

Unit 1 - Alternate Peat Based Systems In Pennsylvania

1-1 Introduction to Alternate Peat Based Onlot Sewage Disposal Systems

1-2 Approved Alternate Peat Based Filters for Use in Pennsylvania

Unit 2 - Alternate Peat Based System Option 1

2-1 Alternate Peat System Option 1: Site Testing Criteria

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Unit 5 - Installation, Inspection, and Maintenance

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5-3 Alternate Peat Based Systems Maintenance

Introduction to the Course

Alternate peat based systems use a peat filter to provide secondary treatment of effluent, as listed in the DEP Alternate Systems Guidance document (guidance). Three general system configuration options are available, and each incorporates a self-contained peat filter as part of the system. The type of disposal area that is used for final treatment will vary depending on which option is used.

In this course, you will learn:

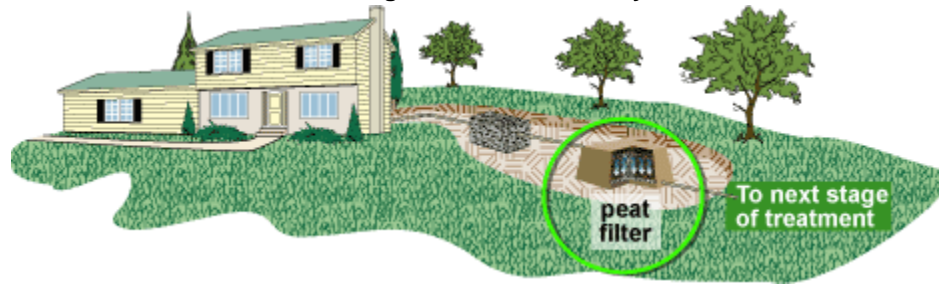
- 1) The use of alternate peat based systems in Pennsylvania.
- 2) The site testing and design criteria for each of the various peat based system options.
- 3) Installation, inspection, and maintenance of peat based systems.

Note: Throughout the rest of the course when we use the word **guidance**, we are referring to the DEP Alternate Systems Guidance document.

What You Will Learn in This Lesson

In this first lesson, you will learn what the peat inside each self-contained filter actually is and how it works to cleanse sewage effluent. We will also cover certain facts you should be aware of when permitting or working with alternate peat based system options.

Home Using a Peat Filter Onlot System

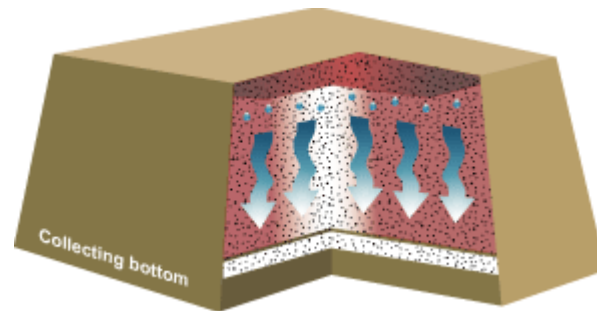


What is Peat?

Peat is partially decayed organic matter stemming mainly from plant origins. When used inside filter modules, it is a successful medium for wastewater treatment.

Inside a filter module, the peat filters the wastewater and promotes the growth of healthy microorganisms. These microorganisms naturally cleanse the wastewater to provide effective secondary treatment.

A Peat Filter Module



Peat as a Biofilter

A peat based biofilter provides the secondary treatment of effluent as it flows through a sewage system.

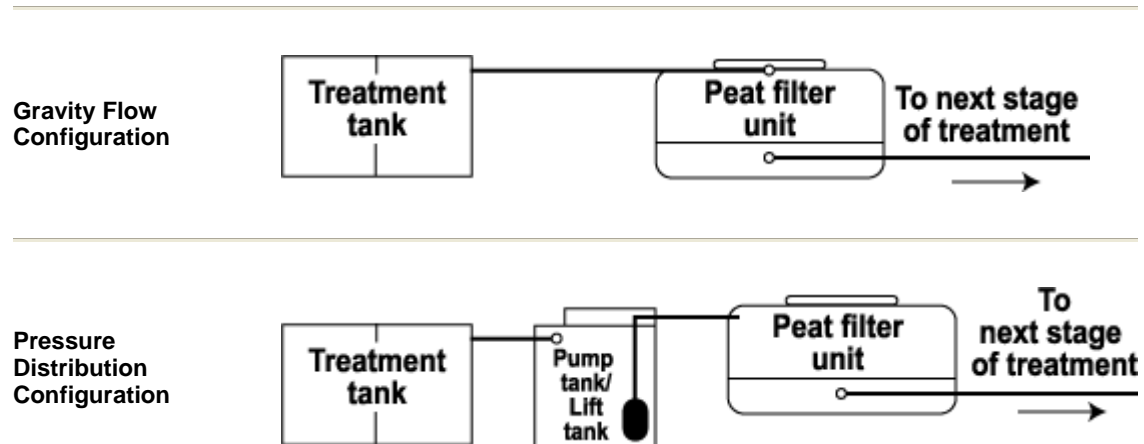
The effluent first goes through primary treatment either in a septic tank(s) or an aerobic tank before it flows to the peat filter.

Depending upon the brand of filter used, the peat filter unit may receive the effluent either by gravity flow or by a timed dose.

Peat as a Biofilter

Two brands of peat filters are approved for use in Pennsylvania. One brand of filter may be either gravity fed or timed dosed, while the other must be fed by a pump tank. We will cover each brand in the next lesson.

The Different Peat Filter Configurations

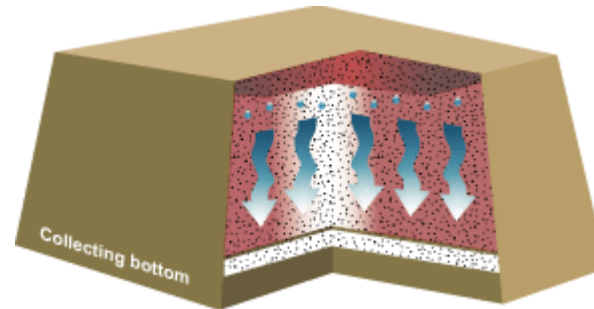


Peat as a Biofilter

EFFLUENT QUALITY CONSISTENCY

Wastewater within a peat filter is treated through a combination of physical, chemical, and biological interactions, including filtration, absorption, ion exchange, and microbial assimilation. These interactions provide increased renovation of the effluent. As a result, the quality of the effluent produced is consistent as long as the peat filter units are fed normal domestic-strength wastewater.

Peat Filter Module Acting as a Physical Filter for Wastewater



Review



Which of the following statements about onlot alternate peat based systems is true?

Click on all that apply.

- A) Peat filters may be used for either primary or secondary treatment of the effluent.
- B) Effluent may be fed to the peat media inside the filter unit either by gravity flow or by a timed dose, depending upon which brand of filter is used.
- C) The peat media relies on microorganisms to aid in the cleansing of the wastewater effluent.
- D) The guidance lists five brands of peat filters permittable for use in Pennsylvania.

Submit

Reset

Peat Based System Facts

1) System versatility

- Peat filters are approved for use with several disposal methods as outlined in the guidance.
- Peat filters are expandable.
- Peat filters can be used in several applications.

2) Reduced size of absorption area

- New peat filter system installations sometimes allow for the size of the absorption area to be reduced when certain criteria are met. We will cover this topic in the next unit.
- Repair situations may incorporate peat filters to reduce the size of the absorption area and thus ensure that isolation distances are not violated.

3) Easy installation

- Installing a peat filter to an onlot disposal system is simple and requires less than a day to accomplish.

Peat Based System Facts

1) SYSTEM VERSATILITY – DISPOSAL METHODS

In the three peat based system options, the tertiary and final treatment of the effluent takes place in the disposal area. You may use a peat filter option with the following disposal methods, as long as certain site criteria are met:

- In-ground absorption area
- Elevated sand mound absorption area
- Individual residential spray irrigation system (IRSIS)
- At-grade bed absorption area
- Drip irrigation system
- Subsurface sand filter system

The next three units of this course will cover each peat system option in specific detail.

Peat Based System Facts

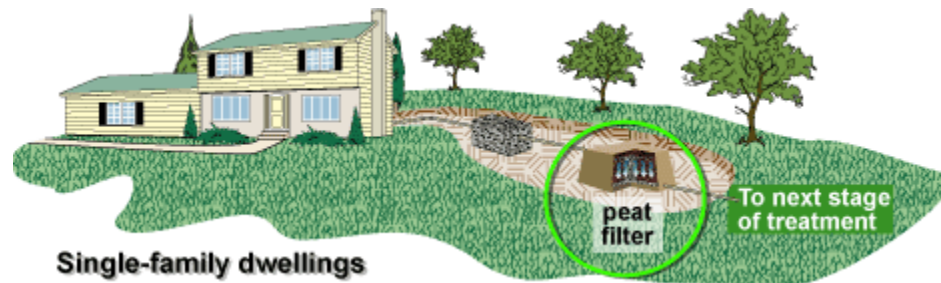
1) SYSTEM VERSATILITY – EXPANDABLE

Peat filters are expandable systems. Since they are modular in form, a homeowner who decides to remodel can add on the required number of peat filter units if bedrooms are ever added to the home. Keep in mind that other parts of the sewage system (i.e., treatment tank(s) or the absorption area, etc.) may need to be expanded as well.

Peat Based System Facts

1) SYSTEM VERSATILITY – APPLICATIONS

The alternate peat based system options permitted under the guidance may only receive wastewater from a residential development or other facility producing sewage effluent with chemical characteristics typical of untreated domestic wastewater. So, as long as domestic wastewater characteristics are established, alternate peat systems may be used to serve commercial and institutional applications. However, because an IRSIS can only ever be used to serve a single-family dwelling, a peat filter used in an IRSIS system configuration may **only** be used to serve a single-family home.



Peat Based System Facts

1) SYSTEM VERSATILITY – APPLICATIONS

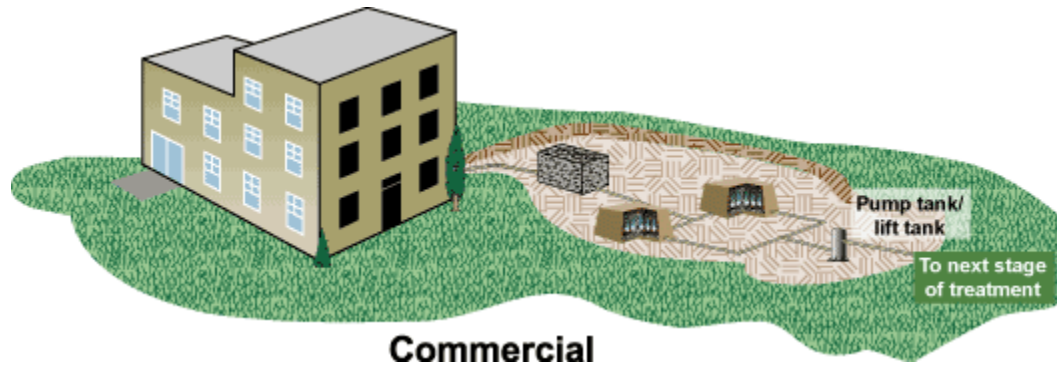
As long as the domestic wastewater characteristic requirements have been satisfied, peat system options permitted in accordance with the guidance and regulations may be used with the following:

- **Commercial applications that have domestic wastewater characteristics**

- example: apartment buildings, offices, hotels

- **Institutional applications that have domestic wastewater characteristics**

- example: libraries, municipal buildings



Review



True or false? An individual residential spray irrigation sewage disposal system (IRSIS) may serve a commercial establishment when a peat filter is used to provide secondary treatment of the effluent.

- A) True
- B) False

Submit

Peat Based System Facts

2) REDUCED SIZE OF ABSORPTION AREA

New peat filter system installations may allow for the size of the absorption area to be reduced, **but only with the alternate peat system option 1** as governed by the guidance. Several criteria must first be met before any reduction may be incorporated into the design of a new system installation.

We will cover alternate peat based system option 1 in the next unit.

Peat Based System Facts

2) REDUCED SIZE OF ABSORPTION AREA

Peat filters may be helpful in repair situations. Because they can be used with smaller absorption areas, peat filters may be the answer for a malfunctioning system, especially when available space is an issue. Effluent treated with peat filters requires less space within the absorption area for renovation.

Peat Based System Facts

3) EASY INSTALLATION

A peat filter can be installed as part of an onlot sewage disposal system in less than a day. The installation process is straightforward since the units are pre-engineered and modular in design

Review



True or false? Alternate peat filter systems may only be used to repair malfunctioning systems.

- A) True
- B) False

Submit

Review



Which of the following is a **FALSE** statement about peat filters?

- A) The guidance outlines three alternate peat based system options.
- B) Bedrooms cannot be added to homes already served by peat filters because these sewage systems are not expandable.
- C) Either gravity flow or a timed dose may be used to distribute the effluent to the peat filter.
- D) Peat systems used for new dwellings must conform to the rules of Chapter 73 for minimum horizontal isolation distance requirements.

Submit

Lesson Review

In this lesson, you have learned the fundamentals of peat filters. You now should have a basic understanding as to what peat is and how these systems work to provide secondary treatment of effluent. You've also learned of the benefits that peat filters may provide in a variety of situations and applications.

Note: If you have more questions about peat filter systems after completing this course, refer to the DEP Alternate Systems Guidance document in the "job aids."

What You Will Learn in This Lesson

In this lesson, you will learn about the two different brands of peat filters listed in the Alternate Systems Guidance document (guidance). These peat filters are permissible for use throughout the state of Pennsylvania.

In addition to becoming familiar with the two brands, you will also be able to identify the differences and similarities between them.

Approved Peat Filters for Pennsylvania

The guidance lists two brands of peat filters available for use in Pennsylvania:

- the Ecoflo Biofilter
- the Puraflo Biofilter

Both brands produce a similar quality effluent.

Landscaped Puraflo Peat Filters



Differences Between Filter Brands

The Ecoflo and Puraflo units basically produce the same results, but there are some subtle differences between them. The differences arise in the following manufacturers' criteria:

- 1) Sewage flow
- 2) Distribution method
- 3) Unit installation
- 4) Maintenance

Differences Between Filter Brands

1) SEWAGE FLOW - ECOFLO

One Ecoflo unit is designed to treat the flow from a home with five bedrooms or less. Homes with four bedrooms or less may use gravity flow to feed the peat filter if site conditions allow. A five-bedroom home with one treatment unit must use a timed dose to dose the peat filter.

For homes with six bedrooms, two Ecoflo units are required. If site conditions allow, the two Ecoflo units may be fed by gravity flow. For applications involving more than six bedrooms or in the case of commercial or institutional applications displaying domestic wastewater characteristics, the manufacturer should be contacted to determine the appropriate number of required Ecoflo units.

Ecoflo Filter Installation



Differences Between Filter Brands

1) SEWAGE FLOW - PURAFLO

One Puraflo modular unit is designed to treat up to 150 gallons of domestic-strength wastewater per day, or the flow for one bedroom in a residential application. In Pennsylvania, however, the minimum design flow for single-family dwellings is based on three bedrooms, or a daily flow of 400 gallons per day. Consequently, a minimum of three Puraflo units will be required.

Example:

- 1-bedroom = 400 gpd = 3 units design flow
 - 2-bedroom = 400 gpd = 3 units design flow
 - 3-bedroom = 400 gpd = 3 units design flow
 - 4-bedroom = 500 gpd = 4 units design flow
-

For commercial or institutional applications displaying domestic wastewater characteristics, the manufacturer will have to be contacted to determine the number of units required.

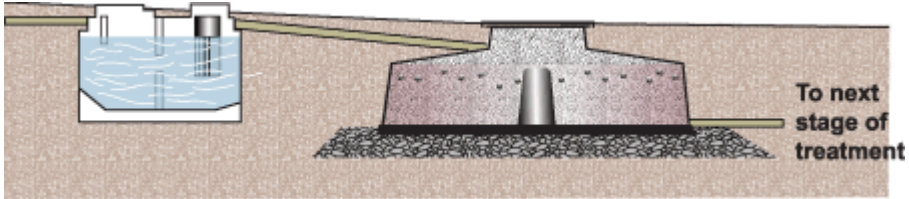


Four Puraflo Units Being Installed

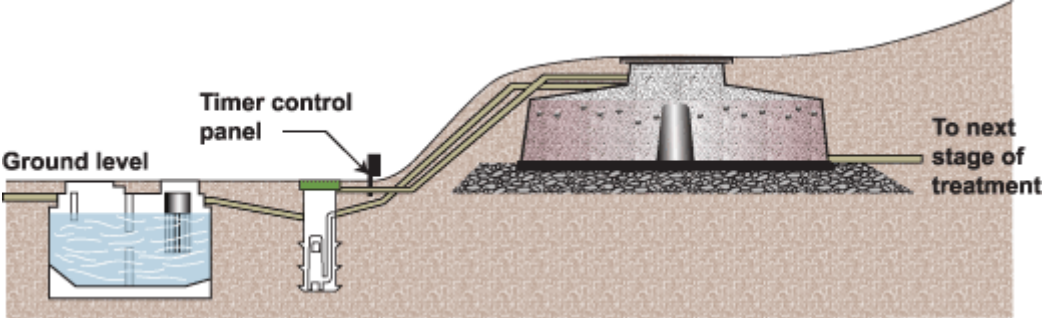
Differences Between Filter Brands

2) DISTRIBUTION METHOD - ECOFLO

Ecoflo filters may be fed by gravity flow or by timer-dosed pumping. The designer must determine if there is a sufficient grade on the site to allow for gravity flow to the peat filter.



Gravity Flow to the Peat Filter

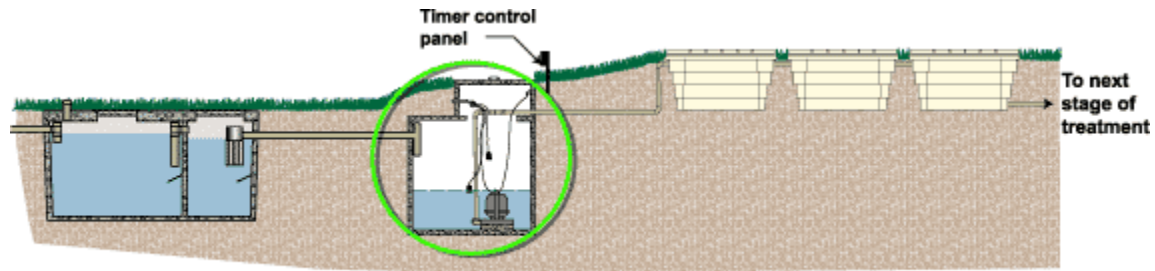


Pump Tank to the Peat Filter

Differences Between Filter Brands

2) DISTRIBUTION METHOD - PURAFLO

Timer-dosed pumping is the only distribution option with Puraflo filters. Therefore, a pump tank is required in every application using Puraflo filters.



Required Timer-Dosed Installation

Review

You are the SEO reviewing an onlot peat system design for a six-bedroom home. The design has two peat filter units and does not require a pump.



Based on the information given, can you infer what brand of peat filter is specified in the design?

- A) Puraflo
- B) Ecoflo
- C) Not enough information is given.

Submit

Differences Between Filter Brands

3) UNIT INSTALLATION - ECOFLO

Each Ecoflo unit, while pre-engineered in shape and size, does not come preassembled with the peat already installed. Thirty bags of peat must be manually installed in each unit. A trained installer, as approved by the manufacturer, must install the unit, including the peat, as part of the purchase agreement.

Ecoflo Unit Being Filled with Peat



Differences Between Filter Brands

3) UNIT INSTALLATION - PURAFLO

Each Puraflo unit comes complete with the required amount of peat already arranged inside the preassembled module.



Differences Between Filter Brands

4) MAINTENANCE AGREEMENT



Section 3.A.4

Just as with any other onlot sewage disposal system, the peat based system requires maintenance. In addition to regular septic tank pumping, the peat inside the filter bed must be periodically replaced. The guidance requires that the peat filter company's warranty be attached to the permit application, permit, and purchase agreement and that this warranty clearly notify the property owner of the need to replace the peat. The two manufacturers of the Pennsylvania-approved brands of peat filters have different maintenance schedules as to when their brands of peat need to be replaced. In the next few pages, we will clarify the difference between the two brands.

Differences Between Filter Brands

4) MAINTENANCE AGREEMENT - ECOFLO

Ecoflo's manufacturer has established that the maintenance and subsequent replacement cycle for its peat filter bed is eight years.

The purchase price of an Ecoflo unit includes an obligation by the manufacturer to provide maintenance to the system once a year for the eight-year life of the peat, beginning with the second year that the filter is in service.

At the end of the eighth year, the owner of the filter is responsible for the cost of replacing the peat within the filter bed. This replacement cost also renews the maintenance agreement, and the eight-year cycle begins again. The maintenance agreement is legally binding and 100 percent transferable to new owners of the property and system.

A blank copy of the Ecoflo maintenance agreement is available in the "job aids" section.

Differences Between Filter Brands

4) MAINTENANCE AGREEMENT - PURAFLO

The manufacturer of Puraflo modules does not require a legally binding maintenance agreement between the company and the owner of the system. However, the manufacturer will conduct annual inspections to determine when the peat needs to be replaced. Typically, the peat will need to be replaced approximately every fifteen years. The owner of the filter is provided with a list of maintenance recommendations to follow to help ensure a long and healthy life for the system. For a list of service professionals, you should contact Puraflo for suggestions.

