

Soils and Wastewater

What is soil?

Soil is defined as the top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter. More importantly, soil is made up of particles of sand, silt, and clay and the proportion of each of the particles determines the soil texture (or soil type). Between the particles are pore spaces where microbes, air, and water may be found. Pore spaces between sand particles are larger than those between clay particles. The pore size is important as it affects the rate that water moves through soil.

What is the importance of soil in the treatment of wastewater?

Wastewater generated in the bathroom, kitchen, and laundry may contain a number of contaminants such as bacteria, viruses, dirt, soaps, detergents, and grease. These contaminants can pose risks to human and environmental health. While the septic tank is important for holding a number of these contaminants, many of them eventually make it to the drainfield and into the soil.

Soil then becomes an important part of a septic system for the treatment of wastewater. Once effluent contacts the soil, microbes present in the pore spaces will feed on nutrients in the wastewater. As microbial activity increases a layer develops on the soil surface, referred to as a biomat. This biomat slows the rate of effluent flow into underlying soil and further filters out pathogens and solids from the effluent. Soil particles themselves also attract and hold onto pathogens which make them easily available to microbes.

Soil type is an important factor in wastewater treatment as well. Very sandy soils may allow effluent to move to rapidly through the soil (due to large pore size) which may not give the wastewater adequate treatment before reaching groundwater. On the other hand, a soil with high clay content may not allow effluent to move through quickly enough, resulting in sewage backups into the home or onto the ground surface. Neither situation is protective of public health.

The last stage of the soil treatment process is dispersing the water back into the environment. This is accomplished through evaporation, transpiration by plants growing in the drainfield area, or by water percolating downward until it reaches groundwater. The soil treatment system is the last defense against groundwater contamination. A properly designed, sited, installed, and maintained system will help to protect groundwater and public health.

How is soil type determined?

The State of Idaho Technical Guidance Manual (TGM) utilizes the soil textural classification as adopted from the U.S. Department of Agriculture (USDA).

A test hole excavated to a minimum of 8 feet deep is used to observe and classify soils. Visual inspection of the soils allow an evaluation of pore spaces, compactness of the soil, rooting depth, and determining if shallow groundwater may be present during the year. To determine soil texture a sample of soil is placed in the hand and enough water is added to moisten it. The soil can then be 'ribboned' between thumb and fingers. The length of the ribbon as well as how sticky, smooth, or gritty the sample is can be used to determine the soil type.

Where soils have been initially classified as "unsuitable", a second opinion is required by an experienced staff member within SDHD or from a professional soil scientist from the local Soil Conservation District. If both opinions agree that the soil is unsuitable, the applicant can still obtain the services of a professional engineer familiar with the USDA soil classification system, to conduct further evaluation and soil type determination. This information may then be submitted to SDHD for review.

