

Your Sewage System IS YOUR RESPONSIBILITY

Did you know that as a homeowner you're responsible for maintaining your sewage system? Did you know that maintaining your sewage system protects your investment in your home? Did you know that you should periodically inspect your system and pump out your septic tank? If properly designed, constructed and maintained, your sewage system can provide long-term, effective treatment of household wastewater. If your sewage system isn't maintained, you might need to replace it, costing you thousands of dollars. A malfunctioning system can contaminate both groundwater that might be a source of drinking water as well as surface water. And if you sell your home, your sewage system must be in good working order.

This guide will help you care for your sewage system. It will help you understand how your system works and what steps you can take as a homeowner to ensure your system will work properly. To help you learn more, consult the resources that are listed throughout this booklet. A helpful checklist is also included at the end of the booklet to help you keep track of your sewage system maintenance.

TOP THREE THINGS YOU CAN DO TO PROTECT YOUR SEWAGE SYSTEM

- **Do not** build anything over or within ten feet of any part of your sewage system.
- **Do not** allow anyone to drive heavy vehicles like cars or trucks over any portion of the system. Pipes and tanks may be damaged or crushed. The soil in the filtration or leaching field may be compacted, which would minimize its ability to filter and absorb sewage.
- **Do not** plant any shallow rooted trees or shrubs, like willows or soft maples, near any portion of the system. Their roots will grow and travel laterally underground. As they seek water, they can grow into pipes causing blockages.

Water Quality Program

The Cuyahoga County Board of Health conducts an extensive water quality program. The focus of this program is an overall watershed based approach when dealing with water quality issues. Activities within this program include:

- Identifying and eliminating public health nuisances and hazards in our surface waters
- Surveying the various watersheds throughout the county
- Supporting the Household Sewage, Storm Water, Semi-public Sewage, Bathing Beach and Parks & Recreation Programs
- Educating the public on Non-Point Source Pollution issues
- Participating in local watershed protection groups and meetings

Stream Monitoring

The Board of Health has conducted a stream monitoring program since the late 1980's. This program allows for the chemical and biological monitoring of water quality in our watersheds. The information collected from this program has documented the need for the Board of Health's Operation and Maintenance Program for Household Sewage Treatment Systems. To date, thousands of water quality samples have been collected. Likewise, over 50 permanent water quality monitoring sites have been established within the various watersheds in Cuyahoga County. This data is used to obtain general baseline conditions and to identify problem areas potentially being impacted by sources of water pollution.

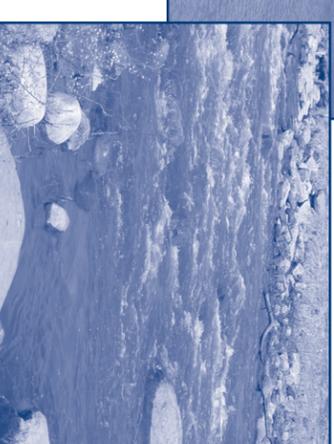
The Board of Health also employs college interns over the summer months to perform various studies on specific sub-watersheds. These studies enable college students with an interest in environmental health the opportunity to receive real work experience by performing biological and chemical monitoring of surface waters. If you would like more information about this program or are interested in becoming an intern, please contact the Board of Health.

Stream Surveys

Intensive surveys are performed on specific watersheds.

Survey methods include:

- Bacteriological and chemical analysis
- Macroinvertebrate sampling
- Qualitative Habitat Evaluation Index (QHEI) analysis
- Headwater Habitat Evaluation Index (HHEI) analysis



Operation and Maintenance Program

Along with requested point of sale inspections and complaint investigations, the Cuyahoga County Board of Health conducts operational maintenance inspections of home sewage treatment systems throughout the health district. Since the effluent from home sewage systems has been identified as a major contributor to non-point source pollution in our waterways, an on-going inspection and maintenance program is a necessity.

