

3. On-lot Sewage Treatment System Maintenance

The Homeowner's Guide to Wastewater Management

by John Jose, Watershed Specialist, Pike County Conservation District

"The subject is a peculiar one..."

~ George Jennings

Nineteenth century English Sanitary Engineer and Inventor

In more densely developed urban and metropolitan areas, household wastewater is commonly piped off-site to a centralized sewage treatment plant. However in rural areas, often characterized by more widely scattered residential development, the infrastructure required for centralized systems is often impractical and financially prohibitive.

With some basic knowledge of proper use and maintenance, the homeowner can help ensure their on-lot system will provide years of treatment of household wastewater.

As a result, like much of rural Pennsylvania, Pike County residents must often rely on individual, on-lot sewage treatment systems (on-lot systems) to treat household wastewater. *In effect, each homeowner has his/her own small-scale sewage treatment plant right in their own yard and it is the homeowner's responsibility to ensure the proper use and maintenance of their system.*

The good news is, on-lot system management need not be a mystery. With some basic knowledge, the homeowner can help ensure their system will provide years of service treating household wastewater.

The Ins and Outs of On-lot Systems

While often bemoaned for their cost of installation and repair, properly functioning on-lot systems provide many benefits including:

- Minimizing pollution of surface and groundwater
- Providing a safeguard for family health by helping to reduce contamination of drinking water supplies and public swimming areas
- Protecting the financial investment of homes and property

Because of their widespread use in Pike County, proper use and care of on-lot systems is very important.

However, these benefits are only enjoyed when a system is:

- Placed in an appropriate location on a building lot

- Constructed properly
- Used and maintained properly

When any of these conditions are not met, on-lot systems have the potential to create water pollution and become a human health hazard. The negative impacts of improperly functioning on-lot systems can be felt by the individual homeowner experiencing bacterial contamination of well water, to community or even watershed-wide impacts on both surface and groundwater supplies. Because of their widespread use in Pike County, proper use and care of on-lot systems is very important.

Elevated Sand Mound Systems and Other Options

Traditionally, on-lot septic systems consisted of a holding or **septic tank** and an in-ground soil **absorption field**. While septic tanks are still a mainstay in on-lot systems, in-ground absorption fields are seldom used in Pike County today.

This is because in-ground absorption fields only work when the right type of soil is present at sufficient depth, conditions often not found over much of Pike County where shallow, rocky, poorly drained soils predominate. Due to these poor soil conditions and with the adoption of more stringent regulations designed to provide for more effective and safer on-lot wastewater treatment, in-ground soil absorption fields now often fail to meet the regulatory criteria set by the Pennsylvania Department of Environmental Protection (PA DEP).

Specially designed above-ground absorption fields called **elevated sand mounds** – also sometimes referred to as turkey, sand or raised mounds – are now widely used in place of in-ground absorption fields, and have become a fixture of community landscapes in Pike County. Given their wide use, this section will focus on on-lot systems that incorporate an elevated sand mound. For those who do have in-ground absorption fields, the basic principles of proper use and management covered here, apply.

Note: Additional **conventional** as well as **alternative** on-lot systems, approved by PA DEP, are available to the homeowner installing a new system or undertaking a replacement or upgrade of an existing system (See Resources for More Information at the end of this chapter). However, space limitations do not permit coverage of these systems here, which include, but are not limited to at-grade, spray irrigation and drip irrigation systems. Although they all serve the same purpose – processing residential wastewater on site – the differ-

ences between these systems provide a resident with more options in providing for on-lot treatment that can meet the specific requirements presented by a building site.

On-lot Sewage Treatment and Disposal

The primary components of a typical on-lot system in Pike County include a septic tank buried beneath the surface, the above ground absorption area, which includes sand and gravel material of the elevated sand mound, and underlying soils. On-lot sewage treatment and disposal is a two-stage process.

The first stage begins with any household wastewater from appliances, bathrooms and kitchens being directed through a network of pipes within the home to a central collecting pipe that runs out to the septic tank. The primary function of the septic tank is to provide for settling, breakdown, and storage of the collected wastewater.

