

# Soil Facts

## *Why Do Septic Systems Fail?*

*A properly designed, constructed, and maintained septic system should treat and disperse wastewater effectively for many years. Unfortunately, septic systems sometimes fail.*

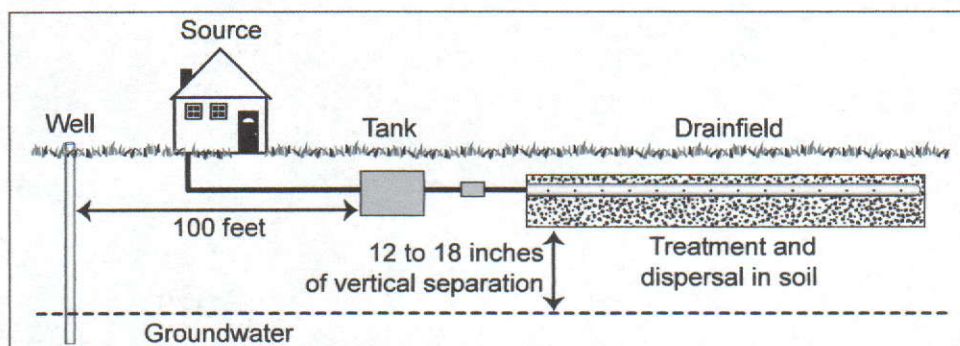
### Is My Septic System Failing?

How do you know if your septic system is failing? First, answer the following questions:

1. Do your drains empty slowly for reasons other than old, clogged pipes?
2. Does sewage back up into your house?
3. Have you noticed a wet, smelly spot in your yard?
4. Is your septic tank piped to a ditch or stream?
5. Is your washing machine or sink piped to a road or stream?
6. When it rains or the ground is wet, do you experience problems with your drains?
7. When you do laundry, does a wet spot appear in your yard?
8. Do you frequently have to pump your septic tank (more than once a year)?
9. Is the grass over or around your septic tank greener than the rest of your lawn?
10. Is the area around your septic tank or drainfield wet or spongy even when it has not rained for a week or more?

If you answered “yes” to any of these questions, your septic system has failed or is near failing. This means that it is not treating and disposing of sewage in a safe, environmentally sound fashion. You may also be able to tell your system is in trouble if noxious bacteria (fecal coliform) or large amounts of nutrients (particularly ammonia) are found in both nearby wells and surface water.

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**Figure 1. Wastewater treatment and dispersal in the environment (not to scale).**

## What Is a Septic System?

A septic system consists of four basic components: the source (home), the septic tank, the drainfield or leach field, and the soil beneath the drainfield (Hoover, 2004; Figure 1). Several different septic system designs are used in North Carolina. The type of system used is based on the lot's soil and site conditions; however, the conventional system (as illustrated in Figure 1) is the most commonly used in the state.

## Excessive Water Use

A common reason for septic system failure is overloading the system with more water than it can absorb. A septic system is designed for a specific wastewater flow rate based on the number of bedrooms (120 gallons per bedroom per day) in the house served by the system. When this flow rate is exceeded, the excess water backs up into the house or surfaces in the yard. This problem is often the result of a leaky fixture: either a toilet that has a slow leak or a dripping faucet. A change in water use, such as more people in the house or the addition of a water-using appliance, such as a dishwasher or washing machine, may add additional water to your septic system. Further problems can arise if a sump pump, icemaker, or dehumidifier drains into the septic tank. Each of these devices can add excess water and should not be connected into your septic system.

Along with excess water from inside the house, drainage or runoff water outside also may overload the septic system. In particular, water from roofs, roads, or paved areas may be diverted onto the system drainfield. This surface water will saturate the soil to the point that it can no longer absorb additional water. The result is sewage backing up into the house or on top of the ground. Finally, if the groundwater or surface water is allowed to enter the septic tank, it, too, can overload the system. For this reason, septic tanks are designed to be

watertight, and surface water should be diverted from the access covers of the septic tank.

## Poor Maintenance or None at All

As with all major appliances, septic systems require routine maintenance. The N.C. Cooperative Extension publications *Septic Systems and Their Maintenance*, AG-439-13, and *Septic System Owner's Guide*, AG-439-22, describe the proper maintenance of a septic system. The main purpose of the septic tank is to stop solids from entering into the drainfield. If solids do reach the drainfield, they will clog the small spaces or pores in the gravel and soil below, resulting in sewage backing up into the house or surfacing in the yard. The lack of septic tank maintenance is a key cause of premature septic system failure. You should have your tank pumped every 3 to 5 years depending on use (see *Septic Systems and Their Maintenance* (AG-439-13) for specific guidance on pumping frequency). Also, you should have the septic tank pumper inspect the sanitary tee outlet or effluent filter to ensure proper function. Houses with septic systems should not have a garbage disposal. But if your home has a garbage disposal or grinder pump, the tank should be pumped more frequently. Additives, whether biological or chemical, have not been shown to have any beneficial effect on the solids in the tanks or system in general. For this reason, they are not recommended.

If your system received its permit from your county health department after January 1, 1999, it must have an effluent filter. These filters are designed to prevent finer solids from reaching the drainfield. The filters require some additional maintenance. As the filters clog with solids, your drains may work more slowly. When this occurs, a septic tank pumper or the homeowner can clean the filter with a garden hose, making sure the waste on the filter is washed off into the inlet side of the tank, and replace

the filter in the tank. If the filter is clogged, it is often a sign that the tank needs to be pumped.

## Poor Design and Installation

An improperly designed septic system is a failure waiting to happen. It is critical that the system be designed with adequate space and has suitable soil. The space requirements are determined by the amount of sewage flowing into the system and by the soil and site conditions of the drainfield. In designing a septic system, it is assumed that there are two people per bedroom in a house and that each resident produces about 60 gallons of wastewater a day. Therefore, a septic system is designed to handle a flow rate of 120 gallons per day per bedroom (two people per bedroom x 60 gallons per person per day). For non-residential property, the flow rate is determined by the proposed use. Soil and site conditions dictate the amount of sewage that can be safely applied to the soil. In general, sandy soils can accept more wastewater than clayey soils, which results in smaller drainfields for sandier soils. Finally, the location of a seasonal high water table or a restrictive layer (such as hard pan or rock) determines the depth below the soil surface that the bottom of the drainfield trenches can be placed.

The soil is the most important part of the septic system in treating and ultimately dispersing the treated sewage. If the soil beneath the drainfield is too wet, the sewage may not be adequately treated before it reaches groundwater. Furthermore, if a restrictive layer is too close to the trench bottom, the soil may not be able to absorb all of the sewage, thus forcing it to the surface or back up into the house. In North Carolina, there must be 12 to 18 inches of unsaturated soil beneath the drainfield trench bottom. This distance is referred to as the vertical separation distance. Environmental health specialists employed by the county or district health departments are trained to evaluate the soil and site to ensure that it is suitable for sewage treatment