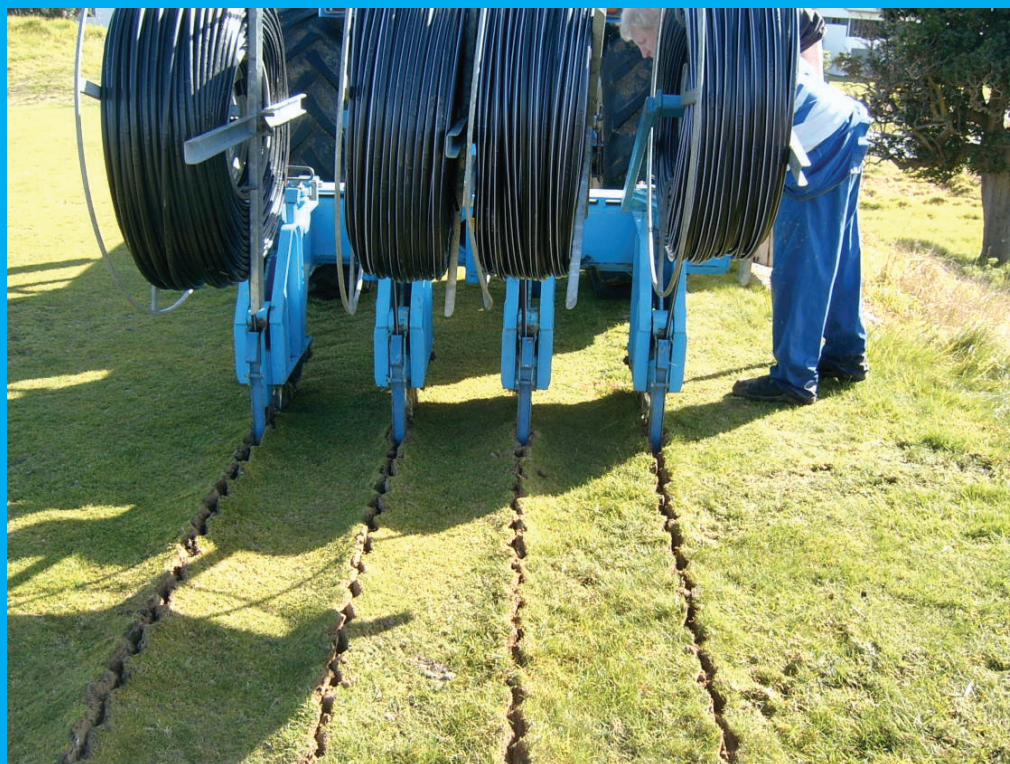


Biolytix BioPod

Wastewater Treatment System



DRIP IRRIGATION GUIDE

October 2014



Welcome to the Biolytix Drip Irrigation Guide.

The land disposal system is a critical component of any on-site wastewater system yet it is the component that typically gets lesser consideration during the design, installation and maintenance of a wastewater system. As a consequence the disposal system is the area problems will typically become evident. Not only that, a poorly performing disposal system can have a negative impact on the performance of the treatment system.

There are numerous sources of information, Standards, guidelines, Council rules and designer's and installer's opinions when it comes to the drip irrigation of treated effluent. We have selected what we believe are the most important issues and summarised them in this guide to create a best practice recommendation for Biolytix wastewater systems. This guide will cover most typical Biolytix installations however where parameters fall outside the scope of this document Biolytix engineers are available to assist with specific disposal system recommendations.

This guide does not offer procedures on how to determine the area of irrigation required or the suitability of the site for irrigation of treated wastewater. This requires an experienced specialist who can assess the site and soils and is familiar with the local conditions and compliance requirements.

Please note that this guide is tailored to the use of a Biolytix wastewater treatment plant disposing to land via a Wasteflow drip irrigation system. Biolytix accepts no responsibility for the use of this guide with other types of treatment plant or dripline.

On a typical project it is not uncommon for there to be conflicting opinions on the design of a dripline disposal system between the Council and Regional rules, the Australia New Zealand Standard, Building or Resource Consent conditions, the recommendations of the design engineer, preferences of the installers or property owner and Biolytix recommendations. Whilst these conflicts are usually resolved in one way or another it is Biolytix as the manufacturer who carries the most responsibility for the satisfactory long term operation of the wastewater system. The Biolytix recommendations must therefore have some priority. Where there is dispute about the design or layout of a particular dripline disposal system Biolytix engineers are available to help recommend what is best for the site. An incorrectly installed disposal system may affect the overall warranty of the Biolytix system.

