This condition is usually the result of the clearing of wooded land and pushing up the stumps and root balls of large trees with a bulldozer. This condition is also associated with back-filled pits that were excavated for some purpose (usually the burial of trash, vegetative debris or animals).

IMPORTANT NOTE: When a mixed soil area is found to cover a large area and not just in spots, the consultant should be looking for indications of past mining activity. There are several areas of Williamson County where phosphate mining was conducted. Many of these sites are old and were reclaimed many years ago and thus may not show any obvious indications of the disturbance aside from the mixed soil. Mining activities are gone now, but were in operation through the 1980's. Therefore, the mined areas shown in the Williamson County Soil Survey, issued in 1964, are not the only mined sites in the county.

NOTE: This type of mixed soil area is considered unsuited for SDS utilization. The area is to be delineated and red line color-coded. Furthermore, the consultant is to make a recommendation as to an appropriate buffer distance to maintain from these areas with any type of sewage disposal system that could be placed in adjacent soil mapping units.

3) Many times, a combination of both 1 and 2 are found together on a mapping site.

The mixed soil areas described can be found anywhere since most all open land was cleared (and in some cases phosphate mined) at some point in history. The factor of time can allow for the *healing* or *recovery* of the landscape and thus covering or disguising the signs and evidence of where land was cleared. The mixed soil areas are most evident on recently cleared land.

(5) Slope

The slope classes discussed in this Subsection shall be used on all intensity soil maps. These slope classes are specifically designed to coincide with the SDS design criteria mandated in the Willliamson County Subsurface Sewage Disposal Regulations.

Slope shall be expressed as a percentage. The use of a clinometer is required to ensure the accurate measurement of the slopes.

The following slope class breaks are mandatory:

(a) Mapping for Conventional Systems
   1) 0-5 percent
   2) 5-15 percent
   3) 15-25 percent
   4) >25 percent

(b) Mapping for Low Pressure Pipe Systems (standard or modified)
   1) 0-5 percent
   2) 5-15 percent
   3) 15-25 percent
   4) >25 percent

(c) Mapping for Mound Systems (standard or modified)
   1) 0-6 percent
   2) 6-12 percent
   3) >12 percent

(d) Mapping Units to be Considered for Percolation Testing

1) 0-5 percent
2) 5-15 percent
3) 15-20 percent
4) >20 percent

(e) Mapping for Subsurface Drip Disposal (SDD or Drip) Systems

1) 0-9 percent
2) 10-20 percent
3) 20-30 percent
4) 30-35 percent
4) >35 percent

Any mapping unit with a slope of greater than 25 percent (>12% in the case of mapping for a Mound and >35% in the case of mapping for Drip) shall show only the name of the soil series, variant or landscape designation (e.g. Gulliedland), the slope designation of greater than 25 percent (or, greater than 12% or 35%, as applicable) and a red line color-code. Do not denote the estimated soil absorption rate of the soil or indicate any other soil properties or characteristics in the map unit delineation or in the soil map notes.

Any mapping unit in which the consultant determines that percolation testing will be required, shall have a slope of less than 20 percent. Mapping units consisting of soils that could be percolation tested but have slopes greater than 20 percent shall show only the name of the soil series or variant, the slope designation of greater than 20 percent, a red line color-code and note indicating the unit to be *not percable*.

NOTE: Williamson County Sewage Disposal Regulations do not allow for the use of soils on slopes greater than ~~25~~ 35 percent.

(6) Soil Drainage Classification

Soil mapping units consisting of soils that are classified as being Very Poorly Drained, Poorly Drained or Somewhat Poorly Drained are to receive a red line color-code and are to be shown with an estimated soil absorption rate of >75MPI. Where any soil mapping investigation is intended to delineate soil areas for percolation testing any of the aforementioned drainage classifications, where found and mapped, are to be clearly addressed with a notation indicating the unit to be *not percable*

(7) Rock and Non-rock Restrictive Horizons

Where soil mapping units are being delineated for any type of SDS consideration or for the determination as to whether or not a site is eligible for percolation testing, any and all information that can be obtained, via soil observations and probing (in some cases backhoe pits), is to be shown and noted on a soil map regarding the depth to rock or non-rock restrictive horizons when these soil features are evident or suspected in an area of soil mapping.