Guidance-Listed Peat Filters for Use in Pennsylvania

For more information on either of the peat filters listed under section 3 of the guidance, please contact the Pennsylvania distributors. Each distributor's contact information is listed in the "job aids" section.

Lesson Review

This lesson introduced you to the two brands of alternate peat filters permissible in Pennsylvania: Puraflo and Ecoflo.

You should now be able to identify the basic differences and similarities between the two brands.

Drag and drop each of the listed "differences" under either the Ecoflo or Puraflo option, then click the "Submit" button. Click on "Reset" if you want to change your answer or restart the interaction.

Ecoflo



Puraflo

assembly required at installation
timed dosing to the peat filter
one module treats up to five bedrooms
preassembled for installation
one module treats one bedroom
maintenance agreement
required by manufacturer
gravity flow or timed dosing to the peat filter
no maintenance agreement
required by manufacturer

Submit answer

Reset

Lesson Review

You have been introduced to the two DEP-approved brands of alternate peat filters used for onlot disposal in Pennsylvania. As we progress through this course and cover the individual peat based system options, we will go into more detail regarding the two brands.

Note: If you have more questions about the system after completing this course, refer to the DEP Alternate Systems Guidance document in the "job aids."

What You Will Learn in This Lesson

The alternate peat system option 1 is the first peat based system configuration outlined in the Alternate Systems Guidance document (guidance). In this option, the effluent that has passed through a septic or aerobic tank for primary treatment goes through secondary treatment in a self-contained peat filter. The final treatment and disposal for this option may be done by any of the onlot systems described in Chapter 73, except IRSIS. (A peat based system option 2 can be used with IRSIS. Option 2 will be covered in Unit 3 of this course.) An alternate at-grade bed or a drip irrigation system, which are described in the alternate guidance, may also be used for disposal with a peat option 1 system.

In this lesson, you will learn about the necessary site testing criteria for each of the disposal methods available for use with the alternate peat system option 1.

Wastewater Characteristics

As with all alternate systems, the peat based system option 1 may only be used to serve residential development or other facilities that produce sewage effluent with chemical characteristics typical of untreated domestic wastewater.

Click to see a review of [Domestic Wastewater Characteristics](#).

Review

An onlot system using an alternate peat filter was proposed for a Home Depot store. Effluent testing done at a similar facility produced the results listed below:

- 25 mg/L ammonia as nitrogen
- 20 mg/L organic nitrogen (45 mg/L total kjeldahl nitrogen)
- 1,000 mg/L total solids
- 200 mg/L suspended solids
- 210 mg/L BOD5



May an onlot system using an alternate peat filter be approved for this Home Depot site?

- A) Yes
- B) No

Submit

Disposal Area Options



Section 3.B

The specific disposal area methods available for use with an alternate peat system option 1 are:

- Conventional in-ground trenches
- Conventional in-ground seepage beds
- Conventional elevated sand mound trenches
- Conventional elevated sand mound beds
- Alternate at-grade absorption area beds
- Alternate at-grade absorption area beds with UV disinfection. (UV disinfection will be covered in Lesson 2-3.)
- Alternate drip irrigation systems

Disposal Area Options

Regardless of the type of disposal method selected for use with an alternate peat system option 1, site evaluations must be performed to establish the conditions of each of the criteria below:

- 1) Isolation distances
- 2) Slope
- 3) Suitable soil depth
- 4) Percolation rate on a site with a limiting zone of greater than or equal to 20 inches

Once the site evaluations are concluded and each of the criteria is satisfied, then an alternate peat system option 1 may be considered. The following pages explain what criteria meet the requirements for a peat system option 1.

Isolation Distances

Isolation distances are the first criterion to examine when considering an alternate peat system option 1.



Section 73.13

The isolation distance requirements for the peat system option 1 are the same as for a conventional system.



Section 12.B.2

Note: A drip irrigation system requires the isolation distances to be measured from a perimeter extending 2 feet beyond the outermost drip tubing in a drip irrigation zone.

Click to see a [review of minimum horizontal isolation distance requirements for conventional systems](#).

Review

You, the local agency SEO, are asked to review a permit request for the site shown in the plot plan graphic to the right. Click on the plot plan to enlarge it.



Does the site meet the isolation distance requirements to an absorption area for a conventional system?

- A) Yes, all requirements are met.
- B) No, the system is too close to the well.
- C) No, the system is too close to the creek.
- D) No, the system is too close to the rock outcrop.

Submit



Click on the isolation distance topographic map above for a larger version.

Slope

The next testing criterion to examine is the slope of the proposed site.

The maximum slope requirements vary depending on the disposal method used with a peat system option 1. The various disposal methods and their individual slope requirements are listed below:



Sections 73.52, 73.53, and 73.55

- In-ground trenches – 0 to 25 percent slope
- In-ground seepage beds – 0 to 8 percent slope
- Elevated sand mounds and trenches– 0 to 12 percent slope



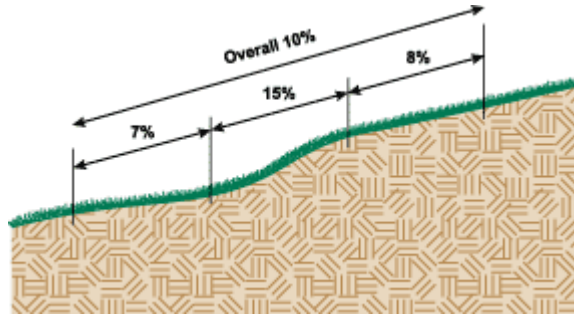
Section 9.A.3 and 12.A.2

- At-grade beds – 0 to 12 percent slope
- Drip irrigation systems – 0 to 25 percent slope

Review



You are evaluating a site with a slope over the absorption area as shown in the diagram. Assuming all of the other testing criteria are satisfied, which disposal area options could you consider for the site under alternate peat system option 1?



- A) Elevated sand mound trenches
- B) In-ground seepage bed
- C) Elevated sand mound bed
- D) At-grade bed
- E) Drip irrigation system
- F) A and E are correct

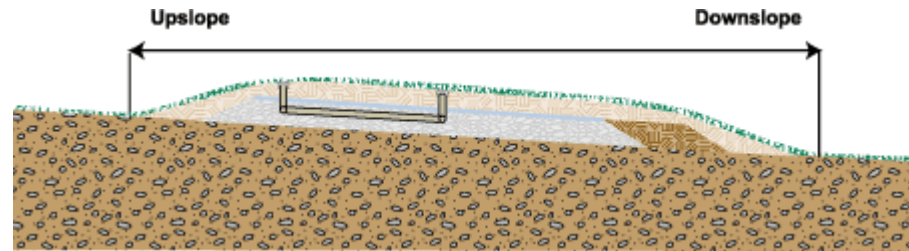
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Slope



Section 3.B.4.g

The disposal area must be designed to take full advantage of the slope so that effluent moves out from under the absorption area and down gradient, with the long side of the bed or trenches parallel to contours.



At-Grade Bed Example

Site Testing Criteria

*Click on each blank and type in the maximum slope measurement.
Click "Submit answer" when you have completed each blank.*

Please indicate the maximum slope allowed for each system.

In-ground systems:

-Trenches -- maximum slope of _____ percent

-Seepage beds -- maximum slope of _____ percent

Elevated sand mounds:

-Maximum slope of _____ percent

At-grade beds:

-Maximum slope of _____ percent

Drip irrigation systems:

-Maximum slope of _____ percent

Submit

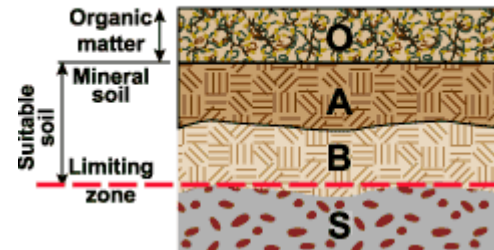
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Suitable Soil Depth



Section 73.51

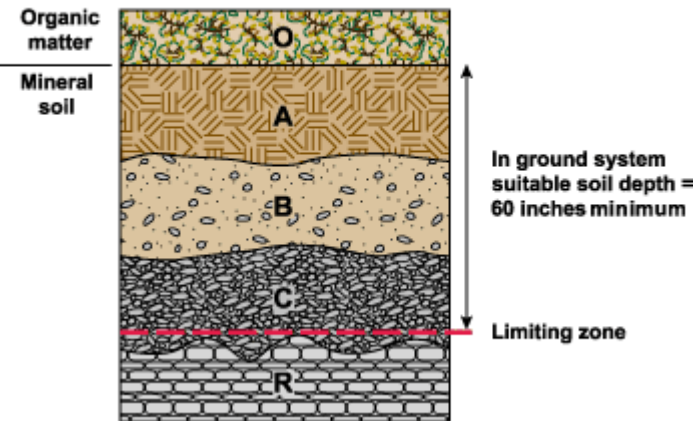
The next criterion to examine for an alternate peat system option 1 is the required suitable soil depth(s). Minimum suitable soil depths will vary depending on the type of absorption area that is being used.



Suitable Soil Depth

IN-GROUND SYSTEM SOIL REQUIREMENTS

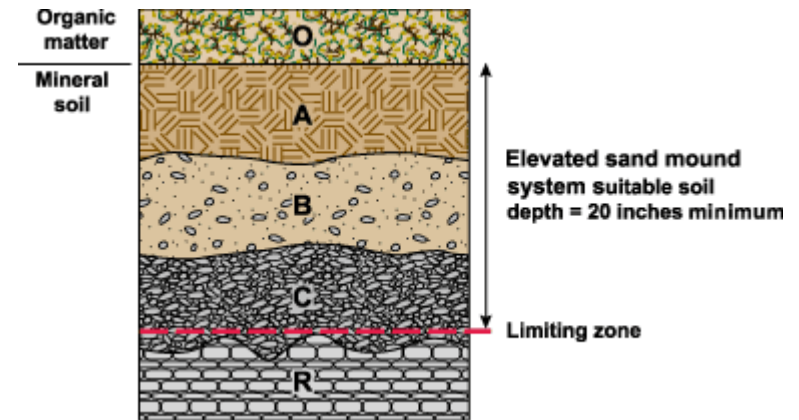
A minimum of 60 inches of suitable soil depth, not including the layer of organic matter, must be consistent throughout the area for an in-ground bed or in-ground trenches to be used. Be sure to maintain the 48-inch vertical separation from the bottom of the aggregate to the top of the limiting zone.



Suitable Soil Depth

ELEVATED SAND MOUND SYSTEM SOIL REQUIREMENTS

A minimum of 20 inches of suitable soil is required for an elevated sand mound to be used.



Note: The guidance states in Section 3.B.4.b that sufficient soil profiles must be conducted to ensure a minimum of 20 inches of suitable soil is present under the entire in-ground or elevated absorption area.

Suitable Soil Depth

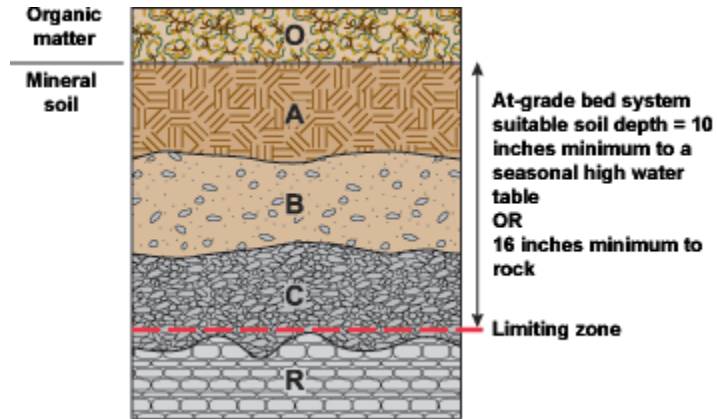
AT-GRADE SYSTEM SOIL REQUIREMENTS



Section 3.B.2.b(1)

When a peat filter is used with an at-grade bed, the minimum suitable soil depth requirement is 10 inches to a seasonal high water table or 16 inches to rock. Remember that the suitable soil depth does not include the layer of organic matter.

SOIL REQUIREMENTS FOR AN AT-GRADE BED SYSTEM USED WITH A PEAT FILTER



Note: Disinfection is required to use the peat filter with an at-grade bed on a limiting zone of less than 20 inches. Lesson 2-3 will discuss disinfection.

Suitable Soil Depth

AT-GRADE SYSTEM SOIL REQUIREMENTS



Section 3.B.4.f

When an at-grade absorption area bed is proposed on a site with a limiting zone of less than 20 inches of suitable soil, profiles must be conducted to ensure the entire proposed absorption area has at least 10 inches to a seasonal high water table and 16 inches to rock.

Suitable Soil Depth

AT-GRADE SYSTEM SOIL REQUIREMENTS



Sections 3.B.2.b(2) and 3.B.3.c(2)

A qualified soil scientist must conduct a soil morphological evaluation when a site is being evaluated for a peat filter option 1 with an at-grade bed and the limiting zone is less than 20 inches. This evaluation will determine the size of the system.

A qualified soil scientist is either a professional member of the Pennsylvania Association of Professional Soil Scientists (PAPSS) or a "qualified soil scientist" as defined in Chapter 73 of the regulations.

To determine the size of the absorption area bed, the horizontal linear loading rate must be derived from the soil morphological analysis and the Hydraulic Linear Loading Rate (HLLR) chart in the guidance under appendix 5. Appendix 5 is in the Alternate Systems Guidance Document in the "job aids."

Information about how the soil evaluation will be conducted can be found under "Soil Morphological Analysis Done By a Soil Scientist" in the "job aids."

Suitable Soil Depth

DRIP IRRIGATION SYSTEM



Section 12.A.3

To use an option 1 peat filter with a drip irrigation system, there must be at least 20 inches of suitable soil to a seasonal high water table and a minimum of 20 inches to a rock limiting zone.

Site Testing Criteria

*Click on each blank and type in the minimum suitable soil depth.
Click "Submit answer" when you have completed each blank.*

Please indicate the minimum suitable soil depth for each system.

In-ground beds and trenches: _____ inches throughout the area of the bed or trenches, as long

as the 48-inch vertical separation from the bottom of the absorption area aggregate to the top of the limiting zone is maintained.

Elevated sand mounds: _____ inches

At-grade beds used with a peat filter: 10 _____ inches to a seasonal high water table
_____ inches to rock

Drip irrigation system used with a peat filter: _____ inches to a seasonal high water table
_____ inches to a rock formation

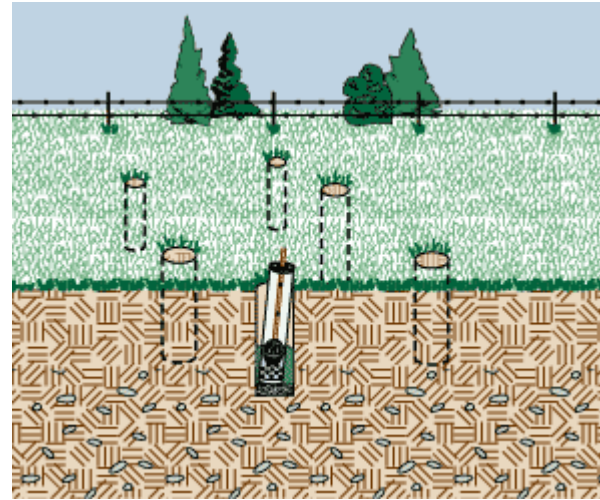
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Reset

Percolation Rate

The final testing criterion to evaluate for an alternate peat system option 1 is percolation rate. To consider the viable disposal methods available with option 1, the percolation standards discussed on the next few pages must be met.

Percolation Testing Set-up



Percolation Rate

The suitable percolation rate ranges for an alternate peat option 1 disposal area are listed below.



Sections 73.15 and 73.16(c), Table A

IN-GROUND ABSORPTION AREAS: Beds and Trenches

- 6–90 minutes per inch

ELEVATED SAND MOUND ABSORPTION AREAS: Beds and Trenches

- 3–180 minutes per inch

Percolation Rate

The suitable percolation rate range for the alternate at-grade bed is listed below.



Section 9.A

AT-GRADE BEDS

- 3–180 minutes per inch
- No percolation test is required on sites with less than 20 inches of suitable soil. Instead, a qualified soil scientist must conduct a soil morphological analysis.

For more information on at-grade bed percolation testing, refer to the Web-based continuing education At-Grade Bed Systems course (329).



Section 12.A.1

DRIP IRRIGATION SYSTEM

- Percolation tests are not conducted with a drip irrigation system

For more information on the drip irrigation system, refer to the Web-based continuing education Drip Irrigation System course (321).

Site Testing Criteria

*Click on each blank and type in the correct percolation rate. Click
"Submit answer" when you have completed each blank.*

Please indicate the correct percolation rate specification for each system.

In-ground beds and trenches:

- _____ to 90 minutes per inch

Elevated sand mounds:

- 3 to _____ minutes per inch

At-grade beds:

- _____ to 180 minutes per inch

Submit

Reset

Lesson Review

Site Testing Criteria

A) Isolation distances

- Must meet the requirements of Chapter 73 of the regulations.

B) Slope

- **IN-GROUND SYSTEMS — TRENCHES**
0 to 25 percent slope
- **IN-GROUND SYSTEMS — SEEPAGE BEDS**
0 to 8 percent slope
- **ELEVATED SAND MOUNDS AND TRENCHES**
0 to 12 percent slope
- **AT-GRADE BEDS**
0 to 12 percent slope
- **DRIP IRRIGATION SYSTEMS**
0 to 25 percent slope

Lesson Review

Site Testing Criteria

C) Minimum suitable soil depth

- **IN-GROUND SYSTEMS — BEDS AND TRENCHES**

60 inches throughout the area of the bed or trenches, and maintaining the 48-inch vertical separation from the bottom of the absorption area aggregate to the top of the limiting zone.

- **ELEVATED SAND MOUNDS AND TRENCHES**

20 inches

- **AT-GRADE BEDS**

20 inches

10 inches to a seasonal high water table and 16 inches to rock when UV disinfection is used.

- **DRIP IRRIGATION SYSTEMS**

20 inches to a seasonal high water table

20 inches to rock

Lesson Review

Site Testing Criteria

D) Percolation Rate

- **IN-GROUND SYSTEMS -- BEDS AND TRENCHES**

6 - 90 minutes per inch

- **ELEVATED SAND MOUNDS AND TRENCHES**

3 - 180 minutes per inch

- **AT-GRADE BEDS**

3 - 180 minutes per inch

No percolation test is required on sites with less than 20 inches of suitable soil.

A soil morphological analysis must be conducted.

- **DRIP IRRIGATION SYSTEMS**

Percolation tests are not conducted with a drip irrigation system.

Note: If you have more questions about the system after completing this course, refer to the DEP Alternate Systems Guidance document in the “job aids.”

Lesson Review



Under the following site conditions, which type of disposal method(s) could be used with an alternate peat system option 1?

Click all that apply.

- 11 percent slope
- 30 inches of suitable soil
- perc rate of 70 minutes per inch

- A) Elevated sand mound
- B) In-ground trenches
- C) At-grade bed
- D) In-ground seepage bed
- E) Drip irrigation system

Submit

Reset

What You Will Learn in This Lesson

In this lesson, you will learn about the design criteria for an onlot alternate peat system option 1. Recall that in this option, the effluent receives primary treatment in a septic or aerobic tank before going through secondary treatment in a self-contained peat filter. Final treatment/disposal may be done by an in-ground bed, in-ground trenches, an elevated sand mound, an alternate at-grade absorption bed, or an alternate drip irrigation system.

We will cover how the system components listed below should be configured to comply with both the DEP Alternate Systems Guidance document (guidance) and the regulations for a peat system option 1.

- Building sewer
- Primary treatment
- Distribution method to the peat filter
- Distribution method to the absorption area
- Disposal area options



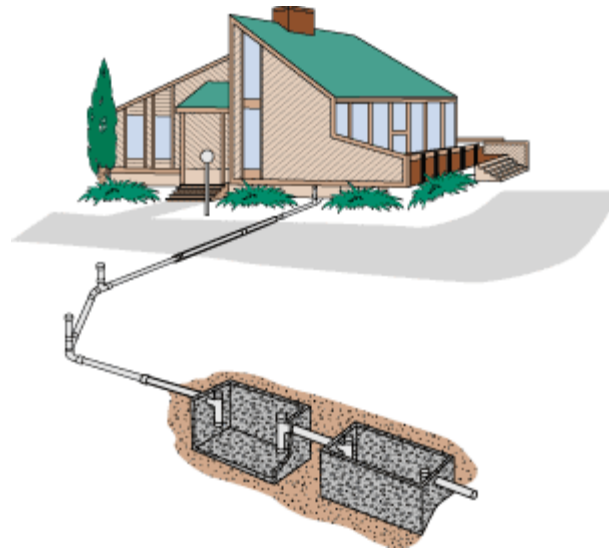
Building Sewer



Section 73.21

The guidance does not address the subject of building sewers for alternate peat system option 1. When the guidance is silent, the regulations for onlot systems must be followed. In this case, the building sewer must meet all the requirements listed in the regulations.

Click on the building sewer graphic to the right for a detailed version of building sewer requirements.



Please consult the section of the regulations shown above to review the requirements for building sewers.

Primary Treatment Tank(s)

Septic Tank(s)

The guidance requires that the primary treatment tanks be either a **multiple-compartmented rectangular tank** or **two rectangular tanks in a series**.

Research conducted at Delaware Valley College has shown that rectangular tanks produce lower total suspended solids when compared to round tanks. If total suspended solids are lower, the risk of clogging the soil is reduced.

