

# Types of Septic Systems

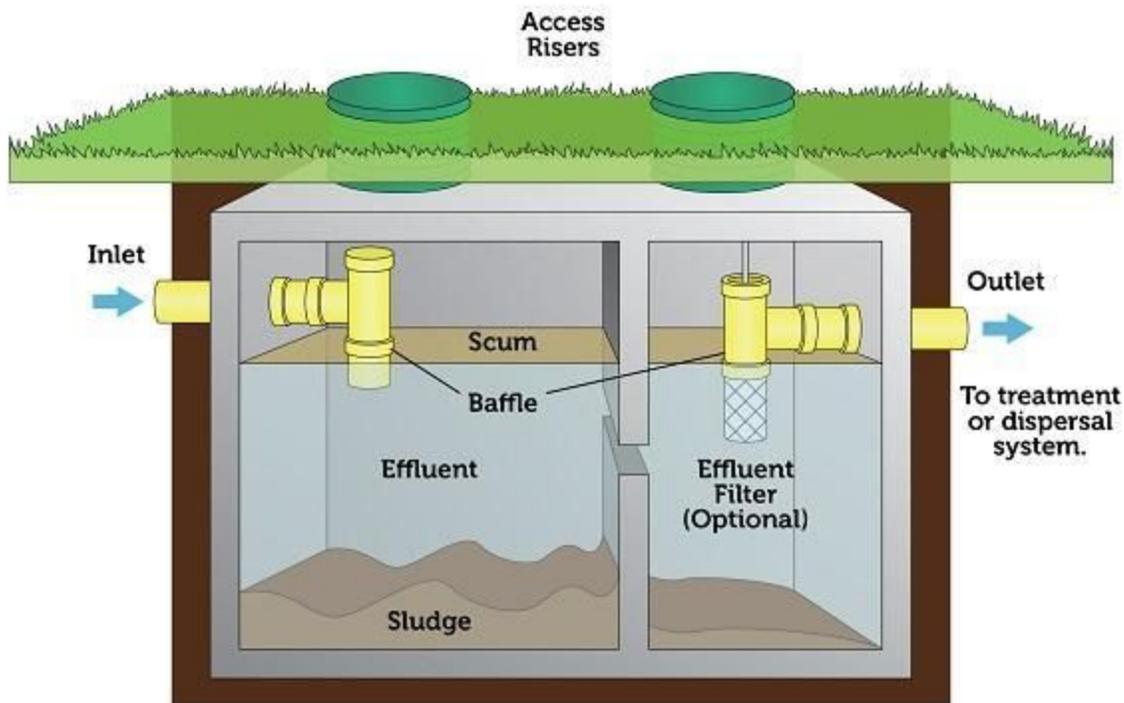
Septic system design and size can vary widely, from within your neighborhood to across the country, due to a combination of factors. These factors include household size, soil type, site slope, lot size, proximity to sensitive water bodies, weather conditions, or even local regulations. Below are ten of the most common types of septic systems used. The list is not all-inclusive; there are many other types of septic systems.

- [Septic Tank](#)
- [Conventional System](#)
- [Chamber System](#)
- [Drip Distribution System](#)
- [Aerobic Treatment Unit](#)
- [Mound Systems](#)
- [Recirculating Sand Filter System](#)
- [Evapotranspiration System](#)
- [Constructed Wetland System](#)
- [Cluster / Community System](#)

## Septic Tank

A buried, watertight tank designated and constructed to receive and partially treat raw domestic sanitary wastewater. Heavy solids settle to the bottom of the tank while greases and lighter solids float to the top. The solids stay in the tank while the wastewater is discharged to the drain field for further treatment and dispersal.

# Septic Tank



## Conventional System

A decentralized wastewater treatment system consisting of a septic tank and a trench or bed subsurface wastewater infiltration system (drainfield). A conventional septic system is typically installed at a single-family home or small business.

The gravel/stone drainfield is a design that has existed for decades. The name refers to the construction of the drainfield. With this design, effluent is piped from the septic tank to a shallow underground trench of stone or gravel. A geofabric or similar material is then placed on top of the trench so sand, dirt, and other contaminants do not enter the clean stone.

Effluent filters through the stone and is then further treated by microbes once it reaches the soil below the gravel/stone trench.

Gravel/stone systems are relatively large in overall footprint and may not be suitable for all residential sites or conditions.



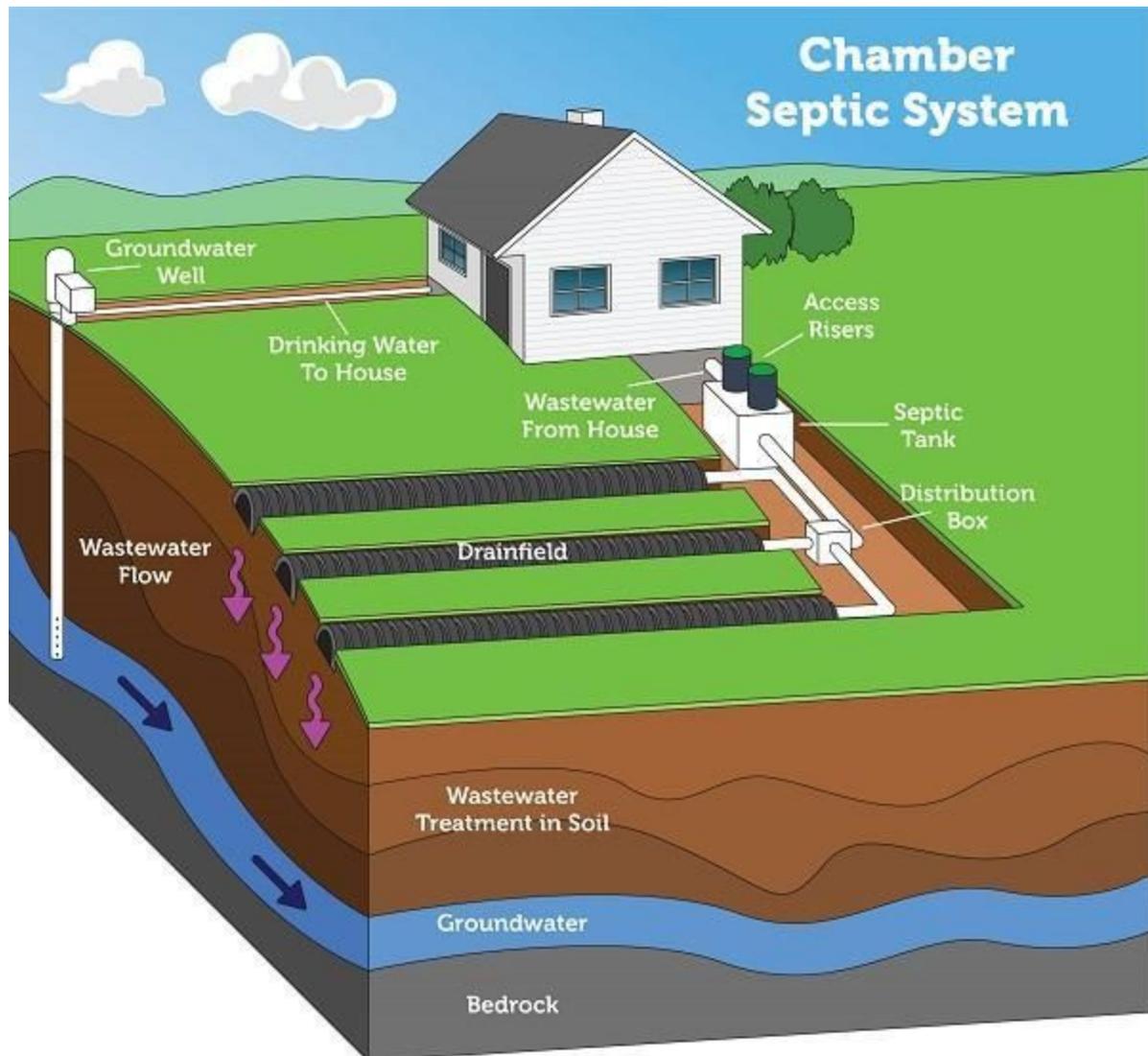
Please note: Septic systems vary. Diagram is not to scale.

