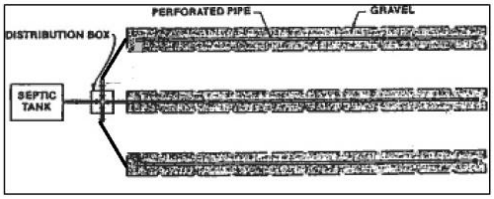
County of Yolo ~ DEPT OF PLANNING, PUBLIC WORKS AND ENVIRONMENTAL SERVICES
Environmental Health Division
137 N. Cottonwood Street, Suite 2400, Woodland, CA 95695
PHONE - (530) 666-8646 FAX - (530) 669-1448

HOMEOWNER SEPTIC SYSTEM MANUAL

THE PURPOSE OF THIS MANUAL

In 1881, the septic tank and leach field were developed, and today over 50 million people in the United States rely upon this wastewater management system. In spite of widespread use, approximately one half of the existing septic systems have extremely high failure rates due to incorrect design, poor construction, and inadequate maintenance. As more people move out of urban areas into unsewered rural residential communities, the potential for septic system failures increases.



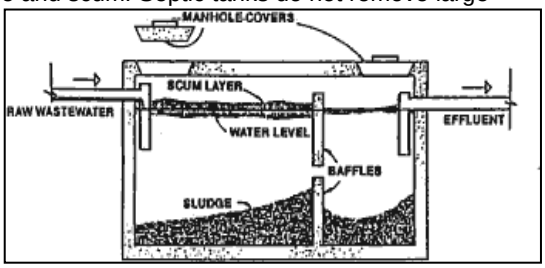
The purpose of this manual is to explain the basic operations of septic tanks and leach fields to homeowners and residents. In addition, possible reasons for septic system failures are presented, and several solutions are recommended. However, this manual should be used only as a general guide for the operation and maintenance of septic systems. The design of septic tanks and leach fields and the evaluation of septic system failures must be completed on a parcel-by-parcel basis. Assistance is provided by the Yolo County Environmental Health Division, local septic system contractors, and local septic system designers or engineers. It is also important to contact the Yolo County Environmental Health Division prior to the construction of a new septic system or replacement of existing septic systems.

WHAT IS WASTEWATER?

Wastewater, or sewage, is generated through the use of toilets, bathroom sinks, showers and bathtubs, kitchen sinks, garbage disposals, dishwashers and washing machines. The average person produces about 50 to 75 gallons per day of wastewater. The wastewater contains dissolved organic and inorganic materials, suspended and settleable solids, and microorganisms, including bacteria and viruses. Direct discharge of wastewater to surface waters, groundwater, or ground surfaces will result in public health hazards. To protect the environment, the majority of unsewered homes utilize septic tanks to remove solids and greases, and leach fields, or other types of soil absorption systems, for wastewater disposal.

HOW DO SEPTIC TANKS WORK?

In the past, wastewater treatment and disposal facilities for homes with indoor plumbing consisted of buried bottomless containers, or cesspools. Discharge of both solids and liquids to the soils caused the soil pores to clog, and contaminated water entered surface waters and groundwater. Therefore, to protect the soils and reduce public health hazards, septic tanks were installed between the houses and the soil absorption systems. Septic tanks are watertight containers which remove large solids and greases, provide anaerobic digestion of the solids, and storage of the sludge and scum. Septic tanks do not remove large numbers of bacteria and viruses.



Septic tanks are usually constructed of concrete or fiberglass. Some older tanks are made of bricks, clay, or redwood – but these are no longer approved for construction. Sanitary t's and baffles are placed within the tank to improve solids settling and prevent the scum layer of lightweight solids, fats and greases from floating out of the tank with the effluent. The settled solids are biologically digested by bacteria which live in environments without air (anaerobic bacteria). Some of the products of anaerobic digestion are gases, including methane, carbon dioxide, and hydrogen sulfide, which has an odor similar to that of rotten eggs. The gases are vented from the septic tank through the household plumbing vents. Inorganic and non-biodegradable materials cannot be digested by the microorganisms in the septic tank, and accumulate in the sludge or digested by the microorganisms in the septic tank, and accumulate in the sludge or scum layers. The sludge and scum layers must be removed periodically to prevent the accumulated solids and greases from flowing into the soil absorption system and clogging the soil pores. If washing machines, dishwashers, and garbage disposals are used, the amount of sludge will increase and the septic tank will require frequent cleaning.