Round tanks **cannot** be used with any alternate system option.



Primary Treatment Tank(s)

Septic Tank(s)



Section 73.31



Section 3

If a septic tank(s) is used to provide primary treatment with the alternate peat system option 1, then the tank(s) must:

- meet all the regulations for septic treatment tanks,
- be rectangular, and
- include an effluent filter (a Zabel A-300 or equivalent NSF-approved filter)

Please review the section of the regulations listed above for more information on septic tank requirements.



A Zabel Filter



Rectangular Septic Tanks in Series

Primary Treatment Tank(s)

Aerobic Tanks



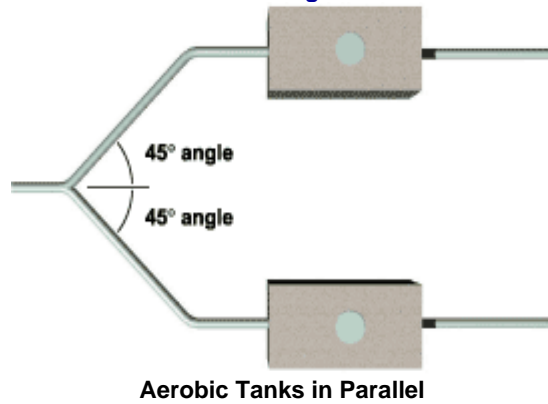
Section 73.32



Section 3

If an aerobic tank is used as the primary treatment with an alternate peat system option 1, then the tank must comply with all of the requirements of the regulations and must include an effluent filter (a Zabel A-300 or equivalent NSF-approved filter).

Please consult the section of the regulations shown above to review aerobic tank requirements.



Primary Treatment Tank(s)

Aerobic Tanks - Size Reductions



Sections 3.B.2.a and 3.B.2.b(1)

If the percolation rate is in the range of 3 to 60 minutes per inch, the guidance allows a maximum 40 percent reduction in the size of the absorption area. Because sizing reductions are **not** cumulative, no additional sizing reduction may be taken for using an aerobic tank or leaching chambers. The 40 percent reduction may only apply to in-ground, elevated, and at-grade absorption areas with a limiting zone of 20 inches or more.

Review

Given the following specifications for an alternate peat system option 1 permit request ...

- | | |
|---|---|
| <ul style="list-style-type: none">• Primary treatment: Aerobic tank• Secondary treatment: Peat filter• Absorption area size reduction: 32 percent | <ul style="list-style-type: none">• Final treatment and disposal: At-grade bed absorption area with a 27-inch suitable soil depth• Percolation rate: 40 minutes per inch |
|---|---|



Is the absorption area size reduction permissible?

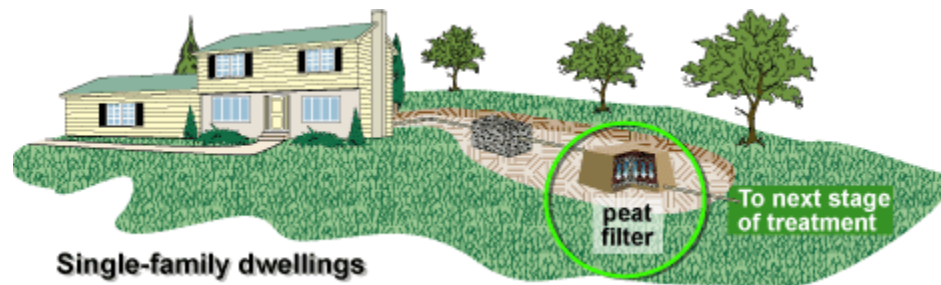
- A) Yes, because an aerobic tank is used in the primary treatment.
- B) Yes, because the percolation rate falls between 3 and 60 minutes per inch.
- C) No, because size reductions are not permitted with option 1 systems.
- D) No, because the percolation rate is too slow to permit a size reduction and the guidance prohibits an aerobic tank sizing reduction for at-grade beds.

Submit

Distribution Method to the Peat Filter

In any alternate peat based system, the peat filter performs the secondary treatment. How the effluent makes its way from the treatment tank(s) to the peat filter varies depending on site conditions and/or the type of peat filter brand. Sometimes gravity flow will work, and sometimes the peat filter will be time dosed with a lift pump.

We are now going to cover the requirements for distributing the effluent to the peat filter in peat option 1 systems. Do not confuse the distribution of the effluent to the peat filter with the distribution of the effluent to the absorption area. The distribution to the absorption area will be covered later in this lesson.



Distribution Method to the Peat Filter

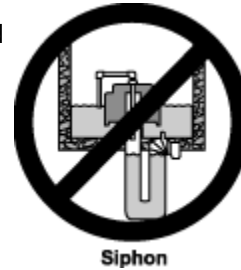


Section 3.A.2

In option 1 systems, effluent may be distributed from the treatment tank(s) to the peat filter by either gravity flow or a timed dose.

With a timed dose, the peat treatment media inside the filter module is dosed at certain time intervals throughout the day. This method will allow the peat filter to operate at maximum efficiency.

Demand dosing to a peat filter is not permitted. Since siphons provide demand dosings, they cannot be used to distribute the effluent to the peat filter.



Siphon

Distribution Method to the Peat Filter

REVIEW OF PURAFLO AND ECOFLO REQUIREMENTS

Recall from lesson 1-2 that two brands of peat filters are approved for use in Pennsylvania: Puraflo and Ecoflo. The manufacturer requires the effluent to be pumped to Puraflo brand peat filters, and the guidance further requires that this be done with a timed dose.

Ecoflo brand peat filters may receive the effluent either by gravity or by a timed dose. Gravity may be used for applications with four bedrooms or less if site conditions allow. A home with five or more bedrooms served by a single Ecoflo unit requires a pump to the peat filter. Again, when a pump is used, it must be a timed dose to the peat filter.



Timer-Dose Control Unit

Distribution to the Absorption Area

For an alternate peat system option 1, the method used to distribute the effluent to the absorption area depends on the type of absorption area and the percolation rate.



Section 73.16(c) Table A



Sections 9 and 12

Peat Option 1 with In-Ground Absorption Area

- A percolation rate in the range of 6 to 60 minutes/inch allows for gravity flow to the absorption area.
- A percolation rate in the range of 61 to 90 minutes/inch requires pressure dosing.

Peat Option 1 with Elevated Sand Mound System

- All elevated sand mound systems require pressure dosing to the absorption area.

Peat Option 1 with At-Grade Bed System

- All at-grade bed systems require pressure dosing to the absorption area.
Note: If an at-grade bed system is used at a site with a suitable soil depth of less than 20 inches, disinfection is required. Refer to lesson 2-3 for information on disinfection.

Peat Option 1 with Drip Irrigation

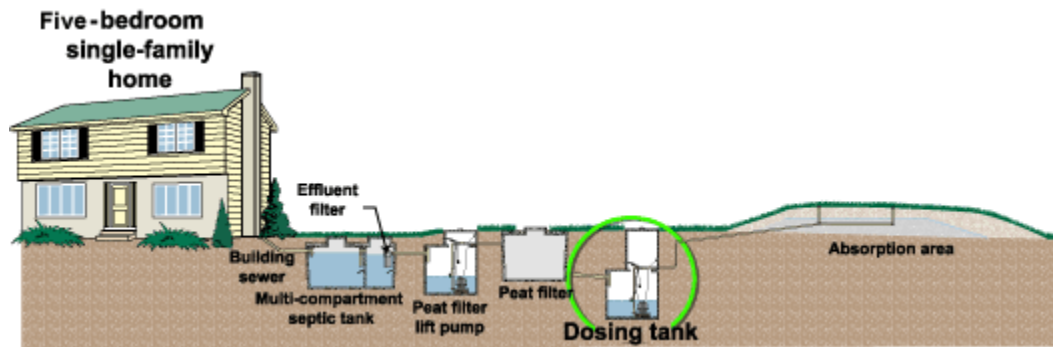
- All drip irrigation systems require a timed dose to the absorption area.

Distribution to the Absorption Area



Sections 73.43 and 73.44

The design requirements for pressure distribution to the absorption area are listed in the regulations. Refer to the sections listed above for more information on pressure distribution.



Possible Option 1 System Configuration

Absorption Area Options Review



Sections 73.52, 73.53, and 73.55



Sections 9 and 12

An alternate peat system option 1 may be used with:

- Conventional in-ground absorption area
- Conventional elevated absorption area
- Alternate at-grade bed
- Alternate drip irrigation system

Please consult the sections of the regulations and guidance shown above to review the requirements for each absorption area.

Absorption Area Options System Sizing for the Conventional In-Ground and Elevated Absorption Areas and the At-Grade Bed



Section 73.16 Table A

TABLE A
Minimum Aggregate Absorption Area Requirements for Treatment Tank Effluent:

Average Percolation Rate Expressed as Minutes Per Inch	Square Feet of Aggregate Area Per Gallon Per Day	
	All Systems Except Elevated Sand Mounds and Subsurface Sand Filters	Subsurface Sand Filters and Elevated Sand Mounds
Less than 3.0 ⁴	Unavailable	Unavailable
3 - 5 ⁴	Unavailable	
6 - 15 ⁴		

To size the absorption area and determine the minimum square footage of the absorption area aggregate, you need to know the percolation rate of the soil. The table mentioned above gives formulas for determining the minimum square feet of aggregate area required depending on the gallons-per-day flow. **Click on the graphic above to see a larger version of Table A now.**

Percolation rate requirements for peat system option 1 are covered in lesson 2-1 of this course and are listed in the Alternate Systems Guidance Document, under peat filter option 1 testing criteria. The guidance can be found in "job aids."

Note: The alternate at-grade system used with a limiting zone of 20 inches or more is sized the same way a conventional sand mound is sized. Use the "Subsurface Sand Filters and Elevated Sand Mounds" column in the table for an at-grade bed.

Absorption Area Options

System Sizing For an At-Grade Bed With a Limiting Zone of Less Than 20 Inches



Section 3.B.3.c(2)

The absorption area bed for an at-grade bed used with a limiting zone of less than 20 inches is sized with the help of the HLLR table in appendix 5 of the guidance. A qualified soil scientist (covered in lesson 2-1) will assign a horizontal linear load from the HLLR table, and this rate will be used to size the absorption area bed.

Appendix 5 is in the Alternate Systems Guidance Document in the "job aids."

Absorption Area Options

System Sizing For a Drip Irrigation System



Section 12

The drip irrigation zones are sized according to the soil morphological evaluation. Refer to the Drip Irrigation System Web-based course or the guidance for more information on sizing the drip zones.

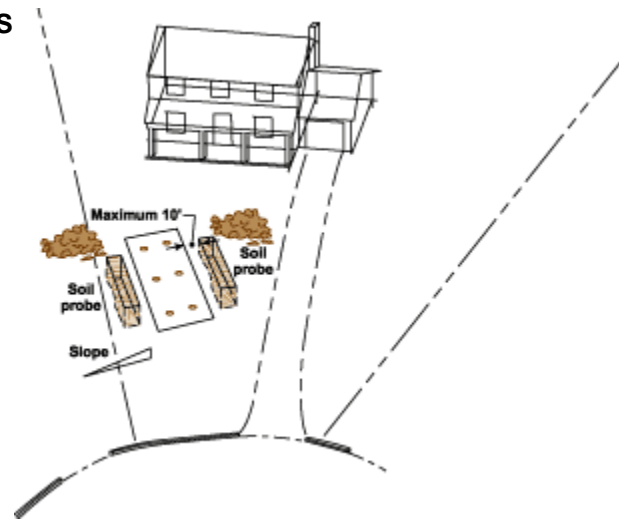
Absorption Area Options



Section 3.B.2.a

ABSORPTION AREA SIZING REDUCTIONS

If the percolation rate is between 3 and 60 minutes per inch, the size of the absorption area for an alternate peat system option 1 may be reduced up to 40 percent. This reduction may only be applied to in-ground beds and trenches, sand mound beds and trenches, and alternate at-grade absorption beds when the limiting zone is equal to or greater than 20 inches.



Absorption Area Options



Sections 3.B.4.d and 3.B.4.e

Before taking the 40 percent absorption area reduction for a peat system option 1 at a new dwelling, the soil profile evaluations and percolation testing must document that a sufficient area exists for a full-size absorption area to be installed.

Note: At-grade beds with a limiting zone of less than 20 inches and drip irrigation systems do not allow reductions in the size of the absorption area.

Absorption Area Options

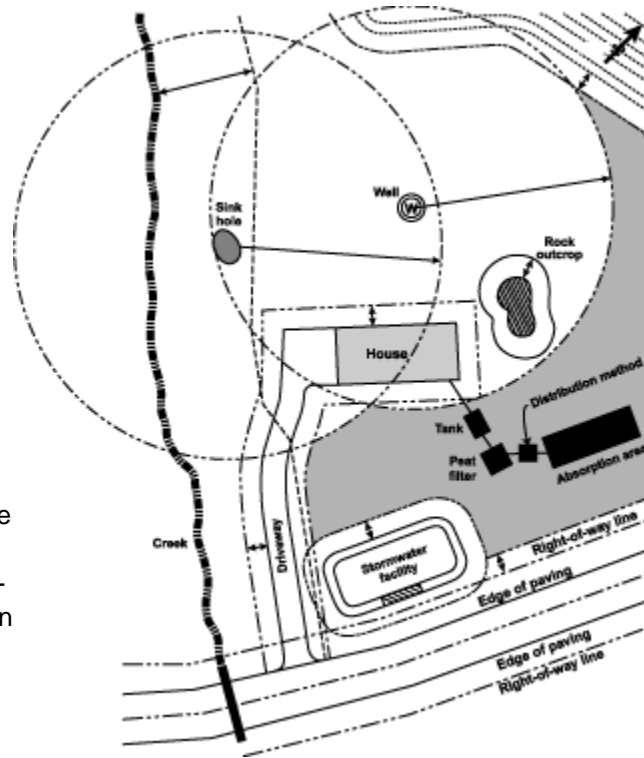
System Repairs



Section 3.B.2(e)

Whenever system repairs involve reducing the size of the absorption area, try to maximize the absorption area sizing up to the square footage of a full-size absorption area.

Using the largest size absorption area as possible will help to limit malfunctions in the future. Remember, too, that it is important to meet critical standards, such as the 100-foot well isolation distance to the absorption area aggregate.



Absorption Area Options

ABSORPTION AREA SIZING REDUCTIONS



Section 3.B.4.c

Alternate peat system option 1 is the only option that allows a possible reduction in the size of the absorption area, depending on the disposal method. A sizing reduction will not apply to either option 2 or option 3 peat based systems.

If a peat system option 1 qualifies for a reduction in the size of the absorption area and the designer decides to take the reduction, then no further sizing reductions may be taken—even if an aerobic tank or leaching chambers are used in the design. **Reductions are not cumulative.**

Review



SEO Lorraine Green has received a design for an onlot system using a peat filter and an at-grade bed to serve a new dwelling. The designer has proposed a 40 percent reduction in the size of the absorption area, and testing has shown that a full-size absorption area is available. The designer's reasoning for the reduction is to minimize the downslope height of a level-top at-grade bed. The SEO could:

- A) Explain that at-grade beds do not have to have a level top.
- B) Encourage a return to the full-size absorption area because no compelling need for reduction has been shown and at-grade bed construction costs are minimal.
- C) Issue a permit.
- D) All of the above.

Submit

Lesson Review

Design Criteria

A) Building sewer

- Must meet the requirements of the regulations.

B) Primary treatment

- Either a septic tank(s) or an aerobic tank may be used.
- Rectangular multi-compartmented septic tank or two rectangular tanks in a series must be used.
- A Zabel A-300 or equivalent NSF-approved filter must be used.

C) Secondary treatment

- The peat filter provides the secondary treatment.

Lesson Review

Design Criteria

D) Distribution method to the peat filter

- Gravity flow or pump tank/lift pump, depending upon the elevation change on the site and/or what brand of peat filter is used.
- If a pump is needed to dose the peat filter, it must be on a timed dose.

E) Available disposal area options

- In-ground trenches or seepage beds
- Elevated sand mound trenches or beds
- At-grade beds
- Drip irrigation system

Lesson Review

Site Testing Criteria

F) Absorption area size reduction

- A percolation rate of 3 to 60 min./in. allows the size of an absorption area to be reduced up to 40 percent with an alternate peat filter option 1 system.
- A percolation rate of 61 to 180 min./in. **does not** allow for a size reduction.
- An at-grade bed if the limiting zone is less than 20 inches does not allow for any reductions.
- A drip irrigation system does not allow for any size reductions.

Note: If you have more questions about the system after completing this course, refer to the DEP Alternate Systems Guidance document in the “job aids.”

What You Will Learn in This Lesson

Of the various disposal methods available with the peat system option 1, the at-grade bed allows the system to be used on a site with the least amount of suitable soil. The minimum suitable soil depth requirement is 10 inches to a seasonal high water table and 16 inches to rock. However, whenever there is less than 20 inches of suitable soil, disinfection of the effluent is required.

In this lesson, you will learn about using a UV light with the peat system option 1 component to provide disinfection of the effluent.

Specifically in this lesson, you will learn . . .

- the conditions that must be met for disinfection to be used with an at-grade bed
- how a UV light provides disinfection (to further reduce disease-causing organisms) before effluent is discharged to the absorption area
- the design of the UV disinfection unit
- the maintenance of the disinfection unit
- the role of the SEO in permitting a system with a UV disinfection unit

Unit Review

In the previous two lessons of this unit, we discussed the minimum suitable soil depths that must be met to be able to use certain disposal methods with an alternate peat based system option 1.

Below is a list of the various final treatment/disposal methods approved for use with this type of peat system and the absolute minimum soil depths that must be met:

- Conventional in-ground trenches: inches **20**
- Conventional in-ground seepage beds: inches **20**
- Conventional elevated sand mound beds or trenches: inches **60**
- Alternate at-grade absorption area beds: **16**
 - inches to a seasonal high water table **60**
 - inches to rock **60**
- Alternate drip irrigation systems: inches **10**

Using the At-Grade Bed on Sites with Less than 20 Inches of Suitable Soil CONDITIONS THAT MUST BE MET

For sites with less than 20 inches of suitable soil, the only disposal method that can be used with a peat filter option 1 is the at-grade bed. However, to use the alternate peat based system option 1 component on such a site, the following four conditions must first be met:

- 1) Suitable soil depth may be no less than 10 inches to a seasonal high water table and 16 inches to rock.
- 2) Slope cannot exceed 12 percent.
- 3) In place of percolation testing, a soil morphological analysis must be conducted by a soil scientist who is either a professional member of the Pennsylvania Association of Professional Soil Scientists or a qualified soil scientist as defined in Chapter 73 of the regulations. This analysis must verify the soil morphology of the proposed absorption area and determine the loading rate and hydraulic loading rate of the soil. For more information, go to "Soil Morphological Analysis Done by a Soil Scientist" under "job aids."
- 4) The effluent must pass through a UV disinfection unit before going to the at-grade bed.



Section 3.B

Section 3.B of the guidance allows an at-grade bed to be used with a suitable soil depth of less than 20 inches if UV disinfection is added to the system.

Using the At-Grade Bed on Sites with Less than 20 Inches of Suitable Soil

REVIEW

To be able to use an alternate peat based system option 1 with an at-grade bed on a site with less than 20 inches of suitable soil, the following conditions must be met:

- Suitable soil depth may be no less than _____ inches to a seasonal high water table
or _____ inches to rock.
- Slope cannot exceed _____ percent.
- A soil morphological analysis must be conducted by a qualified soil scientist.
- The effluent must pass through a UV unit before going to the at-grade bed.

Submit

Reset

Using the At-Grade Bed on Sites with Less than 20 Inches of Suitable Soil

REVIEW



May an alternate onlot system with a peat based system option 1, UV disinfection, and an at-grade bed be used on a site that meets the following testing criteria?

- limiting zone at 12 inches due to rock
- soil morphological analysis completed by qualified soil scientist
- slope of 10 percent

A) Yes

B) No

Submit

Using the At-Grade Bed on Sites with Less than 20 Inches of Suitable Soil

REVIEW



May an alternate onlot system with a peat based system option 1, UV disinfection, and an at-grade bed be used on a site that meets the following testing criteria?

- limiting zone of 11 inches to seasonal high water table
- soil morphological analysis completed by qualified soil scientist
- slope of 15 percent

A) Yes

B) No

Submit

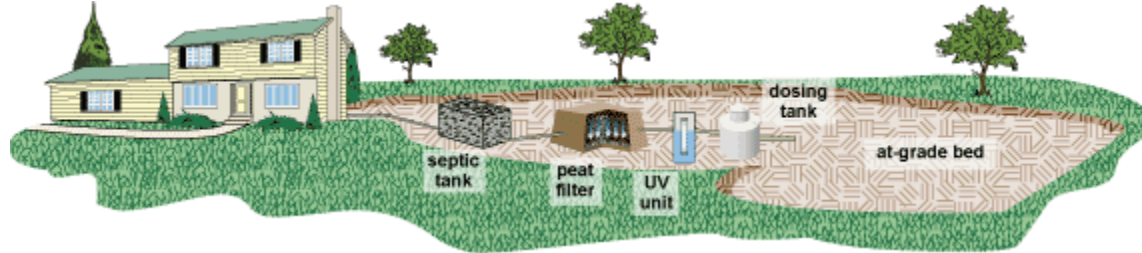
Disinfecting the Effluent

Let's take a look at what occurs in an alternate onlot system with a peat based system option 1 component and an at-grade bed when the limiting zone on a site is less than 20 inches (but no less than 10 inches to a seasonal high water table or 16 inches to rock).