## Chamber System

Gravelless drainfields have been widely used for over 30 years in many states and have become a conventional technology replacing gravel systems. They take many forms, including open-bottom chambers, fabric-wrapped pipe, and synthetic materials such as expanded polystyrene media. The gravelless systems can be manufactured with recycled materials and offer a significant savings in carbon footprint.

An example of a gravelless system is the chamber system. The chamber system serves as an alternative design to the gravel/stone system. The primary

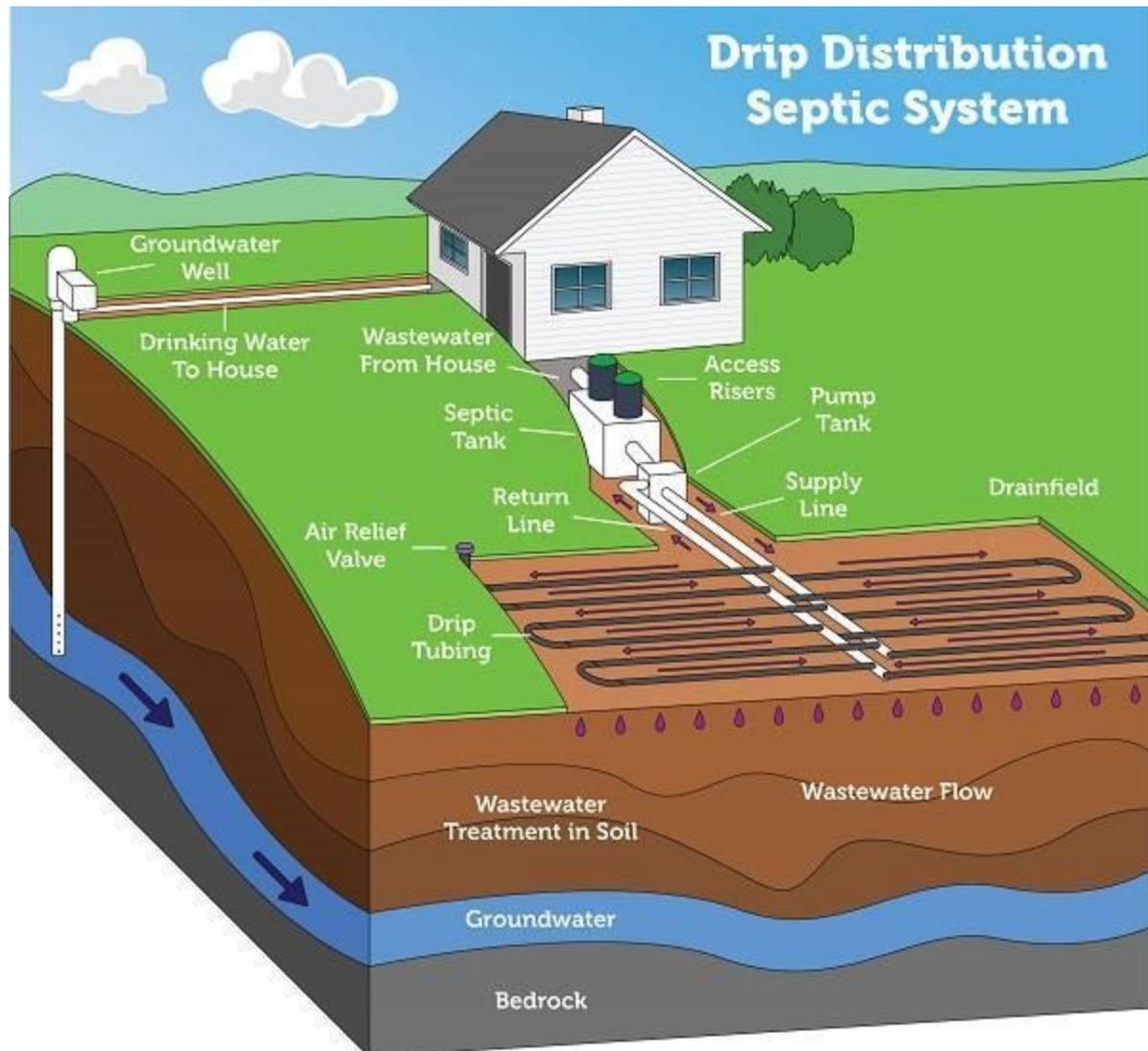
advantage of the chamber system is increased ease of delivery and construction. They are also well suited to areas with high groundwater tables, where the volume of influent to the septic system is variable (e.g., at a vacation home or seasonal inn), in an area where gravel is scarce, or in areas where other technologies such as plastic chambers are readily available. This type of system consists of a series of connected chambers. The area around and above the chambers is filled with soil. Pipes carry wastewater from the septic tank to the chambers. In the chambers, the wastewater comes into contact with the soil. Microbes on or near the soil treat the effluent.



Please note: The ends of the chamber system lines are open for illustrative purposes only. In reality, and when properly installed, these lines are closed at the end. Septic systems vary. Diagram is not to scale.

