

Boone County Guide to Onsite Wastewater Treatment Systems and Soil Properties



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Introduction

The purpose of this publication is to provide information about installing onsite wastewater treatment systems in Boone County, Missouri. While public sewers are available in many areas, 40% of residential areas, communities and commercial businesses in the United States are served by onsite systems. Boone County has an ordinance that specifies the type of systems that can be installed. This ordinance provides the minimum requirements for each system. However, the type of system that is ultimately installed depends on variable factors such as soil properties, site selection and the size of the home that will be served.

Household domestic waste includes wastewater that we flush down the toilet, the water that we rinse down the sink and tub and the water that runs through the dishwasher. Household wastewater must be disposed of properly because it contains bacteria and viruses that can cause illness and contains high concentrations of nutrients that can have negative effects on the environment. Examples of diseases that can be contracted from sewage include hepatitis A, cholera, salmonellosis, shigellosis, typhoid fever, giardia and cryptosporidiosis.

Onsite wastewater treatment technology has advanced significantly in the last decade. In addition, our understanding of the variables that effect how systems perform has also improved. Soil properties and site conditions vary greatly throughout our landscape. In Boone County, there are certain site limitations that are encountered regularly. These limitations, including methods to overcome them, are discussed in this publication. This document is presented with the goal of providing the information in a form that is easily understood by the general public.

Regulations

Across the state of Missouri, various agencies have jurisdiction over the regulation of wastewater. Wastewater amounts that exceed 3,000 gallons per day or types generated by commercial processes are regulated by the Missouri Department of Natural Resources (MDNR). The type and amount of wastewater generated by a single-family home is usually regulated by the Health Department. Depending on the county the property is located in, the Health Department could be the county or city Health Department or the Missouri Department of Health and Senior Services (MDHSS).

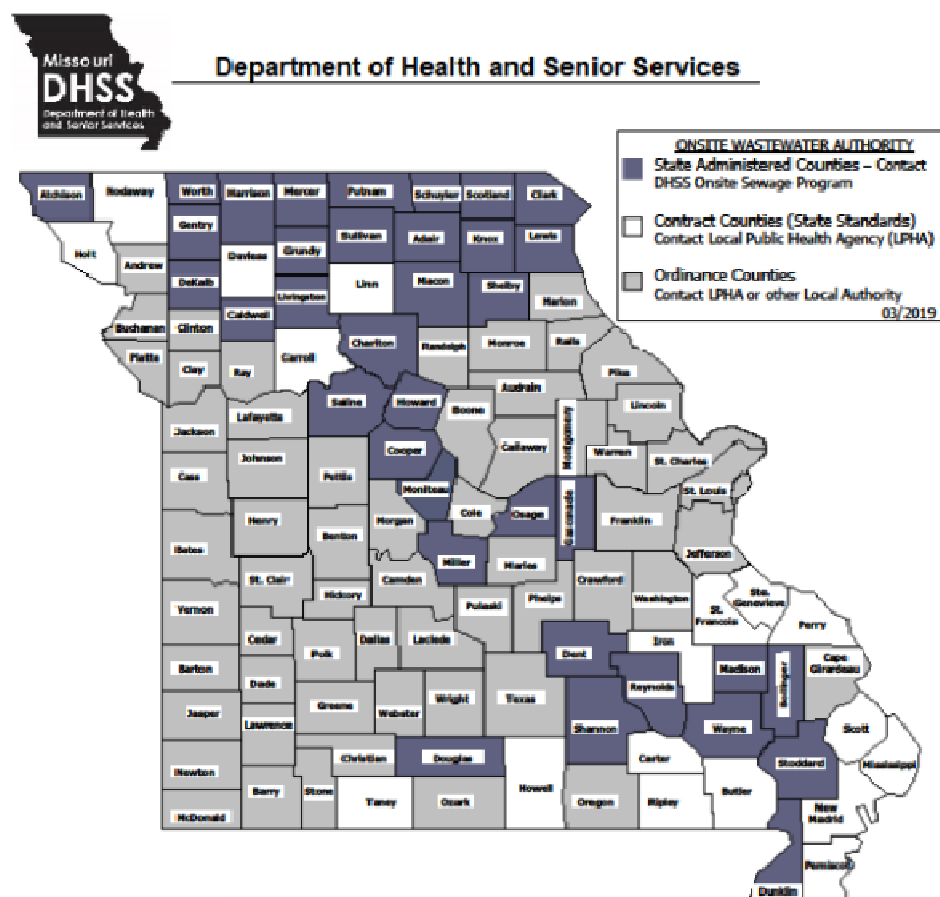
Missouri Department of Natural Resources (MDNR)

The Missouri Department of Natural Resources has jurisdictional responsibility for wastewater systems designed to treat more than 3,000 gallons per day of wastewater flow. MDNR also regulates lagoons that serve any type of facility other than a single family dwelling. In other words, if there is more than one home connected to a lagoon or if there is a multiple family dwelling connected to a lagoon, MDNR has regulatory

authority. If a lagoon is to serve a commercial facility with less than 3,000 gallons per day of flow, an MDNR annual permit for that lagoon must be obtained. The MDNR permit application process involves approval by MDNR staff of the design and operation of the lagoon, including sampling of the effluent and application of effluent, and includes an annual permit fee. The alternative to a lagoon for a commercial facility with less than 3,000 per day of wastewater flow is a subsurface disposal system. The Columbia/Boone County Health Department has regulatory authority if this option is chosen.

Missouri Department of Health and Senior Services (MDHSS)

The Missouri Department of Health and Senior Services has jurisdictional authority in counties where there is no local Health Department ordinance or authority. There is a construction permit requirement and associated fee. As of 2019, the map below shows the counties that are regulated by MDHSS. Boone County has a local ordinance, so is not regulated by DHSS.



