

APPENDIXES

APPENDIX J
SIGNIFICANT SOILS IN THE HEADWATERS RESOURCE AREA

TABLE J-1
PHYSICAL PROPERTIES OF SIGNIFICANT SOILS

1 Soil Series	2 Slope Classes	3 Soil Depth	4 Soil Drainage	5 Soil Permeability	6 Available Water Capacity	7 Texture		8 Erosion Susceptibility		9 Hydrologic Group
						Surface	Subsoil	a. Water	b. Wind (MEG)	
Blaine	Gently sloping- steep	Moderately deep	Well	Moderate	Very low -Low	Gravelly loam	Gravelly loam, gravelly clay loam	Moderate- Severe	Moderate (5)	C
Cabbe	Gently sloping- steep	Shallow	Well	Moderate	Very low	Loam	Sandy loam	Moderate -Severe	Nonerosive (8)	C
Cashner	Gently sloping- Very steep	Shallow	Well	Moderate	Very low	Channery loam	Very channery loam	Severe	Nonerosive (8)	C
Chadle	Gently sloping- Very steep	Shallow	Well	Moderate	Very low	Stony loam, stony sandy loam	Very channery loam, very flaggy loam	Severe	Nonerosive (8)	C
Comad	Sloping- steep	Deep	Well	Rapid	Very low	Extremely stony sandy loam, extremely stony loamy sand	Extremely stony sand, extremely stony loamy sand	Severe	Nonerosive (8)	B
Crago	Gently sloping- steep	Deep	Well	Moderate above 36", rapid below 36"	Low	Very cobbly loam, cobbly loamy gravelly loam, channery loam	Very gravelly loam, gravelly loam, extremely gravelly sandy loam, very gravel- ly sandy loam, very gravelly loamy sand	Moderate- Severe	Severe 4L	B
Crittenden	Gently sloping -steep	Deep	Well	Moderate to 25", rapid below 25"	Low	Sandy loam	Sandy clay loam, sandy loam, clay loam	Severe	Severe (3)	B
Ess	Sloping- steep	Deep	Well	Moderate	Low	Stony loam	Very stony clay loam	Severe	Moderate (5)	B
Hanson	Gently sloping- steep	Deep	Well	Moderate	Low	Channery loam, loam, gravelly loam, very grav- loam, stony loam very stony loam	Very channery loam	Severe	Moderate (5)	B
Hauz	Gently sloping- Very steep	Moderately deep	Well	Moderate	Low	Channery loam	Very channery clay loam, extremely channery loam	Severe	Nonerosive (8)	C
Hilger	Sloping- steep	Deep	Well	Moderate	Low	Extremely stony loam, extremely cobbly loam, extremely cobbly clay loam, ex- tremely stony clay loam	Extremely stony loam, extremely stony clay loam, extremely cobbly loam, extremely cobbly clay loam	Moderate- Severe	Nonerosive (8)	B
Holter	Gently sloping- steep	Deep	Well	Moderate	Low	Loam, channery loam	Extremely channery clay loam	Moderate- Severe	Nonerosive (8)	B
Lake Creek	steep	Moderately deep	Well	Moderate	Low- Very low	Channery loam	Channery heavy loam	Severe	Nonerosive (8)	C
Libeg	Gently sloping- steep	Deep	Well	Moderate- Moderately rapid	Low	Extremely stony loam	Channery heavy loam, very chan- nery sandy clay loam, channery clay loam	Slight- Severe	Nonerosive (8)	B

