GEOFLOW

DESIGN - INSTALLATION - MAINTENANCE

SUBSURFACE DRIP DISPERSAL & REUSE

CONTENTS

INTRODUCTION

The objective with effluent dispersal is usually to disperse the effluent using the minimum area as quickly and safely as possible at an approximately uniform rate throughout the year. If the main purpose of the Geoflow system is to irrigate, then please use the standard irrigation manual for landscape available from Geoflow, Inc.

Subsurface drip is a highly efficient method to dispose of effluent. Small, precise amounts of water are uniformly applied under the soil surface from multiple points.

The main advantages of Geoflow's subsurface drip system for effluent dispersal are:

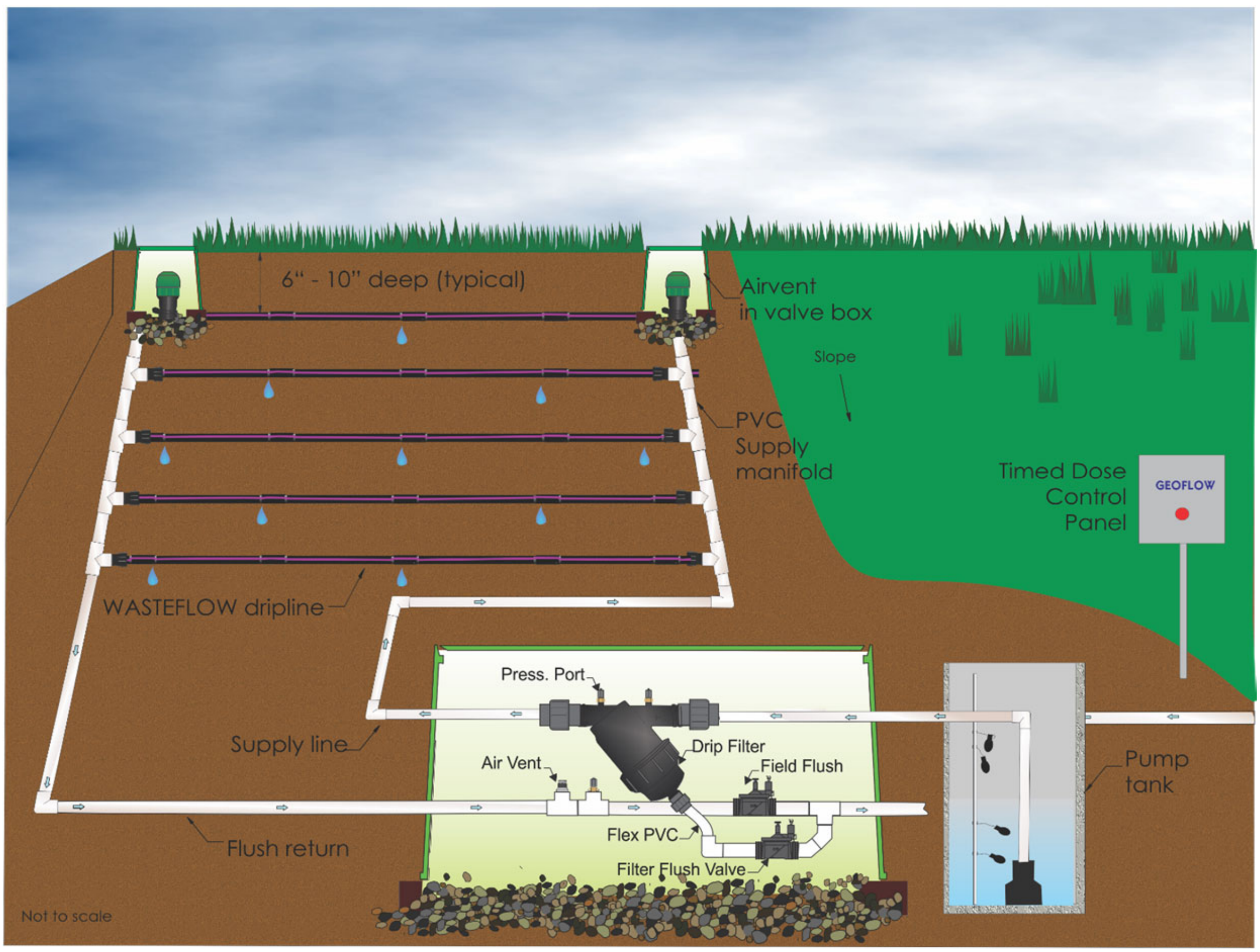
- Human and animal contact with effluent is minimized, reducing health risks.
- Correctly designed operated, and maintained systems should not cause puddling or runoff.
- It can be used under difficult circumstances of high water tables, tight soils, rocky terrain, steep slopes, around existing buildings, trees or other vegetation, and on windy sites.
- Disposal of water is aided by means of evapotranspiration.
- The system requires no gravel. It is installed directly into indigenous soils and the natural landscape can be maintained.
- Minimizes deep percolation.
- Consumption of nitrates by plants.
- Low visibility and vandal resistant installations.
- Fifteen-year warranty for root intrusion with a long expected life of approximately 30 years.
- Non intrusive. It allows use of the space while operating.
- Easily automated.
- Effluent may be re-used for irrigation.

