2.3 Evaluating Fill Material

Revision: October 23, 2012

This section provides general information for property owners to consider when filling a site, and it is not an approved alternative design. Property owners interested in pursuing a fill material project will need to get prior approval of their site modification plan. The site modification plan will be part of an application for a septic system permit. It is recommended that the property owner seek assistance from a certified soil scientist in preparing the site modification plan. Fill material typically has great variability, and property proposed for fill will require more extensive on-site investigation to determine the existence of restrictive layers.

2.3.1 Weathered Fill

Weathered or natural settling of fill will, over time, give fill similar characteristics to that of the natural soils. The annual precipitation cycle causes fill to settle and compact. Idaho has a wide range of precipitation, ranging from about 7 inches to near 80 inches. Differences in annual precipitation affect the rate and amount fill material will settle or compact. Normal settling and compaction will usually take at least 10 years to occur, depending on soil texture, fill depth, and precipitation. Fill in low precipitation zones may never become naturally compacted enough to prevent settling in the drainfield area. Table 2-9 shows the natural settling of fill. Fill depths in excess of the moisture penetration depths will not naturally settle in 10 years.

Table 2-9. Natural settling of fill over a 10-year period.

Soil Class	Precipitation Zones (inches)		
	7–16	16–24	>24
	Depth of Moisture Penetration and Settling (inches)		
A	40	60	120
B	30	48	60
C	20	30	40

2.3.2 Supplemental Irrigation

Supplemental spray irrigation water can be used to aid settling where natural precipitation is not adequate. Generally, fill must be adequately saturated by irrigation for a minimum of 5 years to ensure natural settling. Ideally, potential drainfield sites in fill should be planned 5–7 years in advance. Adequate depth and area should be planned, and the site should be leveled before the settling period begins. For additional details, see section 2.3.8.

2.3.3 Fill Material Sites

Fill material sites must have a minimum of 12 inches of unsaturated suitable soil above the seasonal high ground water level. Judgment in site evaluation will be necessary when layers of different textures occur.

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2.3.4 Fill Material

If a fill has a continuous horizontal layer of a finer-textured soil, the settling should be calculated for the most restrictive soil. For example, most of a fill is an A soil, but a continuous layer of C soil occurs at 20 inches or less in a 7- to 16-inch precipitation zone. In this situation, the fill should be considered a C soil. If the layer occurred at 30 inches then the depth between 30 and 40 inches may lack natural compaction. Understanding field capacity of the soils is critical to determining if the fill material has adequately settled.

2.3.5 Acceptable Fill Material

Fill material must be an acceptable soil type and free of trash, garbage, solid waste, demolition materials, woody debris (e.g., stumps, branches, sticks, forest slash, and mill yard debris), organic material (e.g., manure, grass and lawn clippings, biosolids, sludge, and compost), unsuitable soils, and large rocks. Based on the site evaluation, the fill material must be no more permeable than the next soil subgroup of the receiving soil. Fill material may be less permeable than the receiving soils.

2.3.6 Mechanical Compaction Not Authorized

Mechanical compaction of fill soils is not an acceptable substitute to weathered fill. Mechanical compaction has its place in providing buildings with structurally stable level bases, essentially preventing the building from settling. The soil-based treatment system of a drainfield, while it too needs a stable base, is easily overcompacted resulting in horizontal flow paths and break out (a type of system failure), or greatly reduced long-term infiltration and subsequent system failure.

2.3.7 Site Preparation

Thick vegetative mats should be removed. Prior to placement of any fill, the natural ground surface should be scarified or plowed to a depth of 6 to 8 inches. This will increase stability and avoid the problems associated with a layer of organic material. Include enough area to run compaction and settling tests. This area should not be included in the drainfield area calculations because the test pit excavations will destroy the area for use as a drainfield.

The original soil should not be compacted before the placement of fill. Compaction can easily happen at construction sites if equipment or other types of vehicles have been operated during periods when the site was wet. On sloping areas, preventing compaction is very critical because saturation zones can develop just above the compacted layer, creating stability problems. Loose soils with significant amounts of volcanic ash are particularly susceptible to compaction. No pneumatic-tired equipment should be permitted on the fill area and fill material in order to prevent soil compaction.

Sites should be avoided where fill has been dumped in piles for a long period and then leveled out because differential settling occurs. The calculation of settling time will begin after leveling.

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2.3.8 Enhanced Weathering Procedures

Supplemental irrigation may be employed to shorten the fill weathering time. Enhanced weathering of fill is a process that mimics the yearly or annual hydrologic cycle of soil weathering. The fill soils are brought up to their field capacity by using an irrigation system to mimic rainfall, and then the fill soils are left to dry and settle. Irrigation application methods need to avoid erosion of the fill and formation of rills that allow runoff to occur. A sufficient timeline between irrigation sets needs to be determined based on soil transpiration or soil measurements. Natural weathering of fill material can be enhanced by using supplemental spray irrigation and drying. Fill depth and fill soil type are key factors in determining the length of time needed for this type of site modification.

Elements of a site modification plan for enhanced weathering procedures should include, but may not be limited to the following:

1. Site modification plan application information
    a. Proposed fill area including
        1) Primary and replacement drainfield areas in square feet (ft^2)
        2) Test pads of sufficient size are calculated. Testing pads are sacrificed by excavation to bottom of fill to determine soil structure/weathering.
    b. Site map
2. Site evaluation
    a. Topography
        1) Elevation
        2) Primary wind direction
    b. Climate
        Precipitation and evaporation based on the 30-year averages (this will be an important part of field capacity analysis and natural weathering for the test period)
    c. Access
        Equipment access for site ingress and egress
    d. Setbacks
    e. Ground water level determination
3. Soil characterization
    a. Native soil horizons and native soil types
    b. Effective soil depth determination
    c. Soil structural characteristics
    d. Percent rock/gravel
    e. Limiting layers
4. Site modification plan details
    a. Fill depth needed to achieve effective soil depth
    b. Proposed soil type for fill
        1) Follow TGM particularly on sloped ground.
        2) Use information gained in the soil characterization (step 3) to determine fill soil type.
    c. Determine fill soil field capacity.

