

Residential On-site Wastewater Treatment: Septic Tank and Drainfield Maintenance

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This NebGuide is the result of a cooperative effort by the Nebraska On-site Wastewater Task Force. It discusses recommended practices for the operation and management of residential on-site septic systems for wastewater treatment.

Many Nebraskans live in homes located in rural areas or small communities that do not have access to a public wastewater treatment system. Instead, they must rely on their own private systems for wastewater treatment and disposal. The most common on-site system used is a septic tank 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 ab-

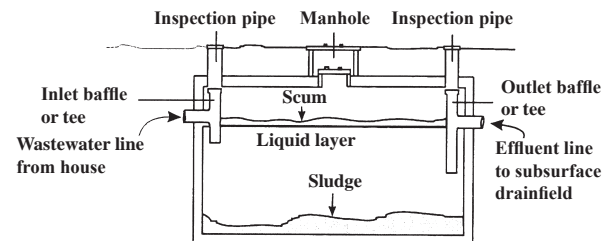


Figure 2. Septic tank.

sorption field, leach field 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 pathogens (disease-causing microorganisms). Also, bacteria

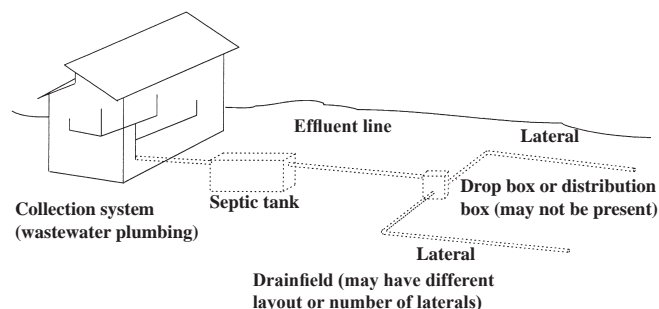


Figure 1. Typical components of a septic tank system for residential wastewater treatment.



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

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 that there must be 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 and 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, including the number of people living in the home, water usage and whether a garbage disposal is used. Many experts recommend pumping a tank every two to three years. Depending on the factors listed above, 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 until there is a change in water use patterns. 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 should be pumped when (Figure 4):

- 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
- 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. Many professionals in the on-site wastewater treatment industry will look

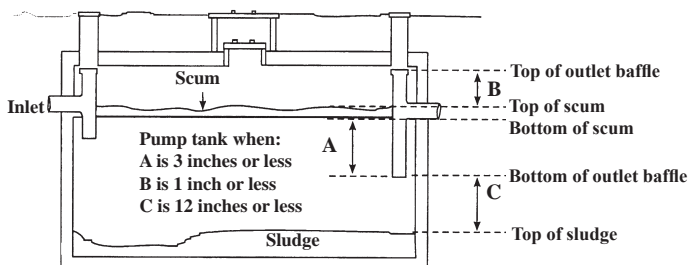


Figure 4. Measurements to determine if a septic tank should be pumped.

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 could be fatal. Do not allow anyone to smoke in the vicinity because volatile gases may be present. Secure septic tank lids with locking mechanisms such as a padlock, 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 immediately after pumping, 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 of time or heavy water flow at any given time, solids remain suspended in the wastewater and 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 volume toilets, and low water-use appliances when replacing.
- 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 in which the need to regenerate 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 or facial tissue. 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, cover the jar opening, and shake vigorously. The toilet paper should fall apart rapidly when shaken.
- Install a filter on the washing machine water discharge line to trap lint and 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 deteriorates the rubber parts and seals in the toilet, and can reduce populations of bacteria in the septic tank that break down waste.

Let the system work naturally.

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:

- Do not use septic system starters.
- Do not use septic system additives.
- Do not use septic system feeders.

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 water from roofs, downspouts or any other surface water runoff away from the area of the drainfield.
- Do not add large amounts of water to the drainfield by using underground sprinklers. Use a manually operated sprinkler only if it is 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.
- Do not plant trees or other deep-rooted plants within 5-10 feet of the drainfield. Do not plant trees, such as cottonwoods, with invasive root systems 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.
- Mow grass frequently to encourage growth.
- Reserve a replacement drainfield area and manage it the same as the present drainfield.

*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.

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.

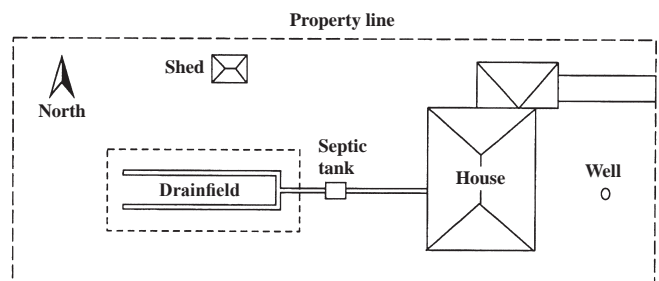


Figure 5. Sample sketch of lot.

Troubleshooting Septic Tank/Drainfield Systems

Problems that sometimes occur include sluggish drainage, contaminated drinking water, wastewater surfacing in the yard, odors or pipes freezing. If any of these occur, the following list may 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 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 back up 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 back up 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 pipes and/or drainfield freezes in winter may be due to: improper construction; check valve in pump to lift wastewater to tank or effluent to drainfield not working; traffic over subsurface pipes (drainfield, pipe to drainfield, etc.); low wastewater flow rate; 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, 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.

Additional Resources

University of Nebraska–Lincoln Extension publications, available from county Extension offices or Publications Distribution, P.O. Box 0927, Lincoln, NE 68583-0927:

Residential On-site Wastewater Treatment: An Overview, EC01-798

Residential On-site Wastewater Treatment: Septic Tank Design and Installation, G02-1473

Residential On-site Wastewater Treatment: Traditional Drainfield Systems for Effluent Treatment, G02-1479

Residential On-Site Wastewater Treatment: Gravelless Drainfield Systems for Effluent Treatment, G02-1480

NDEQ publications, available from P.O. Box 98922, Lincoln, NE 68509-8922:

Title 124: Rules and Regulations for the Design, Operation and Maintenance of On-site Wastewater Treatment Systems. On-line at

www.deq.state.ne.us/RuleAndR.nsf/Pages/124-TOC

Kansas State Agricultural Experiment Station and Cooperative Extension Service, online at www.oznet.ksu.edu.

Septic Maintenance: A Key to Longer Septic System Life. September 1998. G. Morgan Powell, Barbara Dallemund, and Judith M. Willingham.

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UNL Extension publications are available online at <http://extension.unl.edu/publications>.

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