

Drip Distribution Systems for Percolation Areas - Domestic Use

Drip irrigation of wastewater (also known as drip distribution or drip dispersal) is the most effective soil infiltration system. It is well suited to both permeable and impermeable soils and often eliminates the need for a raised mound. Drip can provide solutions on many sites with no other options.

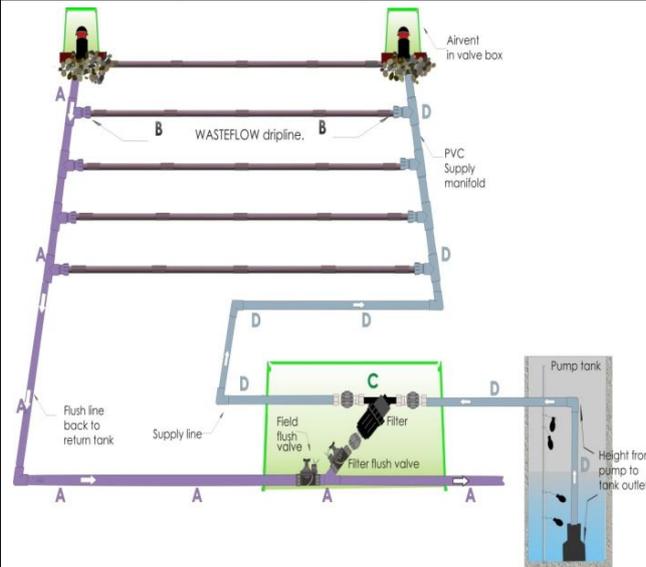
Irish EPA research (Jan 2016) reported very positive results from tests of drip systems designed and supplied by Ash Environmental. The new EPA Code of Practice 2018 draft to be finalised in 2019 includes guidelines on the use of drip systems. Drip is also used for tertiary treatment on sites with very shallow soils or gravelly soils or rock outcrops. It is suitable for single house and large commercial projects with design, commissioning and servicing quality control assured.

How does it work?

Tiny amounts of water are released from a network of drip irrigation tubing just below the grass surface. The drip tubing is specially designed for wastewater and to repel roots. The water is filtered and pumped in controlled doses day and night.

How is it Installed?

The dripline is typically buried 6 – 9 inches below ground surface by a mole plough on a farm tractor. No gravel is used. The drip lines are spaced 600mm along the site and connected in a piped network.



1/2" flexible polyethylene drip tubing with emitters attached to the inside wall, are spaced 600mm apart. Driplines are laid approx. 600mm apart in a network.



Mole ploughing driplines

Drip distribution of wastewater (drip-feed) is included in the Irish EPA Code of Practice 2009 under *Other infiltration systems*. Use of the drip technology is becoming more widespread following the 2016 EPA report on its successful use on studies in Ireland.

We supply Geoflow pressure compensating Wasteflow® drip systems as evaluated by Trinity/EPA research in Ireland. The Geoflow drip tubing has been treated to repel roots and bacterial slimes



What are the Benefits of Drip Distribution?

- Drip systems replace the need for an unsightly raised mound.
- Use on difficult sites- high water tables, tight soils, rocky terrain, steep slopes, around existing buildings and trees.
- Uptake of water by evapotranspiration is maximised.
- Installations are invisible and safe to walk or play on.
- Easy to install directly into existing soils with little or no disturbance.
- Shallow installation allows treatment in the biologically active topsoil
- Removal of pathogens and viruses in the aerated soil is maximised.
- Consumption of nitrates by the plant material is maximised.
- Uptake of phosphorous and nitrogen is maximised by vegetation.
- Wastewater is recycled in an environmentally sensitive manner.
- Efficient natural tertiary treatment and reuse of wastewater
- 15-year warranty for root intrusion and drip tubing integrity.
- Systems are robust with an expected life of 30 years.
- Multiple zones can be used for large systems or compact sites
- Easily automated with annual service contracts available.
- Design, installation, commissioning and full servicing is provided.

Drip systems are very cost effective for **larger systems and industrial effluent**. We provide design, installation and commissioning on projects. We also provide engineering consultancy and designs

for pressurised collection systems and decentralised treatment systems for community housing projects, villages and small towns.

