pump if stopped)	Take the base off the pump and clean the impellers and make sure the motor is turning at full power. Failed capacitor or incorrect wiring will lead to greatly diminished pump capacity.
Control float is fitted too high on the pump.	Adjust the cut in height of the control float to be 165 mm (refer to pump replacement in the service manual)
Irrigation field is blocked (i.e. it has less than 12 L/min minimum flow)	Manually flush the line by removing the flush valves and note any slime or sediment. Then flush with chlorine solution and recheck the flow rate to irrigation.
Flushing valves are not working.	Clean, and retest to ensure that they are working for at least 2 cycles.
Flushing valves are incorrectly fitted (e.g. below the irrigation field and don't open when the pump cycles.)	Fit a DNL valves between flush line and the flushing valve/s and ensure there is a dripper fitted between the DNL valve and the flushing valve to enable the pressure side of the diaphragm to drain and reset between cycles.
Irrigation laterals are designed incorrectly so that they do not have a sufficient scour velocity during flushing.	Fit extra flush valves to the end of each long lateral or pair of laterals (Ref. Netafim irrigation design manual) Seek design assistance if in doubt +61409 898 690
Irrigation field installed is too small to handle the peak loads so the pump can't discharge as fast as water enters the sump.	Cut-in stain ring on the pump is not distinct. Redesign the irrigation field so that it has more than 10 l/min minimum flow.
There may be ground water entering the plumbing or the Biolytix filter tank.	A “soil” stain below the overflow relief drain “y” junction will be evident if a torch is shone down the inspection opening if ground water is entering here. There is also a rare possibility of ground water entering through the base of the tank if the Sump Inspection pipe is not inserted correctly into the rubber grommet.
There may be hydraulic overloading of the system.	Refer back to section 1 above to diagnose.
The pump fitted is not correctly sized for the head loss of the irrigation field as it is designed.	Fit a pump with a higher head that can deliver the correct flushing velocity for the irrigation design, or redesign the irrigation field so that it is suitable for the existing pump.

3. Failed Air Supply

The bed relies on air to remain aerobic and support an active worm and microbial population. If the bed becomes anaerobic, then the bed porosity will gradually decline and lead to eventual hydraulic failure. This is because the macro- and micropores in the bed are cleaned and maintained by grazing microbes, mites and worms etc. The geofabric is also continually cleaned by microbes and if the bed or geofabric becomes anaerobic, then it will soon become coated with and impregnated with biofilm slime. If this happens then the slime must be removed or the filter will fail to drain properly.

Causes of Failed Air Supply	Action
1. Air pump has failed.	Replace the air pump or its diaphragm.
2. Air line to base has become kinked or blocked.	Follow the work instruction for “installing and commissioning a lower filter bed air line” and then test air flow again.
3. No air bypassing the geofabric layer into the lowest DME layer.	Fit a new air line down the side of the Biopod tank to the middle of the lowest DME layer. (Ref. “installing and commissioning a lower filter bed air line”)
a. Repeated flooding of the geofabric layer due to slow pump out.	Fix the slow pump discharge problem see section 2 above.
b. Bubble point back-pressure below the geofabric prevents effluent from flowing through the filter cloth under gravity	Fit a second air line down the side of the BioPod tank to the middle of the lowest DME layer (Ref. “installing and commissioning a lower filter bed air line”)
4. Flooding above the geofabric creating an air seal which prevents air escaping from the sump up though the geofabric (short pump cycling will usually be evident in this case).	Test lower bed water level and if more then a 100 mm of water pressure then insert a 25 mm riser spear and use a Helical rotor pump (or other suitable suction pump) to pump down excess effluent in the bed so air can flow through the bed. This may need to be repeated a few times before the beds aerobic status is back to normal levels. DO should be 2 mg/L or higher.
5. Upper Bed blocked – i.e. Bed air flow resistance is greater than 380mm of water head Ref: “Measuring Bed Blockage” below.	Blast the bed with the full air flow from a standard 12 CFM air compressor (with a 20 L or more compressed air storage tank) directly to the lower bed air line. Allow the pressure to build in the air compressor tank to the cut out pressure then connect to the air line at the full flow possible through the Air line. This procedure should be repeated a few times until the manometer reading is no more than 380 mm of water head.