# Drip Distribution System

The drip distribution system is a type of effluent dispersal that can be used in many types of drainfields. The main advantage of the drip distribution system is that no large mound of soil is needed as the drip laterals are inserted into the top 6 to 12 inches of soil. The disadvantage of the drip distribution system is that it requires a large dose tank after the septic tank to accommodate the timed dose delivery of wastewater to the drip absorption area. Additional components, such as electrical power, are necessary for this system, requiring an added expense and increased maintenance.

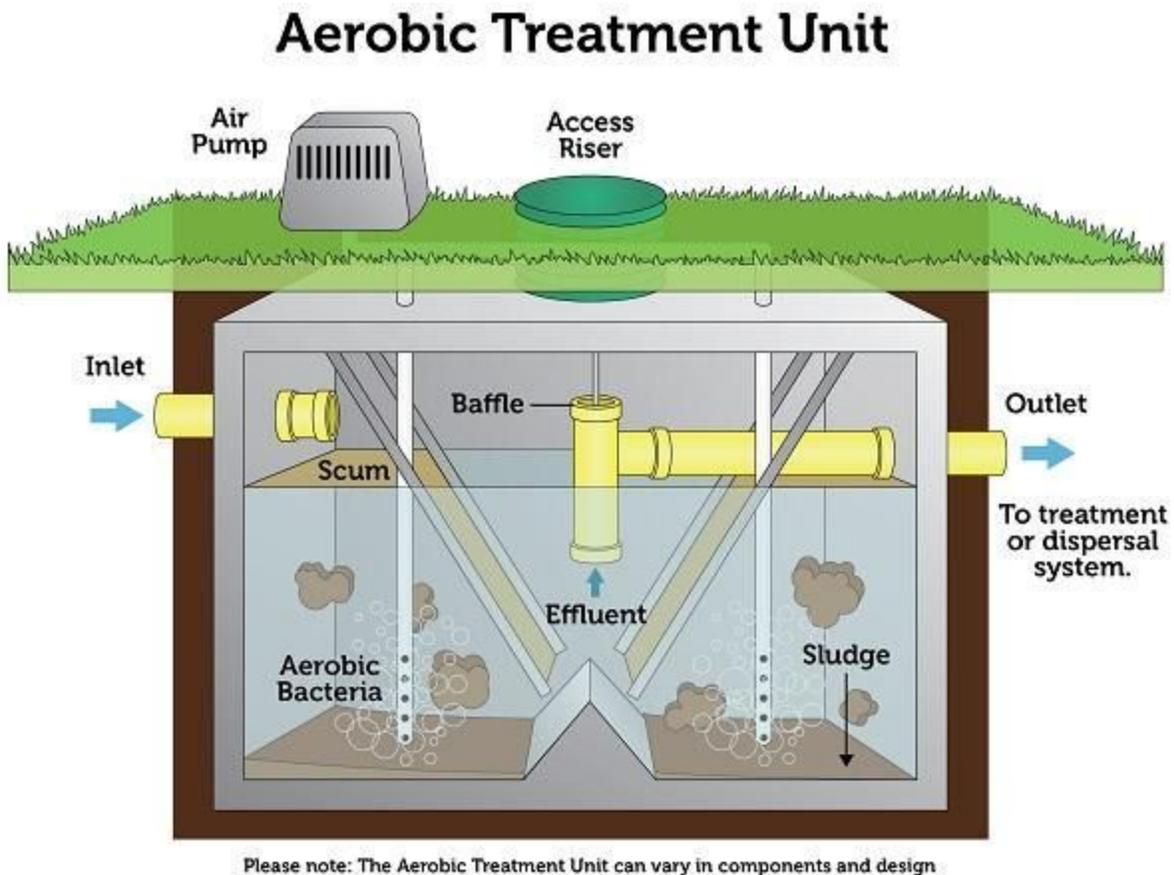


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# Aerobic Treatment Unit

Aerobic Treatment Units (ATUs) use many of the same processes as a municipal sewage plant, but on a smaller scale. An aerobic system injects oxygen into the treatment tank. The additional oxygen increases natural bacterial activity within the system that then provides additional treatment for nutrients in the effluent. Some aerobic systems may also have a pretreatment tank and a final treatment tank including disinfection to further reduce pathogen levels.

The benefits of this system are that it can be used in homes with smaller lots, inadequate soil conditions, in areas where the water table is too high, or for homes close to a surface water body sensitive to contamination by nutrients contained in wastewater effluent. Regular life-time maintenance should be expected for ATUs.