The Biolytix wastewater treatment plants, the BF6 and BF8, produce wastewater effluent of a quality suitable for direct irrigation to land via pressure compensating dripline. Biolytix provides irrigation kits in 100m increments which exclusively use Wasteflow dripline. Wasteflow dripline was specifically developed for subsurface disposal of effluent. It incorporates unique features such as:

- Root intrusion protection by patented technology incorporating sustained release herbicide impregnated into the plastic of the emitters at time of manufacture
- Organic growth reduction in the dripline and emitters by the use of non-mobile anti-microbial lining inside the pipe and in the plastic of the emitters
- Consistent flows through the use of 2.0 litre per hour pressure compensating emitters spaced at 0.6m centres
- Chemically resistant components, especially the Silicon diaphragms in the drippers (which are not affected if chemical cleaning ever required)
- Can be used subsurface or on-surface under mulch application
- Clear identification with lilac stripes that the pipe carries treated effluent
- Robust pipe & emitters that are much more resistant to kinking and compressing relative to other thin walled dripline

Biolytix irrigation kits are available in standard sizes of 300m, 400m, 500m and 600m. For disposal systems in excess of 600m we recommend contacting Biolytix engineers for specific design advice.

The design engineer for the wastewater project will have recommended a minimum disposal area based on the Council rules, the estimated flow volumes and the design irrigation rate for the site soils. Biolytix require that a minimum quantity of 300m of dripline is used and that disposal area are rounded up to the nearest 100m increment e.g. for a 350m² disposal area Biolytix recommend a 400m irrigation kit. Dripline is usually installed with no more than 1m between parallel laterals (or rows) although in some circumstances the design engineer may recommend a lesser row spacing (which will require more dripline for the same size disposal area).

The design engineer will take into account Council required separation distances (to boundaries, watercourses, dwellings etc) and the property owners landscaping plans and will usually allocate an envelope on the property within which the land disposal system must be installed. The final layout of the dripline within that envelope is often left up to the installer to decide and typically there may be numerous potential layouts.

Eight example layouts of a 400m disposal field	
<p>AIR VALVE AT HIGH POINT 32mm MDPE BIOLYTIX</p> <p>FLUSH VALVE IN VALVE BOX</p> <p>100m</p> <p>SLOPE</p> <p>STANDARD 4m x 100m LAYOUT</p>	<p>AIR VALVE AT HIGH POINT</p> <p>FLUSH VALVE IN VALVE BOX</p> <p>100m</p> <p>SLOPE</p> <p>4 X 100m LAYOUT WITH TANK HIGHER THAN FIELD</p>
<p>AIR VALVE AT HIGH POINT</p> <p>ENSURE FLUSH VALVE FOR EACH LATERAL IS LOWER THAN AIR VALVE</p> <p>MAX 50m</p> <p>33m</p> <p>SLOPE</p> <p>12m x 33m LAYOUT</p>	<p>MAX 50m</p> <p>50m</p> <p>SLOPE</p> <p>8m x 50m LAYOUT</p>
<p>AIR VALVE AT HIGH POINT</p> <p>32mm MDPE</p> <p>BIOLYTIX</p> <p>FLUSH VALVE IN VALVE BOX</p> <p>100m</p> <p>SLOPE</p> <p>VARIABLE LATERAL LENGTHS POSSIBLE</p>	<p>AIR VALVE AT HIGH POINT</p> <p>32mm MDPE SUPPLY MANIFOLD</p> <p>FLUSH VALVE AT TANK</p> <p>25mm MDPE SUPPLY MANIFOLD</p> <p>100m</p> <p>SLOPE</p> <p>NO MORE THAN 4 LATERALS WITH THIS LAYOUT</p>
<p>200m</p> <p>SLOPE</p> <p>LONG NARROW STRIP CAN BE IRRIGATED IN THIS CONFIGURATION</p>	<p>GARDEN IRRIGATION</p> <p>ON A FLAT SITE DRIPLINE LATERALS CAN BE IN ALL DIRECTIONS</p>

The following simple rules are designed to assist the installer determine the best dripline layout for a site:

