

# RURAL WATER

WATER WELLS AND SEPTIC SYSTEMS

SAMPLE





## RURAL WATER

Rural living comes with many benefits—fresh air, less traffic, room to roam—but it can also come with extra responsibilities, including the maintenance of private wells and septic systems. If adequate clean water is available, private wells can—with proper installation and maintenance—provide clean, fresh, and abundant water to rural landowners, and septic systems can work without a hitch.

## GROUNDWATER

Seventy percent of Earth is covered with water, but the majority of that water exists as salt water in the oceans and is not suitable (without expensive treatment) for use as drinking water. Humans and many other living creatures depend on fresh water, which makes up only about 3 percent of all water on Earth. Much of that 3 percent is frozen in glaciers and ice caps, while a small portion exists as surface water—ponds, lakes, rivers, streams, and wetlands. The remaining third of fresh water exists as groundwater, which is used by approximately half of all Americans—for drinking, bathing, filling swimming pools, cleaning, and farming—and can be easily contaminated by human activities.



## GROUNDWATER'S MOVEMENT THROUGH SOIL

Groundwater exists below Earth's surface in natural underground "storehouses" where there are voids between rocks and soil particles. Sometimes groundwater moves through the soil and other times it stays in one place. As it moves, groundwater can be naturally cleaned—or filtered—by the soil and rocks that it is moving through. The ability of water to move down through the ground and the rate of its flow depend largely on the characteristics of the soil that it comes in contact with.

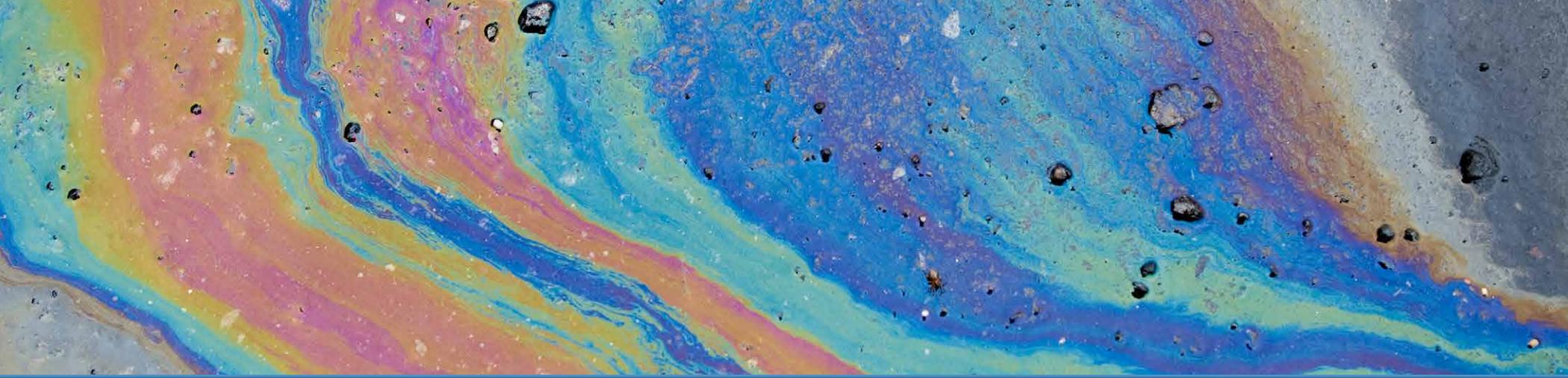
All soils are made up of sand, silt, and clay, in varying proportions. Sand particles are large and have large pore spaces between each particle. This allows water—and any pollutants and nutrients that it might be carrying—to freely flow down through sandy soils. Silt particles and their pore spaces are smaller than those of sand, but water can still flow relatively easily through silt. Clay has the smallest particles and pore spaces of all soil types, which can make it difficult for water to move through it at all.

The best soil for water storage is made up of all three soil types—sand, silt, and clay. This mixture of different sizes of soil particles and pore spaces allows for water to slowly seep through the soil, filtering out some of the nutrients and harmful pollutants that might exist in the water as it moves

underground. The pores in soil can physically trap pollutants and nutrients in water, and the chemical components of soil can attract various chemicals, pulling them out of the water or neutralizing them. Furthermore, some bacteria and fungi in the soil will pull nutrients from water for their own use, filtering the water even more.

