

Keuka Lake Book

Onsite wastewater treatment systems

In the past, human waste or sewage was either buried or dumped into rivers and lakes, believing in nature's ability to cleanse itself. Society discovered in the 19th century this method of sewage disposal produced both immediate human health and lasting negative environmental impacts and changed from methods of sewage disposal to sewage treatment. Currently, about 75% of the residences, businesses and institutions around the Keuka Lake Watershed depend on individual, onsite wastewater treatment systems (formerly referred to as septic systems) to properly "cleanse" their wastewater. Of nearly 70 miles of waterfront, only 16 miles are on municipal sewers along the East Branch. The areas currently serviced by sewers are between the village of Penn Yan and 10 miles south on East Bluff Drive and between Penn Yan and 6 miles south on East Lake Road to the Milo/Barrington town border.

In order to address the serious potential impact of failed or inadequate onsite wastewater treatment systems, the eight municipalities that border Keuka Lake adopted a uniform wastewater treatment law. This led to the formation (in 1993) of the intermunicipal group called the Keuka Watershed Improvement Cooperative (KWIC) to assure onsite wastewater treatment systems are designed, built and managed in a manner that protects water quality, public health and the value of lake front properties.

Years of experience have proven that properly designed, sited, installed, and maintained onsite wastewater treatment systems have little adverse effect on the environment. The uniform wastewater treatment law was developed (and revised in 2010) to ensure onsite wastewater treatment systems conform to strict standards to protect public health and the lake. A reputable contractor and the Watershed Inspector together can make sure your system will be properly installed. Homeowners have a major influence on how well their septic system functions. This chapter will describe how onsite wastewater treatment systems function, the role of the KWIC in septic system regulation, and how homeowners can properly maintain their septic system.

How Onsite wastewater treatment systems Function

Onsite wastewater treatment systems have two major components: a septic tank and a soil absorption system. The septic tank is typically a 1,000 to 1500 gallon prefabricated concrete container that receives all household wastewater including bathrooms, kitchen, and laundry room. In the septic tank, the inlet baffle helps to slow flow, reduce agitation and settle heavy solids where they are partially decomposed by bacteria to form sludge. Light solids and grease float to the top of the tank forming a scum layer. The outlet baffle ensures that only liquid effluent is discharged to the soil absorption system.

The soil absorption system (drainfield or leachfield) typically consists of a distribution box, perforated distribution lines made of plastic, and an area of well-drained soil. Wastewater from the septic tank filters through the soil where soil particles, bacteria, and other organisms remove

harmful, disease-causing microorganisms, organic matter and some nutrients. For the system to function properly, it must be carefully designed and constructed for the site's soil conditions.

The soil also needs time to filter out these harmful materials from the wastewater. Suitable soils do not include pure sand, which allows wastewater to pass through too fast, or clay, which is too dense to allow for proper wastewater treatment. State and local regulations that determine what constitutes suitable soil have been developed after careful consideration of many factors that affect a soil's ability to adequately treat domestic wastewater. These factors specify four feet of usable soil with no bedrock, high water table or other limiting layer on slopes of less than 15%. To determine if the soil is suitable for wastewater treatment, both a deep hole test of 6-8 feet and a percolation test is performed on the site where the system will be located. The results of the deep hole test help determine what type of system can be installed and the results from the "perc test" determines the size of the system.

Why Worry?

The threat of disease is the chief concern in treating human wastewater. The epidemics that killed millions of people in the Middle Ages were caused by mixing of human waste with drinking water supplies. Domestic wastewater contains bacteria and viruses that cause dysentery, hepatitis, typhoid fever and many other significant diseases. To protect human health, these dangerous microorganisms need to be excluded from drinking water supplies. Fortunately, soil and soil bacteria effectively remove disease-causing microorganisms from wastewater in properly functioning onsite wastewater treatment systems. It takes time for these natural processes to work so there are regulations dictating separation distances between onsite wastewater treatment systems and water sources to prevent contamination before the wastewater is fully treated. Sewage treatment plants use chlorine and/or bacteria to remove or kill pathogens prior to the effluent being discharged to streams or lakes.