10 Surface Water Runoff	11 Geographic Setting	12 Representative Vegetation	13 Response to Grazing Management	14 Suitability for Mechanical Treatment	15 Other Comments
Medium- Rapid	Low hills and footslopes of the uplands (4000 to 6000 ft.)	Bluebunch wheatgrass, Idaho fescue, needle and thread	Moderate, due to skeletal profile with low available water. Calcareous subsoils	Not suited, due to rock fragments in surface	Low susceptibility for compact- tion. Water and wind erosion hazard.
Medium- Rapid	Sedimentary up- lands (4200 to 5000 ft.)	Bluebunch wheatgrass, little bluestem, annuals, some ponderosa pine	Moderate, due to low available water in shallow profile	Not suited, due to depth of bedrock	Bedrock around 20 inches. Water erosion hazard.
Slow- Rapid	Uplands and mountains (4500-6000 ft.)	Bluebunch wheatgrass, rough fescue, needle and thread, forbs, and woody plants	Slow, due to shallow profile and low avail- able water	Not suited, due to depth of bedrock and rock frag- ments	Bedrock between 10 and 20 inches. Severe water erosion hazard.
Rapid- Very rapid	Sideslopes and ridges of hills and mountains (5000-6500 ft.)	Bluebunch wheatgrass, prairie Junegrass, fringed sagewort, clubmoss	Same as above	Same as above	Bedrock between 8 and 20 inches. Severe water erosion hazard.
Medium- Rapid	Mountain slopes, fans, and glac- ial moraines (5000-8000 ft.)	Douglas fir, lodgepole pine, bluebunch wheatgrass, huckleberry, twinflower, kinnikinnick	Moderate	Not suited due to slope, rock fragments, and tree canopy cover	Severe water erosion hazard on barred soil. Very low available water.
Medium- Rapid	Alluvial fans, terraces, and footslopes (3800-5500 ft.)	Bluebunch wheatgrass, west- ern wheatgrass, needle and thread, blue grama	Slow, due to extremely gravelly soils, low available water, and strongly calcareous soils	Not suited due to coarse fragments in surface	Severe wind erosion hazard. Some Crags are cropped, but they are associated with more suitable soils.
Medium- Rapid	Uplands (3800-4500 ft.)	Bluebunch wheatgrass, prairie Junegrass, shrubs, Juniper, forbs, and some ponderosa pine	Rapid	Suitable on slopes less than 8%	Severe wind and water erosion hazard. Life of mechanical treatment less than on less coarse soils.
Rapid	Mountain side- slopes (5000-6500 ft.)	Same as Cheedle	Moderate	Not suited due to slope and rock fragments	Severe water erosion hazard. The B and C horizons range from 50- 80% stones, cobbles, and gravel.
Medium- Rapid	Mountain slopes (6000-7000 ft.)	Bluebunch wheatgrass, western wheatgrass, fringed sagewort	Moderate	Same as above	Severe water erosion hazard. Greater than 50% rock fragments below A horizon.
Rapid	Uplands and mountains (4000-5500 ft.)	Bluebunch wheatgrass, needle and thread, prairie Junegrass, fringed sage- wort, silversage	Slow due to skeletal profile with low available water	Same as above	Severe water erosion hazard. Greater than 50% rock fragments, larger than 5 inches in size.
Medium- Rapid	Fans and foot- slopes (3000-4600 ft.)	Bluebunch wheatgrass, Idaho fescue, western wheatgrass, forbs	Slow due to skeletal profile with low available water	Same as above	Severe water erosion hazard, 50-80% rock fragment content in pro- file.
Rapid	Mountain side- slopes (4500-6000 ft.)	Rough fescue, bluebunch wheatgrass, Idaho fescue, forbs, shrubs	Slow, due to low avail- able water and amount of coarse fragments	Not suitable due to slope and rock fragments	40-65% rock fragments in B horizon.
Rapid	Uplands along drainageways and mountain sideslopes (4500-6500 ft.)	Douglas fir, Englemann spruce	Same as above	Not suited due to slope and tree canopy cover	Mostly on north slopes. Wood- land site Index is 40-50 for Douglas fir on a 50-year base. Limitations to logging on slopes greater than 30%.
Medium- Rapid	Hilly glacial moraines and valley side- slopes (5000-6500 ft.)	Rough fescue, Idaho fescue, phlox, clubmoss, creeping Juniper, kinnikinnick	Same as above	Not suited due to slope and rock fragments	More than 50% rock fragments in A horizon.

