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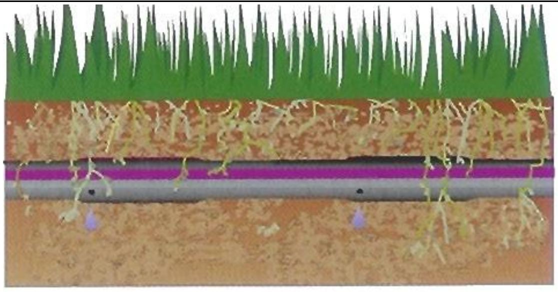
Specialists in onsite wastewater products

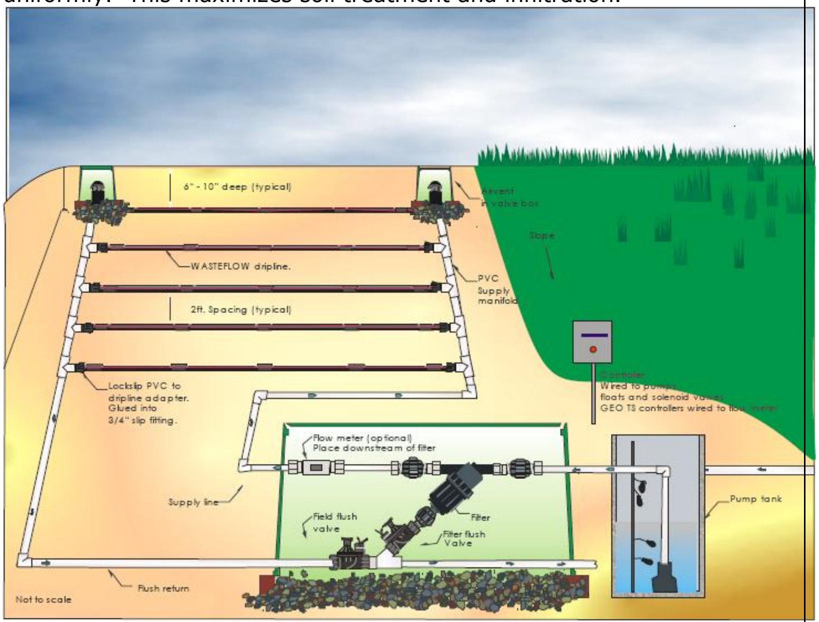
Drip Distribution Systems for Percolation Areas

Drip distribution of wastewater (drip-feed) is included in the Irish EPA Code of Practice 2009 under *Other infiltration systems.* Its use is at the discretion of each Local Authority. A growing number of drip installations have been installed - including two by Trinity College under the EPA STRIVE program in co-operation with Ash Environmental.



½" flexible polyethylene drip tubing with emitters attached to the inside wall spaced either 1 or 2 feet apart along its length

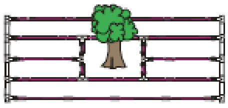
The dripline is typically buried 6 – 9 inches below ground surface in the biologically active soil horizon where the effluent is pumped slowly and uniformly. This maximizes soil treatment and infiltration.



Full packaged system schematic.

Drip distribution is recognised as the most efficient method of distributing treated wastewater. It is the fastest growing method of distributing wastewater to soils in the United States. Drip was developed in Israel for irrigating crops with recycled wastewater as a precious resource. The US EPA wastewater manual 2002 says drip "is the most efficient of all distribution methods".

It allows effluent to be dispersed in the biologically active soil zones a few inches below the surface without ponding, water contamination or smells. It also allows the efficient reuse of the treated water along with its beneficial nutrients for landscaping in a controlled environmentally friendly fashion.



Dosing of the filtered effluent is intermittent and controlled and is unaffected by land use or weather. This maximises the treatment capacity of the soil in combination with the ecofriendly dispersal of wastewater.

Geoflow is the largest US supplier of drip distribution for wastewater use and their Wasteflow® packaged drip systems are supplied by Ash Environmental for large or small systems with design support provided. The Geoflow drip tubing has been treated to repel roots and to allow its safe use with sewage contaminants.

Drip systems take up less infiltration area and function in areas with shallow unsaturated depths of soil. This results in a smaller land requirement for percolation areas.