The direction of groundwater flow across a landscape depends not only on the soil type but also on the shape of soil particles, which can make water move sideways instead of directly downward. Most groundwater moves in a downward direction because of gravity, but it can move sideways for a long distance if it comes in contact with a layer of rock or tightly packed soil (like clay) that it cannot pass through. Groundwater can also sometimes move upward through the soil due to a natural force called "capillary action," which is the process by which water molecules bind with each other; many plants remove water from the soil this way.





## GROUNDWATER CONTAMINATION

A variety of contaminants (or pollutants), both chemical and biological, can make their way into groundwater aquifers and private wells. Contamination can originate on the surface or in the ground and is usually described as “point source” or “nonpoint source” pollution. Point source pollution comes from a single source and can usually be traced back to its origin. It is often found in plumes radiating from the source, with the highest concentration of contaminants near the source. Faulty septic systems and leaching landfills are examples of point source pollution. Nonpoint source pollution is the result of many dispersed pollution sources and may be called runoff. Runoff occurs when stormwater—rainfall or snowmelt—moves over and through the ground. As the water moves, it picks up pollutants, finally depositing them into lakes, rivers, wetlands, oceans, and groundwater. Contaminants that originate from agricultural land as well as those carried by stormwater runoff are examples of nonpoint source pollution.

Groundwater contamination may go undetected for many years until the water supply is tested for use. Cleaning up groundwater

contamination is often very difficult and costly, and it may cause adverse health effects in both people and local ecosystems. When an aquifer becomes contaminated, it may be unusable for many years or decades, or maybe even forever. Some contaminants are naturally occurring—like minerals, salts, and organic and inorganic compounds—and are picked up by groundwater as it moves through the soil or sedimentary rock. Other contaminants, such as nitrates, heavy metals, fertilizers, animal waste, and volatile organic compounds (VOCs)—may be introduced into groundwater by local industrial and agricultural activities; leaking dumps, landfills, underground hazardous storage tanks, or septic systems; illegal industrial wastewater dumping; stormwater runoff; improper disposal of oils, medicines, household chemicals, and paints down household drains; overuse of pesticides and fertilizers; use of road deicing salt; and natural disasters, such as flooding. See the “Testing Your Private Well Water” section below for information about testing your well water for some of these contaminants.



## PROPER MAINTENANCE AND USE OF RURAL WATER SYSTEMS

Although some sources of groundwater contamination occur off of your property and may be out of your control, there are many small actions that you, as a rural landowner, can do at home to help protect your local groundwater supplies. These actions include making sure that your private wells and septic systems are properly maintained and functioning correctly.

### PRIVATE WELLS

In many urban and suburban areas, residents receive their water from municipal water sources, which monitor the quantity and quality of water available. In rural areas, however, most residents depend on private water sources. Though some rural landowners get their water from natural springs (groundwater that flows freely from the ground through an opening in a landscape) or cisterns (water storage tanks that



can be refilled from outside water sources and sometimes local rainfall), most rural landowners depend on private wells to pump groundwater to the surface for their use. In fact, the Environmental Protection Agency (EPA) estimates that over 13 million households in the United States depend on private wells for their drinking water.

If properly located, installed, and maintained, private wells can provide adequate and high-quality water supplies to landowners. However, they can also come with issues, including poor location or equipment malfunction—which can lead to inadequate quantity and flow rate of water—and water quality problems from contaminants above or below the ground. Learn more below about potential private well issues and contaminants, and follow the provided tips to maintain the integrity of your private well and water quality.



