

SOILS INFORMATION FOR GEORGIA

(Source: Manual for Erosion and Sediment Control in Georgia, Fifth Edition, 2000)

Appendix B-1

SOILS INFORMATION

The soils information in Appendix B has been assembled to assist the plan preparer and reviewer in accomplishing responsibilities under Act 599.

Appendix B-1 contains charts of selected Georgia soils series with *estimated* soil properties and soils limitations for urban uses. These charts may be used in conjunction with published soil survey information or other soils maps available through the Soil and Water Conservation Districts and the Natural Resources Conservation Service. The Soil Series Chart for the entire state may be found in Volume II of the Georgia Stormwater Management Manual.

Appendix B-2 contains excerpts from NRCS Technical Release No. 51, "Procedure for Computing Sheet and Rill Erosion on Project Areas." Also included is a method for *estimating* soil erodibility or "K" values and sediment delivery ratio charts. This Appendix should be of assistance in planning for land-disturbing activities.

Explanation of Charts: Appendix B-1

Soil Series Interpretations

Column 1: Soil Series

This column lists alphabetically the name of the soil series which are used in the State of Georgia.

Column 2: Permeability

Soil permeability is the quality that enables soil to transmit water and air. Accepted as a measure of this quality is the rate at which soil transmits water while saturated. That rate is the "saturated hydraulic conductivity" of soil physics. In line with conventional usage in the engineering profession and traditional usage in the published soil surveys, this rate of flow, principally downward, continues to be expressed as "permeability". The permeability of a soil is the *rate of flow* for the most restrictive layer in the profile.

Soil permeability is rated using the numerical ranges shown below:

Permeability class	Numerical range (inches per hour)
Very Slow	Less than 0.06
Slow	0.06-0.2
Moderately Slow	0.2-0.6
Moderate	0.6-2.0
Moderately Rapid	2.0-6.0
Rapid	6.0-20
Very Rapid	More that 20

Column 3: Soil Reaction

The degree of acidity or alkalinity of a soil is expressed in pH values. A soil with a pH 7.0 is precisely neutral in reaction. The pH ranges given in this column are the high and low values for the soil profile. The surface layer may be higher due to the addition of lime.

Column 4: Shrink-Swell Potential

Shrink-swell behavior is the quality that determines soil's volume change with change in moisture content. Building foundations, roads and other structures may be severely damaged by the shrinking and swelling of the soil. The volume change of soil is influenced by the amount of moisture change and the amount and kind of clay in the soil profile.

The shrink-swell interpretations are relevant to structures, such as houses and other low buildings, streets and roads, and parking lots. Three classes have been developed to express shrink-swell behavior; *low, moderate and high*.

Column 5 and 6: Corrosivity

Various metals and other materials corrode when on or in the soil, and some metals and materials corrode more rapidly when in contact with specific soils than when in contact with others. To be meaningful, corrosivity must be rated in relation to specific structural material. In these columns the soil series are given ratings on potential for inducing corrosion of uncoated steel (column 5) and of concrete (column 6).

Soils are assigned to one of three classes of corrosivity: *low, moderate, or high*.

Columns 7 and 8: Depth to Water-table and Bedrock

The depth to the water-table is given in feet (to the nearest half-foot). The value given is an indication of how close to the soil surface the water-table will rise during the wet season.

Depth to bedrock is given in inches. Hardness of rock may range from "rippable", which can be excavated using a single tooth ripping attachment on a 200-300 horsepower tractor, to "hard", where excavation may require blasting. Rock hardness should be determined by on-site-investigation.

Both the depth to water-table and bedrock are *estimates*—*actual* depths may vary from site to site.

Column 9: Flood Frequency

Flood frequency is an indicator of how often if ever, floods occur. Ratings are as follows:

None: No reasonable possibility of flooding.

Rare: Flooding unlikely but possible under unusual weather conditions.

Occasional: Flooding is expected infrequently under usual weather conditions.

Frequent: Flooding is likely to occur often under usual weather conditions.

Column 10: Hydrologic Soil Group

The hydrologic soil group parameter, A, B, C, or D, is an indication of the minimum rate of infiltration obtained for a bare soil after prolonged wetting.

