

DOMESTIC WASTEWATER MANAGEMENT



INFORMATION AND OPTIONS FOR HOMEOWNERS

DOMESTIC ON-SITE WASTEWATER MANAGEMENT

WHAT IS WASTEWATER AND WHY BE CONCERNED?

Many of our daily chores such as bathing, doing laundry, flushing toilets, preparing meals, washing dishes and other activities generate wastewater. Few people give thought to where wastewater goes after it disappears down the drain. Domestic wastewater (i.e. sewage) must be properly treated because it contains excessive nutrients, harmful bacteria/viruses and household chemicals that may contaminate the land and waters of our state and threaten public health. In the U.S., we are fortunate to have the technology and the resources available to properly treat our wastewater.



POSSIBLE DISEASES FOUND IN WASTEWATER

PARASITES

- Beef Tapeworms
- Pork Tapeworms
- Fish Tapeworms
- Giardia lamblia
- Cryptosporidium species

BACTERIA

- Salmonella
- Vibrio cholera
- Escherichia coli
- Bacillus cereus
- Shigella species

VIRUSES

- Polio
- Hepatitis A
- Rotavirus
- Enterovirus

WASTEWATER TREATMENT: PUBLIC OR INDIVIDUAL (ON-SITE)

In heavily populated areas both domestic and commercial wastewater is treated using a central collection and treatment system. Individual residences, subdivisions and even entire cities and towns use this type of

wastewater collection and treatment system. The wastewater is transported, via a collection system, from its origin to a central location where it is treated and disposed of in compliance with state and federal regulations.

Central collection and treatment can be cost prohibitive in rural and/or less populated areas. In these areas, individual on-site sewage disposal systems are commonly used to treat and dispose of household wastewater.

ON-SITE WASTEWATER TREATMENT

In the United States, it has been estimated that there are more than 75 million residential on-site sewage disposal systems in use. The average household uses 300 gallons of water per day, which equates to more than 22 billion gallons of wastewater being treated and disposed of in on-site sewage disposal systems per day.

SITE SPECIFIC

Each on-site sewage disposal system is designed for a specific site and a specific

volume of wastewater. Each site is different and must be evaluated individually. Site evaluation information includes: soil conditions, topography, lot size and location, estimated water usage, depth of the groundwater tables, seasonal high water tables, water-well locations (yours and your neighbors'), location of creeks, rivers, springs, ponds and lakes, or other factors that may affect the type of system you select. It is possible that no system can be approved if



adverse environmental and/or physical conditions exist on the site.

Soil conditions are determined by conducting a soil percolation test or soil profile description. Your local DEQ office or a qualified private consultant can conduct these services for you.

FACTORS TO CONSIDER IN SELECTING A SYSTEM

- Cost (Initial and Operation/Maintenance)
- Soil Conditions
- Estimated Water Usage
- Lot Size and Location
- Topography
- Groundwater Tables
- Well Location (When Applicable)
- Location of Other Water (Creeks, Rivers, Springs, Ponds and etc.)
- Ability to Maintain Future Use

COMPONENTS OF ON-SITE SEWAGE DISPOSAL SYSTEMS

It takes both primary treatment and secondary treatment combined to make a properly designed on-site sewage disposal system.

PRIMARY TREATMENT

Primary treatment is the initial process in which the solids are removed from the liquids through settling. The two types of primary treatment allowed in Oklahoma are the septic tank and the equalization tank for the aerobic system.

SEPTIC TANKS

Nationwide, septic tanks are the most common primary treatment method used for on-site sewage disposal systems. Septic tanks can be made of pre-cast concrete, fiberglass or plastic. Septic tanks must have a minimum capacity of 1,000 gallons. They are made in different shapes and sizes to accommodate different sites.

The septic tank receives household wastewater and helps the liquid wastes to separate from the solid wastes. The heavier solids settle to the



bottom while the lighter solids (greases, etc.) float to the surface of the tank. The liquids (effluent) from the septic tank then discharge into a secondary treatment system.

All DEQ approved secondary treatments methods, except aerobic/surface application, utilize septic tanks for primary treatment.

