

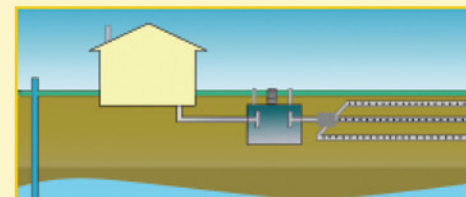
All About Your SEPTIC SYSTEM

NEW BRUNSWICK ENVIRONMENT INDUSTRY ASSOCIATION

Page 3...
How Septic Systems Work



Page 4...
Location is Vital



Page 5...
Septic System Installation



Page 6...
Possible Contamination Risks



Page 7...
Water Conservation



Page 8...
Septic System Maintenance



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Looking for more information?

A considerable amount of knowledge exists on septic system design and operation. Some of the most useful references used in the preparation of this publication are included below. Any further questions or concerns should be directed to your local Department of Health.

Internet Reference Sites:

NB Septic System Technical Guidelines:

http://www.gnb.ca/0053/public_health/pdf/land/technical-guidelines-jan2010-e.pdf

Septic System Design:

http://www.epa.gov/owm/septic/pubs/homeowner_guide_long.pdf

How Septic and Sewer Systems Work:

<http://home.howstuffworks.com/home-improvement/plumbing/sewer2.htm>

Canadian Drinking Water Guidelines:

http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/sum_guide-res_recom/summary-sommaire-eng.pdf

Government of New Brunswick:

<http://www2.gnb.ca/content/gnb/en.html>

Environment Canada:

<http://ec.gc.ca/default.asp?lang=En&nav=FD9B0E51-1>

Toilet History:

<http://www.sulabh.toiletmuseum.org/pg02.htm>

Septic Tank Filters:

<http://www.zabelzone.com/>

Infiltrator Systems:

<http://www.infiltratorsystems.com/>

National Small Flows Clearinghouse:

<http://www.nesc.wvu.edu/subpages/septic.cfm>

Out with the Old and In with the New

On Earth there is a fixed amount of nutrients, the chemical building blocks of life. The same nutrients are continuously recycled on the planet. Those nutrients that fed the dinosaurs and our ancestors are the same nutrients that supply us today and will continue to supply future generations. Farmers plant crops that obtain nutrients from the surrounding soil enabling them to grow and develop. We in turn consume harvested produce and obtain essential nutrients for performing life functions. Some of the consumed nutrients are rid from our bodies through solid and liquid excretions. Microorganisms then feed on these wastes and return the nutrients to the soil to start the cycle again.

All but gone are the days when people had to travel to a little house outdoors, the outhouse, when nature called. Technology has advanced in sewage treatment where it is now healthier and more convenient for us to have washrooms located inside the home. In New Brunswick, approximately 50% of people live in rural settings, which

depend on sewage systems on-site for treating wastewater from the home.

It is common practice for rural and suburban homes in the province to be equipped with an on-site septic tank and drainage field, the septic system, for the removal of sewage and wastewater from the home. When properly designed, constructed and maintained, a septic system will safely and effectively dispose of these wastes. A faulty septic system can lead to drinking water contamination and even outbreaks of dangerous diseases. Therefore, it is necessary to have a general understanding of the complete system and what should and should not be done to suitably maintain that system.

The septic system is designed to treat household sewage through physical and biological

processes. Proper treatment ensures that groundwater sources, such as aquifers, and surface waters, such as streams and lakes, are not contaminated. The system also provides a hygienic way of disposing of your household wastes.

