

CAROLINA SOIL & SEPTIC CONSULTING, PLLC

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NC Licensed Soil Scientist, SC Professional Soil Classifier,
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Certified Septic Inspector

May 10, 2016
Project Name: 2016-006

Herbert Waynick
2212 E. Innes St.
Salisbury, NC 28144

Re: Preliminary soil evaluation for onsite waste water systems located on approximately 148.46 acres (Parcel #'s 628 144, 628 145, 628 146 and 628 022) as described and located in Rowan County, North Carolina.

Dear Mr. Waynick:

Carolina Soil & Septic Consulting, PLLC, performed a medium intensity soil investigation on the parcels referenced above (*See Soil Map*). The evaluation was performed at your request as part of the preliminary planning process to evaluate the soil for onsite subsurface wastewater disposal systems for future subdivision of the property in varying individual tracks ranging from approximately 1.4 acres to 30 acres. Fieldwork performed March through May 2016.

The property was traversed to observe elements of the landscape (slope, drainage patterns, complex topography, etc.) as well as soil conditions (depth, texture, structure, seasonal wetness, restrictive horizons, back fill, etc.) through approximately 300 hand auger borings. The site was evaluated during moist to wet soil conditions. These observations of the site were used to identify areas relative to subsurface disposal of wastewater. The soil/site evaluation criteria used is that contained in 15 A NCAC 18A .1900 "Laws and Rules for Sewage Treatment and Disposal Systems".

Rowan county GIS aerial photography and Lidar Topography were used to determine locations of soil auger borings, usable soil areas and potential locations and length of new property lines, including their acreage. Soil boring locations are best professional judgement based on the aforementioned data used along with locations of potential future property subdivision lines. It is to be noted that soil boring locations were not located via GPS or physical survey but is recommended.

Requirements for sizing of the subsurface disposal field are as follows: 1) the design flow from the proposed facility (120 gallons/bedroom/day in residences), and 2) the long term acceptance rate (LTAR) of the soil (based on the hydraulic conductivity of the soil, a function of the soil's texture, clay mineralogy, structure, porosity, etc.) The proposed design flow on this site along with the size, shape and topography of the usable soil area will dictate the utility of that area. Another consideration are the required horizontal setbacks from various features such as wells (100'), surface waters (50') or more depending on watershed regulations, property lines (10'), top of embankment (15'), watershed buffers, etc. (*see Attachment 1*).

FINDINGS

This site is located in the southeastern area of Rowan County approximately 2.8 miles southeast

of the Town of Granite Quarry, located in the Providence Township. Identified soils were formed in residuum weathered from felsic metamorphic or igneous rocks, mafic or intermediate igneous or metamorphic rocks or intermediate and mafic metamorphic or igneous rocks of the Piedmont uplands.

Most of the unsuitable soil borings were determined to have characteristics most similar to Vance, Enon, Helena, Sedgefield, Zion or a combination of them. Vance soil series consist of a brown sandy loam surface over a brownish yellow to yellowish brown clay subsoil. Lower chroma 2.5Y 6/2 mottles can be found within the soil profile along with expansive clay inclusions. Depth to bedrock is generally greater than 60 inches. Enon soil series consist of a fine sandy loam surface over a strong brown to yellowish brown expansive clay subsoil. Depth to bedrock is greater than 60 inches. Helena soil series typically have an olive brown sandy loam surface over a brownish yellow to yellow clay subsoil with low chroma 10YR 7/1 mottles beginning within 19 inches of the surface. Irregular shaped masses of iron accumulations can also be found within the soil profile. Depth to bedrock is generally greater than 60 inches. Sedgefield soil series typically have a dark grayish brown and pale yellow fine sandy loam surface over yellowish brown clay to expansive clay subsurface. Common distinct light olive gray 5Y 6/2, light brownish gray 10YR 6/2 and gray 5Y 6/1 mottles can be found within the subsoil. Depth to bedrock is generally more than 60 inches. Zion soil series consists of a brown sandy loam surface over yellowish brown expansive clay subsoil. Common Manganese concretions can be found within the subsoil and depth to hard bedrock is usually within 20-40 inches.

Suitable soils were determined to be most similar to Appling, Cecil, Pacolet or Wedowee soil series (*see soil map*). Appling soil series typically consist of a yellowish brown to brownish yellow sandy loam surface over a yellowish red to strong brown subsurface. Common brownish yellow 10YR 6/6 mottles are found within the subsoil showing a reduction in iron content and slowed water movement which negatively affects the LTAR of the soil. Depth to bedrock is generally greater than 60 inches. Cecil soil series typically have a dark yellowish brown sandy loam surface over deep red clay subsoil. Signs of iron depletions and brownish yellow 10YR 6/6 mottling can be found in transitional areas. Depth to bedrock ranges 6-10 feet or more. Pacolet soil series typically have brown sandy loam surface over red clay subsoil. Pacolet soils generally have a subsoil depth to 33 inches before turning to saprolite (saprolite is a transitional material that is neither soil nor rock but most similar to phase in soil formation where the parent rock is broken down to its individual mineral grains). Common mica can be found within the subsoil and much mica can be found in the saprolite. Wedowee soil series typically consists of a brown sandy loam surface over laying a strong brown to yellowish red clay subsoil with distinct yellowish red 5YR 5/6 and brownish yellow 10YR 6/6 mottles. Saprolite is commonly encountered within 34 inches and depth to bedrock is more than 60 inches.

Marginal soil areas with at least 18 inches of usable soil were not included within the usable soil areas. These soils would require the use of Innovative septic system material such as drip irrigation tubing, with or without advance pre-treatment.

The attached soils map indicates areas of Usable soil, along with proposed property/subdivision lines.

WASTEWATER CONSIDERATIONS

The potentially utility of the useable soil area for a subsurface system can be accurately determined by an on-ground layout of the proposed system. The area needed for system and repair fields will depend upon the type of system proposed, the efficiency of the contours, the total design flow and factors mentioned above. Areal requirements can be reduced by using approved drainfield technologies that provide 25 – 50% reductions in disposal areas.

Carolina Soil & Septic Consulting, PLLC evaluated the subject property and determined that through this medium intensity soil evaluation there are enough suitable soils for on-site wastewater systems on each newly proposed property to support at least a 4 bedroom septic

system. These soils were evaluated for the use of Accepted Septic System material such as conventional gravel, 25% reduction material (i.e. Chambers, EZ-Flow) or Prefabricated Permeable Block Panel Systems (PPBPS) as indicated and approved by NC DHHS On-site Wastewater Division. Septic system type and material used will depend on the size and location of the future residence. For all Onsite Water Disposal Systems Rowan County Environmental Health Dept. retains final determination of system type and application rate.

All soils were evaluated based on 15 A NCAC 18A .1900 "Laws and Rules for Sewage Treatment and Disposal Systems".

Carolina Soil & Septic Consulting, PLLC, was pleased to be of service in this matter and look forward to assisting in any site analysis needs you may have in the future. Please feel free to call with any questions or comments.