Local Public Health Agency (LPHA) contact information:
<http://health.mo.gov/living/lpha/lphas.php>

In state administered counties contact:

Onsite Wastewater Treatment Program
 930 Wildwood Dr.
 Jefferson City, MO 65102
 (573) 751-6095
 (573) 526-7377 Fax

Columbia/Boone County Department of Public Health

In 1992, the Boone County Commission passed the “Boone County Code of Health Regulations, Chapter IV: Small On-Site Wastewater Systems”. This Code regulates all onsite wastewater treatment systems installed in Boone County. Prior to installing a system, a construction permit must be purchased from Boone County. The fee for a permit is \$440.00. A permit for an existing home is obtained at the Columbia/Boone County Department of Public Health and Human Service office at 1005 W. Worley Street, Columbia, MO. For new construction, the permit is obtained at the same time the building permit is purchased at the Boone County Resource Management Department. For a newly constructed home, the building permit and wastewater permit are linked. No inspections of the building site can be scheduled until the Health Department has recorded site approval for the sewer system. No occupancy or temporary occupancy approval can be scheduled until the wastewater system has been completely installed and recorded as finalled by the Health Department. No tag electric inspection for a mobile home can be scheduled until the wastewater system has been recorded as finalled by the Health Department.

The first inspection that is conducted for the onsite wastewater system is termed “site approval”. When the Health Department receives the permit, a date and time is scheduled with the owner, the installer or the contractor to meet at the physical site. The type of system and placement of the system must be approved by the Health Department. The next inspection is termed a “construction inspection”. The construction inspection must be scheduled by owner, installer or contractor. This inspection is conducted by the Health Department to verify that the system has been installed to the proper specifications and setback requirements. Depending on the system components and timing of installation, more than one construction inspection may need to be performed. The last inspection, or “final inspection”, is conducted when the system has been completed and is functional. Once the system has a final inspection from the Health Department, a copy of the permit along with maintenance information is sent to the owner in the mail.

Site Selection and System Design

Site selection is a key component of installing an onsite wastewater system that will function properly. The landscape itself can impact a wastewater treatment system. For example, lagoons may not be installed in a flood plain or on slopes exceeding 20%. Lateral fields must not be installed at the bottom of a hill where surface water will collect. All systems have setback requirements to different landscape features that must be met, such as property lines, water lines, water supply wells, etc.

In Boone County, there are several areas that have geological limitations due to the presence of karst topography. Karst topography consists of fractured or soluble limestone with features such as caves, sinkholes and springs. The fractured nature of the rock can allow surface water and contaminants to enter the water table directly.

These areas are designated in Boone County by MDNR and must have onsite systems designed by an engineer. A list of the designated sinkhole areas by township and range can be obtained from the Health Department.

The Role of Soils in Treatment

Soils are the most important component of site selection. Without accurate soil information, an onsite wastewater treatment system will fail, no matter how well it was installed. In Boone County, a large portion of our soils contain high levels of clay. Clay soils are not suitable for conventional septic systems. There are some areas in our county that are known for soils suitable for conventional systems, such as areas of wind-blown glacial soils near the Missouri River bottoms. Boone County also has areas of alluvial soils located in creek and stream floodplain areas that can be suitable for conventional lateral fields.

The most common limiting features to subsurface disposal systems in Boone County soil profiles are perched water tables and high levels of clay. A perched water table is a condition whereby water is held on top of, or “perched” on top of, a layer of soil that does not allow for rapid dispersal of water. If a lateral field is installed in or near this feature, the field will be saturated with ground water and is doomed to failure. In some instances, a curtain drain can be installed to mitigate this limiting feature. For lagoons, high clay content is required. The clay seals the lagoon basin, allowing no water to escape. This is the reason that laterals cannot be installed in clay, as the wastewater will not be able to percolate through the soil.

Types of Onsite Wastewater Treatment Systems

Wastewater Stabilization Ponds (Lagoons)

A wastewater stabilization pond, or lagoon, can provide satisfactory sewage treatment in rural areas where soils are not suited for absorption systems. A lagoon is a small pond that receives wastewater from a home for treatment. The lagoon is three to five feet in depth and the size is determined by the number of bedrooms in the home. A lagoon works to treat domestic sewage by a biological process. Algae, a microscopic plant that lives in the lagoon, works with carbon dioxide and sunlight to produce oxygen. Other microorganisms use this oxygen to digest the sewage. This is why sunlight and good wind action are essential for a lagoon to work properly. Trees must be cleared around a lagoon for this reason. No additives will be necessary to start the biological process. The bacteria from the sewage will be sufficient.

Lagoons may be utilized when there are no significant limitations related to groundwater from their use and the soils have been demonstrated to be impermeable. There shall be a minimum separation distance between the pond bottom and creviced bedrock of three feet. The administrative authority may require a soil morphology when soil conditions are not suitable or are marginal for installation of a lagoon.

Selection of the pond site should consider a clear sweep of the surrounding area by prevailing winds. Heavy timber should be removed for a distance of fifty feet from the water's edge to enhance wind action and prevent shading. Steeply sloping areas should be avoided. The Health Department must issue special approval for sites with a slope greater than 15%. No lagoon can be installed on slopes greater than 20%.

The pond shall be designed on the basis of 440 square feet of water surface area per bedroom at the three foot operating level. Whenever the pond is preceded by a septic tank, the water surface area may be reduced up to a maximum of 20%. If a septic tank is used, schedule 40 pipe must be used for at least 10 feet in and out of the tank, the tank must be level, and there must be two risers to the surface.

Embankments shall be compacted sufficiently to form a stable structure with very little settlement. Soil for the lagoon should consist primarily of clay. Berms must be smooth and well compacted. The minimum width of the top of the berm shall be four feet. The embankment slopes shall not be steeper than three to one (3:1) on the inner and outer slopes. Inner embankment slopes shall not be flatter than four to one (4:1). Outer embankment slopes shall be sufficient to prevent the entrance of surface water into the pond. Freeboard shall be at least 18 inches and preferably 24 inches.