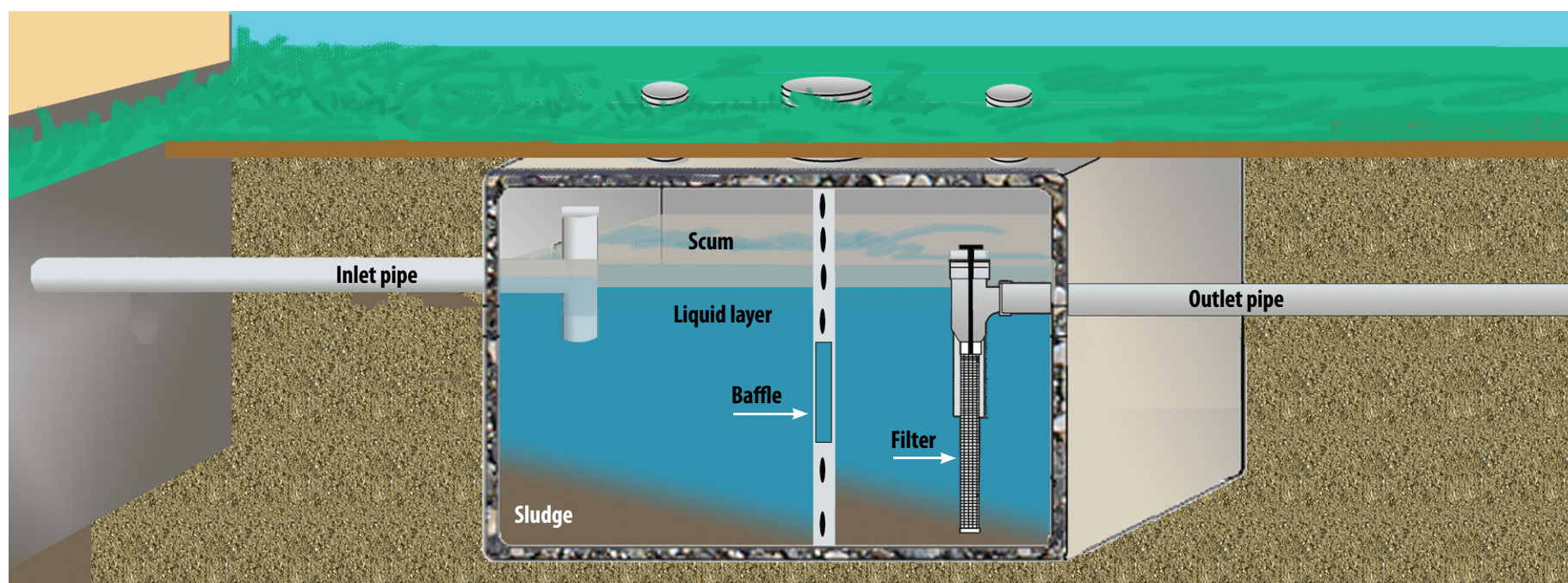


There are over 10 million microorganisms in a handful of ordinary soil.

Did you know...

- Some major nutrients are carbon, hydrogen, oxygen, nitrogen, phosphorous and calcium
- Prior to the early/mid-twentieth century, outhouses were the most common form of ridding sewage from homes
- In addition to providing lighting and air circulation, a crescent moon on the door of an outhouse signified the men's room while a star or sun burst was placed on the ladies room
- The first indoor sit-down toilets date back to 2500 BC in India and 2100 BC in Egypt
- The water closet was invented by Englishman John Harrington in 1596
- The first separate public toilets for men and women appeared at a ball in Paris in 1739
- American Joseph Cayetty invented toilet paper in 1857
- Contrary to popular belief Thomas Crapper did not invent the modern toilet, it was actually developed by SS Helior in 1870 who improved upon early toilet designs
- Sewage treatment for the first time in the world occurred in 1889





How Does Your Septic System Actually Work?

The purpose of a septic system is to collect, treat and dispose of household wastewater. Untreated wastewater may contain harmful bacteria, viruses and other contaminants that could cause serious health problems. Wastewater must be properly treated before it enters the environment to avoid contamination of groundwater and surface water. Your septic system consists of two main parts, a septic tank and a drainage field.

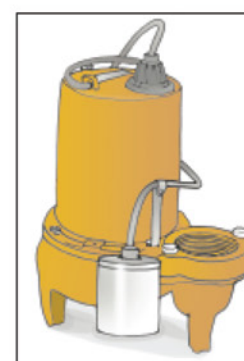
A septic tank is a watertight container that is buried below the ground surface. In the past, septic tanks were made from wood, metal or loose rock but these tanks were found to be unreliable and not very strong. Today septic tanks are made from concrete, fibreglass, or plastic.