NOTES

- These guidelines are for secondary treated effluent. When using primary treated effluent, Geoflow recommends increasing the number of emission points in the dispersal field by reducing the soil loading rate. For more information on septic tank dispersal, please check our website at www.geoflow.com or telephone Geoflow at 800-828-3388.
- Please follow your State and County Regulations for onsite wastewater dispersal. These guidelines are intended to be a guide to users of the Geoflow drip tube and should be used only as a supplement to your local regulations.

TYPICAL DRIPFIELD LAYOUT

Geoflow's WASTEFLOW®[1] drip system disperses effluent below the ground surface through ½" pressurized pipes. It is designed using the grid concept with supply and flush manifolds at each end of the dripline creating a closed loop system. The grid design provides a complete subsurface wetted area.



DATA REQUIRED PRIOR TO DESIGN

The following is the minimum data required prior to any SDI design:

1. Maximum gallons per day to be disposed of
2. Soil loading rate expressed in gallons per day per square foot
    a. Not the maximum loading rate but the rate that is to be used for design
    b. Depth to seasonal high water table, if present within five feet of the installation depth of the drip tube, supply and return manifolds, and or the supply and return mains
    c. Depth to restrictive horizon (rock, clay layers, etc.) if present within five feet of the installation depth of the drip tube, supply and return manifolds, and or the supply and return mains
3. Plat of area to be used for system design
    a. Property lines
        i. Set back from property lines
    b. Contours
        i. Major on 10 foot increments
        ii. Minor on 5 foot increments
    c. Utilities, above ground and buried, existing and those to be added with system
        i. Minimum set backs
        ii. Location and method of crossing, if allowed
    d. Surface water bodies
        i. Minimum set backs
        ii. Inlet and outlet drain ways with minimum setbacks, if present
    e. Streams, dry ditches, and drain ways
        i. Minimum set backs
    f. Wetlands delineation
        i. Minimum set back
    g. Location of treatment system
        i. Minimum setbacks from all structures and facilities associated with the collection, treatment, and operation of the facility
        ii. Temporary and permanent roads/drives with minimum set backs
        iii. Location of pump station
        iv. Location of acceptable drip field flush point

COMPONENTS

A typical drip system installation will consist of the elements listed below:

1. WASTEFLOW® DRIPLINE

(See product sheet for specification)

WASTEFLOW dripline carries the water into the dispersal/reuse area. The dripline is connected to the supply and return manifolds with Compression or Lockslip fittings. Typical spacing between each dripline and between drip emitters is 24" on center. Dripline is usually buried 6"-12" below ground. Standard coil length is 500-ft. Rolls of alternative lengths, diameter and dripper spacing may be special ordered.

a.) nano-Rootguard®

The risk of root intrusion with an emitter slowly releasing nutrient rich effluent directly into the soil is well known to anyone who has observed a leaking sewer pipe. All Geoflow drip emitters are guaranteed to be protected against root intrusion with nano-ROOTGUARD. This patented process fuses the root-growth inhibitor, Trifluralin or Pendamethylene into the dripline during manufacturing. It is registered with the United States EPA for this application. The nano-ROOTGUARD prevents root cells from dividing and growing into the barrier zone. It is chemically degradable, non-systemic, and virtually insoluble in water (0.3 ppm). nano-ROOTGUARD carries a **15-year warranty** against root intrusion.