Disclaimers are typically placed on soil maps concerning rock depths or depths to non-rock restrictive horizons. However, a disclaimer regarding this or any other matter, does not relieve the consultant of making every possible effort to determine the nature of the rock in a mapped area if that area is to be considered for any type of SDS use.

For the purposes of discussion in this Section, the term *rock* will be synonymous with an R layer, lithic contact and unweathered bedrock. The term *non-rock* will be synonymous with Cr horizons, Bt horizons, paralithic contact, weathered rock, saprolite, water table or fragipans.

- *Note on Saprolite:* Though saprolite is geologically associated with igneous and metamorphic rock, the characteristics that define saprolite can be found in some sedimentary rock formations. Two prominent rock formations in Williamson County, the Hermitage Formation in the Outer Central Basin and the Ft. Payne

Formation on the Highland Rim, are sometimes found to be deeply weathered. The weathering of the limestone is to the extent that the Cr horizon, particularly in the Hermitage formation (where the limestone bedding planes are clearly visible in deeply weathered areas), will have the appearance of saprolite, thus being *saprolite-like* or *saprolitic*.

NOTE: In Williamson County, any soil area found to be less than 24 inches in depth to Rock or a Cr (Non-rock) Restrictive Horizon, is considered unsuitable for SDS use and the area is to be delineated as a map unit and red line color-coded. However, subsurface drip dispersal may be considered if the depth to Rock or a Cr (Non-rock) Restrictive Horizon is 20 inches or greater and the depth to redoximorphic depletions (chroma 2 or less) is greater than or equal to 24 inches.

(a) Rock

Several soil series mapped in Williamson County are well known for being shallow in depth to rock and thus not suited for SDS use. Other soil series mapped in the county may not necessarily be described as being shallow to rock, but rock outcrops and shallow depths to rock are typically associated with the soil series. Many of the soils that are associated with rocky areas are common to the Inner Central Basin. However, associations of this type are not limited to the Inner Central Basin and are indeed found in all physiographic regions of the county.

When mapping in an area where rock outcrops are observed and/or shallow, subsurface rock inclusions (such as floaters or pinnacles), are encountered, a description of the nature of the rock shall be required in some manner on the soil map. Such notations shall be highlighted or written on the final soil map in a conspicuous manner. This may be done by placing rock depth descriptions in the soil map note section or by placing rock depth descriptions with the soil mapping unit notations.

However, where any soil mapping unit is indicated as being suited for SDS use, said map units shall not be described as having a percentage of subsurface rock or underlying rock within those units and assigned an MPI rating of 75 or less. Where any such mapping units are suspected as having a potential rock problem, the consultant shall either delineate such rock or denote the soil mapping unit as unsuited for SDS use with a red line color-code. Additionally, the consultant may indicate that such units are unsuited for SDS use, however they may have potential for use should such units be assessed via Ultra High-Intensity soil mapping procedures.

NOTE: This requirement applies only when the soil mapping unit is to be considered for SDS utilization. Red line mapping units with outcropping rock or subsurface rock inclusions will not require detailed description. The only notation regarding the depth of the rock, in a red line map unit, will be a description of the general or average depth to rock (e.g. Talbott, 20-22" to rock, 0-5% slopes or Ashwood-Barfield-Rock Outcrops, 10-26" to rock, 15-25% slopes) in the map unit.

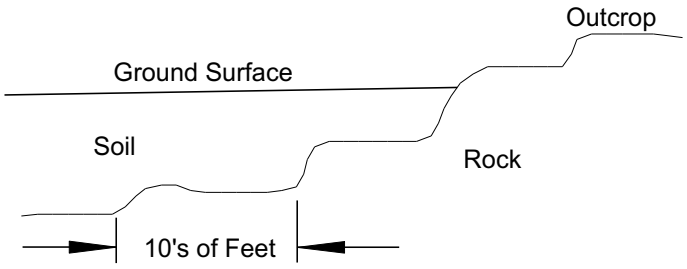
When delineating a red line mapping unit consisting only of Rockland (areas where 50 to 90 percent of the ground surface is exposed rock), it is not necessary to describe the nature of the rock or to delineate the required slope units. The map unit can simply be shown as Rockland with the range of slopes of the Rockland mapping unit (e.g. Rockland, 5-20% slopes).