Since the inception of the Operation and Maintenance Program, many educational seminars have been conducted for homeowners who utilize household sewage systems. The Board of Health continues to stress homeowner education as the key to a successful Operation and Maintenance Program. Countywide stream monitoring and sampling of surface water continue to assist in prioritizing areas determined to be adversely impacted by pollution sources. Many of the sewage systems in use today are of an antiquated design and were installed over 30 years ago. Evaluation results have shown that less than a third of these older systems are operating in a satisfactory manner. Most are not capable of properly treating and disposing of the household wastewater generated on a daily basis. This results in several hundred gallons of partially treated effluent, or in some cases, raw sewage leaving each failing system every day. To help identify and eliminate these sources of pollution, sewage system evaluations continue to be scheduled and conducted in communities throughout Cuyahoga County.

Working with Communities

The Operation and Maintenance Program encompasses an overall water quality and watershed based approach in hopes of minimizing water quality problems emanating from failing household sewage systems. As sewage systems are evaluated in a community, the data gathered is provided to local officials. This information can then be utilized to help determine the most effective means of eliminating pollution sources in a specific area. In many circumstances, the design and installation of a sanitary sewer is a feasible solution for eliminating failing sewage systems. Where sanitary sewers are determined not to be feasible, the repair or replacement of failing home sewage treatment systems will be on going.

Many municipalities have completed preliminary studies and have determined that the installation of sanitary sewers in sections of their communities is not feasible. Topographical limitations, large lot sizes or frontages, and sparse population in an area may result in a sewer project not being practical. In these communities, the Board of Health continues to collaborate with homeowners to repair or replace failing home sewage treatment systems. To date, several thousand failing or improperly working sewage treatment systems have either been repaired or replaced throughout Cuyahoga County. These activities have resulted in dramatic improvement in the water quality in those areas. In many cases, the cost to homeowners for the construction of a sanitary sewer is often comparable to the cost of replacing the existing sewage treatment system. Likewise over 4000 systems have been eliminated from use as a result of the installation of sanitary sewers since the inception of the Operation and Maintenance Program.

The Cuyahoga County Board of Health has also developed a regional storm water program to assist our 55 designated Phase II Storm Water Communities within our jurisdiction, and to also assist communities throughout the State of Ohio. This program was created and expanded from our existing Household Sewage Operation and Maintenance Program and Water Quality Monitoring Programs. This program allows the Board of Health to provide specific functions for these communities to assist them in reaching their Storm Water Management Program Goals. These activities includes educational outreach and participation, illicit discharge detection, MS4 inventories, dry weather flow surveys, water quality monitoring of MS4 outfalls and investigative activities to locate illicit sources of pollution to a communities MS4 system.

How does my sewage system work?

Pipe from the home

All of your household wastewater flows through your plumbing and exits your home through a pipe to the septic tank. The contents of this sewer pipe should include the wastewater from all of the drains inside the home - sinks, toilets, showers, utility tubs, etc. Stormwater or groundwater that does not need to be treated by the sewage system should not enter this pipe. Drainage from downspouts, sump pumps, etc. will send too much water to the system and possibly shorten its lifespan.

Septic tank

The septic tank performs the first step of the wastewater treatment process. The septic tank is a solid watertight tank designed specifically to accept all wastewater from the home. Some installations may have one tank or two tanks in series. All tanks should feature inlet and outlet baffles, along with an access manhole for cleaning.

The inlet baffle ensures that entering wastewater mixes with the liquid contents of the tank to begin bacterial breakdown of organic materials and separation of solids. The inlet baffle also prevents the floating scum layer from floating back and clogging the inlet pipe.

The outlet baffle ensures that only liquid is able to leave the tank and enter the secondary treatment portion of your system. If the scum layer reaches the outlet pipe, the pipe would quickly become plugged.

The contents of the septic tank stratifies into three layers:

- Floating Scum Layer - soaps, greases, toilet paper, etc.
- Liquid layer - water, other liquids, and suspended solids
- Sludge - heavy organic and inorganic materials settle to the bottom of the tank.

Bacteria that naturally occur in the sewage which enters the tank are necessary to break down organic materials in wastewater. This is often referred to as primary treatment. Pathogens in the waste are not destroyed in the septic tank. The septic tank and its bacteria prepare the wastewater for treatment by the remainder of your system.