b.) GeoshieldTM

The smooth inner turquoise lining of WASTEFLOW is called Geoshield, which inhibits adhesion of biological growth on the inside walls of the tube and drip emitters. This minimizes the velocity required to flush WASTEFLOW dripline. Only enough velocity is required to move out the fine particles that pass through the drip filter that, if not flushed, will ultimately accumulate at the distal end of each lateral. It is not necessary to scour growth off the inside wall of WASTEFLOW tubing. Since all pumps deliver more volume given less resistance to flow, just opening the flush valve will usually achieve this degree of flushing. We recommend 0.5 feet per second be used with WASTEFLOW dripline to get the settled particles at the bottom of the pipe back into suspension. This equates to 0.375 gpm per dripline when using standard WASTEFLOW dripline (0.55"ID)

c.) Turbulent Flow Path

WASTEFLOW drip emitters are pre-inserted in the tube usually spaced 12" or 24" apart with 24" being the most popular. Angles in the emitter flow path are designed to cause turbulence in order to equalize flow between emitters and keep the emitters clean. Geoflow emitters boast large flow paths, which, coupled with turbulent flow, have proven over the years to be extremely reliable and dependable.

d.) WASTEFLOW Classic and WASTEFLOW PC Dripline

Both WASTEFLOW Classic and WASTEFLOW PC have turbulent flow path emitters with nano-ROOTGUARD and *Geoshield* protection.

The WASTEFLOW PC has the added element of a silicone rubber diaphragm that moves up and down over the emitter outlet to equalize flows regardless of pressure between 7 and 60 psi. To ensure a long life the recommended operating range is 10 to 45 psi.

For WASTEFLOW Classic, the flow rate delivered by the emitter is a function of the pressure at the emitter. The Classic dripline has the advantage of no moving parts or rubber that may degrade over time. Also, when minimum flushing velocities are required, the flows during a dosing cycle and flushing cycle are very similar with the Wasteflow Classic because when the flush valve is opened, the pressure is reduced, causing the flows from the emitters to decline.

We generally recommend using WASTEFLOW Classic, unless the economic advantages to using PC is substantial.

- WASTEFLOW PC can run longer distances than WASTEFLOW Classic.
- Steep slopes. Systems must be designed for the dripline lateral to follow the contour. When this is practical, the extra cost of installing pressure regulators required for WASTEFLOW Classic would likely be less than the incremental cost of WASTEFLOW PC.

2. CONTROL PANELS

Control panels are used for time dosing and flushing of the filter and drip fields. GEO controllers include a programmable logic computer to increase flexibility and reliability in the field. They can be used on systems ranging in size from one to eight zones at the time this manual was printed. All controllers include an elapsed time meter and counter. Controllers can be ordered with special features such as variable dose times in each zone, monitoring of flow, ultraviolet, blower, and other inputs.

3. PUMPS, PUMP TANKS & FLOATS

Pump tanks serve as a storage system to hold the effluent until it's dosed into the drip field. The pump tank provides flow equalization, and emergency storage during periods of pump failure or electrical outage. Pump tanks must be sized according to your local rules and regulations, taking surge control and flow equalization into consideration.

WASTEFLOW drip fields depend on pumps to time dose effluent under pressure to the field. These must be sized according to TDH (Total Dynamic Head) for both the disposal and flushing cycle of each individual zone. Geoflow does not endorse a single manufacturer, but does advocate you use a pump that is readily serviced in your area. Two (duplex) pumps may be used. These will normally alternate at each signal from the control panel and are often used on commercial or large drip systems. Geoflow controllers are set-up for 4 floats with the lowest one in the tank being the *redundant off float*. The *primary timer on/off float* is second from the bottom, followed by the *secondary timer float* third from the bottom and the *high level alarm float* on the top.

4. FILTERS

(See product sheet for specifications)
Geoflow systems require 120 mesh or 130 micron filtration to keep any oversized upstream contaminants from entering the dripline. Geoflow offers a full range of drip filters, including both disc filters and screen filters. The discs are impregnated with Geoshield, and antibacterial that helps keep the discs clean. Filter surface area depends on the source of the effluent, the treatment, and consistent quality of the effluent entering the drip system. A 1.5" BioDisc filter will generally suffice for a single family residence with secondary treated effluent. Multiple filters can be placed in parallel to achieve larger surface area.

5. SUPPLY MANIFOLD AND LINE

This carries the water from the dosing tank to the dispersal area. Rigid PVC schedule 40 is usually used. Schedule 80 is at times used to either avoid dips in the line that can collect water and freeze. To minimize the potential of freezing, the pipes should slope back to the pump tank, be buried below frost depth and/or be insulated.