Where is Drip Distribution Suitable?

Drip distribution of wastewater to soil percolation areas has now been used in many parts of Ireland and has recently become available for use in Scotland as an alternative to raised mound systems.

Drip is a cost-effective option in all soil conditions due to its installation near the ground surface which usually eliminates the need for costly fill material and unsightly raised mounds.

It is an excellent option for slowly permeable soils but it is also suitable for free draining and shallow soils in sensitive environments including limestone karst areas. The shallow and controlled dosing allows the water to pass through the surrounding biologically active and porous topsoil and avoid any short circuiting through fissures or sinkholes. This allows soil attenuation of pollutants and cleansing and renovation of the water as moves horizontally through the soil.

The US EPA wastewater design manual 2002 describes drip as “the most efficient of all distribution methods”. The Irish EPA research/evaluation of two drip systems in low permeability soils was published in January 2016. The Geoflow manufactured drip systems were designed and supplied by Ash Environmental. The drip system results reported were excellent on both sites evaluated. The drip system is recommended for use in the most impermeable soils with T-values up to 120 combined with a reduction of soil depth to 600 mm of unsaturated soil. Report link <http://www.epa.ie/pubs/reports/research/water/researchreport161.html#.VqDMc2SvlaQ>.

Drip System Installation

<p>The 2018 revised EPA CoP will give installation conditions for new developments. For existing systems the drip system requires a minimum of 400mm of soil below the drip tubing install depth of 150 -200mm in order to operate hydraulically.</p> <p>A mole plough attached to a tractor or similar is easiest for insertion but the driplines can also be manually dug into the topsoil. A rectangular arrangement is typically used for the infiltration area with the dripline inserted parallel to the fall on the site and direction of the groundwater flow.</p>		<p>Mole ploughing dripline 6-9” below ground level.</p>
<p>The PVC supply and return manifolds are usually placed on the short side of the rectangle in a single trench. The dripline is inserted into the topsoil at 150-200mm depth at 600mm spacing between driplines. No aggregate or stone is required around the dripline. One end of the dripline is attached to the PVC supply line from pump tank and the other end to a PVC pipe returning to the primary tank for backwashing of solids from the drip network.</p> <p>A pump supplies the required operating pressure and a fine mesh filter is on the pump outlet to screen the effluent.</p>		<p>If necessary dripline can be manually inserted on steep slopes or wooded areas.</p>

- Drip systems are very cost effective for larger community systems and commercial or industrial effluent flows.
- We provide design, installation and commissioning on projects.

- We can also provide engineering consultancy and designs for pressurised collection systems and decentralised treatment systems for community housing projects, villages and small towns.

Drip System Installation



Driplines are connected to pipe manifold kits and air vacuum release/ vent valves



Dripline is connected by hand to lock-slip connections and solvent welded to PVC



Headworks with filter and flush valves

The secondary treated effluent is distributed uniformly over the total available area using Geoflow pressure compensating drip tubing. A pump tank of approximately 800 -1200 litre volume allows flow equalisation and control over the dose volume. A high head submersible pump generates the required pressure to pressurise the dripline network while taking account of the site total dynamic head including network friction losses.

Timed dosing of effluent is an option to allow dosing over the 24 hours of each day. The dripfield is dosed intermittently and rested between pumping events to avoid saturated conditions which assists the water to infiltrate into the subsoil and for the soil to remain air filled and unsaturated.

With timed dosing, the treatment capacity of the soil to remove pollutants and the soil infiltration of the water are both enhanced by the intermittent dosing and resting cycles of the wastewater controlled by the system electronic PLC.



Dripline pegged in place in fill material before backfilling



Water drips from emitters into the topsoil

Design, installation, commissioning and full servicing is provided for a lifetime of quality assured operation.

