



Rapid Infiltration & Overland Flow

Rapid Infiltration and Overland Flow are natural wastewater treatment systems that are almost as effective in reducing pollutants as spray irrigation systems. Each has unique features that can dovetail into the specific land characteristics and needs of a community.

Rapid Infiltration

This system uses highly permeable soil beds to filter the waste water. As the water percolates downward, biological and chemical actions that take place in the first few feet of soil and sandy substrates break down organic compounds and other pollutants. By the time the water reaches an underground aquifer, it is cleansed.

Rapid infiltration achieves an excellent reduction of biochemical oxygen demand, suspended solids, and fecal coliform. It is less effective in reducing nutrient content and heavy metals. To improve nitrogen removal, different measures are used, such as: alternating the wetting and drying process; pretreating the wastewater; or adding vegetation to the system. The level of phosphorus removal depends on the depth of the soil the water flows through.

A rapid infiltration system can handle a large amount of waste water on a relatively small land area. The system is not dependent on climate to the degree that some natural systems are. Because it can operate year-round, the need for storage facilities is limited. Over 90% of the water applied is returned to the watershed, a feature that is especially useful to communities with serious water shortages. Nassau County on Long Island and the City of Phoenix, Arizona, "polish" pretreated wastewater by a rapid infiltration process using it to recharge groundwater supplies or recovering it for unrestricted irrigation of croplands.

The biggest factors in siting this system are the soil type and depth available, and the percolation rate in the subsoil. Sand, sandy looms, gravel and gravely sands are the most suitable soils. Other important factors include topography, the underlying geological formations, and the depth, movement and quality of the groundwater.

Compared with some of the other natural waste water systems, the life span of a rapid infiltration system may be shorter. This is attributed to the saturation of the soil by phosphorus and heavy metals that attach to soil particles. However, this treatment system is also the least costly to construct and requires minimum energy to operate.

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The town of Lake George, NY, situated at the foot of Lake George, is a community that has been using a rapid infiltration system for over 30 years. Developed in response to serious pollution in the lake, the system has been successful in cleaning up the lake and maintaining a high level of water quality in the lake. For more information call Riverkeeper at (215) 369-1188.

Overland Flow

In contrast to rapid infiltration, overland flow systems are constructed in areas with relatively impervious soils. Wastewater is released onto gently sloping terraces covered with water tolerant grasses. At the bottom of the slope, the water is collected in a drainage ditch and is discharged to nearby waters with little or no additional treatment, depending on the effluent standards.

Relatively high levels of water purification are achieved by biological and chemical processes in the saturated top layer of the soil and by bacteria and algae attached to the grass that break down dissolved organics found in the water. The grasses consume some nutrients, potash, and trace minerals and can reduce nitrogen to levels that equal advanced treatment systems. This system is less successful in removing phosphorus and suspended solids than spray irrigation and rapid infiltration systems, but phosphorus reduction can be improved by adding alum or Ferris chloride.

A benefit from this system is that a substantial amount of water (40 -80%) can be kept within the watershed. Also, the system generally requires little pretreatment beyond primary settling, making it less costly to construct and operate. The grasses can be harvested and sold as mulch or hay, generating some income to offset operating expenses.

Due to the impervious surface required, site availability is an important factor early in the decision making process. Another consideration is that although overland flow systems can operate all year even in colder climates, their effectiveness at removing nitrogen is sharply reduced during the winter months.

For fact sheets on other natural wastewater systems, call (215) 369-1188

For more information call the National Small Flows Clearinghouse at 1(800) 624-8300