6. RETURN MANIFOLD AND LINE

In order to help clean the system, the ends of the drip lines are connected together into a common return line, most often made of rigid PVC. This line will help equalize pressures in the system. Flushing should be done frequently during the installation period. Periodic flushing will help to keep the manifolds clean. Many designers use the same size return line as they do the supply line for simplicity, or some down size the return line since return flow is lower than supply. The smaller the line is, the quicker it will take to pressurize the dripfield at the beginning of each dose. To minimize the potential of freezing, the pipes should slope back to the pump tank, be buried below frost depth and/or be insulated.

7. PRESSURE REGULATOR

Pressure regulators fix the inlet pressure at a given rate. Under normal operating conditions, pressure in the drip lines should be 10 psi to 45 psi. With WASTEFLOW

Classic it helps to know exactly what the pressure is in the dripline, so system flow can be easily calculated. With all dripline it is prudent to have a pressure regulator to avoid oversized pumps from blowing out fittings.

8. AIR VACUUM BREAKER

Vacuum breakers are installed at the high points, above dripline and below grade in a 6" to 12" valve box to keep soil from being sucked into the emitters due to siphoning. This is an absolute necessity with underground drip systems. They are also used for proper draining of the supply and return manifolds in sloping conditions. One is used on the high end of the supply manifold and one on the high point of the return manifold. Additional air vents may be required in undulating terrain. Freezing conditions require the vacuum breaker be protected with insulation.

9. FILTER FLUSH VALVES

Used to flush debris from the filter cleanout port back to the inlet of the treatment system. This can be an electronically activated solenoid valve, or a motorized ball valve. If manual valve is used, follow all local and State code requirements.

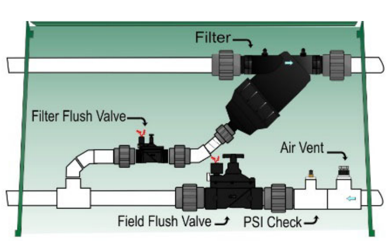
10. FIELD FLUSH VALVES

Used to flush out fine particles that have passed through the filter and accumulated on the bottom of the drip tube at the end of each lateral. This can be an electronically activated solenoid valve, or a motorized ball valve. If manual valve is used, follow all local and State code requirements.

10. ZONE VALVES

Used to divide single dispersal fields into multiple zones, these can be mechanically activated, hydraulically operated index valves or electric solenoid valves or solenoid valves that are electically activated and hydraulically operated.

12. WASTEFLOW HEADWORKS

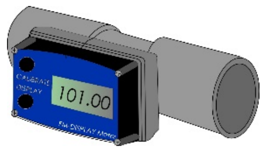


WASTEFLOW Headworks is a pre-assembled unit including the filter and valves in a box or on a skid. Residential systems are generally in a box buried below ground, while large commercial or municipal headworks may be shipped on a skid. It is installed between the pump and the field. Be sure to insulate the box in freezing climates.

13. FLOW METER

(See product sheet for specifications)

Measuring total flow and the rate of flow are both tools used to analyze the health of a drip field.



Most common on the market are simple totalizers, and Geoflow does offer a digital meter that can easily be read in the field that measures both total and rate of flow. The local display model, which includes a digital screen is most often used in residential and light commercial systems, while the Pulse Output Model is outfitted with a pulse that can be read on a Geo controller.

DESIGN PARAMETERS

1. SELECT AREA

Select the area with careful consideration of the soil, the terrain and your State and local regulations. Be sure the field is not in a flood plain or bottom of a slope where excessive water may collect after rain. Surface water should be directed away from the proposed field area.

2. WATER QUALITY

Determine the quality of the water entering the system. Is it secondary treated or primary treated? Be aware of water conditions intrinsic to the area. If iron or iron bacteria are prevalent, please be sure to eliminate it upstream of the drip system with ozone, ultraviolet or chemical treatment. Iron can be recognized as orange stain on plumbing fixtures and may be treated prior to entering the facility.

3. SOIL APPLICATION DESIGN

The instantaneous water application rate of the system must not exceed the water absorption capacity of the soil. A determination of the instantaneous water absorption capacity of the soil is difficult, however, since the value varies with the water content of the soil. As the soil approaches saturation with water, the absorption rate reduces to an equilibrium rate called the "saturated hydraulic conductivity." Wastewater application rates should be less than 10 percent of this saturated equilibrium.

Even though drip disposal maximizes the soil absorption rate through the low rate of application, in an attempt to maintain the soil below saturation, there will be times when the soil is saturated from rainfall events. The design must account for these periods and assume the worst case condition of soil saturation. *By designing for a safety factor of 10%, of the saturated hydraulic conductivity, the system may be under-loaded part of the time but should function without surface failure during brief periods of extreme wet periods.*

Applying wastewater slowly near the soil surface where the soil dries the quickest, would aid in keeping the soil absorption rate at the highest value possible and minimize the potential for hydraulically overloading the soil.