4. Blocked Geofabric

The geofabric is a self-cleaning filter cloth with a 90 micron pore size. The pores are kept clean through the grazing action of aerobic microbes. If the oxygen levels in the bed and the effluent are high, then the filter cloth will remain free-draining, and only very fine colloidal organic sediment will pass through in very small quantities. It can become blocked if the bed or effluent becomes anaerobic. This promotes the growth and accumulation of anaerobic microbial slime similar to a septic trench biomat. This can lead to effluent ponding on the geofabric and preventing air from getting to the lower filter bed. This is a negative feedback loop and must be corrected through deliberately supplying extra air where it is needed. This can recover the drainage capacity of the geofabric. There is one other source of blockage which is more difficult to correct however. If large amounts of grease or oils are applied to the bed, this can overwhelm the aerobic microbes and also block the pores in the bed and geofabric. In this case it may be necessary to rebuild the bed and correct the excessive addition of oil and grease by the filter users.

Causes of Geofabric Blockage	Action
1. Bed air supply failure.	See above table.
2. Excessive disposal of oil or grease into the Biolytix Filter.	Advise users on correct operation of the BioPod – Ref Biopod Users manual and contact +61409 898 690
3. Oil and grease on or embedded in the geofabric material.	Add grease consuming microbes or enzymes to clean the geofabric cloth. This may be effective if the bed is still draining at a high enough flow rate to cope with daily system loading.
4. Repeated flooding of the geofabric layer due to slow (less than 12 L/ min) pump out.	Fix the slow pump discharge problem see section 2 above.
5. Air pressure can build up in the sump and stop water coming through the geofabric.	Air can be observed “burping” into the pump-well and or IO tube. If not present then fit a second air line down the side of the BioPod tank to the middle of the lowest DME layer. (Ref. “installing and commissioning a lower filter bed air line”)
6. Flooding above the geofabric. If 5. above is present then the flooded layer will mean that no air can get to the lower bed and it will become anaerobic, causing the geofabric to block even more	Insert a 25 mm poly riser spear down the side of the bed and use a Helical rotor pump (or other suitable suction pump) to pump down excess effluent in the bed so air can flow through the bed. This may need to be repeated a few times before the beds aerobic status is back to normal levels of 2 mg/L DO
7. Bed blocked – i.e. Bed air flow resistance is greater than 380mm of water head as measured by a U- tube Water Manometer with air supplied to lower bed using a Schego air pump.	Refer to “installing and commissioning a lower filter bed air line”

Component Check

Pump Operation (if fitted)

The effluent pump is designed to transfer water from the sump to the dispersal system. The pump should always have power supplied to its level control float. In the up position, power is on and the pump runs. It is critical that the float switch and the pump are both operational at all times. There is a pump over-ride switch on the control box/GPO base. Pressing this button bypasses the float switch and allows the pump to run irrespective of the water level in the sump. The industrial quality pump Biolytix uses can be fully repaired and refurbished, and so we require all replaced pumps to be returned to our factory for examination and repairs. This enables us to continually improve our product quality and so reduce the life cycle cost of the pumps.

What can go wrong?

1. Pump outlet or irrigation can block (Symptoms: flow discharge from the filter is less than 12 L/min when measured with a water meter)
    a. Remove the flushing valves and retest the flow rate through the water meter.
        i. If the flow ate is still below 12 L/min.
            A. There may be a kink or obstruction in the irrigation feed or return line.
                - Find the kink or obstruction and repair.
            B. There could be an in-line filter installed in the discharge line somewhere.
                - Find the filter and remove the filter element.

2. Air hole below the Non-return valve can block (symptoms: pump may airlock and fail to discharge water - this often happens after the pump is removed and replaced. If left blocked, a high-level alarm would occur.)
    a. Any alarm soon after a service event should be treated seriously as this can lead to system failure)
    b. Always activate the pump using the bypass button after a pump has been replaced into the sump to ensure that it works and that the irrigation flush valves operate correctly.
    c. If not, use a torch to observe if there is a fine jet of water discharging from the bleed hole.
        i. If not, clean out the air bleed hole if fitted.

3. Pump is not plugged in or wired in correctly (Symptoms: pressing the bypass button doesn't operate the pump or it spins weakly because the phases are not connected correctly)
    a. Double check the pump is connected correctly.
    b. The capacitor may have failed – replace the pump and return the old one to Biolytix.

4. Pump intake screen or impellers are blocked or obstructed (symptoms: output pressure is insufficient to operate the flushing valves correctly or to discharge the minimum flow rate of 12 L/min to the dispersal system)
    a. Use a pressure gauge to test the actual shut head pressure.
    b. Check and clean the inlet screen so it is not fouled with organic matter that may have entered the pump well (can happen if the pump-well cover is not correctly fitted and the system floods).
    c. Remove the intake screen from the pump base and remove and clean the multistage pump impellers.
        i. Reassemble the cleaned parts in reverse order.