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						Surface	Subsoil	a. Water	b. Wind (MEG)	
Loberg	Moderate- ly steep- Steep	Deep	Well	Slow- Moderately slow	Low- Moderately high	Stony clay loam, very stony loam	Gravelly clay, stony clay, sandy clay	Severe	Moderate (6)	C
Marysville	Gently sloping- Steep	Deep	Well	Moderately rapid	Low- Very low	Channery loam	Very channery loam, extremely channery loam	Slight- Severe	Moderate (5)	B
Musashille	Gently sloping- Moderately steep	Deep	Well	Moderate	Low- Very low	Channery loam, gravelly loam, cobble loam, cobble clay loam	Gravelly loam, very gravelly loamy sand	Moderate- Severe	Severe (4L)	B
Nielsen	Sloping- Very steep	Shallow	Well	Moderate	Very low	Channery loam	Channery silty clay loam, very channery silty clay loam	Severe	Moderate (5)	B
Pass Creek	Gently sloping- -Steep	Moderately deep	Well	Moderate	Low- Very low	Channery silt loam, channery silty clay loam	Silty clay loam	Moderate- Severe	Moderate (5)	B
Pensore	Gently sloping- Very steep	Shallow	Well	Moderate	Very low	Channery loam	Channery loam, very channery loam	Severe	Severe (4L)	B
Perma	Gently sloping- Steep	Deep	Well	Moderate	Low- Moderately high	Very gravelly loam, very cobble loam	Very gravelly loam, very cobble loam	Moderate- Severe	Nonerosive (8)	A
Radarsburg	Gently sloping	Deep	Well	Moderate	Low	Very cobble loam	Cobble clay	Slight	Nonerosive (8)	B
Rencot	Gently sloping- Steep	Shallow	Well	Moderate	Very low	Channery loam	Channery loam, very channery loam	Severe	Moderate (6)	B
Rootele	Gently sloping- Steep	Moderately deep	Well	Moderate	Low	Channery loam	Channery loam	Moderate	Severe (4L)	B
Roto	Gently sloping- -Steep	Moderately deep	Well	Moderate	Low	Channery loam	Very channery loam	Moderate	Severe (4L)	B
Sheege	Gently sloping- Very steep	Shallow	Well	Moderate	Very low	Stony loam, extremely stony loam	Stony loam, extremely stony loam	Severe	Nonerosive (8)	D
Skaggs	Moderately steep- Steep	Moderately deep	Well	Moderate	Low- Moderately high	Loam, stony loam, gravelly loam, cobble loam	Gravelly clay loam, very grav- elly clay loam	Moderate- Severe	Moderate (5)	B

10 Surface Water Flow?	11 Geographic Setting	12 Representative Vegetation	13 Response to Grading Management	14 Suitability for Mechanical Treatment?	15 Other Comments
Medium- Rapid	Fans and foot- hills (4000-7000 ft.)	Douglas fir, Englemann spruce, lodgepole pine, pine grass, snowberry, oregon grape	Same as above	Not suited due to slope, tree canopy cover, and rock fragments.	Woodland site index is 70 for lodgepole pine and 43 for Dou- glas fir. 25-50% rock fragments larger than 3 inches in size in profile. Very plastic subsoil
Rapid	Mountain side- slopes (6500-7800 ft.)	Whitebark pine, subalpine fir, lodge- pole pine, grouse whortle- berry, elk sedge, other forbs and shrubs	Same as above	Same as above.	20-85% rock fragments in profile.
Medium- Rapid	Smooth uplands and stream terraces (3500-4500 ft.)	Western wheatgrass, needle and thread, blue grama	Slow due to very low available water and amount of carbonates	Not suited, due to amount of carbonates in profile.	Severe wind erosion hazard, how- ever, some are in dryland wheat.
Medium- Rapid	Sideslopes and ridges of hilly and mountainous uplands (5000-6000 ft.)	Bluebunch wheatgrass, prairie junegrass, fringed sagewort, other forbs and shrubs	Slow, due to depth of profile, low available water, and coarse frag- ments	Not suited, due to slope, rock fragments, and shallow depth.	Bedrock between 10-16 inches. 35-60% rock fragments in profile.
Medium- Rapid	Benches, ridges, and sideslopes in mountainous uplands (5000-7000 ft.)	Bluebunch wheatgrass, prairie junegrass, fringed sagewort, forbs, and shrubs	Moderate	Suitable on slopes less than 8%.	Used for dryland winter wheat and and range. Depth to bedrock ranges from 20-40 inches.
Rapid	Uplands and mountains (3800-5500 ft.)	Bluebunch wheatgrass, needle and thread, western wheatgrass, prairie junegrass, juniper with some pond- cross pine	Slow, due to shallow depth, very low avail- able water, and high carbonate content	Not suited, due to shallow profile and high carbon- ates in surface.	Bedrock ranges from 10-20 inches. Severe wind erosion hazard.
Medium	Terraces, fans, and footslopes (3000-6000 ft.)	Bluebunch wheatgrass, Idaho fescue, western wheatgrass, shrubs, and forbs	Moderate	Not suited, due to rock fragments in surface.	35-65% coarse fragments in pro- file.
Medium	Rolling fans and terraces (3800-4700 ft.)	Bluebunch wheatgrass, western wheatgrass, needle and thread, sageworts, and cacti	Moderate	Not suited, due to rock fragments in surface.	35-65% rock fragments in pro- file. B horizon contains 35-55% clay.
Rapid	Sloping to steep uplands (3500-5000 ft.)	Bluebunch wheatgrass, western wheatgrass, needle and thread, bluegrama, fringed sagewort	Slow, due to very low available water; high carbonates, and skele- tal profile	Not suited, due to shallow depth.	Depth to bedrock ranges from 10- 20 inches. 40-60% channel fragments from around 4" to bedrock.
Rapid	Uplands (3500-5000 ft.)	Bluebunch wheatgrass, western wheatgrass, needle and thread, bluegrama, fringed sagewort	Moderate	Suitable for contour ter- racing and scaping on slopes less than 8%.	Severe wind erosion hazard. Some areas in dryfarmed small grains.
Rapid	Uplands and mountains (3800-5500 ft.)	Bluebunch wheatgrass, needle and thread, western wheatgrass, prairie junegrass, broom snakeweed	Moderate	Not suited, due to high level of carbonates in surface.	Severe wind erosion hazard. 50-60% rock fragments below A horizon.
Rapid	Mountain slopes (6500-10,000 ft.)	Bluebunch wheatgrass, big sagebrush, Idaho fescue, western snowberry	Slow, due to shallow depth, low available water, and an abundance of rock.	Not suited, due to rock fragments.	Bedrock at 10-20 inches. 25-65% rock fragments greater than 3 inches in profile.
Slow- Rapid	Bedrock uplands (5000-9000 ft.)	Rough fescue, Idaho fescue, Richardson needlegrass, perennial and annual forbs, and other shrubs	Moderate	Not suited, due to slope.	Mainly range, but some areas used for dryland farming.