To prevent buildup, sludge and floating scum need to be removed through periodic pumping of the septic tank. County regulations require that septic tanks be pumped out at least once every three years. If you have a large family you probably need to have it pumped more often.

The access lid for your septic tank is required to be kept to grade. This allows the tank to be easily located, pumped, and inspected. If your tank is not to grade, an extension riser can be installed at the time of your next cleaning.

THE COMPONENTS

What are OFF-LOT and ON-LOT Household Sewage Treatment Systems?

There is a misconception that all Household Sewage Treatment Systems are leachfields. Leachfields function as “on-lot” systems where the wastewater flows from the septic tank into the soil. The wastewater percolates into the soil, which provides final treatment by removing harmful bacteria, viruses, and nutrients. Suitable soil is necessary for successful wastewater treatment.

In Cuyahoga County, and much of Ohio, the soils are too severe to allow for proper percolation into the ground. The soils will not accept these volumes of water and can not provide the necessary treatment. For this reason, the majority of systems used in the past in this area are “off-lot” sewage treatment systems. These systems are designed to discharge the treated effluent from the sewage system back into the environment via a creek, storm sewer or ditch.

Filter Beds

Although their design may have changed over the years, filter bed systems have been installed in Cuyahoga County for decades. Filter beds installed prior to the early 1970's typically utilized gravel as a filtration media. These older beds consisted of clay tile pipes laid on top of a 15 to 24 inch thick bed of large gravel. A clay tile line was also placed below the gravel bed to act as a collection pipe. Wastewater from the septic tank would drain into the top pipes, filter through the gravel and be collected in the bottom line. This effluent was then discharged to the environment. Many of these systems are still in use today.

Unfortunately, these old gravel beds did not function well and did not have the ability to properly filter the sewage prior to discharging it to a ditch, stream or storm sewer. For this reason, approved filter sand has been utilized as the actual filtration media in more modern filter bed systems. Perforated pipe is laid in gravel both above and below the filter sand. The sand has a filtration capability that is far superior to that of gravel.

Filter bed systems installed in the last few decades typically use a splitter box, also known as a distribution box. This box contains a flow diversion device that directs the flow of wastewater to one side of the filter bed or the other. This allows one part of the bed to rest, while the other is in use. This may help extend the life span of your filter bed system. The flow diverter should be switched to alternate flow at least annually. For this reason, the flow diversion box must be kept to grade. If you do not know where it is located, contact your septic pumper, installer, or the Board of Health.

High-efficiency toilets and showerheads

Toilet use accounts for 25 to 30 percent of household water use. Do you know how many gallons of water your toilet uses to empty the bowl? Most older homes have toilets with 3.5 to 5-gallon reservoirs, while newer high-efficiency toilets use 1.6 gallons of water or less per flush. If you have problems with your sewage system being flooded with household water, consider reducing the volume of water in the toilet tank if you don't have a high-efficiency model. The use of high-efficiency showerheads can also dramatically minimize the volume of water the system receives on a daily basis.

Products not to be put into your sewage system

Even though sewage systems thrive on wastewater, certain chemicals can harm the delicate balance in a septic tank and should not be run through the system. They include:

- Paints, thinners, and solvents
- Drain cleaners
- Motor oil, kerosene and gasoline
- Floor wax and chlorine bleach

Other materials may not chemically harm the system, but may cause a blockage or clog pipes. These items will not break down and can not be digested by microorganisms. The following materials should never be flushed down the toilet or run down the drain:

- Grease, cooking oil and animal fat
- Cotton balls and cotton swabs
- Sanitary napkins and tampons
- Condoms
- Plastics
- Coffee grounds

Garbage disposals

Eliminating the use of a garbage disposal can reduce the amount of grease and solids entering the septic tank and possibly clogging components of your sewage system. A garbage disposal grinds up kitchen scraps, suspends them in water, and sends the mixture to the septic tank. Once in the septic tank, some of the materials are broken down by bacterial action, but most of the grindings flow through the tank and into the secondary treatment component of your sewage system. This can cause filter beds and filters in aeration units to clog.

USE WATER EFFICIENTLY!