Square or rectangular cells are considered most desirable. Rectangular cells shall have a length not exceeding three times the width. No islands, peninsulas or coves shall be permitted. The floor of the pond shall be stripped of vegetation and leveled to the proper elevation. Organic material removed from the pond area shall not be used in embankment construction.

Embankments should be seeded with a locally hardy grass from the outside toe to one foot above the water line to minimize erosion and facilitate weed control. Alfalfa or similar long-rooted crops which might interfere with the water-holding capacity of the embankment shall not be used. Riprap may be necessary under unusual conditions to provide protection of embankments from erosion.

The minimum grade of pipe that may be used from the house to the lagoon is SDR 35. The line shall have a minimum diameter of four inches and be laid on a firm foundation at a minimum grade of 1/8" per foot. The influent line shall discharge to the center of the lagoon. A cleanout or manhole should be provided in the influent line near the pond embankment. A concrete splash pad three feet square should be placed under the terminus of the pipe. The elevation of the cleanout or manhole bottom should be a minimum of six inches above the high water level in the pond. The operating depth of the lagoon is determined by the outside elevation of the overflow discharge pipe. Cleanouts shall be provided at least every 100 feet.

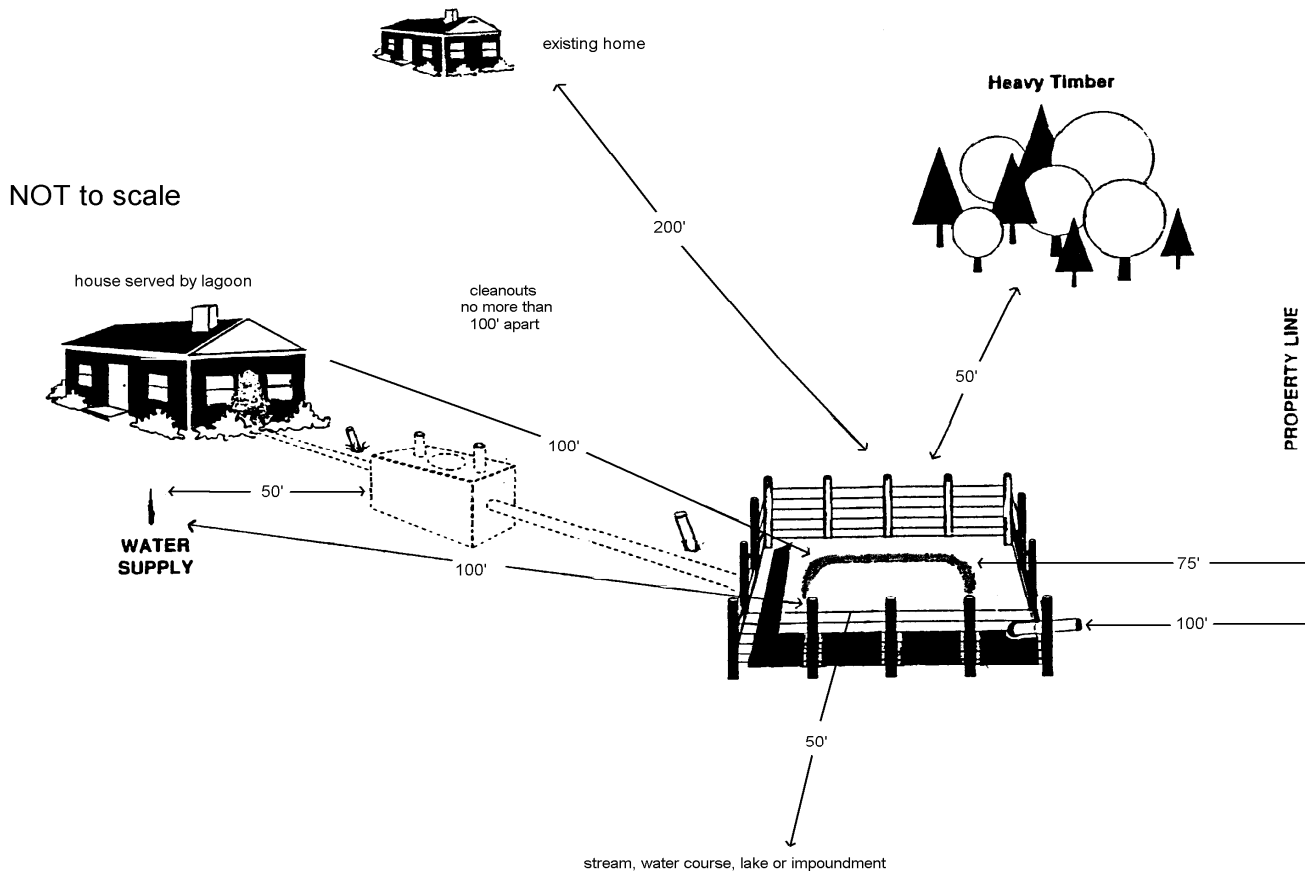
Any effluent should be withdrawn from 6 inches below the water surface. This can be accomplished by placing the outlet pipe 8-10 inches lower on the inlet end than the outlet end of the pipe. Effluent from a pond must be disposed of on the property from

