



The Impact of Septic Systems on the Environment

Nearly half of the homes and businesses in the Long Island Sound watershed have septic tank waste disposal systems. When properly sited and maintained on a routine basis, septic systems are an excellent waste management alternative. However, when not properly sited or maintained, they can cause contamination of surface and groundwater resources, which leads to public health and pollution problems.

How Septic Systems Work

Septic systems have two key components, a **receiving tank** and a **leaching system**. A sewage line carries wastewater from the kitchen, bathroom and laundry room to the underground septic tank, where heavy particles settle out of the liquid, forming a layer of **sludge** on the bottom of the tank. Light materials float, forming a layer of **scum** on top of the water in the tank (see Figure 1). Bacteria use the solid materials, liquefying these waste products. To allow sufficient time for particles to settle and **for** bacteria to break down the sludge, a septic tank should be large enough to hold at least one day's flow of wastewater from the home, and to provide storage for sludge and scum.

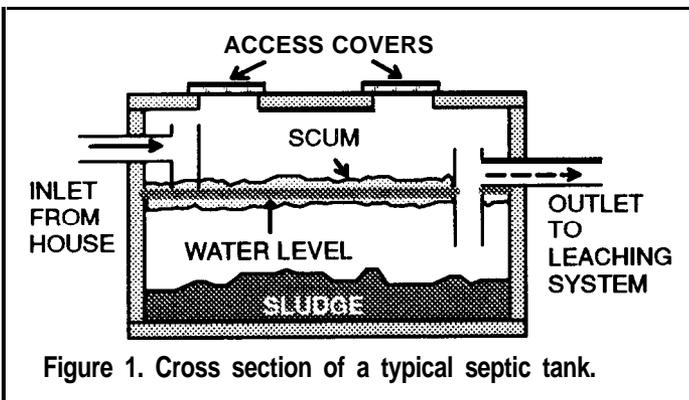


Figure 1. Cross section of a typical septic tank.

Each addition of wastewater to the septic tank displaces an equal amount of liquid into the leaching system. This may consist of a large perforated ring, leaching pit, or a series of absorption trenches, depending on the regulations in effect in your area when your system was installed. The leaching system is designed to allow the liquid from the septic tank (called effluent) to be released into and filtered by the surrounding soil. Bacteria in the soil further degrade the waste, removing harmful organisms, organic matter, and some nutrients. Ultimately, some of the effluent enters the groundwater.

Groundwater Contamination

Septic systems will operate effectively if, and only if, they are designed properly, situated in areas that allow

proper operation, used only for the purposes for which they were designed, and given periodic maintenance. Even a properly operating system will discharge nutrients (phosphates and nitrates) and some bacteria or viruses to the groundwater. An improperly maintained or failing system will discharge even more contaminants to the groundwater.

Domestic wastewater can contain bacteria and viruses that cause dysentery, hepatitis, and typhoid fever. To protect public health, it is important to minimize the amount of these organisms that reach surface or groundwater. Fortunately, soil and soil bacteria can effectively remove most pathogens (disease-causing microorganisms) from wastewater treated in a properly functioning septic system.

When nutrients such as **nitrogen** and **phosphorus** are discharged from septic systems into the groundwater, they contaminate drinking water supplies, and also represent a potentially important **nonpoint** source of pollution to ponds, streams, and the Sound (see LISS Fact Sheet #7, Nonpoint Source Pollution in Long Island Sound). The connection between ground and surface water pollution is closely linked since the base flow of streams draining to Long Island Sound comes primarily from groundwater contributions. (see Figure 2).

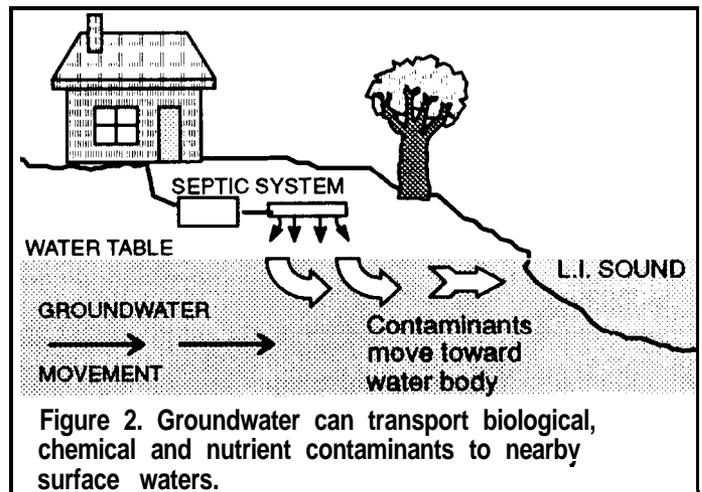


Figure 2. Groundwater can transport biological, chemical and nutrient contaminants to nearby surface waters.