Sincerely,

Adrian L. Pruett

Encl: *Attachment 1*

Soil Map

Soil Series Descriptions



Attachment 1

.1950 Location of Sanitary Sewage Systems

(c) Every sanitary sewage treatment and disposal system shall be located at least the minimum horizontal distance from the following:

- | | |
|--|------------------------------------|
| (1) any private water supply source including a well or spring | 100 feet |
| (2) any public water supply source | 100 feet |
| (3) streams classified as WS-I | 100 feet |
| (4) water classified as S.A. | 100 feet from mean high water mark |
| (5) Other coastal waters | 50 feet from mean high water mark |
| (6) any other stream, canal, marsh, or other surface waters | 50 feet |
| (7) any Class I or Class II reservoir normal | 100 feet from pool elevation |
| (8) any permanent storm water retention pond | 50 feet from flood pool elevation |
| (9) any other lake or pond | 50 feet from normal pool elevation |
| (10) any building foundation | 5 feet |
| (11) any basement | 15 feet |
| (12) any property line | 10 feet |
| (13) top of slope of embankments or cuts of 2 feet or more vertical height | 15 feet |
| (14) any water line | 10 feet |
| (15) drainage systems: | |
| (A) Interceptor drains, foundation drains and storm water diversions | |
| (i) upslope | 10 feet |
| (ii) sideslope | 15 feet |
| (iii) downslope | 25 feet |
| (B) Groundwater lowering ditched and devices | 25 feet |
| (16) any swimming pool | 15 feet |
| (17) any other nitrification field (except repair area) | 20 feet |
| (b) Ground absorption, sewage treatment and disposal systems may be located closer than 100 feet from a private well supply, except springs and uncased wells located downslope and used as a source of drinking water, repairs, space limitations and other site-planning considerations but shall be located the maximum feasible distance and, in no case, less than 50 feet. | |
| (c) Nitrification fields and repair areas shall not be located under paved areas or areas subject to vehicular traffic. If effluent is to be conveyed under areas subject to vehicular traffic, ductile iron or its equivalent pipe shall be used. However, pipe specified in Rule .1955 (e) may be used if a minimum of 30 inches of compacted cover is provided over the pipe. | |

Note: Systems over 3000 GPD or an individual nitrification fields with a capacity of 1500 GPD or more have more restrictive setback requirements, see .1950 (a) (17) (d) for specifics.

LOCATION VANCE
Established Series
Rev. ENH:RAG
07/1999

NC+AL GA SC VA

VANCE SERIES

The Vance series consists of well drained, slowly permeable soils that formed in residuum weathered from acid crystalline rocks in the Piedmont. They are moderately deep to saprolite and very deep to bedrock. The soils are on ridges and side slopes. Slopes range from 2 to 25 percent. Mean annual precipitation is 44 inches and mean annual temperature is 61 degrees F. near the type location.

TAXONOMIC CLASS: Fine, mixed, semiactive, thermic Typic Hapludults

TYPICAL PEDON: Vance sandy loam--in a cultivated field. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 5 inches; grayish brown (10YR 5/2) sandy loam; weak medium and coarse granular structure; very friable; many fine roots; moderately acid; abrupt smooth boundary. (4 to 9 inches thick)

Bt1--5 to 14 inches; yellowish brown (10YR 5/8) clay; few fine prominent red mottles; weak coarse prismatic primary structure that parts to moderate coarse angular blocky; very firm, sticky, plastic; common fine roots between peds; common fine pores; many prominent clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--14 to 23 inches; strong brown (7.5YR 5/6) clay; common medium prominent red (2.5YR 5/8) mottles; moderate medium angular blocky structure; very firm, sticky, plastic; few fine roots between peds; few fine pores; many prominent clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3--23 to 29 inches; yellowish brown (10YR 5/8) clay loam; many medium prominent red (2.5YR 5/6) mottles; weak fine angular blocky structure; firm, sticky, plastic; few fine roots between peds; many fine pores; few faint clay films on faces of peds; common pockets of saprolite; strongly acid; gradual irregular boundary. (Combined thickness of the Bt subhorizons is 18 to 30 inches)

C--29 to 72 inches; multicolored saprolite that has a loam texture; massive; friable; strongly acid.

TYPE LOCATION: Wake County, North Carolina; 3.5 miles west of Wakefield Baptist Church, 600 feet northeast on farm road.

RANGE IN CHARACTERISTICS: Solum thickness is 24 to 40 inches over saprolite. Depth to hard bedrock ranges from 6 to 10 feet or more. The soil is moderately acid to very strongly acid in the A horizon, unless limed. The B and C horizons are strongly or very strongly acid. Content of coarse fragments ranges from 0 to about 35 percent by volume in the A and E horizons and 0 to 10 percent by volume in the B horizon.

The A or Ap horizon has hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. It is fine sandy loam, sandy loam, or coarse sandy loam or their gravelly analogues. Eroded phases are sandy clay loam or clay loam and chroma can range to 8.

The E horizon, where present, has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 6. It is fine sandy loam, sandy loam, or coarse sandy loam or their gravelly analogues.

The BA or BE horizon, where present, has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Mottles in shades of red, brown, and yellow are present in most pedons. Texture is clay loam or sandy clay loam.

The Bt horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Mottles in shades of red, brown, and yellow are present in most pedons. The lower part may contain some low chroma mottles. Texture is clay, clay loam, or sandy clay with less than 30 percent silt. Consistence is very firm and plastic.

The BC horizon, where present, has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Mottles in shades of red, brown, and yellow are present in most pedons. The lower part may contain some low chroma mottles. Texture is clay loam, sandy clay loam, clay, sandy clay, or loam.

The C horizon is multicolored loamy saprolite weathered from felsic crystalline rock. Texture is variable and but commonly is clay loam, sandy clay loam, loam, or sandy loam.

COMPETING SERIES: Series in the same family are [Albertville](#), [Badin](#), [Bengal](#), [Bonwier](#), [Brockroad](#), [Carnasaw](#), [Catharpin](#), [Cullen](#), [Cunningham](#), [Cuthbert](#), [Enders](#), [Endsaw](#), [Fluvanna](#), [Galilee](#), [Gritney](#), [Kirvin](#), [Luverne](#), [Masada](#), [Mattaponi](#), [Mayodan](#), [McQueen](#), [Nason](#), [Remlap](#), [Sweatman](#), [Tatum](#), [Totier](#), [Townley](#), [Urland](#), [Uwharrie](#), and [Williamsville](#) soils. Albertville, Badin, Carnasaw, Cunningham, Enders, Endsaw, Nason, Sweatman, and Townley soils contain sandstone, shale, or other fine-grained coarse fragments. In addition, Badin, Bengal, and Townley soils have bedrock within 20 to 40 inches. Bonwier and Urland soils have less total moisture during the growing season. Brockroad and Catharpin soils have lithologic discontinuity within the series control section. Cullen, Tatum, Totier, and Uwharrie soils have hue of 5YR or redder. Cuthbert, Kirvin, and Williamsville soils contain ironstone coarse fragments. Fluvanna soils lack mica flakes in the control section. Galilee, Gritney, Luverne, Masada, Mattaponi, and Mayodan soils lack the very firm consistence. In addition, Gritney, Luverne, and Mattaponi soils have formed in marine sediments and Masada soils have formed in old alluvium. McQueen soils contain many mica flakes in the lower Bt horizon and substratum. Remlap soils have thick sola and clay content in the series control section that ranges from 60 to 75 percent.

GEOGRAPHIC SETTING: Vance soils are on gently sloping narrow and broad ridges and sloping to moderately steep side slopes in the Piedmont. Slopes range from 2 to 25 percent. These soils formed in residuum weathered from felsic crystalline rock, primarily aplitic granite. Mean annual precipitation is about 44 inches and mean annual air temperature is about 61 degrees F. near the type location.