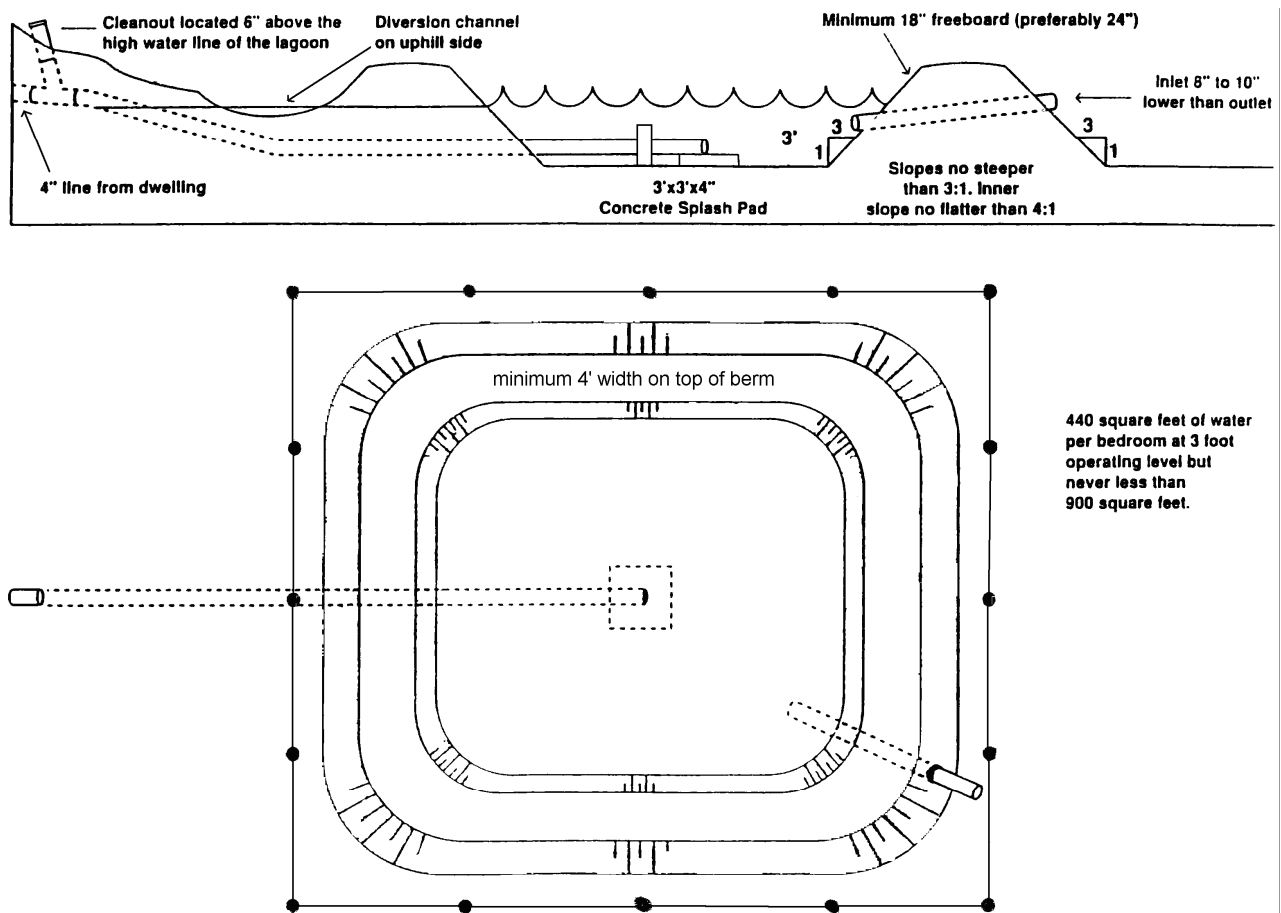
which it originated. This may be accomplished by locating the outlet as far as practical from the property line and out of any natural drainage ditches and swales. The minimum distance from the outlet to a property line shall be 100 feet. Another method is to construct a terraced swale with a minimum length of at least 150 feet.

The pond area shall be enclosed with a four foot high woven or chain link fence to preclude livestock and discourage trespassing. The fence shall be so located to permit mowing of the embankment top and slopes. A gate of sufficient width to accommodate mowing equipment shall be provided. The lagoon fence shall be no closer than the center of the berm to the water's edge. Fence setbacks should not exceed thirty feet from the water's edge. The lagoon fence shall be of sound construction with no gaps or openings along the bottom. The fence shall be welded, woven or chain link material with no smaller than 14 gauge wire. Welded wire requires braced corner posts and a hinged gate.

Fence posts shall be pressure treated wood, galvanized and/or painted steel. Fence posts shall be driven, tamped or set in concrete. Line posts should be at least eighteen inches deep and shall be spaced no more than ten feet apart. Corner posts should be at least twenty-four inches deep and shall be properly braced. Cattle panels can be substituted for welded, woven or chain link material.

A properly hinged four foot high gate of the same or comparable materials shall be installed and provided with an effective locking device. The gate should be 36" - 48" in width to accommodate maintenance and mowing equipment.





Lagoon Minimum Size - all sizes measured at the 3 foot operating level

- 1 or 2 bedrooms = 900 square feet surface area
- 3 bedrooms = 1320 square feet surface area
- 4 bedrooms = 1760 square feet surface area
- allow 440 square feet for each additional bedroom

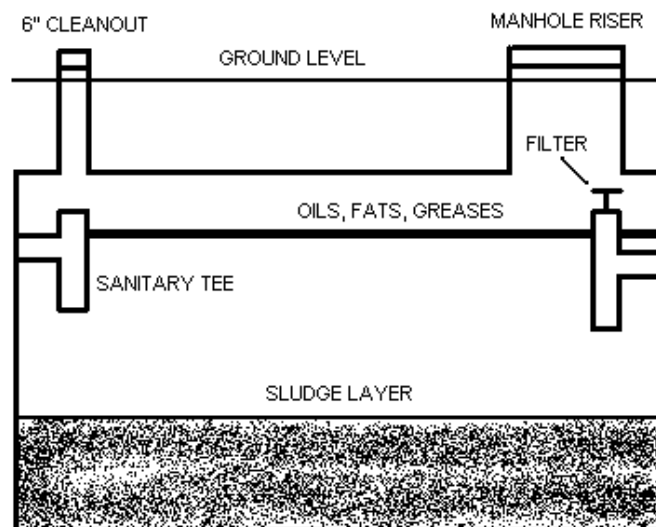
Lagoon Setbacks

- 75 feet from any property line as measured from the water line
- 100 feet from the outlet pipe to the nearest property line over land
- 200 feet from the nearest existing residence
- 100 feet from the residence it serves
- 100 feet from a potable water supply or pump suction line
- 300 feet from any public water supply well (tank or disposal system)
- 50 feet from a stream, water course, lake or impoundment
- 50 feet from any individual water well
- 10 feet from any building
- 500 feet from any sink hole (must be designed and certified by an engineer if in a designated sinkhole area)

