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The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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Septic System Basics for Home Builders

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http://osufacts.okstate.edu

When someone decides to build a house, they need to contact a homebuilder who has a reputation of building good quality houses within budget and who could provide solid advice regarding all aspects of the homebuilding process. As the client and homebuilder deliberate details about the house, particular attention are often given to kitchen and lighting features, storage space, façade design, counter-top material, backsplash color and bathroom fixtures, among others. However, household waste treatment features, like septic systems, are seldom discussed in great detail.

Often, the client would rely on advice and information given by homebuilders to come up with decisions about their house. Ideally, details regarding the type of septic system permitted in the property, additional expenses for soil and site characterization, designating an area for possible septic system repair and the associated costs involved in all of these should be included in the client-homebuilder discussions. For example, if the land would require a very expensive septic system (say $10,000), it is best if the builder can advise the client about this detail so it can be considered in possibly making adjustments in house design to keep within budget.

This Fact Sheet will focus on the following key topics that are useful to homebuilders and their clients: 1) homebuilder responsibilities; 2) important site and soil properties; and 3) various permissible systems.

Homebuilder Responsibilities

The homebuilder is the primary source of information and professional advice concerning any aspect of the house – including septic systems. In our opinion, the following are the septic system-related responsibilities of the home builder:

Inform the client about the process associated with the filing of permits and all steps involved until the system is installed

Homebuilders are not expected to file the permits themselves, but they are expected to inform the client about the process of getting an installation permit and the amount of time that should be allocated to it. Ideally, the builder should be able to refer clients to a State-certified installer and a licensed soil profiler. In some cases, a percolation test (a test measuring the rate of downward water flow through the soil) may need to be done. It should also be noted that many municipalities in Oklahoma require a soil test report before issuing a building permit.

A list of State-certified installers can be found at: www.ocia.s5.com/custom.html or http://www.deq.state.ok.us/ECLSNew/CertInstallers/certInstallers.htm. The list of licensed soil profilers could be accessed at http://www.deq.state.ok.us/ECLSNew/On-site/soilprofilers.htm or inquire from the local DEQ office.

Homebuilders should inform the client of the juncture in the homebuilding process when the septic system needs to be installed. This is critical so the client can prepare for the associated expense. ***Note:*** The septic system installer will take care of the installation permit application.

Inform clients on the probable types of systems that may be installed in the area, as well as the cost and time needed for system installation

There are six types of systems permitted in the State. The various types of systems permitted in the State will be discussed later. Some systems rely heavily on gravity and the soil to accomplish the dispersal and treatment of the wastewater, while others require electricity and involve mechanical parts driven by complex electronics. All of these systems require up-keep by homeowners and involve some expense when needing periodic maintenance and repairs by professionals.

Cost for installation varies widely, depending upon the type of system, location and site properties. Homebuilders are advised to check with a local installer for the range of installation cost applicable for the area. Table 1 shows the estimated time required for installation of the various On-site Wastewater Treatment Systems (OWTS).

Table 1. Estimated time required for installation of various OWTS designed for a two-bedroom house that produced 200 gallons of wastewater per day.

On-site Wastewater Treatment System	*Installation Time*
Conventional System	1-2 days
Shallow Extended Subsurface Absorption Field	1-2 days
Low Pressure Dosing System	1-2 days
Evapotranspiration/Absorption System	1-2 days
Lagoon System	2 days
Aerobic Treatment System	1 day

Site and Soil Properties

Site and soil properties eventually determines the type of OWTS that can be installed in the area. The homebuilder should identify the location within the property best for the house, taking into consideration the requirements for OWTS installation.

Minimum Lot Size

The homebuilder needs to ascertain whether the property has enough space for both the house and the OWTS. At least 10,000 square feet should be allocated for OWTS installation in the general installation area. In addition, the area should be accessible to the installers and the equipment needed in earth-working activities related to the installation.

If public water would be used in the house, the minimum size for a residential lot that needs an OWTS is one-half acre. If a drinking water well needs to be installed in the area, then a minimum lot size of three-fourths acre would be required.

Area for Repair

Apart from the area allocated for OWTS installation, enough area should be designated as "repair area." This is the area where dispersal lines will be installed in case the first system installed would fail.

Soil Profile Evaluation

Only State-certified soil profilers can perform soil profile descriptions. However, it is ideal if the homebuilder can understand the soil profile description report so they can explain to the client the OWTS cost and installation timing implications of having certain types of soils in the area. Refer to Extension Fact Sheet PSS-2271, *Soil-based Septic System Decisions in Oklahoma* for more details.

Landscape Position

Areas in the property where surface runoff would tend to pass through or could be collected should not be used as effluent dispersal site. Make sure the effluent dispersal area is not in a floodplain. In addition, the toe slope of a sloping area is not a good location for installation of the OWTS, because, aside from being an area that collects runoff, the water table also tends to be shallow underneath it.

Other Site Considerations

Slope: Sloping areas could still be used for installation of OWTS. However, installation of OWTS in relatively flat areas is easier for installers and would not require major earth work. As rule of thumb, areas with a slope greater than 10 percent are undesirable areas for the installation of OWTS.

Proximity to protected water body: Home builders should determine if the property is within the Water Body Protection area as described in the Oklahoma DEQ Rules. If the chosen effluent dispersal area is in Zone 1 (660 feet) or Zone 2 (1,320 feet) from a streambed, advanced systems with a nitrate-reduction component would be required. This means the homeowner is going to pay more for the OWTS. To determine whether the property is within a water body protection area, check with your local DEQ office or go to http://gis.deq.ok.gov/flexviewer/.