GEOGRAPHICALLY ASSOCIATED SOILS: These are [Appling](#), [Cecil](#), [Helena](#), [Louisburg](#), [Pacolet](#), [Rion](#) and [Wedowee](#) soils. All these soils, except Helena, lack the very firm consistence of the Bt horizon. Appling, Cecil, Pacolet, and Wedowee soils have kaolinitic mineralogy. Helena soils are in small depressions, head of drainageways, and along intermittent drainageways. Louisburg, Rion, and [Wilkes](#) soils have mixed mineralogy and less than 35 percent clay. In addition, Louisburg soils have a discontinuous Bt horizon.

DRAINAGE AND PERMEABILITY: Vance soils are well drained. Runoff is medium to rapid, and permeability is slow. A perched water table may occur above the Bt horizon for a few days following periods of high rainfall.

USE AND VEGETATION: The principal use is for cultivated crops and pasture. The remainder is in a mixed hardwood and pine forest. Dominant tree species are white oak, southern red oak, mockernut hickory, loblolly pine, shortleaf pine, and Virginia pine. Common understory plants are American holly, flowering dogwood, sassafras, sourwood, and hophornbeam.

DISTRIBUTION AND EXTENT: Piedmont of Virginia, North Carolina, South Carolina, Georgia, and Alabama. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Franklin County, North Carolina; 1938.

REMARKS: This description restricts the series to soils with very firm, plastic Bt horizons which lack, in the control section, low chroma mottles that are associated with wetness. Some low chroma particles and streaks in the lower Bt horizons of some pedons are incompletely weathered parent materials and not mottles indicative of wetness.

Diagnostic horizons recognized in this pedon are:

Ochric epipedon - the zone from the surface to a depth of 5 inches (Ap horizon).

Argillic horizon - the zone from 5 to 29 inches below the surface (Bt1, Bt2, and Bt3 horizons).

MLRA=136

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
NC0039	VANCE	2- 25	58- 65	185-240	37- 60	350- 900

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0039	NONE		6.0-6.0		-	60-60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0039	0- 5	FSL SL COSL	0- 5	80-100	8-20	2- 6
NC0039	0- 5	GR-SL GR-COSL	5- 10	55- 80	8-20	2- 6
NC0039	0- 5	SCL CL	0- 5	90-100	20-35	4- 8
NC0039	5-29	CL SC C	0- 5	90-100	35-60	7- 13
NC0039	29-72	VAR	-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0039	0- 5	4.5- 6.0	.5-2.	0- 0	2.0- 6.0	LOW
NC0039	0- 5	4.5- 6.0	.5-2.	0- 0	2.0- 6.0	LOW
NC0039	0- 5	4.5- 6.0	.5-1.	0- 0	0.6- 2.0	LOW
NC0039	5-29	4.5- 5.5	0.-.5	0- 0	0.06- 0.2	MODERATE
NC0039	29-72	-	-	-	-	

National Cooperative Soil Survey
U.S.A.

LOCATION ENON

NC+AL GA SC VA

Established Series

Rev. AG;DTA

11/2007

ENON SERIES

The Enon series consists of very deep, well drained, slowly permeable soils on ridgetops and side slopes in the Piedmont. They have formed in residuum weathered from mafic or intermediate igneous and high-grade metamorphic rocks such as diorite, gabbro, diabase, or hornblende gneiss or schist. Slope ranges from 2 to 45 percent. Mean annual precipitation is 45 inches and mean annual temperature is 60 degrees F. near the type location.

TAXONOMIC CLASS: Fine, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Enon fine sandy loam--forested. (Colors are for moist soil unless otherwise stated.)

A--0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; few medium fragments of quartz and black concretions; strongly acid; clear smooth boundary. (2 to 9 inches thick)

E--3 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots and root channels; few medium black concretions; moderately acid; clear wavy boundary. (0 to 7 inches thick)

BE--8 to 11 inches; light olive brown (2.5Y 5/4) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few distinct clay films on faces of peds; few fine roots and root channels; slightly acid; gradual wavy boundary. (0 to 5 inches thick)

Bt1--11 to 21 inches; yellowish brown (10YR 5/8) clay; moderate, medium, prismatic structure that parts to moderate medium angular blocky structure; firm, sticky, plastic; many distinct clay films on faces of peds; few fine and medium roots between peds; few fine pores and root channels; common fine and medium black concretions; slightly acid; gradual wavy boundary.

Bt2--21 to 33 inches; yellowish brown (10YR 5/8) clay; moderate medium angular blocky structure; firm, very sticky, plastic; few fine roots and pores; many distinct clay films on faces of peds; many medium black concretions; few medium gravel; neutral; gradual wavy boundary. (Combined thickness of the Bt ranges from 10 to 45 inches.)

C--33 to 75 inches; mottled brownish yellow (10YR 6/8), black (10YR 2/1), and dark greenish gray (5GY 4/1) loam saprolite; massive; friable; neutral.

TYPE LOCATION: Guilford County, North Carolina, one mile southwest of Greensboro, North Carolina, 25 feet north of Secondary Road 1662 and 450 feet east of Secondary Road 1387.

RANGE IN CHARACTERISTICS: The solum thickness ranges from 20 to 50 inches. Depth to bedrock is more than 60 inches. Reaction is strongly acid through slightly acid in the upper horizons and strongly acid to moderately alkaline in the lower horizons. Black manganese concretions range from few to common in some horizons of most pedons. COLE ranges from .04 to .09. Some Bt subhorizons may have slickensides. Rock fragment content ranges from 0 to 60 percent by volume in the A, Ap, and E horizons, and from 0 to 15 percent by volume, in the lower horizons. Fragments range from gravel to stones.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is sandy loam, fine sandy loam, loam, or silt loam in the fine-earth fraction. In eroded phases the Ap horizon is clay loam silty clay loam, or sandy clay loam in the fine-earth fraction.

The E horizon, where present, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The BA or BE horizon, where present, has hue of 7.5YR to 2.5Y, value of 4 to 6 and chroma of 3 to 8. Texture is loam, clay loam, silty clay loam, or sandy clay loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Mottles of high and/or low chroma are in lower Bt horizons of some pedons. Slickensides may be present in some subhorizons. It is clay or clay loam.

The BC or CB horizon, where present has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 3 to 8, and typically has few to many mottles in shades of brown or yellow. In some pedons, this horizon lacks a dominant color and is mottled in shades of brown or yellow. Texture is sandy clay loam, clay loam, silty clay loam, silt loam, or loam.

The C horizon has the same colors and the BC and CB horizons or is mottled or multicolored loamy saprolite weathered from mafic or intermediate, igneous or high-grade metamorphic rocks.