Conventional Septic Systems

A conventional septic system is an example of a subsurface disposal system, meaning the effluent travels through a septic tank to a distribution and treatment area that is buried below the surface. A conventional septic system consists of a properly sized septic tank followed by a properly sized lateral field buried 18" to 24" deep. Before considering a conventional septic system, a soil morphology report must be obtained for the site. This is done by contacting a certified soil scientist – a list is available at the Health Department. The soils at the site must be capable of accepting and treating sewage effluent. This is determined by soil properties such as texture, color and type. The size of the lateral field is designed by the Health Department and is based on the number of bedrooms in the home and the loading rate assigned to the soil by the soil scientist. It is very important to avoid unnecessary traffic and compaction of the lateral field area once the area has been designated for the lateral field. Driving over the site can render it unusable and another site may have to be designated.

The septic tank must be set level on a firm foundation and can be made of concrete, fiberglass or plastic as approved. The tank must be watertight. The tank must have sanitary tees or baffles to facilitate in the separation of the sewage into scum, liquid and solids. The tank must have at least one manhole riser and a 6" inspection port to the surface over the inlet and outlet sanitary tee. Another manhole riser can be substituted for the 6" cleanout. All connections must be watertight. A filter in the septic tank is required when preceding a lateral field to prevent solids from entering the laterals. The tank should be placed so that it is accessible for removal of solids by a pumper truck.

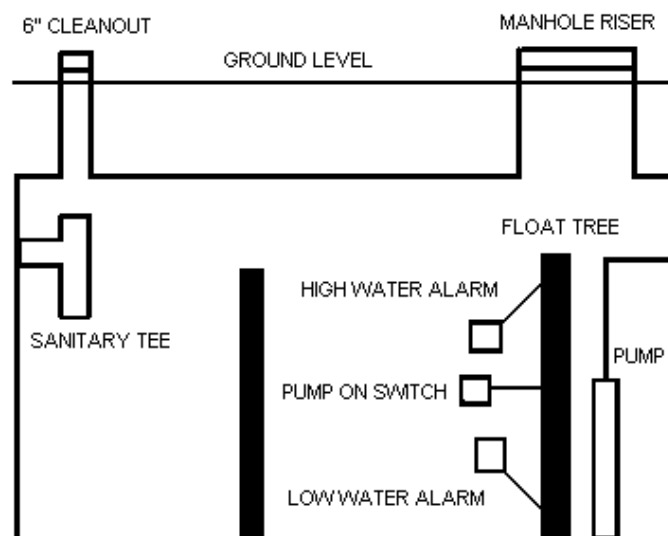


The sewer line from the house to the tank must be a minimum of SDR 35 with a cleanout located between the house and the tank. The lines must have a slope of one 1/8" per foot to the tank and to the trenches. The line into and out of the tank must be schedule 40 for at least ten feet.

Maximum trench length is one hundred feet if gravity is used as the method of distribution. All trenches must be laid level. A transit or laser level must be used to determine the elevations. Trenches must be laid on the contour. Acceptable trenches include gravelless pipe or chambers. In Boone County, gravel pipe systems are not used due to the lack of availability of clean rock. The tubing must be encased in its protective wrap until time of installation. The fabric sock must enclose the pipe in the trench. The maximum trench depth will be determined by the Health Department, but will not exceed 24". It is very important that the trenches be excavated when the soil is dry to prevent smearing of the soil. The trenches must be located three times the trench width or five feet minimum apart on centers. The laterals must be installed in the area that the soils evaluation was taken.

Even distribution to all laterals is key to operation of laterals. This can be done by means of a flow splitter, self leveling distribution box or pumping the effluent to a distribution box or to the laterals directly. Any devices used to distribute the flow of effluent must be set levelly on a firm foundation and be watertight. Of the size of the lateral field exceeds 500 linear feet, a pump is required to dose the lateral field.

There are different ways to install a pump in a conventional septic system. A two compartment septic tank with the pump located in the second compartment is one method. Another method is to install a filtered pump vault in septic tank. You may also use a separate pump tank set and placed in-line after the septic tank.

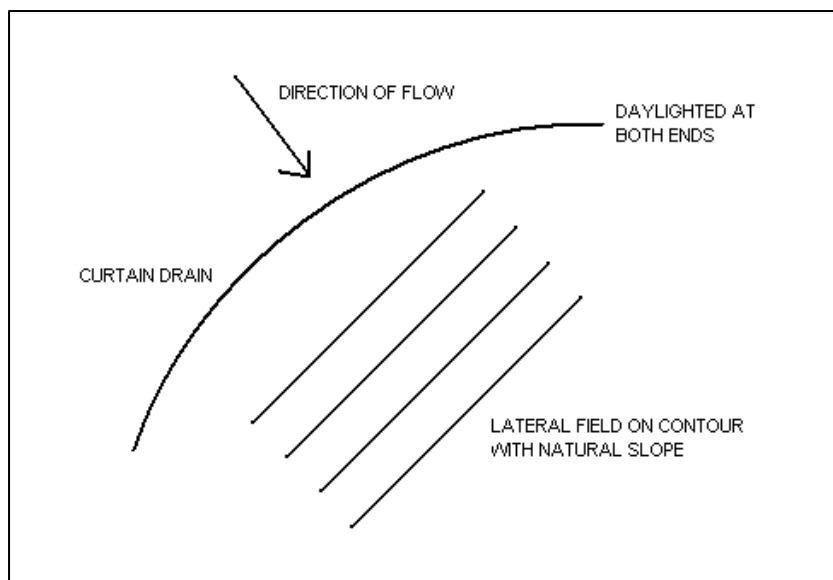
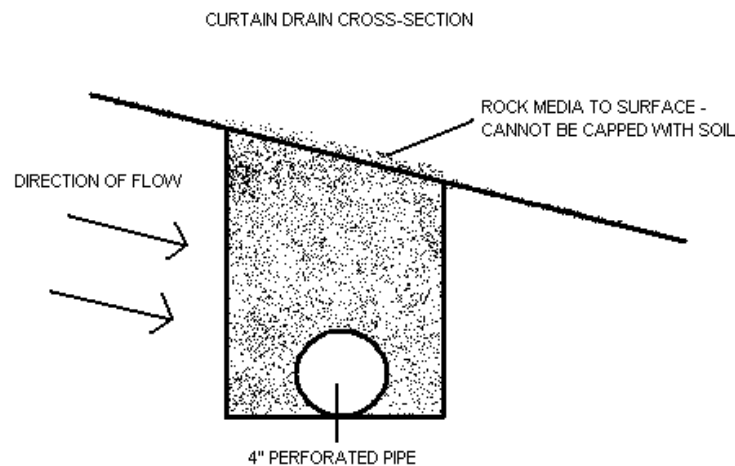


