## 2.2 Separation Guidelines

Revision: June 5, 2014

### 2.2.1 Separation Distance Hierarchy

Separation distances to features of concern or interest are required by IDAPA 58.01.03. Separation distances include both vertical and horizontal separation distances, including effective soil depths, to features of concern, interest, or limiting layers. Section 2.2 of this manual provides guidance on reducing separation distances based on site-specific conditions. The guidance on reducing separation distances is provided to help find permitting solutions for difficult sites that may not meet the full separation distances required by IDAPA 58.01.03. These reductions will only be granted after it is documented that the site cannot meet the separation distances required by IDAPA 58.01.03. When performing a site evaluation for issuing a subsurface sewage disposal permit, the following separation distance hierarchy should be followed:

1. IDAPA 58.01.03
2. Technical allowance (IDAPA 58.01.03.010.01)
3. TGM guidance
4. Variance (IDAPA 58.01.03.010.02–06)

This hierarchy does not apply to specific alternative system guidance for reducing effective soil depth to limiting layers. If the guidance from section 2.2 of this manual is used for any new or replacement subsurface sewage disposal permit, justification must be included in the permit documentation explaining why this guidance was used over the requirements of IDAPA 58.01.03.

### 2.2.2 Effective Soil Depth to Porous Layers or Ground Water

Table 2-5 provides guidance for determining effective soil depth from the bottom of absorption fields to very porous layers or to normal high ground water.

**Table 2-5. Minimum effective soil depth (feet) by soil design subgroup to the limiting layer.**

| Limiting Layer | Soil Design Subgroup (feet) | | | | | |
|---|---|---|---|---|---|---|
| | A-1 | A-2 | B-1 | B-2 | C-1 | C-2 |
| Fractured bedrock or other porous layer | 6 | 5 | 4 | 3 | 3 | 2.5 |
| Normal high ground water | 6 | 5 | 4 | 3 | 3 | 2.5 |
| Seasonal high ground water | 1 | 1 | 1 | 1 | 1 | 1 |

### 2.2.3 Effective Soil Depths to Impermeable Layers

Table 2-6 may be used to determine the effective soil depth below absorption fields to impermeable layers, such as dense clays, bedrock, or caliche if the approval conditions contained in this section can be met.

**Table 2-6. Effective soil depth (feet) to impermeable layers.**

| Slope (%) | Acres (feet) | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 or more |
| 20 | 3.0 | 2.8 | 2.5 | 2.3 | 2.0 |
| 16 | 3.2 | 2.9 | 2.6 | 2.4 | 2.0 |
| 12 | 3.4 | 3.1 | 2.7 | 2.4 | 2.0 |
| 8 | 3.6 | 3.2 | 2.8 | 2.5 | 2.0 |
| 4 | 3.8 | 3.4 | 2.9 | 2.5 | 2.0 |
| 0 | 4.0 | 3.5 | 3.0 | 2.5 | 2.0 |

Approval Conditions:

1. Impermeable layer is that soil or geological feature less permeable than a subgroup C-2 soil. The layer must be contiguous and unbroken beneath the absorption field and its replacement area for at least 10 feet in any direction from these sites.
2. Adjacent lots are of equal size or larger.
3. This guidance is applicable to standard systems and capping fill trench alternatives.
4. Minimum distance to a property line on the downslope side of the absorption field and its replacement area must be at least 10 feet.
5. Lateral hydraulic conductivity of the effective soil should be able to transport the combined precipitation and wastewater flow through the soil without surfacing.

### 2.2.4 Effective Separation Distance to Surface Water

Reduction in separation distances to surface water from the requirements of IDAPA 58.01.03 are allowed as provided in section 2.2.4 as long as the hierarchy and documentation practices described in section 2.2.1 of this manual are followed. Each site should be reviewed on its own merits. Additional criteria, such as population density, watershed characteristics, and reasonable access to municipal sewer must be examined before an allowance for the reduction of separation distance to surface water is granted. The following conditions are in place for all surface water allowances:

1. Separation distance to surface water shall not be less than 100 feet.
2. Alternative systems may be required to achieve the reduction allowance.
3. No additional technical allowance may be granted to the reductions included in the sections below without following the formal variance procedure outlined in IDAPA 58.01.03.010.
4. Application for a variance under IDAPA 58.01.03.010 does not guarantee that a reduction in separation distance will be allowed.