EQUALIZATION TANKS

Equalization tanks provide the primary treatment for wastewater entering aerobic systems. As with septic tanks, the job of the equalization tank is to separate the solids from the liquids. It also equalizes the strength of the sewage entering the aerobic treatment unit.

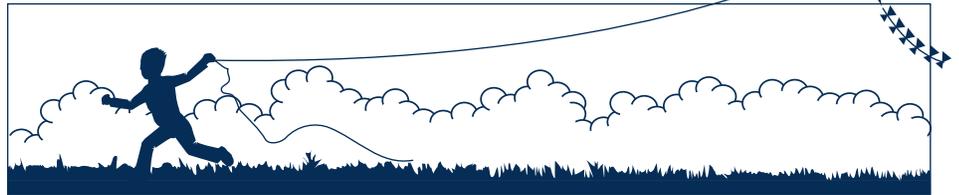
Equalization tanks must have a minimum capacity of 300 gallons and maximum capacity of 1,000 gallons.

COMPONENTS OF ON-SITE SEWAGE DISPOSAL SYSTEMS

SECONDARY TREATMENT

Secondary treatment is the biological breakdown of the remaining organic matter in the effluent after primary treatment. Secondary treatment reduces the pollutants and pathogens in the effluent prior to disposal.

There are several types of secondary treatment systems available for use in Oklahoma: Subsurface Absorption Fields, ETA Systems, Lagoons, Aerobic Systems and other approved alternative systems



including Constructed Wetlands.

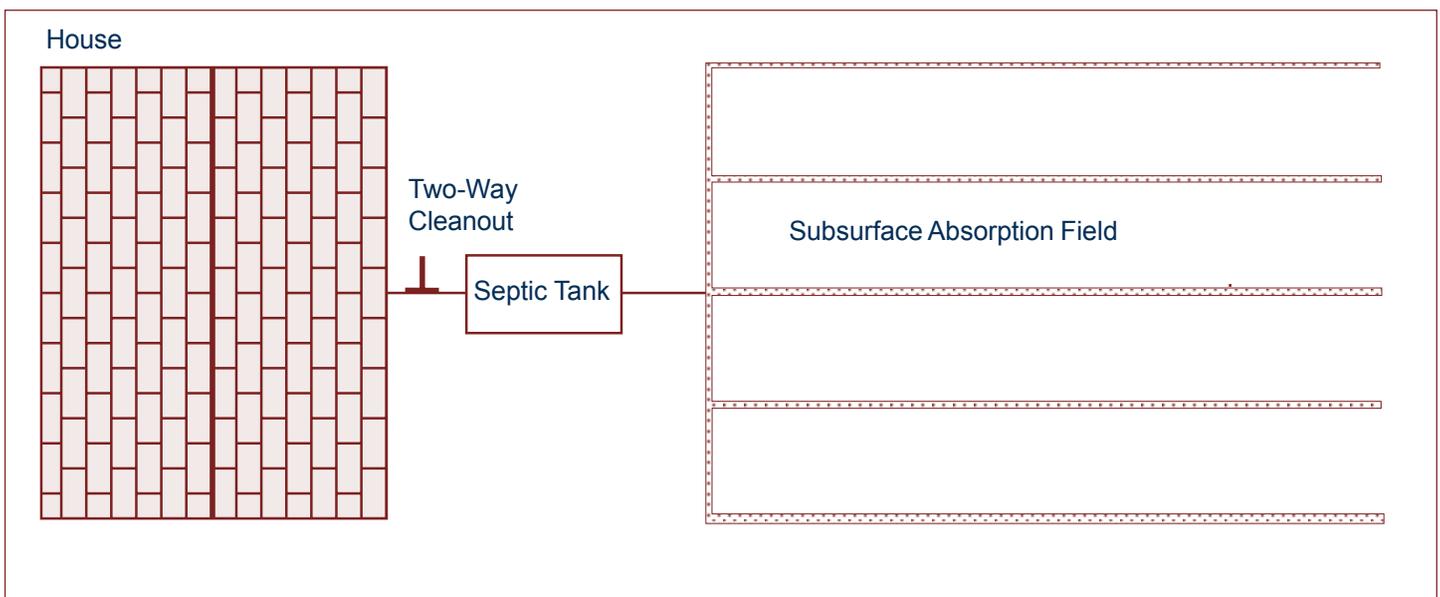
SUBSURFACE ABSORPTION FIELDS

The most common on-site wastewater disposal method is the subsurface absorption field. It consists of a network of shallow trenches filled with an absorption media (usually rock,

gravel or other similar material). The gravel surrounds perforated pipe and is covered with the excavated native soil.

