

Residential Onsite Wastewater Treatment: Septic Tank and Drainfield Maintenance

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This NebGuide discusses recommended practices for the operation and management of residential onsite septic systems for wastewater treatment.

Many Nebraskans live in homes located in rural areas or small communities without access to a public wastewater treatment system. Instead, they must rely on their own private systems for wastewater treatment and disposal. The most common onsite system is a septic tank used in combination with a traditional drainfield. A properly designed, installed, and maintained system should operate for 20 to 40 years or more, treating wastewater to minimize the negative impact on groundwater, surface water, and human health.

This publication covers proper maintenance of a septic tank and traditional drainfield wastewater treatment system.

In a septic tank/drainfield system (*Figure 1*), wastewater flows from the household wastewater plumbing into an underground septic tank. There, waste components naturally separate, with heavier solids settling to the bottom forming sludge, and lighter solids floating to the top, forming scum (*Figure 2*). Bacteria begin to treat wastewater by partially decomposing the solids. The liquid (effluent) flows through the outlet to the subsurface drainfield, also called a soil absorp-

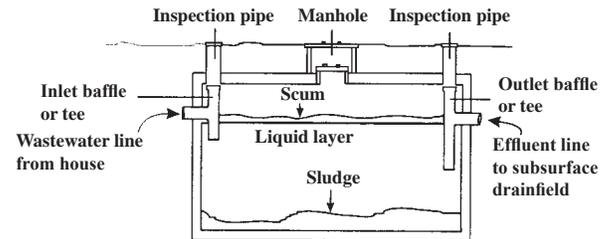


Figure 2. Septic tank.

tion field, leach field, soil treatment area, or laterals. A system may have a drop box or distribution box between the septic tank and the drainfield to distribute effluent evenly between the drainfield trenches, described below.

The drainfield usually consists of a series of underground parallel trenches, each containing a distribution pipe embedded in gravel or rock, or using gravelless chambers (*Figure 3*). The effluent flows through the distribution pipes or chambers where it moves through holes in the pipe or chambers down into the soil. The soil filters out remaining small solids and

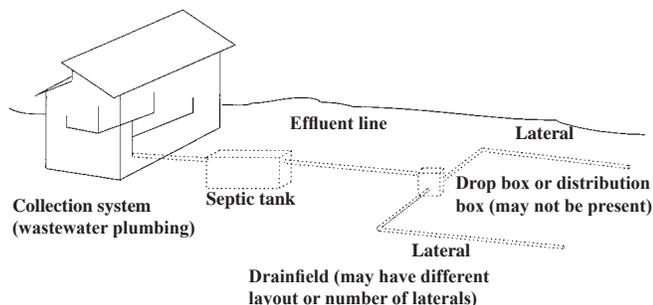


Figure 1. Typical components of a septic tank system for residential wastewater treatment.



Figure 3. Drainfield with chamber prior to backfilling with soil for a gravelless system.

pathogens (disease-causing microorganisms). Also, bacteria and other microorganisms in the soil treat pathogens and other contaminants in the effluent. Water, carrying dissolved substances such as nitrate, slowly moves down to groundwater. Nebraska regulations require at least 4 feet between the bottom of the drainfield and groundwater or bedrock to minimize the movement of pathogens into groundwater.

System Maintenance

Proper maintenance of a septic tank and drainfield is **critical** to keep the system functioning properly. This protects human health and the environment. In addition, it delays the need to repair or replace a system, thereby saving the homeowner money.

Have the septic tank pumped regularly.

One of the most important things you can do to keep the system functioning properly is to have the septic tank pumped regularly. Scum and/or sludge could build up, reducing the effective tank volume, and resulting in wastewater moving through the tank more rapidly with less treatment. In addition, solids could be carried to the drainfield if the tank is not pumped regularly. This will clog the drainfield and not allow wastewater to be treated. Wastewater may form a pond in the yard or back up into the house. At this point, the owner is probably facing costly repairs or replacement instead of minimal maintenance expenses.