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1) Soil type for the fill will determine the field capacity of the soil.
2) A soil scientist should determine the volume of fill and corresponding field capacity for the fill. This step is critical to determine the amount of water to apply to the fill material.
3) The goal is to simulate a natural weathering cycle through artificial water sprinkler application.

d. Irrigation water management plan
1) The objective is to apply enough water through the sprinkler system to achieve the field capacity of the fill material.
2) Describe the source of irrigation water, method of application, length of application based on calculated sprinkler flows, and length of the resting period.
3) Supplemental water application must be through a metered supply with sprinkler coverage measured and monitored.
4) Irrigation days with high winds and hot temperature (>90 °F) should be avoided as the water from the sprinkler system will drift and evaporate out of the fill material and not achieve field capacity.
5) Soil lysimeters can be installed at several depths to measure field capacity and determine when sprinkler application can stop. The lysimeters provide certainty that the irrigation system is achieving field capacity.
6) Without lysimeters, additional test pad areas are likely to be needed, along with potentially longer time frames to complete the enhanced weathering process.
7) Sprinkler activity is on a month-by-month basis to achieve the equivalent of a 10-year soil weathering cycle for a deep fill project.
a) The sprinkler application period should occur during the growing season, which is typically May–October.
b) The water cycle must stop during the nongrowing season and allow the fill materials to completely dry out to replicate the weathering pattern.
c) Sprinkler activity should occur over two summers, with additional sprinkler activity in years 3 and 4 depending on the test pad results.

5. Submit plans for review.
6. Install fill material as per section 2.3.7 and any additional conditions identified in the plan review.
7. Monitoring
a. Monitor sprinkler application rate to confirm calculated time for the sprinkler set.
b. Monitor sprinkler coverage to ensure no areas are left dry. Ensure overlap of sprinkler coverage.
c. Monitor lysimeters to confirm field capacity has been met.
d. Fill material monitoring
1) Test holes are first excavated with a soil auger to determine soil stability.
2) Holes that collapse when the soil auger is removed indicate that the fill is not ready for further tests.
3) Refill hole and tag or mark the spot as sacrificed. Do not test in this location again.
4) If necessary, repeat test hole soil auger determination until test hole remains open and does not collapse.

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This process will require extra weathering time before repeating test hole auger determination.

8. Fill material weathering tests
   a. Excavate test hole with backhoe after the soil auger stability tests are successful.
      1) Test hole excavation needs to be done carefully.
         a) Collapse of the test hole is likely in deep fill materials or with inadequate sprinkling.
         b) Follow safety protocols for septic tank excavation. Be cautious of cave in and sidewall collapse.
         c) Observe the soil structure. Look for massive collapses or sections of sidewall collapse—this is a failure.
         d) Refill test hole and tag or mark the spot as sacrificed.
            a. Do not test in this location again.
         e) Additional sprinkling over the entire area is needed if areas have massive sidewall collapse.
            Minor sidewall collapse may be acceptable as this can easily occur with poor excavation technique.
         f) Observing the excavation is critical to determine if partial soil collapse was a result of the mechanical disturbance by the backhoe.
         g) U-shaped trenches indicate unstable soil sidewalls and the need for additional weathering.
   b. Use a geology pick to look for penetration on side walls.
      1) Follow test hole safety protocols.
      2) To check for compaction run a knife or geology pick point vertically on the pit face.
         a) Penetration depth should be about 0.5 to 1 inch into the soil.
         b) A change in resistance to the movement of this sharp object across the soil horizons indicates compaction.
      3) Very distinct platy structure or high bulk density also indicates compaction.
      4) Field soil densitometer tests should be run, and laboratory bulk density tests should be collected and analyzed. Compare results to normal soil values for the soil type.
   c. If fill, other than sand, is loose or can be easily dug out by a gloved hand, then adequate settling has not occurred.
9. Fill is ready for installation of a septic system when the pick test, soil densitometer, and soil bulk density test show normal soil compaction.

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2.4 Ground Water Level

Revision: October 31, 2013

Ground water is any water in Idaho that occurs beneath the surface of the earth in a saturated geological formation of rock or soil (IDAPA 58.01.03.003.14). Ground water may be present near the ground surface at normal and seasonal high levels. Seasonal high ground water level is the highest elevation of ground water that is maintained or exceeded for a continuous period of 1 week per year (IDAPA 58.01.03.003.15.a). Normal high ground water level is the highest elevation of ground water that is maintained or exceeded for a continuous period of 6 weeks per year (IDAPA 58.01.03.003.15.b).

Subsurface sewage disposal systems and septic tanks must maintain vertical separation distances from the ground water to the bottom of the drainfield (IDAPA 58.01.03.008.02.c) and top of the septic tank (IDAPA 58.01.03.007.17). Ground water may be present year-round or seasonally. Permanent (year-round) ground water levels may fluctuate through the year or remain fairly constant. Seasonal ground water levels can fluctuate greatly and are typically affected by runoff or irrigation practices. To ensure separation distances as required by IDAPA 58.01.03 to permanent or seasonal ground water levels are met, determining the normal and seasonal high ground water levels is important.

High ground water levels may be established by the presence of low chroma mottles, historic records, or actual ground water monitoring (IDAPA 58.01.03.003.15). DEQ recommends and prefers that actual ground water monitoring be performed prior to issuing a subsurface sewage disposal permit if the proposed site of a new system is suspected to be affected by ground water levels. This monitoring ensures that adequate separation distances are maintained from subsurface sewage disposal systems and ground water as required by IDAPA 58.01.03.008.02.c and fulfills the intent of the State of Idaho's ground water policy as outlined in Idaho Code §39-102.3.a and the intent of DEQ's ground water policy as outlined in IDAPA 58.01.11.006.05 to prevent contamination of ground water from any source to the maximum extent practical.

In situations where a repair permit must be issued to replace a failing subsurface sewage disposal system, it would be appropriate to use historic records or the presence of low chroma mottles to establish the normal and seasonal high ground water levels.

The following provides guidance on when and how to use low chroma mottles and historic records, and how to perform and interpret actual ground water monitoring.

2.4.1 Ground Water Monitoring

Ground water monitoring is the preferred method for determining ground water levels. Over a period of time, ground water levels can be established by recording elevation changes in the ground water's surface, observed through a permanent or temporary well.

2.4.2 Monitoring Wells

During preliminary site investigations prior to subsurface sewage disposal permit issuance, the most common type of monitoring well used is a temporary monitoring well. If continual ground water monitoring is required as a condition of the subsurface sewage disposal installation permit

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(e.g., large soil absorption systems), permanent monitoring wells are recommended to be installed after permit issuance. The recommended installation and design of both of these well types are provided below.