## THE NUTS AND BOLTS OF PRIVATE WELLS

Private wells are installed on the landowner's private property at the cost of the landowner (if a functioning well doesn't already exist on the property). It is the responsibility of the landowner to maintain the water well and monitor the quality of water coming from the well. Here are the three main types of wells<sup>1</sup>:

- **Dug wells.** These are shallow wells that are dug by shovel or equipment and usually are not more than 30 feet deep. They often don't provide enough water for modern uses. To prevent these wells from collapsing, they are usually lined with stones, bricks, tiles, or other materials.
- **Driven wells.** These wells generally are 30–50 feet deep and are created by a piece of equipment that drives a pipe into the ground. They are "cased" (or lined) continuously, but they are often easily contaminated because they draw water from aquifers near the surface.
- **Drilled wells.** These wells are usually at least 100 feet deep, and they can extend down for thousands of feet! They are created by percussion or rotary-drilling machines. Like driven wells, they are continually cased; however, they are less likely to be contaminated because they draw water from deep aquifers.

## PRIVATE WELL MAINTENANCE

Water well issues—like low water pressure or no water at all!—can't always be predicted or avoided, but you can do your best to keep your well functioning properly by performing regular well maintenance.

### PRIVATE WELL MAINTENANCE TIPS

- Find out what type of well you have and make sure that it was properly built to avoid groundwater contamination. You can contact well contractor licensing agencies, local health departments, or local water system professionals to get information about your existing well construction. These professionals can also help you obtain information about siting a well if you are in the process of installing a new well.
- Keep a log. Save all documents relating to your well's history, construction details, water-testing results, inspections, maintenance, and repairs.
- Have your well checked and serviced occasionally by a qualified contractor. Make sure the well covering, casing,



<sup>1</sup> <https://www.epa.gov/privatewells/learn-about-private-water-wells>



and cap are thoroughly inspected. The top of the well should sit about one foot above the ground, and the ground around the well should be sloped away from the well for proper drainage.

- Be careful when working or mowing around your well. The wellhead—the structure built over the well—may be damaged easily by heavy equipment.
- Always consult a professional for assistance with well repairs. Trying to fix well issues yourself can result in injury or death if you are not trained to do so.

You can learn more (and even sign up for a private wells class!) at [www.epa.gov/privatewells](http://www.epa.gov/privatewells).



## TESTING YOUR PRIVATE WELL WATER

According to the EPA, you should test your private well annually for total coliform bacteria, nitrates, total dissolved solids, pH levels, and any other contaminants that you suspect might be present. You can contact your local health department to find out if they provide free water well testing and also to find out what substances are common in your area's groundwater. If the health department does not provide free testing, a state certified laboratory should be used.

You may want to test more frequently than annually if small children or elderly adults live in your house or if someone in your house is pregnant or nursing. These segments of the population are more vulnerable to pollutants. You should also test your private well immediately if

- there are known problems with groundwater or drinking water in your area;
- conditions near your well have changed significantly (e.g., flooding, land disturbances, and new construction or industrial activity have occurred nearby);
- you replace or repair any part of your well system; or
- you notice a change in your water quality (e.g., in its odor, color, or taste).



The EPA provides the useful chart on the next page that “lists common conditions and/or nearby activities that well owners should be aware of and the substance(s) that you should consider testing for to ensure your well is safe. Not all of the substances listed pose an immediate or long term health problem; some impact quality of water only, such as appearance, taste, and odor.”<sup>2</sup>

If your water tests show higher-than-acceptable levels of any contaminant in your water, the EPA suggests that you contact your public health department for specific steps to follow and have your well retested to confirm the contaminant’s presence and concentrations. Some problems can be handled quickly. For example, high bacteria concentrations can sometimes be controlled by disinfecting a well using chlorine, ozone, ultraviolet light, or electronic radiation. On-site treatment processes like disinfection, distillation, and filtration may remove the contaminants found in your well water. However, depending on the contaminant, its concentration, and the condition of the well, you may need a new source of water.