1. Do not use an in line disc or screen filter. Biolytix tanks have an internal 80 micron filter and do not require additional filtration (see notes on filtration below).
2. Unless required by the design and agreed to by Biolytix do not install DNL valves, TNL valves, sequencing valves or other mechanical devices on the dripline system. Good hydraulic design negates the need for these items which just add potential blockage points.
3. Always install dripline across the natural slope of the ground, parallel to the site contour. Each dripline lateral should ideally remain at about the same elevation.
4. Always install an air valve at the highest point of the disposal field. Usually this will be adjacent to the tank, or at the end of the 32mm MDPE supply manifold. Our irrigation kits contain fittings that allow the air valve to be installed at either end of the 32mm supply manifold.
5. The minimum quantity of dripline recommended by Biolytix is 300m. For example if the design engineer for the site has recommended a 150m² disposal area we recommend installing the minimum 300m of dripline at a 0.5m row spacing to give a 150m² area.
6. The maximum length of lateral recommended is 100m. Wasteflow dripline comes in a 100m coil. In most circumstances there will be enough system pressure to use the full 100m coil. We generally recommend using longer laterals e.g. recommend 3 x 100m laterals in preference to 6 x 50m laterals.
7. Individual dripline laterals do not need to be the same length. e.g. if it suits the site layout there is no reason not to have four laterals of 1 x 100m, 1 x 80m, and 2 x 60m.
8. Install a 15mm flush valve at the end of each dripline lateral and install a soakage pit at the end of each lateral. Soak pit should be filled with aggregate and have an approximate volume of 50 litres. Install flush valve inside a valve box and mark location with a high visibility stake or similar. Each Biolytix irrigation kit is supplied with 15mm flush valves, valve boxes and marker stakes to enable this.
9. The maximum slope recommended for subsurface dripline installations is 30% (16.7 degrees) and less for surface pinned installations. Contact Biolytix for specialist design advice for slopes in excess of this.
10. The maximum vertical elevation (between the top of the disposal field and the top of the Biolytix tank) is 16m for a 300m field, 14m for a 400m field, 12m for a 500m field and 10m for a 600m field. Contact Biolytix engineers for advice if the elevation is in excess of these heights.
11. Each irrigation kit has a 50m coil of 32mm MDPE pipe to connect the Biolytix treatment plant to the land disposal system. The maximum length of 32mm MDPE supply manifold is 50m. Contact Biolytix engineers for specialist design advice if the site requires a longer manifold. Each irrigation kit contains a number of tapping saddles to allow the dripline to be connected to the 32mm supply manifold.
12. Where possible maximise the width of the disposal field and minimise the height of the disposal field.
13. Always bury or cover the dripline with topsoil or a mulch layer.
14. Always record the pressurised flow rate on commissioning.

For those irrigation fields for which the above recommendations and layouts are not practical Biolytix recommends consultation with Biolytix engineers.

Filtration

The Biolytix has a large area, 80 micron internal filter through which all treated effluent must pass before final disposal. This eliminates the need for an inline disc or screen filter. Key advantages of the internal filter are:

- With a surface area of over 5m² it is significantly larger than the typical small external standard irrigation filters (i.e. typical 1" disc filters with a filtration surface area in the order of 0.05m²)
- External filters are prone to blockage and can need extra maintenance by requiring regular cleaning
- At 80 micron it produces improved filtration over the typical 130micron discs typically used by the industry

To protect the internal Biolytix filter it is essential that the system has an effective and reliable irrigation system. If the disposal system blocks or has reduced capacity it can result in flooding of the Biolytix system. For this reason Biolytix only specifies Wasteflow dripline with standard design layouts and maintenance procedures as described in this document.

Air Valves

An air valve must be installed at the highest point in the disposal field. The air valve has three functions:

- Prevents a vacuum from forming when the liquid drains to the lowest emitters in the disposal system between pump cycles.
- Prevents soil from being sucked into emitters during dripline draining
- Allows air to escape from the dripline network when the pump starts

Biolytix irrigation kits are all supplied with a 25mm air valve which will typically be located in one of three locations:

- At the end of the 32mm manifold when the field is higher than the tank
- Immediately adjacent to the tank when the tank is higher than the field
- At the highest point of the 32mm manifold. This will require use of a tapping saddle or similar fitting not supplied in the standard irrigation kits.

In all cases the air valve should be protected with the supplied valve box.