2.4.2.1 Permanent Monitoring Wells

DEQ recommends that permanent monitoring wells be installed by a professional well driller and the Idaho Department of Water Resources be consulted to determine the need for a well permit and any required construction standards. Permanent wells should be cased, with perforations in the casing throughout the anticipated zone of saturation. An idealized permanent monitoring well for observing ground water of less than 18 feet deep is shown in Figure 2-5. If a permanent well will be used for water quality monitoring, it should be

1. Purged or otherwise developed to eliminate installation contamination and silt buildup.
2. Provided with a ground water seal at the annular space between the casing and natural ground to prevent surface water from entering the ground water along the casing's exterior.

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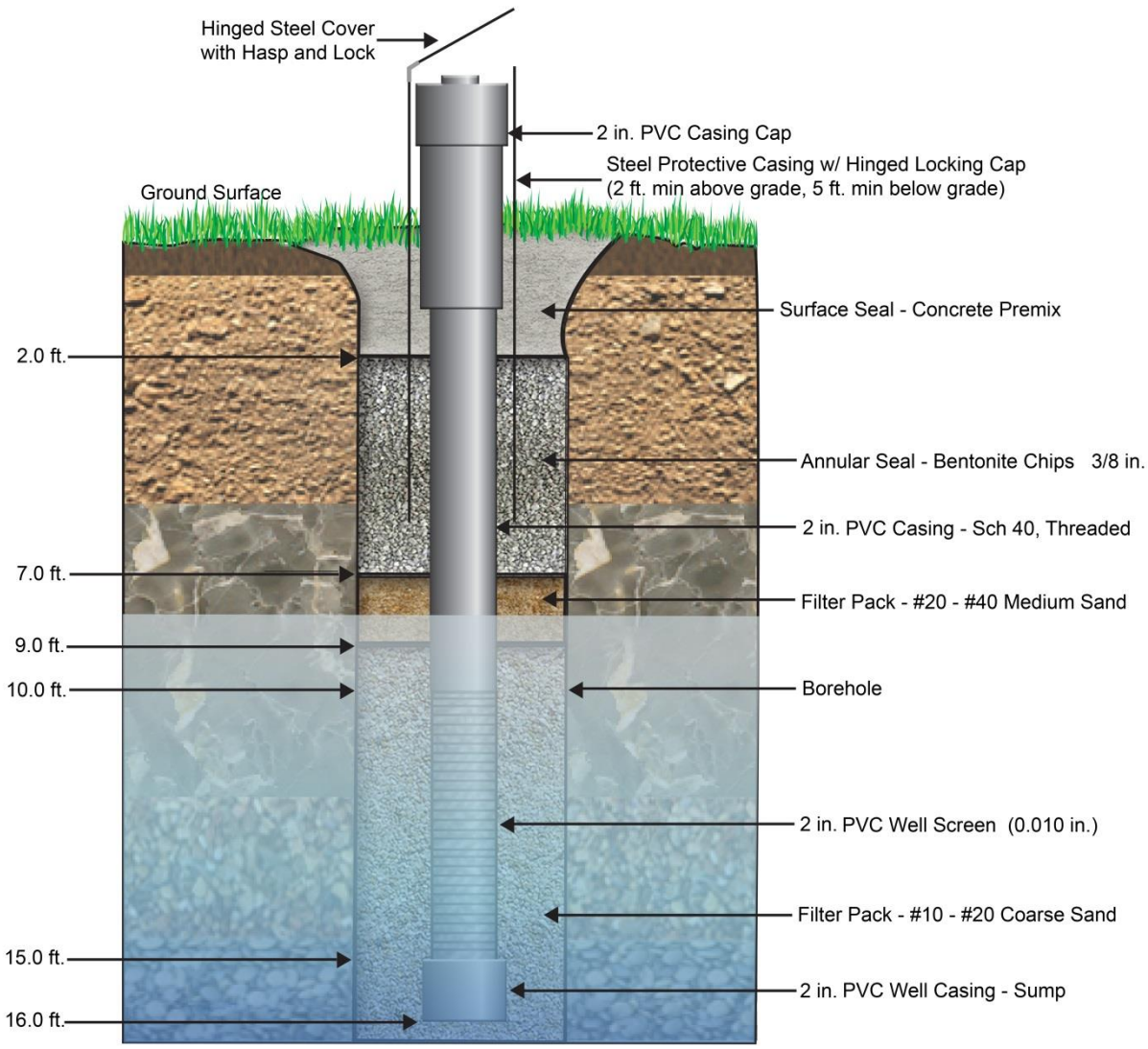

Figure 2-5. Permanent shallow ground water monitoring well design.

2.4.2.2 Temporary Monitoring Wells

Temporary monitoring wells are typically installed at the same time that test pits are excavated and evaluated. Monitoring wells are either placed in the excavated test pit or are placed in a separate hole near the test pit created by an auger. Temporary monitoring wells placed by an auger should be no farther than 10 feet from the evaluated test pit. More than one temporary monitoring well may be necessary at each site and is highly recommended. Each monitoring well should have an evaluated test pit associated with its placement.

Temporary monitoring wells are typically constructed of perforated or solid plastic pipe at least 1 inch in diameter. Solid plastic pipe should be manually perforated with holes or slits that extend up the pipe through the expected zone of saturation. Temporary monitoring wells should extend 10 feet belowground or to a known limiting layer less than 10 feet deep. Temporary monitoring wells placed to evaluate spring runoff influenced seasonal ground water should be extended above grade high enough to be found through snow pack during the early monitoring period. Removable caps are recommended to be placed on the top of each monitoring well. The

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bottom end of the monitoring well should not be capped. Geotextile fabric or a filter cloth/sock should be used to wrap the plastic pipe from the bottom of the pipe to a point above the perforations. Mound fill soil around the temporary monitoring well when backfilling the well excavation so a depression does not form in the ground's surface around the mound that will collect surface runoff and artificially raise the ground water level within the monitoring well. An idealized temporary monitoring well for observing ground water of less than 18 feet deep is shown in Figure 2-6.

