

Home & Environment

Septic Systems in Flooded and Wet Soil Conditions

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The most common septic systems used in the United States employ soil absorption fields to treat and disperse wastewater (see Figure 1). The soil absorption field consists of a network of perforated pipes within gravel-filled trenches. Under normal environmental conditions, well-designed and managed septic systems work very well at dispersing wastewater and removing pathogens from the wastewater before they reach groundwater.

However, Indiana's large precipitation events occasionally flood residential areas that rely on septic systems. A flooded private sewage system can be hazardous for homeowners until saturated soils return to their normal state. Flooding risks include sewage backing up in the home, contaminated drinking water, and lack of sanitation. The purpose of this publication is to explain how homeowners can prepare for high water problems and respond appropriately to septic system flooding.

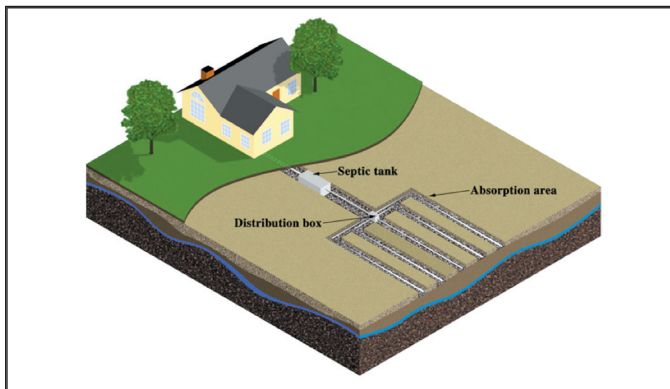


Figure 1. This top view of a conventional trench septic system shows that it uses a series of trenches (each about 2 feet deep) to distribute wastewater into aerobic (with oxygen) soil for treatment before it reaches groundwater.

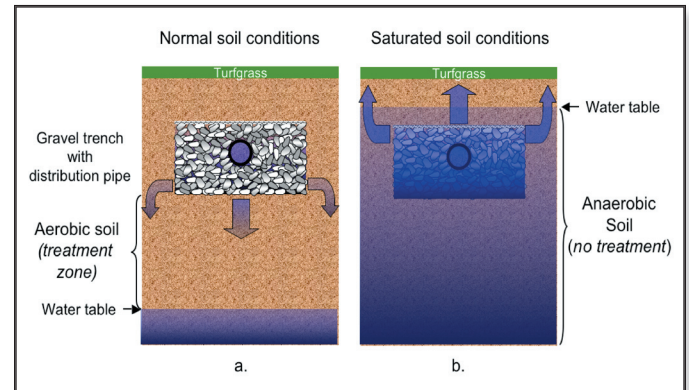


Figure 2. A cross section of an individual septic system soil absorption field trench. (a) Under normal soil conditions, wastewater will move laterally and down, away from the trench through 2 to 3 feet of aerobic soil (that is, soil with oxygen) prior to reaching the water table. (b) Under high water table or flood conditions, however, the soil is saturated and anaerobic (without oxygen). Wastewater moves from the trench up through the soil to the ground surface, or backs up into the household plumbing system and prevents adequate draining.

How Problems Occur

When there is flooding, or when soils are saturated for extended periods of time, septic systems cannot function properly. Proper septic system performance relies on the soil's ability to treat and disperse wastewater. Under normal conditions, soils are aerobic (that is, contain enough oxygen) so they can properly treat wastewater by removing pathogens and other contaminants (see Figure 2a). When saturated, soils cannot treat wastewater properly, so these contaminants can enter ground and surface waters, possibly contaminating your drinking water (see Figure 2b).

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How to Prepare for a Flood

If flooding appears likely, there are certain measures homeowners can take to protect their septic systems, homes, and water supplies before floodwaters arrive.

- Make sure all septic tanks are full of liquid. High-water season is not the time to have tanks pumped because empty tanks are buoyant and may float out of the ground when water tables are high.
- Plug floor drains, if necessary, to keep sewage from backing up into basements. Of course, floodwaters may still enter the basement through cracks and seams.
- Seal all the septic system's possible points of entry. If possible, seal the manhole and inspection ports to keep excess water out of the tank.
- Waterproof all electrical connections to avoid electrical shock, or damage to wiring, pumps, and the electrical system (relevant to at-grade, flood-dose, or mound systems).

During the Flood

While there is flooding, there are several practices homeowners should follow.