5. Pump bearing is worn out (Symptoms: Pump impeller shaft is loose. Motor rotor is polling against

the case. Motor won't start reliably).

a. Replace the pump, it must be reconditioned before being redeployed.

Under normal operation, press and hold the pump by-pass button on the control box to activate the pump (ensure the outlet line is attached to the riser and that there is sufficient effluent in the sump)

6. Check that the level in the sump drops. The minimum discharge rate with the flush valves removed must typically be measured at more than 20 l/min using a water meter.

7. If the pump pressure or flow rate is found to be unsatisfactory, replace it with a stronger pump approved by Biolytix.

8. Return all failed pumps to Biolytix in the same packaging that the new pump was sent in.

Float Switch Operation (if fitted)

The float switch is fitted in a swivel assembly that allows it to move in a controlled arc within the pump-well without fouling on the side of the pump-well or the pump. This Biolytix designed assembly is both simple and highly reliable.

What can go wrong?

1. Float switch can fail (Symptoms; will not complete the power circuit so the controlled equipment won't operate in the up position or will not stop operating when the float is in the down position)
   a. replace the float switch
      i. In pre-December 2010 systems, turn off the power, open the control box and disconnect the float switch. (there are two float switches so make sure you replace the faulty one.)
      ii. In Post December 2010 units unplug the faulty float switch and remove the plug.
      iii. Refit the new float switch in the reverse order to disassembly above.

2. Float switch can leak and fill up with water (Symptoms: and may trip any RCD installed, pump voltage is incorrect and will not deliver the full head pressure or flow, you can hear water in the float when shaken, and multimeter shows 10K Ohms or less resistance when float is in the up position, the float will not be as buoyant and will switch at the wrong level)
   a. Replace the float switch as above.

3. Stainless steel hose clamp is adjusted to the wrong height (Symptoms: float does not cut in at 165mm and does not cut out at 60mm, the float cut-out is too low and air sucked into the pump inlet screen before the pump switches off).
   a. Loosen the stainless steel hose clamp screw and adjust it up or down as needed then retighten it (the lower edge of the hose clamp should be 150mm up from the pump base plate.

4. Float cable is incorrectly installed in the swivel clip. (Symptoms; either the float or the cable catches on the pumpwell wall so that the switch does not operate reliably)
   a. Release the swivel clip mechanism and slide the float cable in or out so that it is 20mm from the shoulder of the float to the closest edge of the swivel clip.
   b. Shorten the cable loop so that it just clears the pump well during its arc of movement.

5. Float swivel clip can stick (Symptoms: feels stiff to rotate and the float may not cut in or out at the correct levels – this is very rare with the Current PP clips).
   a. If it does, loosen it by applying silicone grease and working it up and down several times, then replace the swivel and stainless steel M4 screw.
   b. If it is the old SS swivel arrangement from 2004, replace with the new PP swivel clip.

6. Stainless steel hose clamp is loose broken (Symptoms: 316 SS hose clamp may have rusted out or broken. This is usually caused by high concentrations of caustic soda in the effluent or other harsh chemical may have been used.)
   a. Carefully check the body of the pump for corrosion or pitting
   b. Replace any parts as necessary. This is not covered under warranty as we use only marine grade stainless steel parts and the system must never have harsh corrosive chemicals used in it.

Alarm Operation – Pre December 2010 Telemetric only

1. Activate the high-level alarm float by lifting it up with the float test rod (made by connecting 1" MF polypropylene elbow to a 900 mm x 1" polypropylene pump riser).
   i. Check that electrical continuity is obtained across the high level alarm cable (blue and brown) connected to the terminal strip in the alarm box (small junction box). Continuity is checked by switching the multimeter to the ohms scale 2000k range and obtaining a reading of approx 0. If continuity is not obtained the float switch is faulty and requires replacement.
   ii. Switch off power to the unit.
   iii. Check that the air pressure switch is working by checking the electrical continuity across the pressure switch leads (red) connected to the terminal strip in the alarm box. (Test as step 2 and replace if necessary) note this may take up to 30 seconds, after switch off to operate
   iv. Check that the phone line has a dial tone by plugging in a standard telephone handset or measuring the voltage across the telephone line (48 V DC). To test for voltage attach the supplied test lead to the phone line and clip multimeter leads to the crocodile clips using the dc volts 200 range.
   v. If there is no dial tone or voltage, please contact our Field Services Team to get approval for repairs.
2. Replace the pump-well lid. Hand tighten riser gland and attach the elbow and camlock fitting onto the top of the pump riser and connect the outlet hose's matching camlock fitting securely.
3. Complete Section QC004 in the Biolytix Service Checklist.
4. Activate the pump and make sure there are no leaks in the fittings.