COMPETING SERIES: These are [Brantley](#), [Canton](#), [Bend](#), [Capshaw](#), [Cowton](#), [Gundy](#), [Hampshire](#), [Maben](#), [Magnet](#), [Mecklenburg](#), [Meth](#), [Skyuka](#), [Spray](#), [Sugartown](#), [Wynott](#), and [Zuber](#) series. Brantley, Meth and Zuber soils, on Coastal Plain uplands, have thicker sola. In addition Brantley and Meth soils have hue that ranges to 2.5YR, and Zuber soils have sandy A and AB horizons. Canton Bend, Cowton, Gundy, Magnet, and Mecklenburg soils have hues redder than 7.5YR. In addition, Canton Bend, on stream terraces, have mica in the upper sola and more than 30 percent silt in the control section. Cowton soils have Cr horizons at 20 to 40 inches. Gundy soils are underlain by Carolina slates and fine grained schist rock at 40 to 72 inches. Capshaw and Hampshire soils are underlain by hard limestone at depths less than 60 inches. Maben soils have micaceous sands and shale at depths less than 60 inches. Skyuka soils have C horizons of alluvium, moderate shrink-swell potential in the Bt horizon, and range to 5YR hue in

the Bt horizon. Spray soils have sola less than 20 inches thick. Sugartown soils have sola more than 60 inches thick. Wynott soils have a depth to soft bedrock of 20 to 40 inches.

GEOGRAPHIC SETTING: Enon soils are gently sloping on ridgetops and sloping to steep on the side slopes in the Southern Piedmont uplands. Slopes are generally between 4 and 10 percent but range from 2 to 45 percent. The soil formed in clayey residuum weathered from mafic or intermediate, igneous or high-grade metamorphic rocks such as diorite, diabase, gabbro, or hornblende gneiss or schist. Mean annual precipitation is 45 inches and the mean annual temperature is 60 degrees F., near the type location.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing [Mecklenburg](#) and [Wynott](#) series, these are the [Armenia](#), [Brewback](#) (T), [Coronaca](#), [Cullen](#), [Davidson](#), [Gaston](#), [Iredell](#), [Lloyd](#), [Mecklenburg](#), [Poindexter](#), [Sedgefield](#), [Virgilina](#), [Wilkes](#), and [Winnsboro](#) series. Armenia, Brewback (T), Iredell, and Virgilina soils are not well drained and Armenia and Virgilina soils have smectitic mineralogy. Coronaca, Davidson, Gaston and Lloyd soils have Bt horizons with rhodic colors at least in the upper part. Also, Cullen, Davidson, Gaston and Lloyd soils are Ultisols. Cullen soils have red Bt horizons. Poindexter soils have weathered bedrock at depths of 20 to 40 inches and are fine-loamy. Sedgefield soils are moderately well drained. Wilkes soils have weathered bedrock within 20 inches of the surface. Winnsboro soils have a depth to soft bedrock of 40 to 60 inches. All these soils except for Armenia, Iredell and Sedgefield are well drained and are on similar landscape positions as Enon soils. Armenia soils are in heads of drains, drainageways, and depressions. Brewback (T), Iredell, Sedgefield, and Virgilina soils are in upland flats, depressions, heads of drains, and toeslopes.

DRAINAGE AND PERMEABILITY: Well drained; medium to rapid runoff; slow internal drainage; slow permeability.

USE AND VEGETATION: Cleared areas are used primarily for growing pasture, hay, corn, soybeans, and small grain. Forested areas have varying association of shortleaf, loblolly, and Virginia pine, eastern redcedar, white oak, northern and southern red oak, hickory, yellow-poplar, sweetgum, blackgum, dogwood, and holly.

DISTRIBUTION AND EXTENT: Georgia, North Carolina, South Carolina, and Virginia. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Green County, Georgia; 1939.

REMARKS:

The May 2006 revision was to clean up text only. No major revisions. (RHB)

Diagnostic horizons and features in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 8 inches (A and E horizons)

Argillic horizon - the zone between depths of 8 and 33 inches (Bt1 and Bt2 horizons)

Ultic feature - the base saturation of 35 to 60 percent at a depth 1.25 m below the top of the argillic horizon.

ADDITIONAL DATA:

MLRA: 136

TABULAR SERIES DATA:

SOI-5 Soil Name Slope Airtemp FrFr/Seas Precip Elevation

NC0030 ENON 2-45 58-66 180-225 37-60 300-900

NC0138 ENON 2-45 58-66 180-225 37-60 300-900

NC0175 ENON 2-45 58-66 180-225 37-60 300-900

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0030	NONE		6.0-6.0		-	>60	
NC0138	NONE		6.0-6.0		-	>60	
NC0175	NONE		6.0-6.0		-	>60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0030	0-8	SL FSL	0-5	80-100	5-20	3-15
NC0030	0-8	L SIL	0-5	90-100	7-27	4-20
NC0030	0-8	CL SCL	0-5	80-100	20-35	10-25
NC0030	8-11	CL SCL	0-5	80-100	20-35	10-20
NC0030	11-33	CL C	0-5	80-100	35-60	15-35
NC0030	33-75	VAR	-	-	-	-

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0138	0-8	ST-L ST-SL ST-FSL	10-25	55-90	5-20	3-15
NC0138	0-8	STV-L STV-SL STV-FSL	25-50	35-75	5-20	3-15
NC0138	0-8	STV-CL CBV-CL	25-50	35-75	27-35	10-25
NC0138	8-11	SCL CL	5-10	80-100	20-35	10-20
NC0138	11-33	C CL	0-10	80-100	35-60	15-35
NC0138	33-75	VAR	-	-	-	-

NC0175	0-8	GR-FSL GR-SL GR-L	2-10	55-90	5-20	3-15
NC0175	0-8	GR-CL GR-SCL	2-10	65-85	20-35	10-25

NC0175	0-8	CB-FSL	CB-SL	CB-L	15-35	55-90	5-20	3-15
NC0175	8-11	SCL	CL	GR-SCL	0-10	60-100	20-35	10-20
NC0175	11-33	C	CL		0-5	80-100	35-60	15-35
NC0175	33-75	VAR			-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0030	0-8	5.1-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0030	0-8	5.1-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0030	0-8	5.1-6.5	.5-1.	0-0	0.6-2.0	LOW
NC0030	8-11	5.1-6.5	0.-.5	0-0	0.6-2.0	LOW
NC0030	11-33	5.1-7.8	0.-.5	0-0	0.06-0.2	HIGH
NC0030	33-75	-	-	-	-	

NC0138	0-8	5.1-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0138	0-8	5.1-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0138	0-8	5.1-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0138	8-11	5.1-6.5	.5-1.	0-0	0.6-2.0	LOW
NC0138	11-33	5.1-7.8	0.-.5	0-0	0.06-0.2	HIGH
NC0138	33-75	-	0.-.5	-	-	

NC0175	0-8	5.1-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0175	0-8	5.1-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0175	0-8	5.1-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0175	8-11	5.1-6.5	.5-1.	0-0	0.6-2.0	LOW
NC0175	11-33	5.1-7.8	0.-.5	0-0	0.06-0.2	HIGH
NC0175	33-75	-	0.-.5	-	-	

LOCATION HELENA
Established Series
Rev. AG, MDJ
12/2012

NC+AL GA SC VA

HELENA SERIES

MLRA(s): 136

MLRA Soil Survey Regional Office (MO) Responsible: Raleigh, North Carolina

Depth Class: Very deep

Agricultural Drainage Class: Moderately well drained

Permeability: Slow

Surface Runoff: Moderate to rapid

Parent Material: Residuum weathered from a mixture of felsic, intermediate, or mafic igneous or high-grade metamorphic rocks

Shrink-Swell Potential: High

Slope: 0 to 15 percent

TAXONOMIC CLASS: Fine, mixed, semiactive, thermic Aquic Hapludults

TYPICAL PEDON: Helena sandy loam - on a 4 percent slope in a cultivated field. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches; grayish brown (10YR 5/2) sandy loam; weak, medium, and coarse granular structure; very friable; many fine roots; moderately acid; abrupt smooth boundary. (4 to 10 inches thick)

E--8 to 12 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; few fine roots; few fine black concretions; strongly acid; clear wavy boundary. (0 to 10 inches thick)

BE--12 to 19 inches; brownish yellow (10YR 6/6) sandy clay loam; moderate medium prismatic structure that parts to moderate medium angular blocky; friable; sticky, plastic; few fine roots; few fine pores; few faint clay films on faces of peds; few medium quartz gravel; common fine faint pale brown (10YR 6/3) iron depletions; very strongly acid; clear wavy boundary. (0 to 7 inches thick)

Bt1--19 to 24 inches; yellowish brown (10YR 5/8) clay; weak coarse angular blocky structure; firm; sticky, plastic; few fine roots; few fine pores; few faint clay films on faces of peds; few fine prominent light brownish gray (10YR 6/2) iron depletions; very strongly acid; clear wavy boundary.