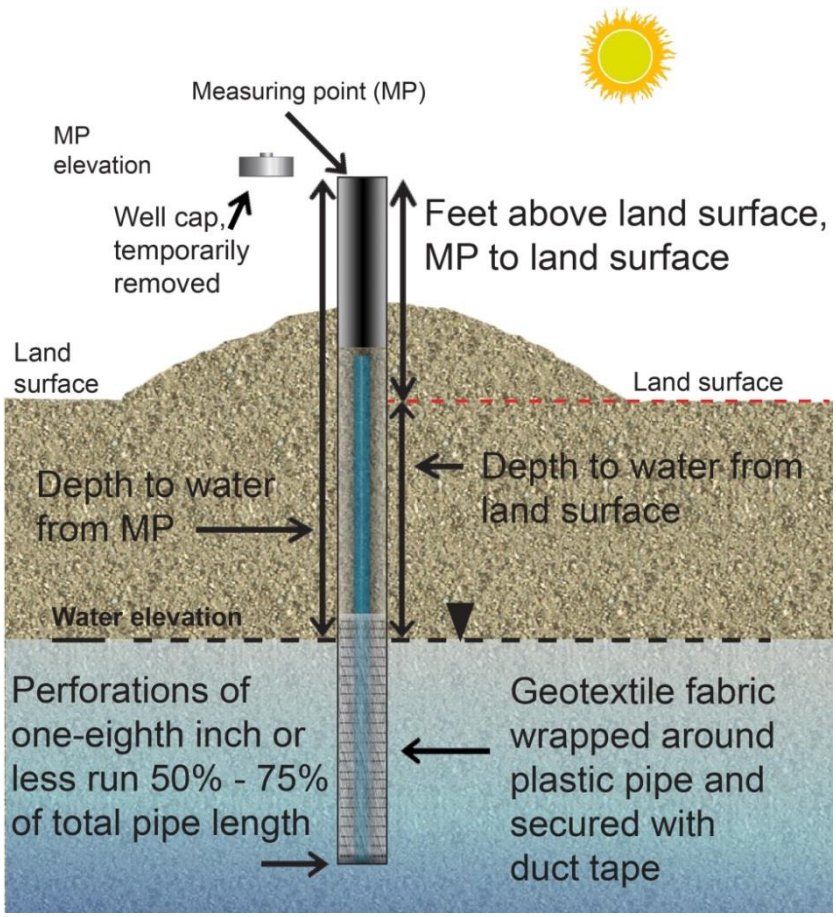

Figure 2-6. Temporary ground water monitoring well design.

2.4.2.3 Measuring the Seasonal Ground Water Level from a Monitoring Well

Seasonal ground water is typically influenced by seasonal runoff of snowmelt, spring rain events, and irrigation practices. The time frame in which these influences affect a property may vary due to location, climate, or agricultural practices. Due to this variability, monitoring time frames required prior to subsurface sewage disposal permit issuance may vary from permit to permit. Monitoring periods may overlap if all of these influences are expected to impact seasonal ground water levels at a proposed subsurface sewage disposal site. Typical time frames for monitoring based upon ground water influences are as follows:

- Seasonal runoff and spring rain events: February 15 through June 30
- Irrigation: April 15 through October 31

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Monitoring should be performed by the applicant on a weekly basis over the determined monitoring period. Concurrent monitoring at a proposed subsurface sewage disposal site should also be performed by the health district on a monthly basis to verify ground water levels obtained by the applicant. The monthly verification by the health district also allows for the evaluation of any potential temporary or intermittent surface waters that may exist on the site.

Prior to recording ground water levels from a newly installed permanent or temporary monitoring well, the well should be left undisturbed for 24 hours before observing and recording the ground water's surface elevation. To record the ground water level, mark a standardized location on the top rim of the monitoring well to obtain the ground water measurements from. Use the following equipment to obtain the ground water level below grade:

- Measuring tape that will fit inside the monitoring well
- Carpenter's chalk to coat the initial length of the measuring tape
- Ground water monitoring table that includes the following information:
  - Height of the monitoring well above the native soil surface
  - Total depth of the monitoring well from the top rim to its termination point below ground level
  - Date and time for each measurement
  - Location for recording the ground water level from top rim of monitoring well
  - Location for recording the total depth of wetted chalk (indicates how far below the ground water level that the measuring tape was inserted)
  - Location for recording the water level below ground surface (ground water level measurement minus the wetted chalk depth minus the height of the monitoring well above the native soil surface)
  - Location for date specific notes (e.g., weather, well conditions, and recorder)

The following steps should be taken at each monitoring well to obtain the ground water level:

1. Coat 1 to 2 feet of the measuring tape with carpenter's chalk.
2. Lower the measuring tape down the monitoring well with the tape against the identified measuring point on the top rim of the monitoring well. This step should occur at a rapid rate so the measuring tape can be heard when it encounters the top of the ground water level.
3. Once the tape has either encountered the top of the ground water level or the bottom of a dry monitoring well, record the value on the measuring tape that is identified at the measuring point on the top rim of the monitoring well.
4. Slowly remove the measuring tape from the monitoring well and obtain the total wetted chalk measurement.
5. Determine the ground water depth below native ground level by subtracting the wetted chalk measurement and height of the monitoring well above native ground from the measurement obtained in step 3.

Do not insert large diameter items into the ground water through the monitoring well to obtain ground water level measurements. Large items may cause water displacement and artificially raise the ground water level. Ground water monitoring should continue throughout or past the expected monitoring period until it is determined that the seasonal and normal high peaks have occurred and will not be exceeded.

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2.4.2.4 Determining Seasonal and Normal High Ground Water Levels

Seasonal and normal high ground water levels can be determined once the weekly monitoring for the designated monitoring period is completed. The seasonal high ground water level is the weekly measurement that is the highest level recorded during the monitoring period. The highest level is the measurement that equates to the shallowest depth from the native ground level to the ground water level.

The normal high ground water level is the highest elevation of ground water that is maintained or exceeded for a continuous period of 6 weeks per year. This determination may include the seasonal high ground water level week but may fall outside of the seasonal high peak. If the determination of the normal high ground water falls outside of the seasonal high peak, it is because the highest ground water level that is maintained or exceeded for a continuous period of 6 weeks falls within this time frame (IDAPA 58.01.03.003.15.a). A normal high ground water level that falls in a 6-week block of time that does not include the seasonal high ground water level will be more restrictive than what would be determined by the 6-week block of time that included the seasonal high ground water level. The determination is demonstrated in Table 2-10 and Table 2-11.

