UNIVERSITY OF GEORGIA
Warnell School of Forestry & Natural Resources

Publication WSFNR-21-83A

January 2022

Safely Planting Trees Near Septic Systems

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Many Georgia homeowners rely on onsite wastewater treatment structures known as septic systems. Septic systems are found in areas lacking access to a centralized sewer system. Although there are different types of septic systems, they all use engineered and natural processes to treat household wastewater. A properly functioning septic system is an important part of home maintenance, so homeowners should understand how to care for this significant investment. An important aspect of septic system care is what can be grown over a septic field. This publication focuses on safely planting trees near septic systems.

HOW A SEPTIC SYSTEM WORKS

Septic systems vary based on household size, slope, lot size, soil type, proximity to water bodies, weather, and local regulations. Different types of septic systems are described below (US EPA, 2021).

- **Conventional** – system that consists of a septic tank and stone drain field
- **Chamber** – system that lacks gravel and may have open-bottom chambers, fabric-wrapped pipe, and synthetic materials
- **Cluster / Community** – system that collects effluent from two or more homes to a common drain field
- **Constructed Wetland** – system which mimics treatment processes of natural wetlands
- **Drip Distribution** – system that employs drip tubing for timed dose delivery of wastewater to the drip absorption area
- **Evapotranspiration** – system designed to evaporate wastewater into the air from the drain field rather than releasing it into the soil
- **Mound** – system designed for use in soils with a shallow depth, high groundwater level, or shallow bedrock
- **Recirculating Sand Filter** – system that uses a box filled with sand to filter wastewater

Most Georgia homeowners have a conventional system consisting of a septic tank, drain field, and associated piping (Fig. 1). The drain field receives the wastewater after effluent from household bathrooms and a kitchen is separated in the septic tank (Fig. 2) where heavy solids (sludge) settle to the bottom of the tank and greases and lighter solids (scum) move to the top. Tanks can be made of concrete, plastic, fiberglass, or steel, though most tanks in Georgia are made of concrete. Microbial communities and microscopic soil animals, such as bacteria, yeast, and nematodes, treat the solids in the tank through anaerobic digestion. Excessive use of chlorinated solvents, anti-microbial products, and petroleum products can harm the system and cause inefficiencies because they can lead to microbial death or microorganisms have difficulty catabolizing the chemicals.