Effluent from the septic tank slowly trickles through the pipes into the absorption media where it is stored. The effluent is gradually absorbed into the soil. The effluent is filtered and cleansed by the soil and natural

TYPICAL ON-SITE SEWAGE DISPOSAL SYSTEM



bacteria. This type of disposal is totally dependent on the soil's permeability (its ability to absorb water). Subsurface absorption fields do not work well in tight or high clay content soils.

EVAPORATION- TRANSPIRATION/ ABSORPTION (ETA) SYSTEMS

ETA systems are generally used in tight clay soil. The trench construction is the same as the subsurface absorption field with the exception of the backfill material. Instead of being used as backfill, the excavated native soil (clay) must be removed. The trench is back filled with sand instead of the clay and then capped with two to four inches of new topsoil. The wastewater wicks upward through the sand where it can evaporate and/or be utilized by vegetation.

Like the typical subsurface absorption field, ETA systems are sized according to water usage and location. However, they are required to be much

larger than subsurface absorption fields. The use of the ETA system is not recommended in areas of high rainfall and low evaporation.

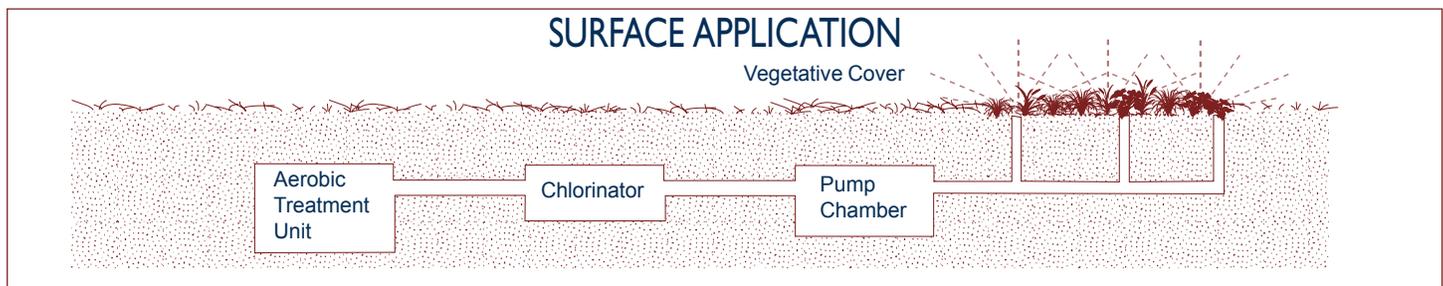
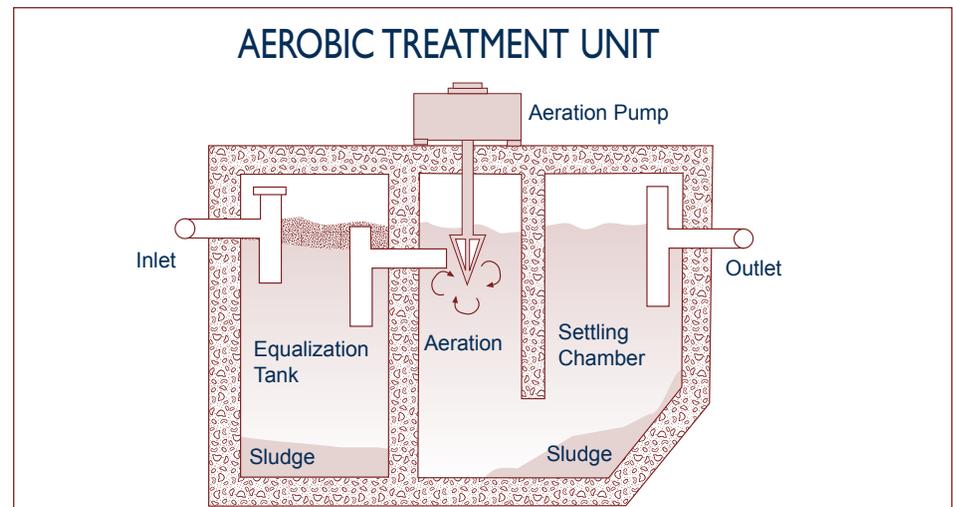
LAGOONS (OXIDATION PONDS)