The effluent is first treated in the primary septic or aerobic tank. The effluent then passes through the peat filter for additional renovation.

To further renovate the effluent after treatment in the peat filter, a disinfection unit that uses an ultraviolet (UV) light is added to the system. This light provides disinfection of the effluent before it is discharged to the absorption area.

The disinfection unit is placed after the peat filter and before the dosing tank.



Disinfecting the Effluent

HOW THE DISINFECTION UNIT WORKS

In the disinfection unit, the effluent passes by the UV light, which destroys disease-causing organisms. Disinfecting effluent with a UV light is similar to the disinfection of drinking water with a UV light that is sometimes used to purify water from a contaminated well.

UV disinfection helps to further reduce fecal coliform concentrations to less than 200 per 100 ml. of effluent.

Note: When using UV disinfection to an at-grade bed with a limiting zone of less than 20 inches, no other means of disinfection, such as chlorination, may be used. High levels of disinfectants, such as chlorine, may have negative effects on the necessary soil bacteria in the absorption area.

Disinfecting the Effluent

REVIEW



Select the statement that is true.

- A) UV disinfection occurs **before** the effluent is treated through the peat filter and **before** the effluent is distributed to the at-grade bed.
- B) UV disinfection occurs **before** the effluent is treated through the peat filter and **after** the effluent is distributed to the at-grade bed.
- C) UV disinfection occurs **after** the effluent is treated through the peat filter and **after** the effluent is distributed to the at-grade bed.
- D) UV disinfection occurs **after** the effluent is treated through the peat filter and **before** the effluent is distributed to the at-grade bed.

Submit

Disinfecting the Effluent

REVIEW



True or false? To further reduce fecal coliform concentrations to less than 200 per 100 ml. of effluent, UV disinfection may be supplemented with chlorination in an alternate onlot system with a peat based system option 1 and an at-grade bed.

A) True

B) False

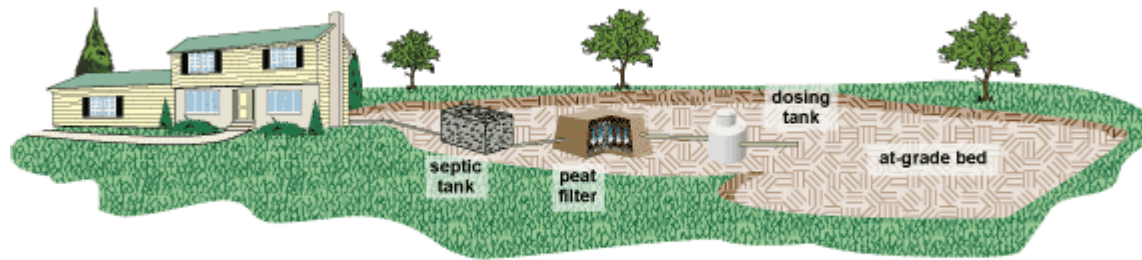
Submit

Design of UV Disinfection System

WHERE IS THE UV DISINFECTION UNIT PLACED?

The UV disinfection unit is placed after the peat filter. Typically the unit is buried in the ground at the entrance to the dosing tank.

Click on the diagram below to see where the UV unit should be installed.



Design of UV Disinfection System

WHAT DESIGN CRITERIA MUST BE MET?



Section 3.B.3.c.2.h

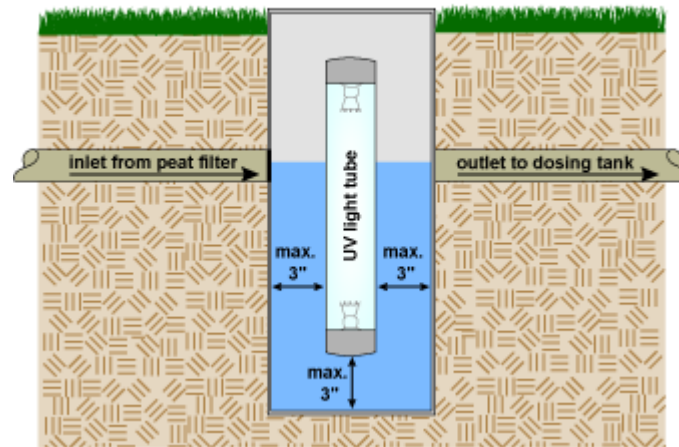
The UV disinfection unit must meet the design criteria described on this and the following three pages:

- The UV light must provide ultraviolet radiation at a level of 254 nanometers that is applied at a minimum dosage of 25,000 microwatt-seconds per square centimeter at all points throughout the water disinfection chamber. The guidance recommends providing a dosage of 30,000 to 35,000 microwatt-seconds per square centimeter.

Design of UV Disinfection System

WHAT DESIGN CRITERIA MUST BE MET? (continued)

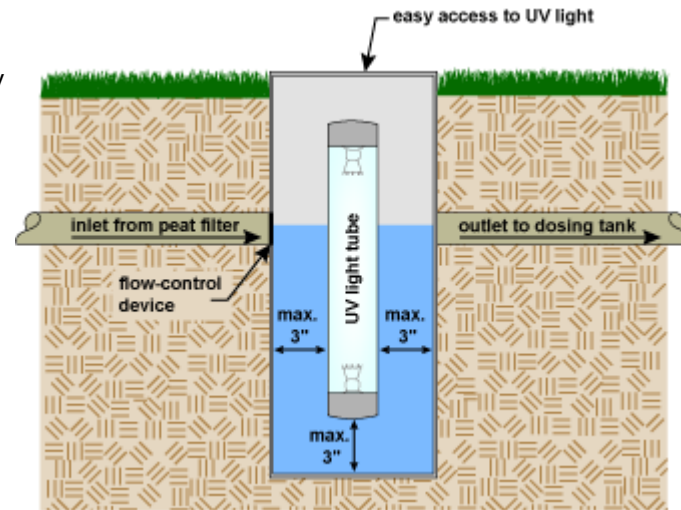
- The ultraviolet tube must be jacketed in quartz or high-silica glass so that an operating temperature of 104 degrees Fahrenheit is maintained in the tube.
- The maximum water depth in the chamber, measured from the tube surface to the chamber wall, is 3 inches.



Design of UV Disinfection System

WHAT DESIGN CRITERIA MUST BE MET? (continued)

- The unit must be designed to allow the water contact surface of the UV tube jacket to be mechanically cleaned frequently without disassembly of the unit.
- A device must be installed to limit the flow rate of the effluent to the maximum design flow of the treatment unit.



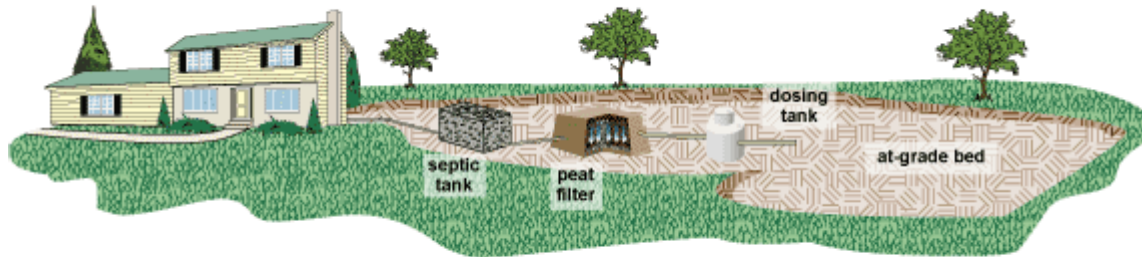
Design of UV Disinfection System

Click on the graphic below to indicate where the UV disinfection unit should be placed.

REVIEW



The suitable soil depth for the system design shown is less than 20 inches. A UV disinfection unit needs to be added. Where should the UV disinfection unit be located?



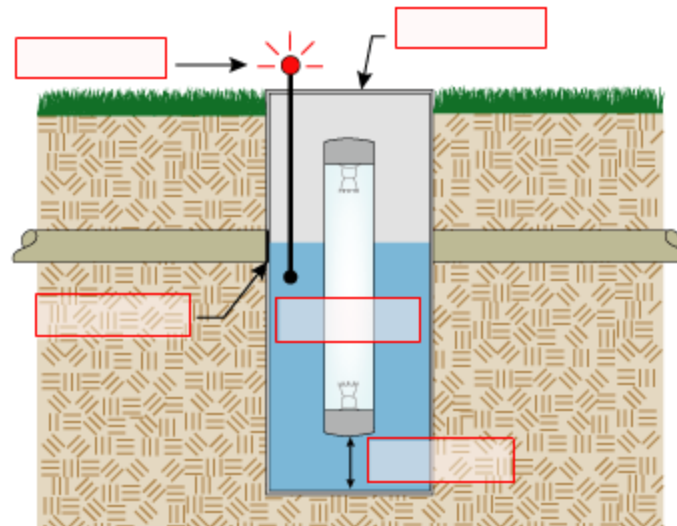
Design of UV Disinfection System

REVIEW

Drag each of the design criteria below to its correct location on the diagram of the UV disinfection unit.

1. **UV light** provides ultraviolet radiation at a level of 254 nanometers applied at a minimum dosage of 25,000 microwatt-seconds per square centimeter. The UV tube is jacketed in quartz or high silica glass to maintain operating temperature of 104 degrees F.
2. **Max. 3-in.** water depth, measured from tube surface to chamber wall
3. **Flow-control device** to limit flow of effluent to maximum design flow of treatment unit
4. **Access** to allow frequent cleaning of UV light tube without disassembly of unit
5. **Alarm light** to warn of burned-out UV bulb

Note: Although the above design criteria must be met, the actual appearance of the UV unit will vary depending on the manufacturer and the flow path (gravity or pressurized) of the effluent to the unit.



Maintenance Issues



Sections 3.A.4.a and b

INSPECTIONS

- Every month, the property owner must inspect the disinfection unit to make sure the unit is clean and functioning within the specifications of the manufacturer.

Maintenance Issues

INSPECTIONS

- Every six months, the maintenance entity must inspect the unit and a qualified technician must determine if the unit meets the minimum standards of the alternate guidance. Under Section 72.25(h) of the regulations, the maintenance entity is an individual, firm, or corporation experienced in the operation and maintenance of the sewage treatment system. Although it is often a private third party, the maintenance entity could also be the municipality or its designated local agency.
- During the six-month inspection, the manufacturer recommends that the UV tube be pulled out of the unit and wiped clean. The bottom of the unit should also be checked for any solids that may have settled there. If necessary, the settlement should be flushed away with water from a hose.

Maintenance Issues

MAINTENANCE

- At least once a year, a laboratory must test the effluent discharged to the system. The sample must be taken following the disinfection unit and should be tested for fecal coliforms, carbonaceous biological oxygen demand (CBOD), and suspended solids. A copy of the lab results and the inspection documents must be sent to the local agency.
- At least once a year, the UV tube should be replaced. The replacement should be made earlier if an inspection reveals the need for a new light.
- To ensure that appropriate UV dose levels are maintained, a warning alarm must be functioning properly to alert the homeowner that a UV bulb is burned out and needs replaced.
- A spare UV tube and other necessary equipment must be available to allow for prompt repair of the UV unit.

Maintenance Issues

REVIEW



True or false? The property owner must inspect the disinfection unit every six months.

A) True

B) False

Submit

Maintenance Issues

REVIEW



True or false? The maintenance entity (an individual, firm, or corporation experienced in operation and maintenance of sewage treatment systems or the municipality or its designated local agency) must inspect the disinfection unit every six months.

A) True

B) False

Submit

Maintenance Issues

REVIEW



The guidance requires a copy of the lab results testing the discharge to the system to be sent to the _____ at least once a year.

- A) regional DEP office
- B) homeowner
- C) maintenance entity
- D) local agency

Submit

Maintenance Issues

REVIEW



True or false? The homeowner must check the unit a minimum of every week to make sure the UV bulb in the disinfection unit is not burned out.

A) True

B) False

Submit

Role of the SEO

An SEO who successfully completes the Alternate Peat Based System Web-based course and the Alternate At-Grade Bed System Web-based course has a role to play in the permit issuance, final inspection, and maintenance of a system using an alternate peat based system option 1 with an at-grade bed.

PERMIT ISSUANCE

An SEO who successfully completes the required courses may independently review the system design and, if the design is accurate, issue the permit.



Section 3.B.4.a

Role of the SEO

FINAL INSPECTION

When conducting the final inspection of a system that calls for a UV disinfection system, the SEO must make sure the UV unit is installed properly and is working correctly. This inspection would include making sure the UV light is on, checking it with the calibrated UV intensity meter, if one is available, and ensuring that the signal alarm operates properly.

MAINTENANCE

The UV disinfection unit requires maintenance that the homeowner must be made aware of. Before a permit is issued, the SEO should make sure the maintenance entity is named and a maintenance schedule is set up. The SEO could perform the scheduled maintenance if the local agency has a sewage management program in place.

Role of SEO

REVIEW



An SEO who has successfully completed the Alternate Peat Based System Web-based course and the Alternate At-Grade Bed System Web-based course must perform all of the following duties except:

- A) Review the design and issue a permit for an alternate onlot system calling for a peat based system option 1, UV disinfection, and an at-grade bed.
- B) Conduct a final inspection of the system.
- C) Make sure a maintenance entity is named and a maintenance schedule is set up.
- D) Perform all of the scheduled maintenance on the system as required by the alternate guidance.
- E) All of the above

Submit

Lesson Review



An alternate onlot system that uses a peat based system option 1 and an at-grade bed has the following site requirements:

Enter the correct answer in the blank provided and then click "Submit."

- Slope cannot exceed 12 percent.
- For a site with a limiting zone of less than 20 inches, a soil morphological analysis must be conducted by a qualified soil scientist.
- Suitable soil depth may be no less than 10 inches to a seasonal high water table and 16 inches to rock.
- The system requires UV disinfection if the site has less than _____ inches of suitable soil.

Submit

Reset

What You Will Learn in This Lesson

We are now going to discuss the alternate peat system option 2. With this option, a peat filter is used in place of an intermittent sand filter in an IRSIS. IRSIS is normally a conventional system, so we will be relying on the standards set forth in Chapter 73 of the regulations. Keep in mind that IRSIS may only be used to serve single-family residential dwellings.

We will first cover the site testing criteria that must be evaluated for proposed option 2 system installations:

- 1) Isolation distances
- 2) Slope
- 3) Suitable soil depth

IRSIS



Spray riser

Isolation Distances

IRSIS



Section 73.13(b)

When using an alternate peat system option 2, the isolation distance requirements to the tanks are the **same** as for a conventional system. When working with an IRSIS option 2 system, the tank isolation distance requirements outlined in the above section must be followed.

[Click here for a review of Minimum Horizontal Isolation Distance Requirements.](#)

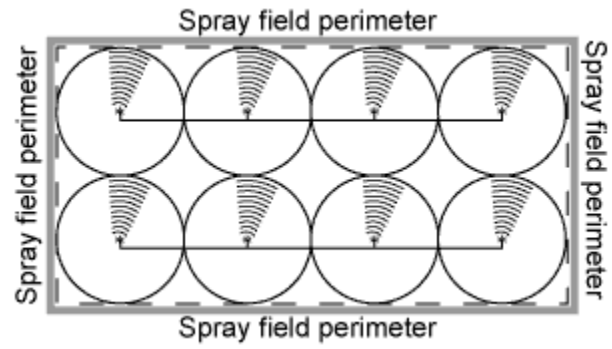
Isolation Distances

IRSIS



Section 73.13(d)

The section above describes the minimum horizontal isolation distances that must be maintained from the wetted perimeter of the IRSIS spray field. Please consult that section of the regulations for specifics.

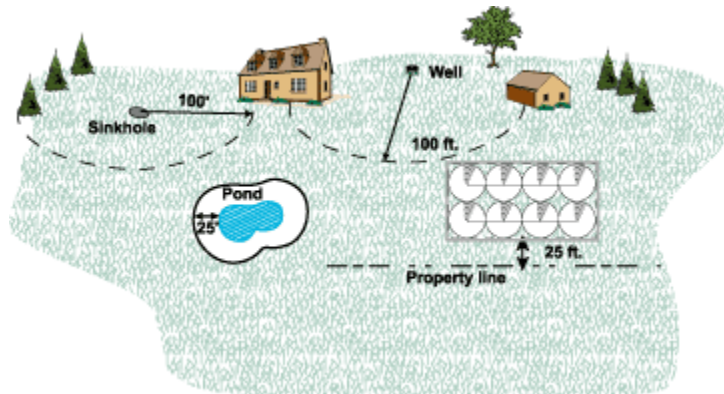


Review



Below is a graphic of a proposed option 2 IRSIS disposal area.

Click on the minimum isolation distance to the wetted perimeter of the spray field that is incorrect.



- A) 100' to a sinkhole B) 100' to a well C) 25' to a pond D) 25' to the property line

Submit

Slope

IRSIS

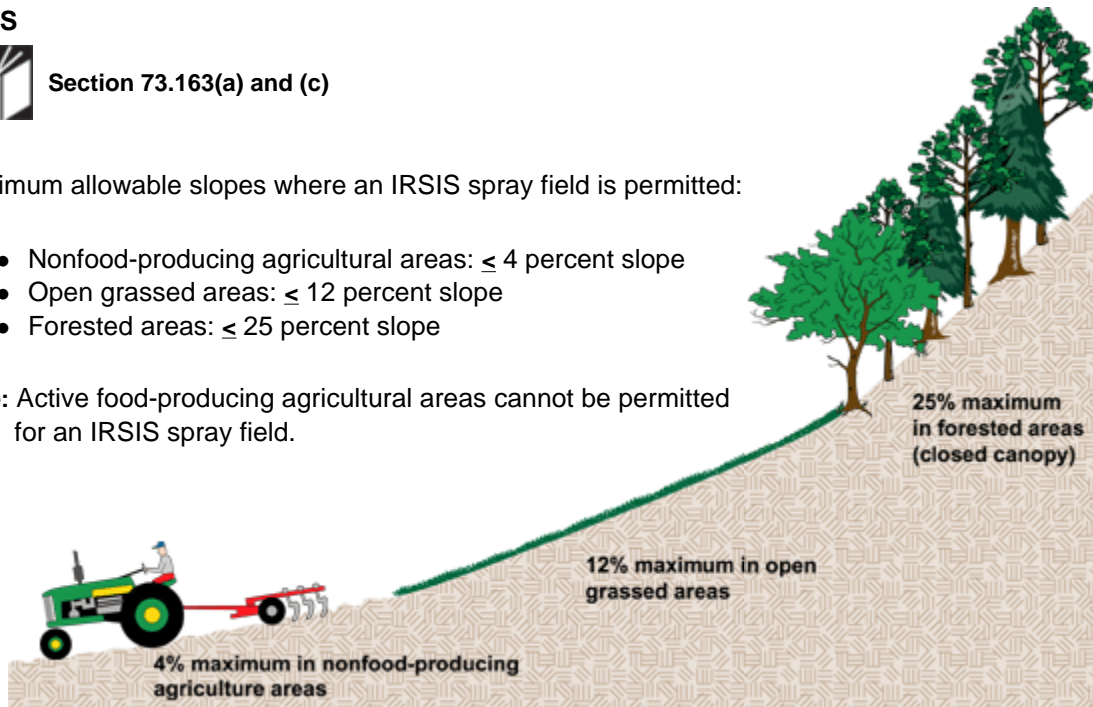


Section 73.163(a) and (c)

Maximum allowable slopes where an IRSIS spray field is permitted:

- Nonfood-producing agricultural areas: ≤ 4 percent slope
- Open grassed areas: ≤ 12 percent slope
- Forested areas: ≤ 25 percent slope

Note: Active food-producing agricultural areas cannot be permitted for an IRSIS spray field.



Review



Chester Smith, a township SEO, is evaluating sites with the slope measurements listed below. Which of these sites have allowable slopes for the listed disposal areas?

Click all that apply.

- A) IRSIS on a 10 percent slope in an open, grassed area.
- B) IRSIS on a 22 percent slope in a forested area.
- C) IRSIS on an 8 percent slope in a nonfood-producing agricultural area.

Submit

Reset

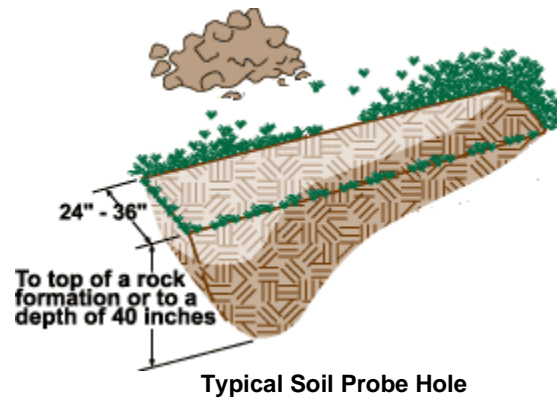
Suitable Soil Depth

IRSI



Section 73.14(b)

A minimum of four soil profile evaluation probes must be dug for a proposed IRSIS with a planned spray field of $\leq 20,000$ square feet. These profiles must be excavated to a depth of 40 inches or to the depth of a rock formation, whichever is shallower. The profiles must be evenly spaced within 10 feet of the perimeter of the proposed spray field.



Consult the above section of the regulations for more information on site conditions for spray fields $>20,000$ square feet.

