

Q&A

Editor's Note: This column is based on calls received over the National Small Flows Clearinghouse (NSFC) technical assistance hotline. If you have further questions concerning drainfields, call (800) 624-8301 or (304) 293-4191 and ask to speak with a technical assistant.

How To Extend the Life of Your Drainfield

NSFC ENGINEERING SCIENTIST

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I was told my drainfield is failing. The pumper said that drainfields have a short lifespan, and I will need to replace it. Is there anything I can do to prolong the life of my system?

A septic tank/soil absorption system is the most common method of onsite wastewater treatment and disposal. This system is considered conventional because it works well in many situations and is normally the least expensive option.

The septic tank/soil absorption system provides all the wastewater treatment of large, municipal plants. The septic tank functions to remove solids and floatables (oil, grease, etc.), with the effluent passed on to the soil absorption system. Here, the soil works as a filter to physically strain out waste. It serves as a biological reactor as well. The soil particles provide an attachment point for bacteria where they can "feed" on the waste in the effluent flowing past. As the bacteria feed, they grow and multiply, forming a "biomat" or biological mat in the soil. Even bacteria have a lifespan, though, and some bacteria are continually dying off to be replaced with new ones.

The growth of the biomat is linked to the supply of food provided in the effluent. Biomats grow faster with more effluent, or higher strength effluent, and degrade or die off when deprived of enough food. When drainfields were first installed, the accepted thinking was that they had a limited

lifespan and would eventually clog up completely. The current procedure is to consider the long-term acceptance rate (LTAR), which balances the application of wastewater so that the bacterial growth rate is balanced by the bacterial die-off rate and the system never completely clogs.

However, the LTAR is dependant on many complex factors, such as the soil permeability, the amount of oxygen present, the hydraulic and biological loading rates, and the growth and death curves of the bacteria. Since our knowledge of the growth of bacteria in soil is somewhat limited and many of the factors fluctuate considerably, calculating the precise LTAR is difficult, so drainfields continue to clog and fail. However, based upon our knowledge that biomats deprived of food will degrade, onsite system designers have recommended alternating drainfields.

The theory is that as one drainfield is being used, and the biomat there is growing, the biomat on the other field is deprived of food and decaying. After a suitable time of starvation, the second drainfield is regenerated, which means the clogging mat of bacteria dies off and the soil is restored to its original permeability. Switching periodi-

cally between drainfields should extend the life of the system indefinitely.

Design

The design of alternating drainfields closely follows conventional drainfield design. Trench design and layout should be done as prescribed by your state and local authorities, in terms of depth, spacing, depth of cover, and material used in the trench. The concept of resting and regeneration for drainfields works with pipe and gravel trenches, chamber systems, gravelless pipe systems, or alternative media systems such as those using chipped tires.

The U.S. Department of Agriculture (USDA) offers an equation based on percolation rate and design life, suggesting that a design life of 3 years is acceptable for alternating systems. (See Table 1.)

For example, for a site with a percolation rate of 33.5 minutes per inch, alternating drainfields would be sized at 187 square feet each, for a total size of 374 square feet. A single drainfield with a design life of 40 years should have an area of 520 square feet. Of course, local and state regulations take precedence over USDA guidelines and must be followed in any system design.