Wastewater that enters a tank is held long enough to allow heavier solid waste to settle to the bottom while lighter matter, consisting of grease and fats, floats to the top. Structures called baffles prevent these materials from flowing out of a tank and into the absorption field. Inside the tank, solid waste is reduced in volume through bacterial decomposition.

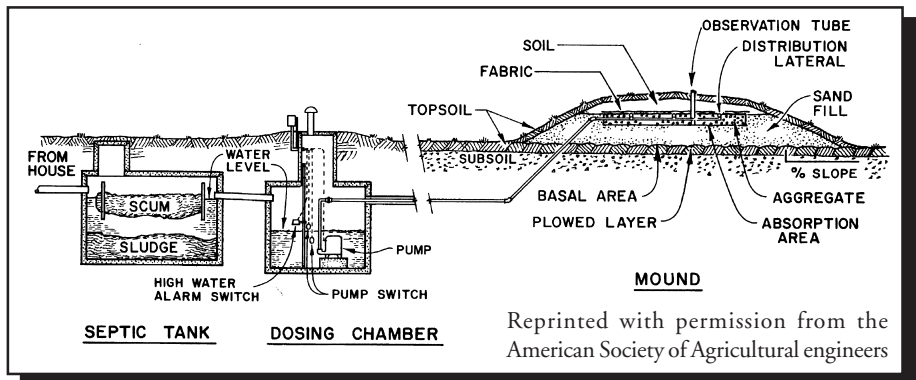


Diagram of an on-lot sewage treatment system with elevated sand mound

The Elevated Sand Mound

Although a septic tank provides initial or “primary” treatment of household wastewater, additional treatment is required to remove disease causing bacteria, viruses, protozoa and other contaminants. This is accomplished in the second stage of on-lot treatment that takes place in the absorption area that includes the elevated sand mound and soil layers beneath the mound.

With solid waste remaining in the tank, the partially treated liquid wastewater flows by gravity out of a port near the top of the septic tank and into a pumping chamber, which in turn, pumps the effluent up to the top of the absorption field. Here the effluent flows into a network of perforated distribution pipes, located just beneath the mound's surface.

These pipes distribute the effluent evenly over the absorption field. A portion of the wastewater released from the pipes evaporates up through the surface of the mound or is taken up by grass or other vegetation growing on the mound's surface.

The remaining wastewater trickles down through gravel, sand and soil layers within the raised mound. The sand serves to remove larger particles and disperse the wastewater evenly through the absorption field. Through complex physical, chemical, and biological processes the soil beneath the mound provides treatment, removing much of the remaining disease causing microorganisms and other pollutants. Finally, the now treated wastewater is released from the soil layers and eventually down into underlying groundwater.

A clogged absorption field, resulting from not pumping a septic tank frequently enough is one of the primary causes of on-lot system failure.

Maintaining On-lot Systems and Preventing System Failure

The rate at which solid waste enters a septic tank generally exceeds how quickly it is decomposed by bacteria. As a result, if not pumped out periodically, solid waste will accumulate and eventually exceed a tank's capacity.

A general rule of thumb is to have a septic tank pumped every three years or when solids occupy no more than 1/3 of a tank's volume.

This can result in excess solid waste from a septic tank overflowing into the distribution pipes of the raised mound eventually causing them to clog. The result is often wastewater backing up into households or seeping out of the surface of the raised mound. A clogged absorption field, resulting from not pumping a septic tank frequently enough to remove accumulated waste, is one of the primary causes of on-lot system failure in Pike County.

A general rule of thumb is to have a septic tank pumped every three years or when solids occupy no more than 1/3 of a tank's volume. A more accurate estimate of how often a tank should be pumped can be obtained using the chart in Table 1. Using this chart, based on the number of people in a household and the size of a tank, the frequency for pumping a tank can be determined.

Remember, pumping a tank out frequently will not harm a system! But not pumping a tank frequently enough can lead to costly repairs and water pollution.