Every septic tank has an inlet and an outlet pipe to allow the wastewater to flow into and out of the tank. Every septic tank also has a hole on the top of the tank that has a removable cover. This opening, which may vary in size, allows the tank to be accessed for cleaning and maintenance purposes. Some homeowners may decide to put a vertical port or extension on this opening so that it almost reaches the ground surface. These extensions are called risers. Risers allow for regular maintenance checks and cleaning of the septic tank without the need to remove the large amounts of soil that usually covers the tank.

Septic Systems versus Holding Tanks

Some people collect their household waste in holding tanks buried beneath the ground surface. These holding tanks are not true septic systems. In order to properly collect, treat, and dispose of household waste, septic systems must have two main components, a septic tank and a drainage field.

Wastewater, from your home, flows into the septic tank through an inlet pipe. The wastewater in the tank is fairly stagnant and this allows the solid material, referred to as sludge, to settle to the bottom. Prefabricated septic tanks must have baffles at the inlet and outlet to prevent sludge from leaving the tank. The lighter materials, such as grease and oil, will float to the top and are called scum. Natural bacteria present in the wastewater will feed on the sludge and scum causing it to decompose or breakdown. A partly clear liquid layer will form between the scum and sludge layers. This liquid, referred to as effluent, flows through the outlet pipe into the drainage field as the final stage in the treatment process.



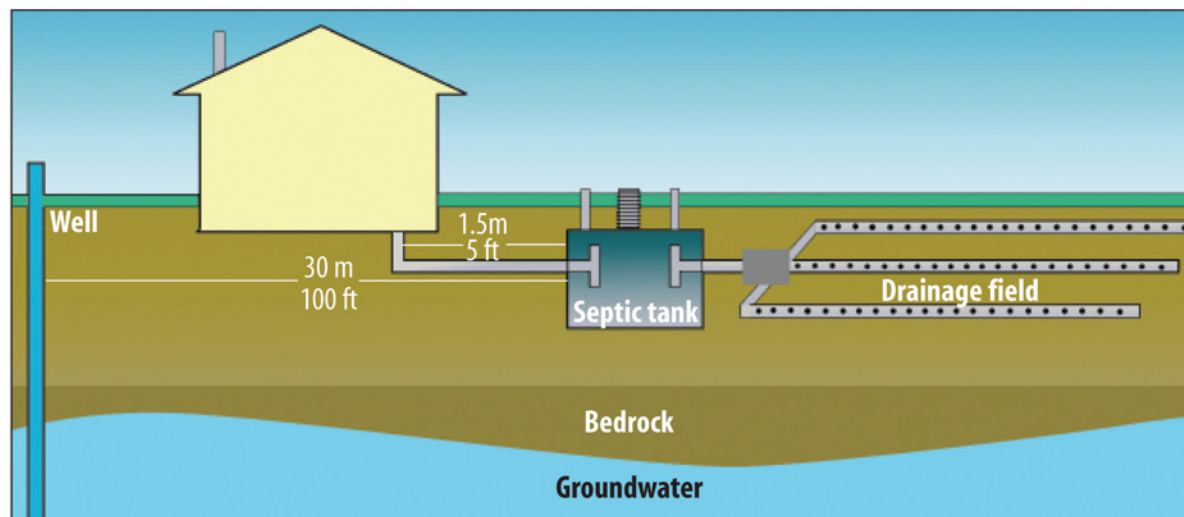
Sewage pump

If your drainage field is located at a higher elevation than your septic tank, a pump may be required to move the effluent from the tank to the field. The drainage field is composed of a series of perforated pipes that are usually placed in trenches and surrounded by a sand and gravel bed. Then the trench is covered with topsoil.

As the effluent flows through the pipes in the drainage field, it will slowly seep out into the surrounding ground. Before the effluent reaches the groundwater, bacteria that are naturally present in the surrounding sand and gravel bed will further breakdown any remaining organic matter. Finally, as the effluent continues to flow toward the water table, bacteria and viruses will be filtered out by the surrounding sand and gravel bed.

