

Septic Systems 101: A Primer to Understanding Your Individual Subsurface Sewage Disposal System (ISSDS)

Introduction:

In general, a contemporary septic system consists of two basic units (Figures 1 & 2): an underground septic tank (Primary Treatment Unit) and a soil absorption area or drainage field (Secondary Treatment Unit) with a distribution box that connects the two and disperses the septic tank effluent evenly over a properly sized absorption area. The septic tank itself is a durable, watertight container that is resistant to corrosion or decay, e.g., concrete, plastic or fiberglass. The soil absorption field is typically a network of perforated piping laid-out in trenches filled with a filtering medium such as gravel, crushed stone or sand.

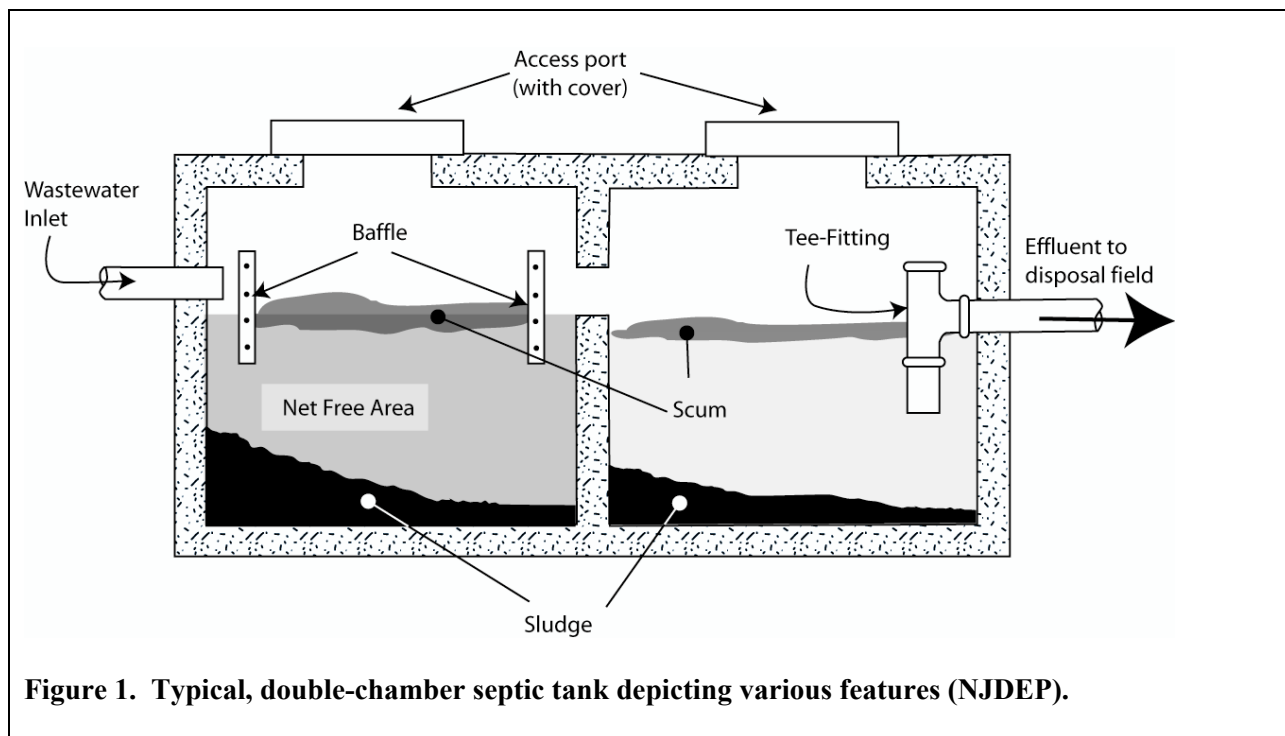


Figure 1. Typical, double-chamber septic tank depicting various features (NJDEP).

The septic tank serves as a settling basin: heavy solid wastes (sludge) sink to the bottom of the tank where microbial action will ultimately reduce it by as much as 50% over time; and lighter solids, e.g., grease, toilet paper, and hair, rise to the surface to form a floating layer of scum (Figure 1). A typical septic tank will “hold” the wastewater for at least 24 hours to provide adequate time for separation and settling. The “clarified” water between the sludge and scum layers then enters the distribution box and is discharged into the drainage field where it is further purified as it moves through the filtering beds and soil profile. The septic tank is specifically designed to aid the separation process: inlet baffles or tees direct the household discharges downward to the bottom of the tank, which prevents the wastewater from flowing straight across the tank to the outlet end and concurrently minimizes splashing and resuspension of settled solids. An outlet baffle or tee is also incorporated to contain the scum layer and prevent it from entering the disposal field. Removing solids prior to the release of effluent protects the soil absorption system from clogging and failure.