Several factors determine tank-pumping frequency, related to the amount and characteristics of wastewater generated. One important factor is whether a garbage disposal is used. Many experts recommend pumping a tank every two to three years. Depending on use, a tank may need to be pumped more or less frequently. A safe approach is to have the tank checked annually until it is determined that pumping is required. Once the pumping interval is established, use that schedule until wastewater patterns change. Additional people living in the home, children becoming teenagers, the installation of a garbage disposal, or the addition of a whirlpool tub could all increase water usage and wastewater generation. Conversely, fewer people living in the home could decrease water use and wastewater generation.

A septic tank (*Figure 4*) should be pumped when:

- the bottom of the scum layer is within 3 inches of the bottom of the outlet baffle (A),
- the top of the scum layer is within 1 inch of the top of the outlet baffle (B), or

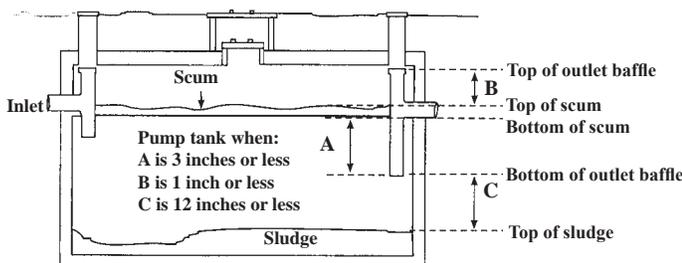


Figure 4. Measurements to determine if a septic tank should be pumped.

- the top of the sludge layer is within 12 inches of the bottom of the outlet baffle (C).

To determine these distances, a septic tank must be opened and checked, and measurements must be taken. Certified professionals in the onsite wastewater treatment industry can look over a septic tank. **Only qualified service personnel using proper safety precautions should enter a septic tank.**

Lack of oxygen or the presence of dangerous gases in the tank could be fatal. Do not allow anyone to smoke in the tank's vicinity because volatile gases may be present. Secure septic tank lids with locking mechanisms such as padlocks, specialized bolts or other devices to keep out children and animals.

Only a Nebraska certified pumper, professional engineer or registered environmental health specialist may legally pump a septic tank. A good pumper will:

- pump wastewater through the manhole or access port, not the inspection pipe. The inspection pipe is too small to see if the tank is sufficiently emptied, or if there are any problems.
- loosen and stir up materials by pumping, backflushing and repumping, or using a mechanical agitator.
- check that baffles or tees are in place and working. These are vital to prevent the drainfield from clogging.
- dispose of septage from the tank in a safe, legal manner. This may be at a municipal wastewater treatment plant or through land application if allowed by local codes and done according to septage disposal regulations.

Conserve water and spread out water usage.

Conserving water to reduce the amount of wastewater that needs to be treated and distributing water flow to the septic tank over an extended period of time will extend the life of a system. Wastewater should remain in the septic tank long enough, at least 24 hours, for heavy solids to settle out, forming sludge, and light solids to float to the top, forming scum. Except for the period immediately after pumping, however, a septic tank contains wastewater to its full capacity at all times. As a gallon of wastewater flows into the tank from the house, a gallon of effluent flows out of the tank into the drainfield. If wastewater moves in and out of the tank too rapidly, due to constant flow for extended periods, or heavy water flow at any time, solids remain suspended in the wastewater. This means they may move with the effluent out of the tank and into the drainfield. Solids can clog a drainfield, decreasing its ability to treat wastewater. This can lead to costly repairs or even replacement. Conserve water and spread out water usage by following these suggestions:

- Wash one or two loads of laundry a day, rather than three or more loads in one day.
- Install low-flow water fixtures, low water-volume toilets, and low water-use appliances.
- Check for and repair leaky faucets, toilets, and other leaks in the plumbing system.
- Take short showers.
- Turn off the faucet while brushing teeth or shaving.

If you use a water-softening unit, select one with demand-initiated regeneration. This means regeneration is determined by measuring gallons of water used, or by measuring the change in the electrical conductivity of the resin bed, or by sensing a change in water hardness.

