WATER QUALITY

Septic Tank–Soil Absorption System

Households not served by a sewer system most often depend on a septic tank-soil absorption system to treat and dispose of wastewater. The septic tank removes most solids that settle to the bottom and float to the top. By removing solids, the septic tank protects the soil absorption system from clogging and premature failure. The effluent, though clear, is still sewage and contains many dissolved organics and disease organisms. The soil absorption system filters and treats the septic tank effluent, making the water stable and low in organics.

In Kansas at least 4 feet of suitable soil is required under the lateral lines of the soil absorption system to provide adequate treatment of the septic tank effluent. To accommodate construction of a conventional lateral system and provide adequate soil cover to restore the site, nearly 6 feet of suitable soil is needed above the limiting layer. The soil absorption system must beat least 50 feet from any water supply and 25 feet from the house and property lines. Greater separation distances are recommended, and many county sanitary codes may require greater distances. Septic system construction is limited by steep slopes and a system should not be placed in areas subject to flooding.

On-site systems in Kansas are regulated by the county, generally through the local health department. The county adopts a sanitary code, issues permits and inspects construction. In counties that have not adopted a sanitary code, Kansas Department of Health and Environment (KDHE) guidelines in bulletin 4-2, A Manual of Recommended Standards for Locating, Constructing and Operating Septic Tank Systems for Rural Homes or its replacement, should be followed. This bulletin is available from your local health department, Kansas Department of Health and Environment, or your county Extension office.

Septic Tank

A septic tank is a watertight container constructed of durable material resistant to corrosion or decay. Septic tanks may have multiple compartments. Research shows two compartment tanks or two single tanks in series do the best job of removing solids. Some counties recommend or require them, especially for larger homes.

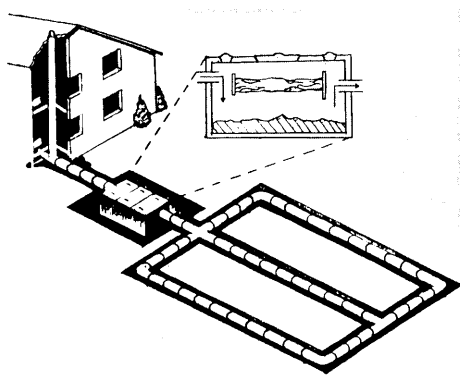
Baffles are the most important component to the operation of a septic tank. The inlet baffle forces wastewater down into the tank, preventing short-circuiting across the top. The outlet baffle keeps the scum layer from moving into the soil absorption system. If the baffles are damaged or missing the solids are not separated and the soil absorption system is damaged and may fail. Septic tanks have inspection ports for checking the condition of the baffles and a manhole for pumping the tank.

The capacity of the septic tank is based on the size of the house. The KDHE guideline specifies a minimum 1,000 gallon tank for up to a 3-bedroom home, plus 250 gallons of tank capacity for each additional bedroom.

Soil Absorption System

The soil absorption system filters and treats the septic tank effluent before it enters the groundwater. At least 4 feet of suitable aerated soil beneath the absorption field (trench) is needed to renovate wastewater before it reaches a limiting layer. A limiting layer maybe bedrock, impervious soil layer, groundwater or seasonally saturated soil (gray soil or mottled soil indicates saturated or seasonally saturated).

A soil absorption system can be used in areas of suitable soil. This corresponds to soil with a perc rate of 5-60 minutes per inch. The soil absorption system usually consists of a set of trenches, 18–36 inches wide, filled with rock and covered with 9–15 inches of soil. Trenches should have at least 6 feet of undisturbed soil between them. The bottom of these trenches must be level so should be constructed to follow the contours. Slope less than 15 percent is best suited for easy construction.



A conventional septic tank–soil absorption system.

The bottom of each trench is filled with 6 inches of clean gravel or rock ¾ to 2 inches in size. A 4-inch perforated pipe is placed on top of the rock and 6 inches of rock added, to cover the pipe at least 2 inches. The top of the rock is covered with filter fabric that prevents the soil particles from moving down into the gravel but does not restrict water and air movement. Straw or untreated building paper may also be used but do not last as long as filter fabric. The back-filled trench should be mounded to allow for settling, the area graded to allow rainwater to run off, and then seeded with grass to prevent erosion.

The size of a soil absorption system is based on the household wastewater flow and soil properties. For a 3-bedroom home, the area needed for the absorption system could range from 262 ft^2 for arse-textured soil to 2,000 ft^2 for a fine-textured soil. Set-backs from the well, house and property lines must be provided. An area is usually reserved for future absorption system construction in the event of failure. Typically two acres or more are required to accommodate these requirements.

A correctly operating soil absorption system will remove bacteria and will oxidize dissolved organic materials, making the water clean. It will not remove dissolved minerals such as nitrate, total dissolved solids, sodium, or many household chemicals which may be in the wastewater. Care should be taken not to introduce large quantities of these materials.

Several proven options are available for soil absorption systems when space, soil, high groundwater or shallow bedrock eliminate use of conventional laterals. These include beds, shallow in-ground, at-grade and mound systems. Lagoons are also useful for slowly permeable soils. Landowners should contact their local health department for help with wastewater systems options and design.

Precautions

- Keep heavy equipment off the soil absorption and downslope areas both before and after construction. Soil compaction reduces permeability and contributes to premature system failure.
- Divert rainwater from adjacent areas and impervious surfaces (building roofs and paved areas) away from the soil absorption system. Surface runoff increases the amount of water the soil has to absorb and can contribute to premature failure.
- Make sure the distribution system is level, so wastewater reaches all parts of the absorption area. If settling or frost action cause shifting, part of the system may be overloaded and another part dry.
- Avoid installing the septic tank and soil absorption system when the soil is wet. Construction in wet soil causes puddling, smearing and soil compaction which reduces soil permeability and may cause system failure quickly.
- Use water-saving fixtures and habits. Low volume toilets, showers and washers and water-conserving habits can substantially reduce the wastewater flow and extend system life.
- To facilitate cleaning and inspection, install risers from the access manholes and inspection ports to or within 12 inches of the surface before burying the tank. Also, map and mark the location of the tank and absorption field laterals for easy access.
- Have the septic tank pumped and inspected regularly, typically every 3–5 years.
- Remove trees and shrubs within 50 feet of the absorption area or provide a root barrier.

For more information on septic tank-soil absorption systems, contact your local health department or your county Extension office. Related Extension titles include:

- Soil Evaluation for Individual Septic Systems, MF-945
- Why Septic Systems Fail? MF-946
- Septic Tank Maintenance, MF-947
- Wastewater Lagoons for Private Homes, MF-1044

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This publication is provided for Kansas citizens in an effort to promote voluntary and proper management of nonpoint pollution sources. It was written by Kansas State University Cooperative Extension Service specialists in cooperation with Kansas Department of Health and Environment. Printing cost was provided from the State General Fund and State Water Plan Fund.

COOPERATIVE EXTENSION SERVICE, MANHATTAN, KANSAS

MF-944 Revised July 1992

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File Code: Engineering 4-5 (Water Quality)