A Lagoon is a shallow total retention, pond-like structure in which the effluent is exposed to sunlight and oxygen that enables aerobic bacteria to digest the organic matter. Lagoons are sized based upon local rainfall and evaporation rates. A properly sized lagoon will have no discharge to the

environment since the volume of the wastewater is reduced through evaporation. This type of system is very effective and relatively easy to maintain; however, it requires a large lot or site for construction.

AEROBIC SYSTEMS WITH SURFACE APPLICATION

Aerobic systems consist of an aerobic treatment unit with surface application of the treated effluent. Aerobic treatment units are used primarily when environmental conditions preclude the use of subsurface absorption fields. Treatment occurs when air is



SECONDARY TREATMENT CONTINUED

AEROBIC SYSTEMS WITH SURFACE APPLICATION CONTINUED

injected into the wastewater to promote biological breakdown of the organic matter. Chlorination completes the treatment prior to disposal.

While for most on-site sewage disposal systems the secondary treatment also accomplishes disposal, this is not true for aerobic systems. The aerobic treatment process produces a high quality effluent that still requires disposal. This high quality effluent may be applied directly to lawns through a timed



sprinkler system that sprays the effluent over a large vegetated area at night. Most of this water will evaporate and the rest will be absorbed and utilized by the vegetation.

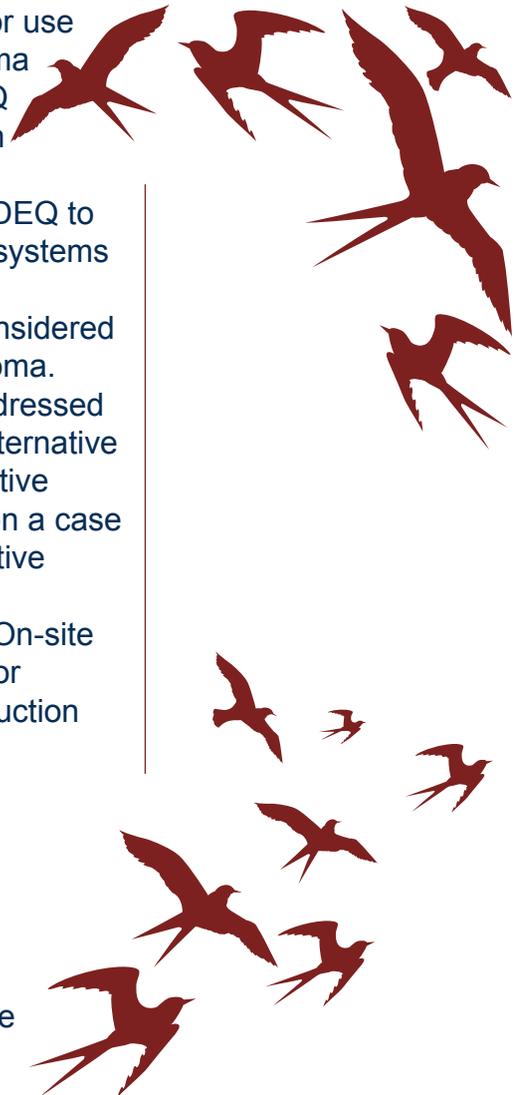
ALTERNATIVE SYSTEMS

Requirements for on-site sewage disposal systems that have been approved for use by the DEQ in Oklahoma are outlined in the DEQ regulations. Included in the regulations is provision allowing the DEQ to consider and approve systems not addressed in the regulations that are considered experimental in Oklahoma. These systems are addressed in the regulations as alternative systems. Each alternative system is considered on a case by case basis. Alternative system plans must be submitted to the DEQ On-site Systems Coordinator for approval before construction begins.