In freshwater systems, phosphorus causes excessive **aquatic** weed growth that can limit the uses of ponds and lakes. In the Sound, nitrogen fuels massive algae blooms, which in turn die, using up oxygen as they decompose. This causes **hypoxia**, a loss of oxygen in the bottom waters, which has serious ecological implications for Long Island Sound (see LISS Hypoxia Management Update).

Infectious diseases and nutrients are not the only concern. The improper use of septic systems has been shown to contribute to contamination of groundwater by toxic chemicals. Contaminants that may enter groundwater through septic systems include heavy metals and toxic chemicals from small commercial establishments, toxic household products, and organic chemicals typically found in septic tank cleaning products. Given that over 50 percent of all drinking water used in the United States is

groundwater. improper use and failure of septic systems should not be taken lightly.

In order to improve the level of wastewater treatment and minimize the amount of disease organisms, nutrients, and chemicals that enter ground and surface waters, you should make sure your system is in proper working order, follow simple maintenance procedures, and conserve water.

SIGNS OF SEPTIC SYSTEM FAILURE

- Slow drainage or sewage backup in drains or toilets.
- Excessive lush grass growth in the system area, even during dry weather.
- Unpleasant odors around your home.
- Excessive growth of aquatic weeds or algae in lakes or ponds adjacent to your home.

HEALTH EFFECTS OF A FAILING SYSTEM

- Improperly treated wastewater can contaminate drinking water supplies, causing disease.
- Infectious diseases are spread by mosquitoes and flies that breed in areas where liquid wastewater reaches the surface.
- Risk to the public, especially children and animals who come into contact with surface flows and may drink contaminated groundwater.

What You Can Do

Maintenance is the single most important factor that determines the length of time a septic system will function properly. Too often homeowners forget that whatever goes down the drain or toilet ultimately finds its way into the soil (and possibly the groundwater) or remains in the septic tank until it is pumped out. The following maintenance practices will help keep your system functioning well and help minimize its impact on the environment.

Pump out your septic tank. When a system is poorly maintained (not pumped out on a regular basis), solids build up in the septic tank, then flow into the leaching system, clogging it beyond repair. Since it may cost \$5,000 or more to replace a septic system, having a reputable contractor pump out your septic tank every two to three years is well

worth the price. Maintain records of system maintenance and know the location of the system's components.

Watch what you put down the drain. The use of a garbage grinder will add 50 percent more solids to the system, and result in the need for more frequent pumping out of the septic tank. Don't put grease or cooking oil down the drain — it congeals and can clog your pipes, septic tank, and leaching system. Dispose of unwanted household chemicals properly- do not pour them down the drain where they can contaminate groundwater; instead save them for the next household hazardous waste collection day in your community. Remember, the less you put into the system, the longer it will function properly.

Avoid Additives. There is no scientific evidence that demonstrates the effectiveness of any additive. Various products marketed for that purpose do not improve the performance of the septic tank, nor do they reduce the need for routine maintenance. Organic chemicals, such as chloroform and trichloroethylene, are typically found in septic tank cleaning products. Some of these chemicals are suspected of causing cancer, and they are generally ineffective as septic tank cleaners.

Conserve Water. Conserving water by installing low flow fixtures in your home and by adopting more conservative water use practices can extend the life of the system, delay the need for repair, and lessen the likelihood of contaminating local surface and groundwater. Distribute laundry chores throughout the week to avoid overloading the system on any given day. Don't connect downspouts from roofs or basement sumps to the system; in heavy rain they will quickly overload its capacity. Instead, make sure such drainage is diverted away from the leaching system area. Minimizing water usage during periods of heavy rainfall will reduce the potential for system malfunction.

FOR MORE INFORMATION:

For more information about septic systems, a comprehensive series of fact sheets titled "Your Septic System" is available through Cornell Cooperative Extension. If you have a question about your septic system, call your local Department of Health or Cooperative Extension office.

The Long Island Sound Study

The Long Island Sound Study (LISS) is a multi-year research and management project that began in 1985 as part of the National Estuary Program, a recent addition to the federal Clean Water Act created to protect estuaries of national importance. The LISS is a cooperative effort involving research institutions, regulatory agencies, marine user groups, and other concerned organizations and individuals. The purpose of the Study is to produce a management plan for the Sound that will be administered by the three major LISS partners, the U.S. Environmental Protection Agency and the states of Connecticut and New York. To learn more about or become involved with the Study, contact the New York Sea Grant Extension Program, 125 Nassau Hall, SUNY at Stony Brook, Stony Brook, NY 11794-5002, (516) 632-8730; or the Connecticut Sea Grant Marine Advisory Program, 43 Mame St., Hamden, CT 06514, (203) 789-7865.

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