WASTEWATER DISPOSAL BY SOIL ABSORPTION

Effluent from the septic tank flows by gravity or is pumped to a leach field for disposal. The wastewater effluent is absorbed by soil particles and moves both horizontally and vertically through the soil pores. The dissolved organic material in the effluent is removed by bacteria which live in the top ten feet of the soil. As the effluent moves through the soil, the temperature and chemical characteristics of the wastewater change and create an unfavorable habitat for most bacteria and viruses. Therefore, as the septic tank effluent moves through the soil, organic material and microorganisms are removed. The wastewater generally percolates downward through soil and eventually enters a groundwater aquifer. A portion of the wastewater may move upwards by capillary action and is removed at the ground surface by evaporation and transpiration of plants.

A standard leach field consists of a series of four-inch diameter perforated distribution pipelines placed in two-to-three foot wide trenches. The perforated pipe is placed on top of gravel which is also used to backfill around the pipe. The gravel promotes drainage, provides a surface area for necessary bacterial activity, and reduces root growth near the pipeline. Untreated building paper, approved filter fabric, or straw is placed over the gravel to prevent fine soil particles from migrating into the gravel. The building paper, filter fabric or straw does not reduce the evapotranspiration of the wastewater. A minimum topsoil cover is placed over the gravel to protect the leach field, prevent contact with the wastewater and reduce infiltration from rain.

HOW DO SEPTIC SYSTEMS FAIL?

When sewage collects on the ground surface or seeps from the side of a bank, or when the household plumbing becomes clogged or slow, you may be experiencing a septic system failure. Although the failure may be caused by the septic tank, sometimes it is the leach field which has failed.

Leach field operation is affected by the soil percolation rates. To ensure that the sewage is treated adequately in the soil, minimum set-back distances have been established between leach fields, fractured bedrock, soil layers with limiting percolation structure or texture, groundwater, streams, cut banks, wells, water supply pipelines, houses, and property lines. When adequate soil depth is not available, untreated sewage could enter streams, wells, or contaminate groundwater. To prevent such failures, specific design criteria should be used for septic systems in areas with high groundwater or soils with limiting percolation layers.

Soil analysis and or percolation tests should be completed on the leach field site prior to construction. This information is used to calculate the amount of sewage which can be applied per square foot of leaching area. If the percolation rate is slow due to soil characteristics (such as clay particles in the soil), or there is evidence of groundwater, then an alternative septic system may be required.

As the leach field becomes older, a bacterial slime mat grows in the soil under the trench. The mat functions as part of the wastewater treatment process, however, the mat also reduces the percolation rate. Percolation rates are also reduced by solids which flow from septic tanks that have not been pumped and by flooding due to high groundwater or sewage flowing from neighboring leach fields.

HOW TO REPAIR FAILING SYSTEMS: SYMPTOMS / CAUSES / REMEDIES

Please be aware that most repairs to a septic system require a Yolo County permit. Please contact Yolo County Environmental Health for further requirements or if you have any questions.

1. Water will not drain in showers & toilets / Ponding of wastewater over leach fields.
   Solids or scum blocking septic tank inlet and outlet:
   - Pump septic tank periodically
   - Clean effluent filter, if one exists – hose out the filter into the inlet side of the tank and then re-insert into the outlet sanitary T. This should be done about once a year as routine maintenance.

   Roots blocking pipelines:
   - Contact commercial root remover services or local septic contractors.

   System hydraulically overloaded:
   - Reduce water usage through water conservation.
   - Reduce landscape irrigation of soils near leach field.
   - Increase design capacity of leach field to meet actual use of septic system.