Drip can be used on large and small systems including existing problem sites.

- Can be used on difficult sites- high water tables, tight soils, rocky terrain, steep slopes, around existing buildings and trees.
- The system requires no gravel. It is easy to install directly into indigenous soils and the natural landscape can be maintained.
- Shallow installation maximizes use of "good" topsoil.
- Reduces the amount and cost of fill material required.
- Consumption of nitrates by the plant material is increased.
- Installations are invisible and safe for pedestrian traffic.
- Ten-year warranty for root intrusion and materials.
- Systems are durable with a long expected life of 30 years.
- Multiple zones can be used to facilitate landscaping.
- Disposal of water is maximized by means of evapotranspiration.
- Non intrusive. It allows use of the space while operating.
- Easily automated with annual service contracts available.
- Design and installation can be arranged.
- Human and animal contact is minimised, reducing health risks.
- Correctly designed systems will not cause ponding or runoff.

Call for comprehensive design installation and maintenance guidelines.

Recommended Drip Loading Rates

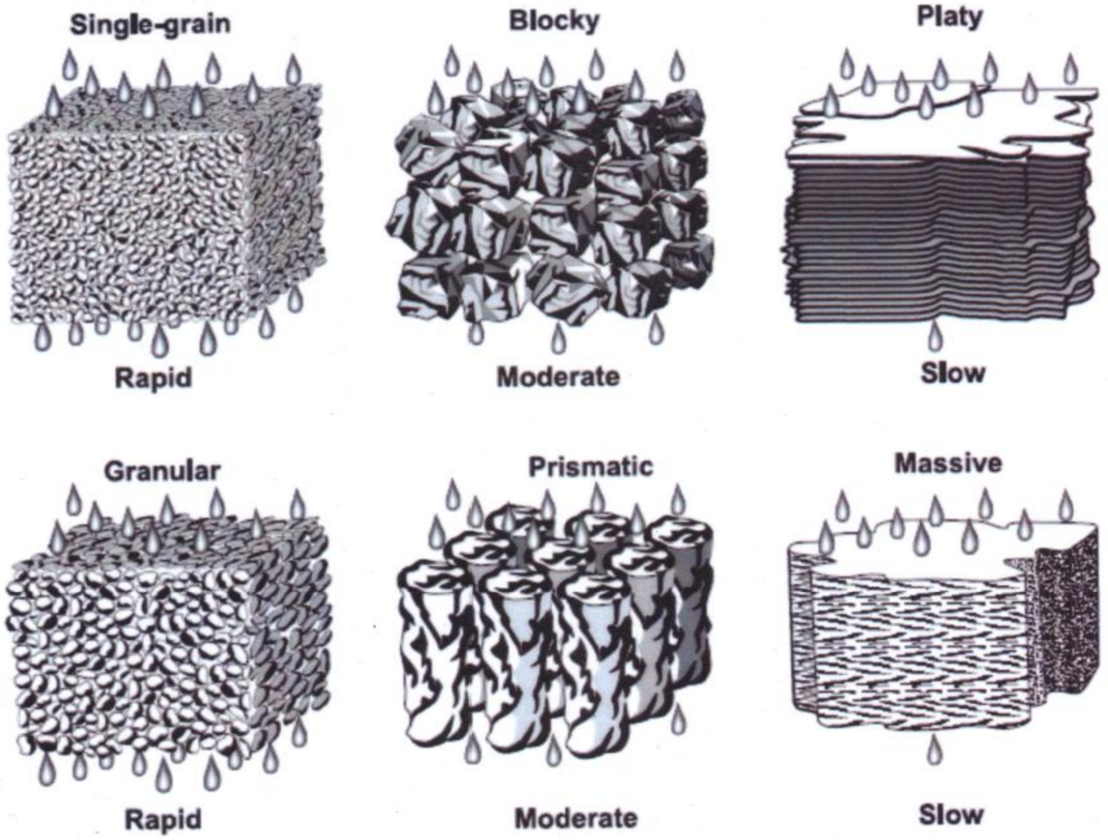
Soil Texture	Soil Structure[1]	Maximum Monthly Average BOD5<30mg/L TSS<30mg/L (US gallons/ft2/day)	Litres/SqM /day
Course sand or coarser	N/A	1.6	65.2
Loamy coarse sand	N/A	1.4	57.0
Sand	N/A	1.2	48.9
Loamy sand	Weak to strong	1.2	48.9
Loamy sand	Massive	0.7	28.5
Fine sand	Moderate to strong	0.9	36.7
Fine sand	Massive or weak	0.6	24.4
Loamy fine sand	Moderate to strong	0.9	36.7
Loamy fine sand	Massive or weak	0.6	24.4
Very fine sand	N/A	0.6	24.4
Loamy very fine sand	N/A	0.6	24.4
Sandy loam	Moderate to strong	0.9	36.7
Sandy loam	Weak, weak platy	0.6	24.4
Sandy loam	Massive	0.5	20.4
Loam	Moderate to strong	0.8	32.6
Loam	Weak, weak platy	0.6	24.4
Loam	Massive	0.5	20.4
Silt loam	Moderate to strong	0.8	32.6
Silt loam	Weak, weak platy	0.3	12.2
Silt loam	Massive	0.2	8.1
Sandy clay loam	Moderate to strong	0.6	24.4
Sandy clay loam	Weak, weak platy	0.3	12.2
Sandy clay loam	Massive	0	0.0
Clay loam	Moderate to strong	0.6	24.4
Clay loam	Weak, weak platy	0.3	12.2
Clay loam	Massive	0	0.0
Silty clay loam	Moderate to strong	0.6	24.4
Silty clay loam	Weak, weak platy	0.3	12.2
Silty clay loam	Massive	0	0.0
Sandy clay	Moderate to strong	0.3	12.2
Sandy clay	Massive to weak	0	0.0
Clay	Moderate to strong	0.3	12.2
Clay	Massive to weak	0	0.0
Silty clay	Moderate to strong	0.3	12.2
Silty clay	Massive to weak	0	0.0

Conversion: US gals/ft2 to Litres/SqM /day
(3.785412 * 10.76391) 40.75

Compiled by Dr Jerry Tyler, University of Wisconsin
based on secondary treated effluent

Note 1: Types of soil structure are shown over the page -graphic courtesy of the US Dept of Agriculture.

Figure 5-10. Types of soil structure



Source: USDA, 1951.

Soil Structure

Soil structure refers to the relative arrangement of soil particles. The structure creates a secondary set of pores and can greatly affect the pore sizes predicted based on soil texture alone (Tyler, et al. 1991). Single grain and massive soil do not have the secondary pores. The stronger the structure, the better the aggregates or peds are defined and the more pronounced the set of secondary pores in the soil. If the pores created are in the direction of the desired wastewater movement then the soil structure enhances the wastewater movement. However, if the pores created are perpendicular to the desired wastewater flow, then the structure will be restrictive to flow. Granular, blocky and prismatic structure generally enhances vertical flow. Platy structure results in reduced vertical flow.

Even though the majority of the states use soil texture as the sole parameter in deciding the hydraulic loading rate, it is suggested that the other soil morphological factors such as structure should be included as well (Tyler et al., 1991). Soil structure and clay mineralogy have been found to have a significant impact on rate of water movement through soils (Bouma et al., 1983; Schoeneberger et al., 1995; Vepraskas et al., 1996; Vervoot et al., 1999).

Soil structure is a primary determinant in the hydraulic properties of fine textured soil, since most of the saturated flow occurs through interpedal voids and cracks of well-structured soil. Tracer experimental studies have confirmed that under initial conditions of both saturation and unsaturation that water applied in fine-textured, well-structured soil moves quickly through the interpedal voids, resulting in high dispersion values (Anderson and Bouma, 1977a,b). In a study to determine appropriate hydraulic loading rates for fine-textured soil Simon and Reneau (1987) placed emphasis on including soil structure, as a key evaluation tool. This study concluded that well drained fine-textured soils provide adequate treatment of effluent, and subsurface soil absorption systems (SSAS), longevity should occur, provided that loading rates are determined relative to the structure of the soil below and around the SSAS.

Courtesy Washington State Department of Health