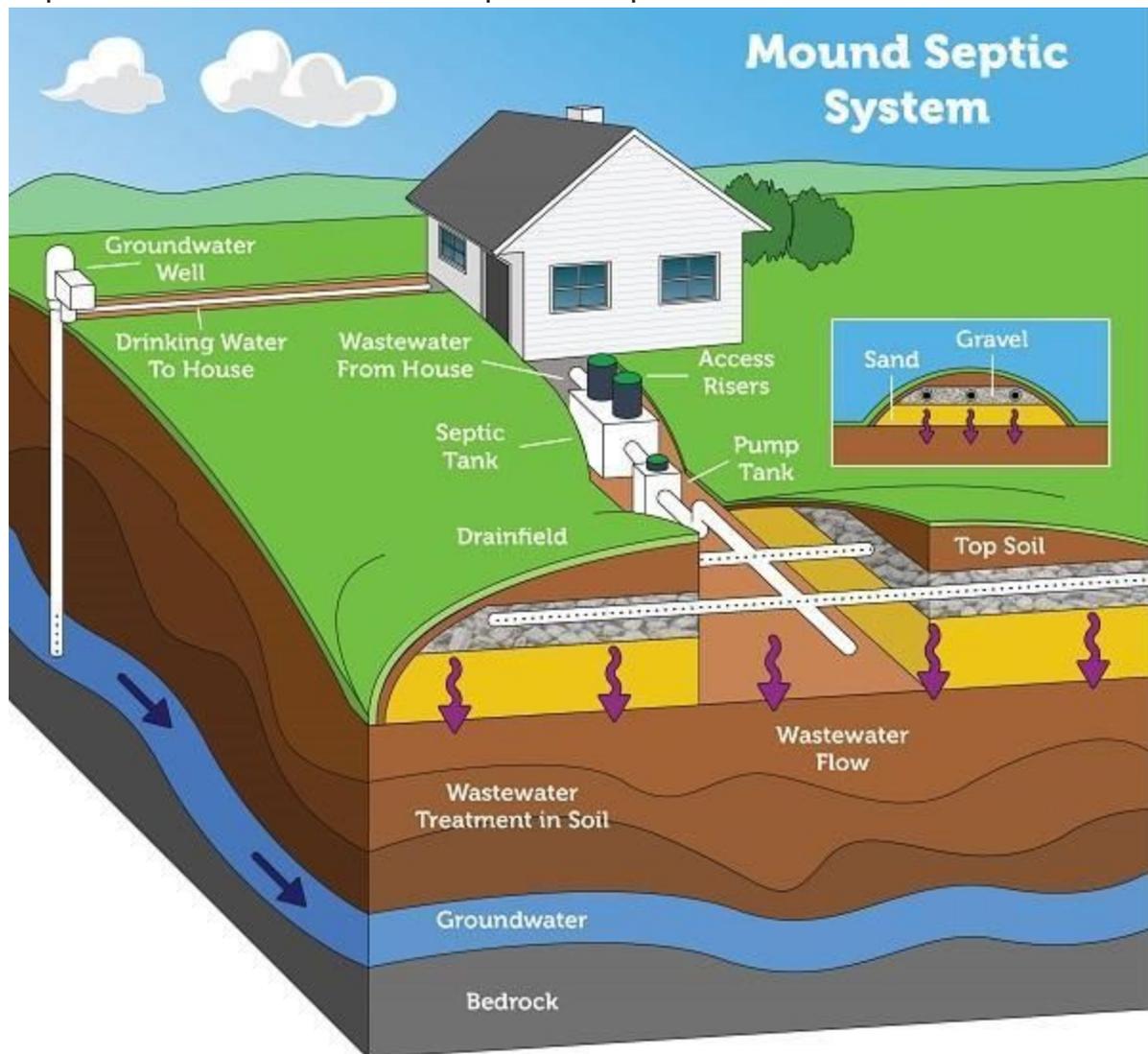


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## Mound Systems

Mound systems are an option in areas of shallow soil depth, high groundwater, or shallow bedrock. The constructed sand mound contains a drainfield trench.

Effluent from the septic tank flows to a pump chamber where it is pumped to the mound in prescribed doses. Treatment of the effluent occurs as it discharges to the trench and filters through the sand, and then disperses into the native soil. While mound systems can be a good solution for certain soil conditions, they require a substantial amount of space and periodic maintenance.

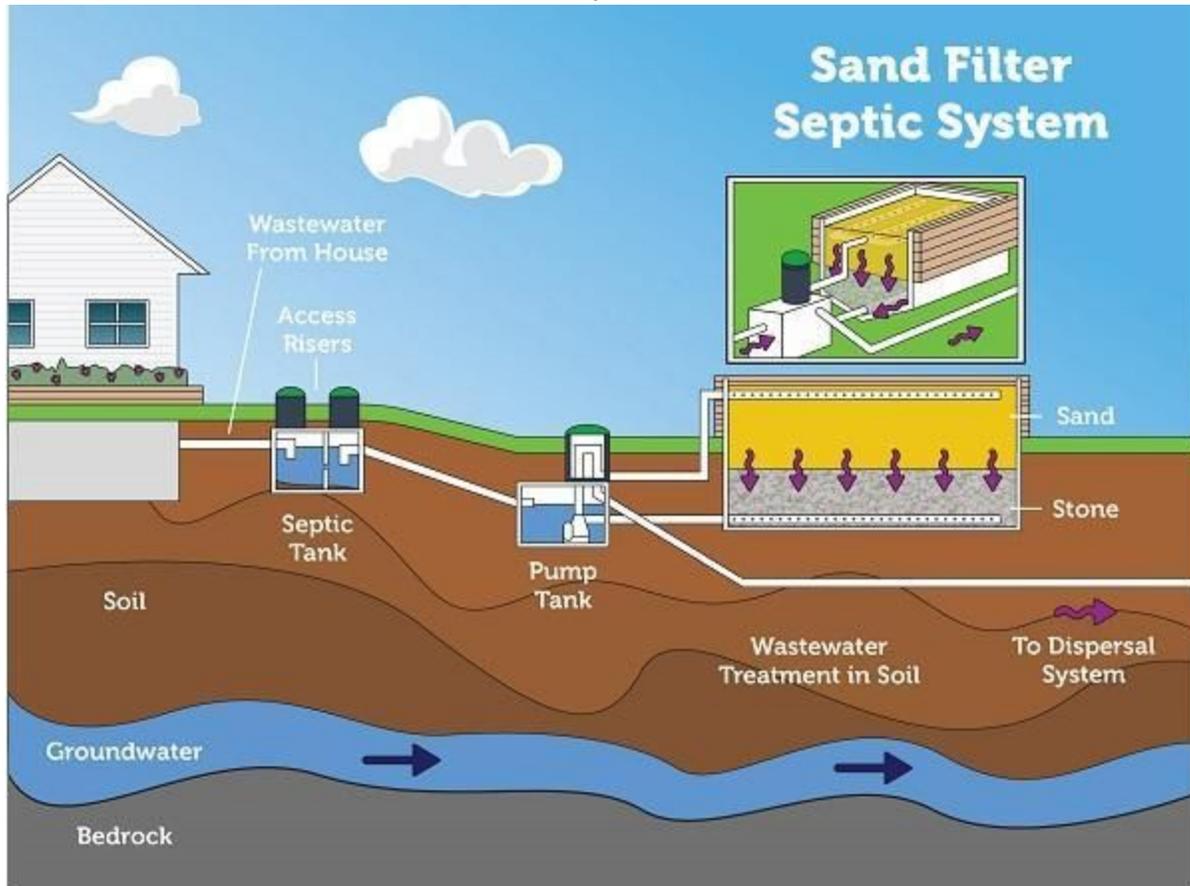


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## Recirculating Sand Filter System