   High groundwater:
   - Construct surface and subsurface drainage diversion facilities upstream of leach field.
   - Construct new leach field in area without high groundwater – soil analysis necessary.
   - Construct an alternative septic system to allow for less vertical separation to groundwater.

   Gravel clogged with fine soils:
   Soils smeared due to obstruction during wet weather:
   Damage due to heavy vehicles or objects:
   - Replace leach field.

2. Surfacing downslope:
   Excessive Slopes
   Fractured bedrock
   System constructed too close to cut bank
   Gopher or rodent activity
   - Replace leach field - or -
   - Repair suspected area, possible replacement of leach field.

3. Odors from house vent:
   No problem exists with the septic system.
   Atmospheric conditions may prevent dispersion of odors during early morning and late afternoon.
   Increase height of house vent to provide for better dispersion.

SEPTIC SYSTEM MAINTENANCE

Septic tanks and leach fields are a viable and permanent wastewater management system if properly designed, constructed, and maintained. Maintenance of the septic system primarily consists of removing the accumulated sludge on a periodic basis. Periodically, the sludge and scum layer depths should be inspected. The septic tank should be pumped when the bottom of the scum layer is within three inches of the bottom of the outlet pipe, or the distance between the top of the sludge and the bottom of the outlet pipe is within the limits presented below:

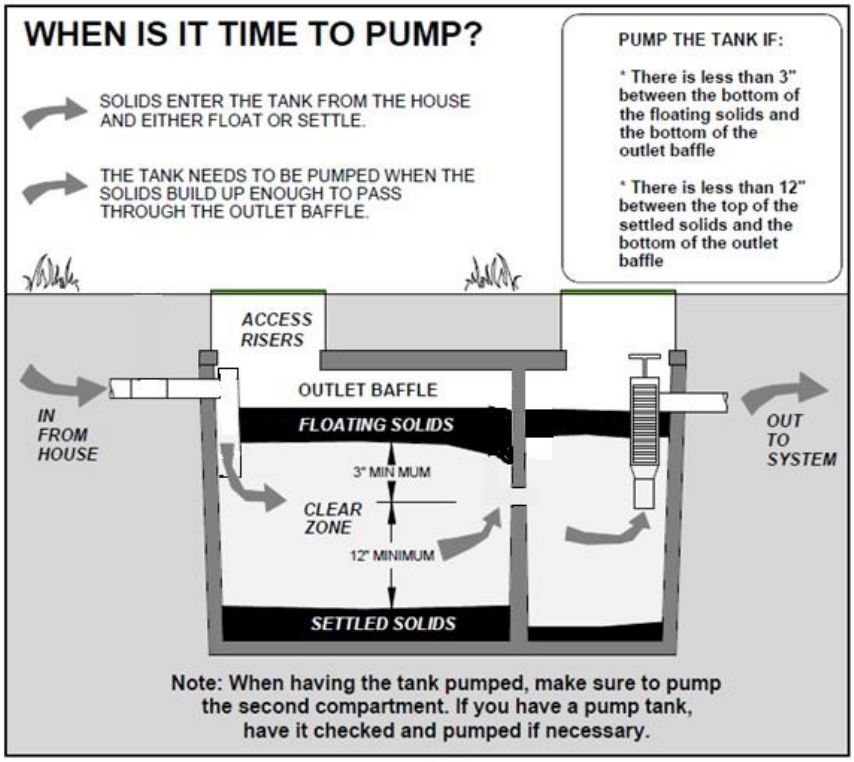
In addition, users of a septic system must observe the following basic rules in order to ensure satisfactory operation:

DO...

- inspect and, if necessary, pump septic tank every three years minimum (see image below for more information).
- reduce the amount of water used during winter and spring when groundwater levels are high.
- minimize or eliminate the use of garbage grinders. This appliance adds extra solids and water to septic system.
- conduct percolation tests during wet weather season before installing a new system.

DO NOT...