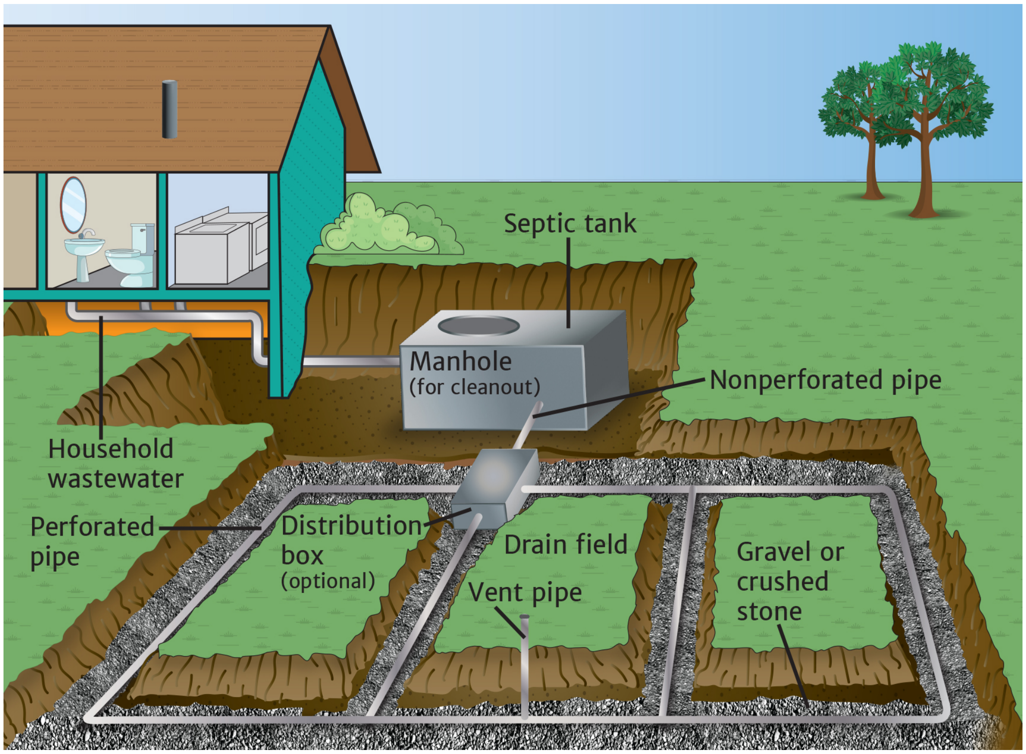


Figure 1: *Conventional septic system (Source: Thurston County, WA Public Health and Social Services, 2021)*
Illustration by Wade Newbury/UGA

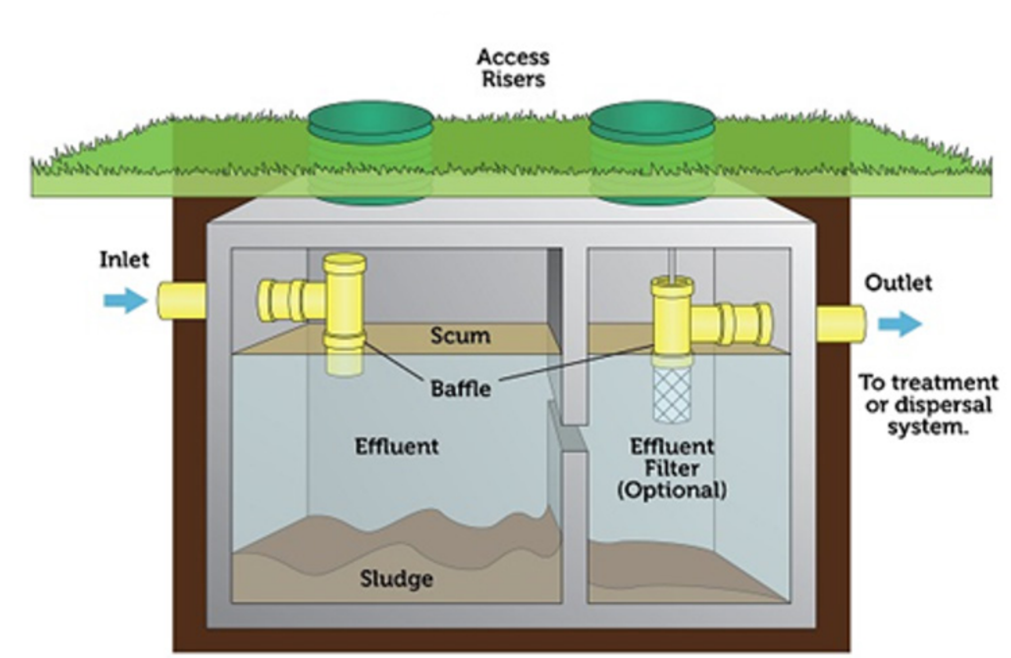


Figure 2: *Cross-section of a septic tank. Modern tanks tend to have two settling chambers. (Source: US EPA, 2021)*

A drain field (Fig. 3) is a trench or bed subsurface wastewater infiltration system made of gravel or stone. In gravity-based systems, effluent flows into a distribution box which then disburses the wastewater among the stone trenches. In the trenches, the wastewater filters through perforated PVC piping and then the stone where it is further treated by microorganisms. The most efficient septic systems remove approximately 30% of the nitrogen waste and 60% of the phosphorous with the remainder infiltrating to groundwater (Lusk et al. 2016). A barrier, such as a geofabric, reduces surface runoff and limits animals, soil or sediment, and other contaminants from entering the stone trench. Geotextile's primary purpose is to keep roots from penetrating into the drain lines (= plugged lines and backed up flows). They also keep some soil/sediment from getting into the gravel drain field so that treated water can quickly flow away from the pipes (also reducing back flow). When it rains however, the geotextile allows water in, which can carry septic effluent away from the leach field. The land area set aside for the drain field is known as the Septic Reserve Area (SRA).