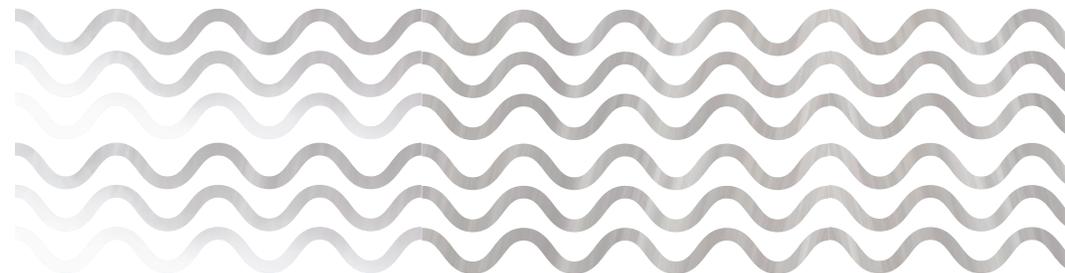
## PRIVATE WELL WATER PROTECTION

Once you’ve tested your well to make sure the water quality meets drinkability standards, you’ll want to keep it that way! Think prevention first! Although some groundwater contamination is out of your control, you can greatly reduce the chances of your well water becoming—or staying—contaminated by following the tips below. An ounce of prevention is worth a pound (or many gallons!) of cure.

## STAY PROACTIVE AFTER A FLOOD OR OTHER NATURAL DISASTER

Well water can become contaminated after a natural disaster, especially one that causes flooding. If your well has been flooded, the EPA recommends the following precautionary steps to keep you and your family safe and ensure the quality of your well water:

- Stay away from the well pump while it’s flooded to avoid electric shock.
- Do not drink water from a flooded well or wash with it; doing so could make you sick.
- Get assistance from a well or pump contractor to clean and disinfect your well before turning on the pump.
- After the pump is turned back on, pump the well until the water runs clear to rid the well of flood water.
- If the water does not run clear, get advice from the county, state health department, or extension service about what to do.





# THE AREA AROUND YOUR WELLHEAD

Protecting the area around your wellhead is especially important in maintaining the safety and quality of your drinking water. The well head protection area should be at least 50 feet in diameter, but a bigger area is better, especially in steep terrain. Apply the same standards to sinkholes, as they often lead directly to groundwater.

- Do not pile snow or leaves around your wellhead.
- Do not mix, store, or use any chemicals or other hazardous materials, such as paint, fertilizers, pesticides, road salts, manure, petroleum tanks, or motor oil, within your wellhead protection area.
- Do not allow animals to be kenneled or contained within 100 feet of your wellhead.
- Install your septic system at least 50 feet away (100 feet or more away is better—check your local ordinances) and downslope from your wellhead protection area.



| CONDITIONS AND/OR NEARBY ACTIVITIES:   | TEST FOR:   |
|--|---|
| RECURRING GASTRO-INTESTINAL ILLNESS; NEARBY ANIMAL LIVESTOCK AREA OR KENNEL, MANURE SPREADING, OR LEAKING SEPTIC SYSTEM  | COLIFORM BACTERIA   |
| HOUSEHOLD PLUMBING OR SERVICE LINES THAT CONTAIN LEAD  | PH, LEAD, COPPER  |
| RADON IN INDOOR AIR OR REGION IS RADON RICH  | RADON   |
| CORROSION OF PIPES, PLUMBING   | CORROSION, PH, LEAD   |
| NEARBY AREAS OF INTENSIVE AGRICULTURE; SKIN DISCOLORATION, ESPECIALLY A BLUE-GRAY COLOR (INFANTS ESPECIALLY SUSCEPTIBLE) | NITRATE, NITRITE, PESTICIDES, COLIFORM BACTERIA                                   |
| COAL OR OTHER MINING OPERATIONS NEARBY   | METALS, PH, CORROSION   |
| GAS DRILLING OPERATIONS NEARBY   | CHLORIDE, SODIUM, BARIUM, STRONTIUM   |
| DUMP, JUNKYARD, LANDFILL, FACTORY, GAS STATION OR DRY-CLEANING OPERATION NEARBY  | VOLATILE ORGANIC COMPOUNDS, TOTAL DISSOLVED SOLIDS, PH, SULFATE, CHLORIDE, METALS |
| ODOR OF GASOLINE OR FUEL OIL, AND NEAR GAS STATION OR BURIED FUEL TANKS  | VOLATILE ORGANIC COMPOUNDS  |
| OBJECTIONABLE TASTE OR SMELL   | HYDROGEN SULFIDE, CORROSION, METALS   |
| STAINED PLUMBING FIXTURES, LAUNDRY   | IRON, COPPER, MANGANESE   |
| SALTY TASTE AND SEAWATER, OR A HEAVILY SALTED ROADWAY NEARBY   | CHLORIDE, TOTAL DISSOLVED SOLIDS, SODIUM  |
| SCALY RESIDUES, SOAPS DON'T LATHER   | HARDNESS  |
| RAPID WEAR OF WATER TREATMENT EQUIPMENT  | PH, CORROSION   |
| WATER SOFTENER NEEDED TO TREAT HARDNESS  | MANGANESE, IRON   |
| WATER APPEARS CLOUDY, FROTHY OR COLORED  | COLOR, DETERGENTS   |