Table 2-10. Determination of seasonal ground water levels where the seasonal high ground water level and normal high ground water level occur within the same 6-week block of time.

Monitoring Week	1	2	3	4	5	6	7	8	9
Ground water level (inches below native grade)	69	62	65	53	46	40	47	66	72

In Table 2-10, the seasonal high ground water level occurs within the 6-week block of time that defines the normal high ground water level. The seasonal high occurs in week 6 and is 40 inches below native grade. The 6-week block of time that defines the normal high ground water level occurs from week 2 through 7. During this time, the lowest ground water level recorded from native grade occurs on week 3, so the normal high ground water level is 65-inches below native grade.

Table 2-11. Determination of seasonal ground water levels where the seasonal high ground water level occurs outside the 6-week block of time that determines the normal high ground water level.

Monitoring Week	1	2	3	4	5	6	7	8	9
Ground water level (inches below native grade)	23	24	19	23	21	22	25	16	20

In Table 2-11, the seasonal high ground water level occurs outside of the 6-week block of time that defines the normal high ground water level. The seasonal high occurs in week 8 and is 16-inches below native grade. The 6-week block of time that defines the normal high ground water level occurs from week 1 through 6. During this time, the lowest ground water level recorded from native grade occurs on week 2, so the normal high ground water level is 24-inches below native grade. This level meets the requirements of IDAPA 58.01.03.003.15.a in that 24 inches is the highest elevation of ground water that is maintained or exceeded for a continuous period of 6 weeks.

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2.4.3 Low Chroma Mottles

If the static ground water level cannot be determined through ground water monitoring due to the time of year the soil profile is observed, but its presence at some time in the year is suspected, its level can be predicted by looking for the presence of the following soil conditions:

1. Reddish-brown or brown soil horizons with grey mottles that have a chroma of two or less and red or yellowish-red mottles
2. Grey soil horizons that have a chroma of two or less, or grey soil horizons with red, yellowish-red, or brown mottles
3. Dark-colored, highly organic soil horizons
4. Soil profiles with soluble salt concentrations at or near the ground surface

Take care in interpreting soil conditions as an indicator of high ground water. Mottling may be the artifact of past ground water from geologic time. Some soils do not readily indicate mottling, especially those with high ferric (Fe+++) iron content and in areas with newly established water tables or where the brown color is from iron bacteria.

2.4.4 Historical Records

Historical records are another method that may be used to determine seasonal and normal high ground water levels for a proposed subsurface sewage disposal system. Use historical records that evaluate unconfined aquifers or perched seasonal water tables. Well drilling records may not be suitable in all circumstances and must be evaluated on a case-by-case basis if available. Historical records composed of ground water monitoring data, as described in section 2.4.2, should be used to determine ground water levels at a proposed site.

All historical records available for properties immediately surrounding the applicant's property should be used to determine ground water levels. Other records from nearby properties should also be evaluated to gain an understanding of ground water levels for the immediate area with emphasis placed on records for properties closest to the applicant's property. Take a conservative approach in this evaluation, and use the most restrictive ground water level record within the historical records when issuing a permit.

2.4.5 Low Water Years

Take care when reviewing ground water monitoring records related to spring runoff during low water years. Snow-water equivalents of less than 75% of normal would be considered an extremely low water year. Ground water monitoring performed during these years may need to be repeated due to below normal ground water levels. Information regarding the snow-water equivalent reading is available through the Natural Resources Conservation Service.

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2.5 Cutoff Trenches

Revision: July 18, 2013

2.5.1 Description

A cutoff trench is a perforated pipe installed beneath the ground surface that collects and conveys seasonal or normal high ground water to a natural drainage way.

2.5.2 Purpose and Function

Cutoff trenches may be used to lower seasonal high and normal high ground water on slopes by intercepting laterally moving ground water that is perched above a hydraulically restrictive horizon and directing the intercepted ground water away from the drainfield area. Cutoff trenches must intercept an impermeable layer for ground water to be significantly reduced in the area of the drainfield and replacement area (Figure 2-7).

Cutoff trenches that do not intercept impermeable layers will only reduce the water table in the near vicinity of the drainage trench. Drainage trenches do not significantly reduce the water table levels in the drainfield and reserve areas. Effectiveness of drainage trenches depends on site-specific criteria.

2.5.3 Approval Conditions

It is recommended that cutoff trenches are orientated parallel to the length and width of the drainfield and installed on all sides except for the downslope side as shown in Figure 2-8. The following conditions should be followed:

- Trenches must be keyed into the hydraulically restrictive zone, such as impermeable soil, or hardpan, at least 8 inches deep.
- Cutoff trenches may not be used to lower perched water tables in soils with moderate or strong platy structure and where the subsoil structure does not follow the topography of the land.
- Caution: Cutoff trenches must not pass through the confining layer. Cutoff trenches that pass through the confining layer could potentially drain a perched aquifer into a developed aquifer.
- Ground water levels must be monitored for an entire high ground water season after the cutoff trench is installed.
- Drainage must discharge to a natural drainage way on the property so the water will not flood or damage adjacent property.
- Cutoff trenches may not be used to drain wetlands.
- Cutoff trenches must meet surface water separation distances from upgradient drainfields.
- Cutoff trenches cannot be used for any large soil absorption system, community septic system, or central sewage system. Cutoff trenches may only be used for individual homes.
- Mechanical disposal of water is prohibited. Pumps are not allowed to be used with a cutoff trench.

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- Slope of the site must be between 5% and 45%, and the minimum drain slope shall be 1% or 1 foot of fall per 100 feet of run.
- Outlets should be 50 feet from the property line unless discharging directly into a well-defined drainage way.
- Outlets shall be designed, constructed, located, and maintained in a manner that does not violate any applicable federal, state, or local laws or regulations.

