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On-Site Sewage Treatment Planning For A Septic System

The most common home sewage treatment system for farm and country homes is a septic tank and absorption field. In fact, about 36 percent of all American homes have such systems, and almost 50 percent of all Alabamians use a septic tank system to safely dispose of household sewage.

If you are planning to purchase a building lot for a new home, investigate before you invest. Check to see if the property is served by a city or central sewer system. If it is not, you need to know if the property has a suitable site for a septic system.

The following steps can help you screen lots and determine their suitability before you purchase land:

- Investigate the site.
- Determine soil characteristics of the site.
- Seek professional help for on-site soil evaluations.
- Know state regulations.

Investigate The Site

Before you buy a lot, know exactly where the boundaries are. Walk over each lot and look for indications of soil problems or site limitations that could cause construction and drainage problems. Use the following questions for guidance:

Is there enough space on the building lot for the home, the septic system, and a water supply well if needed?

One acre of land with suitable soils and suitable topography is usually the minimum sufficient area. However, much larger lots are frequently needed where soil and site conditions are not as good. There must be enough land so that your well and all neighbors' wells can be 100 feet or further from the septic system. There must also be enough land for a "repair area" that can be used if the system needs expansion or repair in the future.

Are parts of the land rocky?

Bedrock would interfere with the installation and operation of a septic system.

Is the land next to a stream or river that could flood?

Does the land seem wet and swampy?

Are there gullies, ravines, excessively steep slopes, or other topographic problems that would make it difficult to install a system?

Determine Soil Characteristics Of The Site

If you do not observe any obvious site problems, you may wish to determine the soil characteristics of the site.

Most counties have soil survey reports available at local Cooperative Extension Service or Soil Conservation Service offices. You can use this report to help screen land parcels and focus your efforts upon those lots that have the most desirable soil and site characteristics. The county soil survey report shows soil characteristics such as soil permeability, depth of seasonal high water table or bedrock, and slope.

Soil Permeability. The rate of movement of water and air through a soil is called soil permeability and is an important factor in determining how well an absorption system will function. Soil permeability should be moderate to rapid.

The amount of sand, silt, and clay in the soil influences soil permeability. Water moves faster through sandy soils than through clay soils. However, locating an absorption field in a sandy or gravelly soil is not recommended. If the sandy soil is too thin, the wastewater will not be adequately filtered before it enters the groundwater. Similarly, locating an absorption field in a soil having a high clay content is not recommended because of the slow permeability. If the clay soil is too tight, the wastewater will not be absorbed and will be forced to the surface.

Depth Of Seasonal High Water Table. The groundwater table, bedrock, or impervious soil layer should be at least 4 feet below the absorption trenches. At least 4 feet of permeable soil is needed for adequate filtration and purification. In sandy or gravelly soils,

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additional depth to the water table will help prevent contamination.

An area subject to flooding should never be used for soil absorption fields. Occasional flooding reduces the efficiency of the system while frequent flooding could destroy its effectiveness as well as contaminate surface water.

Slope. The soil slope should be less than 15 percent. Where slope exceeds 5 to 6 percent, absorption trenches can be placed on the contour.

The soil survey report provides very useful planning information; however, it does not provide enough detail to make a decision on land suitability for septic systems. Do not substitute it for an on-site evaluation of soil and site conditions.

Seek Professional Help For On-Site Evaluations

If the soil survey report indicates that most of the soils on your lot are probably suited to the use of septic systems, then a comprehensive on-site investigation must be conducted. For help in evaluating the soil suitability for a building site and septic system, contact your local office of the Soil Conservation Service or the local health department. Professionals may make soil borings or conduct percolation tests at the proposed sites for the house and the septic system to confirm the suitability of the site.

Soil Borings. Evidence of a high seasonal water table in the soil can show up in soil borings. In the spring, the water table can be observed in the boring holes. In the fall, the only evidence of a high seasonal water table may be mottled (spotted or streaked) soil that is colored several shades of red and grey.

Percolation Tests. Percolation, or perk, tests are the most common tests of soil suitability for septic systems. Percolation tests measure the rate of water movement into soils and are generally regarded by many health agencies as the best test available.

Although professionals are required to make the test in order to obtain a permit to install a septic system, you may find it useful to know how perk tests are conducted.

Procedure:

1. Using a post-hole digger, dig a minimum of six holes along the proposed absorption trench. The holes should be 24 to 42 inches deep and from 8 to 12 inches in diameter. Roughen or scratch the inside of the holes to provide a natural surface free of smooth or compacted areas. Remove all loose material and place about 2 inches of coarse sand or fine gravel in the holes to prevent bottom scouring.