Manage solids in wastewater.

Manage what is flushed down the toilet or drain to reduce the amount of solids in wastewater. More solids in wastewater will require more frequent septic tank pumping. Follow these tips:

- Do not flush cigarettes, diapers, feminine hygiene products, paper toweling, facial tissue, or “wipes.” They may not break down readily and will contribute to the scum or sludge layers. Dispose of these items with other solid waste.
- Do not overuse the garbage disposal. It grinds up food products that settle out in the tank, adding considerably to the sludge buildup and the amount of organic matter that needs treatment.
- Do not put grease or oils down the drain. Grease and oils from cooking, frying, and skin lotions increase the scum layer in the septic tank.
- Use liquid detergents instead of powdered detergents. Powdered detergents have “fillers” in them that add to the sludge layer.
- Use toilet tissue that breaks down rapidly. Test by placing a tissue sample in a jar of water, covering the jar opening, and shaking vigorously. The toilet paper should fall apart rapidly when the jar is shaken.
- Install a filter on the washing machine water discharge line to trap lint. Clean according to manufacturer's directions.
- Install an effluent filter at the outlet of the septic tank to help prevent solids from flowing into the drainfield. Have it cleaned according to manufacturer's directions.

Keep potentially hazardous materials out of wastewater.

The septic system is not the best way to dispose of some materials. While a septic tank and drainfield system can adequately treat many pathogens in wastewater, it cannot effectively treat all hazardous materials. Keep potentially hazardous materials out of wastewater by following these tips:

- Do not dump unwanted pesticides such as herbicides, fungicides, or insecticides down the drain.
- Do not dump paints, thinners, or solvents down the drain.
- Do not dump excess medications down the drain.
- Do not overuse cleaning products, including bleach and drain cleaners, and do not dump excess cleaning products down the drain. A septic system can handle typical amounts used for routine cleaning, as well as normal-use amounts of anti-bacterial soaps.
- Avoid using automatic toilet cleaning dispensers that release bleach with every flush. This can reduce populations of bacteria in the septic tank that break down waste.

Let the system work naturally.

Research shows that septic system starters, additives, or feeders are not necessary to keep a system working and are not a solution for improperly installed, designed, or maintained systems. In some cases, additives may keep materials suspended in the wastewater and allow them to flow out of the tank where they can clog the drainfield. Follow these recommendations:

- Generally, do not use septic system starters, additives, or feeders.
- If you use a starter, additive, or feeder, select one containing biological components such as bacteria, enzymes, or yeast as these will not harm the system.
- Do not use additives containing chemical components such as solvents or strong acids or bases.

Protect the drainfield.

While the drainfield does not require maintenance, a few precautions will help ensure proper functioning and a long service life. The drainfield should not be inundated with excess water, as extra water will reduce the ability of wastewater to percolate through the soil as needed for proper treatment. The drainfield should not be compacted; compaction will prevent the drainfield from treating wastewater properly. The structural integrity of the drainfield must be maintained. Follow these tips to protect the drainfield:

- Divert surface water runoff from roofs, downspouts and such to areas away from the drainfield.
- Do not add large amounts of water to the drainfield by using automatic irrigation systems. Water only as necessary to maintain the grass cover.
- Do not drive vehicles or agricultural equipment over the drainfield.
- Do not site dog kennels or other animal confinement units over the drainfield.
- Do not construct driveways, parking lots, sidewalks, patios, or buildings over the septic tank or drainfield.
- Maintain all required setback distances* when adding buildings or other improvements to the property.
- Do not place additional soil over the drainfield other than to fill slight depressions. A slight mounding will ensure runoff of surface water.
- Keep rodents and other burrowing animals out of the drainfield area.
- Take care when planting trees or other deep-rooted plants. Determine the distance from the trunk to the dripline (outermost edges of branch tips of mature plant). Plant the tree or shrub at least twice that distance from the drainfield. Do not plant trees with invasive root systems, such as cottonwoods or silver maples, as they may clog or damage pipes.
- Establish and maintain grass over the drainfield. Do not plant vegetables or other annuals that require digging in the soil due to potential contact with pathogens. In addition, the soil will be bare at times, reducing evapotranspiration of water to the air.