- Stop using your private sewage system. Use portable toilets, if possible, or store wastewater in large containers with tight-fitting lids. Line each container with a plastic bag. After each use, add chlorine bleach or disinfectant to prevent odors and kill germs. If necessary, bury wastes on high ground far away from your well.
- Do not drink your well water. Remember that wells may become contaminated during a flood. Drink bottled water or disinfect your water before drinking by boiling it for 10 minutes.
- Shut off power to any sewage lift pumps you have in the house or in a pump chamber. Pumps are required for flood dose, at-grade, and mound systems.
- Shower at another location, such as work, the gym, or a friend's home.
- Do not launder clothes at home.
- Use moist towelettes to clean hands unless they are very dirty, or you are preparing food.
- Use recyclable plates, cups, and utensils to avoid washing dishes.
- Turn off your water softener.
- Repair leaky faucets. This will prevent unnecessary wastewater load on the septic system.

After the Flood

Once floodwaters have receded, there are still several things homeowners should remember.

- Do not drink well water until it is tested. Contact your local health department or read the following Purdue Extension publications for information on how to disinfect wells before using them again: WQ-4-W, *Why & How to Test Home Water Supplies* (<http://www.ces.purdue.edu/extmedia/WQ/WQ-4-W.pdf>), and MWPS-14, *Private Water Systems Handbook*, (to order online, visit <http://www.ces.purdue.edu/new>).
- Do not use the sewage system until water in the soil absorption field is lower than the water level around the house.
- Have your septic tank professionally inspected and serviced if you suspect damage. Signs of damage include settling or an inability to accept water. Most septic tanks are not damaged by flooding since they are below ground and completely covered. However, septic tanks and pump chambers can fill with silt and debris, and must be professionally cleaned. If the soil absorption field is clogged with silt, a new system may have to be installed.
- Only trained specialists should clean or repair septic tanks. That's because tanks may contain dangerous gases. For more information about septic tanks see Purdue Extension publication HENV-5-W, *Septic Tanks: The Primary Treatment Device of Your Septic System*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-5-W.pdf>. Contact your health department for a list of septic system contractors who work in your area. A septic system contractors list can also be found on the Indiana Onsite Wastewater Professionals Association Web site, <http://www.iowpa.org>.
- If sewage has backed up into the basement, clean the area and disinfect the floor. Use a chlorine solution of a half cup of chlorine bleach to each gallon of water to disinfect the area thoroughly.
- Pump the septic system as soon as possible after the flood. Be sure to pump both the tank and lift station. This will remove silt and debris that may have washed into the system.
- Do not compact the soil over the soil absorption field by driving or operating equipment in the area. Saturated soil is especially susceptible to compaction, which can reduce the soil absorption field's ability to treat wastewater and lead to system failure.
- Examine all electrical connections for damage before restoring electricity.

- Be sure the septic tank’s manhole cover is secure and that inspection ports have not been blocked or damaged.
- Check the vegetation over your septic tank and soil absorption field. Repair erosion damage and sod or reseed areas as necessary to provide turfgrass cover.

Reduce System Stress

Remember: whenever the water table is high or your sewage system is threatened by flooding there is a risk that sewage will back up into your home. The only way to prevent this backup is to relieve pressure on the system by using it less.

References

The authors consulted the following publications while developing this bulletin.

University of Minnesota Extension Service. 1997. Protect Your Septic System from Flood Damage.

Minnesota Department of Health. Preventing and Solving Sewage Treatment Problems During a Flood.

University of Wisconsin Cooperative Extension. 2002. Flooded Private Sewage Systems: Safety, Sanitation and Clean-up Concerns.

Other Purdue Extension bulletins in this series:

HENV-1-W, *Septic System Failure*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-1-W.pdf>.

HENV-2-W, *Increasing the Longevity of Your Septic System*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-2-W.pdf>.

HENV-3-W, *Turfgrass Color: Indicator of Septic System Performance*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-3-W.pdf>.

HENV-4-W, *Septic System Distribution Boxes: Importance of Equal Distribution in Trenches*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-4-W.pdf>.

HENV-5-W, *Septic Tanks: The Primary Treatment Device of Your Septic System*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-5-W.pdf>.

HENV-6-W, *Grandfathered Septic Systems: Location and Replacement/Repair*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-6-W.pdf>.

HENV-7-W, *Indiana Soils and Septic Systems*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-7-W.pdf>.

HENV-8-W, *Gravel and Gravelless Trench Soil Absorption Fields*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-8-W.pdf>.

HENV-9-W, *Water Use and Septic System Performance*, <http://www.ces.purdue.edu/extmedia/HENV/HENV-9-W.pdf>.

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Visit the Home & Environment Web site for science-based information about homes and the home environment: <http://www.ces.purdue.edu/HENV/index.htm>.