The hydrologic soil groups range from A, which are deep sands or gravels with low runoff, to D, which are soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

Some soil series may have a dual hydrologic soil group rating. The dual ratings are given for certain wet soils that can be adequately drained. The criteria used in making dual group ratings are as follows:

1. Soils are rated D in their natural condition.
2. Drainage is feasible and practical.
3. Drainage improves the hydrologic group by at least two classes (from D to A or B).

Columns 11-16: Limitation of Soils

For Urban Uses

The soils are rated L for slight limitations, M for moderate limitations, or S for severe limitations.

A *slight* soil limitation (L) is the rating given soils that have properties favorable for the rated use. The degree of limitation is minor and can be overcome easily. Good performance and low maintenance can be expected.

A *moderate* soil limitation (M) is the rating given soils that have properties moderately favorable for the rated use. This degree of limitation can be overcome or modified by special planning, design, or maintenance. During some part of the year, the performance of the structure or other planned use is somewhat less desirable than for soils rated *slight*. Some soils rated *moderate* required treatment such as artificial drainage, runoff control to reduce erosion, extended sewage absorption fields, extra excavation, or some modification of certain features through manipulation of the soil. For these soils, modification is needed for those construction plans generally used for soils of slight limitation. Modification may include special foundations, extra reinforcement of structures, sump pumps, etc.

A *severe* soil limitation (S) is the rating given soils with one or more properties unfavorable for the rated use, such as steep slopes, bedrock near the surface, flooding hazard, high shrink-swell potential, a seasonal high water-table or low bearing strength. This degree of limitation generally requires major soil reclamation, special design, or intensive maintenance. Some of these soils, however, can be improved by reducing or removing the soil feature that limits use. In most situations, however, it is difficult and costly to alter the soil or to design a structure to compensate for a severe degree of limitation.

Following the limitation rating symbol will be a lower case symbol to indicate the reason for the particular rating. These symbols are s-slope, w-wetness, f - flooding, pk - slow percolation, cl - too clayey, ss - shrink-swell potential, b - low bearing strength, r - shallow depth to rock, p - seepage, st - stones, cc - cutbanks may cave, h - too much humus, pf - poor filter, d - dense layer.

A number followed by a % indicates percent slope; for example 2-6% reads two to six percent slope.

Some soil series may have a flood frequency listing of two ratings (Example: None-Occasional). Such soils may consequently have a two rating limitation. For example, a listing of

None: M; w; Occ; S; f

means, if the soil is located where no flooding occurs, it is rated Moderate due to wetness and, if occasional flooding occurs, it is rated as Severe due to flooding.

Column 11: Septic Tank Absorption Fields

A septic tank absorption field is a soil absorption system for sewage disposal. It is a subsurface tile system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into one natural soil. Criteria used for rating soils (*slight, moderate, and severe*) for use as absorption fields are based on the limitations of the soil to absorb effluent.

Column 12: Sewage Lagoon Areas

A sewage lagoon (aerobic) is a shallow lake used to hold sewage for the time required for bacterial decomposition. Sewage lagoons require consideration of the soils for two functions, (1) as a vessel for the impounded area and (2) as soil material for the enclosing embankment. The requirements for this embankment are the same as for other embankments designed to impound water. Enough soil material that is suitable for the structure must be available, and, when the lagoon is properly constructed, it must be capable of holding water with minimum seepage. The material should be free of coarse fragments (over 10 inches in diameter) that interfere with compaction.

Column 13: Shallow Excavations

These excavations require excavating or trenching to a depth of 5 or 6 feet. Note that limitation ratings for shallow excavations alone, though highly relevant, are insufficient for interpretations for ultimate uses, such as for dwellings with basements, sanitary landfills, cemeteries, and underground utility lines (sewers, pipelines, and cables). Additional soil features must be considered in evaluating for those uses. For example, additional interpretation concerning shrink-swell potential and corrosivity are needed for giving ratings for the ultimate use of soils for pipelines.

Column 14: Dwellings

This column gives ratings for undisturbed soils on which single-family dwellings or other structures with similar foundation requirements can be built. Buildings of more than three stories and other buildings requiring a foundation load in excess of that of a three-story dwelling are not considered in the entries in this column.