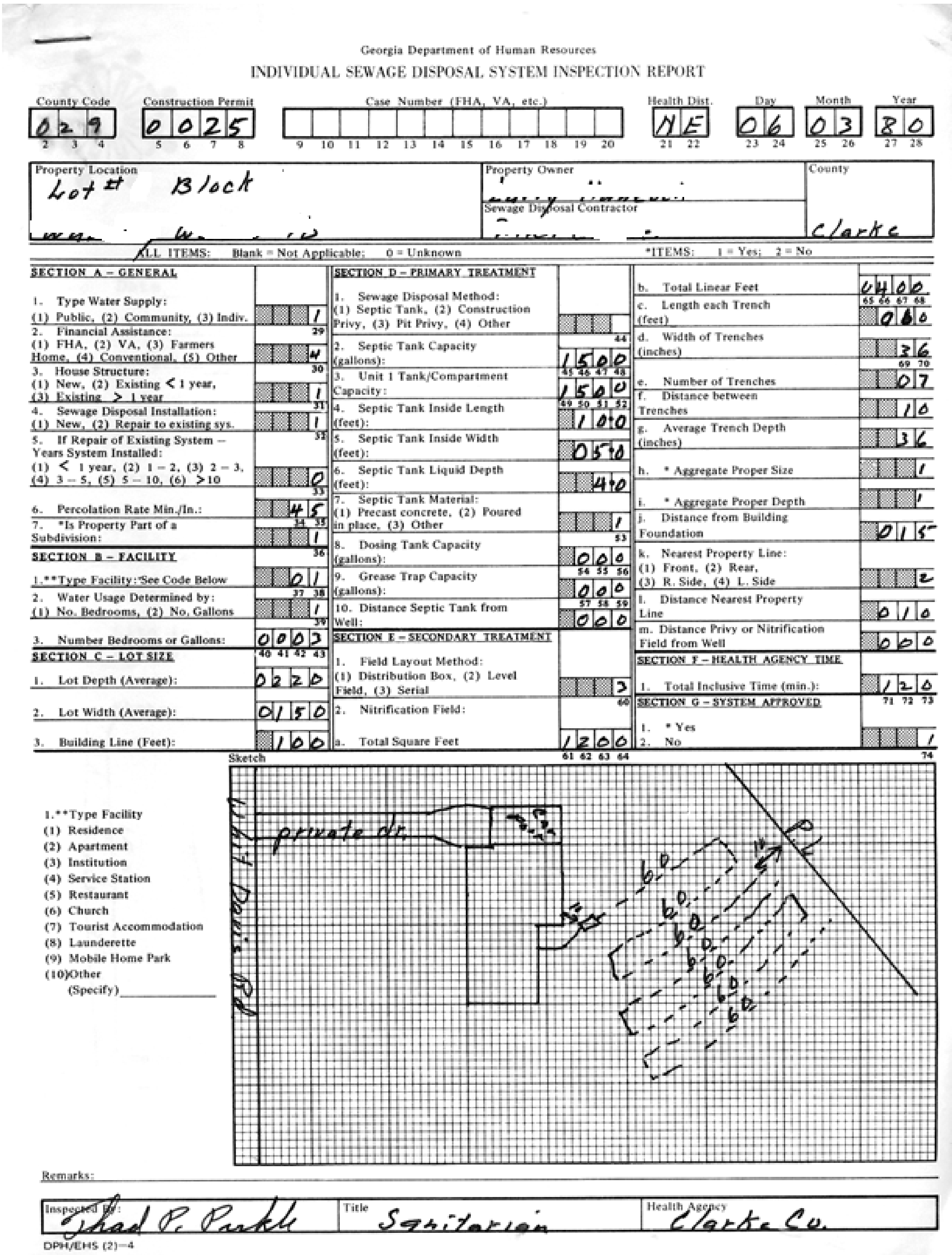
Figure 3: *Conventional septic drain field (Source: Nonztp, 2019)*