Bt2--24 to 39 inches; yellowish brown (10YR 5/8) clay; weak coarse subangular blocky and angular blocky structure; very firm, sticky, very plastic; few fine roots; few fine pores; common distinct clay

films on faces of peds; many medium prominent gray (10YR 6/1) iron depletions; very strongly acid; clear wavy boundary.

Bt3--39 to 43 inches; light yellowish brown (10YR 6/4) clay loam; weak medium subangular blocky structure; extremely firm, sticky, very plastic; common distinct clay films on faces of peds; few brown concretions; common medium distinct light gray (10YR 7/1) iron depletions; very strongly acid; clear wavy boundary. (Combined thickness of the Bt horizons is 17 to 42 inches.)

BCg--43 to 46 inches; light gray (10YR 7/1) clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; many coarse prominent strong brown (7.5YR 5/6) soft masses of iron accumulation; very strongly acid; clear wavy boundary. (0 to 14 inches thick)

C--46 to 60 inches; strong brown (7.5YR 5/8) sandy loam saprolite; many coarse prominent light gray (10YR 7/1) streaks; massive; friable; few coarse veins of gray clay; common fragments of granitic rock; very strongly acid.

TYPE LOCATION: Durham County, North Carolina; 0.4 mile west of Mangum Store on Secondary Road 1603; 400 feet north on a farm road; 400 feet east in a cultivated field. USGS Durham North topographic quadrangle; lat. 36 degrees 11 minutes, and 45 seconds N. and long. 78 degrees 49 minutes 59 seconds W.

RANGE IN CHARACTERISTICS:

Depth to top of argillic horizon: 4 to 18 inches

Solum thickness: 40 to more than 60 inches

Depth to bedrock: Greater than 60 inches

Depth to seasonal high water table: 18 to 30 inches, January to April

Soil reaction: Extremely acid to moderately acid, except where limed.

Rock fragment content: 0 to 35 percent, by volume, throughout the profile; mostly gravel

Other features: Some pedons may have few to common dark concretions in the upper part of the profile

Range of Individual Horizons:

A or Ap horizon:

Color--hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4

Tecture--(fine-earth fraction) loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, sandy loam, or loam

In eroded phases, the Ap horizon is clay loam or sandy clay loam

E horizon:

Color--hue of 10YR to 5Y, value of 5 to 8, and chroma of 2 to 4

Texture--(fine-earth fraction) loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, sandy loam, or loam

BE or BA horizon:

Color--hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8

Texture--(fine-earth fraction) sandy clay loam or clay loam

Bt horizon:

Color--hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8. In some pedons, the lower Bt horizon has 5YR hues or is multicolored in shades of yellow, brown, gray, or red.

Texture--(fine-earth fraction) clay loam, sandy clay, or clay. Some pedons have thin subhorizons of sandy clay loam.

Redoximorphic features--iron depletions with chroma of 2 or less occur within 24 inches of the upper boundary of the Bt horizon. Iron accumulations in shades of yellow, brown, or red may also be present.

Btg horizon, where present:

Color--hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2.

Texture--(fine-earth fraction) clay loam, sandy clay, or clay. Some pedons have thin subhorizons of sandy clay loam.

Redoximorphic features--iron accumulations in shades of yellow, brown, or red are commonly present

BC horizon, where present:

Color--hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8. Some pedons may have 5YR hues or are multicolored in shades of yellow, brown, gray, or red.

Texture--(fine-earth fraction) clay loam, sandy clay loam, loam, fine sandy loam, or sandy loam

Redoximorphic features--iron depletions in shades of brown, olive, or gray and iron accumulations in shades of yellow, brown, or red may also be present.

BCg horizon:

Color--hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2

Texture--(fine-earth fraction) clay loam, sandy clay loam, loam, fine sandy loam, or sandy loam

Redoximorphic features--iron accumulations in shades of yellow, brown, or red are commonly present

C horizon:

Color--hue of 5YR to 5Y, value of 5 to 8, and chroma of 3 to 8, or is multicolored in shades of gray, yellow, brown, red or white

Texture--(fine-earth fraction) sandy loam, fine sandy loam, sandy clay loam, or loam saprolite. Some pedons may have bodies or seams of clay loam or clay.

Redoximorphic features--iron depletions in shades of brown, olive, or gray and iron accumulations in shades of yellow, brown, or red.

Cg horizon, where present:

Color--hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2 and is typically multicolored in shades of yellow or brown.

Texture--(fine-earth fraction) sandy loam, fine sandy loam, sandy clay loam, or loam saprolite. Some pedons may have bodies or seams of clay loam or clay.

Redoximorphic features--iron accumulations in shades of yellow, brown, or red

COMPETING SERIES:

[Annemaine](#) soils--have a redder hue and form from lower Coastal Plain sediments
[Beason](#) soils--have a higher silt content and have sediments from sedimentary rock origin
[Buckatunna](#) soils--form from Coastal Plain sediments
Bush River soils--have a paralithic contact at a depth of 40 to 60 inches
[Chickasawhay](#) soils--form in marine and Coastal Plain sediments
[Cid](#) soils--have a lithic contact at a depth of 20 and 40 inches
[Craven](#) soils--formed from Coastal Plain sediments and have a higher silt content
[Creedmoor](#) soils--have a very high shrink swell potential, more exchangeable aluminum and form from Triassic parent material
[Dogue](#) soils--have a higher silt content and form from Coastal Plain sediments
[Dorian](#) soils--have a moderate shrink-swell potential and form from fluvial sediments on stream terraces
[Gritney](#) soils--form from Coastal Plain sediments
[Lignum](#) soils--have a paralithic contact at a depth of 40 to 60 inches
[Nemours](#) soils--have a redder hue and form from Coastal Plain sediments
[Newco](#) soils--have a redder hue and form from Coastal Plain sediments
[Prosperity](#) soils--have a paralithic contact at a depth of 40 and 60 inches
[Telfair](#) soils--have a thinner solum and have a paralithic contact at a depth of 20 to 40 inches

GEOGRAPHIC SETTING:

Landscape: Piedmont

Landform: Ridges and hill slopes

Geomorphic Component: Interfluves and side slopes

Hillslope Profile Position: Toe slope, summits, and heads of drains

Parent Material: Residuum from aplitic granite or granite gneiss that is cut by dykes of gabbro and diorite, or mixed with hornblende schist or hornblende gneiss