Types of acceptable pumps include:

- effluent pump - high flow, low head pumps that pump liquid and small solids only.
- sewage pump - pumps up to two inch (2") solids.
- turbine pump - pumps liquids only. Liquids must be filtered, pumps low volumes at high heads. Ideal for use in systems that require frequent dosing.

Pumps come in many sizes. A pump dealer can size the pump based on the desired operating pressure, the estimated friction losses, elevation differences and application. Float switches activate pumps to let the pump know when to kick on. The switches work by opening and closing a wire circuit. The activation can be by means of mercury or mechanical means. There should be a control panel when a pump is installed. The panel should have an alarm that will notify the homeowner if there is a failure of the pump.

A curtain drain may be required when there is evidence of a perched water table. The curtain drain will help lower the perched water table by draining the water moving laterally through the soil away from the lateral area. The curtain drain is required to be excavated one foot into the limiting layer, within ten feet of the top line and extend at least ten feet past the laterals to daylight at least on one end. The trench should have a 4" perforated pipe installed in the bottom and be filled to the surface with rock.



Alternative Treatment Systems

Alternative systems are used on sites where conventional systems cannot be installed due to limiting site conditions or soil conditions. They generally contain a higher degree of pretreatment than standard type septic systems. The category “alternative systems” includes many different types of onsite wastewater treatment systems, but there is one thing they all have in common: the system must be designed by a licensed professional engineer. The Health Department recommends that you choose a licensed engineer that is experienced with onsite wastewater. A soil morphology is required and should be submitted with the engineer’s design to the Health Department for approval before the site evaluation is conducted.

Drip Absorption: Drip absorption systems consist of septic tanks with a high degree of pretreatment of the wastewater. The treated wastewater is then pumped to the drip field, which consists of 1” tubing with drip emitters spaced every 2 feet along the dripline. The pretreatment can utilize an aerated treatment unit (ATU) that injects oxygen into the wastewater to facilitate digestion by aerobic organisms. Another method of pretreatment utilizes an artificial media filter over which wastewater is sprayed. Aerobic organisms live on the media and digest wastewater components. Drip lines can be installed by using a vibratory plow or with a trencher. Drip lines are placed 2 feet apart on the contour.

Constructed Wetlands: Constructed wetlands provide secondary levels of treatment, which means that some form of pretreatment (septic tank, aeration tank, lagoon, etc.) must be used prior to the wetland, as wetlands cannot withstand large influxes of suspended solids. The pretreatment used must be capable of removing a large portion of these solids. Effluent from wetlands must be contained on the owner’s property using a reduced lateral field based on the site and soils morphology.

The configuration of a wetland for an individual home should be at least two cells in series. Larger systems may consist of multiple cells in parallel or series in order to provide more management options.

Submerged flow wetlands have channels that are filled with shallow depths of rock, gravel or sand. The depth of the porous media is usually less than eighteen inches. The porous media supports the root systems of the emergent aquatic vegetation. The water level is to be maintained below the top of the porous media so that there is no open water surface. Rock with rounded edges, such as creek gravel, shall be used. Rock must be thoroughly washed to remove fines which may cause plugging. Rock substrate size should be one inch in diameter, while rock to be used around inlet and outlet pipes may be two to four inches in diameter to reduce potential clogging. A three to four inch layer of washed pea gravel may be used on top of the one inch substrate for decorative purposes.

All piping shall be SDR 35 sewer pipe, schedule 40 polyvinyl chloride (PVC) DWV pipe, or material of equivalent or stronger construction. Piping shall be a four inches in

diameter. If effluent from the septic tank flows to the wetland by gravity and there are parallel cells in the wetland, a distribution box shall be placed ahead of the wetland so that flow can be controlled to individual cells. If effluent is pumped, the pumping rate shall not exceed 25 gallons per minute and no more than one-third of the daily flow shall be pumped at one time.

Water level in a wetland shall be controllable. The range of control shall be from two inches above the surface of the rock to complete draining of the wetland. Maximum water level in the wetland shall be a minimum of twelve inches below the outlet of the septic tank so that water does not back up into the septic tank. To conveniently check the water level relative to the gravel surface, a four inch diameter perforated pipe may be placed in the bottom of the wetland, through the channel embankment, and then elbowed up to the elevation of the top of the channel. Water level control may be obtained by use of swivel standpipes or collapsible tubing.

Surface water shall be kept out of the wetland. This may be accomplished by diverting runoff away from the wetland or constructing an earthen berm around the wetland. Berms shall be a minimum of six inches above the surface of the porous media.

The plants in a wetland provide treatment of the wastewater. The plant roots provide surface area for attachment of desirable bacteria and supply oxygen to the bacteria. The roots also transpire water. Selecting plants should be based on the following criteria: ability of the plant to root and grow in the wastewater/rock environment; ability to treat wastewater to acceptable levels; amount of foliage produced which may require management; and appearance. To prevent a loss of plants due to disease, it is recommended that more than one species of plant be supplied for the wetland.