## GENERAL TIPS

- Always follow directions for use and disposal of products.
- Follow product directions to clean up all spills of hazardous products. Accidents happen and spills will never be completely avoidable, but with the right tools and a quick response, spills can be handled in a way that limits their impact on the environment.
  - Sweep up dry spills and absorb liquid spills with clay cat litter or other absorbent material.
  - Don't ever use a hose or water to rinse hazardous product spills into nearby bodies of water, ditches, or storm drains (the grates used to drain water from paved areas), as water in these goes straight to streams, untreated!
  - Report large spills to local authorities/hazardous waste cleanup teams.
- Store hazardous products inside rigid, durable, and watertight containers with tight-fitting covers, preferably in a covered and contained area, to avoid exposure to stormwater.
  - Don't store a lot of any hazardous product. Buy less or donate extra product to neighbors or local citizen groups.
- Regularly check the integrity of any aboveground or underground storage tanks that hold home heating oil, diesel fuel, gasoline, or any other hazardous product on your property.
- Don't leave storage tanks exposed to weather, and make sure they are sealed tightly.
- Make sure to properly dispose of these items by taking them to a hazardous waste collection site or recycling center. You can also check with your local solid waste authority, health department, or environmental agency about proper disposal methods and locations.
- Don't dump hazardous wastes on or in the ground. The wastes may contaminate the soil, leach into the groundwater, or travel into storm drains.
- Don't pour hazardous wastes down the drain. Harmful chemicals, medicines, and certain oils poured or flushed down the drain can eventually contaminate local groundwater supplies.
- Use less. Reducing the amount of harmful chemicals in the environment lowers the chance of groundwater contamination. Limit use of hazardous products or don't use them at all. Instead, use nontoxic, biodegradable, recycled, and recyclable products whenever possible. Follow directions for use and disposal of these, too!



## HANDLE HAZARDOUS PRODUCTS WITH CARE

Hazardous products can poison drinking water. Responsibly using hazardous household products like cleaning agents, detergents, and solvents (especially those with phosphates); drain and oven cleaners; insecticides, pesticides, fungicides, and herbicides; gasoline, kerosene, and propane; paint, stains, and sealants; used motor oil, antifreeze, and other auto fluids; batteries; mercury thermometers, thermostats, and fluorescent lights; pool chemicals; and chlorides (deicing salts) can keep them out of groundwater.

## DETOX THE DEICER

- Use coffee grounds, sand, fireplace ash, or other non-salt, environmentally friendly deicers instead of chlorides. Using road salt in the winter and storing it may reduce water quality, affecting human health and aquatic ecosystems.
- If you use deicing salt, do so sparingly and apply it before a storm hits instead of after snow has fallen, which is less effective.

## BE PARTICULAR ABOUT PAINT

- Sweep up paint chips. Never rinse paint chips or other hazardous waste from pavement with water (this will put it on a fast track to storm drains and local bodies of water).
- Use latex paint instead of oil-based paint; this eliminates the need for paint thinner.
- Clean water-based paint from brushes in the sink, not outdoors.
- Oil-based paints should be removed with thinner that can be set aside until paint particles settle out and then reused.
- Donate excess paint to local organizations, or dispose of extra paint and other hazardous materials through a household hazardous waste collection program. As a last resort, mix equal parts of paint and cat litter or cement to harden it and then dispose of it in the trash.
- Instead of using commercial paint stripping and removal products, do as much as possible with sandpaper and buy citrus oil stripper if necessary.