Engineering studies have shown that the shape of the percolation rate test hole is not as important to the

test results as prior saturation. For this reason, follow procedures 2 and 3 below explicitly.

2. Fill the holes with clear water and continue to add water until the soil becomes saturated. The minimum saturation time is 4 hours, but overnight is preferable. In soils having high clay content, the test can be expedited by routinely filling all test holes with water the night before the tests are made to allow ample time for soil swelling and saturation. Setting up automatic siphons for refilling the holes may be beneficial. In sandy soils with a low amount of clay, the saturation procedure is not necessary and the test can be made after the water from two fillings has seeped away.

3. After the holes are saturated, measure the rate at which the water surface drops. This can be done by first placing a board horizontally across the hole. Be careful to anchor it in a firm position. Next, add water to a maximum depth of 6 inches over the sand or gravel. Then slide a pointed stick or similar measuring tool straight down until it just touches the water surface. Immediately read the exact time on your watch and draw a horizontal line on the measuring stick using the horizontal board as a guide and reference point.

Repeat the test at 5-minute intervals if the water drops quickly and at 30-minute intervals if the water drops slowly. When at least three spaces between the pencil markings on the measuring stick become relatively equal, which may require as long as 3 or 4 hours, the test is completed.

4. With the aid of a ruler, measure the space between the equal markings and calculate the time required for the water level to drop 1 inch. For example, if the water level fell $\frac{3}{8}$ inch in 5 minutes, the time required for the water level to drop 1 inch would be 13.3 minutes ($5 \text{ minutes} \div \frac{3}{8} \text{ inch} = 13.3 \text{ minutes/inch}$). An average percolation rate for the entire absorption field can then be determined from the percolation rate of each test hole.

If the percolation rate is 60 minutes or more per inch (24 minutes/cm) or if the groundwater table is close to the surface, the soil should be considered unacceptable for a subsurface absorption field. A mound, lagoon, aerator, or other alternative system should be considered in either of these situations.

What are the characteristics of a good site for conventional septic systems? Gently sloping, thick, permeable soils with deep water tables make the best sites. The soil should be a uniform brown, yellow, or bright red, and it should not have spots of gray, which often indicate that it is excessively wet. The soil texture should be neither too sandy nor too clayey, and it should have good aggregation or structure. (That

means a handful of the soil should easily break apart into small aggregates.) Areas that have rock close to the surface, very sticky clays, or soil layers that restrict the downward flow of water should be avoided.

Know State Regulations

State law requires a comprehensive soil and site evaluation by the local health department to determine the suitability of the soils and topography of the lot. State law also requires that an improvement permit be obtained from the local health department before construction begins on the home or the septic system.

A subdivision developer must obtain approval for using septic systems before an area can be opened for housing development. Therefore, when you purchase a lot in a subdivision that does not have sewers, you can usually be assured that septic tank systems will be permitted there. However, you should verify that permission has been obtained for sewage disposal, water supply, and solid waste disposal by checking with the local health department.

If you are looking at property that is not in a subdivision, then check with the local health department. They may have a percolation test and soil boring for the property on file already. If they do not have valid records, then a professional consultant with experience in soils evaluation can help you narrow your decision so that you can have perk tests made on those lots that show the greatest potential.

Once you buy property, you must submit an Application For A Permit To Install An On-site Sewage Disposal System to your local health department. If the local health department does not have a valid percolation test and soil boring on file for your lot, you will be required to have the soil tests performed. The soil tests must be performed and signed by an engineer, land surveyor, or soil classifier. These tests will show whether the soil is able to properly filter and dispose of household wastes. If the application is complete and the test results are acceptable, you will receive an approved Permit To Install. Upon receipt of this permit your contractor or installer can then install your septic system.

The septic system installation must be approved by the health department before electrical service can be permanently connected to the home and the septic system put into use. If your septic system malfunctions you must obtain a permit from the local health department prior to doing any repair work or addition to the septic system.

Conclusion

Don't buy land until you've investigated the site, determined soil characteristics, and made on-site evaluations. Just because adjacent land is apparently suitable for an on-site sewage disposal system does not necessarily mean yours will be. Soils can change within a short distance, and many sites are not suitable for on-site sewage disposal systems. It's cheaper to check before you buy.

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To obtain the state sewage code or the Environmental Protection Agency publication, "On-Site Treatment And Disposal Systems" (EPA 625/2-81-013), write to the following: Alabama Department of Public Health, Division of Community Environmental Protection, Onsite Sewage Branch, State Office Building, 434 Monroe Street, Montgomery, AL 36130-1701 or U.S. Environmental Protection Agency, Center for Environmental Research Information, Cincinnati, OH 45268.



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For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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