Bulrush and cattail have been frequently used in wetlands. However, both produce large amounts of foliage which may require the homeowner to harvest and dispose of large amounts of organic material. More desirable choices may include soft rush, pickerel rush, arrowhead and horsetail. All have good rooting depths if the total water depth in the wetland is kept at 12 inches or less. Planting is best in early spring but can be done through late summer. The plants need time to become established and produce root mass before winter freezes occur.

Table 11 - Plant Growth Data after one growing season

Plant Species	Wet Weight	Dry Weight	Top Dry	Root Dry	Top/Root	Root Depth
Softstem Bulrush (<i>Scirpus validus</i>)	(lbs./sq. ft.) 9.74	(lbs./sq. ft.) 4.20	3.20	1.00	3.20	(inches) 7.0
Horsetail (<i>Equisetum hyemale</i>)	1.90	0.55	0.20	0.35	0.57	11.0
Water Iris (<i>Iris pseudacorus</i>)	3.28	0.66	0.31	0.35	0.90	8.0
Pickerel Rush (<i>Pontederia cordata</i>)	6.24	1.30	0.50	0.80	0.63	15.0
Arrowhead (<i>Sagittaria latifolia</i>)	2.25	0.35	0.17	0.18	0.94	10.0
Cattails (<i>Typha latifolia</i>)	7.89	3.00	1.90	1.10	1.73	8.0
Soft Rush (<i>Juncus effusus</i>)	3.00	1.05	0.65	0.40	1.62	18.0
Flowering Rush (<i>Butomus umbellatus</i>)	0.30	0.07	0.01	0.06	0.18	12.0

Table 12 - Characteristics of Emergent Aquatic Plants

Plant Species	Bloom Date	Type of Bloom	Bloom Color	Plant Height	Growth Pattern	Initial Spacing
Softstem Bulrush (<i>Scirpus validus</i>)	June–July	Oblong Spikelets	Gray	(inches) 40–60	Spreading	(feet) 3
Horsetail (<i>Equisetum hyemale</i>)	July–Aug.	Oblong Spikelets	Brown	30–40	Spreading	3
Water Iris (<i>Iris pseudacorus</i>)	May–Aug.	Flower	White-Lt. Blue	10–18	Bunches	2–3
Pickereel Rush (<i>Pontederia cordata</i>)	July–Sept.	Flower	Purple	10–18	Bunches	2
Arrowhead (<i>Sagittaria latifolia</i>)	June–July	Hanging Bulbs	Green-White	6–10	Spreading	2–3
Cattails (<i>Typha latifolia</i>)	May–June	Oblong Spike	Brown	48–72	Spreading	3
Soft Rush (<i>Juncus effusus</i>)	June–July	Flower	Brown	18–30	Bunches	2

Other Systems: Where unusual conditions exist, special systems of treatment and disposal, other than those specifically mentioned in this rule, may be employed. These systems may include at-grade systems, modified mound systems or LPP systems. These special systems may be used provided:

- reasonable assurance of performance of the system is presented to the administrative authority;
- the engineering design of the system is first approved by the administrative authority;
- adequate substantiating data indicate that the effluent will not contaminate any drinking water supply, groundwater used for drinking water or any surface water;
- treatment and disposal of the wastes will not deteriorate the public health and general welfare;
- these systems comply with local codes and ordinances, and all applicable requirements of sections 701.025-701.055 and Chapter 644, RSMo.

Pumps: Two types of pumps are usually used in the forced distribution of sewage into an alternative system: effluent and turbine pumps. Effluent pumps can handle very small amounts of solids and give a high volume at a low head. They are good pumps to pump to gravity distribution. Turbine pumps are made to start and stop many times per day as is required for the artificial media and other secondary treatment methods. They emit low volumes at a high head and must receive filtered effluent. This pump is made of stainless steel.

Pumps are sized based on the desired operating pressure, the estimated friction losses and the elevation differences. These will vary from site and to site and application. The certified engineer will calculate these losses and determine the total dynamic head.

Pump manufacturers supply pump curves for the various pumps that they make. The engineer will calculate a system curve for the system, and ensure that it is at least slightly above the pump curve for the chosen pump.

Float Switches: Float switches work in pump tanks to let the pump know when to kick on. Float switches should be assembled on a float tree, which is a piece of PVC pipe to which the floats can be tethered to. They should not be attached to the discharge pipe as it can vibrate and dislocate the floats. The float tree can be easily removed for inspection or float replacement. The drawdown amount will be determined by the amount of time that the pump operates. This will be controlled by the length of the tether on the on/off float.

Splice Boxes: An electrical splice box is used to house spliced wire connections in the riser between equipment such as pumps, float switches and the control panel. The splice box enables all electrical equipment to be easily removed. The splice box, cord grips and other components must be non-corrosive and rated as water resistant. All splices must be waterproof. If these components are allowed to take on water, it can cause the alarm to go off and the pumps to fail.

Control Panels: Control panels act as the brains of many complicated systems. A control panel is used to tell the pump when to turn on, usually on a timed basis. There will also be alarms on the control panel to notify the homeowner if there is a problem with the pump.

Operation and Maintenance

Lagoons

All onsite wastewater treatment systems require some type of maintenance to assure proper function – even lagoons. The water in your lagoon should have a greenish hue. If it looks black or has an odor, it may not be operating properly. A properly built and maintained lagoon should have little to no odor. The lagoon may "turn over" or mix due to natural processes in the spring and in the fall and may have some odor for a few days. If a lot of leaves fall into the lagoon, they can cause the lagoon to smell. If this occurs, trim or cut the trees that are causing the leaves to fall into the lagoon. Odors can also be caused by large amounts of chemicals entering the lagoon or a lack of sunlight, as in extended cloudy weather.