If designing for an efficient irrigation system, the water supply may not be sufficient to meet the demands of a lawn or landscaped area during peak water demand months. This problem can be overcome by either of two solutions: if allowed, add additional fresh-water make-up to the system during the growing season to supply the needed water for plants in question; or split the system into two or more fields with necessary valves and only use one of the fields during the peak water demand months and alternate the fields during winter months or extremely wet periods, or use both fields simultaneously if the pump capacity will so allow.

Soil loading Table 1 prepared by Jerry Tyler at the University of Wisconsin for the State of Wisconsin follows for your reference. Please note:

1) Table 1 is provided as a guide only. States and Counties may have regulations that are different. Check your State guidelines and consult with your local health department.

2) Problems with drip dispersal fields often occur when soils are misinterpreted or the maximum daily volume to be treated and disposed of is underestimated. If in doubt, choose the more restrictive soil type from the table above.

3) "Soil type" should be based on the most restrictive naturally occurring layer within two feet of the dripline. In many soils 1-ft. vertical separation from the limiting layer has proven successful with secondary treated effluent. Geoflow recommends you follow State and Local guidelines.

4) This table is for single family homes. For large systems, loading rates are likely to be more conservative as consideration must include reduced edge effect and mounding on large fields.

TABLE 1. DRIP LOADING RATES CONSIDERING SOIL STRUCTURE.

Soil Textures	Soil Structure	Primary BOD5> 30mg/L<220mg/L TSS>30 mg/L<150 mg/L (gallons/ft^2/day)	Secondary BOD_5<30mg/L TSS<30mg/L (gallons/ft^2/day)
Course sand or coarser	N/A	0.4	1.6
Loamy coarse sand	N/A	0.3	1.4
Sand	N/A	0.3	1.2
Loamy sand	Weak to strong	0.3	1.2
Loamy sand	Massive	0.2	0.7
Fine sand	Moderate to strong	0.3	0.9
Fine sand	Massive or weak	0.2	0.6
Loamy fine sand	Moderate to strong	0.3	0.9
Loamy fine sand	Massive or weak	0.2	0.6
Very fine sand	N/A	0.2	0.6
Loamy very fine sand	N/A	0.2	0.6
Sandy loam	Moderate to strong	0.2	0.9
Sandy loam	Weak, weak platy	0.2	0.6
Sandy loam	Massive	0.1	0.5
Loam	Moderate to strong	0.2	0.8
Loam	Weak, weak platy	0.2	0.6
Loam	Massive	0.1	0.5
Silt loam	Moderate to strong	0.2	0.8
Silt loam	Weak, weak platy	0.1	0.3
Silt loam	Massive	0.0	0.2
Sandy clay loam	Moderate to strong	0.2	0.6
Sandy clay loam	Weak, weak platy	0.1	0.3
Sandy clay loam	Massive	0.0	0.0
Clay loam	Moderate to strong	0.2	0.6
Clay loam	Weak, weak platy	0.1	0.3
Clay loam	Massive	0.0	0.0
Silty clay loam	Moderate to strong	0.2	0.6
Silty clay loam	Weak, weak platy	0.1	0.3
Silty clay loam	Massive	0.0	0.0
Sandy clay	Moderate to strong	0.1	0.3
Sandy clay	Massive to weak	0.0	0.0
Clay	Moderate to strong	0.1	0.3
Clay	Massive to weak	0.0	0.0
Silty clay	Moderate to strong	0.1	0.3
Silty clay	Massive to weak	0.0	0.0

4. DEPTH AND SPACING

WASTEFLOW systems usually have emitter lines placed on 2 foot (600 mm) centers with a 2 foot emitter spacing such that each emitter supplies a 4 sq. ft (0.36 m^2) area. These lines are typically installed best placed at depths of
6-10 inches (150 - 250 mm) below the natural ground surface, however drip line depth should be determined by
the soil and site evaluator base soil and site conditions at each individual site.

5. SOIL LAYERS AND TYPES

The shallow depth of installation is an advantage of the subsurface dripfield since the topsoil or surface soil is generally the most biologically active and permeable soil for accepting effluent. The topsoil also dries the fastest after a rainfall event and will have a higher water absorption rate. The quality and homogeneity of the soil may present a problem. If there are pieces of construction debris, rocks and non-uniform soils, it is very difficult and may even be impossible to obtain a uniform water spread. In some cases, particularly if the soil is compacted, soil properties may be greatly improved by ripping and disking. This is a determination that should only be made by the soil and site evaluator.