In some cases, a rating may differ depending on whether the dwelling will or will not have a basement. In such cases, the rating is marked with an asterisk (*) for dwellings *with* basements and a pound sign (#) for ones *without* basements.

Column 15: Small Commercial Buildings

This column provides limitations for commercial buildings of 3 stories or less.

Column 16: Local Roads and Streets

The limitation ratings given in this column apply to use of soils for construction and maintenance of improved local roads and streets that have all-weather surfacing—commonly asphalt or concrete—and that are expected to carry automobile traffic all year. The roads and streets consist of (1) underlying local soil material, whether cut or fill, that is called "the subgrade"; (2) the base material of gravel, crushed rock, lime-stabilized soil, or soil-cement-stabilized soils; and (3) the actual road surface or street pavement that is either flexible (asphalt), rigid (concrete), or, in some rural areas, gravel with binder in it. These roads and streets also are graded to shed water and conventional drainage measures are provided. With probable exception of the hard surfaces, the roads and streets are built mainly from the soil at hand; cuts and fills generally are limited to less than 6 feet of thickness. Excluded from consideration in the ratings in this column are highways designed for fast moving heavy trucks.

Also, the ratings cannot substitute for basic soil data and for on site investigation.

KEY TO SYMBOLS—

SOIL SURVEY INTERPRETATIONS

Limitations of Soils:

- L - Slight Limitation
- M - Moderate Limitation
- S - Severe Limitation

Reasons for Limitations:

- s - slope
- w - wetness
- f - flooding
- pk - slow percolation
- cl - too clayey
- ss - shrink-swell potential
- b - low bearing strength
- r - depth to rock
- p - seepage
- st - stones
- cc - cutbank may cave
- pf - poor filter
- h - too much humus
- d - dense layer

Appendix B-2

Soil Loss Predictions

The first portion of Appendix B-2 is the SCS Technical Release No. 51, "Procedure for Computing Sheet and Rill Erosion on Project Areas." It explains the use of the Universal Soil-Loss Equation.

Also included in Appendix B-2 is a guide for developing the Soil Erodibility Factor (K).

Another section is devoted to applying sediment delivery ratio charts to the Universal Soil-Loss Equation for estimating sediment yields.

Additional information includes a textural classification chart and a chart for comparing different soil classification systems.