## PUT THE BRAKES ON AUTO POLLUTION

- Wash your car at a professional/commercial car wash that recycles water to keep grease, detergents, and other solvents out of groundwater.
- If you do wash your car at home, do so in a grassy area instead of on pavement so the water will go into the ground and be filtered naturally before it reaches any body of water.
- Use a low-phosphate or nonphosphate soap to wash your car (in the “Green Up’ Your Lawn and Garden Section” below, read about problems that phosphorus can cause in aquatic habitats).
- Regularly tune your car and fix leaks.
- Use a drip pan under cars while working on them.
- Clean up spilled fluids with an absorbent material like cat litter. Remember to properly dispose of the absorbent material. Don’t rinse spills into a nearby water body, ditch, or storm drain.
- Never dump vehicle fluids on pavement, on the ground, or down a storm drain.
- Dispose of and recycle used batteries, motor oil, and other auto fluids (and old automobiles) at designated drop-off or recycling locations. Ask local service stations about where to recycle.

## “GREEN UP” YOUR LAWN AND GARDEN

Being cautious about what you do on your lawn can prevent many groundwater pollutants, including hazardous pesticides (mentioned in a previous section) and excess nutrients.

### GO NATIVE

- Plant native plants, since they are adapted to the local area and can survive without extra fertilizers, pesticides, and water.
- Determine how large of a grassy area you need, and plant the rest in low-maintenance or no-mow vegetation.



## SEND POISON PACKING (WHEN POSSIBLE)

- Accurately identify weeds, diseases, or insects before applying a pesticide. Some insects and plants are beneficial and help to keep pests under control naturally without causing harm to humans or plants.
- Use pesticides and herbicides sparingly and only when all else fails. Remember—as with any hazardous product—to read the label, use as directed, store with care, dispose of properly, and donate extra to neighbors or a local gardening club.
- If pesticides are necessary, spot-treat weeds because widespread application can kill beneficial insects.
- Remember: more is not better. Applying more pesticide than recommended will not lead to a healthier lawn or garden and will not do a better job of controlling pests. Overapplication will only increase your costs and the chance of contaminating local groundwater supplies.
- Use prescription flea drops (or natural, nontoxic flea treatments) for pets instead of treating a lawn.
- Avoid sensitive areas. Identify vulnerable areas such as your wellhead protection area, sinkholes, streams, ponds, or storm sewers and avoid pesticide applications near these areas.

- Do not apply pesticides before heavy rain is forecast. you will lose the benefit of the product if it's washed away and the rain could wash it into sensitive areas.

## PICK UP PET WASTE

- Clean up after your pet, both in your yard and when walking along trails or roadways.
- Dispose of pet waste properly in waste receptacles or by flushing it (this is the best disposal method). Just be sure not to flush disposal bags or litter with the waste.
- Never let your pet do its “business” in your wellhead protection area.

## MANAGE MANURE

- Store and apply manure away from bodies of water and in accordance with a nutrient management plan to limit nutrient loss and leaching into groundwater.
- Do not spread manure on steep slopes, in the winter when there is snow or the ground is frozen, or right before a precipitation event. Doing so can pollute local groundwater and surface bodies of water.



## BE FRUGAL WITH FERTILIZER

- Test soil for nutrient levels so you can choose a fertilizer that adds only the nutrients that are needed in your soil. Limiting unnecessary and excess fertilizer saves you money, is healthier for the plants (it minimizes the risk of plant roots being chemically burned), and reduces extra nutrients that might wash off into groundwater or nearby bodies of water. County extension offices commonly offer a residential soil-testing program, and independent laboratories perform soil sampling as well.
- Help fertilize your lawn naturally by mowing only one-third of the total grass height and leaving the clippings on the lawn (mulching mowers and mowers with sharp blades work best).
- If fertilizer is necessary, use, store, and dispose of it as directed.
- Know what and how much you are applying. Understand the nutrient content of chemical fertilizers, manure, compost, or other materials you use. Apply only the recommended amount for the plant you want to grow. Applying too much, especially at the wrong time, can contaminate groundwater and chemically burn your plants.
- Choose a fertilizer with a slow-release form of nitrogen to reduce the potential for leaching into groundwater or ending up in stormwater runoff.
- Consider using iron (chelated iron or ferrous sulfate) instead of nitrogen.
- Know how and when to apply. It's best not to apply fertilizers or manure when the soil is saturated, frozen, or snow-covered or when a storm is on the way. Applying nutrients at the right time and place can maximize uptake by the plant and reduce loss to the environment. Try splitting the total amount of fertilizer into two or more applications during the growing season rather than applying it all at once.
- Sweep up any fertilizer that lands on sidewalks instead of using water to wash it off (water could send it to a storm drain and local waterway).