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						Texture		a. Water	b. Wind (WEG)	
						Surface	Subsoil			
Stemple	Moderately steep- Steep	Deep	Well	Moderate	Low- Moderate- ly high	Very channery loam, extremely channery loam	Extremely channery clay loam	Moderate- Severe	Moderate (5)	C
Tolex	Moderately steep- Very steep	Shallow	Well	Moderate	Very low	Channery loam	Extremely channery clay loam	Moderate- Severe	Moderate (6)	C
Toiman	Gently sloping- Steep	Shallow	Well- somewhat excess- ively	Moderate	Very low	Channery loam	Very channery sandy clay loam	Severe	Moderate (6)	D
Towhead	Gently sloping -steep	Deep	Well	Moderate	Low- Moderate- ly high	Very channery loam, extremely channery loam	Extremely channery clay loam	Moderate- Severe	Moderate (5)	B
Tropal	Sloping- Very steep	Shallow	Well	Moderate	Very low	Gravelly loam	Gravelly loam	Severe	Moderate (6)	C
Whitecow	Nearly level- Very steep	Deep	Well	Moderate	Moderate- ly high	Gravelly loam	Very gravelly heavy loam	Moderate- Severe	Moderate (5)	B
Whitone	Sloping- Steep	Deep	Somewhat excess- ively	Moderate	Low- Moderate- ly high	Gravelly loam, channery loam	Channery loam, very channery loam	Moderate- Severe	Moderate (6)	B
Windham	Sloping- Steep	Deep	Well	Moderate- Moderately rapid	Low- Very low	Gravelly clay loam	Very gravelly heavy loam, ex- tremely gravelly loam	Moderate- Severe	Severe (4L)	B
Woodgulch	Moderately steep- Steep	Deep	Well	Rapid	Low- Very low	Loamy sand, sand	Loamy sand	Moderate- Severe	Very severe (2)	A