Suitable Soil Depth

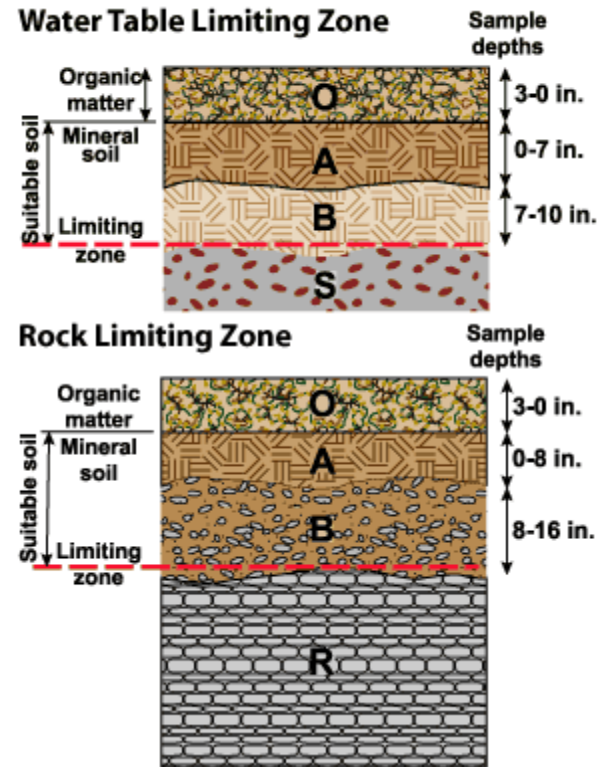
IRSIS

Listed below are the suitable soil depth requirements for using an IRSIS.



Section 73.163(b)

- **10 inches** of suitable soil measured from the mineral soil surface to the top of a **seasonal high water table limiting zone**.
- A minimum of **16 inches** of suitable mineral soil measured from the soil surface to the top of a **rock limiting zone**.



Review



SEO Samuel Gray is verifying several sites for possibly installing an IRSIS with a peat option 2 component. The suitable soil depths listed below are evident at the sites. Which of these sites may SEO Gray not approve?

Click all that apply.

- A) 18 inches to [mottling](#).
- B) 15 inches to a rock limiting zone

Submit

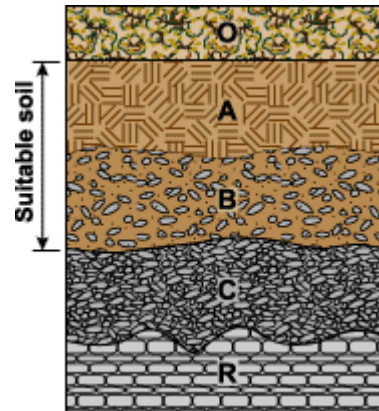
Reset

Percolation Rate

No percolation testing is required for an IRSIS since the treated effluent will be dispersed in the upper horizons of the soil.

Theory

The effluent is dispersed at the ground surface for an IRSIS. As the theory goes, by the time [transpiration](#) has occurred, the effluent that remains will only travel through the A and B horizons at most before it is taken up by the root systems of plants. The A and B horizons have the highest renovation capacity.



Lesson Review

SITE TESTING CRITERIA

A) Isolation distances

- Must meet the requirements of the regulations.

Lesson Review

Drag the amounts into the correct location to fill in the blanks below.

SITE TESTING CRITERIA

B) Maximum slope measurements

- IRSIS spray field: **≤25%**
 - Nonfood-producing agricultural areas: slope **≤4%**
 - Open grassed areas: slope
 - Forested areas: slope **≤12%**

Lesson Review

Drag the amounts into the correct location to fill in the blanks below.

SITE TESTING CRITERIA

C) Minimum suitable soil depth

- IRSIS spray field:
 - inches from the mineral soil surface to the top of a seasonal high water table limiting zone ≥ 16
 - inches from the mineral soil surface to the top of a rock limiting zone ≥ 10

Lesson Review

SITE TESTING CRITERIA

D) Percolation rate

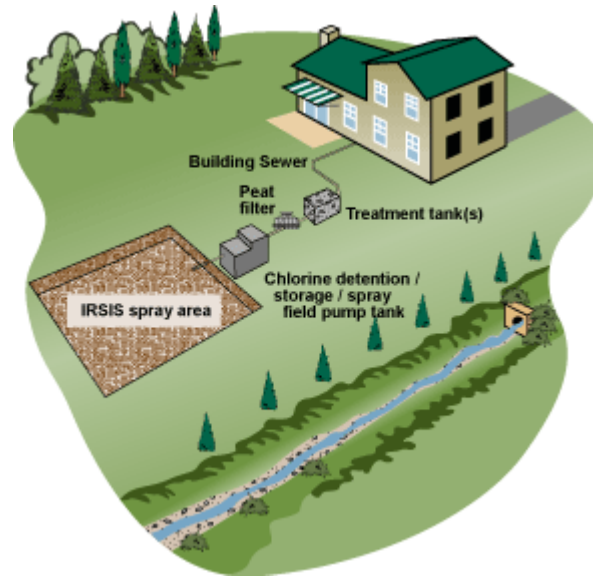
- No percolation testing required for an IRSIS.

Note: If you have more questions about the peat based system after completing this course, refer to the DEP Alternate Systems Guidance document in the “job aids.”

What You Will Learn in This Lesson

In this lesson, you will learn about the design criteria for a system using an alternate peat system option 2. In this option, a peat filter replaces an intermittent sand filter in IRSIS. We will cover how the system components listed below should be configured to comply with both the DEP Alternate Systems Guidance document (guidance) and the regulations for an option 2 system.

- Building sewer
- Primary treatment
- Distribution method to the peat filter
- Secondary treatment
- Distribution method to the spray field
- Spray field disposal area



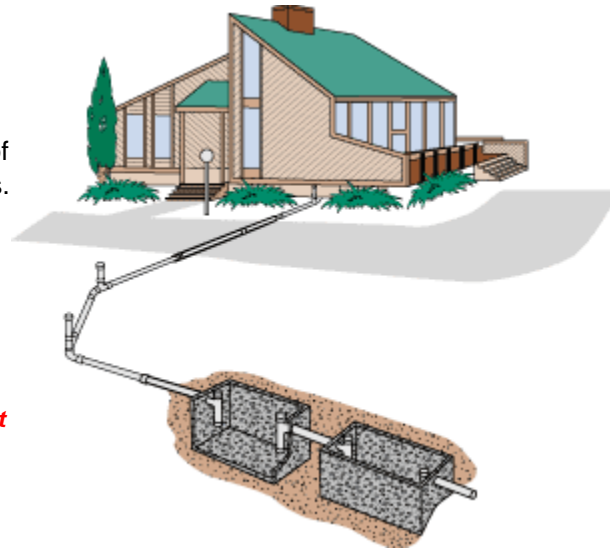
Building Sewer



Section 73.21

The guidance does not address the subject of building sewers when using option 2 systems. When the guidance is silent, use the regulations. In this case, the building sewer must meet **all** the requirements listed in the regulations.

Click on the building sewer graphic to the right for a detailed version including requirements.



Please consult the section of the regulations shown above to review the requirements for building sewers.

Primary Treatment Tank(s)

Whenever a peat system option is used, either septic or aerobic tanks provide the primary treatment of the effluent. All peat systems also require a Zabel A-300 solids retainer or equivalent NSF-approved filter on the preceding septic or aerobic tank.



Zabel A-300 Series Solids Retainer

Primary Treatment Tank(s)

SEPTIC TANKS



Section 73.31

Rectangular Septic Tanks in a Series (top view)



If a septic tank(s) is used as the primary treatment with the alternate peat system option 2, the tank(s) must meet all the regulations regarding septic treatment tanks.

The guidance further requires the septic treatment tanks be either a **multiple-compartmented rectangular tank** or **two rectangular tanks in a series**, since both produce lower total suspended solids than round tanks.

Round tanks **cannot** be used with any alternate system option.

Primary Treatment Tank(s)

AEROBIC TANKS

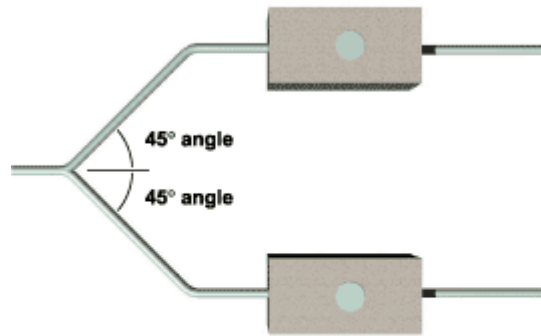


Section 73.32

If aerobic tanks are used as the primary treatment with the alternate peat system option 2, the aerobic tanks must comply with the regulations.

Please consult the section of the regulations shown above to review the requirements for aerobic tanks.

Aerobic Tanks in Parallel



Aerobic Tanks in Parallel

NOTES:

- Tanks must have equal capacity and receive equal loading.
- Multiple aerobic tanks are only permitted where the tanks are connected in parallel.
- There must be a flow diverter or equalizer before the pipes split to the tanks.

Primary Treatment Tank(s)

AEROBIC TANKS – SIZE REDUCTIONS

No spray field sizing reductions of any kind may be taken when using an alternate peat system option 2. Spray field sizing reductions for using an aerobic tank do not apply to an IRSIS.

Review



Why does the guidance specify that we use a multiple-compartmented rectangular tank or two rectangular tanks in a series as opposed to round tanks?

- A) Rectangular tanks are easier to acquire than round tanks.
- B) Rectangular tanks are less expensive than round tanks.
- C) No research has been done yet to study the efficiency of round tanks.
- D) Rectangular tanks produce lower total suspended solids than round tanks.

Submit

Distribution Method to the Peat Filter

The distribution requirements addressed in this section are specific to dosing the peat filter. Do not confuse the distribution of the effluent to the peat filter with the distribution of the effluent to the IRSIS spray field. The distribution to the spray field will be covered later in this lesson.



Section 3.A.2

Effluent may be distributed from the primary treatment tank(s) to the peat filter by either gravity flow or pump. If a pump is used to lift the effluent to the peat filter, a [timed dose](#) is required. [Demand dosing](#) to a peat filter is not permitted.



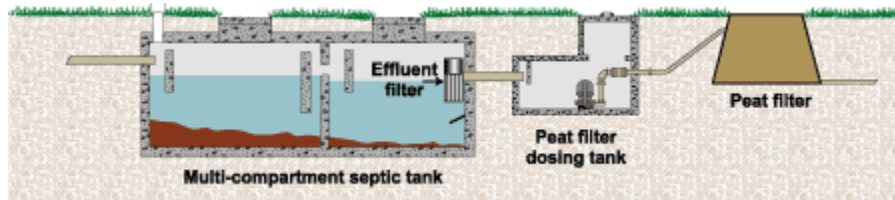
Timed

Review



True or false? When a pump is used to lift the effluent to the peat filter, a timed dose is required.

Sample Peat Filter System Configuration



A) True

B) False

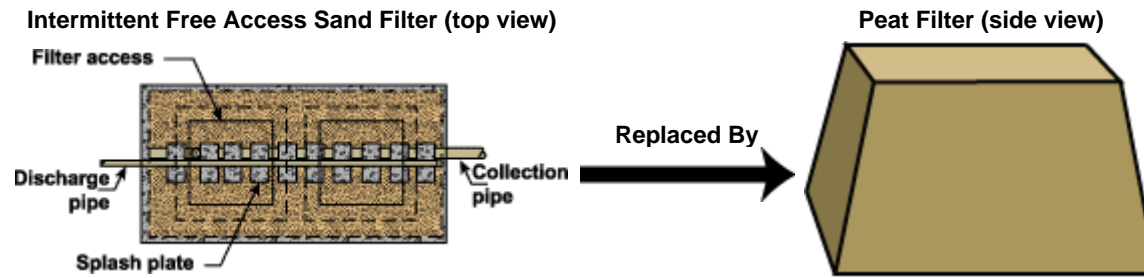
Submit

Secondary Treatment



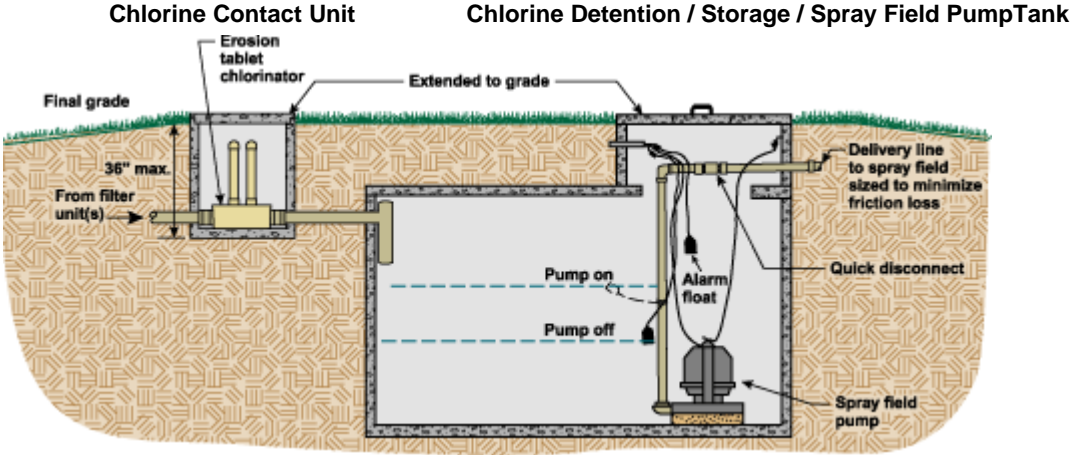
Sections 3.C

The secondary treatment provided by an intermittent sand filter in a conventional IRSIS system is replaced by a peat filter in an IRSIS using an alternate peat based option 2 component.



Spray Field Disposal Area

After the effluent is treated within the peat filter in an IRSIS, it will typically flow from the peat filter collection pipe to the chlorine contact unit. The chlorine contact unit precedes the chlorine detention/storage/spray field pump tank.



Spray Field Disposal Area

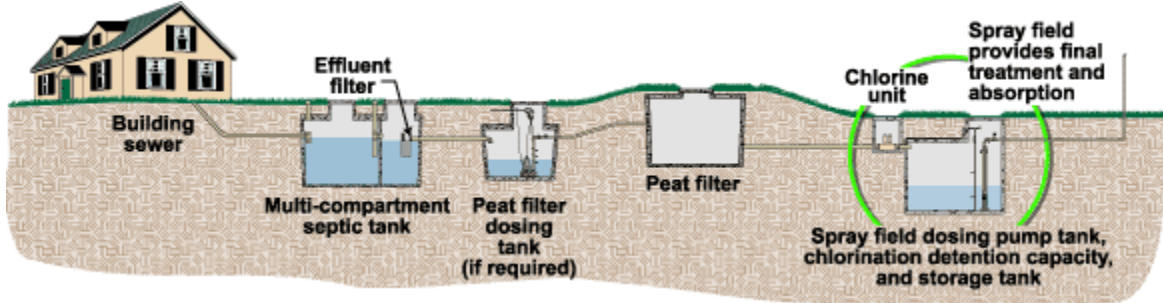
DISTRIBUTION TO THE SPRAY AREA



Section 73.166

The treated effluent in the chlorine contact/storage tank is then pumped to the spray field, which is dosed only once per day and controlled by a timer. The effluent **must** be pumped to the spray field, where final treatment of the effluent takes place.

Typical Option 2 IRSIS Configuration



Spray Field Disposal Area



Section 73.16

The square footage needed for an IRSIS spray field is partially determined by the daily flow. With a single-family dwelling, the minimum flow of 400 gallons per day (gpd) is used and increases by 100 gpd for every bedroom over three. Table B in Section 73.16 lists the square footage of spray area required when certain site conditions are present. To correctly read the table, you will need to know your limiting zone type, limiting zone depth, and slope.



Spray Field Disposal Area



Sections 73.161–73.167

If you have more questions regarding IRSIS systems, please consult Sections 73.161 through 73.167 of the regulations. You may also contact PSATS or DEP for information on available training.

Review



Which of the statements below is FALSE with regard to alternate peat system option 2?

- A) Peat system option 2 uses IRSIS for the disposal area.
- B) Peat system option 2 allows either a timed dose or gravity flow to move the effluent to the peat filter, depending on the brand of filter used.
- C) Peat system option 2 requires gravity flow to move the effluent to the disposal area.
- D) In an IRSIS with an option 2 peat system, the peat filter replaces the secondary treatment usually provided by an intermittent sand filter.

Submit

Lesson Review

DESIGN CRITERIA *Drag the words into the correct locations to fill in the blanks below.*

A) Building sewer

- Must meet the requirements of the .

effluent filter

B) Primary treatment

- Either a septic tank(s) or an aerobic tank may be used.
- Rectangular septic tank or two rectangular tanks in a series must be used.
- A Zabel A-300 or equivalent NSF-approved must be used.

regulations

intermittent sand

multi-compartmented

C) Secondary treatment

- The peat filter provides the secondary treatment by replacing an filter in an IRSIS proposal.

Lesson Review

DESIGN CRITERIA

D) Distribution method to the peat filter

- Gravity flow or a timed dose may be used depending upon elevation change and what brand of peat filter is used.
- If a pump is needed to move effluent to the peat filter, it must always be on a timed dose.

E) Disposal area

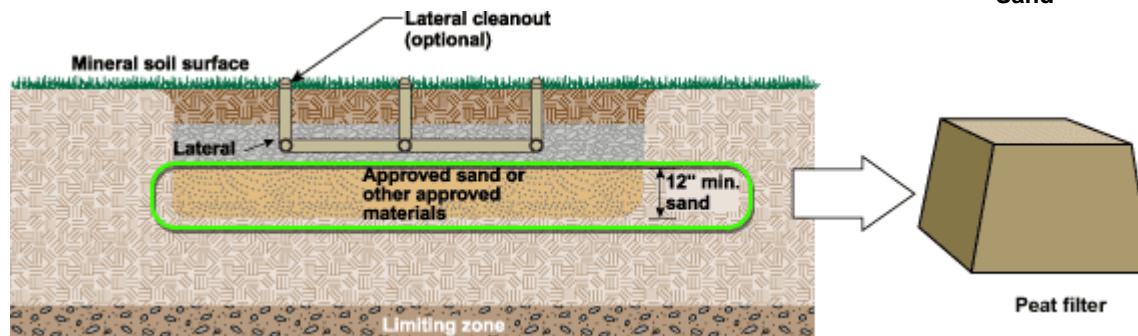
- IRSIS spray field

Note: If you have more questions about the peat based system after completing this course, refer to the DEP Alternate Systems Guidance Document in the “job aids.”

What You Will Learn in This Lesson

The alternate peat system option 3 is the third peat based system configuration described in the Alternate Systems Guidance document (guidance). This option may only be used with the type of absorption area outlined in Section 73.54 of the regulations for subsurface sand filter beds or trenches. However, when an alternate peat filter is used, the subsurface sand filter absorption area is modified by eliminating 12 inches of sand.

Subsurface Sand Filter Absorption Area Cross-Section



What You Will Learn in This Lesson

SYSTEM PRACTICALITY

Subsurface sand filters, as described in Section 73.54 of the regulations, are approved for use in conjunction with a preceding peat filter under the peat system option 3 listed in the guidance. A conventional subsurface sand filter absorption area requires at least 12 inches of sand. Often, however, the design may call for more sand in order to maintain a 4-foot minimum depth of suitable renovating material between the aggregate and limiting zone.

When a subsurface sand filter with a preceding peat filter is designed as an alternate peat system option 3, 12 inches of sand in the sand filter may be eliminated.

In this lesson, you will learn the site testing requirements for an option 3 peat based system used in conjunction with the subsurface sand filter.

Site Testing Criteria

The following site testing criteria for an alternate peat system option 3 must satisfy the requirements of both the guidance and the regulations.

- 1) Isolation distances
- 2) Slope
- 3) Suitable soil depth
- 4) Percolation rate



Site Testing Criteria

A peat option 3 system has the same site requirements as a conventional subsurface sand filter system. *Please consult the following sections of the regulations for specifics.*



Section 73.13 – Isolation Distances



Section 73.54 – Slope

Subsurface sand filter with trenches:

- max. slope - 25%

Subsurface sand filter with seepage bed:

- max. slope - 8%

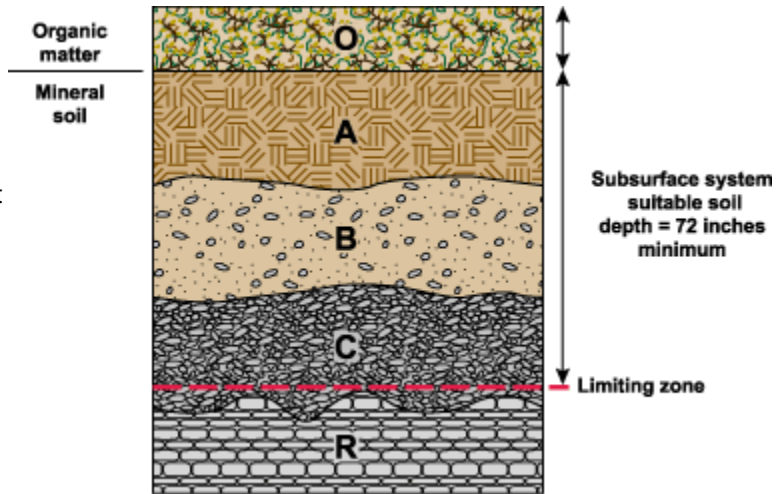
Be aware that the slope can cause a variation in the depth of the excavation cut. The maximum depth of cut from original grade is 60 inches for a peat option 3 to a subsurface sand filter bed.