Slope: 0 to 15 percent

Elevation: 350 to 900 feet

Frost-Free Period: 185 to 240 days

Mean Annual Air Temperature: 58 to 65 degrees F

Mean Annual Precipitation: 37 to 55 inches

GEOGRAPHICALLY ASSOCIATED SOILS:

[Appling](#) soils--are well drained and have a low shrink-swell potential

[Cecil](#) soils--are well drained, have a red subsoil, and have a low shrink-swell potential

[Cullen](#) soils--are well drained, have a red subsoil, and have a low shrink-swell potential

[Durham](#) soils--have less clay in the subsoil

[Enon](#) soils--are well-drained and have a higher base saturation

Hard Labor--soils have a moderate shrink-swell potential

[Iredell](#) soils--have a higher base saturation

[Louisburg](#) soils--are well drained and have less clay in the subsoil

[Mecklenburg](#) soils--are well drained, have a red subsoil, and have a higher base saturation

[Pacolet](#) soils--are well drained, have a red subsoil, and have a low shrink-swell potential

[Rion](#) soils--are well drained and have less clay in the subsoil

[Santuc](#) soils--have less clay in the subsoil

[Sedgefield](#) soils--have a higher base saturation

[Vance](#) soils--are well drained.

[Wedowee](#) soils--are well drained and have a low shrink-swell potential

[Wilkes](#) soils--are well drained, have a higher base saturation, and have a depth to paralithic contact of less than 20 inches

[Worsham](#) soils--are poorly drained

DRAINAGE AND PERMEABILITY:

Drainage Class (Agricultural): Moderately well drained

Internal Free Water Occurrence: Moderately deep, common

Saturated Hydraulic Conductivity Class: Moderately low to moderately high

USE AND VEGETATION:

Major Uses: Mostly cultivated

Dominant Vegetation: Where cultivated--tobacco, corn, soybean, small grain, and vegetables.

Dominant forest vegetation includes a mix of hardwood and pine. Native species include loblolly pine, shortleaf pine, Virginia pine, sweetgum, willow oak, red oak, white oak, yellow-poplar, and American elm. Understory species include sourwood, flowering dogwood, winged elm, eastern cedar, hophornbean, eastern redbud, and sassafras.

DISTRIBUTION AND EXTENT:

Distribution: Alabama, Georgia, North Carolina, South Carolina, and Virginia.

Extent: Large.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Person County, North Carolina, 1928.

REMARKS:

12/2012 Revision updates the format and added latitude and longitude.

8/1991 Revision changed depth to bedrock from "more than 48 inches to more than 60 inches" to be consistent with one depth to bedrock class as shown on the Soil Interpretation Records for Helena.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon--the zone from the surface to 12 inches (Ap and E horizons)

Argillic horizon--the zone from 12 to 46 inches (BE, Bt1, Bt2, Bt3 and BCg horizons)

Aquic conditions--periodic episaturation and reduction in a zone within the upper 24 inches of the argillic horizon

Revised: RLV 8/14/98

MLRA = 136

ADDITIONAL DATA:

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
NC0058	HELENA	0-15	58-65	185-240	37-55	350-900
NC0176	HELENA	0-15	58-65	185-240	37-55	350-900
NC0266	HELENA	0-15	58-65	185-240	37-55	350-900

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0058	NONE		1.5-2.5	PERCHED	JAN-APR	>60	
NC0176	NONE		1.5-2.5	PERCHED	JAN-APR	>60	
NC0266	NONE		1.5-2.5	PERCHED	JAN-APR	>60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0058	0-12	SL FSL L	0-5	90-100	5-20	1- 6
NC0058	0-12	SCL CL	0-5	95-100	20-35	4- 8
NC0058	12-19	SCL CL	0-5	95-100	20-35	4- 7
NC0058	19-43	CL SC C	0-5	95-100	35-60	7-13
NC0058	43-60	VAR	-	-	-	-
NC0176	0-12	GR-FSL GR-L GR-COSL	0-5	50- 75	5-20	1- 6
NC0176	0-12	GR-LCOS GR-LS GR-S	0-5	50- 75	3-12	1- 4
NC0176	0-12	GR-CL GR-SCL	0-5	50- 75	20-35	4- 8
NC0176	12-19	SCL CL SL	0-5	95-100	20-35	4- 7
NC0176	19-43	CL SC C	0-5	95-100	35-60	7-13
NC0176	43-60	VAR	-	-	-	-
NC0266	0-12	LS LCOS	0-5	90-100	3-12	1- 4
NC0266	12-19	SCL CL	0-5	95-100	20-35	4- 7
NC0266	19-43	CL SC C	0-5	95-100	35-60	7-13
NC0266	43-60	VAR	-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0058	0-12	3.5-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0058	0-12	3.5-6.5	.5-1.	0-0	0.2-0.6	LOW
NC0058	12-19	3.5-5.5	0.-.5	0-0	0.2-0.6	MODERATE
NC0058	19-43	3.5-5.5	0.-.5	0-0	0.06-0.2	HIGH
NC0058	43-60	-	-	-	-	-
NC0176	0-12	4.5-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0176	0-12	4.5-6.5	.5-2.	0-0	6.0- 20	LOW
NC0176	0-12	4.5-6.5	.5-1.	0-0	0.2-0.6	LOW
NC0176	12-19	4.5-5.5	0.-.5	0-0	0.2-0.6	MODERATE
NC0176	19-43	4.5-5.5	0.-.5	0-0	0.06-0.2	HIGH
NC0176	43-60	-	-	-	-	-
NC0266	0-12	3.5-6.5	.5-2.	0-0	6.0- 20	LOW
NC0266	12-19	3.5-5.5	0.-.5	0-0	0.2-0.6	MODERATE
NC0266	19-43	3.5-5.5	0.-.5	0-0	0.06-0.2	HIGH
NC0266	43-60	-	-	-	-	-

National Cooperative Soil Survey
U.S.A.

SEDGEFIELD SERIES

The Sedgefield series consists of very deep, somewhat poorly drained, slowly permeable soils. These soils are on Piedmont uplands. They have formed in residuum weathered from intermediate and mafic crystalline rock. Slope ranges from 0 to 10 percent. The mean annual temperature is 60 degrees F., and the mean annual precipitation is 47 inches near the type location.

TAXONOMIC CLASS: Fine, mixed, active, thermic Aquultic Hapludalfs

TYPICAL PEDON: Sedgefield sandy loam--cultivated. (Colors are for moist soil unless otherwise stated.)

A--0 to 3 inches; gray (10YR 6/1) sandy loam; weak medium granular structure; very friable; many fine and medium roots; few large roots; strongly acid; abrupt smooth boundary. (2 to 5 inches thick)

E--3 to 7 inches; very pale brown (10YR 7/3) sandy loam; few fine faint yellowish brown mottles; weak fine and medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary. (0 to 8 inches thick)

BE--7 to 13 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; very pale brown (10YR 7/3) E material in pores, root channels and tongues make up 10 percent of the horizon; few quartz pebbles less than 1 inch in diameter; strongly acid; gradual wavy boundary. (0 to 6 inches thick)

Bt1--13 to 23 inches; brownish yellow (10YR 6/6) clay; moderate medium subangular and angular blocky structure; firm; sticky, plastic; few medium roots; few fine pores; thick prominent clay films on faces of peds; common medium distinct gray (10YR 6/1) iron depletions; strongly acid; gradual wavy boundary.