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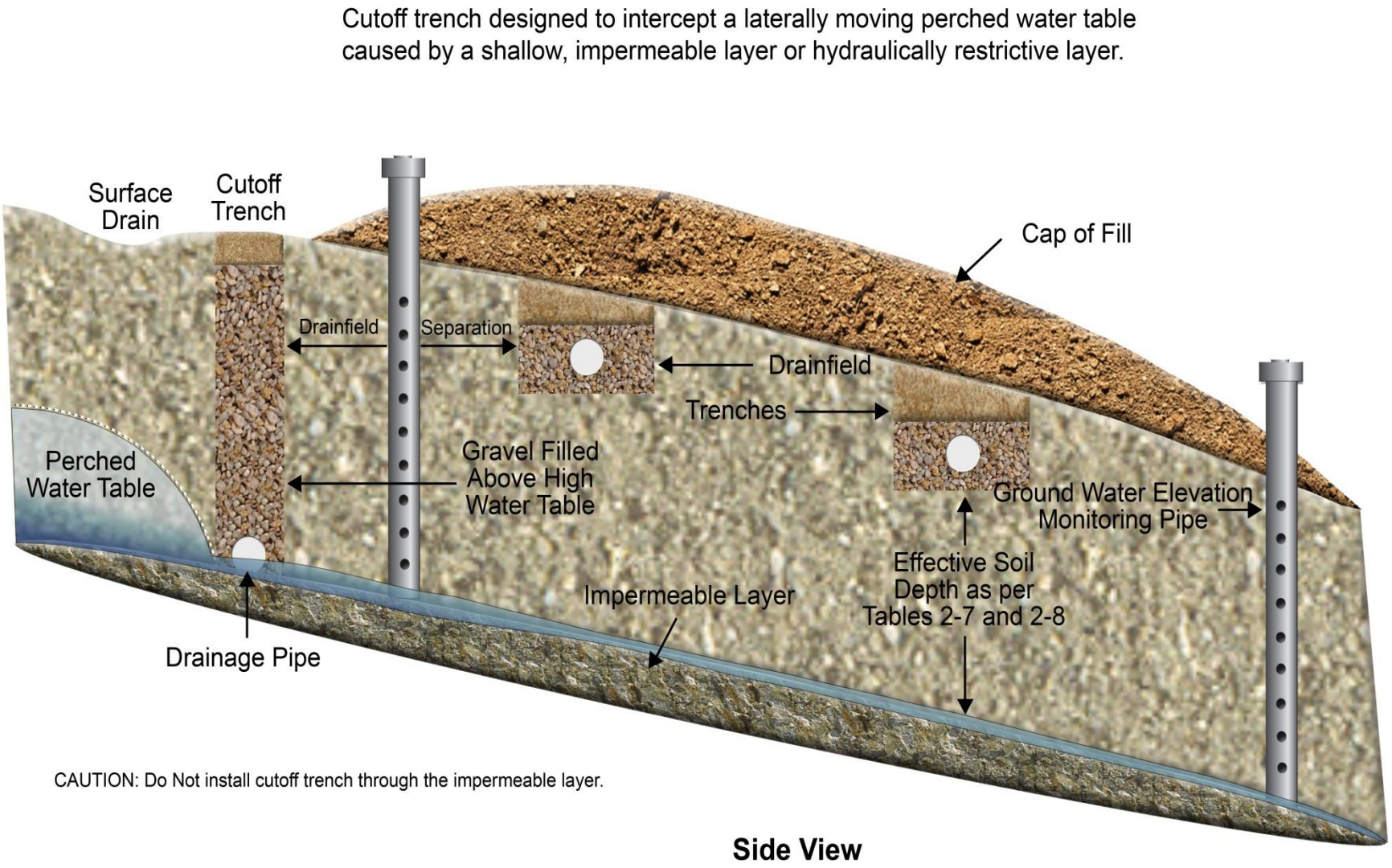

Figure 2-7. Cutoff trench side view.