Subdivision restrictions/codes: If the property is in a housing subdivision, it best practice to double-check if the Subdivision Covenant Agreement has restrictions about septic systems or not (e.g. a provision stating that spray dispersal systems are not allowed).

Permissible Systems in Oklahoma

Conventional System

The conventional system is the most widely-used and least expensive type of on-site wastewater treatment system. It has two main components: 1) the septic tank and 2) the soil treatment area (STA). This is the preferred system in sites with deep, good soils (loamy sands, loam, clay loam, sandy clay) that meet STA size requirements. This system relies on the soil for wastewater treatment and on gravity for the distribution of wastewater throughout the STA. Well-maintained conventional systems could stay effective for more than 20 years.

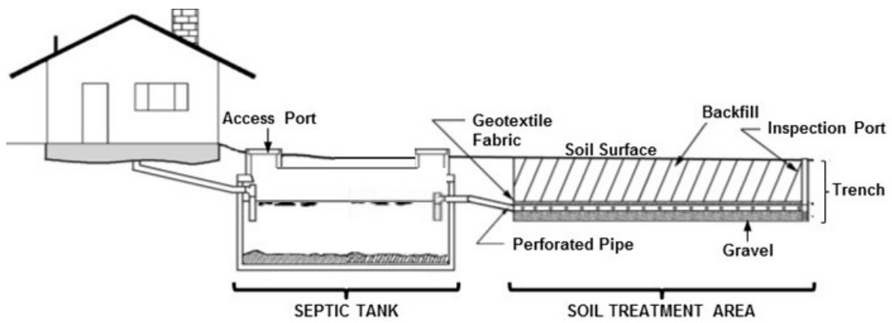

Figure 1. Schematic illustration of a conventional septic system.

Low Pressure Dosing (LPD) System

The low pressure dosing system is similar to the conventional system except that it has a pump tank. It is used in sites with slight limitations related to soil texture, soil thickness and area size. For example, it is used in areas with coarse soils (coarse sand or loamy coarse sand) that do not meet the land area size requirement of a conventional system.

Pressure generated in the pump tank is used to evenly apply the effluent throughout the entire soil treatment area. Because of the even effluent dispersal, the use of the STA is maximized – compensating for soil- and site-related limitations.

Evapotranspiration/Absorption System (ET/A)

The ET/A system is another option for areas with fine-textured soils (high clay content). This system is a particularly good option in areas where evapotranspiration exceeds precipitation. This system requires one acre as the minimum lot size. In Oklahoma, this would be more suited in areas west of Interstate 35 (e.g. the panhandle) than in the southeast.

Aerobic Treatment System

The aerobic treatment system is currently very popular in Oklahoma. It is used in areas with major limitations regarding soil texture, soil thickness, slope and other site limitations. It has an aeration tank wherein the wastewater is bubbled with atmospheric air (has about 20 percent oxygen). The introduction of oxygen significantly enhances microbial activity, which in turn, improves wastewater treatment prior to land application. Effluent may be dispersed by subsurface drip lines or may be surface-applied by a spray irrigation system. Surface-applied effluent is pre-treated with bleach. This system will need a lot more maintenance than other systems.

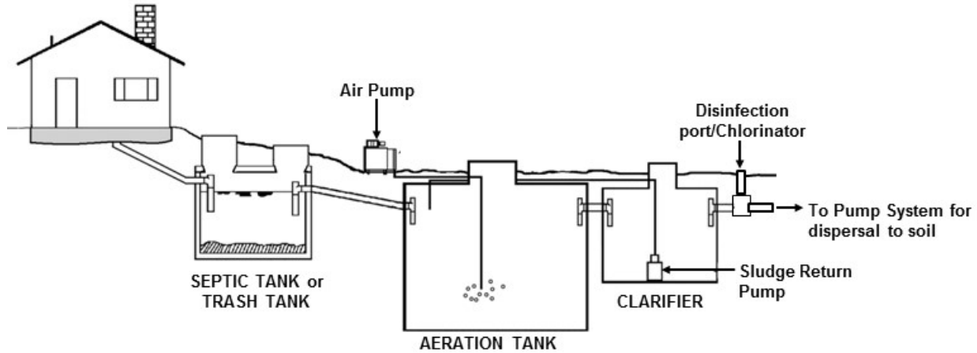

Figure 2. Schematic illustration of an aerobic treatment system. Other variations of this system involve a single large tank divided into three compartments/smaller tanks namely: 1) the trash tank, 2) the aeration tank and 3) the pump tank.

Treatment Lagoon

Treatment lagoons are good alternatives in areas where evaporation exceeds total precipitation. It relies on evaporation as a mode of disposal of wastewater. This system uses an open pond as the storage/evaporative area and a septic tank for pre-treatment of wastewater. Lagoons are permitted on any type of soil that has a lot size of at least two and a half acres.

Alternative Systems

There are instances when none of the systems described earlier can be allowed or is practical. In these instances, an alternative OWTS is needed. For additional information concerning the types of alternative systems available and the application/approval process for alternative systems, please contact your local DEQ office or call 405-702-6100.

For more detailed discussions about the various OWTS permissible in Oklahoma, refer to Extension Fact Sheet PSS-2913, *On-site Wastewater Treatment Systems Permitted in Oklahoma*.