Suitable Soil Depth



Section 73.54(a)(1)

You must have a **minimum of 72 inches of suitable soil** to consider a subsurface sand filter. If the limiting zone occurs at less than 72 inches from the soil surface, then the site cannot be permitted for a subsurface sand filter.

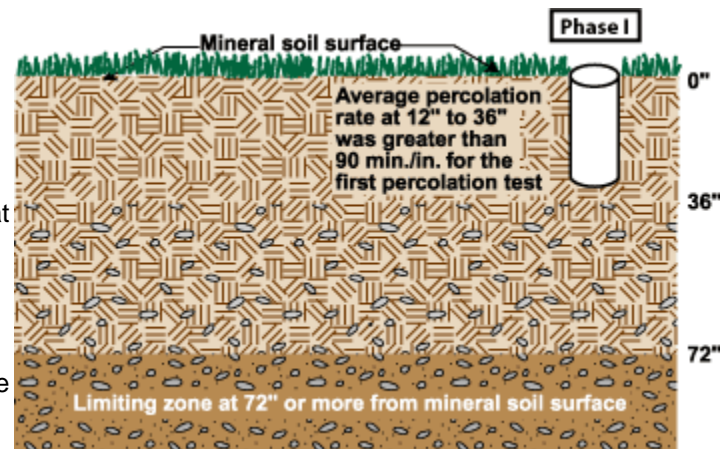


Percolation Rate

Percolation testing for a subsurface sand filter system is more complex than percolation testing for other conventional systems. There are two phases to the testing.

PHASE I

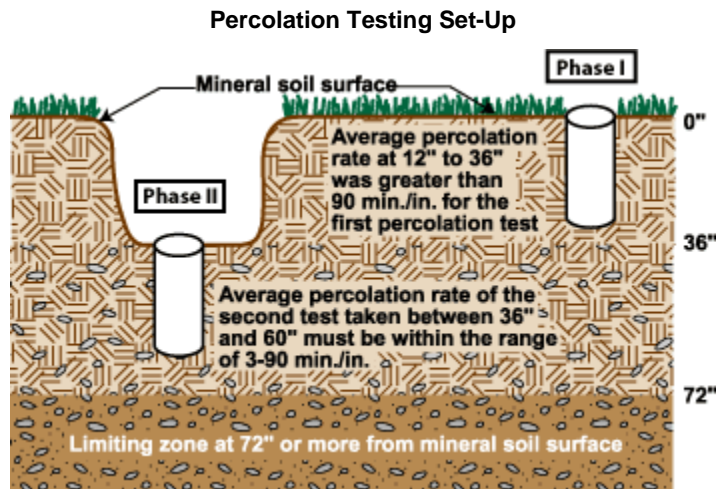
Conduct a percolation test as you would for any other in-ground conventional absorption area by digging the holes to a depth of 12 to 36 inches. If the percolation rate is more than 90 minutes per inch at that depth, then in-ground beds or trenches are determined to be unsuitable. To consider whether a subsurface sand filter absorption area is still possible, phase two of the percolation testing must be conducted.



Percolation Rate

PHASE II

Conduct a second percolation test at a depth between 36 and 60 inches.



Percolation Rate

If the percolation rate at this second depth falls in the range of **3 to 90 minutes per inch**, then a subsurface sand filter absorption area may be used and an alternate peat system option 3 could also be considered for the site.

PHASE II – RESULTS

- 3-90 min./in. = suitable for a subsurface sand filter absorption area
- <3 min./in. = unsuitable for a subsurface sand filter absorption area
- >90 min./in. = unsuitable for a subsurface sand filter absorption area

Percolation Rate and Absorption Area Size



Section 73.16, Table A

To size the absorption area for the subsurface sand filter system, refer to Table A in the regulations section referenced above. *You can also click on the graphic below to see all of Table A now.*

TABLE A
Minimum Aggregate Absorption Area Requirements for Treatment Tank Effluent:

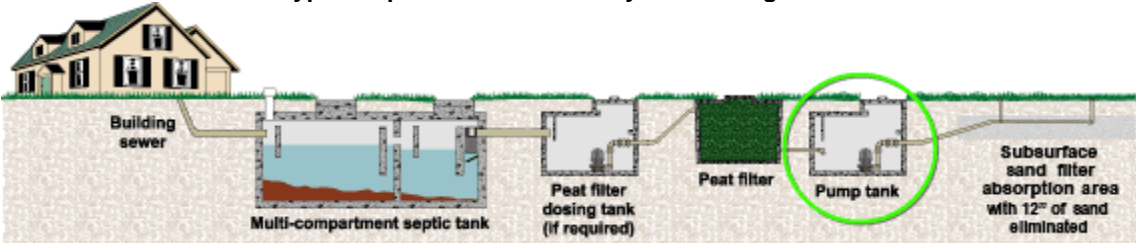
Average Percolation Rate Expressed as Minute Per Inch	Square Feet of Aggregate Area Per Gallon Per Day	
	All Systems Except Elevated Sand Mounds and Subsurface Sand Filters	Subsurface Sand Filters and Elevated Sand Mounds
Less than 3.0 ⁱⁿ	Unavailable	Unavailable
3 - 9 ⁱⁿ	Unavailable	Unavailable
6 - 15 ⁱⁿ		

Note: You may not reduce the square footage of the absorption area in a subsurface sand filter system that also employs a peat system option 3.

Pressure Distribution

All subsurface sand filters must be pressure dosed. Table A in Section 73.16 of the regulations dictates that pressure distribution is required for subsurface sand filters.

Typical Option 3 Subsurface System Configuration



Lesson Review

Click on each of the blanks and type in the maximum slope amounts that may be used with a subsurface sand filter.

SITE TESTING CRITERIA

A) Isolation distances

- Must meet the requirements for conventional systems.

B) Slope

- Seepage bed:

- maximum slope of _____ percent.

- Trenches:

- maximum slope of _____ percent.

Submit

Reset

Lesson Review

SITE TESTING CRITERIA

Drag and drop the correct amounts that may be used with a subsurface sand filter absorption area into their corresponding spaces to the left.

- C) Minimum suitable soil depth 90
- inches. 36
- D) Percolation rate 3
- Phase I Test - At a depth of 12 to inches, percolation rate must be greater than minutes per inch to move to Phase II testing. 72
 - Phase II Test - At a depth of 36 to 60 inches, percolation rate must be within the range of to 90 minutes per inch.

Note: If you have more questions about the peat based system, refer to the DEP Alternate Systems Guidance document in the "job aids."

What You Will Learn in This Lesson

In this lesson, you will learn about the design criteria for an alternate peat system option 3. With this option, a subsurface sand filter absorption area is the final disposal method.

We will discuss how each of the system components listed below should be configured to comply with both the Alternate Systems Guidance document (guidance) and the regulations for an option 3 system.

- Building sewer
- Primary treatment
- Distribution method to the peat filter
- Secondary treatment
- Distribution method to the subsurface sand filter absorption area
- Absorption area

System Components



Section 73.21 – Building Sewer

Consult the section of the regulations shown above to review the requirements for building sewers. These are the same as for conventional systems.



Section 73.31 – Septic Tanks

If a septic tank(s) is used as the primary treatment with an alternate peat system option 3, then the tank(s) must meet all the regulations for septic treatment tanks used in a conventional system. For specifics, review the regulations section shown above.



Section 73.32 – Aerobic Tanks

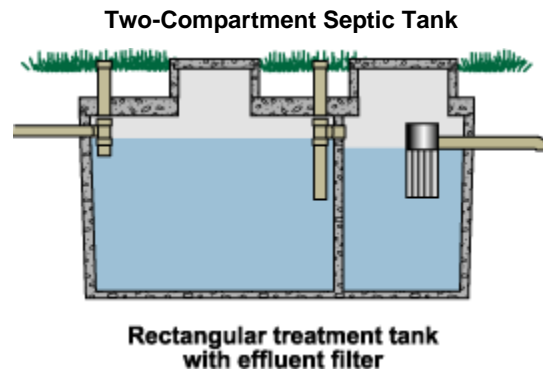
If an aerobic tank is used as the primary treatment with an alternate peat system option 3, then the aerobic tank must comply with the regulations for a conventional system. For specifics, review the regulations section shown above.

Primary Treatment Tank(s)

The guidance requires the treatment tank that precedes the peat unit to have an **effluent filter attached to its outlet pipe**. It must be a Zabel A-300 or other equivalent NSF-approved filter.

The guidance further requires that septic tanks be either a **multiple-compartmented rectangular tank** or **two rectangular tanks in a series**.

Round septic tanks **cannot** be used with any alternate peat system option.



Distribution Method to the Peat Filter

This section discusses the distribution of the effluent **to the peat filter**. It is important to remember that the distribution of the effluent to the peat filter and the distribution of the effluent to the subsurface sand filter absorption area are two different things. The distribution to the absorption area will be covered later in this lesson.



Section 3.A.2

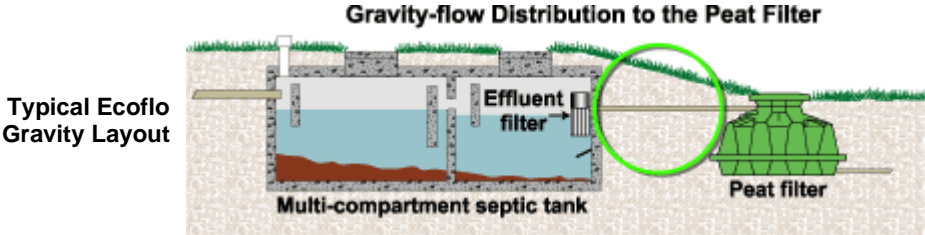
Distribution of effluent from the treatment tank(s) to the peat filter may be done by either gravity flow or pump depending on site conditions and the type of peat filter used. If a pump is used to lift the effluent to the peat filter, a timed dose is required.

Demand dosing is **not** permitted for dosing to a peat filter.

Distribution Method to the Peat Filter – Review

ECOFLO

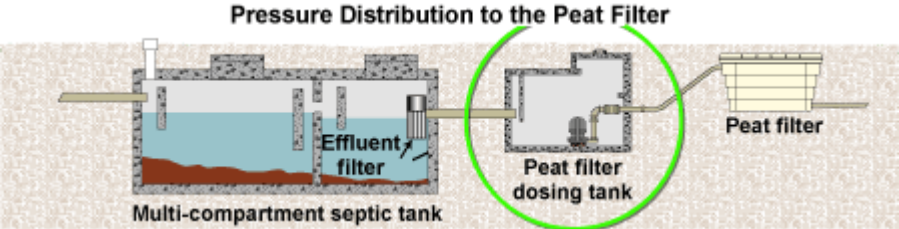
The Ecoflo brand of peat filter may be served by either gravity flow or a timed dosing. Site conditions will govern which method will work best. If a lift pump is needed, then a timed dose is always required.



Typical Ecoflo Gravity Layout

PURAFLO

The Puraflo brand of peat filter must always be served by a pump. A timer will control the dosing.

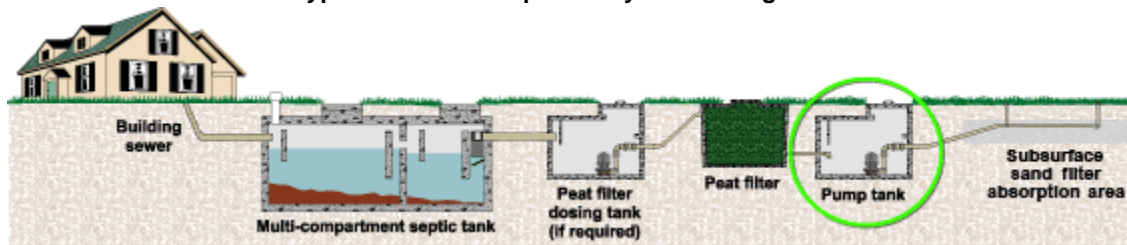


Typical Puraflo Pump Layout

Absorption Area

As stated earlier, the peat system option 3 **can only be used with subsurface sand filter absorption areas**. When using a peat system option 3, 12 inches of sand in the subsurface sand filter may be eliminated.

Typical Peat Filter Option 3 System Configuration



Absorption Area

SYSTEM SIZING



Section 73.54(a)(4)

To size a subsurface sand filter absorption area, use the average percolation rate that was calculated at a depth between 36 and 60 inches. Table A of Section 73.16 of the regulations will then help you figure out the minimum square footage of aggregate required in the subsurface sand filter absorption area.

Click on the graphic below to see all of Table A now.

TABLE A
Minimum Aggregate Absorption Area Requirements for Treatment Tank Effluent:

Average Percolation Rate Expressed as Minute Per Inch	Square Feet of Aggregate Area Per Gallon Per Day	
	All Systems Except Elevated Sand Mounds and Subsurface Sand Filters	Subsurface Sand Filters and Elevated Sand Mounds
Less than 3.0 ^d	Unavailable	Unavailable
3 - 5 ^c	Unavailable	
6 - 15 ^c		

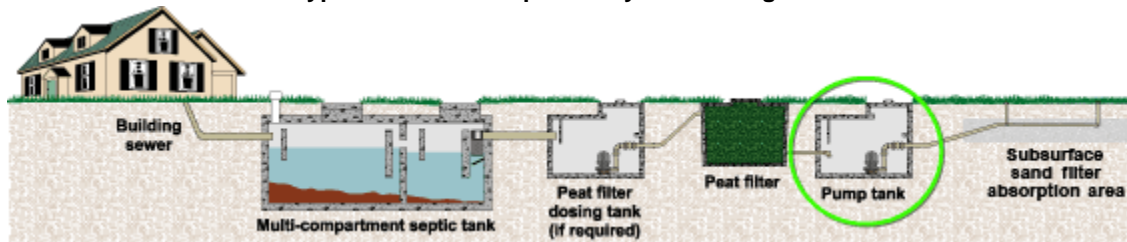
Distribution to the Absorption Area



Section 73.16(c) Table A and Section 73.44

Subsurface sand filter absorption areas are always pressure dosed. The design of the pressurized distribution must comply with the the regulations. Please refer to the regulations referenced above to review the general requirements of pressure dosing to the absorption area.

Typical Peat Filter Option 3 System Configuration



Lesson Review

DESIGN CRITERIA

A) Building sewer

- Must meet the requirements of the regulations.

B) Primary treatment

- Either a septic tank(s) or an aerobic tank may be used.
- Rectangular compartmented septic tank or two rectangular tanks in a series must be used.
- A Zabel A-300 or equivalent NSF-approved effluent filter must be used.

C) Secondary treatment

- The peat filter provides the secondary treatment of the effluent and thus allows 12 inches of sand to be eliminated in the subsurface sand filter absorption area.

Lesson Review

DESIGN CRITERIA

D) Distribution method to the peat filter

- Distribution may be by gravity flow or pump, depending on the site conditions and which brand of peat filter is used.
- If a pump is used, it must be on a timed dose.

E) Available absorption area options

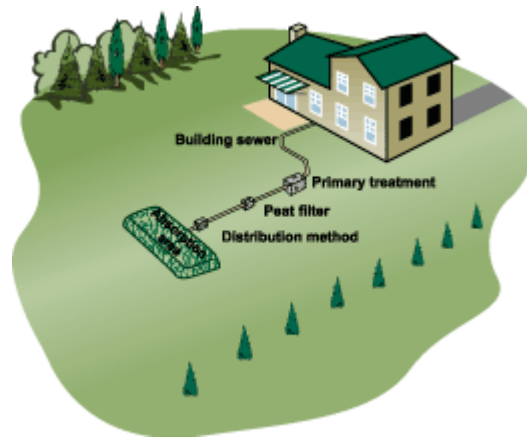
- Disposal may be through a subsurface sand filter seepage bed or trenches.
- No reduction in the size of the absorption area is permitted with a peat system option 3.

Note: If you have more questions about the peat based system after completing this course, refer to

the DEP Alternate Systems Guidance in the “job aids.”

What You Will Learn in This Lesson

In this lesson, you will learn how a peat filter is properly installed as part of an onlot sewage disposal system. Recall that peat filters may be used with several different system configurations, depending on the option used. For installation information on these complete systems, consult the regulations, the Alternate Systems Guidance (guidance), or related Web-based courses.



Peat Filter Unit Installation

ECOFLO

Ecoflo provides a warranty on its products, and an authorized installer must install the unit.

PURAFLO

Puraflo provides a warranty on its products. It also provides either a factory representative to oversee the installation or a certified Puraflo systems installer to install the unit.

Peat Filter Unit Installation – Ecoflo

Since the two Pennsylvania-approved brands of peat filters differ somewhat in terms of installation, we will examine the installation of each brand on its own. We will first cover the Ecoflo unit.

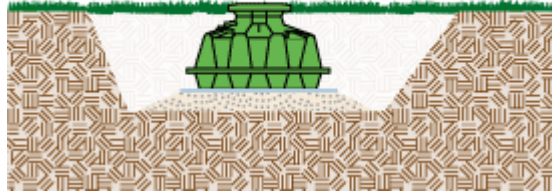
Each Ecoflo unit is designed to treat sewage flows for homes with one to five bedrooms. Six-bedroom homes require two Ecoflo units. Therefore, if an Ecoflo system is to serve a home with six or more bedrooms, the installer will have to excavate for more than one Ecoflo module unit.

Two Ecoflo Filter Tanks With Bags of Peat to be Installed



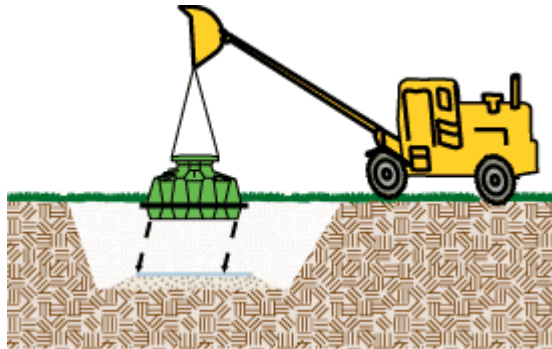
Peat Filter Unit Installation – Ecoflo

An area 10 feet by 15 feet is excavated for each Ecoflo peat filter module. The bottom of the excavated area is covered with 6 inches of sand or other appropriate bedding material and graded to be made level. A 7-mm or heavier geotextile sheet is then laid over top of the bedding material.



Ecoflo Unit Installation

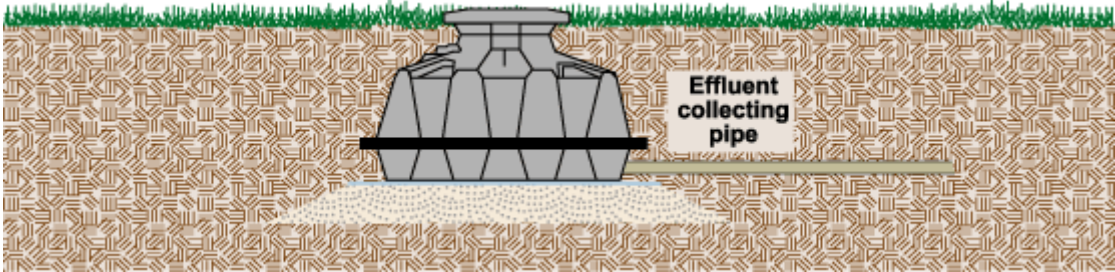
The Ecoflo Biofilter is set in the excavated and prepared area. The filter must be level and in full contact with the surface of the bedding material and geotextile sheet.



Ecoflo Unit Being Placed on the Prepared Surface

Peat Filter Unit Installation – Ecoflo

The biofilter's effluent discharge pipe must connect to either the dosing tank or the gravity-flow distribution box, depending on the system design.



Review

You, as the local agency SEO, stop by to do an interim inspection for a peat option 2 system installation. The new installation is to serve a three-bedroom house. According to the design, the brand of peat filter is Ecoflo.



Given that information, which of the items below would you identify as a problem with the installation?

Click on all that apply.

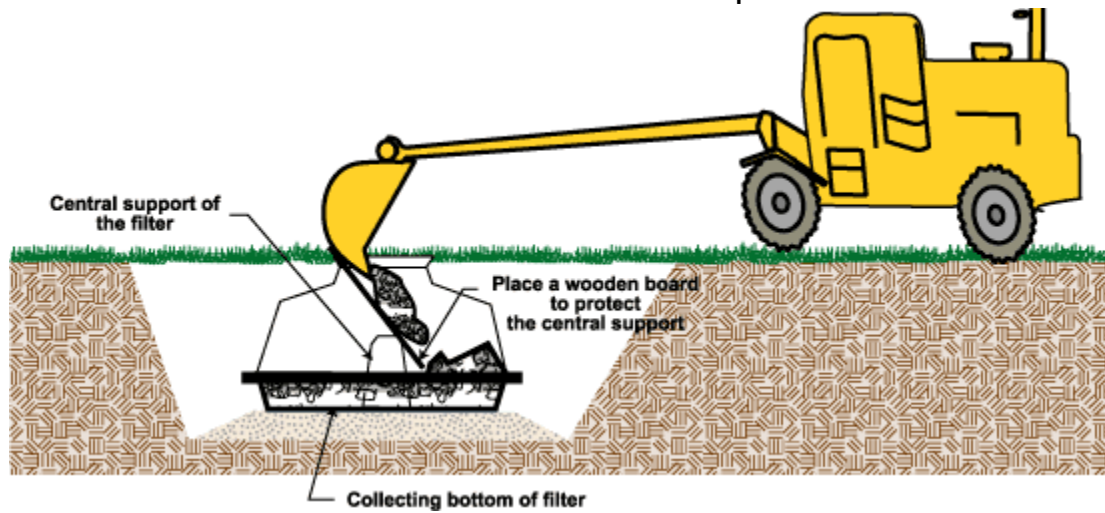
- A) Only one Ecoflo peat filter is to be installed for the system.
- B) The excavated area for the peat filter is covered with 6 inches of sand.
- C) An Ecoflo-authorized installer is working on the installation.
- D) No problems—everything looks good.