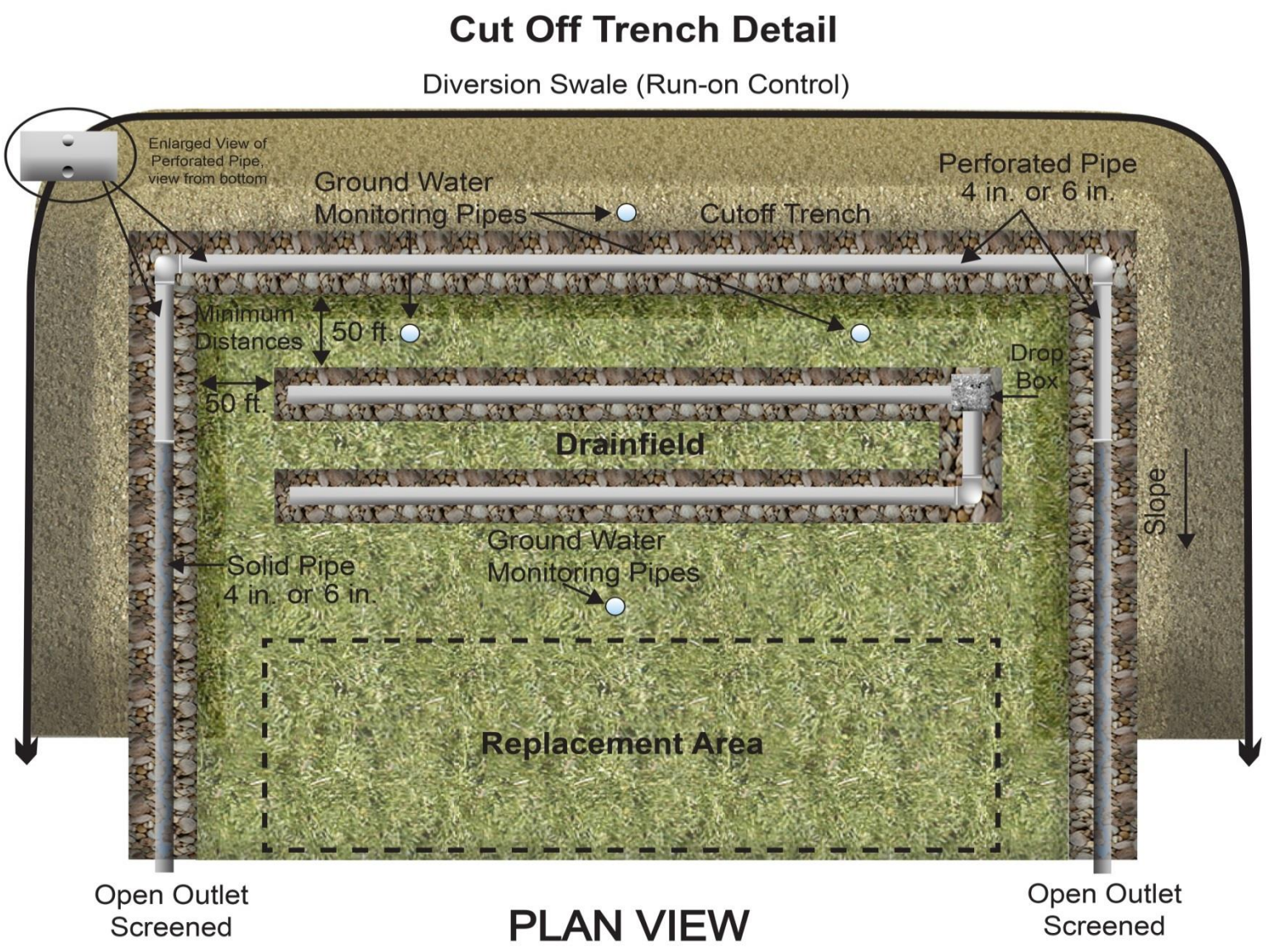

Figure 2-8. Cutoff trench plan view.

Table 2-12 shows drainfield setbacks from cutoff trenches based on percent slope. In Table 2-12, each split cell shows the drainfield depth requirement in the upper left and the minimum setback distance in the lower right. Effective soil depths for drainfields must meet requirements in Table 2-5 and Table 2-6.

Table 2-12. Setbacks of drainfield from cutoff trench based on percent slope.

Slope (%)	Depth of Cutoff Trench (feet)							
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**
5	0.5 - 3 / 50	1.5 - 4 / 50	2.5 - 4 / 50	3.5 - 4 / 50	4 / 61	4 / 81.5	4 / 100	4 / 120
10	0 - 3 / 30.5	0 - 4 / 40.5	0 - 4 / 50	1 - 4 / 50	2 - 4 / 50	3 - 4 / 50	4 / 50	4 / 61
15	0 - 3 / 18	0 - 4 / 25	0 - 4 / 32	0 - 4 / 39	0 - 4 / 45	0.5 - 4 / 50	1.5 - 4 / 50	2.5 - 4 / 50
20	0 - 3 / 14	0 - 4 / 19.5	0 - 4 / 24.5	0 - 4 / 29.5	0 - 4 / 34.5	0 - 4 / 39.5	0 - 4 / 44.5	0 - 4 / 50
25	0 - 3 / 11.5	0 - 4 / 16	0 - 4 / 19.5	0 - 4 / 23.5	0 - 4 / 27.5	0 - 4 / 31.5	0 - 4 / 35	0 - 4 / 39.5
30-45	0 - 3 / 9.5	0 - 4 / 13	0 - 4 / 16.5	0 - 4 / 19.5	0 - 4 / 23	0 - 4 / 26.5	0 - 4 / 30	0 - 4 / 33

Note: Split cells show drainfield installation depth requirements in the upper left and minimum setback distance in the lower right.

Each split cell in Table 2-12 shows the installation depth required to maintain the drainfield below the level of the cutoff trench. Drainfield setback distances are a function of slope. As the slope increases, the separation distance is reduced. The risk of septic tank effluent being intercepted by the cutoff trench decreases as the slope increases, which enables reduced setbacks at higher slopes.

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2.5.4 Design and Construction Techniques

1. Excavate plumb sidewall of a 1-foot wide trench for the length of the cutoff trench, including side trench area. Trench depth depends on the depth to impermeable or hydraulically restrictive layers.
2. Install drain line (e.g., ultraviolet resistant pipe and foundation drain material). Drain holes are oriented down to intercept ground water at its lowest level. Cover and secure screen on the drain line outlet to prevent animal harborage and infestation. Use hardware cloth and a pipe clamp or animal guard (Figure 2-9). Minimum size of drain used in mains shall be determined by applying Manning's equation, assuming full pipe flow. In no case shall the pipe be less than 4 inches in size, except when soils containing a high percentage of fine sand or where local experience has shown it to be desirable, the minimum size shall be 6 inches.
3. Cover drain line(s) with drainrock above the normal high ground water elevation.
4. Cover drainrock with a geotextile filter fabric of >1 ounce per square yard.
5. Fill trench with medium sand or pit run sand (4 inches minus) and cover with topsoil.
6. Construct diversion swale to prevent runoff from flowing onto the drainfield areas.
7. Excavate, or drill, and install ground water elevation monitoring pipes and monitor ground water elevation for an entire high ground water season to determine effectiveness of cutoff trenches.