SOIL SERIES INTERPRETATIONS

ESTIMATED SOIL PROPERTIES										LIMITATION OF SOILS FOR URBAN USES					
Soil Series	Permeability (In. / Hrs.)	Soil Reaction (pH)	Shrink-Swell Potential	Corrosivity		Depth To:		Flood Freq	Hydro- Group	Septic Tank Absorption Fields	Sewage Lagoon Areas	Shallow Excavations	Dwellings * w/ basement # w/o basement	Small Commercial Buildings	Local Roads and Streets
				Steel	Concrete	Water Table (Ft.)	Bedrock (in.)								
Ailey	0.06 - 0.2	4.5 - 5.5	Low	Mod.	Mod.	> 6.0	> 60	None	B	0 - 15%: S; pk 15+%: S; S, pk	0 - 7%: S; p 7+%: S; s, cc	0 - 15%: S; cc 15+%: S; S, cc	0 - 8%: L 8 - 15%: M; s 15+%: S; s	0 - 4%: L 4 - 8%: M; s 8+%: S; s	0 - 8%: L 8 - 15%: M; s 15+%: S; s
Alapha	0.2 - 0.6	4.5 - 5.5	Low	High	High	0 - 1.0	> 60	None Rare Occ	D	None, Rare: S; w, pk Occ: S, w, f, pk	None, Rare: S; w, p Occ: S; w, f, p	S; w, cc	None: Sw Rare, Occ: S; w, f	None: Sw Rare, Occ: S; w, f	None, Rare: S; w Occ: S; w, f
Albany	0.6 - 2.0	4.5 - 6.0	Low	High	High	1.0 - 2.5	> 60	None Rare Occ	C	None, Rare: S; w Occ: S; w, f	None, Rare: S; w Occ: S; w, f	S; w, cc	None: S; w Rare, Occ: S; w, f	None: S; w Rare, Occ: S; w, f	None: M; w Rare: M; w, f Occ: S; f
Alberville	0.2 - 0.6	4.5 - 5.5	Mod.	High	High	> 6.0	40 - 60	None	C	2 - 15%: S; pk 15+%: S, s, pk	2 - 7%: M; s, r 7+%: S; s	2 - 8%: M; cl 8 - 15%: M; s, cl 15+%: S, s	2 - 8%: M; ss 8 - 15%: M; ss, s 15+%: S; s	2 - 4%: M; ss 4 - 8%: M; s, ss 8+%: S; s	2 - 15%: S; b 15+%: S; s, b
Alcovy	0.6 - 0.2	4.5 - 5.5	Low	High	High	2.0 - 3.0	> 60	None	B	S; w, pk	S; w	2 - 8%: M; w 8+%: M; w, s	2 - 8%: M; w 8+%: M; w, s	2 - 4%: M; w 4 - 8%: M; w, s 8+%: S, s	2 - 8%: M; w 8+%: M; s
Allanton	2.00 - 6.00	3.6 - 5.5	Low	High	High	-2.0 - 0.0	> 60	None	D	S; pk, w	S; p	S; cc, p	S; p	S; p	S; p
Allen	0.6 - 2.0	4.5 - 5.5	Low	Mod.	Mod.	> 6.0	> 60	None	B	2 - 8%: M; pk 8 - 15%: M; s, pk 15+%: S, s	2 - 7%: M; s 7+%: S; s	2 - 8%: M; cl 8 - 15%: M; s, cl 15+%: S, s	2 - 8%: L 8 - 15%: M; s 15+%: S; s	2 - 4%: L 4 - 8%: M; s 8+%: S, s	2 - 8%: M; b 8 - 15%: M; s, b 15+%: S; s
Altavista	0.6 - 2.0	3.6 - 6.0	Low	Mod.	Mod.	1.5 - 2.5	> 60	None Rare Occ Freq	C	None, Rare: S, w Occ, Freq: S; w, f	None: S; w Rare, Occ, Freq: S; w, f	S; w	None: M; w# None: S; w* Rare, Occ, Freq: S, w, f	None: M; w Rare, Occ, Freq: S; f	None: M; w, b Rare: M; w, f, b Occ: S; f
Americus	2.0 - 6.0	4.5 - 5.5	Low	High	High	> 6.0	> 60	None	A	0 - 8%: L 8 - 15%: M, s 15+%: S; s	0 - 15%: S; p 15+%: S, s, O	0 - 15%: S; cc 15+%: S; S, cc	0 - 8%: L 8 - 15%: M; s 15+%: S; s	0 - 4%: L 4 - 8%: M; s 8+%: S, s	0 - 8%: L 8 - 15%: M; s 15+%: S; s
Angelina	0.6 - 0.2	4.5 - 5.5	Low	High	High	+2 - 0	> 60	Occ Freq	D	S; f, pk, w	S; f, w	S; w	S; f	S; f	S; f
Angie	0.6 - 0.2	3.6 - 5.5	High	Mod.	Mod.	3.0 - 5.0	> 60	None	D	S; pk, w	2 - 7%: M; s, r 7+%: S; s	0 - 8%: M; cl, w 8 - 12%: M; s, cl	S; ss	0 - 8%: S; s 8+%: S; s, ss	S; b, ss