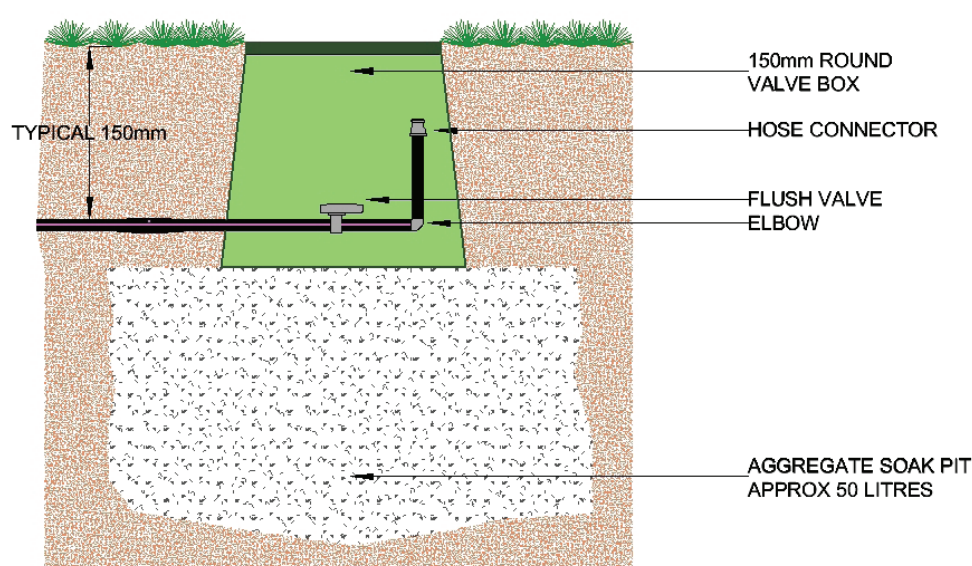
Maintenance

FLUSHING

Regular flushing is essential for all dripline disposal systems. Regardless of the level of treatment there will be residual organics in the treated wastewater which will stimulate the growth of biomass within the mainline and laterals of the dripline system. This biomass needs to be scoured from the dripline via flushing. Installing the dripline system with individual flush valves on the end of each lateral as described above allows for higher velocity flushing as the entire pump flow can be flushed one lateral at a time. The recommended procedure is as follows:

1. Switch off pump and then fill the pump chamber with water beyond the pump start level.
2. Identify all the flush points in the disposal field. Open one flush valve only, leave the remaining valves closed.
3. Start the pump and allow active line to flush until clear or for 2 minutes – whichever takes the longest.
4. Close the flush valve and repeat the procedure with all the other flush valves.

The flush valves provided in the Biolytix irrigation kits have a hose connector to allow a short length of garden hose to be temporarily fitted to the flush valve to divert flush water away to a suitable location where it won't cause a nuisance.





FLOW RATE RECORDING

It is important to record the pressurised flow rate of the disposal field at each service (preferably after the field has been flushed) and comparing it to the flow rate measured on commissioning. The procedure for recording the flow rate is as follows:

Undo the camlock fittings on the pump outlet and install a water meter fitted with camlocks (Biolytix can supply a suitable water meter with camlock fittings).

Start the pump using the override button. Wait for the flow rate to stabilise (typically about a minute) and then count the number of revolutions of the litre dial in

one minute (or short a shorter time frame). Assuming Wasteflow is being used and there is no blockage the following flow rates should be achieved:

300m:	16.7 litres/minute
400m:	22.2 litres/minute
500m:	27.7 litres/minute
600m:	33.3 litres/minute

If a recently flushed dripline field is delivering less than 75% of the theoretical flow rate it will be necessary to repeat the flushing procedure and/or undertake a chlorine flushing procedure until the flow rate improves. Contact Biolytix for specific advice and a chlorine flushing procedure.