6. ADDING FILL TO THE DISPERSAL FIELD

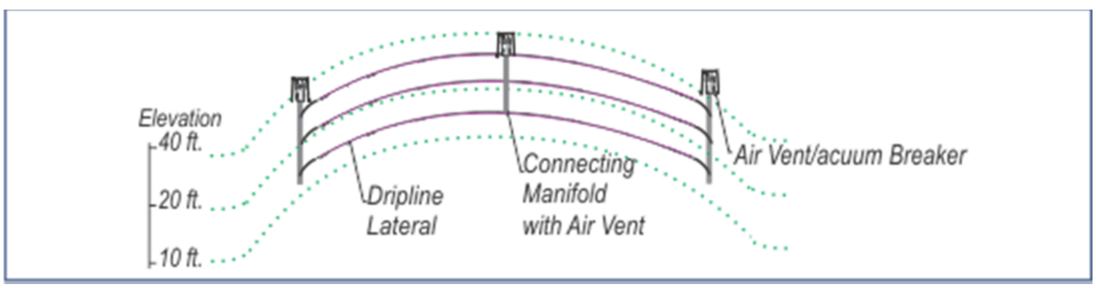
Some dispersal sites require additional soil be brought in for agronomic reasons or to increase separation distances from the restrictive layer. Restrictive layers stop or greatly reduce the rate of downward water movement, as a result surfacing may occur. In soils with high water tables treatment is minimized due to a lack of oxygen.
Placing drip lines in selected fill material above the natural soil provides an aerated zone for treatment. Dispersal however still occurs in the natural soil and the field size must be based on the hydraulic capability of the natural soil to prevent hydraulic overload.
Any time fill material is to be used, the area to receive the fill should have all surface grasses and other organic material removed or it must be incorporated into the natural soil to prevent an organic layer from forming and restricting downward water movement. Removal must be performed under dry conditions. Divert surface and subsurface water prior to adding fill.
Soils to be used should be determined by a soils expert. Uniform soil material should be chosen. Avoid soils with platy or massive materials.
The fill material should be applied in shallow layers with the first 4 to 6 inches incorporated into the natural soil to minimize the effects of an abrupt textural interface. Placement of fill should be uniform so preferential bypass flows do not occur. Soil should not be compacted. Continue this process until all fill has been incorporated.
The fill area should be left crowned to shed surface water and may need diversion ditches or some other devices to prevent surface water from infiltrating. The entire fill area should have a vegetative

cover to prevent erosion. If possible, allow the fill to set at least seven to ten days before installing WASTEFLOW dripline.
It is generally agreed that fill should not be used on slopes without considering means for controlling erosion, such as netting, are used. Consult a soils engineer on a case by case basis.

7. SLOPES OR HILLY SITES

a.) High Points and siphoning

A potential problem with buried drip lines is siphoning fluidized soil dirtparticles into the emitters when the pump is switched off. For this reason:
i) At least one vacuum breaker should be installed at the highest point in each zone. It is best practice to install one at the high point of the supply and one at the high point of the return manifold.
ii) Drip lines should be connected at the end to a common return line with a flush valve.
iii) Run dripline along a contour. Avoid installing lines along rolling hills where you have high and low points , off contour, along the same line. If the dripline is installed over a ridge, as shown below, connect all the high points together and install a vacuum breaker on the connecting line.