Both the septic tank and drainage field are required in order to properly and safely treat household wastewater. It is important that all waste flows through both parts of the septic system to ensure that untreated wastewater is not entering surface water and groundwater environments.

Location is Vital to a Healthy System!



the upper layer of the soil. This layer must not be saturated with water and it should have an intermediate permeability. Following these measures will ensure that the bacteria in the soil have enough oxygen and time to safely breakdown the remaining waste in the effluent before it reaches the water table.

Regional Departmental Contacts

A Public Health Inspector must approve applications for septic system installation, repair and/or significant upgrades. They must also inspect the system before it can be covered over and used. Consultation with the Medical Officer or a Public Health Inspector will help you determine the minimum system size and operation based on the site conditions. A listing of the regional public health protection branch offices in New Brunswick can be accessed online at the following website: <http://www.gnb.ca/0051/> or in the blue pages of your phone book.

Testing soil permeability is required under the New Brunswick Public Health Act before a drainage field can be installed. The percolation test is a way of measuring soil permeability and determining if a septic system can be constructed without harming the environment. Briefly, the test involves digging a hole in the ground and filling it with water. If water slowly drains out of the hole the test is successful. However, if the water drains too quickly or too slowly the soil bacteria will not be able to effectively breakdown the remaining organics. Systems can often be installed in areas where a percolation test has failed, but material with a suitable permeability will have to be imported for the purpose of installing the drainage field. Materials, such as clay and silt, do not have a permeability sufficient enough to permit their use.

Separation distances are established in the New Brunswick Technical Guidelines for On-site Sewage Disposal Systems to provide reasonable levels of health and environmental. The Technical Guidelines also establish minimum lot sizes that septic systems can be installed on and minimum setback distances from the septic tank and disposal field. Trained licensed contractors are aware of these requirements and know they must follow them for your protection. A Public Health Inspector must inspect the septic system before it is covered over to ensure that the system meets the requirements in the Public Health Act.

General setback distances for your septic system

Septic tank¹

- 1.5 meters (m) [5 feet (ft)] from any building
- 15 m [50 ft] or more from a drilled drinking water well
- 30 m [100 ft] from a dug well
- 30 m [100 ft] from a recreational lake or stream
- 90 m [300 ft] from a lake or stream used for drinking water

¹ As of November 20, 2009, all septic tanks shall conform to the requirements of Canadian Standards Association CAN/CSA Standard B66-05.

Minimum lot size for your septic system²

- The minimum lot area is 4 000 m² [0.4 hectares; 1 acre]
- Your lot must be at least 54 m [180 ft] in width
- Lot depth must not be less than 38 m [125 ft]

² Lot size, width and depth requirements may vary depending on your site conditions.

Drainage field³

- 1.2 m [4 ft] above bedrock
- 1.2 m [4 ft] above the groundwater table
- 3.0 m [10 ft] from any building
- 3.0 m [10 ft] from any property line
- 15 m [50 ft] from the natural boundary of any recreational lake or stream
- 23 m [75 ft] from a drilled drinking water well
- 30 m [100 ft] from a dug drinking water well
- 75 m [250 ft] from a lake or stream used for drinking water

³ Distances may vary depending on your site conditions.

Have you ever built a sand castle at the beach with a water moat around it only to discover that the water disappears almost as quickly as you pour it in? This is an example of a soil that has a high permeability, which means that water can pass through it at a high rate. If you were to do the same exercise with a clay soil your moat would remain full of water because clay, compared to sand, has a low permeability. Your septic system will operate the best when installed in soils between these two extremes.

Testing soil permeability is required under the New Brunswick Public Health Act before a drainage field can be installed.