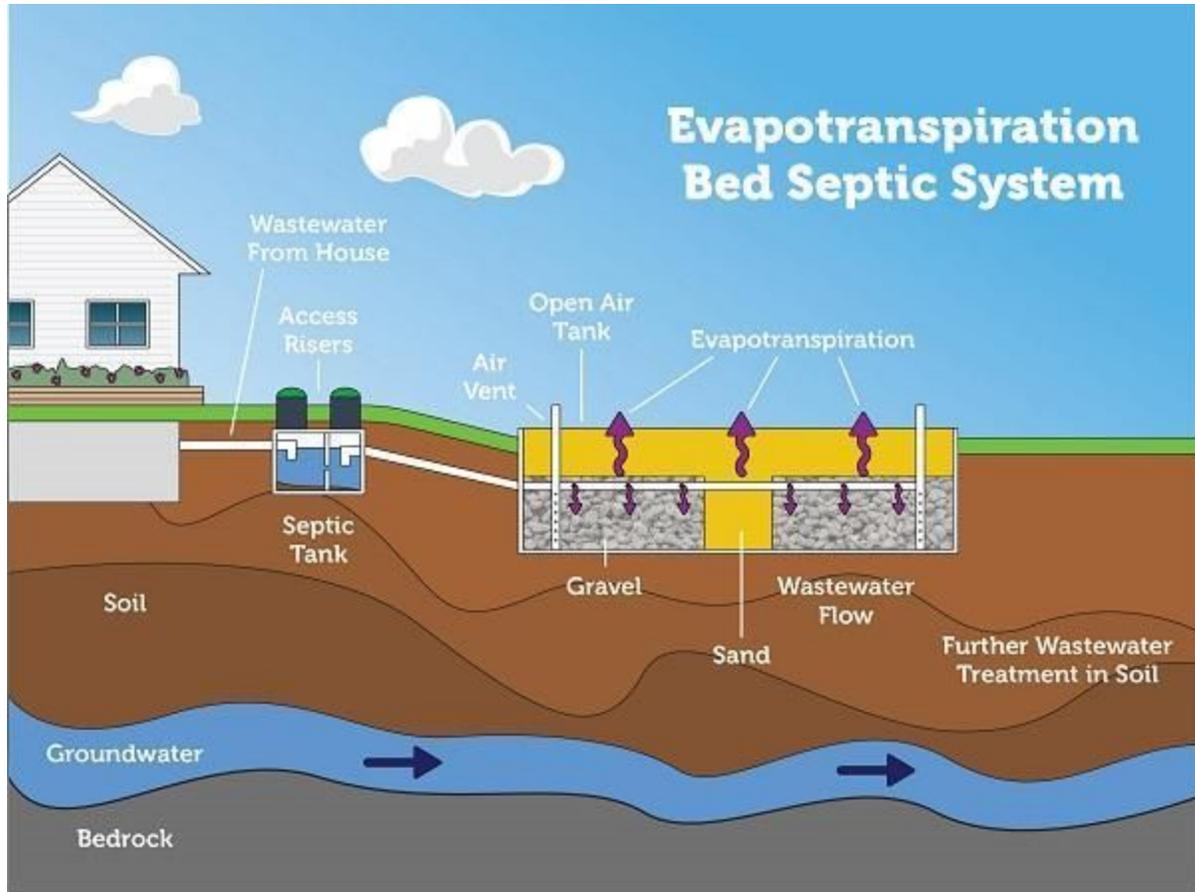
Sand filter systems can be constructed above or below ground. Effluent flows from the septic tank to a pump chamber. It is then pumped to the sand filter. The sand filter is often PVC-lined or a concrete box filled with a sand material. Effluent is pumped under low pressure through the pipes at the top of the filter.

The effluent leaves the pipes and is treated as it filters through the sand. The treated wastewater is then discharged to the drainfield. Sand filters provide a high level of treatment for nutrients and are good for sites with high water tables or that are close to water bodies, but they are more expensive than a conventional septic system.



## Evapotranspiration System

Evapotranspiration systems have unique drainfields. The base of the evapotranspiration system drainfield is lined with a watertight material. After the effluent enters the drainfield, it evaporates into the air. Unlike other septic system designs, the effluent never filters to the soil and never reaches groundwater. Evapotranspiration systems are only useful in specific environmental conditions. The climate must be arid and have adequate heat and sunlight. These systems work well in shallow soil; however, they are at risk of failure if it rains or snows too much.

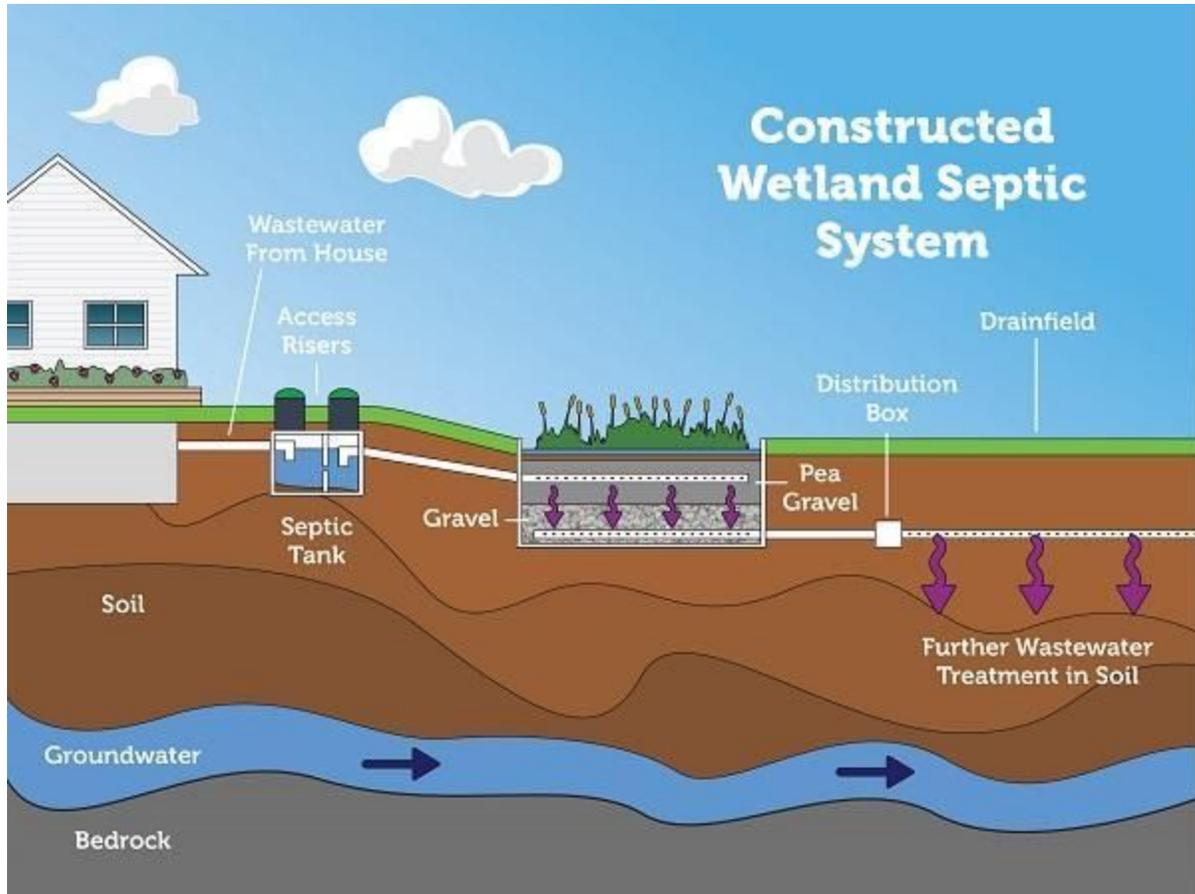


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## Constructed Wetland System

A constructed wetland mimics the treatment processes that occur in natural wetlands. Wastewater flows from the septic tank and enters the wetland cell. The wastewater then passes through the media and is treated by microbes, plants, and other media that remove pathogens and nutrients. The wetland cell typically consists of an impermeable liner, and gravel and sand fill, along with the appropriate wetland plants, which must be able to survive in a perpetually saturated environment.