#### *2.2.4.1 Reduction in Separation Distance to Surface Water without a Variance*

Table 2-7 shows the criteria for reducing separation distances to permanent or intermittent surface water based on soil design subgroups, vertical soil depth above surface water, and the vertical soil depth above any limiting layers.

**Table 2-7. Criteria for reducing separation distances to permanent or intermittent surface water.**

| Separation Distance (feet) | Soil Design Subgroup | Soil Reduction (feet) | Vertical Soil Depth Above Water: >25 feet; and Depth to Limiting Layer: >10 feet | Maximum Separation Reduction (feet) | Minimum Separation Distance to Surface Water (feet) |
|---|---|---|---|---|---|
| 300 | A-1 | 0 | 25 | 25 | 275 |
| 300 | A-2 | 25 | 25 | 50 | 250 |
| 200 | B-1 | 0 | 25 | 25 | 175 |
| 200 | B-2 | 25 | 25 | 50 | 150 |
| 100 | C-1 | 0 | 0 | 0 | 100 |
| 100 | C-2 | 0 | 0 | 0 | 100 |

The distance to permanent surface water may also be reduced to not less than 100 feet for all soil types when it can be demonstrated that

1. Either:
   a. The surface water is sealed so there is no movement of ground water into the surface water body, or
   b. The surface water body is discharging into the ground water, and
2. There are no limiting layers between the drainfield elevation and the surface water elevation.

### *2.2.4.2 Reduction in Separation Distance to Surface Water with a Variance*

The separation distances to surface water are in place to protect the beneficial uses of the surface water. Septic tank effluent carries both nitrogen and phosphorous constituents that pose a threat to surface water. If a separation distance from a drainfield to surface water is to be reduced further than the reductions outlined in section 2.2.4.1, it must be done through a variance supported by models that evaluate the potential effects that the total nitrogen and phosphorous may have on the surface water body.

#### 2.2.4.2.1 Supporting Variance Documentation for a Reduced Separation Distance to Surface Water

The minimum requirements for the supporting variance documentation are included below.

1. The variance must follow all requirements provided in IDAPA 58.01.03.010 and be filed with the health district along with a subsurface sewage disposal permit application.
2. The necessary site evaluation process must be followed to obtain the minimum information necessary to support a subsurface sewage disposal permit and the required effluent nutrient evaluations.
3. A nutrient-pathogen (NP) evaluation must be performed for the site and be acceptable based on the required minimum system designs, proposed system placement, and model outputs as outlined in section 2.2.4.2.3.

#### 2.2.4.2.2 Drainfield Design Requirements for a Reduced Separation Distance to Surface Water

A drainfield proposed with a reduced separation distance to surface water as allowed under this variance procedure must meet the following minimum design requirements:

1. The drainfield shall be pressurized and designed based on section 4.20 of this manual.
2. The maximum installation depth of the drainfield in the native soil profile shall be 6 inches.
3. Two full-sized drainfields shall be installed under the initial permit, and alternating dosing between each drainfield shall be included in the system's pressurized design.
4. Replacement area for a third drainfield must be reserved on the property.
5. No separation distance to surface water shall be reduced to less than 100 feet.
6. An alternative pretreatment system shall be installed after the septic tank that is capable of reducing total nitrogen to at least 27 milligrams per liter (mg/L). A greater total nitrogen reduction level may be required depending on the outcome of the NP evaluation.

#### 2.2.4.2.3 Nutrient Evaluation Model Outputs for a Reduced Separation Distance to Surface Water

To support a variance for a reduced separation distance to surface water, two nutrient evaluations must be performed based on the following specific effluent nutrient values and minimum model outputs:

*Nutrient-Pathogen Evaluation*

1. The maximum total nitrogen concentration of the effluent discharged to the drainfield shall be 27 mg/L.
2. All other standard NP evaluation criteria and output requirements apply.