## SEPTIC SYSTEMS

When there isn't access to a municipal sewer, which is often the case in rural areas, household water that runs down drains, is flushed down a toilet, or cycles through the washing machine goes into a septic system, which is an underground storage and filtration system for household wastewater. A typical septic system includes a septic tank and a drainfield: a septic system treats water by draining all household wastewater through a pipe and into a septic tank, which is a buried, watertight container usually made of concrete, fiberglass, or polyethylene. Its job is to hold the wastewater long enough to allow solids to settle down to the bottom, forming sludge, while oil and grease float to the top as scum. Compartments and a T-shaped outlet prevent the sludge and scum from leaving the tank and traveling into the drainfield area. The liquid wastewater (effluent) then exits the tank through piping and is deposited into the drainfield, which is a shallow, covered excavation made in unsaturated soil. Here, the soil accepts, treats, and disperses wastewater as it percolates through the soil, ultimately discharging to groundwater. If the drainfield is overloaded with too much liquid, it can flood, causing sewage to flow to the ground's surface or create backups in toilets and sinks.<sup>3</sup>

<sup>3</sup> [www.epa.gov/septic/how-your-septic-system-works](http://www.epa.gov/septic/how-your-septic-system-works)

## SEPTIC SYSTEM MAINTENANCE

A septic system can be a safe and effective way to manage household waste, and about one-quarter of U.S. homes dispose of waste using septic systems. However, when improperly installed or maintained, septic systems can develop issues—such as clogs, overfilling, improper drainage, and leaking—that may cause groundwater contamination through the leakage of raw sewage into the ground. Keeping up with the maintenance of your septic system may prolong its life span and prevent groundwater contamination.

## SEPTIC SYSTEM MAINTENANCE TIPS

- Do your research. Make sure your septic system is designed by a licensed engineer and installed by a qualified contractor.
- Locate your septic system away from wells. System leach fields should drain away from wells.



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- Have your septic system inspected and pumped out regularly. The frequency of pumping depends on your specific usage, but an average tank is pumped every one to three years.
- Plant only grass over and near the septic drainfield to avoid damage from shrub and tree roots.
- Don't drive or park vehicles on the septic drainfield.
- Minimize the material entering the system. Avoid using a garbage disposal and keep nonbiodegradable materials out.
- Flush responsibly. Materials such as coffee grounds, cigarette butts, paper towels, wipes, and feminine hygiene products can clog or damage the system.
- Dispose of hazardous products correctly, NOT down the drain. Products like paints, solvents, oil, pesticides, bleach, and drain cleaners can disrupt the biological treatment that takes place in the system.
- Instead of using harsh chemicals to unclog drains, try boiling water or a plumbing snake.
- Limit the amount of water entering the system by practicing water conservation.
- Do not drain a pool or spa into your private septic system. Check with your local government about regulations governing draining your pool or spa. Drain your swimming pool only when a test kit does not detect chlorine. Chlorine generally dissipates naturally in about 10 days, but verify with a test kit.

# RESOURCES

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## ENVIRONMENTAL PROTECTION AGENCY

[epa.gov/privatewells](https://epa.gov/privatewells)

[epa.gov/septic](https://epa.gov/septic)

## US GEOLOGICAL SURVEY

[pubs.usgs.gov/gip/gw\\_ruralhomeowner](https://pubs.usgs.gov/gip/gw_ruralhomeowner)

## CENTERS FOR DISEASE CONTROL

[cdc.gov/healthywater/drinking/private/wells](https://cdc.gov/healthywater/drinking/private/wells)

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