Bt2--23 to 33 inches; strong brown (7.5YR 5/6) clay; moderate medium angular blocky structure; very firm; sticky, plastic; few fine roots; thick prominent clay films on faces of peds; common medium distinct gray (10YR 6/1) iron depletions; strongly acid; gradual wavy boundary. (combined thickness of the Bt horizons is 14 to 24 inches)

BCg--33 to 37 inches; gray (10YR 6/1) sandy clay loam; weak medium subangular blocky structure; firm; 10 percent brownish yellow (10YR 6/6) saprolite; common coarse distinct strong brown (7.5YR 5/6) soft masses of iron accumulation; moderately acid; gradual wavy boundary. (3 to 5 inches thick)

C--37 to 65 inches; mottled light gray (10YR 7/1), yellow (10YR 7/6), and brownish yellow (10YR 6/6) sandy loam saprolite; massive; friable; moderately acid; clear smooth boundary.

TYPE LOCATION: Orange County, North Carolina; 1.5 miles north of Walnut Grove Church on SR 1001, 1 mile west of SR 1001 on SR 1510, 100 feet south of SR 1510 in woods.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 20 to 40 inches. Depth to bedrock is more than 60 inches. Content of rock fragments in the surface layers ranges from 0 to 15 percent. The soil ranges from very strongly acid to slightly acid in the A and upper Bt horizons and from moderately acid to moderately alkaline in the lower Bt and C horizons.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is sandy loam, fine sandy loam, loamy sand, sandy clay loam, or loam.

The E horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 4. It is sandy loam, fine sandy loam, loamy sand, or loam.

The BA or BE horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 to 8. It is sandy loam or sandy clay loam.

The Bt horizon has hue of 7.5YR to 5Y, value of 5 to 6, and chroma of 3 to 8. Iron depletions with chroma 2 or less are in the upper 10 inches of the Bt horizon. Soft masses of iron accumulation in shades of yellow, brown, or red may also be present. Texture is clay loam, sandy clay, or clay.

The Btg horizon, where present, has hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 1 or 2. Soft masses of iron accumulation in shades of yellow, brown, or red may be present. Texture is clay loam, sandy clay, or clay.

The BCg horizon has hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Soft masses of iron accumulation in shades of yellow, brown, or red may be present. Texture is sandy loam, sandy clay loam, clay loam, or loam.

The BC horizon, where present, has hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 3 to 8, or is mottled. Iron depletions with chroma 2 or less and soft masses of iron accumulation in shades of yellow, brown, or red may also be present. Texture is clay loam, sandy clay, or clay.

The C horizon is mottled in shades of yellow, brown, red, or gray. It is saprolite that weathered from intermediate and mafic crystalline rocks and is variable in texture but typically is loamy.

The Cg horizon, where present, has hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Soft masses of iron accumulation in shades of yellow, brown, or red may be present. Texture is variable and can include sandy loam, sandy clay loam, clay loam, sandy clay, or loam.

COMPETING SERIES: There are no other known series in this family. Soils in closely related families are the [Brewback](#)(T), [Crawfordville](#)(T), [Enon](#), [Helena](#), [Iredell](#), and [Winnsboro](#), and series. Brewback and Crawfordville soils have a depth to soft bedrock of 20 to 40 inches. In addition,

Crawfordville soils have an abrupt textural change between the A and Bt horizon. Enon, Iredell, and Winnsboro soils lack redox depletions of chroma 2 or less in the upper 10 inches of the Bt horizon. Helena soils have less than 35 percent base saturation and are strongly or very strongly acid throughout.

GEOGRAPHIC SETTING: Sedgefield soils are on nearly level to gently sloping ridges or depressions and around heads of drainageways in the thermic Piedmont. Frequently, they are on lower parts of the slope, but also are on broad flat areas. Slopes range from 0 to 10 percent. The soil formed in residuum weathered from intermediate and mafic crystalline rocks. Near the type location the mean annual temperature is about 60 degrees F., and annual precipitation is about 47 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the similar Brewback(T), Crawfordville(T), [Enon](#), [Helena](#), [Iredell](#), and [Winnsboro](#) series, and the [Pittsboro](#), [Virgilina](#), [Wilkes](#), and [Wynott](#), series. Pittsboro soils have iron depletions of chroma 2 or less below the upper 10 inches of the Bt horizon and a depth to soft bedrock of 20 to 40 inches. Virgilina soils have smectitic mineralogy and a depth to hard bedrock of 20 to 40 inches. Wilkes soils are well drained and have a depth to soft bedrock of less than 20 inches. Wynott soils are well drained and have a depth to soft bedrock of 20 to 40 inches.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; medium to slow runoff; slow permeability.

USE AND VEGETATION: About two-thirds of this soil is used for crops and pasture. The remaining is in forest of hardwoods and pine. Native species include loblolly pine, shortleaf pine, Virginia pine, sweetgum, willow oak, red oak, white oak, yellow-poplar, and American elm. Understory species include summersweet clethra, greenbrier, flowering dogwood, honeysuckle, and American holly.

DISTRIBUTION AND EXTENT: Southern Piedmont of Georgia, North Carolina and Virginia. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Orange County, North Carolina; 1975.

REMARKS: Sedgefield was formerly included with the Helena series but is less acid and has higher base saturation.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the soil surface to a depth of 13 inches.

Albic horizon - the zone from 7 to 13 inches below the surface.

Argillic horizon - the zone from 13 to 33 inches below the surface.

Features of Aquultic Hapludalfs - gray redox depletions in the upper 10 inches of the argillic horizon (Bt1) and base saturation of 35 to 60 percent in the zone between depths of 37 and 65 inches.

Revised: RLV 9/5/97; DTA 6/2/05 to update format.

ADDITIONAL DATA:

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
NC0099	SEDGEFIELD	0-10	58-66	180-225	40-60	400-800

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0099	NONE		1.0-1.5	PERCHED	JAN-MAR	>60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0099	0-13	LS	0-5	85-100	3-10	2-10
NC0099	0-13	FSL SL L	0-5	85-100	8-20	4-15
NC0099	0-13	SCL	0-5	85-100	20-35	10-25
NC0099	13-33	SC CL C	0-5	95-100	35-60	15-35
NC0099	33-37	SL SCL CL	0-5	90-100	10-35	4-20
NC0099	37-65	VAR	-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0099	0-13	4.5-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0099	0-13	4.5-6.5	.5-2.	0-0	2.0-6.0	LOW
NC0099	0-13	4.5-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0099	13-33	4.5-6.5	0.-.5	0-0	0.06-0.2	HIGH
NC0099	33-37	5.6-8.4	0.-.5	0-0	0.6-2.0	MODERATE
NC0099	37-65	-	-	-	-	

Established Series

DDR-NAM-EPE/Rev. JAK

01/2009

ZION SERIES

MLRA(s): 136 (mesic part)

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

Depth Class: Moderately deep to bedrock

Drainage Class (Agricultural): Well drained

Internal Free Water Occurrence: Very deep

Flooding Frequency and Duration: None

Ponding Frequency and Duration: None

Index Surface Runoff: Low to very high

Permeability: Moderately slow or slow

Shrink-Swell Potential: High

Landscape: Piedmont upland

Landform: Hill, ridge, interfluvium

Geomorphic Component: Crest, nose slope, side slope, head slope

Hillslope Profile Position: Summit, shoulder, backslope

Parent Material: Residuum from mafic rock

Slope: 2 to 45 percent

Elevation (type location): Unknown feet

Frost Free Period (type location): 195 days

Mean Annual Air Temperature (type location): 55 degrees F.