Common terms used to describe the nature of rock outcrops, shallow subsurface rock layers or inclusions are:

- Tabular - broad, flat, areas of rock, typical to *glade* areas
- Undulating - subsurface rock, deep and shallow in places
- Pinnacle - rock found in spots in mapping area

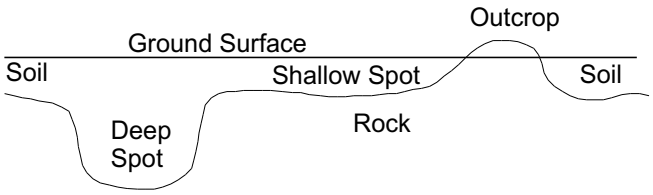
If the general nature of the rock depth remains questionable, no matter how much effort is expended on investigating a site (via probing and boring auger holes), the most restrictive soil depth noted in the mapping area (i.e. the shallowest rock depth encountered) is to be considered as the overall determining factor as to the suitability of the mapping unit for SDS use.

Figure A1-7 shows some common rock scenarios. The combinations of arrangements of subsurface rock is infinite. The natural complexity of the configurations of rock outcrops and related subsurface rock formations makes soil mapping in these areas difficult. The task becomes even more difficult when attempting to map the extent of soils suitable for SDS use and subsequently making the appropriate interpretations of the soils in these areas.



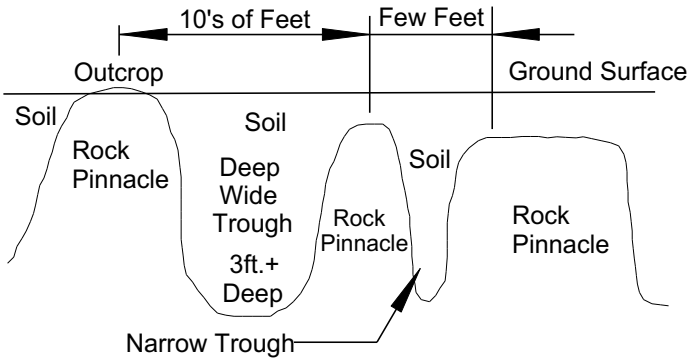
TABULAR

Generally associated with glade areas. The rock outcrops, when seen at the ground surface, exhibit a tabular appearance and typically cover large areas.



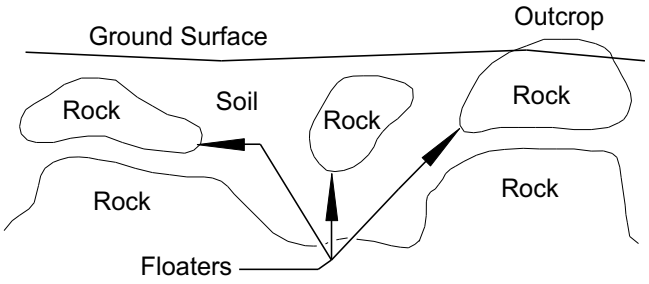
UNDULATING

The rock surface, below the soil, undulates. There will be deep spots and shallow spots of soil, with occasional surface outcrops of the bedrock.



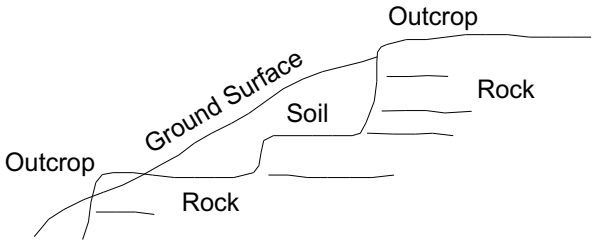
PINNACLE & TROUGH

This subsurface rockscape is characterized by rock pinnacles adjacent to deep troughs. These rock features generally trend with the local joint pattern found in the bedrock formations.



FLOATERS

Floaters are generally random in nature. They may or may not be associated with any of the aforementioned examples.



STAIR-STEP or LEDGE ROCK

This rock scenario is most typical of hillsides. However, it may be present on any degree of slope and in any type of soil association.

Figure A1-7. Examples of common subsurface rock scenarios.