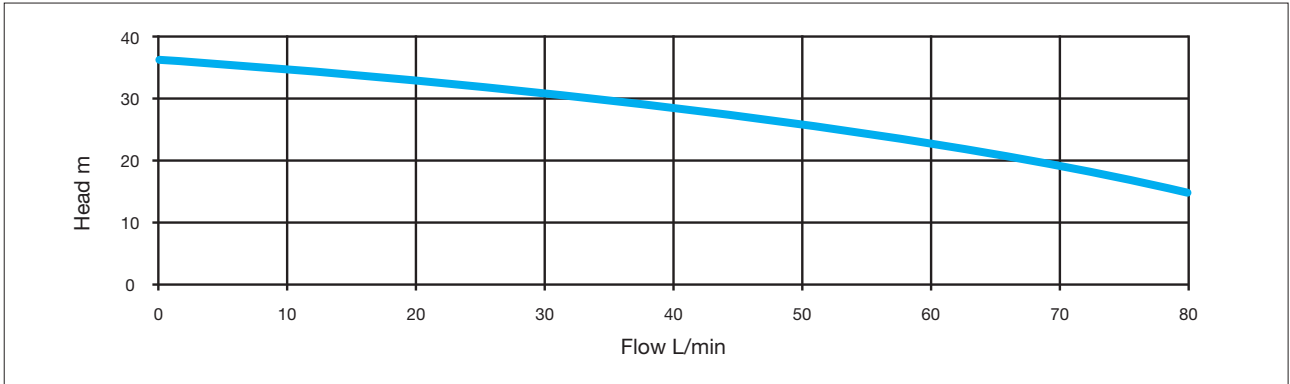
Irrigation Kits contain the following components:

Biolytix Irrigation Kit Components	300m	400m	500m	600m
Wasteflow 16-2-60 (100m coils)	300	400	500	600
MDPE Pipe 32mm PN8 (1 x 50m)	50	50	50	50
Toro Male Coupler 32mm xs 1" BSP (TMC32)	1	1	1	1
VBK-1 BSP Air Valve	1	1	1	1
Toro 32mm Female Elbow x 1" BSP (TFE32)	1	1	1	1
Toro Tapping Saddle 32mm x 3/4"mm BSP (TTS3220)	4	4	6	6
16mm Drip-in Tail x 20mm BSP Male Director (1015662)	4	4	6	6
16mm Drip-in Rachet Clip (1015655)	16	16	24	24
Valve Box 150mm round residential (1012666)	5	5	7	7
Ceelon PTFE Thread Seal Tape Red 10m x 12mm (O-CEELON-30)	1	1	1	1
13mm In-line barbed tap (green black)	4	4	6	6
16mm Drip-in joiner (1015667)	6	6	6	6
13mm Barb to Snap-on Hose Adaptor (1011107)	4	4	6	6
25mm Hansen Threaded Tee	1	1	1	1
25mm Hansen Hex Plug	1	1	1	1



Irrigation Pumps

The standard Biolytix has a Pedrollo NKm 2/1 pump which is float active and delivers approximately 200 litres from the pump well to the irrigation system.
The pump curve for the NKm2/1 is shown below:



Summary of Headlosses for Different Irrigation Kits

Dripline Length	300m	400m	500m	600m	m
Number of Emitters	500	667	833	1000	
Pressurised Flow Rate (PFR)	1000	1333	1667	2000	litres/hour
32mm MDPE Length	50	50	50	50	m
Supply manifold friction loss	12.5	20	28	42	m/1000m
Supply manifold friction loss	0.625	1	1.4	2.1	m
100mm lateral loss	3.5	3.5	3.5	3.5	m
Tank Depth	2	2	2	2	m
Minimum Emitter Pressure	8	8	8	8	m
Assumed Fitting Losses	2	2	2	2	m
Total Friction Losses	16.125	16.5	16.9	17.6	m
Including 10% Safety Factor	17.7	18.2	18.6	19.4	m
NKm2/1 Pressure @ PFR	34	33	31	30	m
Maximum Vertical Elevation	16.3	14.9	12.4	10.6	m
Maximum Elevation Guide	16	14	12	10	m

Biolytix Drip Irrigation Installation Checklist

Date of Installation _____

Installer _____

Registration # of Registered Drainlayer supervising installation _____

Client Name _____

Site Address _____

Suburb _____

Biolytix Type:	<input type="checkbox"/> Aust Manufactured	<input type="checkbox"/> NZ Manufactured	Filter Serial Number (9 digits)	B _____
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1. Total disposal area required	
2. Total disposal area installed	
3. Total length of dripline installed	
4. Maximum elevation (relative to tank)	
5. Minimum elevation (relative to tank)	
6. Number of laterals/flush valves installed	
7. Lengths of each lateral	
8. Pressurised flow rate on commissioning (L/min)	
9. Vegetation/ground cover (lawn, mulch, garden, bush etc)	
10. Estimated average slope	

Notes/Sketch:

Please fax/email a copy of the service checklist & any photos to Biolytix: Fax: (+649) 579-1080 Email: info@biolytix.com