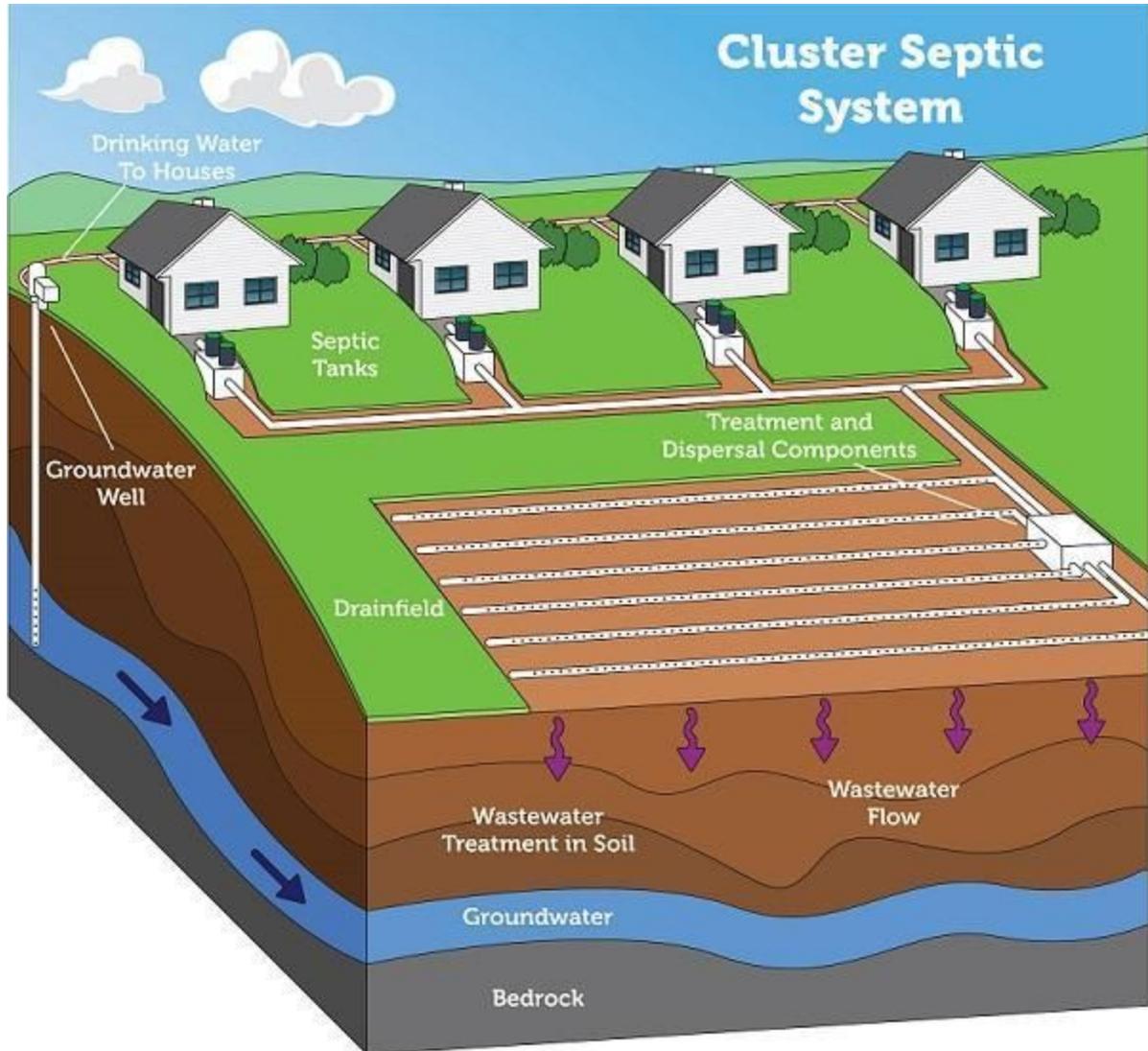
A wetland system can work via either gravity flow or pressure distribution. As wastewater flows through the wetland, it may exit the wetland and flow into a drainfield for further wastewater treatment into the soil.



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## Cluster / Community System

A decentralized wastewater treatment system under some form of common ownership that collects wastewater from two or more dwellings or buildings and conveys it to a treatment and dispersal system located on a suitable site near the dwellings or buildings. It is common to find cluster systems in places like rural subdivisions.



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# Why Maintain Your Septic System

## Maintaining Your Septic System...

### **Saves you money**

Regular maintenance fees of \$250 to \$500 every three to five years is a bargain compared to the cost of repairing or replacing a malfunctioning system, which can cost between \$5,000 and \$10,000 for a conventional system. Alternative systems can cost even more. The frequency of pumping required for each system depends on how many people live in the home and the size of the system.

### **Protects your property value**

An unusable septic system or one in disrepair will lower your property value, and potentially can pose a costly legal liability.

### **Keeps you and your neighbors healthy**

Household wastewater contains disease causing bacteria and viruses and high levels of nitrogen and phosphorus. If a septic system is well-maintained and working properly, it will remove most of these pollutants. Insufficiently treated sewage from septic systems can cause groundwater contamination, which can spread disease in humans and animals. Improperly treated sewage poses the risk of contaminating nearby surface waters threatening swimmers with various infectious diseases, from eye and ear infections to acute gastrointestinal illness and hepatitis.

### **Protects the environment**

More than four billion gallons of wastewater are dispersed below the ground's surface every day. Ground water contaminated by poorly or untreated household wastewater poses dangers to drinking water and to the environment.

Malfunctioning septic systems release bacteria, viruses, and chemicals toxic to local waterways. When these pollutants are released into the ground, they eventually enter streams, rivers, lakes, and more, harming local ecosystems by killing native plants, fish, and shellfish. Learn more about how septic systems can help support greener, more sustainable communities.

# How to Care for Your Septic System

Septic system maintenance is not complicated, and it does not need to be expensive. Upkeep comes down to four key elements:

- [Inspect and Pump Frequently](#)
  - [Use Water Efficiently](#)
  - [Properly Dispose of Waste](#)
  - [Maintain Your Drainfield](#)
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## Inspect and Pump Frequently

The average household septic system should be inspected at least every three years by a septic service professional. Household septic tanks are typically pumped every three to five years. Alternative systems with electrical float switches, pumps, or mechanical components should be inspected more often, generally once a year. A service contract is important since alternative systems have mechanized parts.