Submit

Peat Filter Unit Installation – Ecoflo

Ecoflo modules are not preassembled and therefore must be constructed on site. First, a 15-inch layer of clean $\frac{3}{4}$ -inch crushed stone is placed into the bottom of the Ecoflo unit on both sides of the central support, as shown in the graphic below.

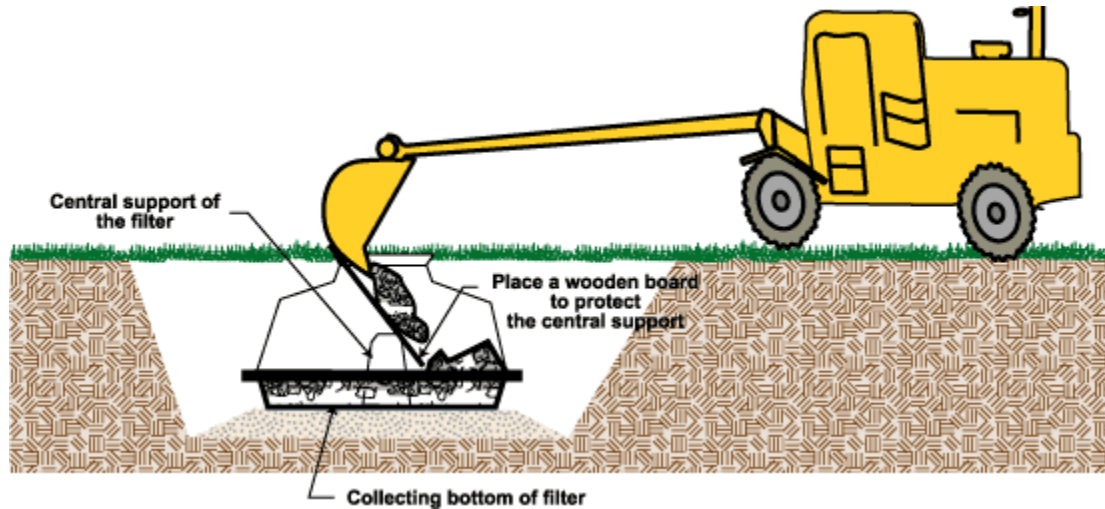
Installation of Ecoflo Internal Unit Components



Peat Filter Unit Installation – Ecoflo

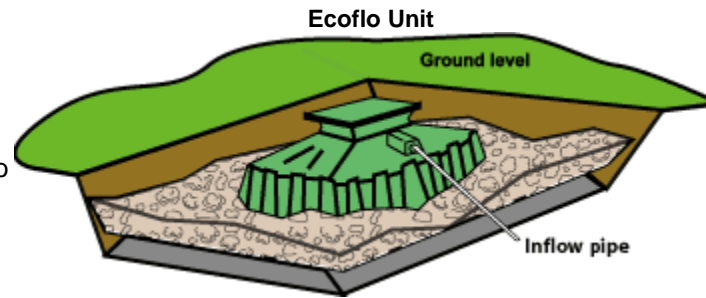
To protect the unit's central support unit against damage when placing the stone, lean a wood panel 26 inches by 96 inches against the side of the unit. The installer should drop the stone on both sides of the central support, spreading the crushed stone over the entire surface of the shell bottom and under the central support after each dumping. The crushed stone bed should be level where the shell joins the collecting bottom. Once this step is completed, the wood panel is removed.

Installation of Ecoflo Internal Unit Components



Peat Filter Unit Installation – Ecoflo

The area around the filter's shell is backfilled. The backfill material should be placed and not dumped, as dumping can cause compaction. The backfill material must contain no organic matter, impermeable soil, stones, rocks, debris, or other objects that could damage the shell.

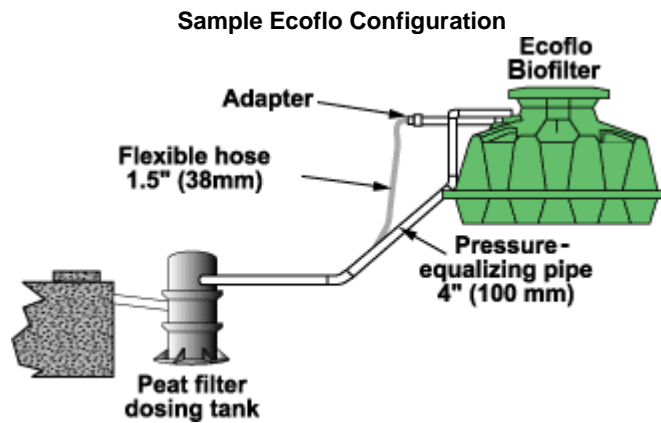


The inflow pipe connects to the Ecoflo Biofilter's intake with a steady downward slope. The pipe must be supported to prevent sagging. Soil excavation near the inlet pipe should be minimized.

Peat Filter Unit Installation – Ecoflo

For installations where a lift pump is used to dose the peat filter:

- The dosing tank and Ecoflo Biofilter must be joined by a 4-inch pressure-equalizing pipe to ensure proper aeration.
- The inflow pipe is made of 1.5-inch flexible piping and is fitted with an adapter so that it can be connected to the biofilter intake.

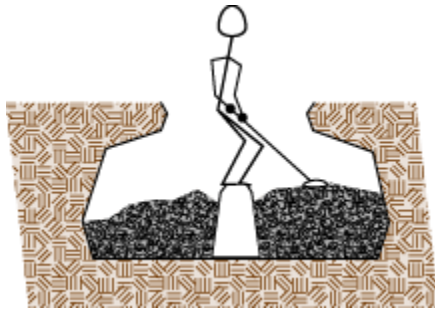


Peat Filter Unit Installation – Ecoflo

Thirty bags of peat are then emptied into the filter. The two sides of the shell are filled equally with the peat, 15 bags per side. For the unit to function properly, it is important that the peat is not compacted.



WARNING: Do not compact the peat.



The installer should rake the surface of the peat to make it level for the next component, the distribution plates, to be installed.

Review



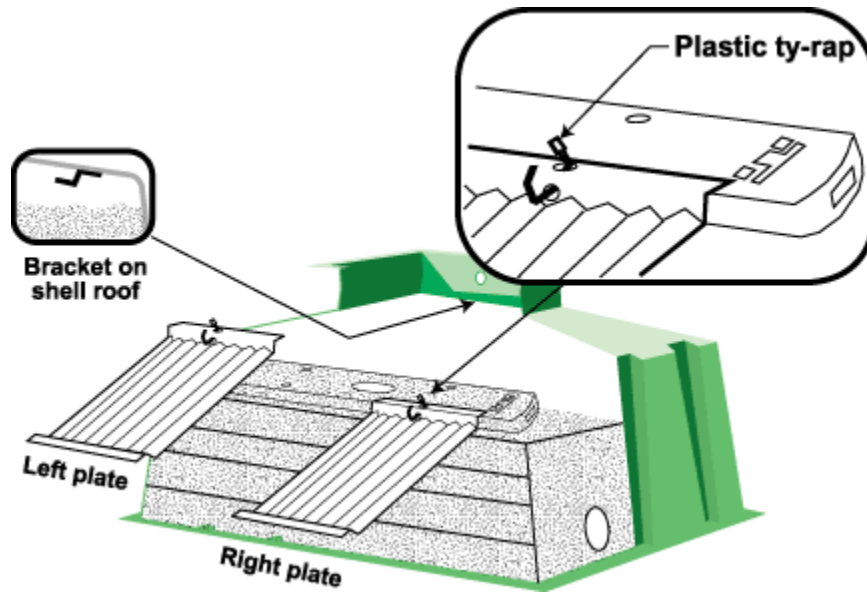
True or false? When the Ecoflo unit is backfilled around its shell, the backfill material should be pushed and dumped by a bulldozer.

- A) True
- B) False

Submit

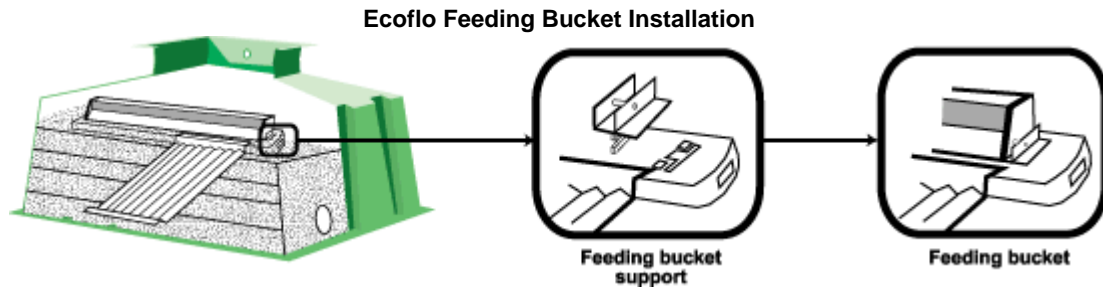
Peat Filter Unit Installation – Ecoflo

The distribution plates hang on the brackets located at the back of the shell roof. The plates should rest on top of the central support and be attached to it with the four black plastic ty-raps provided by the manufacturer for this purpose.



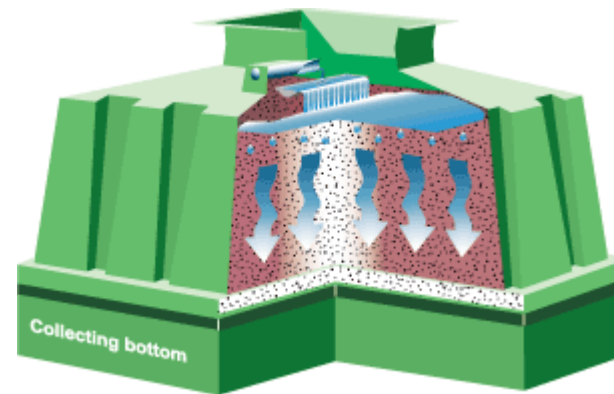
Peat Filter Unit Installation – Ecoflo

The feeding bucket is attached after the distribution plates are secured. As the effluent flows into the unit, the feeding bucket, which is supported at each end of the central support, will tip from side-to-side by gravity to evenly distribute the effluent to the peat. The bucket sits on pivots inside the shell and is fastened into place there. Once attached, all of the internal components of the filter unit have been installed.



Peat Filter Unit Installation – Ecoflo

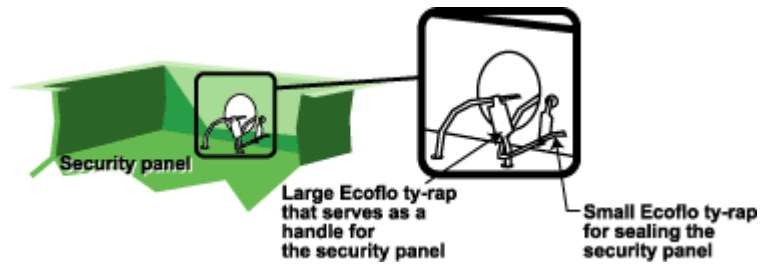
During an inspection, liquid enters the feeding bucket to make sure the bucket and distribution plates are operating properly. The bucket should rock back and forth, spilling the liquid on to the right and left distribution plates and sending it trickling down into the peat media.



Ecoflo Unit

Peat Filter Unit Installation – Ecoflo

To seal the Ecoflo unit, a security panel is used, and the lid is bolted shut. The access lid must be 2 inches above grade once the final landscaping is completed.



Review



True or false? A feeding bucket is the device that distributes effluent to the peat media inside Ecoflo modules.

- A) True
- B) False

Submit

Peat Filter Unit Installation – Puraflo

We will now discuss a Puraflo peat filter installation. These filter units come completely preassembled with the peat media already inside. Each individual unit is designed to treat the sewage flow for one bedroom. Therefore, a three-bedroom residential home would require three Puraflo biofilter units.

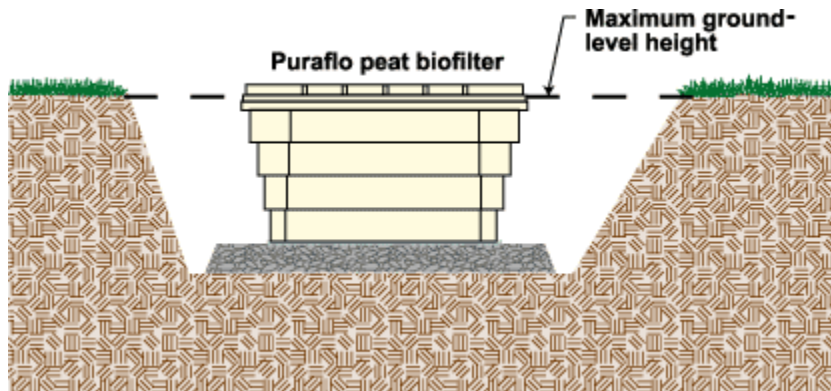
Landscaped Puraflo Filters

In the photo to the right, you can see eight Puraflo filters installed and landscaped. This system could treat the sewage flow from a house with a maximum of eight bedrooms.



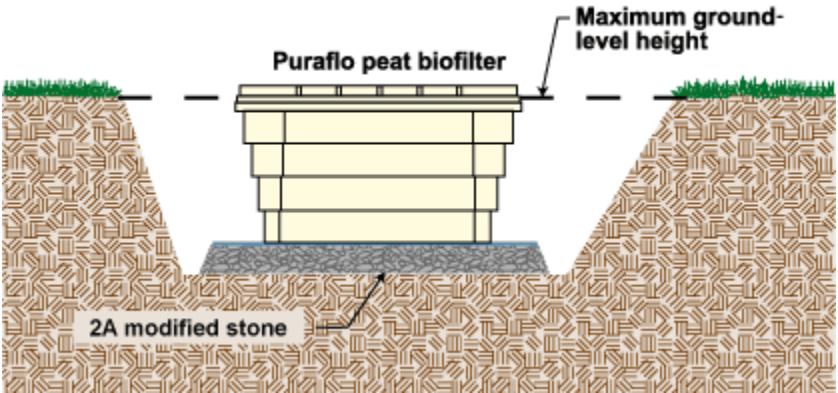
Peat Filter Unit Installation – Puraflo

Each Puraflo module measures 7 feet 1 inch long by 4 feet 6 inches wide at the top and is 30 inches high. The excavated area must correspond to the design and how many Puraflo modules are used. When the installation is complete, the module lids must be slightly above grade.



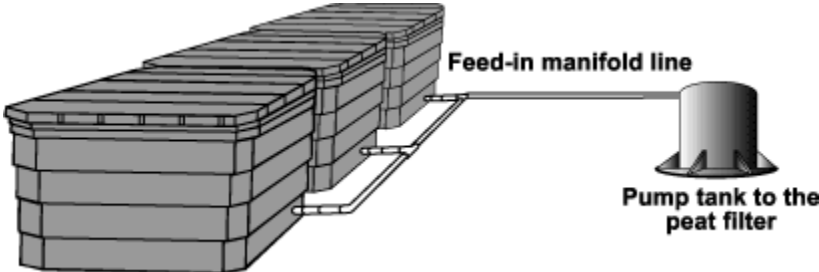
Peat Filter Unit Installation – Puraflo

The bottom of the excavation must be level and filled with clean 2A modified stone to a minimum depth of 6 inches.



Peat Filter Unit Installation – Puraflo

Since Puraflo units must be time dosed by pump, the feed-in manifold line from the dosing tank must be attached to each of the units.



Review



You are performing some interim inspections as the local agency SEO. At one of your stops, you see that peat filter units are being installed for a new three-bedroom home. The design calls for the Puraflo brand. Given that information, click on any item below that you identify as a problem with the installation.

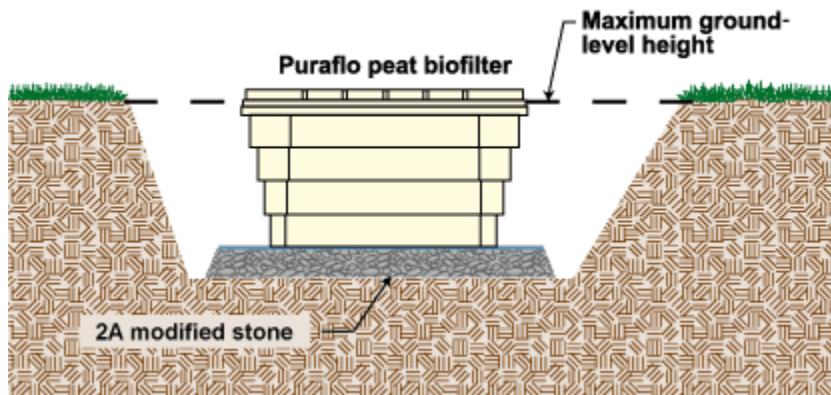
- A) Two Puraflo peat filters are being installed for the system.
- B) The bottoms of the areas excavated for the peat filters are made level and covered with 6 inches of 2A modified stone.
- C) A Puraflo-certified installer is working on the installation.
- D) No problems—everything looks good.

Submit

Peat Filter Unit Installation – Puraflo

The outside base of each module is backfilled with 6 inches of clean stone. This stone backfill is important because it keeps the modules level and well supported.

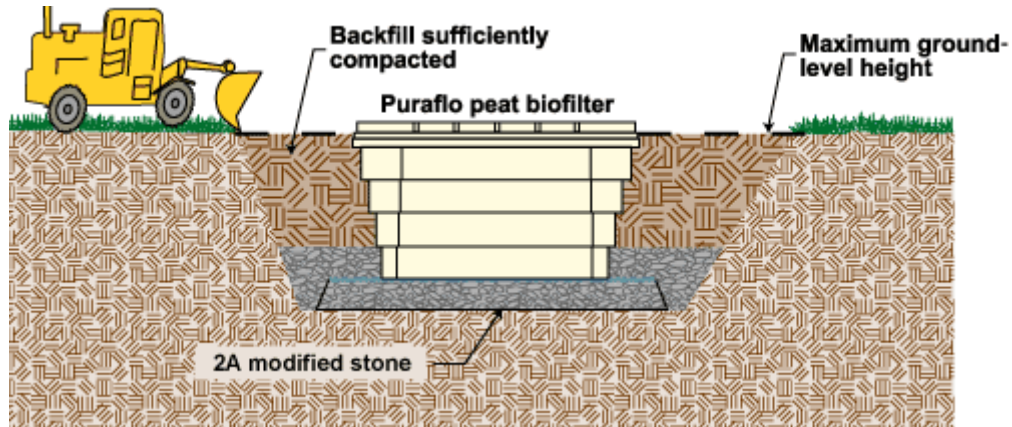
The rest of the area around each of the modules should be backfilled using loose, workable material (not sand). The backfill should reach just under the lid of the modules and be sufficiently compacted to counteract settlement.



Peat Filter Unit Installation – Puraflo

The backfill must be graded to the existing ground level on a slope no steeper than a 1:1 ratio to prevent infiltration of surface water. **The final layer of fill material should be at least 6 inches of suitable topsoil capable of supporting vegetative growth.**

The sloped backfill area should be stabilized as soon as possible using grass, seed, and straw. In some cases, sodding may be needed.



Review



True or false? The final layer of backfill material around each Puraflo module must be at least 6 inches of 2A modified stone.

- A) True
- B) False

Submit

Peat Filter Unit Installation

After either brand of the peat filter is installed, the installer should remind the homeowner of the following:

- Never cover or bury the access lid.
- Never overload the soil (with vehicles, blown snow, embankments) within 10 feet of the access lid.
- Ensure rapid vegetation to prevent soil erosion.
- Ensure the groundwater level never surpasses the top of the modules and that surface runoff is diverted.



Landscaped Puraflo Unit

Review



True or false? Ecoflo requires an authorized installer to perform the peat system installation. Puraflo provides either a certified installer or a factory representative to oversee the installation.

- A) True
- B) False

Submit

Lesson Review

PEAT FILTER UNIT INSTALLATION

In this lesson, we have reviewed the basic principles for installing a peat filter.

For very detailed installation information, both manufacturers offer installation manuals.

You can also contact the manufacturers via their information listed in the “job aids” section.

Lesson Review

PEAT FILTER UNIT INSTALLATION – KEY POINTS

- **Peat filter unit – Ecoflo brand**
 - Installation must be performed by an authorized Ecoflo installer.
 - Ecoflo units do not come preassembled, and the components of the inner cavity must be installed.
 - A pump tank may or may not be used to dose the Ecoflo peat filter.

Lesson Review

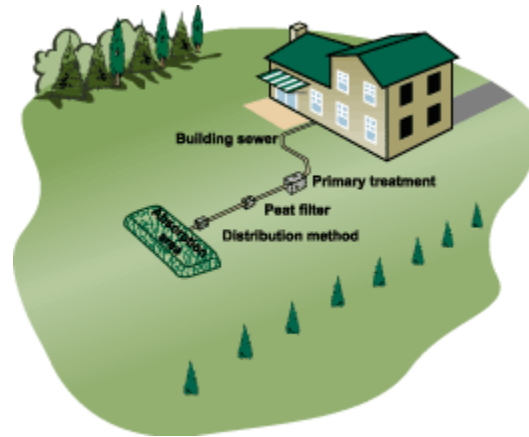
PEAT FILTER UNIT INSTALLATION – KEY POINTS

- **Peat filter unit – Puraflo brand**
 - The manufacturer provides either a factory representative or a certified Puraflo systems installer.
 - Preassembled units arrive ready for installation.
 - A pump tank must dose the Puraflo peat filter.