(b) Non-rock Restrictive Horizons

The discussion of this Section will focus on four of the most common restrictive horizon scenarios encountered in soil mapping for SDS evaluations. The soil characteristics of concern are: water tables (seasonal or permanent), fragipans, abrupt clay horizons and Cr horizons (the most notable example being that of the *Hawthorne* soil series).

1) Water tables

When soil characteristics (2 chroma or less mottles) indicating water table problems (seasonal or permanent) are encountered, serious consideration of the nature of the site and soils shall be taken into account when making the assessment as to the suitability of that site for SDS use.

Water table problems encountered in a soil in the upper 24 inches of the soil profile make that soil unsuited for SDS use, unless a soil improvement practice can be utilized to remediate the problem with the site. If the soil properties are such that a soil improvement practice will not be effective in removing the water problem (such as in moderately well to poorly drained clay soils), the soil mapping unit is to be red line color-coded.

Since most water table problems are found on floodplains, foot slopes or on level to gently sloping upland positions, the consultant must make the determination as to interrelationships between:

- the topography of the area as it affects the site -
  - is the site on a concave or convex landscape position.
  - is surface water directed onto the site by the topography of the area.
  - will the topography allow for the diversion, in some manner, of surface and/or subsurface water affecting the site.
  - is the relief of the site such that there will be a positive outlet to any proposed or recommended soil improvement practice.
- whether or not the soil properties will allow for the soil to be drained utilizing a soil improvement practice -
  - is there a suitable blocking layer or restrictive horizon present into which a drain may be tied in order to provide an effective barrier to any laterally moving subsurface water.
  - is the texture of the upper 24 inches of the soil profile such that it will respond to drainage improvements.

2) Fragipans

Fragipans, whether strong or weak, are considered to be blocking layers or restrictive horizons. Unlike a water table, the fragipan is a fixed feature in the soil profile, thus its position in the soil profile does not fluctuate. When they are found to be present in the upper 24 inches of the soil profile, the soil mapping unit containing a shallow fragipan is unsuitable for SDS use and is to be red line color-coded. However, subsurface drip dispersal may be considered if the depth to the fragipan is 20 inches or greater

In order to properly assess soils with fragipans for SDS use, the depth of the pan shall be determined with accuracy. Well over 95% of sites found to have fragipans require some type of soil improvement practice in order to utilize the site for SDS use.

Essentially, most sites with fragipans have some type of water problem. Thus, the consultant must make the determination as to the interrelationships between the soil mapping unit with the fragipan, to the topography and drainage factors (as noted in the previous Section regarding water tables) of the immediate area to make a determination as to the suitability of the site for SDS use.

3) Abrupt Clay Horizons

When a soil horizon exhibiting an abrupt increase in its clay content (i.e. relative to the textures prior to this horizon and having a 35% or more clay content) is encountered, that horizon is considered to be a blocking layer. Any soil series encountered containing these clayey horizons are to be assessed in much the same manner as soils with fragipans. If the clayey horizon is found to be present in the upper 24 inches of the soil profile, the soil mapping unit containing this horizon is considered unsuitable for SDS use and is to be red line color-coded. However, subsurface drip dispersal may be considered if the depth to the clayey horizon is 20 inches or greater.

Unlike soils having shallow water tables or fragipans, many soils found with these abruptly occurring horizons are well drained and the soil unit may allow for percolation testing if said horizon is 18 inches or more below the ground surface with an adequate depth to rock (i.e. in excess of 36 inches to said rock).

4) Cr Horizons

There are several soil series that are well known for having a weathered Cr horizon and in Williamson County the Cr horizon is considered to be a restrictive horizon. Thus, the depth to the Cr horizon and the textures of the soil material above the Cr horizon will be the main factors in interpreting and rating these soil areas for SDS use.

When the Cr horizon is present in the upper 24 inches of the soil profile, the soil will be considered unsuited for SDS use and a soil mapping unit containing this horizon is to be red line color-coded. However, subsurface drip dispersal may be considered if the depth to the Cr horizon is 20 inches or greater.

The approach to mapping and interpretation, regarding the suitability of a site for SDS use, of areas where soils having Cr horizons are found to be present is essentially the same as in the methodology outlined in the part concerning rock.

The majority of the soil series, having Cr horizons, are associated with the Ft. Payne formation of the Highland Rim and the Hermitage formation of the outer Central Basin.