Alarm Operation – audio/visual

Warning - this alarm is powered by 240v ac. If problems are encountered when testing, a licensed electrician should carry out repairs, if the unit was produced before December 2010, otherwise the faulty parts can be unplugged, replaced and returned.

1. Activate the high-level alarm float by lifting it up with the float test rod (made by connecting a 1" MF polypropylene elbow to a 900 mm x 1" polypropylene pump riser).
2. Check that an audio/visual alarm occurs at the A/V unit. If an alarm is observed, the float switch is

working. No further action is required. Reset unit.

3. Activate the air pressure switch by removing the airline from the switch.
4. Check that an audio/visual alarm occurs at the A/V unit. If an alarm is observed, the air pressure switch is working and no further action is required. Reset unit.
5. If an alarm/s is not registered check that there is power to the A/V unit and that the timer is operational. If satisfactory, split the float and air pressure switch and test for continuity across switch when activated. Replace as necessary.

Air Pump Operation (if fitted)

1. Check the air filter (located in the base plate of the Schego air pump) for contamination. If contaminated, replace the filter.
2. Check the operation of the air pump by removing the airline and ensuring there is adequate airflow. If not, check the diaphragm for wear and the armature for the correct magnetic gap.
3. Change the diaphragm by:
    a. Switching off the unit at the isolating switch.
    b. Unplug the air pump from the GPO (Disconnecting the air pump from the terminal strip in the control box and removing the air pump from the control box in pre-December 2010 units)
    c. Loosening the retaining screws from underneath the air pump and lifting off the housing cover.
    d. Unscrewing the membrane nuts.
    e. Loosening the retaining screws on the metal rocker.
    f. Replace diaphragms and assemble in the reverse order ensuring there is a 2 mm gap between the magnet and the coil.
    g. If the gap is incorrect adjust by loosening the retaining screw on the pump head and loosen the screws on the rocker. Re-adjust and tighten.
4. Check the performance of the air pump again after servicing to ensure satisfactory operation. If operation is un-satisfactory replace pump and return the un-serviceable unit to Biolytix.
5. Reconnect airline.
6. Complete Section QC004 on the Biolytix Service Checklist.

Effluent Dispersal Check

1. With the pump running, check that the dispersal / irrigation system accepts effluent without any overflow or surfacing in or around the dispersal field. The pump-well may need to be filled with mains water (if available) if there is insufficient treated effluent in the pump well to undertake irrigation area field checks. Observe the vegetation in the dispersal field for uneven colour and growth, which may indicate that effluent dispersal is uneven. Complete Section QC006 on the Biolytix Service Checklist.
2. Note any odour coming from vents or flushing valves in the dispersal / irrigation field. Complete Section QC006 on the Biolytix Service Checklist.

3. Unscrew, remove and thoroughly clean the flush valves/vacuum breakers, paying particular attention to any small apertures. The flush valves are normally installed within the Biolytix Filter; however in some installations the flush valves may be located within the irrigation area in valve pits.
4. Activate the pump for a full minute, using the pump by-pass button, to flush the irrigation system of larger debris. Following this step, turn off the BF unit so no further pumping can occur. For sites with infield flush valves removed the pumping time may need to be adjusted to prevent surfacing of flushing flow from infield pits.
5. If the flow to the irrigation system is less than 12 L/min (estimated by monitoring discharge flow), which could indicate the presence of heavy biofilm growth within the irrigation system, insert a Calcium hypochlorite tablet (these can be ordered from pool supplies shops) into the pumpwell and contact Biolytix to discuss installing an irrigation aeration venturii to improve dripper operation and efficiency.
6. Replace the two flush valves/vacuum breakers. Switch the BF unit back on, and trigger the pump using the pump bypass button. Check to see that the flush valves have operated correctly for two complete pump cycles (i.e. flush a small volume of effluent and then close). It is important that the flush valves are operational as they provide a small flush of the irrigation line every time the pump starts, allowing the irrigation system to only receive an annual full field flush.

Complete Section QC006 on the Biolytix Service Checklist.

Installing and Commissioning a Lower Filter Bed Air Line

Background

Some Biolytix filters have the geofabric so tightly sealed against the tank wall, that when saturated, the geofabric forms a very effective air seal. The result is that the air pump pressurises the sump and this can lead to more than 500mm of effluent being held up above the geofabric layer. This effectively blocks the effluent drainage through the bed and more importantly it prevents air from getting to the Filter Bed, resulting in declining bed respiration and effluent quality to the point where it may no longer comply with effluent BOD5 approval limits. In recent times, filter beds in this condition would have been mis-diagnosed and recommended for a rebuild. If this procedure is carried out correctly, then, in many cases, a rebuild should not be required.