10 Surface Water Runoff	11 Geographic Setting	12 Representative Vegetation	13 Response to Grazing Management	14 Suitability for Mechanical Treatment	15 Other Comments
Rapid	Mountain sides (5500-7800 ft.)	Lodgepole pine, Douglas fir, subalpine fir, grouse whortleberry, pine grass	Moderate	Same as above	30-80% rock fragments in profile.
Rapid	Uplands and mountains (4000-6000 ft.)	Ponderosa pine, Douglas fir, bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, other forbs and shrubs	Slow, due to shallow depth, low available water, and rock	Same as above	Depth to bedrock 10-20 inches. 60-90% rock fragments below 3 inches.
Rapid	Hillsides and ridges (3800-6000 ft.)	Idaho fescue, big sage- brush, bitterbrush, snow- berry, and some ponderosa pine	Same as above	Same as above	Depth to bedrock 7-20 inches.
Rapid	Mountain side- slopes (4000-6000 ft.)	Douglas fir, ponderosa pine, bluebunch wheatgrass spirea, balsamroot, other forbs and shrubs	Moderate	Not suited, due to rock fragments and slope	30-80% rock fragments in profile.
Rapid	Hilly and moun- tainous uplands (4800-6000 ft.)	Bluebunch wheatgrass, Idaho fescue, big sage- brush	Slow, due to shallow depth, low available water, and high carbon- ates	Same as above	Bedrock between 12-20 inches com- plexed with rock outcrops.
Slow- Rapid	Uplands and mountains (4900-6000 ft.)	Ponderosa pine, Douglas fir, lodgepole pine, blue- bunch wheatgrass, pine grass, serviceberry, balsamroot, kinnikinnick, woodrose, and other shrubs	Moderate	Not suited due to carbon- ates	Site Index for ponderosa pine is 61 and for Douglas fir, 41.
Slow- Rapid	Sloping to very steep slopes below limestone outcrops and hilly glacial uplands adja- cent to lime- stone outcrops (4900-6900 ft.)	Limber pine, lodgepole pine, subalpine fir, aspen, rough fescue, blue- bunch wheatgrass, pine grass, kinnikinnick, Juni- per	Moderate	Not suited, due to slope	15-55% rock fragments greater than 3 inches in the profile.
Slow- Rapid	Terrace edges and sides of deep drainage- ways (4900-5000 ft.)	Bluebunch wheatgrass, western wheatgrass, needle and thread, blue grasses, prairie june- grass, shrubs and forbs	Slow, due to very low available water and rock fragments	Same as above	Severe wind erosion hazard. 10-75% rock fragments in A horizon.
Medium	Mountain slopes (4900-5900 ft.)	Ponderosa pine, Douglas fir, bluebunch wheatgrass, Idaho fescue, rough fescue, mountain mahogany, pine grass, white spirea, and western yarrow	Moderate	Same as above	Very severe wind erosion hazard. Soil textures are loamy sand to coarse sand.

SOURCES

For SCS established series, data for Table J-1 came from the Broadwater County SCS soil survey legend (USDA, SCS, 1977), the Lewis and Clark SCS soil survey legend (unpublished), the Cascade County SCS soil survey legend (unpublished), and from SCS Form 5's.

DEFINITIONS

Listed below are definitions of the terms used as entries in the various columns for Table J-1.

Column:

1. This column includes soil series and soil families.

2. Slope Classes.

Description	Percent Slope
Nearly level	0-3%
Gently sloping	3-8%
Sloping	8-16%
Moderately steep	16-30%
Steep	30-65%
Very steep	65% and over

3. Soil Depth. Measured vertically from the upper surface of the mineral soil to bedrock or unmodified parent material.

Description	Depth in Inches
Very shallow	0-10
Shallow	10-20
Moderately deep	20-40
Deep	40-60
Very deep	over 60

4. Soil Drainage

Excessively drained. Water is removed from these soils very rapidly. They are commonly very porous and/or shallow or very shallow, and have a low water holding capacity.

Somewhat excessively drained. Water is rapidly removed from these soils. They are usually shallow or very shallow and/or sandy and very porous.

Well drained. Water is removed readily but not rapidly. Soils are commonly intermediate in texture and free from mottling.

Moderately well drained. Profile is wet for a small but significant part of the time, usually because of a less permeable layer within or immediately beneath the solum, a relatively high or intermittently high water table (usually

below five feet), surface additions of water by runoff from areas higher up the slopes, or a combination of these conditions. Mottling usually starts in the lower part of the B horizon.

Somewhat poorly drained. The soil is wet for significant periods, usually because of a less permeable layer or a high water table.

Poorly drained. The soil remains wet for much of the time with the water table near the surface for prolonged periods. They are generally mottled from the surface downward.

Very poorly drained. The water table remains at or near the surface a greater part of the time. These soils have a dark gray or black surface and are gray or light gray with or without mottling in the deeper part of the profile.