Tank Size (gal)	Household Size (number of persons living in household)									
	1	2	3	4	5	6	7	8	9	10
500*	5.8	2.6	1.5	1.0	0.7	0.4	0.3	0.2	0.1	—
750*	9.1	4.2	2.6	1.8	1.3	1.0	0.7	0.6	0.4	0.3
900	11.0	5.2	3.3	2.3	1.7	1.3	1.0	0.8	0.7	0.5
1000 example	12.4	5.9	3.7	2.6	2.0	1.5	1.2	1.0	0.8	0.7
1250	15.6	7.5	4.8	3.4	2.6	2.0	1.7	1.4	1.2	1.0
1500	18.9	9.1	5.9	4.2	3.3	2.6	2.1	1.8	1.5	1.3
1750	22.1	10.7	6.9	5.0	3.9	3.1	2.6	2.2	1.9	1.6
2000	25.4	12.4	8.0	5.9	4.5	3.7	3.1	2.6	2.2	2.0
2250	28.6	14.0	9.1	6.7	5.2	4.2	3.5	3.0	2.6	2.3
2500	31.9	15.6	10.2	7.5	5.9	4.8	4.0	3.5	3.0	2.6

Table 1: Estimated septic tank pumping frequency. Based on number of persons in household and size of tank. Illustration courtesy of Penn State College of Agricultural Sciences.

Another cause of on-lot system failure is **hydrological overloading** that results from overloading a system with excessive amounts of household wastewater. Excess amounts of wastewater flowing into a septic tank can cause solids to be flushed past tank baffles into the absorption field.

Also, an absorption field that remains saturated works less efficiently and can clog due to a build-up of organic material. Reducing water use by practicing basic water conservation measures at home, and spacing out heavy water use days, i.e. days when household laundry is done, can help prevent system overload. (See Appendix C, Water Conservation at Home).

At the very least, a failed system can cause significant inconvenience for the homeowner. At worst, pollution of lakes, streams and drinking water supplies can occur along with the need for costly repairs or system replacement.

Repairing and Replacing On-lot Systems

Postponing repair of a malfunctioning system can lead to further problems. Your local municipal **Sewage Enforcement Officer (SEO)**, as well as a reputable firm with experience in system installation and repair, can provide assistance in determining what repairs are needed to avoid further complications and financial expense.

Financial assistance in the form of low interest long-term loans is available for replacement or repairs of improperly functioning or failed on-lot systems, through the Pennsylvania Infrastructure Investment Authority (See Resources for More Information at the end of this chapter).

Costly system failure can be prevented by much less expensive periodic inspection and pumping. Check your local yellow pages under “Septic Tank and Systems Cleaning” or contact the Pennsylvania Septage Management Association for contractors in your area (See Resources for More Information at the end of this chapter).

The relatively minor investment in periodic inspections and pumping can save the homeowner significant costs down the road. In addition to repair costs incurred, a failed or malfunctioning on-lot system can present an obstacle in the sale of a home.

Financial assistance in the form of low interest long-term loans is available for replacement or repairs of improperly functioning or failed on-lot systems, through the Pennsylvania Infrastructure Investment Authority.

Permits and Testing

Before beginning installation of a new on-lot system, or making repairs or upgrades to an existing system, contact your municipal SEO to determine what permits will be required. Your local conservation district can provide assistance in determining if an Erosion and Sediment Control Plan (Chapters 5 and 10) will also be needed for your project.

There are numerous types of on-lot sewage disposal systems commonly in use throughout Pennsylvania. Each different type of on-lot system has its own requirements and testing procedures. It is important for a property owner to hire a qualified and reputable firm to ensure that proper testing and siting is performed for the specific type of sewage disposal system needed for their property.

Before beginning installation of a new on-lot system, or making repairs or upgrades to an existing system, contact your municipal Sewage Enforcement Officer (SEO) to determine what permits will be required.

Testing, to determine the suitability of a site for an on-lot system, generally involves digging one or more test pits. The SEO examines the soils in the test pits to determine their suitability for treating wastewater. If the soil is found to be suitable, a percolation test is usually conducted to determine the rate at which the soil can accept wastewater produced by a proposed system. Percolation test results found to be acceptable are then used to calculate a system's size.

Other considerations in determining the type of system required for a home, and where the system will be located, include the slope of the land and required isolation distances from wells, driveways and other important features. A reputable firm and your local SEO can provide assistance in ensuring that the appropriate system is selected, properly installed and located in a suitable location on a building lot.