*On-Site System Surface Water Separation Distance Determination Guidance and Model*

1. The average phosphorous output from the septic tank shall be 8.6 mg/L.
2. The minimum phosphorous site life of receiving soils shall be 100 years.
3. All other standard On-Site System Surface Water Separation Distance Determination Model criteria and output requirements apply as described in DEQ's guidance *On-Site System Surface Water Separation Distance Determination Guidance.*

*Restrictions on Drainfield Designs Necessary to Obtain Successful Outputs in Nutrient Evaluation Models*

IDAPA 58.01.03 specifies the minimum drainfield area required to adequately handle the specified volume of wastewater generated in the structure being permitted. It is acceptable for a system design to be in excess of the drainfield area required by IDAPA 58.01.03. To reduce a drainfield's separation distance to permanent or intermittent surface water, it may require that the drainfield area is in excess of the minimum requirements stipulated in IDAPA 58.01.03. This may be due to the surface area and volume of soil below the drainfield necessary to sequester phosphorous constituents in the wastewater and reduce the potential impacts on surface water. If

it is necessary to expand the drainfield to obtain successful outputs for the models described in section 2.2.4.2.3, the drainfield area in excess of the minimum requirements provided in IDAPA 58.01.03 is strictly limited to the original wastewater flows evaluated for the original permit application and cannot be used in the future for additional structures or existing structure expansion.

## 2.2.5 Method of 72 to Determine Effective Soil Depths to Porous Layers and Ground Water

Often, effective soil depths, as required by IDAPA 58.01.03.008.02.c, are not achievable due to various site conditions. In response to this issue, section 2.2.2 provides guidance for reducing separation distances to limiting layers based upon soil design subgroups. In some situations, this guidance does not go far enough to address these site limitations, nor does it provide guidance on how to approach separation distances to limiting layers when the soil profile is variable and does not meet the minimum effective soil depths as described in IDAPA 58.01.03.008.02 or Table 2-5, or when the in-trench sand filter system design is used. To address these situations, use the method of 72.

The method of 72 assigns treatment units to soil design subgroups. Treatment units assigned to soil design subgroups are extrapolated from the effective soil depths required by IDAPA 58.01.03.008.02.c. Based on this rule, it can be determined that 72 treatment units are necessary from the drainfield-soil interface to the porous layer/ground water to ensure adequate treatment of effluent by the soil. Table 2-8 provides the treatment units assigned to each soil design subgroup.

**Table 2-8. Treatment units assigned to each soil design subgroup per foot and per inch.**

| Soil Design Subgroup | A-1/ Medium Sand | A-2 | B-1 | B-2 | C-1 | C-2 |
|---|---|---|---|---|---|---|
| Treatment units per 12 inches of soil | 12 | 14.4 | 18 | 24 | 24 | 28.8 |
| Treatment units per inch of soil | 1 | 1.2 | 1.5 | 2 | 2 | 2.4 |

### *2.2.5.1 Native Soil Profiles and the Method of 72*

When the soil profile contains multiple suitable layers, but no layer is thick enough to meet the separation guidance provided in IDAPA 58.01.03.008.02.c or Table 2-5, use the method of 72 to determine the suitable separation distance for the proposed drainfield site. The following example is based on the soil profile identified in Figure 2-3.

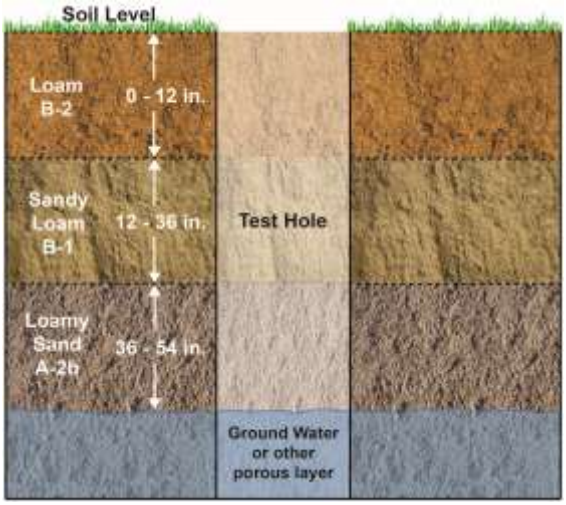


**Figure 2-3. Test hole profile used in example 1.**

**Example 1**:

Based upon the soil profile in Figure 2-3 and treatment units from Table 2-8, the following treatment unit equivalent would be ascribed:

Treatment units = 24 + 36 + 21.6 = 81.6

Since this is the treatment unit equivalent from grade to the porous layer or normal high ground water level, the installation depth must still be determined. In this example, the soil profile has 9.6 treatment units more than the minimum necessary to be considered suitable for a standard alternative drainfield. To determine installation depth, use the upper layer of the soil profile where the system will be installed and determine the treatment units per inch of soil. Once the treatment units per inch are known, the depth of allowable installation can be determined.

- 24 treatment units /12 inches of B-2 soil = 2 treatment units per inch
- Installation depth = 9.6 excess treatment units /2 treatment units per inch
- Installation depth = 4.8 inches

In this example, a standard basic alternative system can be permitted. The system design would be a capping fill trench with a maximum installation depth of 4.5 inches below grade.

### *2.2.5.2 In-Trench Sand Filters and the Method of 72*

The method of 72 may also be used in determining the necessary depth of medium sand required for installation between a drainfield and the native soils overlying a porous limiting layer or normal high ground water. Installation of medium sand may be necessary to access suitable soils below an unsuitable layer. The following example is based on the soil profile identified in Figure 2-4.

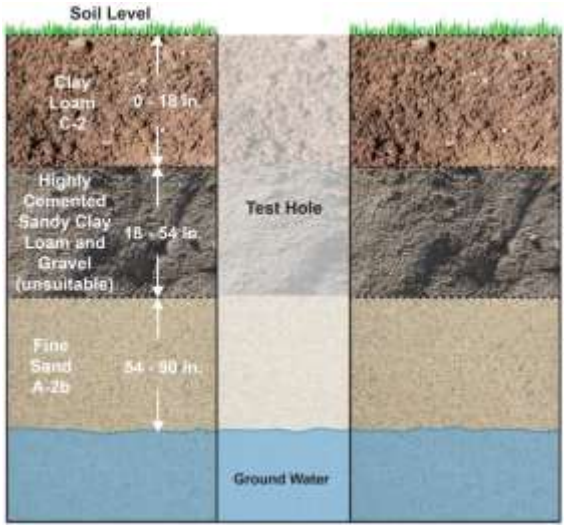


**Figure 2-4. Test hole profile used in example 2.**

**Example 2***:*

In this example, the site soils must be excavated down to 54 inches to access suitable soils. This leaves 36 inches of A-2b soils, providing 43.2 treatment units. The amount of medium sand required to be backfilled prior to system installation would be determined as follows:

- Remaining treatment units = 72 – 43.2 = 28.8
- Depth of medium sand required = 28.8 treatment units remaining/1 treatment unit per inch
- Depth of medium sand required = 29 inches

Thus the medium sand would be backfilled to a depth of 25 inches below grade. The drainfield would then be installed on top of the leveled medium sand.

*Note:* Regardless of the soil profile and treatment units needed, drainfields must be installed no deeper than 48 inches below grade per IDAPA 58.01.03.008.04. Drainfield depth restrictions only apply to the aggregate as defined in IDAPA 58.01.03.008.08 or the gravelless trench components approved in section 5.7. Medium sand may be installed to any depth necessary to reach suitable soils as long as the excavation and installation of the medium sand meet the requirements in section 4.24.

## 2.3 Standard Percolation Test

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A percolation test checks on-site surveys and soil analysis data *only*. It is not to be used as the sole qualifier of a proposed disposal site's infiltrative capability. The most recent version of the following American Society for Testing and Materials (ASTM) standards should be applied when evaluating a site’s infiltrative capability:

- ASTM D3385, Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer