

SECTION III

SITE EVALUATION

SOIL AND SITING CONSIDERATIONS

The size of the required dispersal area will be determined by the design peak daily flow and the soils application rate provided by a qualified soils scientist and / or hydrogeologist. Typically systems greater than 10,000 gpd may be required to undergo in-depth groundwater mounding analysis and / or mass nutrient loading calculations as well as additional infiltration testing. States may have extensive, limited, or no guidance in the siting and design of large flow land based systems.

Loading rates should not be assigned based on textural classes alone. The characterization of a soil based receiver site involves a systematic evaluation by trained individuals. Factors to consider consist of a variety of topographic and soil conditions such as regional hydrology and landscape position, slope, soil depth, soil texture / structure, depth to water table, depth to restriction, soil consistence, clay mineralogy, compaction, density, and site uniformity. At minimum, characterization of the soils should consider features 2-4' + below the point of infiltration.

Infiltration rate estimates based on texture essentially are an indicator of the general status of the total amount of macro pores that would allow water to freely pass through the soil. The macro pores also provide conduits for gas exchange with the surface. The amount, depth, and distribution of macro pores within a soil matrix is very important for performance of any on site system for the soil to efficiently treat and dispose of effluent.

Secondary factors in texture status such as void reduction (increase in density) by compaction, or enhancement by natural soil ped structure development need consideration.

Caution should be exercised when depending upon soil structure to increase loading rates beyond those that may be estimated by texture. The influence of the secondary voids may not extend deep enough to provide the reaeration necessary for efficient biological treatment of the residual organic constituent of the wastewater.

Compaction by even minimum construction activity will always impact or could severely destroy soil structure. These considerations are very important in the case of the fine sands and clayey textures and the characteristics shallow installations.

The loading rate and system configuration should consider a site / soil assessment and be based on an estimate of vertical and horizontal subsurface water movement over / through a limitation.

Typical prescriptive loading rates are maximum values addressing infiltrative capacity. **Landscape linear load** determination and application mitigates the hydraulics of dispersal over shallow limitations in small flows. Large flow systems present similar hydrologic conditions that need to be considered. Application of typical landscape linear loading guidelines is difficult (if not impossible) to achieve in large flows.

An effort should be made to avoid concentration of the adsorption fields in one area. Stretching the system along contour as much as possible (avoid zone stacking) to reduce landscape linear loading as well as placement of "pods" of zones in differing landforms will enhance the hydraulic dispersal of the effluent on the landscape. Typically, begin the loading rate determination process by sizing the foot print of a conventional in ground system and adjust accordingly with justification. **For sizing, the footprint is the trench bottom loading rate (gal. / ft² / day) divided by three (if 3 trenches are used).**

Generally, deep soils with sandy and loamy textures should not be loaded at any greater than 2" per week or .18 gal/ft²/day. The clay loams or shallow to limitation sites should not be loaded at any greater than 1" per week or .09 gal/ft²/day. Loading rates of 1/2" per week or .05 gal/ft²/day are indicated in the most severe sites.

Very deep, coarse, freely draining soils, have been loaded at rates greater than 11" per week or 1 gal/ft²/day after extensive evaluation, testing, and groundwater modeling.

Depth of soil, slope, site landscape linear load, hydraulic conductivity testing of restrictions below the point of infiltration, bedrock permeability, water mounding, and further subsurface geohydrologic investigation may allow for the increase (or reduction) of these loading rates.

When properly sited, drip disposal provides aerobic unsaturated flow conditions at the contact with the soil interface. Saturation of the soil voids should be for brief periods during or directly after dosing. In a typical situation, dose volumes per emitter per dose events are approximately .1 - .25 gallon per dose depending upon the instantaneous dose capacity of the soil and the zone dose volume necessary to provide equal distribution.

At these small volumes, water movement may be primarily influenced by matric (capillary or suction) forces within the soil in addition to, or preceding, downward (or lateral) gravity flow. The result is the retainment of the effluent from the point of distribution, outward and upward such that a drip disposal system can be considered a method of surface disposal within the upper soil horizons. Coupled with time dosing at regular intervals, aerobic conditions are maintained and a nearly static environment is created for the microbial population. The soil treatment system essentially functions as a trickling filter with a film flow condition over the surface of the soil aggregate as the effluent moves within the soil column.