FINDING YOUR SEPTIC SYSTEM

A septic system may be located on any side of a house and finding the drain field may not be easy. A record drawing, a diagram created when the septic system was installed, is one of the easiest methods to locate the drain field. However, details of the record drawing may vary considerably between counties and across periods of time. Newer record drawings may have more details and improved resolution. The record drawing is publicly available and can be found at a county permitting office or health department. You may need your tax parcel number when requesting the record drawing from the local government.

If a copy of the record drawing is not available, look for white-capped pipes stopping near the ground surface. These can be clean-outs that allow you to check the liquid level in the drain field pipes and are located near the end of the field (not all fields have clean-outs) or overflow pipes in case of higher than expected flows. Another option is to carefully probe areas leading away from the septic tank using a rebar or other strong, metal rod (for example, a tile/pipe probe). Avoid using heavy wrecking bars that may lead to damaging the pipes or septic tank.

The sewer pipe may be located leaving the house foundation and running towards the septic tank, which is usually ten to twenty feet from the foundation. The tank is usually about two feet from the surface. Tanks are a variety of sizes based on the number of bedrooms in a house and the square footage. One example of a standard tank for a four-bedroom house is a 1,250-gallon tank with the dimensions of 8 feet 6 inches (length) by 5 feet 8 inches (width) by 5 feet 9 inches (depth). Gently probe until you have found the end of the tank keeping in mind that soil and sediments covering the tank may feel as solid as the tank. Once you have marked the tank location, look for shallow, parallel depressions which mark the drain field trenches (note that depressions may no longer be apparent on older systems). Use the probe to notice a change in consistency between the drain field soil/stones and the surrounding soil. Mark the location of the trenches and make a map of the system for future reference. Call 811 (https://call811.com), a free service, to locate underground utilities like a gas or water lines that may be surrounding the drain field before probing.



Georgia Department of Human Resources

INDIVIDUAL SEWAGE DISPOSAL SYSTEM INSPECTION REPORT

County Code	Construction Permit	Case Number (FHA, VA, etc.)	Health Dist.	Day	Month	Year
029	0025		NE	06	03	80

Property Location: Lot # Block

Property Owner:

Sewage Disposal Contractor:

County: Clarke

ALL ITEMS: Blank = Not Applicable; 0 = Unknown. *ITEMS: 1 = Yes; 2 = No

SECTION A – GENERAL

1. Type Water Supply: (1) Public, (2) Community, (3) Indiv.	1
2. Financial Assistance: (1) FHA, (2) VA, (3) Farmers Home, (4) Conventional, (5) Other	4
3. House Structure: (1) New, (2) Existing < 1 year, (3) Existing > 1 year	1
4. Sewage Disposal Installation: (1) New, (2) Repair to existing sys.	1
5. If Repair of Existing System – Years System Installed: (1) < 1 year, (2) 1 – 2, (3) 2 – 3, (4) 3 – 5, (5) 5 – 10, (6) >10	0
6. Percolation Rate Min./In.:	45
7. *Is Property Part of a Subdivision:	1

SECTION B – FACILITY

1.**Type Facility: See Code Below	01
2. Water Usage Determined by: (1) No. Bedrooms, (2) No. Gallons	1
3. Number Bedrooms or Gallons:	0003

SECTION C – LOT SIZE

1. Lot Depth (Average):	0220
2. Lot Width (Average):	0150
3. Building Line (Feet):	100

SECTION D – PRIMARY TREATMENT

1. Sewage Disposal Method: (1) Septic Tank, (2) Construction Privy, (3) Pit Privy, (4) Other	
2. Septic Tank Capacity (gallons):	1500
3. Unit 1 Tank/Compartment Capacity:	1500
4. Septic Tank Inside Length (feet):	10.0
5. Septic Tank Inside Width (feet):	05.0
6. Septic Tank Liquid Depth (feet):	4.0
7. Septic Tank Material: (1) Precast concrete, (2) Poured in place, (3) Other	1
8. Dosing Tank Capacity (gallons):	000
9. Grease Trap Capacity (gallons):	000
10. Distance Septic Tank from Well:	000