Four major factors influence the frequency of septic pumping:

- Household size
- Total wastewater generated
- Volume of solids in wastewater
- Septic tank size

### **Service provider coming? Here is what you need to know.**

When you call a septic service provider, he or she will inspect for leaks and examine the scum and sludge layers in your septic tank.

Keep maintenance records on work performed on your septic system.

Your septic tank includes a T-shaped outlet which prevents sludge and scum from leaving the tank and traveling to the drainfield area. If the bottom of the

scum layer is within six inches of the bottom of the outlet, or if the top of the sludge layer is within 12 inches of the outlet, your tank needs to be pumped. To keep track of when to pump out your tank, write down the sludge and scum levels found by the septic professional.

The service provider should note repairs completed and the tank condition in your system's service report. If other repairs are recommended, hire a repair person soon.

The National Onsite Wastewater Recycling Association (NOWRA) has a septic locator that makes it easy to find service professionals in your area.

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## Use Water Efficiently

The average indoor water use in a typical single-family home is nearly 70 gallons per individual, per day. Just a single leaky or running toilet can waste as much as 200 gallons of water per day.

All of the water a household sends down its pipes winds up in its septic system. The more water a household conserves, the less water enters the septic system. Efficient water use improves the operation of a septic system and reduces the risk of failure.

- **High-efficiency toilets.**

Toilet use accounts for 25 to 30 percent of household water use. Many 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. Replacing existing toilets with high-efficiency models is an easy way to reduce the amount of household water entering your septic system.

- **Faucet aerators and high-efficiency showerheads.**

Faucet aerators, high-efficiency showerheads, and shower flow restrictors help reduce water use and the volume of water entering your septic system.

- **Washing machines.**

Washing small loads of laundry on your washing machine's large-load cycle wastes water and energy. By selecting the proper load size, you will reduce water waste. If you are unable to select a load size, run only full loads of laundry. Try to spread washing machine use throughout the week. Doing all household laundry in one day might seem like a time-saver; but it can harm your septic

system, not allow your septic tank enough time to treat waste, and could flood your drainfield

Clothes washers that bear the [ENERGY STAR](#) label use 35 percent less energy and 50 percent less water than standard models. Other Energy Star appliances provide significant energy and water savings.

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## Properly Dispose of Waste

Whether you flush it down the toilet, grind it in the garbage disposal, or pour it down the sink, shower, or bath, everything that goes down your drains ends up in your septic system. What goes down the drain affects how well your septic system works.

### Toilets aren't trash cans!

Your septic system is not a trash can. An easy rule of thumb: Do not flush anything besides human waste and toilet paper. Never flush:

- Cooking grease or oil
- Non-flushable wipes, such as baby wipes or other wet wipes
- Photographic solutions
- Feminine hygiene products
- Condoms
- Dental floss
- Diapers
- Cigarette butts
- Coffee grounds
- Cat litter
- Paper towels
- Pharmaceuticals
- Household chemicals like gasoline, oil, pesticides, antifreeze, and paint or paint thinners

### Think at the sink!

Your septic system contains a collection of living organisms that digest and treat household waste. Pouring toxins down your drain can kill these organisms and harm your septic system. Whether you are at the kitchen sink, bathtub, or utility sink:

- Avoid chemical drain openers for a clogged drain. Instead, use boiling water or a drain snake.
- Never pour cooking oil or grease down the drain.

- Never pour oil-based paints, solvents, or large volumes of toxic cleaners down the drain. Even latex paint waste should be minimized.
  - Eliminate or limit the use of a garbage disposal. This will significantly reduce the amount of fats, grease, and solids that enter your septic tank and ultimately clog its drainfield.
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## Maintain Your Drainfield

Your drainfield—a component of your septic system that removes contaminants from the liquid that emerges from your septic tank—is an important part of your septic system. Here are a few things you should do to maintain it:

- **Parking:** Never park or drive on your drainfield.
- **Planting:** Plant trees the appropriate distance from your drainfield to keep roots from growing into your septic system. A septic service professional can advise you of the proper distance, depending on your septic tank and landscape.
- **Placing:** Keep roof drains, sump pumps, and other rainwater drainage systems away from your drainfield area. Excess water slows down or stops the wastewater treatment process.

## What to Do If Your Septic System Fails

### Why septic systems fail

Most septic systems fail because of inappropriate design or poor maintenance. Some soil-based systems (those with a drain field) are installed at sites with inadequate or inappropriate soils, excessive slopes, or high ground water tables.

These conditions can cause hydraulic failures and contamination of nearby water sources.

Failure to perform routine maintenance, such as pumping the septic tank generally at least every three to five years, can cause solids in the tank to migrate into the drain field and clog the system.

## **Whom to contact if you have problems with your septic system**

Contact a local septic system service provider, your local health department, or onsite wastewater treatment regulatory agency. Find the telephone number for your local health department online or in your local phone directory.

Use online searchable databases of installers and septic system service providers to find a professional in your area:

## **What to do if your home floods**

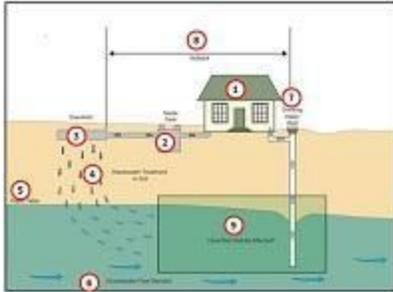
If sewage from your plumbing fixtures or onsite system backs up into your home, avoid contact with the sewage as it may contain harmful pathogens. Contact your local health department or regulatory agency for guidance. Cleanup personnel should wear protective clothing (e.g., long rubber gloves, face splash shields). After cleanup is complete, thoroughly wash all equipment, tools, and clothing used during cleaning as well as the flooded area. Disinfect all items or areas exposed with a mixture of 90 percent water and 10 percent household bleach. The area should be dried out thoroughly and not used until it has been completely dry for at least 24 hours.

For more information:

## **How Your Septic System Can Impact Nearby Water Sources**

Septic systems can impact local drinking water wells or surface water bodies. The extent of this impact depends on how well your septic system is maintained and if it is used properly. Click on the links below to learn more about how septic

systems interact with drinking water wells or surface water bodies and how to keep them healthy.