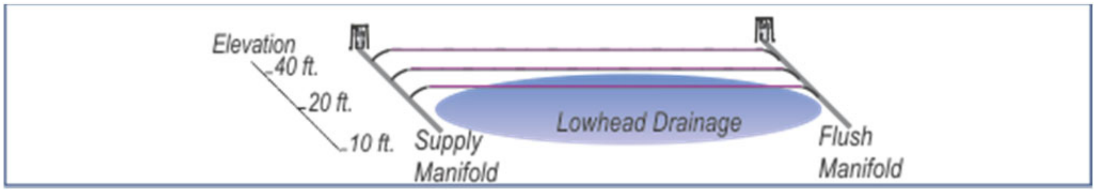


b.) Dripline Pressure Tolerances

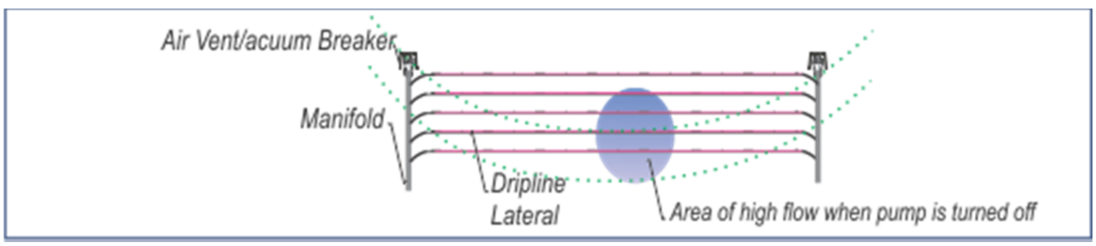
As water travels through a manifold or uphill, pressure decreases, or conversely, if water moves downhill pressure increases, which can affect the flow variation between the first dripline and the last dripline on the manifold.
WASTEFLOW Classic: The Classic dripline can be operated in a range of 10 to 45 psi, however too wide a variance in the pressure in a single field will result in too high a variance in flow within that field. As a rule of thumb, if the level variation within a WASTEFLOW Classic zone exceeds six feet, individual pressure regulators should be placed for each six-foot interval.
WASTEFLOW PC: PC dripline can tolerate very large height variations provided the pressure remains within the 7 to 60 psi range, and preferably within 10 to 45 psi.

c.) Low Head Drainage

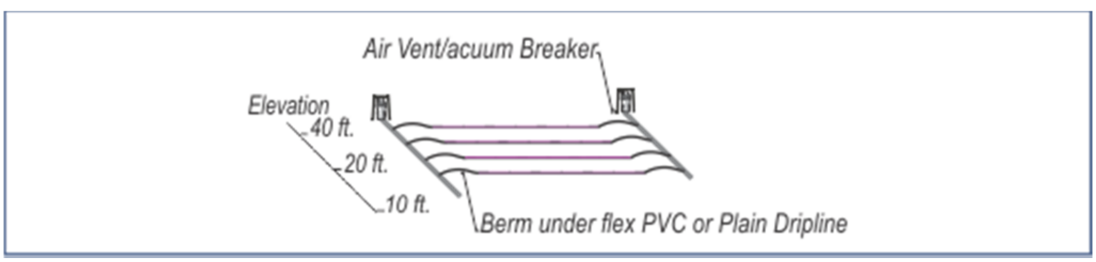
At the end of each dosing cycle, consideration must be taken for gravity plays on redistribution. Where is the water going to drain when the pump shuts off? Water in the dripline AND the water in the soil will flow down to the lowest point within the drip zone. This is called "low head drainage." Use the following precautions to mitigate low head drainage.



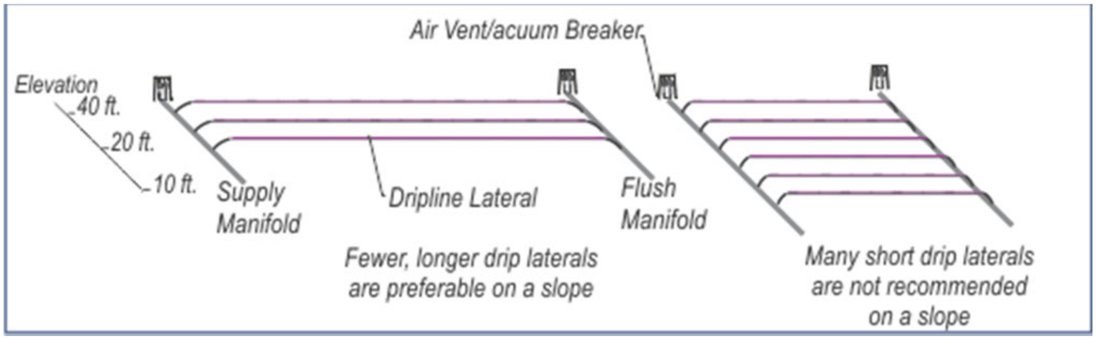
i. The dripline should run along the contour because water will run to the lowest point of the line every time the pump is turned off. If the lowest point in the line is in the middle of the lateral, there will be excess flow at this point. See Diagram below.



ii Have the dripline pass over an elevated berm between the manifold and beginning of the tubing to reduce gravity flow out of the lateral.



iii. Use check valves or multiple zones to isolate the drip laterals. Check valves should only be used if there is no risk of freezing in the manifolds. They are placed on the supply and return manifolds coupled with a vacuum release valve on the downhill side.
iv. Install short manifolds with fewer longer dripline runs.
v. Slope the supply and return manifolds down to the pump tank so the effluent drains back down to the tank when the pump is turned off. Open the zone valves to drain the lines quickly



Concentrate drip lines at the top of the hill with wider spacing towards the bottom. In the case of compound slopes consult a professional irrigation designer or engineer.