SECTION E – SECONDARY TREATMENT

1. Field Layout Method: (1) Distribution Box, (2) Level Field, (3) Serial	3
2. Nitrification Field:	
a. Total Square Feet	1200
b. Total Linear Feet	0400
c. Length each Trench (feet)	060
d. Width of Trenches (inches)	36
e. Number of Trenches	07
f. Distance between Trenches	10
g. Average Trench Depth (inches)	36
h. * Aggregate Proper Size	1
i. * Aggregate Proper Depth	1
j. Distance from Building Foundation	015
k. Nearest Property Line: (1) Front, (2) Rear, (3) R. Side, (4) L. Side	2
l. Distance Nearest Property Line	010
m. Distance Privy or Nitrification Field from Well	000

SECTION F – HEALTH AGENCY TIME

1. Total Inclusive Time (min.):	120

SECTION G – SYSTEM APPROVED

1. * Yes 2. No	1

1.**Type Facility
(1) Residence
(2) Apartment
(3) Institution
(4) Service Station
(5) Restaurant
(6) Church
(7) Tourist Accommodation
(8) Launderette
(9) Mobile Home Park
(10) Other (Specify) ______

Sketch

Remarks:

Inspected By: Thad P. Parkle

Title: Sanitarian

Health Agency: Clarke Co.

DPH/EHS (2)–4

Figure 4: *Record drawing*

PLANTING AND MANAGING VEGETATION ON AND ADJACENT TO DRAIN FIELDS

Only certain types of plants should be placed over a drain field because root systems of some plants can cause damage to drain field functionality, causing effluent to surface in the yard. Lawn turf is an ideal plant cover over a drain field (Dickert, 2010). Grasses have shallow, fibrous root systems that will not penetrate pipes. The grass positively contributes to oxygen exchange between the system and the atmosphere, removes soil moisture, and mitigates erosion. A homeowner, however, might want plants other than grass for visual benefits.

Shallow-rooted herbaceous perennials that are tolerant of drier soils are appropriate for drain field planting (Stanton et al., 2008; Lee et al., 2013). Also, it is generally recommended not to plant a vegetable garden over a drain field due to the risk of contamination (Lee et al., 2013) and frequent soil cultivation; however, if fruiting plants are trellised off the ground the risk of contamination is less (Day & Silva, 2000). Choose low-maintenance species that will thrive without supplemental fertilizers and water, both of which may compromise the system. See the references at the end of this publication for articles specifically addressing herbaceous plants and shrubs (Stanton et al., 2008) appropriate for planting on or near septic systems.

TREES AND SEPTIC SYSTEMS

Larger vegetation tends to have larger root systems, sometimes with aggressive, woody, water-loving root systems that can clog septic system pipes. This includes trees (particularly those with tap roots), as well as shrubs and bamboo.

A septic system contains water and nutrients and tree roots grow towards both. A rule-of-thumb is to plant the tree far enough away so that the mature root system will not reach the drain field; however, this guideline is dependent on tree species and environmental factors. A few best practices when planting or managing trees near conventional septic systems include:

- Avoiding aggressive rooting tree species (Table 1) (Day & Silva, 2000).
- Planting or managing small trees which will have a smaller root spread compared to large trees (Table 1) (Day & Silva, 2000). Since the surface of the drain field should be dry and not shaded more than six hours a day by trees, small trees are more appropriate.
- Estimating the mature root spread of a tree based on tree width to determine if it should be planted in or removed from a septic field. An aggressive estimate can be calculated as 2 - 4 times the width of the mature tree canopy (this can be estimated by finding the maximum width of the tree listed on a nursery tag or within a tree identification book) (Dickert, 2010). A more conservative estimate would be the tree's dripline (edge of canopy), although this distance could result in a much higher likelihood of root encroachment into the septic system.
- Estimating the mature root spread of a tree based on tree height to determine if it should be planted in or removed from a septic field. This can be calculated as 1 ½ - 3 times the height of the mature tree (located on a nursery tag or within a tree identification book). For example, a southern magnolia (Magnolia grandiflora), which may grow up to 80 feet tall and 50 feet wide, should be planted no less than 100 feet from the drain field.
- Using a barrier to prevent root growth into the drain field If an aggressive rooting tree must be planted near the drain field. Use aluminum flashing (16 inches wide) as a barrier, burying it 15 inches vertically into the soil and at least 2 feet from the tank and drain field trenches (allow 1 inch of the flashing to remain above the soil to prevent roots from growing over the flashing).

Table 1. Examples of trees to avoid and trees that are acceptable (at minimum, the dripline distance) to plant near septic drain fields (Day & Silva, 2000; Lee et al., 2013; Davey Tree Expert Company, 2021).

Avoid	Acceptable
American beech (*Fagus* spp.)	American holly (*Ilex opaca*)
birch species (spp.) (*Betula* spp.)	cherry (*Prunus* spp.)
eastern cottonwood (*Populus deltoides*)	crabapple (*Malus* spp.)
elm (*Ulmus* spp.)	crape myrtle (*Lagerstroemia* spp.)
red maple (*Acer* spp.)	dogwood (*Cornus* spp.)
silver maple (*Acer* spp.)	eastern hemlock (*Tsuga canadensis*)
willow (*Salix* spp.)	Japanese maple (*Acer palmatum*)
	needle palm (*Rhapidophyllum hystrix*)
	northern red oak (*Quercus rubra*)
	pine (*Pinus* spp.)
	scarlet oak (*Quercus coccinea*)
	sourwood (*Oxydendrum arboreum*)
	white oak (*Quercus alba*)

RECOMMENDED MAINTENANCE ON THE DRAIN FIELD

It is important to note that air is necessary for the drain field to function properly, so landscaping plastic over the field should never be used. Additionally, no other impervious surfaces should be created on top of the drain field (i.e., patios, walkways, etc.).

Traffic over the drain field should be limited. If planting on the drainage field, employ only light tilling, never add additional soil, and keep only a thin mulch layer, although it is best to avoid mulch.

Sprinklers should be directed so that water stays at least 10 feet away from the drain field. Avoiding pointing gutter downspouts towards the drain field, and do not install rain gardens or ponds over the drain field. It is also important to minimize fertilizer application over the drain field (Lee et al., 2013).

Always wear rubber gloves when working in septic system soil and wash the gloves with soap afterwards. Finally, remember to retain access to the system for pumping and routine maintenance, which may require significant digging and soil disturbance.

MITIGATING ROOTS IN SEPTIC SYSTEMS

If roots clog the drain field pipes, several options are available to mitigate the roots including:

Using a plumber's snake to cut the smallest roots into small pieces making it easier to clear the pipe.

Using granular copper sulfate to kill and dissolve masses of roots. A considerable amount of copper sulfate[1] may have to be used. Some recommendations are two pounds for every 300 gallons of water that the septic tank holds. However, the copper sulfate settles in the tank, and little goes to the drain field.

[1]Follow label instructions. Copper sulfate is corrosive and should not be used in thin metal pipes.

Hiring a professional to clean the system of tree roots considering the investment and importance of a functional septic system.

It should also be noted that it is very likely that roots will continue to enter the septic system until the tree is removed and the root system is decayed. So, identifying the problematic tree or shrub may be necessary to prevent further root growth into the drain field pipes.

CONCLUSION

Maintaining a healthy and well-functioning septic drain field is important for safe and efficient onsite waste management. Homeowners interested in landscaping their drain field should focus on plants with shallow roots and if trees are to be planted, they should be located far enough away so that roots cannot reach the drain lines.

GENERAL REFERENCES

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SELECTED PLANT LISTS

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