Nutrients such as nitrogen and phosphorus in domestic wastewater can cause both health and nuisance problems if allowed to reach surface or groundwater supplies. Nitrogen in the nitrate form poses the most significant threat. When ingested by infants, nitrate can interfere with the blood's ability to carry oxygen, causing "blue-baby" syndrome. Nitrogen carried in septic tank wastewater is usually in the form of ammonia. Ammonia is readily transformed into nitrate, which can easily become part of ground and surface water supplies.

Excess phosphorus in surface water can cause excessive algae growth or "blooms". Throughout the bloom, algae die and decay, depleting dissolved oxygen in the lake and reducing the amount available to other organisms. This process has been responsible for fish kills all over the world and is one reason for the efforts to reduce the amount of nutrients entering the environment from point and nonpoint sources.

System Failures

Onsite wastewater treatment systems do not last forever. The expected life is 20 to 30 years

under ideal conditions. Eventually, soil in the absorption field becomes clogged with organic material, making the system unusable. Symptoms of a serious problem include:

- Sewage backup in you drains or toilets
- Slowly draining sinks, bathtubs, and toilets not cured by plungers or drain cleaning products
- Surface flow of wastewater
- Lush green grass over the absorption fields, even during dry weather
- The presence of nitrates or bacteria in your drinking water well
- Excessive growth of aquatic weeds or algae in lakes or ponds adjacent to your home
- Unpleasant odors around your house

Many other factors can cause the system to fail well before the end of its "natural" lifetime. Pipes blocked by roots, soils saturated by high water tables, crushed distribution pipes, improper location, poor original design or poor installation can all lead to major problems.

By far the most common reason for early failure, however, is improper maintenance by homeowners. When a system is poorly maintained by not pumping out on a regular basis, solids build up in the septic tank, allowing solids to flow into and clog the absorption field.

What You Can Do To Prevent Failure

Maintenance and use of water conservation fixtures are the most important factors a homeowner can control to make sure a septic system will function properly over a long period of time. Too often homeowners forget what goes down the drain ultimately finds its way into the soil and then the lake.

The following maintenance practices will keep the system running smoothly:

- Know the location of all components of the septic system. Keep heavy vehicles away from the system.
- Don't plant trees or shrubs near drainage fields since their roots can clog the pipes. Willow trees are particularly troublesome.
- Dispose of household chemicals properly. Do not pour them down the toilet or drain. Even common cleaning products like bleach and drain cleaner, if used in excess, can temporarily disrupt septic tank function.
- Distribute laundry chores throughout the week to avoid overloading the system on any given day.
- Don't use garbage disposals. They contribute unnecessary solids and grease to the septic system.
- Conserve water whenever and wherever possible by using water conservation fixtures.
- Don't use toilets as trash cans.
- Monitor the septic tank yearly and have a DEC licensed pumper remove sludge and scum every three to five years. This helps ensure that there is enough space in the tank for wastewater and prevents solids from escaping into the absorption system.

- Consider using a Laundromat periodically to lessen the burden on your septic system.
- Be careful of commercial septic tank "cleaning" products. They may do more harm than good.

Other Types of Onsite Wastewater Treatment Systems

Sometimes, a conventional absorption field cannot be constructed on the property to meet Health Department standards. For example, soils at the location of a building site may not have proper drainage. Inadequate separation distances or steep slopes may also be restrictive. Limiting site conditions will require the assistance of the KWIC Watershed Manager, State Health Department and a professional engineer to design the system. There are several alternative systems available for difficult sites.

A built-up or raised fill system is used where the water table is too close to the surface. The absorption field is built up with at least 4 ft. of usable soil between the distribution pipes and the water table. Near a lake or river it is recommended that there be at least 4 feet of soil above the 10 year flood level (717.9 ft. above mean sea level on Keuka Lake). This may require a considerable amount of time, money and trucked in topsoil.

Another alternative is a sand filter. This system uses a bed of sand to treat the effluent. The type of sand is very critical for proper treatment. Current standards do not allow discharge from these systems so an absorption system must follow the sand filter to treat the sand filter effluent. Sand filters, like all alternatives, must be designed by a qualified engineer and meet appropriate health requirements.