Work Instruction

5. Work a 1.8m long 1" poly riser (with the lower end cut to a tip like a syringe needle), down the side of the tank about 50mm either side of the sump air line. After cleaning out with air, insert a dip stick in this to check if there is any liquid ponding above the geofabric.
6. In a 3000L tank the poly riser should be inserted to a depth of about 1300 mm, and in a 4000L tank of about 1660mm below the tank lid inspection opening. Don't force it too far down, or damage to the geofabric layer may result!
7. If there is water ponding above the poly riser end, then connect the threaded end of the riser to a helical rotor pump and suck out the excess effluent. *(If a helical rotor pump is not available then a low cost industrial wet and dry vacuum cleaner can also be used to suck out the effluent if there is only a small amount of ponding, but the waste drum must be frequently emptied and this is fiddly for larger volumes of effluent.)*
8. In a 3000L tank insert a 1300mm, or in a 4000L tank insert a 1660mm long 1/4" air line down the side of the tank using a round ended, 2m long 3.2mm diameter, 316 Stainless Steel rod to ensure the end of the air line is inserted to the correct distance (either 1300 or 1660mm as specified above) below the Inspection Opening in the tank lid.
9. Withdraw the rigid poly riser, and then withdraw the SS rod while holding the air line in the correct vertical position.
10. Settle the geofabric and bed back against the new air line to prevent the air bypassing the bed around this new air line.
11. Using an air compressor ensure that both the sump air line and the lower bed air line are not blocked.
12. Connect up the straight end of a push fit "T" to the lower bed air line.
13. Connect up the old sump air line to the branch of the push fit "T"

Measuring Bed Blockage (by Recording Bed Air Flow Resistance)

The sump air line branch of the Push Fit “T” can be removed and a U tube Water Manometer can be connected to the branch of the "T" to check bed blockage using the air flow resistance method at any time in the future.

13. **Bed Blockage**

The pressure required to force air flow up through the bed is critical and should remain low.

1. If there is more than 380mm of pressure registered in the manometer with the full flow of air from the Schego air pump, then the bed above the geofabric is considered blocked.
2. This must be corrected immediately by applying the full air flow from a standard 12 CFM air compressor (with a 20 L or more compressed air storage tank) directly to the lower bed air line.
3. Allow the pressure to build in the air compressor tank to the cut out pressure then connect to the air line at the maximum flow possible through the 1/4” air line.
4. This procedure should be repeated a few times until the manometer reading with the Schego air pump is not more than 380 mm of water head.
5. Provided air flow through the bed is maintained thereafter, and the tank has an acceptable worm population, the worm activity through the bed will keep the bed pores open and a manometer pressure reading below 380mm of water should be maintained in the future and no further blockage or treatment issues should be encountered. A bed with good worm activity and good air flow will typically have an air flow resistance pressure of less than 200 mm of water head.
6. If there is bypassing of the air around the newly installed air line, then a false low air flow resistance pressure may be recorded. If it is less than 100mm this should be suspected, so fix the bypassing by settling the bed around both air lines and check that the air is not escaping before re-testing.

Geofabric blockage

7. Under normal conditions there should be no water ponding over the end of the lower bed air line.
8. After carrying our Step 1 above, the depth of water that is ponding above the end of the lower bed air line can be measured accurately (provided it is less than the actual bed resistance as measured above).
9. Using a short length of air line with a tap in it (you can remove the effluent sample tap temporarily for this) gradually increase the air flow until the water level in the manometer remains stable **below** the bed's air flow resistance pressure. This is the level of effluent that is ponding above the end of the lower bed air line. After completing this bed maintenance procedure, please recommend to the householders to use water very sparingly for a few weeks while the bed recovers its aerobic status and worms re-colonize the bed and the geofabric's hydraulic flow rate is restored to normal.

Ensure that power is restored and all pumps are operating correctly before you leave the site.

Call our field service team while onsite (+61409 898 690) if you have any questions, observations or feedback.

In a flood situation a partial vacuum can be applied to the pumpwell using a Push fit end connector and air line provided that the pumpwell has a 5 mm hole drilled into the sump 300 mm up from the base of the tank. The partial vacuum can be applied by kinking off the sump air line and then reversing the air flow in the Schego air pump (rotate the flap valves under the diaphragms 180 degrees to reverse the air flow). the suction should be applied to the a sealed fitting in a sealed Pumpwell lid. This arrangement can be left permanently in place to provide bed aeration.