SOIL SERIES INTERPRETATIONS															
ESTIMATED SOIL PROPERTIES										LIMITATION OF SOILS FOR URBAN USES					
Soil Series	Permeability (In. / Hrs.)	Soil Reaction (pH)	Shrink-Swell Potential	Corrosivity		Depth To:		Flood Freq	Hydro- Group	Septic Tank Absorption Fields	Sewage Lagoon Areas	Shallow Excavations	Dwellings * w/ basement # w/o basement	Small Commercial Buildings	Local Roads and Streets
				Steel	Concrete	Water Table (Ft.)	Bedrock (in.)								
Apison	0.6 - 2.0	4.5 - 5.5	Low	Mod.	Mod.	> 6.0	20 - 40	None	B	S; r	S; w	2 - 8% M; r 8 - 15% M; s, r	2 - 8% L# 2 - 8% M; r* 8 - 12% M; s	2 - 4% L 4 - 8% M; s 8+% S, s	2 - 8% M; b 8 - 15% M; s, b
Appling	0.6 - 2.0	4.5 - 5.5	Low	Mod.	Mod.	> 6.0	> 60	None	B	0 - 8% M; pk 8 - 15% M; s, pk	2 - 7% M; s 7+% S; s	0 - 8% M; cl 8 - 15% M; s, cl	0 - 8% L 8 - 15% M; s	0 - 4% L 4 - 8% M; s 8+% S, s	0 - 8% M; b 8 - 15% M; s, b
Aragon	0.6 - 0.2	3.6 - 5.5	Mod.	High	High	> 6.0	> 60	None	C	2 - 15% S; pk 15+% S, s, pk	2 - 7% S; r 7+% S; s, r	2 - 8% M; cl 8 - 15% M; s, cl 15+% S, s	2 - 8% M; ss 8 - 15% M; s, ss 15+% S; s	2 - 4% M; b 4 - 8% M; s, ss 8+% S, s	2 - 15% M; ss 15+% S; b, s
Ardilla	0.6 - 0.6	4.5 - 6.0	Low	High	High	10 - 2.0	> 60	None	C	S; w, pk	2 - 7% M; s 7+% S; s	S; w	S; w	S; w	M; w
Arkabutla	0.60 - 2.00	4.5 - 5.5	Low	High	High	10 - 15	> 60	Occasional	C	S; f, w	S; f, w	S; w	S; f, w	S; f, w	S; b, f
Arkaqua	0.6 - 2.0	5.1 - 6.0	Low	High	Mod.	15 - 2.0	> 60	Freq	C	S; f, w	0 - 2% M; p 2 - 7% M; s, p 7+% S; s	S; w	S; f# S; f w*	S; f	S; b, f
Armuchee	0.2 - 0.6	4.5 - 5.5	Mod.	Mod.	Mod.	> 6.0	20 - 36	None	C	5 - 15% S; r 15+% S, r	S; f, w	5 - 8% M; r, cl 8 - 15% M; r, cl, s 15+% S; s	5 - 8% M; ss#, r* 8 - 15% M; ss, s#, r* 15+% S, s	5 - 8% M; ss, s 8+% S, s	5 - 15% S; b 15+% S; b, s
Arundel	> 0.06	3.6 - 5.5	High	High	High	> 6.0	20 - 40	None	C	2 - 15% S, r, pk 15+% S; r, pk, s	S; w	2 - 8% M; r, cl 8 - 15% M; r, cl, s 15+% S; s	5 - 8% M; ss#, r* 8 - 15% M; ss, s#, r* 15+% S, s	2 - 8% S; ss 8+% S; ss, s	5 - 15% S; ss, b 15+% S; ss, b, s
Ashe	2.0 - 6.0	4.5 - 6.0	Low	Low	High	> 6.0	20 - 40	None	B	2 - 15% S; r 15+% S, r	2 - 7% S; r, p 7+% S; r, s, p	2 - 8% M; r 8 - 15% M; r, s 15+% S; s	2 - 8% M; # 8 - 15% M; r, s# 2 - 15% S; r* 15+% S; s	2 - 4% M; r 4 - 8% M; r, s 8+% S; s	2 - 8% M; r 8 - 15% M; s, r 15+% S; s
Ashlar	2.0 - 6.0	4.5 - 5.5	Low	Low	High	> 6.0	20 - 40	None	B	0 - 15% S; r 15+% S; r	0 - 7% S; r, p 7+% S; r, s, p	0 - 15% S; r 15+% S; s, r	0 - 15% S; r* 0 - 15% M; s, r# 15+% S; s	0 - 4% M; r 4 - 8% M; r, s 8+% S; s	0 - 8% M; r 8 - 15% M; s, r 15+% S; s
Augusta	0.6 - 2.0	4.5 - 6.0	Low	High	Mod.	10 - 2.0	> 60	None Rare Occ Freq	C	None, Rare: S; w Occ, Freq: S; w, f	None, Rare: S; w Occ, Freq: S; w, f	S; w	None: S, w Rare, Occ, Freq: S; w, f	None: S, w Rare, Occ, Freq: S; w, f	None: M; w, b Rare: M; b, w, f Occ, Freq: S; f

** The Soil Series Chart for the entire state may be found in Volume II of the Georgia Stormwater Management Manual.**

This page left intentionally blank.