Geoflow Drip Tubing

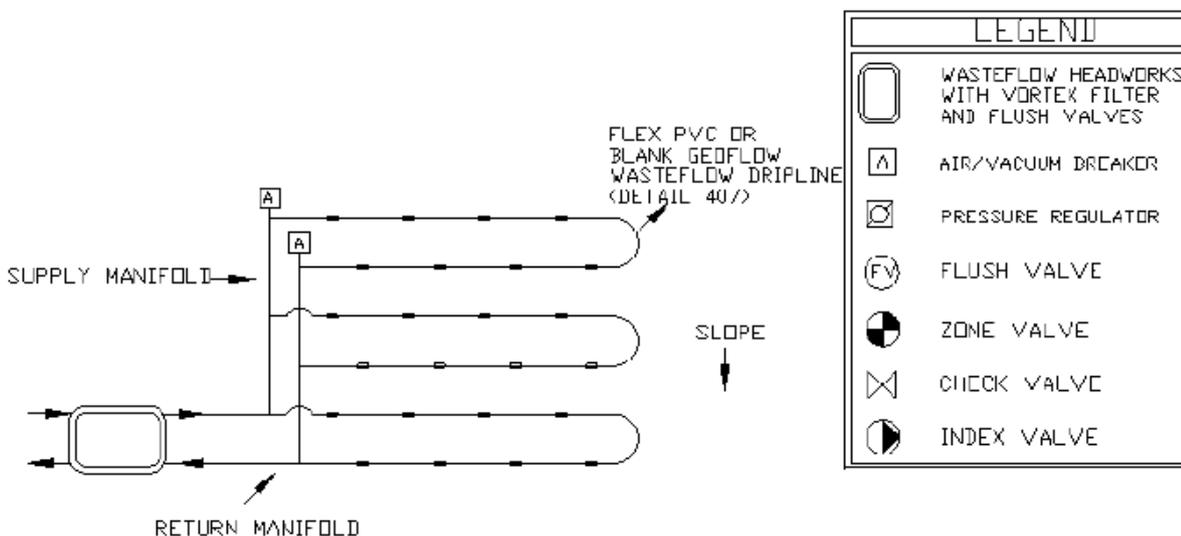
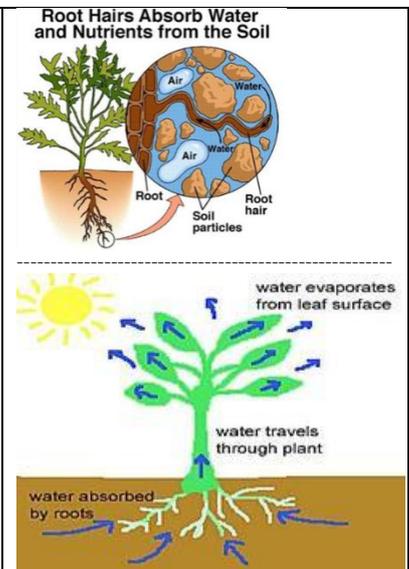
The dripline has a series of emitters spaced at 600 mm intervals in the drip tubing which are moulded into the dripline at the time of manufacture. Each pressure compensating emitter opens when the design pressure is reached and releases 0.03 litres/min of water to literally drip into the soil. The “pressure compensating” dripline minimises the effects of pressure disparities throughout the driplefields and optimises control over dosing volumes throughout the infiltration area. Modelling has shown that the water released from drip emitters moves predominately vertically downwards through the soil.

The Geoflow drip tubing is pre-treated to prevent bacterial deposits adhering to the tubing walls and to prevent root intrusion from vegetation. The PVC supply pipe to the driplefield and the return pipe to the treatment system will be directed through the system headworks containing a fine mesh 120 micron filter and ball valves to allow automatic flushing and backwashing of the filter and the drip network. Farm animals and heavy machinery can damage pipework and components and must be kept off the driplefield.

Benefits of Flow Equalisation and Timed Dosing

The uniform dosing and resting operation combined with the shallow placement in the topsoil will:

1. maximise the treatment of the wastewater in the unsaturated topsoil and nitrogen and phosphorous uptake by the grass roots;
2. maximise evapotranspiration via plant transpiration and air drying;
3. enhance the soil infiltration and percolation through the subsoil;
4. facilitate horizontal water movement in the topsoil for pollution attenuation and safe effluent dispersal;
5. minimise water mounding in periods of seasonal high water table.
6. flow equalisation, uniform dosing and emergency storage are provided via a 1 day’s volume pump tank which spreads the flows over 24 hours.



Looped driplines sketch showing PVC manifolds in a single trench