# Septic Systems and Drinking Water

Septic systems provide wastewater treatment for many homeowners who also often get their drinking water from private wells. If a septic system is not working properly or is located too close to a drinking water well, contaminants from the wastewater can end up in drinking water. Learn how to locate, operate, and maintain your septic system to protect nearby wells.

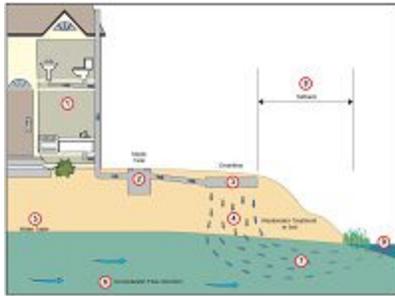
Clickable Element	Text	
1. Bathrooms and Kitchens	Water from toilets, sinks, showers, and other appliances is called wastewater and can be harmful to human health. Wastewater contains harmful bacteria, viruses, and nutrients that could make you sick if it comes in contact with your drinking water well. Make sure the wastewater is properly treated by your septic system and that your drinking water well is located at the appropriate distance (set back) from your and your neighbor's system. Avoid flushing other chemicals or medications down the drain or toilet since they could also contaminate your drinking water well.	

<p>2. Septic Tank</p>	<p>Wastewater generated in your home exits through a drainage pipe and into a septic tank. The septic tank is a buried, water-tight container that holds wastewater for separation and treatment. The solids settle to the bottom (sludge) and fats, oil and grease float to the top (scum). Microorganisms act to break down the sludge and destroy some of the contaminants in the wastewater. Your septic tank should be serviced and pumped on a regular basis to make sure it's working properly.</p>	
<p>3. Drainfield</p>	<p>The drainfield is a shallow, covered trench made in the soil in your yard. Partially treated wastewater from the septic tank flows out through the drainfield, filters down through the soil and enters the groundwater. If the drainfield is overloaded with too much liquid or clogged with solids, it will flood and cause sewage to surface in your yard or back up into your home.</p>	
<p>4. Wastewater Treatment in Soil</p>	<p>Filtering wastewater through the soil removes most bacteria and viruses (also known as pathogens) and some nutrients. While soil can treat many contaminants, it cannot remove all of them (e.g., medicines, some cleaning products, other potentially harmful chemicals). If untreated wastewater surfaces in the yard, wastewater may contaminate your drinking water through an unsecured well cap or cracks in the well casing. It's important to avoid flushing medication and chemicals into your wastewater since it could contaminate your drinking water.</p>	
<p>5. Water Table</p>	<p>The water table is found where you first hit water if you dig a hole into the ground.</p>	
<p>6. Groundwater</p>	<p>The water below the water table is called groundwater. Groundwater flowing underneath a drainfield captures any remaining contaminants released from the septic system. A drinking water well is at greater risk of becoming contaminated if it is in the path of groundwater flow beneath a septic system.</p>	

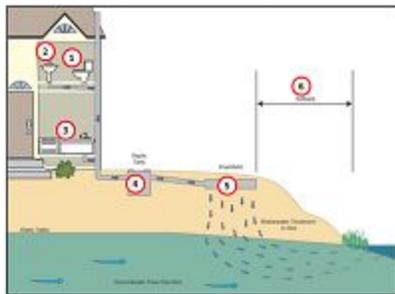
7. Drinking Water Well	<p>A drinking water well is drilled or dug into the groundwater so water can be pumped to the surface. Deep wells located farther away from a septic system and not in the path of the groundwater flow from the septic system are least likely to be contaminated. Drinking water wells should be regularly tested to ensure your home's water is safe to drink.</p>	
8. Setback Distance	<p>Most states or local governments require a specific horizontal distance (or setback) between a septic system and a drinking water well. If the soil where you live is sandy, or porous, you may want to place your well farther away than the minimum required distance. Contamination is less likely the farther apart a well is from a septic system.</p>	
9. Could my well be affected?	<p>Your septic system could contaminate your drinking water well or a nearby well under certain conditions. Remember to test the drinking water from your well regularly and take corrective action as needed.</p> <p>The contamination risk to your well is LOWER:</p> <ul style="list-style-type: none"> <li>the farther apart the well and septic system are located;</li> <li>the deeper the well is placed and if it is in bedrock or below a defined layer of silt or clay; or,</li> <li>when your septic system is pumped, and serviced on a regular basis.</li> </ul> <p>The contamination risk to your well is HIGHER:</p> <ul style="list-style-type: none"> <li>if the well is at a shallow depth and in permeable soil;</li> <li>if the well is downgradient of the septic system (i.e., if the groundwater flows from the septic system towards the well);</li> <li>if there are many homes on septic systems near the well; or,</li> <li>if there is poor construction or maintenance of the well and/or septic system (i.e., contaminants can enter a cracked drinking well casing from ground or surface water).</li> </ul>	

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wastewater can end up in drinking water. Learn how to locate, operate, and maintain your septic system to protect nearby wells.



Many homeowners rely on septic systems for safe and effective treatment of their wastewater. Household wastewater is treated by a septic system before it filters into the soil. Recycled water from a septic system can help replenish groundwater supplies; however, if the system is not working properly, it can contaminate nearby waterbodies. Learn how nutrients and pathogens from your septic system may impact streams, lakes, or other waterbodies near your home.

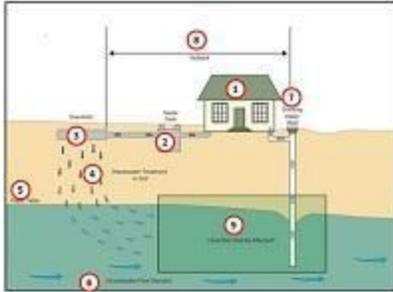


As a homeowner, there are several steps you can take to prevent your home's septic system from impacting nearby water sources. Some are simple while others can be more involved and expensive. Consult with a professional in your area before making significant upgrades to your septic system.

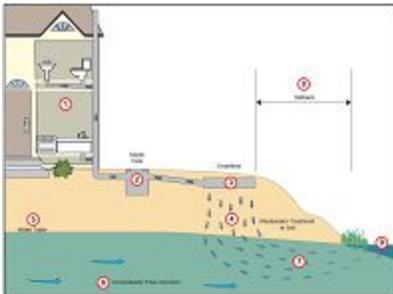
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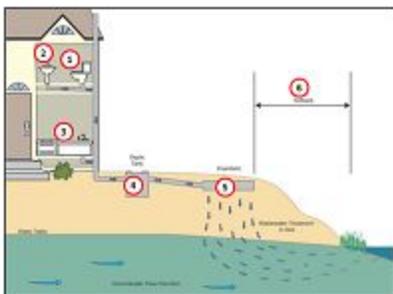
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**Source – United States Environmental Protection Agency**