- use a kitchen garbage disposal (or limit the usage of one and pump tank frequently).
- flush semi or non-biodegradable items into septic tank, including paper towels, newspapers, writing paper, rags, disposable diapers, or cat litter.
- wash down sides of septic tank when it is pumped. The remaining slime contains bacteria which will be needed to digest the wastewater.
- flush large amounts of chlorine bleach or lye products into the septic tank. However, normal household use will not harm the bacteria.
- pour used motor oil into the septic tank.
- discharge brine (salt water) waste from self-regenerating water softeners to the septic tank. The high salt concentrations will clog the soil pores.
- connect roof drains and yard drains to septic tanks. Extra water will flood the tank and the leach field.
- add sodium hydroxide or potassium hydroxide to the septic tank. These chemicals will affect solids settling and cause the sludge to flow into the leach field.
- construct leach field in close proximity to another leach field. The soil will become saturated and both systems will fail.
- construct leach fields in impervious soils, near fractured bedrock, on steep slopes, or on flood plains.
- plant small or medium-sized trees within ten feet of leach fields or large—sized trees within 20 feet of leach fields. Roots will clog the pipelines.
- plant vegetation which requires excessive amounts of water on top of the leach field.
- drive vehicles or place heavy objects, such as portable swimming pools, over septic tanks and leach fields. In addition,- stakes-for-plants and supports for children's' s swings should not be placed over septic tanks and leach fields.
- discharge water from washing machines directly to the ground surface or leach fields. The wash water contains chemicals and bacteria which will contaminate surface waters and cause a public health hazard. The wastewater also contains fine solids and soapscums which will clog the soil pores. If the existing septic system will not accept water from the washing machine, a separate septic tank and leach field must be installed.



Common Myths about Septic Systems:

1. Septic systems last forever and never need replacement.
Reply: Septic systems require periodic maintenance including pumping of the septic tank once every three to seven years on average depending on your use (see above image for more info) and periodic replacement of the leach field. A properly designed, installed and maintained leach field may require replacement in 15 to 30 years. However, a leach field that is not designed and constructed adequately or receives poor maintenance may require replacement before 15 years of age. This maintenance requirement is similar to the periodic replacement of a house roof or water heater. In addition, the leach field must be expanded if additional bedrooms are constructed on a house. However, if the septic tank is pumped frequently (more than once every three years) or the leach field requires replacement more than once every 15 years, the existing septic system is probably failing.

2. Flushing yeast or buttermilk into the septic tank will eliminate the need for pumping.
Reply: It has been a common practice to flush additional organic material into septic tanks that serve vacation homes or other homes which are used infrequently. The additional organic material serves as food for the microorganisms during extended periods when wastewater is not discharged into the septic tank. This organic material does not help or hinder the operation of a septic system which is used continuously. However, the addition of yeast or buttermilk does not cause degradation of non-biodegradable material which accumulate in the sludge and scum. Therefore, the septic system must still be pumped periodically to prevent solids from clogging the leach field.

3. Washing machine wash water and rinse water should be discharged to the ground surface to protect the leach field.
Reply: Water from the washing machine contains bacteria removed from the clothes and will contaminate surface streams. In addition, the soap residue will clog soil pores and may kill vegetation. Water from the washing machine is wastewater, and should be treated and disposed of in the same matter as water from the sinks and showers.

4. If the septic system appears to be failing, flush the septic tank with large amounts of water.
Reply: Septic system failures are caused by accumulated solids in the septic tank or clogged soil pores. Flushing the septic tank will cause the solids to be forced into the soil absorption system and may cause irreversible damage to the leach field. Flushing water into a clogged leach field will prolong the saturation of the soils and prevent oxidation of organic material in the soil pores.

5. Weekly use of commercially available lye products will "clean out" plumbing and the septic tank.
Reply: The regular use of lye products will destroy the anaerobic bacteria which digest solids in the septic tank. Therefore, the septic tank will require pumping several times each year to prevent solids from flowing into the leach field.

6. My septic system is healthy because the grass is bright green over the leach lines.
Reply: A bright green leach field area on the surface could be a sign that the effluent is not percolating through the soil. Look for clear signs of failure, such as standing effluent above the leach lines, or marshy areas.