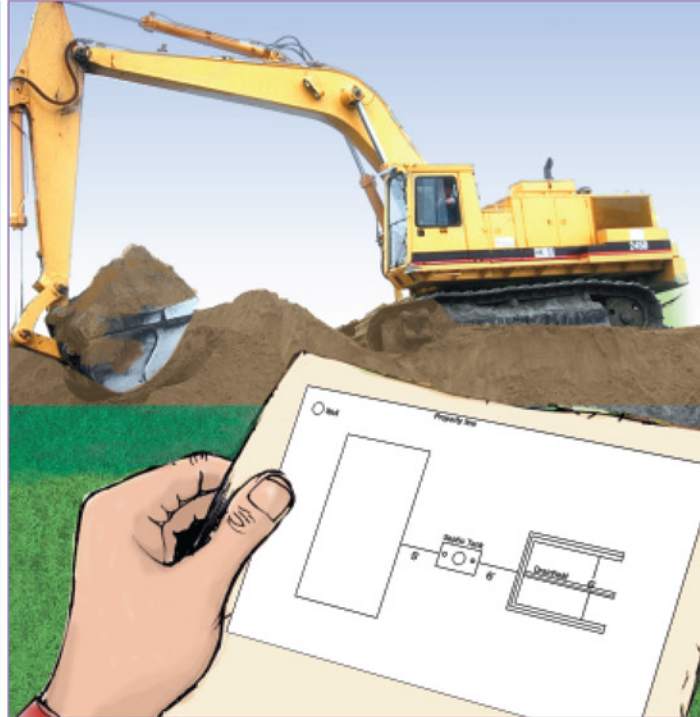
The microorganisms in your septic tank do a good job at breaking down most of your liquid household organic waste. However, naturally occurring bacteria living in the soil are important for the final cleansing of the effluent. They recycle the organic material back into nutrients that can be used by plants, thus continuing the nutrient cycle. There are several important guidelines that should be followed to ensure that the soil bacteria can properly perform the final clean-up of the effluent. The drainage field must be in

Septic System Installation: What Should You Know?

Make Sure You Know What You Are Paying For

Ask your installer if the contract includes:

- Septic system design
- Permeability testing
- Department of Health application and fee
- Septic tank and all of the necessary construction materials
- Drainage field materials and all of the necessary construction materials
- Fill material to cover the system
- Topsoil
- A warranty or guarantee



Innovative Septic System Design

As our knowledge of human impacts on the environment increases, many homeowners are demanding better environmental standards in septic system design and function. Many contractors will offer you the option, often at an additional cost, for reducing your environmental impact. Although you may pay a higher initial cost there is usually a tradeoff. For example, because the septic system has a lower environmental impact there is often less chance that some costly clean-up problem will arise.

Like car pooling, some homeowners in suburban areas are pooling septic systems. They share centralized septic systems because the density of houses or lot sizes does not safely permit the use of single dwelling septic systems. When the liquid household waste from several homes is combined into one septic system cost savings for each homeowner are often realized. The savings result because all homeowners, not just one, share in the cost of building and maintaining the system.

Pumps are frequently being installed in new septic systems. The pump is used to more evenly deliver the wastewater to the distribution field. A pump may permit you to more easily choose a site for your septic system because it does not have to be designed in such away that the water flows by gravity alone. It is believed that drainage fields, which use a pump, will outlast gravity fed systems.

Septic tanks installed after April 1, 2001 must be equipped with an effluent filter conforming to the requirements of NSF/ANSI Standard 46-207. An effluent filter prevents solids from entering the distribution field, thus protecting the distribution field from becoming clogged and/or overloading the soil bacteria.

When having your septic system designed you should ask your installer what new technologies are available. Not only will these innovative designs reduce your environmental impact, but they should also reduce the amount of water sent to the system and reduce the chance of having costly maintenance repairs.

Your septic system may be out of sight, but it should not be out of mind! Together, the septic tank and drainage field play a vital role in the safe and effective elimination of your liquid household waste. Therefore, it is vital to recognize the importance of the system in order to reduce any inconvenience or unnecessary expenses on your behalf.

The *New Brunswick Public Health Act* requires that you pay an application fee and receive approval, issued by the local Department of Health office, before installing, replacing or significantly repairing a septic system. In New Brunswick, as per Regulation 2009-137, it is mandatory that anyone installing, constructing, repairing, and/or replacing a septic system, or any of its parts, be licensed. Additionally, a certificate of compliance must be obtained before putting a septic system into service.