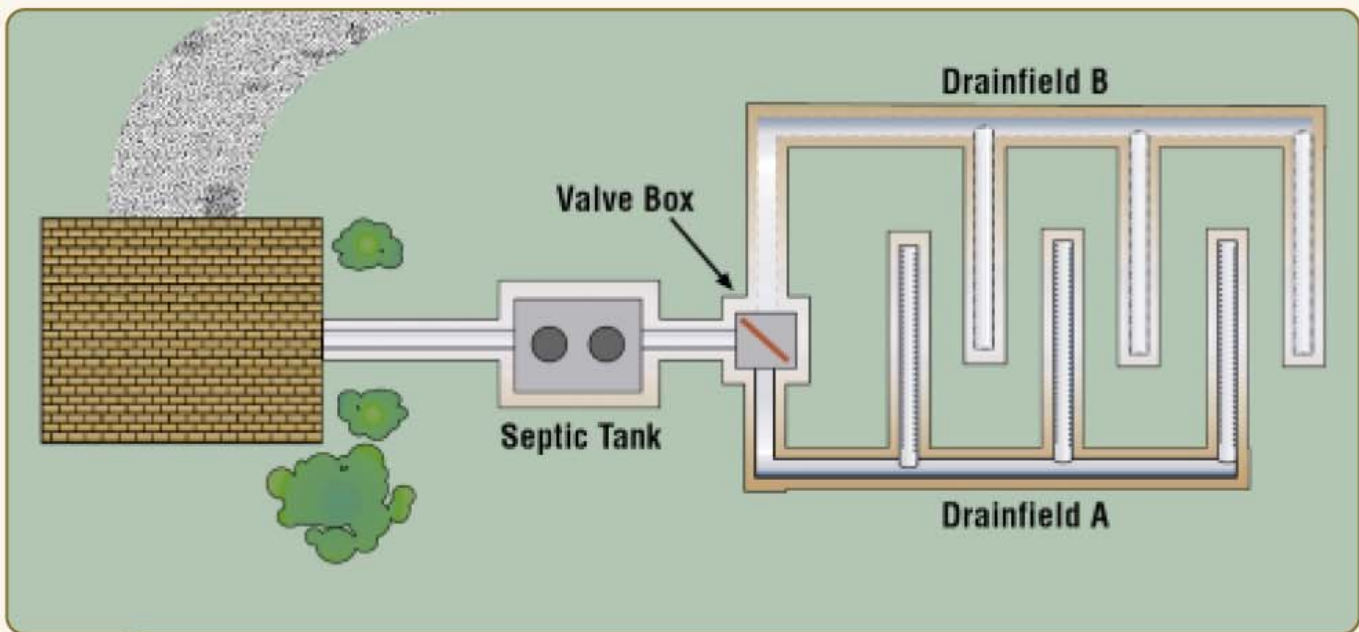


Figure 1 Mechanical Home Aerobic Treatment Unit

Many authorities suggest that pressure dosing is equivalent to installing alternate drainfields, as this achieves the resting/dosing cycle on one field. Pressure dosing uses a pump and a separate tank to send water to the field several times a day. The field rests between doses, which increases oxygen flow. Additionally, the pressure dose spreads the effluent more evenly throughout the whole drainfield.

Siting Advantages and Disadvantages

Obviously, two drainfields take up more space than just one, but most states require a reserve area be set aside. If the fields are being constructed as interlocking, the increase in needed space is not that great, especially if

the fields are sized at 75 percent of a normal field. The homeowner would still be required to set aside a repair area. For repairs, a completely new drainfield needs to be constructed, hopefully in the set-aside repair area.

The main advantage to interlacing the fields, besides reducing the area dedicated to the absorption field, is that interlaced fields may increase the effects of evapotranspiration, according to Winneberger (1976). His claims are that the interlaced field is roughly twice the size of one drainfield, and that all the vegetation above the field receives the benefit of irrigation. Splitting the fields irrigates a single area for a period, then another area receives the benefit when the fields are switched.

Operation and Maintenance

Septic tank and drainfield maintenance is fairly basic. The tank should be inspected periodically—every 3 to 5 years—and the solids pumped out when needed. If an effluent filter is used (which is a good idea), it should be inspected when the tank is and cleaned by washing the solids off of it back into the tank.

There is only a little more maintenance required for alternating fields than for one field, with the addition of the valve box that needs to be switched periodically. However, alternating

fields provide the homeowner with an immediate solution to a clogged drainfield; merely turning the diverter valve.

For normal operation, the homeowner must remember to operate the valve periodically, usually every six months to a year. Penn State (Makuch, 1984) suggests 1-year intervals, as research showed 10 months completely reduced the biomat. Kreissl (1984) cites a Virginia example with annual switching, and Wisconsin research showing 4 weeks as sufficient to unclog a system in sandy soils. Winneberger (1976) says annually.

One consideration about switching too frequently is that a biomat is an important part of the soil treatment. Annual switching provides time for the biomat to establish and provide good treatment before becoming so extensive that it clogs the system. Switching drainfields more frequently than every six months may not give the biomat time to develop enough for effective treatment.

The alternative to frequent switching would be to use one drainfield until it clogs and then switch over to the alternate. This, of course, brings with it the disadvantages of failure, namely ponding in the yard or backing up sewage into the house, if only for a short time. One might also consider switching drainfields after two or three years of use. ■

Table 1

Percolation Rate Equation for Drainfield Area

10 min/in	$A = 75 + 9t$
15 min/in	$A = 100 + 9t$
30 min/in	$A = 160 + 9t$
45 min/in	$A = 210 + 9t$
60 min/in	$A = 240 + 9t$

where A is in square feet and t, the design life of the system, is in years.