CONSTRUCTED WETLANDS

One example of an alternative system is the constructed wetland

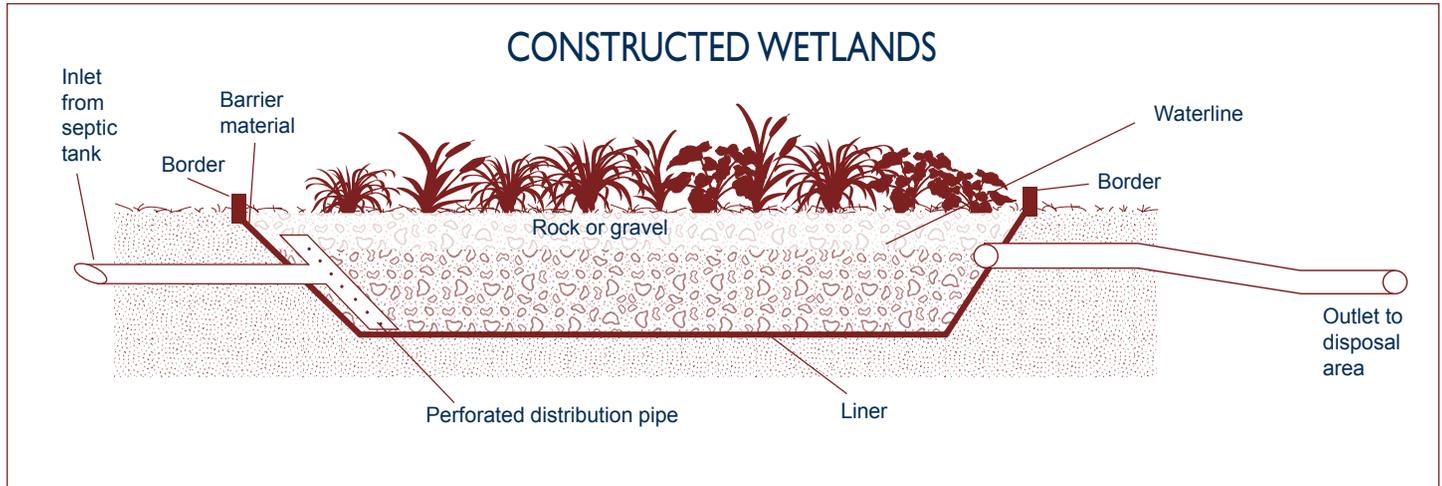
system. Constructed wetlands are an effective and relatively low maintenance method of providing on-site wastewater treatment and disposal. These units consist of various sized beds that are lined with a synthetic liner, filled with filter material, usually gravel (non-limestone) or similar material, and planted with common wetland plants.



Effluent from the septic tank flows through the entire filter bed where plant roots and associated microorganisms living on the roots and gravel surfaces remove pathogens and nutrients from the

wastewater. Any effluent not removed by the plants is usually disposed of using subsurface absorption fields but may be disposed of using surface application.

Constructed wetlands are considered an alternative system in Oklahoma and must be approved by DEQ's On-site Sewage Systems Coordinator before beginning construction.



OTHER CONSIDERATIONS

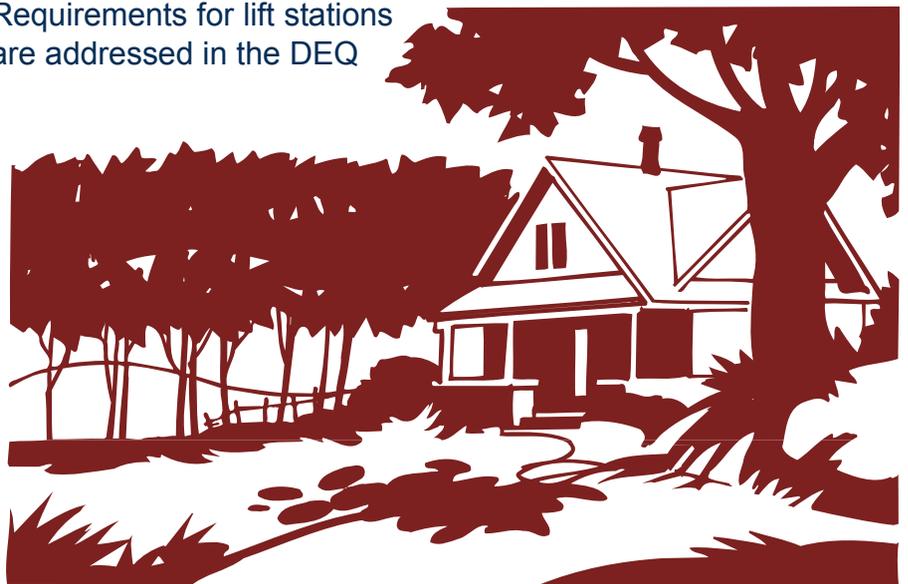
LIFT STATIONS (PUMP TANKS)