Enhanced treatment systems are used to replace failing systems on undersized waterfront lots. Enhanced treatment units consist of the typical aerobic units to various media units. The key component of the enhanced systems is oxygen. Aerobic systems use aerators to introduce oxygen to greatly improve the quality of effluent discharged to the absorption field. Effluent from aerobic systems must be discharged to an absorption field. Media type systems have ventilation paths around the media chosen to provide oxygen for microbial action to treat the waste effluent.

Holding tanks can only be used on existing residential sites as an absolute last resort if no other waste treatment system can be installed. Holding tanks are not allowed for new construction.

Buying, Building, or Selling

If you are buying, building or selling a home, it is important to consider the condition of the wastewater treatment system. Replacing an old or inadequate system can be an expensive proposition. As a buyer or builder, you need to make sure you know what you are getting, and as a seller, you need to make the prospective buyers aware of what they are purchasing. What should be known about a system before purchasing or selling a home? The system should be mapped with the location of the system relative to the house and lot; system specification such as

size of tank and number of absorption lines; maintenance records including last date of tank pumping; information about the installer; and information about the septic system pumper.

For those considering purchasing a new home or selling an old one, it is a good idea to have the septic system evaluated. By clearly informing buyers beforehand, a previous owner is protected from liability if the system fails. Financially strapped new homeowners avoid the surprise that a new septic system is needed. Useful information for evaluation includes: the age of the system - if properly maintained, onsite wastewater treatment systems can last 20 to 30 years; the size of the system - systems are typically designed to accommodate *110 to 150* gallons per day per bedroom, assuming two persons per bedroom depending on the use of water-saving fixtures; the maintenance history of the system - a properly maintained system will function better and longer; and the historical and current condition of the system - Are there wet spots? Does it have a history of flooding? What material is the septic tank made of? What is the condition of the plumbing? Most of this information is revealed during the required septic inspection performed by the **KWIC Watershed Inspectors**.

Just as the prospective homeowner needs to be aware of current and future septic needs, builders or owners replacing a failed or inadequate system need to plan for the future. Besides proper siting, deep soil investigations, good percolation tests, permits, and having a reputable contractor to install the new system, the design of the system needs to fit the intended use. The NYS Department of Health's Public Health Law, section 75-A.6 (1), revised in 2010 for single family residential dwellings, sets the minimum tank capacities and minimum liquid surface area requirements. See http://www.health.ny.gov/regulations/nycrr/title_10/part_75/appendix_75-a.htm for the entire DOH code.

For homes with 1 to 3 bedrooms, the minimum septic tank capacity is a two compartment, 1,000 gallon tank with a minimum liquid surface area of 27 square feet. If the home is going to have a garbage disposal or other device that generates significant waste and/or waste water, each of these units is considered another bedroom.

As with any construction, use a certified and reputable contractor. ***Be certain to have a written agreement with the installer that stipulates that final payment will not be made until the system has received approval from the Watershed Manager.***

Because onsite wastewater treatment systems are such a widespread practice in the Keuka Lake watershed, and because of the long recognized need to prevent untreated waste from entering the lake, all municipalities bordering the lake have formulated and adopted a uniform wastewater treatment system construction and management law. Important features of the law include: a requirement that all onsite wastewater treatment systems be constructed according to specifications outlined in a construction permit; that NYS sanitary code standards be followed for replacement and repair work as well as new construction activities; that inspection of onsite wastewater treatment systems be performed by the local Watershed Inspector as part of property transfers, complaints and building construction; and that routinely scheduled inspections are required of all holding tanks, aerobic treatment systems, and all sites within 200 feet of the lake or its tributaries. These inspections are intended to assure that those systems with the greatest potential to impact the lake through failure or mismanagement are upgraded or improved as necessary, and managed in an effective manner. Oversight and policy for the program is carried

out by a board of directors consisting of one elected official from the municipalities of Barrington, Jerusalem, Hammondsport, Milo, Penn Yan, Pulteney, Urbana and Wayne. Staff for the program consists of the Watershed Manager, responsible for the approval of onsite wastewater treatment systems, and coordination of the inspection program, and the Watershed Inspectors, responsible for the various forms of system inspection required by local law.