Note: If you have more questions about the system after completing this course, refer to the DEP Alternate Systems Guidance Document in the “job aids.”

What You Will Learn in This Lesson

In this lesson, you will learn how to inspect a peat filter system. We will review your role in making sure the peat system components were installed and constructed correctly. As the SEO, you must make sure the system satisfies the requirements of both the regulations and the Alternate Systems Guidance document (guidance). The system must also have been installed according to the permit specifications.



Peat System Final Inspection

If your final inspection progresses from the house out, you should begin your inspection by checking to make sure a high-level alarm for the dose tank(s) is present and functioning properly. Then make your way to the junction of the building drain and building sewer.

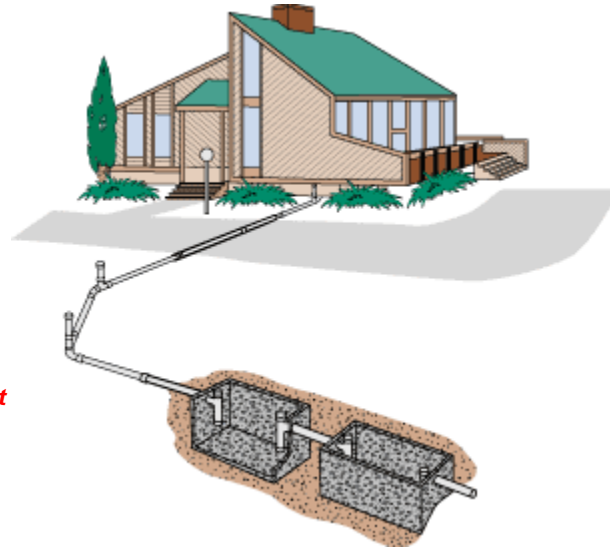
BUILDING SEWER



Section 73.21

The building sewer must meet the requirements of Chapter 73.

Click on the building sewer graphic to the right for a detailed version, including requirements.



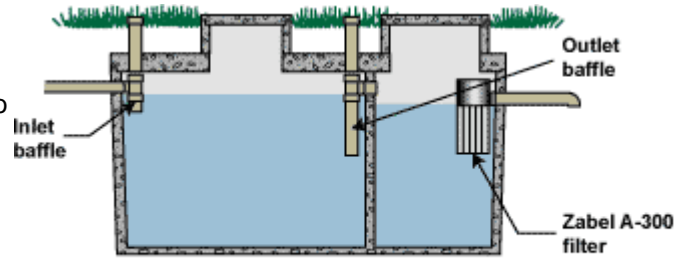
Peat System Final Inspection

TREATMENT TANKS



Section 73.31

The SEO must verify that treatment tank(s) are multicompartmented or two tanks in a series if septic tanks, or in parallel if aerobic tanks. The guidance also requires a Zabel A-300 or equivalent NSF-approved filter be fitted to the outlet pipe on the tank preceding the peat filter.



Peat System Final Inspection

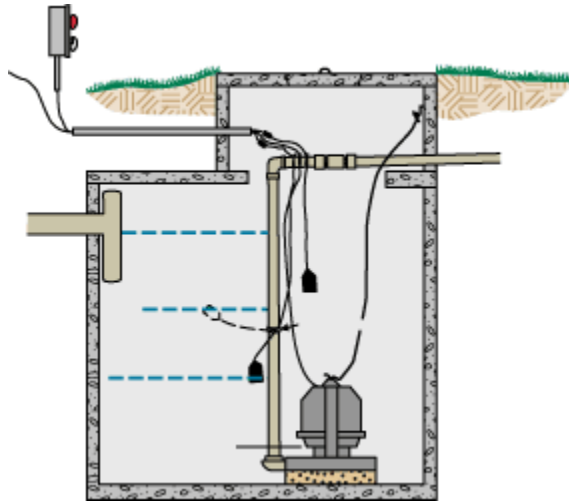
DOSING TANK



Sections 73.45 and 73.46

When a pump tank is used to dose the peat filter, the SEO must inspect the tank to make sure it meets the requirements of Chapter 73. If the peat filter requires a pump, then it must use a timed dose.

Click on the pump tank graphic to the right for a detailed version.



Review



You are conducting an inspection of a peat based system option 1 and find the following.

Click on any items that do not meet the regulations for the system.

- A) A high-level alarm is present and functioning.
- B) The building sewer has two bends, one at 45 degrees and one at 60 degrees. Both have cleanouts.
- C) Primary treatment consists of two rectangular septic tanks in a series.
- D) A Zabel A-300 effluent filter is fitted to the outlet pipe on the tank preceding the peat filter.
- E) All of the above are acceptable.

Submit

Peat System Final Inspection

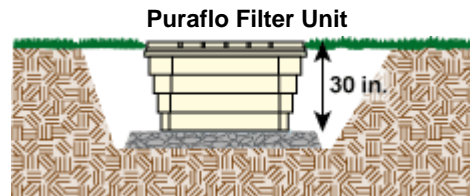
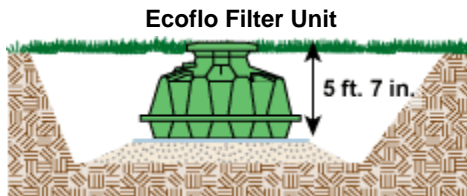
PEAT FILTER



Section 3.A

The SEO first must determine which type of peat filter is used, Ecoflo or Puraflo. Both brands of peat filter units must be watertight with all outlets properly sealed to avoid liquid or solid infiltration and exfiltration.

After the SEO examines the exterior of the units, he or she must determine the volume of peat within the filter unit and make sure it agrees with the guidance.



Peat System Final Inspection

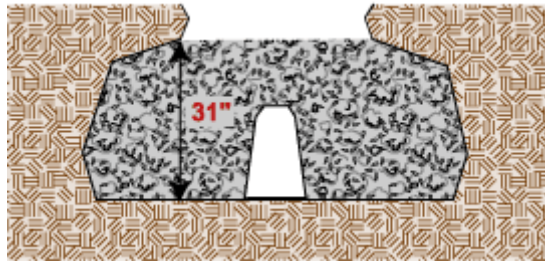
PEAT FILTER – ECOFLO



Section 3.A.1(a)

All Ecoflo installations must have a **minimum of 195 cubic feet of peat** evenly distributed in the filter unit. The depth of the peat within the filter should be approximately **31 inches**.

Inside an Assembled Ecoflo Filter Unit



Peat System Final Inspection

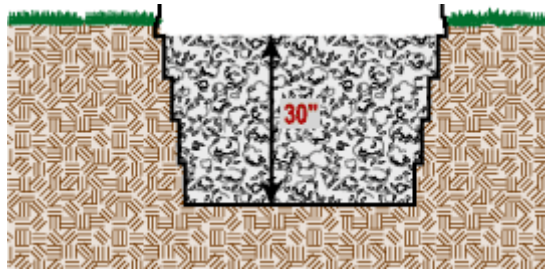
PEAT FILTER – PURAFLO



Section 3.A.1(b)

Puraflo peat filters are preassembled modules, with one module serving each bedroom. Each module must contain **approximately 60 cubic feet of peat**. Each Puraflo filter must have an internal depth of approximately **30 inches** of peat.

Inside a Preassembled Puraflo Filter Unit



REVIEW



You are conducting an inspection of a peat based system option 2 with Puraflo filters.

Click on any findings that do not meet the requirements.

- A) Three Puraflo units were installed for a three-bedroom house.
- B) The peat filter units are watertight with all outlets sealed.
- C) The units are pumped to on demand.
- D) All of the criteria are acceptable.

Submit

Peat System Final Inspection

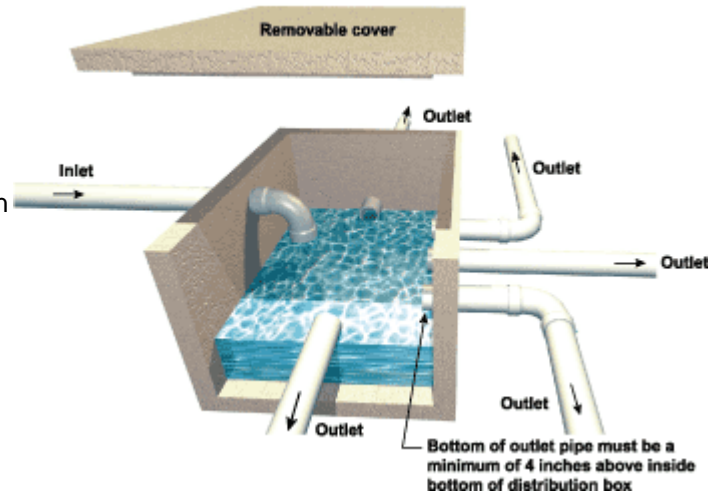
DISTRIBUTION METHOD TO THE ABSORPTION AREA

Distribution Box



Section 73.42

If a distribution box is used to distribute the effluent to the absorption area, then the SEO will have to verify that the distribution box meets the requirements of the regulations.



Peat System Final Inspection

DISTRIBUTION METHOD TO THE ABSORPTION AREA

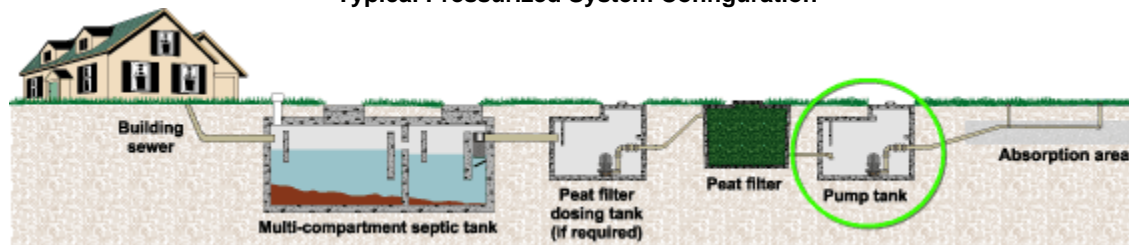
Pressure Distribution



Section 73.45

When a dosing tank is used for distributing the effluent to the absorption area, the SEO must verify that the tank meets the specifications of Section 73.45 of the regulations. This is the same section of the regulations that governs dosing tank requirements when a lift pump is used for the peat filter.

Typical Pressurized System Configuration



Peat System Final Inspection

ABSORPTION AREA

Since there are several peat system options, requirements for inspection will vary with disposal area type. Please consult the following resources for specifics:

- **Peat Based System Option 1**
 - In-ground and sand mound systems – Chapter 73 of the regulations
 - At-grade bed systems – Section 9 of the guidance and/or Web-based course
 - Drip irrigation systems – Section 12 of the guidance and/or Web-based course

- **Peat Based System Option 2**
 - IRSIS – Chapter 73 of the regulations

- **Peat Based System Option 3**
 - Subsurface sand filter systems – Section 73.54 of the regulations

Peat System Final Inspection

FINAL INSPECTION FORM

In addition to the information that was presented in this lesson, the SEO should check a few other things during a final inspection, including isolation distances and watertight connections.

Click on the underlined text to view a "[Sample Final Inspection Form.](#)" This form lists items that may require verification, depending on the peat system option installed.

Peat System Final Inspection

SEEDING AND GRADING

After you have inspected the system and given approval to cover, the system must then be covered before the structure is occupied. The peat filter(s) will be backfilled around the sides and the top of the filter(s) will remain exposed. A seeding and grading inspection should be part of the permit final inspection process.

**A Completed Seeding and Grading
Around Puraflo Filters**



Review



You are conducting a final inspection for an IRSIS option 2 system. Which of the items below would cause you to *not* approve the system for cover?

- A) The Puraflo peat filters precede the chlorination unit.
- B) The building sewer is connected to the treatment tank using watertight mechanical seals.
- C) The manholes on the septic tanks are 20 inches in diameter.
- D) The septic tanks are in a series.
- E) None of the above would cause the system to not be approved for cover.

Submit

Warranty



Section 3.A.4

The guidance acknowledges the fact that peat filters require maintenance, including the periodic replacement of the peat media inside the units. Therefore, the SEO must verify that the warranty of the company—whether Ecoflo or Puraflo—be attached to the permit application, permit, and purchase agreement.

You should be sure the homeowner is familiar with the terms of the warranty, including the need to replace the peat within the life expectancy period established by the manufacturer.

Review



You have completed your inspection of an option 1 peat filter system and have determined that the system was installed properly. Which acts below should you perform before considering your responsibilities as an SEO to be complete?

Click all that apply.

- A) Verify that the company's warranty is attached to the permit.
- B) Advise the homeowner of system maintenance.
- C) Be sure the homeowner understands the conditions of the peat filter warranty.

Submit

Reset

Peat Based System Final Inspection

In this lesson, we covered some of the main components that an SEO should check during a final inspection of a peat option system. Remember, all the parts of the system must be installed according to the specifications in the regulations and the guidance. As the SEO, you must inspect the system to make sure it was installed according to the issued permit.

It is always a good idea to talk to the homeowners about the maintenance of the system. They should have an idea of what to expect for the future and why regular maintenance will help to extend the life of their system. Maintenance will be discussed in lesson 5-3.

Note: If you have more questions about the system after completing this course, refer to the DEP Alternate Systems Guidance document in the “job aids.”

What You Will Learn in This Lesson

The peat system options provide treatment that cleans the effluent to a higher level than primary treatment alone. However, if the peat filter system is not properly maintained, it may not produce the level of treatment that it was designed to provide. In this lesson, you will learn about the warranty and maintenance requirements to keep a peat filter system functioning properly.

Installed Puraflo peat filter



Tank Inspections



Section 3.A.4

All tanks used in the peat based system options must be inspected every six months. This includes the septic tank, aerobic tank, and/or lift pump tank.



Tank Inspections

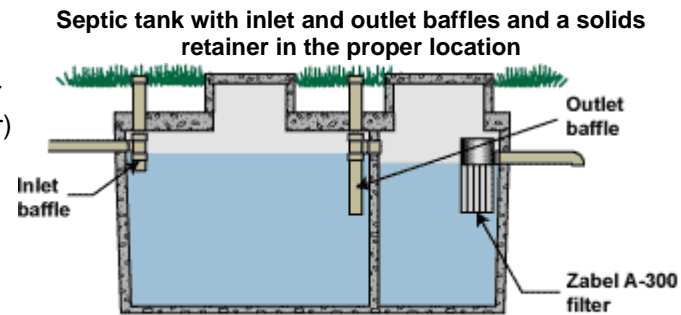
SEPTIC TANK



Section 3.A.4

During the six-month inspection, the septic tank must be inspected for structural integrity, and the items listed below should be thoroughly inspected. The inspector should make sure these components are securely attached in their proper locations in the tank.

- Inlet baffles
- Outlet baffles
- Solids retainer (Zabel A-300 filter or equivalent NSF-approved filter)



Tank Inspections

AEROBIC TANK



Section 3.A.4

During the six-month inspection, the aerobic tank must be inspected for structural integrity, and the items listed below should be thoroughly inspected. The inspector should make sure these components are securely attached in their proper locations in the tank.

- Inlet baffles
- Outlet baffles
- Buoyed solids retainer



Note: All aerobic tanks must be inspected in accordance with the requirements of both the manufacturer and National Sanitation Foundation (NSF). Along with the inspections, the tanks should be pumped in accordance with the requirements of both the manufacturer and NSF. To find out more about the NSF requirements, go to www.nsf.com.

Tank Inspections

DOSE TANK OR LIFT PUMP TANK



Section 3.A.4

During the six-month inspection, the dose or lift pump tank must be inspected for structural integrity and the items listed below should be thoroughly inspected.

- Pump and siphons
 - ✓ Make sure the pump or siphon is functioning properly.
- Electrical connections
 - ✓ Make sure the electrical connections are watertight.

Inspections Review



Inspector Joe Pitts is responsible for inspecting a system that includes an aerobic tank and a peat filter. How often must the aerobic tank be inspected?

- A) Once a month
- B) Every six months
- C) Once a year

Submit

Inspections Review



Joe Pitts is preparing to do the six-month inspection of a system that includes an aerobic tank and a peat filter. Whose requirements must he follow for inspection of the aerobic tank?

Click all that apply.

- A) DEP
- B) Manufacturer
- C) National Sanitation Foundation
- D) PA Building Code

Submit

Reset

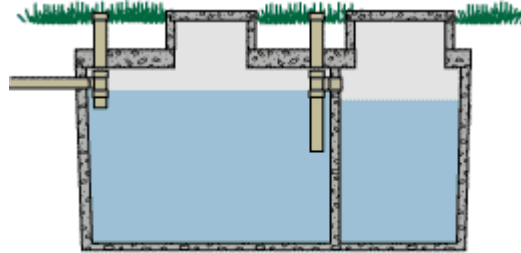
Inspections Review



Inspector Don Tracy performed a six-month inspection of a system that includes a septic tank and a peat filter. The diagram of the septic tank on this page shows what he found. The tank failed the inspection. What caused Tracy to fail the system?

Click all that apply.

- A) Inlet baffle is missing.
- B) Outlet baffle is missing.
- C) Solids retainer (Zabel A-300 filter or equivalent NSF-approved filter) is missing.
- D) The tank should have a single compartment.
- E) Inspector Tracy made a mistake. Nothing appears to be wrong with the tank.



Submit

Inspections Review



An inspector is preparing to perform a six-month inspection of a system with a peat filter system option 1 and a lift pump tank. What should he check on the lift pump during his inspection?

Click all that apply .

- A) Tank is structurally sound.
- B) Pump is working properly.
- C) Electrical connections are watertight.

Submit

Reset

Warranty and Maintenance



Section 3.A.4

Manufacturers of peat filters provide warranties that recommend or require periodic maintenance, including periodic replacement of the peat in the filter. Each company has its own requirements for the replacement of the peat. The company specifications will be covered on the following pages.

Filling the peat filter with new peat



Warranty and Maintenance



Section 3.A.4

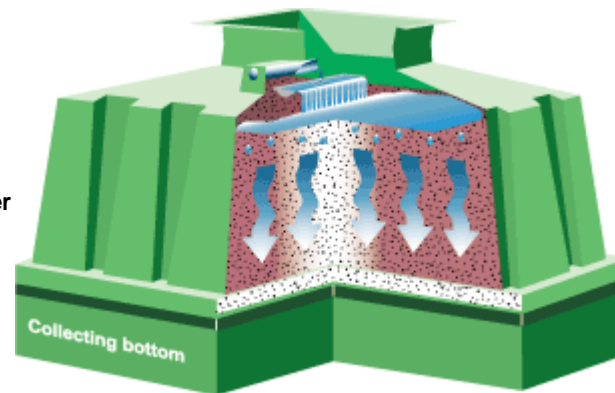
The warranty from the peat filter manufacturer must be attached to the permit application, permit, and purchase agreement. This warranty must clearly notify the property owner of the need to replace the peat within the life expectancy period established by the company. The property owner must also provide access once a year for the peat filter to be inspected.

Warranty and Maintenance – Ecoflo

The Ecoflo warranty includes an eight-year maintenance agreement that is legally binding. The property owner must grant an Ecoflo representative access to the peat once a year for eight years. The representative inspects the peat each year to make sure there are no problems, and at the end of the eighth year, the property owner is responsible for replacing the peat within the filter. Once the peat filter bed is replaced, a new eight-year maintenance agreement begins as required by Ecoflo.

A copy of the Ecoflo maintenance agreement is available in the “job aids” section.

A Properly Maintained Ecoflo Filter

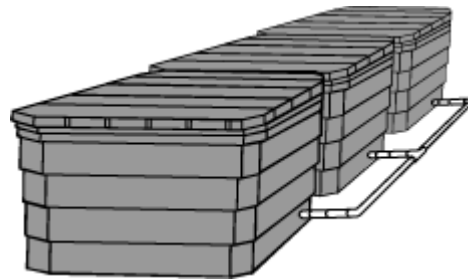


Warranty and Maintenance – Puraflo

Puraflo does not require a maintenance agreement between the property owner and the manufacturer. However, the manufacturer will conduct annual inspections to determine when the peat needs to be replaced. Typically, the peat will need to be replaced approximately every fifteen years. Puraflo does supply the property owner with a [Do's and Don'ts checklist](#) to follow. The company also provides a [Homeowner Problem Checklist](#). Puraflo and the certified factory representative will explain all of this to the user. The SEO should review both checklists with the homeowner and be sure he or she understands this information.

Both of the above mentioned Puraflo maintenance documents are available in the “job aids” section.

Properly Maintained Puraflo Units



Warranty and Maintenance

Regardless of the brand of peat filter used, the SEO should remind the property owner of several key points:

- Never cover or bury the access lid.
- Never place vehicles, blown snow, embankments, etc. within 10 feet of the access lid.
- Promote rapid vegetation around the units to prevent soil erosion.
- Ensure the groundwater level never surpasses the top of the modules.
- Have the septic tank pumped regularly. Regular septic tank pumping and water conservation can help to avoid costly malfunctions.

Successful Completion of This Course



Section 3.B.4.a

After successfully completing this course, an SEO may issue permits that use an alternate peat based system option component without DEP review.

If an alternate peat based system option component is used with an alternate drip irrigation or alternate at-grade bed system, the SEO must also complete the course that covers that system before he or she can issue a permit without DEP review.