Why are regular pump-outs so important?

Inside the septic tank between the accumulating layers of scum and sludge is a volume of water available for the separation and settling of these discharge components, called the “net free area.” As time goes by, this net free area becomes progressively smaller as the layers of sludge and scum grow thicker towards each other, until eventually it lacks the volume necessary to provide adequate time for separation and settling. As the movement of household discharges continues in its typical rhythm, unseparated sewage will start entering the dispersal area where the perforated pipes and filtering beds are highly susceptible to coating and clogging (Figure 3). If a septic tank isn’t pumped out regularly these compromises will begin and quickly accrue, and this damage will be occurring long before any foul odors result or sewage backs up in the home or yard. At best, such compromises will reduce the system’s effectiveness and shorten the lifespan of the soil absorption area. At worst, the system will ultimately fail altogether, costing thousands of dollars to repair or replace. In addition, older systems may lack the components described for contemporary systems, such as baffles and tees, making regular pump-outs even more essential to prevent disposal area clogging and failure.

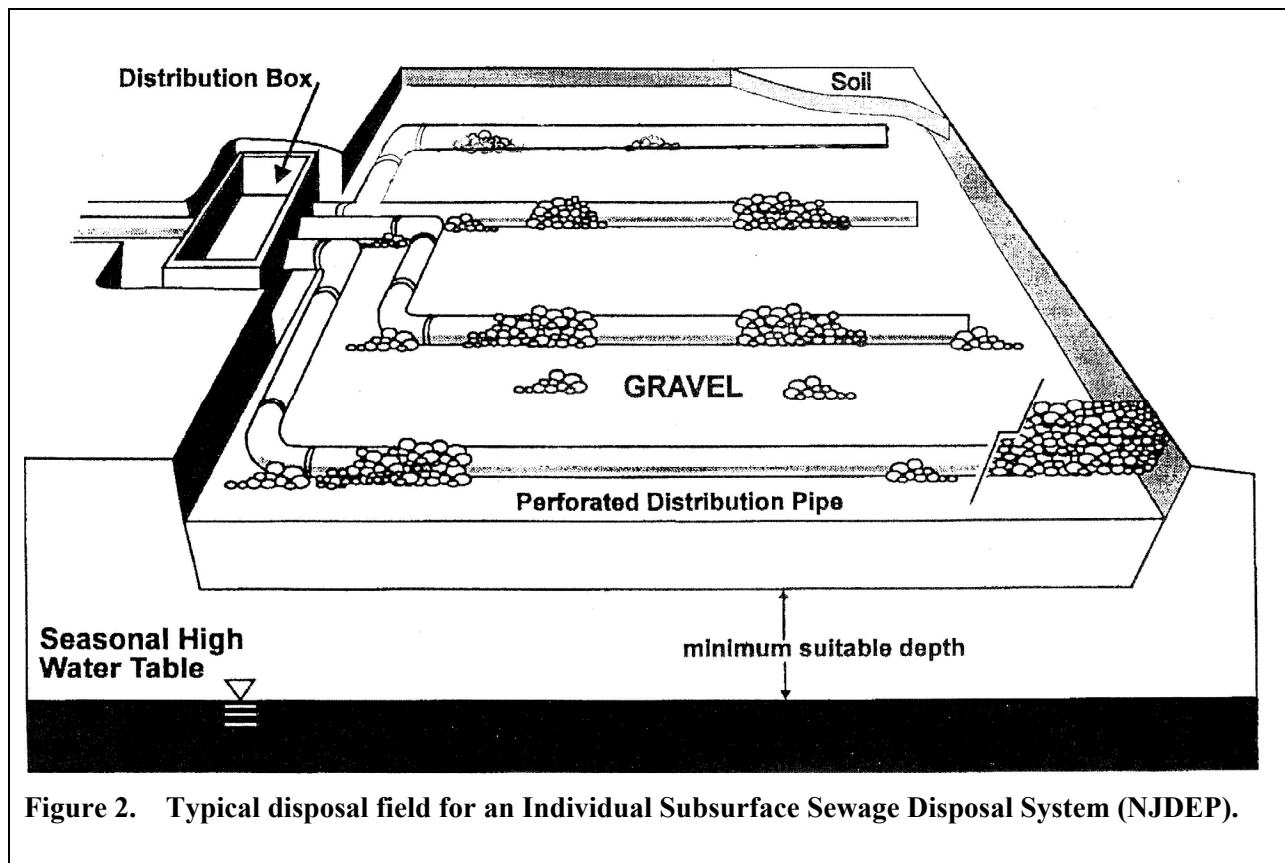


Figure 2. Typical disposal field for an Individual Subsurface Sewage Disposal System (NJDEP).

How often should a septic system be pumped-out?

How often a septic tank should be pumped-out depends on several variables such as tank size, number of persons in the household, and whether a garbage disposal or *grinder* is incorporated into the system. While different sources vary somewhat in their time-frame recommendations,

typical recommended pump-out frequencies are about once every 3 years for a 1,000 -1,250 gallon tank serving a family of 4. A table that provides pump-out recommendations based on tank and household size is provided in the Rutgers' Cooperative Research & Extension Fact Sheet (FS840), *Onsite Wastewater Treatment Systems: The Maintenance and Care of Your Septic System*. The web link to access this fact sheet as well as other resources are provided below.



Figure 3. The materials captured in this effluent filter effectively depict what will enter and accrue in the disposal field of an improperly maintained ISSDS (NJDEP).