- Install high-efficiency toilets and showerheads
- Fill the bathtub with only as much water as you need
- Turn off faucets while shaving or brushing your teeth
- Run the dishwasher and clothes washer only when they're full
- Use toilets to flush sanitary waste only (not kitty litter, diapers, or other trash)
- Make sure all faucets are completely turned off when not in use
- Maintain your plumbing to eliminate leaks
- Install aerators in the faucets in your kitchen and bathroom

WHY SHOULD I maintain my sewage system?

When sewage systems are properly designed, constructed, and maintained, they effectively reduce or eliminate most human health or environmental threats posed by pollutants in household wastewater. However, they require regular maintenance or they can fail. Sewage systems need to be monitored to ensure that they work properly throughout their service lives.

Saving Money

A key reason to maintain your sewage system is to save money! Failing septic systems are expensive to repair or replace, and poor maintenance is often the culprit. Your system will need routine pumping. Pumping frequently will depend on how many people live in the house and the size of the system. A non-functioning sewage system can lower your property value and could pose a legal liability.

Protecting health and the environment

Other reasons for safe treatment of sewage include preventing the spread of infection or disease and protecting water resources. Typical pollutants in household wastewater include nitrogen, phosphorus, and disease-causing bacteria and viruses. If a sewage system is working properly, it will effectively remove most of these pollutants.

With one-fourth of U.S. homes currently using household sewage systems, more than 4 billion gallons of wastewater per day is dispersed below the ground surface or into the surface waters. Over a million sewage systems are currently in use in the state of Ohio. Inadequately treated sewage from these systems can be a cause of groundwater and surface water contamination. It poses a significant threat to drinking water and human health because it can contaminate drinking water wells and cause diseases and infections in people and animals. Improperly treated sewage that contaminates nearby surface waters also increases the chance of swimmers contracting a variety of infectious diseases. These range from eye and ear infections to acute gastrointestinal illnesses and hepatitis.

HOW DO I maintain my sewage system?

Inspect and pump frequently

You should have your sewage system pumped once every three years. If you have an aeration system, you should consider obtaining a service contract from the distributor of that particular system. This maintenance contract allows for routine inspections of all mechanical components of your system. For newer filter bed systems, the beds should be alternated on an annual basis at the distribution box. This allows for the alternating of the beds and will provide optimal life expectancy for your filter bed system. If you do not know where this box is located, contact the Board of Health for assistance.

Use water efficiently

Average indoor water use in the typical single-family home is almost 70 gallons per person per day. Leaky sinks and toilets can waste as much as 200 gallons each day. The more water a household conserves, the less water enters the sewage system. Efficient water use can improve the operation of the sewage system and reduce the risk of failure.

Aeration Systems

If you utilize a home aeration system, special care is required. The motor, which provides aeration to the system, must operate continuously. If it does not, the oxygen required by the microorganisms that thrive in the aeration system will not be sufficient and they will begin to die. These "sewage bugs" help to break down the organic matter in the wastewater and biologically convert it to stable substances in the form of gases and liquids. The aeration and mixing of the wastewater ensures that it comes in contact with the microorganisms so thorough treatment can occur.

Several aeration system designs also incorporate the use of filters to provide additional treatment. These filters need to be checked and cleaned on a routine basis to work effectively. If these filters become clogged, then the wastewater has no place to travel within that system. This can cause a possible backup. It can also cause solids to clog the motor, shortening its life span. Untreated waste may eventually leave the system and enter the environment.

Aeration systems have mechanical components, which will also need to be serviced and eventually replaced. Since much of the additional care and maintenance required with these systems is beyond the expertise of the average homeowner, various companies have been certified by the original manufacturers to offer extended service contracts.

MODERN AERATION SYSTEMS

... have an alarm box that is situated in a conspicuous location in your home.

- An alarm will typically sound if a motor is not operating or if you are having a backup within the tank.
- You can still flush your toilets and use water sparingly during this time.
- Refrain from washing laundry or conducting other activities that generate a large volume of wastewater.
- Once this alarm sounds, you should contact the service provider whose name appears on the alarm box.