Summary

On-lot sewage treatment systems are often used in rural areas, such as Pike County, for the treatment of household waste water. When installed, used and maintained properly, on-lot systems minimize pollution of surface and groundwater resources and help to protect family health and the financial investment of homes and property.

Considering their widespread occurrence in Pike County, proper use and care of on-lot systems becomes critical. With some basic knowledge, the homeowner can help ensure their on-lot system will provide years of household wastewater treatment.

The most critical aspect of maintaining an on-lot system is pumping the tank. Having a tank pumped out every three years is generally considered to be a good rule of thumb.

Negligence in maintaining a system can lead to system failure, water pollution and expensive repair costs. Financial assistance in the form of low interest, long-term loans for replacement or repairs of improperly functioning or failed on-lot systems is available through the Pennsylvania Infrastructure Investment Authority.

Before beginning installation of a new on-lot system, or making modifications or upgrades to an existing system, contact your municipal Sewage Enforcement Officer (SEO) to determine what permits will be required. Your SEO and a reputable firm can help ensure that a new system meets the requirements of a particular site, is correctly sited and installed, and can also provide assistance in determining what is needed to repair a malfunctioning or failed system.

Action Steps for Proper Use and Maintenance of On-lot Sewage Systems

In addition to regular inspections of on-lot systems and pumping of septic tanks, listed below are measures homeowners can undertake to ensure proper operation of a system, extending its life while protecting community drinking water supplies and minimizing environmental impacts.

- ☞ Exercise caution with the use of additives marketed as providing improvement to on-lot systems. Some products can actually create problems in on-lot systems.
- ☞ Use and dispose of household hazardous wastes (HHW) properly (Chapter 2). Excess amounts of HHW poured down household drains can impair on-lot system functioning and may lead to groundwater contamination.
- ☞ Grease and oils from cooking, poured down household drains, can accumulate in a septic tank and contribute to a clogged absorption field; save and dispose of with garbage.
- ☞ The root systems of shrubs and trees, planted over absorption fields, can penetrate, clog and damage distribution pipes. Maintaining a grass cover over a field is a safe bet.
- ☞ Avoid parking or driving automobiles, ATVs and other vehicles over absorption fields. Their weight can cause compaction and damage to distribution pipes. Average-sized riding mowers are generally O.K.
- ☞ Avoid placing large, inflatable swimming pools on absorption fields; their weight can cause compaction of mound materials resulting in system failure.
- ☞ Practice water conservation measures to avoid overloading and saturating an absorption field, which can lead to system failure.

Resources for More Information

Dingman Township Web Site: www.dingmantownship.org. Good resource for information on on-lot systems. Note: Questions regarding on-lot systems should be directed to the local SEO of the municipality a resident resides in. Only Dingman Township residents should contact the Dingman Township SEO with questions or complaints regarding on-lot systems.

Pennsylvania Association of Conservation Districts: www.pacd.org/resources/lake_notes/septic.htm, “Lake Notes – Septic Systems.”

PA DEP, On-lot Sewage Treatment Systems: www.depweb.state.pa.us/dep/site/default.asp. Select “Search” and “On-lot Disposal System.”

Pennsylvania Septic Management Association (PSMA): www.PSMA.net. Good resource for information on on-lot systems. Also provides assistance in locating PSMA-certified inspectors.

Penn State University, Department of Agricultural and Biological Engineering: www.abe.psu.edu/extension/factsheets/f/onlotsewageindex.htm. Find various publications on on-lot systems including fact sheets on alternative systems.

PENNVEST (Pennsylvania Infrastructure Investment Authority): www.pennvest.state.pa.us/pennvest. Select “Financial Assistance” and “On-Lot Sewage Disposal Funds.” Find information on financial assistance in the form of low interest, long-term loans for rehabilitation, improvement, repair or replacement of a malfunctioning or failed on-lot sewage treatment system.

U.S. EPA, Managing Septic Systems to Prevent Groundwater Contamination: www.epa.gov/safewater/protect/pdfs/septic.pdf.