(Refer to part 7312 in the BLM manual for more complete descriptions of these classes)

5. Soil Permeability. That quality which enables soil to transmit water and air. It is expressed quantitatively in terms of water flow through a unit cross section of saturated soil in unit time. Relative classes of soil permeability are:

Class	Rate in Inches Per Hour
Very slow	less than 0.06
Slow	0.06 to 0.20
Moderately slow	0.20 to 0.60
Moderate	0.60 to 2.00
Moderately rapid	2.00 to 6.00
Rapid	6.00 to 20.00
Very rapid	more than 20.00

6. Available Water Capacity (AWC). The ability of a soil to store water for plant growth. AWC is the difference between field capacity and wilting point. The following classes and ranges are recognized.

Class	Inches of Water in Soil Profile
Very high	more than 12
High	9-12
Moderately high	6-9
Low	3-6
Very low	less than 3

7. Soil Texture. Expresses the relative percentages of sand, silt, and clay in the soil. Textures are given for the surface layer (the uppermost part of the soil, usually ranging in thickness from four to eight inches) and the subsoil (usually the B horizon but may include the C if the B horizon is thin or nonexistent).

8. Erosion Susceptibility. Rated for water erosion (a) and wind erosion (b). Indicates susceptibility to erosion without cover.

a. Water Erosion Hazard Classes

(1) Slight. Soils are placed in this class if:
 the potential erosion is not enough to significantly reduce its productivity,
 they contain water stable aggregates,
 they have good infiltration and percolation rates,
 they have adequate depth to store most of the normal rainfall of the area,
 they have no restrictive layers in the profile, and
 they have gentle slopes.

(2) Moderate. Soils are placed in this class if:

the potential erosion is enough to significantly reduce productivity but not enough to stop production entirely,
 they contain aggregates that are not water stable,
 they have moderate infiltration and percolation rates,
 they have moderate depths to store only part of the rainfall of the area,
 they may have restrictions to the downward flow of water in the profile, or
 they have moderate slopes.

(3) Severe. Soils are placed in this class if:

the potential erosion will cause a reduction in productivity to nearly nothing,
 they contain soil aggregates that are very unstable,
 they have poor infiltration and percolation rates,
 they have little soil for water storage,
 they have restrictive layers to the downward flow of water in the profile, or
 they have steep slopes.

b. Wind Erodibility Group (WEG)

WEG	Descriptive Term	Predominant Soil Texture Class of Surface Layer
1	Very severe	All sands
2	Very severe	All loamy sands
3	Severe	All sandy loams

4L	Severe	All calcareous loam, silt loam, sandy clay loam, or calcareous clay loam and silty clay loam soils with less than 35% clay content and more than 5% finely divided calcium carbonate.
4	Severe	All clays and silty clays, and clay loam and silty clay loam soils with more than 35% clay.
5	Moderate	Noncalcareous loam and silt loam soils with less than 18% clay, and all noncalcareous sandy clay loam and sandy clay soils.
6	Moderate	All loam and silt loam soils with more than 18% clay, and clay loam soils with less than 35% clay content.
7	Slight	Noncalcareous silty clay loam soils with less than 35% clay.
8	Nonerosive	Soils not suitable for cultivation due to wetness and percent rock fragments. Wind erosion is not a problem.

9. Hydrologic Group. Rates soils according to their potential to yield runoff.

Group A. Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and/or gravel. These soils result in low runoff potential.

Group B. Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

Group C. Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of: moderately deep soils with a layer that impedes the downward movement of water, soils with moderately fine to fine texture and a slow infiltration rate, soils with moderate water tables (these soils may be somewhat poorly drained), or deep clay soils.

Group D. Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of: clay soils with a high swelling potential, soils with a high permanent water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious materials.

10. Surface Water Runoff. The relative rate water is removed by flow over the soil surface.

Very Slow. Surface water either flows away so very slowly that free water lies on the surface for long periods or enters immediately into the soil.

Slow. Surface water flows away so slowly that free water covers the soil for significant periods or it enters the soil rapidly.

Medium. Surface water flows away at such a rate that a moderate proportion of water enters the soil profile and free water lies on the surface for only short periods.

Rapid. A large proportion of precipitation moves rapidly over the soil surface and a small part moves through the soil profile. Surface water runs off nearly as fast as it is added.