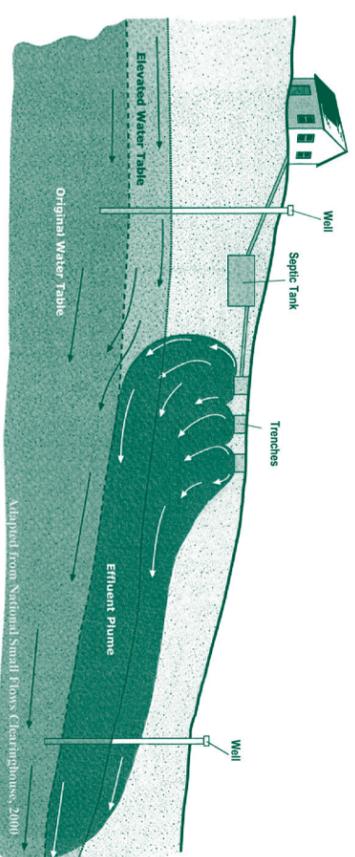
A backup into your home or ponding of wastewater on your lawn could result.

Leachfields

The typical sewage system installed throughout the country for decades has utilized a septic tank and a leaching tile field. By design, the sewage flows out of the tank and into either a clay tile or perforated pipe that is laid in trenches. The wastewater then drains from the pipes and enters the soil where it must be filtered and absorbed. This effluent must be properly filtered so that it does not pose a threat to ground water.

Leaching tile fields work well in areas with well drained, sandy soils. Unfortunately, much of Cuyahoga County consists of relatively poorly drained clay soils. These soils typically have little absorption capacity. The soil permeability - the rate at which water percolates into the soil - is very slow. Poorly drained soils are typically saturated with water during wet weather and stay wet for long periods of time after a heavy rain.

Leaching tile fields are designed to keep all of the effluent on lot. If your system utilizes a leachfield and is instead discharging off lot, your system is not operating properly. Leachfields will fail once the soil can no longer absorb the water that is being sent there from the septic tank. Once this occurs, the wastewater will either pond on top of the ground or find an alternative path and be discharged onto the ground at another location.



Evapotranspiration Fields (E-T)

An evapotranspiration system, or shallow leaching system, receives effluent from the septic tank and disposes of it by a combination of evaporation at the soil surface and transpiration to plants. There is also dissipation into the soil, but it can be limited depending on the severity of the soil structure.

The evapotranspiration system design incorporates a large leaching field preceded by an aeration system or mounded sand filter bed. The trenches are shallow to allow for the evaporation and transpiration of the treated wastewater. The best soil available is typically near the surface, where the plant roots are located.

Mounds

A septic tank mound system can be utilized for treating and disposing of domestic wastewater in areas unsuitable for conventional septic tank soil absorption systems. Mounds are pressure-dosed sand filters placed above, and discharging directly to, the natural soil. Their main purpose is to provide additional treatment to the wastewater before it enters the natural environment. Mound systems are designed to overcome site restrictions such as:

- Soils that have a very slow or extremely rapid permeability
- Shallow soil cover over creviced or porous bedrock
- A high water table.

The three components of a mound system are a pretreatment unit(s), dosing chamber, and the elevated mound. The pretreatment unit is usually a septic tank, which removes solids from the wastewater. An aeration system may also be utilized to improve the quality of wastewater reaching the mound. The dosing chamber follows the septic tank and contains a pump, which uses pressure to evenly distribute the wastewater over the infiltration surface of the mound. The mound is made up of a soil cover that can support vegetation. Below the soil is a fabric-covered coarse gravel aggregate in which a network of small diameter perforated pipe is placed. The network of perforated pipe is designed to distribute the effluent evenly through the gravel. Here it trickles down to the sand media and hence, into the plowed basal area (natural soil). Treatment occurs through physical, biological, and chemical means as the wastewater filters down through the sand and the natural soil.

Drip Irrigation

In a drip irrigation system the wastewater leaves the pretreatment unit and is pumped to a series of small diameter distribution piping. Several ounces of wastewater leave the piping through many emitter openings spaced evenly throughout the system. This allows for frequent, low pressure applications of the treated wastewater to the top layer of the soil, which is the most biologically active zone. This system can be utilized to overcome a number of site limitations and can potentially allow some difficult lots to be developed.