Ideally wastewater flows by gravity from the primary treatment unit to the secondary treatment system. In situations where the secondary treatment system is located at a higher elevation than the primary treatment unit, the effluent flows into a lift station that will pump the effluent to the higher elevation.

The lift station has a pump with a float control that turns it on and off. When the lift station reaches a certain capacity, the float control turns the pump on

to automatically pump the effluent to the secondary treatment system. Requirements for lift stations are addressed in the DEQ

regulations.



WATER CONSERVATION

There is always a limit to how much and how quickly nature can recycle wastewater. Most residential on-site sewage disposal systems are designed to treat and dispose of less than 8,000 gallons per month. It is imperative to practice good water conservation to insure that your on-site sewage disposal system can efficiently and effectively treat wastewater.

You should always contact your local DEQ office if you have any questions regarding on-site sewage disposal.

DEQ has other publications available that provide more detailed information regarding AEROBIC SURFACE APPLICATION, CONSTRUCTED WETLANDS, LAGOONS (OXIDATION PONDS), SEPTIC TANKS and SUBSURFACE ON-SITE DISPOSAL SYSTEMS. These brochures and the Oklahoma Regulations (Oklahoma Administrative Code (OAC) 252:641) governing INDIVIDUAL AND SMALL PUBLIC ON-SITE SEWAGE DISPOSAL can be obtained free of charge from your local or state DEQ office. (See the back of this brochure for a list of phone numbers.)

WAYS TO REDUCE HOUSEHOLD WATER USAGE

- Use low flow faucets, shower heads and toilets
- Repair dripping faucets and leaking toilets
- Run your dishwasher only when it's full
- Adjust water level in your washing machine to fit the size of the load
- Limit shower time and bathtub levels

WHO TO CONTACT FOR INFORMATION REGARDING DOMESTIC WASTEWATER TREATMENT SYSTEMS

DOMESTIC SEWAGE REGULATIONS

Your local DEQ office*

DEQ Small system coordinator (405) 702-6222

Customer Services (800) 869-1400

DETERMINING YOUR SOIL'S SUITABILITY FOR A PARTICULAR SYSTEM

Your local DEQ office*

Private consultants (i.e. Registered-Environmental Specialists, Sanitarians, Engineers, and Land Surveyors)

Soil Conservation maps for general information

HOW ON-SITE SYSTEMS WORK

Your local DEQ office*

DEQ Small system coordinator (405) 702-6222

PROBLEMS WITH YOUR ON-SITE SYSTEM

Your local DEQ office*

DEQ Small system coordinator (405) 702-6222

Private consultants (i.e. Registered-Environmental Specialists, Sanitarians, Engineers, and Land Surveyors)

INFORMATION REGARDING LOCATION AND DESIGN SPECIFICS OF YOUR ON-SITE SYSTEM

Your local DEQ office*

FOR INFORMATION REGARDING ANY TYPE OF ON-SITE SYSTEM,
PLEASE CONTACT YOUR LOCAL DEQ OFFICE*
VISIT OUR WEB SITE AT: www.deq.state.ok.us

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL COMPLAINTS AND LOCAL SERVICES

P.O. Box 1677

Oklahoma City, OK 73101-1677

(405) 702-6222

or 1-800-522-0206

* For the phone number or location of your local DEQ office, consult your local telephone directory or call: (405) 702-6222.