It is important to note that garbage disposals increase the volume of solids discharged into the septic tank by as much as 50% and consequently require more frequent pump-outs. Strategies to address the additional organic wastes produced through the use of a garbage disposal include increasing the frequency of pumping (for example, see www.tctcwa.org and www.inspect-ny.com/septbook.htm) and treating an installed garbage disposal as though it were an additional person living in the household, e.g., a 3-person household using a garbage disposal would be pumped out as often as is indicated for a 4-person household with the same size septic tank (see the New York Septic Code at Section 75-A.6). In New Jersey, pursuant to the Standards for Individual Subsurface Sewage Disposal Systems at N.J.A.C. 7:9A-8.2(c), ISSDSs installed concurrently with a garbage disposal require a double-compartment tank which must be sized 50% larger than that required without a garbage disposal. In addition, at N.J.A.C. 7:9A-10.2(c), Table 10.2(c), the disposal field must be 25% larger than that required without a garbage grinder.

Many ISSDSs will have been installed prior to the above precautionary requirements, however, and the selected pumping frequency should be selected to account for the added loading.

Conclusion:

Malfunctioning septic systems can contaminate both ground and surface waters, creating health risks to humans and impairing natural ecosystems. Pumping out the septic tank on a regular basis is the single most significant step that can be taken to extend the system's effective lifespan and protect the surrounding environment. A small investment in preventative maintenance can avert an expensive repair. Compare the typical \$200.00 - \$400.00 to have a septic tank pumped out with the also typical \$3,000.00 - \$10,000 to repair or replace major system components.

References/Resources

This paper is based on a variety of resources such as those listed below. For more detail on any of the aspects noted, each of the following is available by clicking on the associated link.

Rutgers Cooperative Research & Extension. 2005. Onsite Wastewater Treatment Systems: the Maintenance and Care of Your Septic System. Fact Sheet FS840. The State University of New Jersey. www.water.rutgers.edu (Click on Fact Sheets)

Rutgers Cooperative Research & Extension. 2005. Onsite Wastewater Treatment Systems: Operating Permits. Fact Sheet FS533. The State University of New Jersey. www.water.rutgers.edu (Click on Fact Sheets)

Rutgers Cooperative Research & Extension. 2005. Onsite Wastewater Treatment Systems: Five Levels of Protection. Fact Sheet FS531. The State University of New Jersey. www.water.rutgers.edu (Click on Fact Sheets)

Rutgers Cooperative Research & Extension. 2005. Onsite Wastewater Treatment Systems: Accessorizing Your Septic System. Fact Sheet FS532. The State University of New Jersey. www.water.rutgers.edu (Click on Fact Sheets)

The Home Inspection & Construction Website @ <http://www.inspect-ny.com/septic/tankpump.htm>

The Tobyhanna Creek/Tunkhannock Creek Watershed Association @ http://www.tctcwa.org/html/body_septic.htm