8. MULTIPLE ZONES

Drip dispersal fields can be divided into multiple zones or sections with solenoid or index valves for the following reasons:

a. Steep slopes with a risk of low head drainage can be subdivided to distribute the water at system shut-down more uniformly in the field.
b. Smaller zones reduce the required flow per minute which consequently reduces the size of the pump, valves, filters, supply and return lines.
c. If the dispersal field is located in multiple areas on the property.
d. To accommodate varying soils or vegetation on a single site.

Note. On multiple zones, a single Wasteflow Headworks can be used for filtration and flushing by placing zone valves downstream of the Headworks box. All zones would require a check valve on the individual flush lines upstream of each line joining a common flush line to keep flush water from one zone entering any other zone during the flush cycle. (See Geoflow Design Detail No. 588)

9. REUSE FOR IRRIGATION

A good vegetative cover is an advantage to prevent erosion from the field and utilize water applied to the rooting zone. Sites should be planted or seeded immediately after installation. Grasses are particularly suitable for this application. Most lawn grasses will use 0.25" to 0.35" (6.3-8.9mm) of water per day during the peak growing season. This calculates to be about 0.16 to 0.22 gal/ft2/day. By over-seeding lawns with winter ryegrass, this use may be continued through the active growing season of the grass in question. For vegetation using 0.16 to 0.22 gal/ft2/day by transpiration, a sewage flow of 1000 gallons per day would supply the water needs of a landscaped area of 4600 to 6400 sq. ft. without having to add fresh water. For areas larger than this, the plants will suffer water stress during the hot months unless additional fresh water is applied.

10. WATER APPLICATION FORMULA

To determine the rate of application of flow, abased on emitter flow rate, emitter spacing and dripline spacing.

Water Application (inches per hour) = 231 x emitter flow rate in gph / (emitter spacing) x (dripline spacing)

Example:

Dripline flow rate = 1.0 gph per emitter
Emitter spacing = 24 inches
Dripline spacing = 24 inches

Water application = (231 x 1) / (24 x 24)
= 231 / 576
= 0.4 inches of water per hour

FIELD FLOW

Job Description:
Contact:
Prepared by:
Date:

Worksheet 1- Field Flow

Total field

A	Total Quantity of effluent to be disposed per day		gallons / day
B	Hydraulic loading rate		gallons / sq.ft. / day
	Minimum Dispersal Field Area	Quantity / Loading rate A / B	square ft.
C	Actual Dispersal Field Area	Can be larger than Min. Area above	square ft.

Flow per zone

D	Number of Zones		zone(s)
E	Dispersal area per zone	Zones C / D	square ft.
F	Choose line spacing between WASTEFLOW lines		ft.
G	Choose emitter spacing between WASTEFLOW emitters		ft.
H	Total linear ft.per zone (minimum required)	Area per Zone / Line Spacing E / F	ft. per zone
I	Total number of emitters per zone	Linear Feet / Emitter Spacing H / G	emitters per zone
J	Pressure at the beginning of the dripfield	Usually between 20 and 50 psi	
K	What is the flow rate per emitter in gph?	Refer to Dripline in Appendix	gph
L	Dose flow per zone - gph	Dose flow per emitter x Total emitters per zone K x G	gph
M	Dose flow per zone - gpm	Dose flow / 60 L / 60	gpm
	Note: A few States or Counties require additional flow for flushing. Please check your local regulations. Flush velocity calculation below is for PC dripline. Classic dripline requires less flow to flush than PC. Please refer to Geoflow's spreadsheet "Design Flow and Flush Curves" at www.geoflow.com or call 800-828-3388.		
N	Select **flush velocity**	Min. is 05 fps. Max is 2 fps	ft/sec
O	Flush flow required at the end of each dripline	0.5 fps = 0.37, 1fps = 0.74, 2 fps =	gpm
P	How many WASTEFLOW laterals per zone?	No. of drip connections to supply manifold	lines
Q	Fill in the *actual* length of longest WASTEFLOW lateral	Keep laterals close to same length in a single zone	ft.
R	Flush flow required to achieve flushing velocity	Number of lateral x flush flow (fps) P x O	gpm
S	**Total Flow** per zone- worst case scenario	Flush flow + Dose Flow R + M	