Licensed installers are familiar with the detailed design guidelines for septic systems outlined in the Public Health Act, Regulation 2009-137, and the Technical Guidelines. A licensed contractor will be able to custom design your septic system based on your present and future needs. Before a contractor begins work you should also ensure that you know

what items are included in your agreement and what items are considered extras.

If you live in a rural or suburban area and are looking to have a septic system installed, replaced, or upgraded your neighbours can be a valuable source of information for locating or recommending a licensed installer. Neighbours may also be able to provide information about any problems or difficulties that they have had with their septic system. The Regional Health Protection Branch offices can also supply you with a list of licensed septic system installers in your area.

Every septic system is different but there are some similarities that exist. For health reasons a septic system must be installed so that it drains away from your own and your neighbour's water supply. Because most septic tanks and drainage fields are designed to operate by gravity, the system should be installed along a downward slope from the house. The size of your septic system is determined by the size of your family and is typically based on the number of bedrooms. For example, larger families need a larger tank and disposal field. The system design may vary depending on the local geology and planned future additions, but the function remains the same.

Septic Systems: Possible Contamination Risks

Proper care of your septic system is a good way to protect the quality of your drinking water and reduce future repair costs. Septic systems that are properly designed, installed and maintained usually do not cause contamination problems. However, septic systems may not function properly for a variety of reasons including:

- poor site location
- poor maintenance
- poor design capacity
- poor soil conditions
- excessive water usage

In general, septic systems are considered to have failed when wastewater is not treated properly before it reaches groundwater, surface waters or your drinking water supply. Some warning signs that may indicate your septic system is not working properly include:

- backed-up drains
- wastewater appearing in low lying areas, such as ditches and marshy areas
- vegetation flourishing around your drainage field
- foul odours in and around your home.



Untreated wastewater often contains high levels of nitrogen, phosphorus and bacteria. Nitrogen in wastewater can be found in many different forms, including the nitrate ion. Conventional septic systems are not known to break down and eliminate nitrogen from wastewater and this is a concern in terms of groundwater contamination. Under poor site conditions nitrate continues to be a concern as it can travel with groundwater and enter drinking water sources. Excess nitrate in drinking water sources may lead to serious health risks, especially in infants. Appropriate siting of systems and larger lot sizes to reduce building density aids in the control of this risk.



Groundwater contamination due to phosphorus is not as much of a problem as nitrate because phosphorus tends to attach onto soils particles. An excess amount of nitrogen and phosphorus in surface waters, however, can cause aquatic plant life to flourish. When these large amounts of plants die, bacteria in the water will feed on the dead plants and cause dissolved oxygen levels to decrease. Low oxygen levels in surface waters may cause fish kills.

Harmful bacteria, such as *E. coli*, are also found in untreated wastewater. The presence of coliforms in drinking water supplies can lead to health related illness, such as gastrointestinal problems or other serious health problems especially in the young, the elderly, and people with weakened immune systems.

What If Your Septic System Is No Longer Needed?



As a result of expanding municipal infrastructure, homeowners may have the opportunity to connect their homes to centralized wastewater systems. Therefore, homeowners may no longer need their private septic systems. To avoid contamination problems a septic system should be properly abandoned. A professional cleaner should be hired to completely remove the waste from an abandoned septic system. Then a professional installer should cap the pipe that delivers wastewater from the home to the septic tank. The septic tank should be filled with sand to prevent the tank from collapsing in the future. Finally, the installer should also remove any electrical components such as wiring, control panels, and pumps since these will no longer be needed.

Proper installation and maintenance of your septic system will help avoid these types of contamination problems. However, it is a good idea to have your drinking water tested twice a year for bacteria (one test should be at times when well water quality may be at most risk, such as in the spring after the winter thaw or in the fall following heavy rainfalls) in order to ensure it is safe. Regular testing of your drinking water can also be used as a method of monitoring water quality changes, some of which may indicate that there is a problem with your septic system.

Water Conservation Can \$ave You Money!

Your septic system is designed to handle a certain amount of water daily depending on the number of family members, bathrooms, and household appliances that use water. Allowing too much water to enter your septic system can be a harmful and expensive practice. When your septic system is designed you should consider what your present and future needs are.