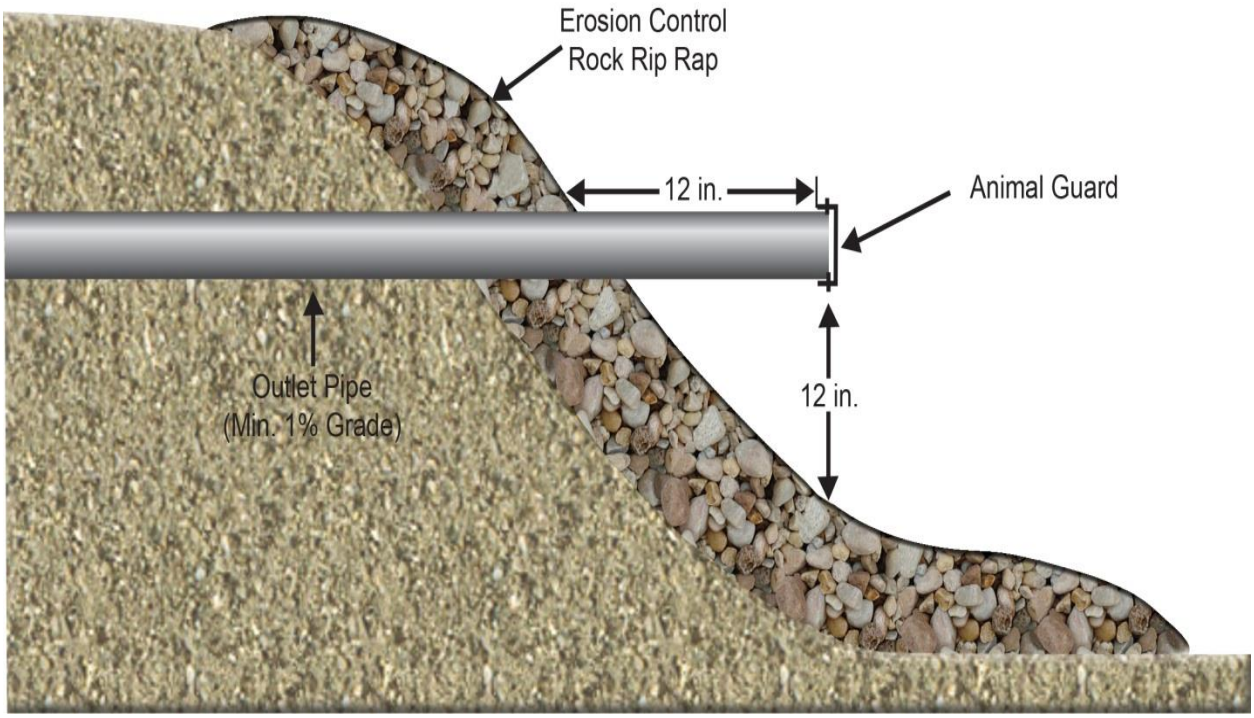

Figure 2-9. Cutoff trench outfall.

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2.5.5 Maintenance

1. Outlets should be kept clear of sediment and debris.
2. Erosion control practices shall be maintained, and outfall structures repaired to prevent scouring of sediment from the pipe outlets.
3. Animal guards shall be maintained to prevent rodent damage to the drain lines and obstruction of the pipe outlets.
4. Water-loving trees and shrubs should be kept at least 50 feet from all perforated drain lines.

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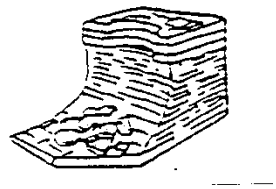
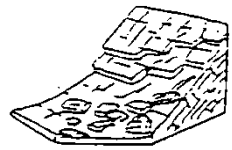
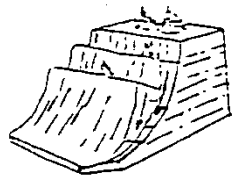
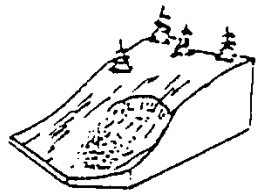
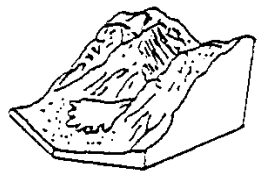
2.6 Unstable Landforms

Revision: July 18, 2013

2.6.1 Description

Unstable landforms means areas showing evidence of mass downslope movement such as debris flow, landslides, rockfalls, and hummocky hill slopes with undrained depressions upslope (Table 2-13). Unstable landforms may exhibit slip surfaces roughly parallel to the hillside; landslide scars and curving debris ridges; fences, trees, and telephone poles that appear tilted; or tree trunks that bend uniformly as they enter the ground. Active sand dunes are unstable landforms. Figure 2-10 presents a cross section of an unstable landform.

Table 2-13. Descriptions and characterizations of different unstable landforms.

Process	Definition and Characteristics	Illustration
Rock fall and debris fall	The rapid descent of a rock mass, vertically from a cliff or by leaps down a slope. The chief means by which taluses are maintained.	
Rockslide and debris slide	The rapid, sliding descent of a rock mass down a slope. Commonly forms heaps and confused, irregular masses of rubble.	
Slump	The downward slipping of a coherent body of rock or regolith along a curved surface of the slumped mass, and any flat-lying planes in it, becomes rotated as it slides downward. The movement creates a sharp facing downslope.	
Debris flow	The rapid downslope plastic flow of a mass of debris. Commonly forms an apron- or tongue-like area, with an irregular surface. In some cases, begins with slump at head, and concentric ridges and transverse furrows in surface of the tongue-like part.	
Variety mudflow	A debris flow in which the consistency of the substance is that of mud; generally contains a large portion of fine particles, and a large amount of water.	

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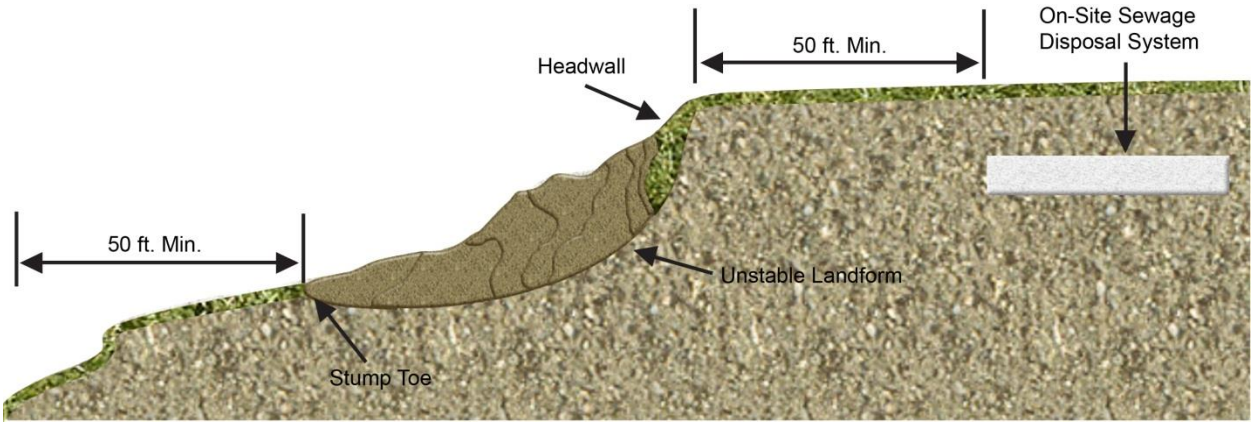

Figure 2-10. Cross section of an unstable landform.

2.6.2 Additional Application Information Requirement

Applicants proposing systems above a suspected unstable landform are required to provide supplemental information on the subsurface sewage disposal application as required in the "Individual/Subsurface Sewage Disposal Rules" (IDAPA 58.01.03.005.04.o) (section 8.1). The septic tank and drainfield shall not be installed on an unstable landform, where operation of the subsurface sewage disposal system may be adversely affected or where effluent discharged to the subsurface will contribute to the unstable nature of the downslope landform.

A permit shall be denied for a subsurface sewage disposal system application where any portion of the system must be installed on an unstable landform. Locating subsurface sewage disposal systems on unstable landforms will result in adverse system operation, performance, and effluent treatment.

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