*These are minimum distances required between the tank or laterals and items such as surface water, wells, and foundations. See Nebraska Department of Environmental Quality *Title 124* for distances.

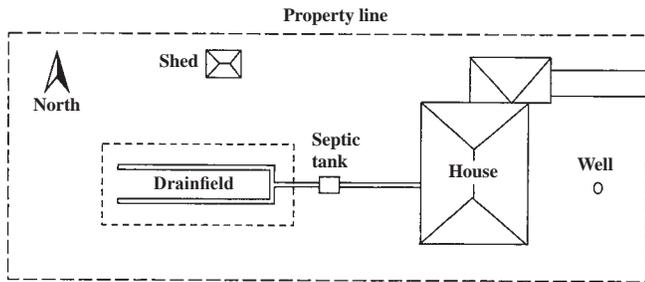


Figure 5. Sample sketch of lot.

- Mow grass frequently to encourage growth.
- Reserve a replacement drainfield area and manage it the same as the present drainfield.

Keep records.

Keep detailed records of repairs, pumping, and other maintenance activities. Keep a sketch of the location of the septic tank and drainfield for future maintenance (Figure 5). This is required by Nebraska regulations and is also important information for potential buyers if the property is ever for sale.

Troubleshooting Septic Tank/Drainfield Systems

Problems may include sluggish drainage, contaminated drinking water, wastewater surfacing in the yard, odors, or pipes freezing. If any of these occur, use the following list to help narrow down the cause of the problem.

- **Sluggish or no drainage from fixtures, or backup of wastewater into the house may be caused by:** improperly designed and/or installed system; improper plumbing in the house; blockage of in-house plumbing; improper appliance operation; excess water entering the system; improper elevations in wastewater system; pump failure or improper operation if system is not a gravity flow; blockage in wastewater line between house and septic tank; blockage in septic tank; blockage in line from septic tank to drainfield; blockage in distribution box, drop box, or pipe; or blockage at the drainfield/soil treatment interface where wastewater enters soil.
- **Contaminated drinking or surface water may be caused by:** inappropriate or improperly designed and/or installed wastewater treatment system; system too close to water supply well; direct flow of wastewater to surface or groundwater; improper well construction; broken water-supply pipe; broken wastewater lines; leaking septic tank; or a source other than owner's system.
- **Sewage odors indoors may be due to:** improper plumbing and venting in house; traps not filled with water;

wastewater backup into house; wastewater surfacing in yard; or unsealed wastewater ejector sump pump.

- **Sewage odors outdoors may be due to:** wastewater surfacing in yard; improper plumbing and venting in house; pump station vent or an inspection pipe located too close to house; inspection pipe caps damaged or removed; wastewater backup into house; source other than owner's wastewater treatment system; or unsealed wastewater ejector sump pit.
- **Wastewater surfacing in yard may be caused by:** excess water entering system; blockage at the drainfield/soil treatment interface where wastewater enters soil; blockage in distribution pipe; improper elevation for drainfield; restricted or impaired flow through the distribution box, drop box or drainfield; undersized drainfield due to design or construction; pump failure or improper operation; or inappropriate or improperly designed and/or installed system.
- **Distribution pipe and/or drainfield freezes in winter may be due to:** improper construction; nonworking check valve in pump to lift wastewater to tank or effluent to drainfield; traffic over subsurface pipes (drainfield, pipe to drainfield, etc.); low wastewater flow rate; lack of snow cover accompanied by severe cold temperatures; or lack of use.

Summary

A properly designed, installed and maintained septic tank and drainfield system should treat wastewater in a way that minimizes the impact on groundwater, surface water and human health. Proper maintenance includes having the tank pumped regularly by a certified professional, conserving water and spreading out water usage, managing solids in wastewater, keeping potentially hazardous materials out of wastewater, not using additives, and protecting the drainfield.

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