Typically, septic tanks are designed so that it takes up to one or two days for water that enters the tank to exit into the drainage field. If you increase the flow of water to your septic system you reduce the time that liquid household waste spends in the septic tank. If too much organic material is sent to the drainage field the bacteria in the soil will not be able to properly breakdown the material or holes in the drainage field pipe may clog. This can eventually lead to a build up of organic material in the drainage field that could require costly repairs.

Almost everyone takes water consumption for granted. For example, we often turn the tap on and do not think of the consequences of using that water. In North America and many other developed parts of the world household water usage has substantially increased in recent years. The primary reason for the increase in water consumption is that the number of household appliances that use water in their operation has increased. You should be aware of the amount of water you use in your house and learn to conserve in areas where water use is careless.

Reducing the amount of water entering your septic system allows it to function properly and safely.

Water conservation in your household will not only help save water but can save you money as well! Reducing the amount of water entering your septic system will allow it to function properly and safely. Allowing the solid material that enters your septic tank to remain in it for the designed period will allow the bacteria to correctly breakdown the material.

What You Can Do To \$ave!



- Consider purchasing a low-flow toilet.



- Repair leaky or damaged faucets
- Turn off the faucet when shaving or brushing teeth
- Install aerator nozzles on sink faucets



- Only run dishwashers and washing machines when they are full and operate them during different days instead of on the same day



- Do not drain your hot tub, pool, waterbed or any other large volume of water with chemicals in it down your drain
- Reduce or eliminate any other wasteful water-use habits
- Install a low-pressure showerhead
- Take a shower instead of a bath
- Reduce your time in the shower by 1/3

The DOs and DON'Ts of Septic System Maintenance

1. Make accurate measurements for your system

Installer: _____ Date Installed: _____

Contact Number: _____ Septic Tank Size: _____

Depth Underground: _____ Tank Made From: _____

2. Put your maintenance records in the table below

Date	Work Done	Performed By	Contact No.

3. Map your septic system

A septic system may be a significant investment, therefore, it is important that it is properly maintained. A failed septic system can result in expensive repairs and inconvenience for the homeowner.

Estimated Septic Tank Pumping Frequencies in Years (year-round residences)¹

Tank Size (gal)	Household Size (number of people)						
	1	2	3	4	5	6	7
500	6	2½	1½	1	¾	¾	¾
750	10	4	2½	2	1	1	1
1000	12	6	4	2½	2	1½	1½
1250	15	7½	5	3	2½	2	2
1500	19	9	6	4	3	2½	2

In order for the septic tank to perform as intended, the solids in the tank usually need to be pumped out by a professional cleaner every 2-3 years. The time between cleanings will vary depending on the septic tank capacity, the amount of wastewater being generated, and the amount of solids in the wastewater.

Proper maintenance begins with record keeping. You should have a map of your property that shows the location of the septic tank and all the other parts of the system, such as the drainage field. Also, you should know what type of system was installed and have a record of its maintenance history.

- Do...** ☒ Have a property map locating all parts of your septic system
- Do...** ☒ Have your septic tank inspected yearly by a trained professional
- Do...** ☒ Have your septic tank pumped out approximately every 2-3 years by a licensed septage hauler
- Do...** ☒ Conserve water in and around your house
- Do...** ☒ Determine if the present tank can accommodate renovations such as extra bedrooms or garbage disposal systems
- Do...** ☒ Divert surface water and eaves trough water away from the drainage field
- Do...** ☒ Avoid using in-sink garbage disposal systems

- Do NOT** ☒ Add a "seed" or commercial additives to your septic system
- Do NOT** ☒ Plant trees and shrubs over your drainage field
- Do NOT** ☒ Allow heavy machinery to pass over your drainage field
- Do NOT** ☒ Use excessive amounts of detergents, bleaches and soaps
- Do NOT** ☒ Use the septic system to dispose of chemicals, household garbage, cooking grease, oils and/or paints
- Do NOT** ☒ Overload your system

¹ After April 1, 2010, the minimum working liquid capacity of a septic tank must be 750 (UK) gallons (3410 litres).