If you do not have a septic tank preceding your lagoon, solids will eventually fill the lagoon and will have to be removed. If vegetation is growing in the interior of the lagoon, this may be a sign that the lagoon is filling with solids. If your lagoon does have a septic tank, the septic tank removes and contains solids from the wastewater. Those solids accumulate as sludge in the bottom of the septic tank. The septic tank must be pumped out periodically to remove the sludge. This should be done every 3 to 5 years depending on the size of the family living in the home. If a garbage disposal is used,

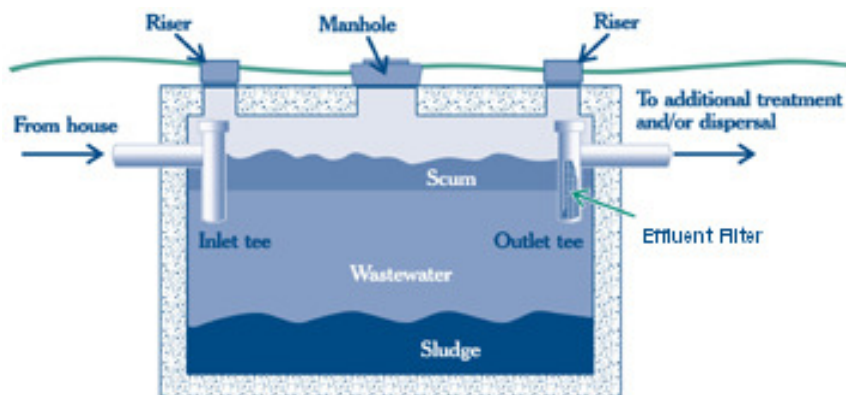
this will add to the accumulation of sludge in the tank. The septic tank pumper can inspect the condition of the tank.

The lagoon banks and area around the lagoon will need to be kept mowed and free of trees. The banks should be mowed to the water's edge. This will prevent tall grass from drooping into the lagoon where it provides mosquito breeding areas and could contribute to premature filling. **WARNING: Exercise extreme caution when mowing the banks of your lagoon. Many people have tipped and rolled their mowers while mowing their lagoon and have drowned.** Watch for damage to the banks, especially from burrowing animals. Repair any damage immediately and reseed with grass as needed. To help reduce damage to the banks, keep the fence in good repair so animals cannot get on the banks. A few duckweeds will not hurt a lagoon, but if the duckweed becomes so dense that sunlight is blocked out, they can be detrimental to the healthy balance that the lagoon needs to function properly. Cattails and large quantities of duckweed should be removed from the lagoon immediately to minimize mosquito breeding and excess organic loading and to improve oxygen transfer. Duckweed can be chemically controlled with fluridone (Sonar AS). Cattails can be physically removed or chemically controlled with glyphosate (Rodeo). Please read all herbicide labels and follow the directions as listed.

Septic Systems

A septic system consists of two basic parts; a septic tank and a soil absorption system. The septic tank removes and contains solids from the wastewater. Those solids accumulate as sludge in the bottom of the septic tank. The septic tank must be pumped out periodically to remove the sludge. This should be done every 3 to 5 years depending on the size of the family living in the home. If a garbage disposal is used, this will add to the accumulation of sludge in the tank. The septic tank pumper can inspect the condition of the tank.

In addition, the effluent filter must be cleaned every 6 months. These filters are typically located in the outlet sanitary tee. Clean the filter by hosing the filter off into the inlet side of the tank.



Signs of problems with a septic system include water ponding or wet areas over the

absorption field, sewage odors in the home or yard or slow or backed up drains.

Some septic systems have a pump installed in the tank to distribute the wastewater to the absorption field. Most of these pressure dosed systems will have an alarm wired to the pump to warn the homeowner of a problem.

Failure of your septic system can be caused by excessive water entering the system. The tank must be watertight. Leaking toilets and faucets can add a significant amount of water to your system. Keep surface water from entering the absorption field. Have your tank pumped and inspected every 3-5 years. Keep a record of maintenance. Practice water conservation. Don't do all of your laundry in one day – space it out throughout the week. If your system has a curtain drain, do not cover it with soil. Do not discard grease in the drain or pour large amounts of strong cleaning chemicals down the drain. Don't use septic tank additives - some may actually promote clogging of your absorption field. Don't use your toilet as a trash can by dumping non-biodegradables down your toilets or drains. Keep heavy equipment or automobiles away from your absorption field. This can damage the laterals.

Drip Absorption Systems

Drip irrigation systems require regular maintenance to keep them functioning properly. The drip lines must be flushed regularly and filters must be cleaned. The pretreatment components should be inspected for proper function. Water conservation is important with these systems. The Health Department recommends an annual service agreement with a maintenance company to keep these types of systems working. The recommendations regarding excessive water use listed above in the Septic System section also applies to drip absorption systems.

Constructed Wetlands

Constructed wetlands have some labor-intensive maintenance – all dead vegetation must be removed each winter to prevent the gravel or sand beds from clogging. Dead plants must be replaced with new ones. The water level must be monitored to make sure it does not exceed the top of the substrate.

Maintenance Schedule

Wastewater Treatment System Layout – not to scale
Show location of house, tank, lateral field, well, property lines
Property physical address: _____

System Permit:

Issued to: _____ Date issued: _____

Address: _____

Legal description: _____

System Description: _____

System Type: _____

Design flow (gpd) or number of bedrooms: _____

Lagoon size: _____

Septic tank volume: _____ Number of compartments: _____

Dosing tank or pump compartment capacity: _____

Tank manufacturer: _____

Advanced pretreatment device: _____

Method of Application: ☐ gravity ☐ dosed with pump

Absorption area type: ☐ trenches ☐ drip irrigation ☐ LPP ☐ mound

Accessories: ☐ tank filter ☐ pump ☐ distribution box ☐ control panel

Installation contractor: _____

Address: _____

Telephone number: _____

Service provider: _____

Address: _____

Telephone number: _____

Service contract: ☐ yes ☐ no

Pumper: _____

Address: _____

Telephone number: _____

Service contract: ☐ yes ☐ no

Onsite Wastewater Treatment System Service Record		
Date	Work Performed	Service Provider