Mean Annual Precipitation (type location): 45 inches

TAXONOMIC CLASS: Fine, mixed, superactive, mesic Typic Hapludalfs**TYPICAL PEDON:** Zion loam (in an unknown area), in woodland. (Colors are for moist soil, unless otherwise indicated.)**A--**0 to 3 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2), dry; weak fine granular structure; very friable; many fine roots; 1 percent, by volume fine black (10YR 2/1) concretions; very strongly acid. (0 to 6 inches thick)**E--**3 to 10 inches; brown (10YR 4/3) loam; weak fine granular structure; friable; many fine and medium roots; common fine and medium pores; 5 percent, by volume coarse black (10YR 2/1) and dark brown (10YR 3/3) concretions; very strongly acid; clear smooth boundary. (0 to 8 inches thick)**BEc--**10 to 18 inches; brown (7.5YR 4/4) very gravelly clay loam; weak medium subangular blocky structure; firm, moderately sticky, slightly plastic; 15 percent, by volume medium and fine roots;

many coarse black (10YR 2/1) and dark brown (10YR 3/3) concretions; strongly acid; 40 percent, by volume gravel; clear smooth boundary. (0 to 8 inches thick)

Bt--18 to 26 inches; brown (7.5YR 4/4) clay; moderate coarse angular blocky structure; firm, moderately sticky, moderately plastic; few fine roots; few fine and medium pores; few prominent clay films on vertical faces of peds; 5 percent, by volume coarse black (10YR 2/1) and dark brown (10YR 3/3) concretions; few fine mica flakes; 2 percent, by volume gravel; strongly acid; gradual smooth boundary. (8 to 20 inches thick)

BC--26 to 36 inches; dark yellowish brown (10YR 4/4) gravelly clay; common distinct black (10YR 2/1) mottles and common prominent grayish green (5G 5/2) and very pale brown (10YR 8/2) mottles; weak coarse subangular blocky structure; firm, moderately sticky, moderately plastic; 30 percent, by volume gravel and cobbles 1 to 4 inches in diameter; 1 percent, by volume mica flakes; strongly acid; mottled material is saprolite; gradual smooth boundary. (0 to 10 inches thick)

R--36 inches; mafic rock; very strongly cemented; very high excavation difficulty.

TYPE LOCATION: Orange County, Virginia; about 2.0 miles northeast of Lahore, east of U.S. Highway 522; USGS Unknown, VA topographic quadrangle; lat. 00 degrees 00 minutes 00 seconds N. and long. 00 degrees 00 minutes 00 seconds W., NAD 27 or 83.

RANGE IN CHARACTERISTICS:

Depth to top of Argillic horizon: 1 to 20 inches

Depth to base of Argillic horizon: 25 to 40 inches

Depth to Bedrock: 20 to 40 inches to hard bedrock

Rock Fragment Content: 0 to 35 percent in the A, Ap, BA, BE, and E horizons, 5 to 60 percent in the BEc horizon, 0 to 15 percent in the Bt horizon and 5 to 40 percent in the BC, B/C, and C horizons; mostly iron and manganese concretions, rock fragments, and angular quartz gravel

Soil Reaction: Very strongly acid to moderately acid in the A, E, and the upper part of the B horizon and strongly acid to neutral in the lower B and C horizon

Mica Content: 0 to 20 percent, by volume mica flakes throughout

RANGE OF INDIVIDUAL HORIZONS:

A horizon or Ap horizon (if it occurs):

Color--hue of 7.5YR to 2.5Y, value of 3 to 5, chroma of 2 to 4

Texture (fine-earth fraction)--loam, silt loam, fine sandy loam, or sandy loam

E horizon (if it occurs):

Color--hue of 5YR to 2.5Y value of 4 to 6, chroma of 3 to 6

Texture (fine-earth fraction)--loam, silt loam, fine sandy loam, or sandy loam

BA or BE horizon (if it occurs):

Color--hue of 7.5YR to 2.5Y, value of 4 to 6, chroma of 4 to

Texture (fine-earth fraction)--lam, silt loam, silty clay loam, or clay loam

BEc horizon (if it occurs):

Color--hue of 7.5YR to 2.5Y, value of 4 to 6, chroma of 3 to 8

Texture (fine-earth fraction)--loam, silt loam, silty clay loam, or clay loam

Bt horizon:

Color--hue of 5YR to 2.5Y, value of 4 to 6, chroma of 4 to 8 or may be variegated in shades of these colors

Texture (fine-earth fraction)--clay loam, silty clay or clay

BC horizon (if it occurs):

Color--hue of 5YR to 2.5Y, value of 4 to 6, chroma of 4 to 8 or may be variegated in shades of these colors

Texture (fine-earth fraction)--clay, clay loam, loam or sandy clay loam

Mottles (if they occur)--shades of red, yellow, brown, black, green, or gray

C horizon (if it occurs):

Color--variegated in shades of yellow, brown, or red

Texture (fine-earth fraction)--sandy loam, loam, sandy clay loam, or clay loam saprolite. Some pedons have tongues of clayey material in the upper part.

C/B or B/C horizon (if they occur):

C part--same properties as C horizon

B part--same properties as Bt or BC horizon

Cr horizon (if it occurs):

Bedrock kind--hornblende schist, gabbro, diorite, diabase, dacite, or other mafic rock

Bedrock hardness--extremely weakly cemented to moderately cemented

Fracture interval--greater than 4 inches

Excavation difficulty--low to high

Thickness--0 to 10 inches

R horizon:

Bedrock kind--hornblende schist, gabbro, diorite, diabase, dacite, or other mafic rock

Bedrock hardness--strongly cemented to indurated

Fracture interval--greater than 4 inches

Excavation difficulty--very high or extremely high

COMPETING SERIES:

[Diana Mills](#) soils--no Official Series Description available

[Montalto](#) soils--are very deep to bedrock

[Mount Rush](#) soils--no Official Series Description available

[Needmore](#) soils--are moderately deep to soft bedrock and formed in residuum from calcareous shale

[Oak Level](#) soils--are very deep to bedrock

[Peabody](#) soils--are moderately deep to soft bedrock and formed in residuum derived from interbedded olive yellow siltstone and red clay shale

[Rasalo](#) soils--are very deep to bedrock

[Spray](#) soils--are very deep to bedrock and formed in residuum from Triassic age materials

GEOGRAPHIC SETTING:

Landscape: Piedmont upland

Landform: Hill, ridge, interfluvium

Geomorphic Component: Crest, nose slope, side slope, head slope

Hillslope Profile Position: Summit, shoulder, backslope

Parent Material: Residuum from mafic rock, commonly hornblende schist, gabbro, diorite, diabase, or dacite

Slope: 2 to 45 percent

Elevation: 250 to 1000 feet

Frost Free Period: 160 to 205 days

Mean Annual Air Temperature: 52 to 57 degrees F.

Mean Annual Precipitation: 40 to 55 inches

GEOGRAPHICALLY ASSOCIATED SOILS:

[Bremono](#) soils--have a loamy-skeletal particle-size control section; on similar landforms

[Orange](#) soils--are deep to hard bedrock and are somewhat poorly or moderately well drained; on lower-lying landforms

[Jackland](#) soils--are very deep and are moderately well drained or somewhat poorly drained; on lower-lying landforms

[Rasalo](#) soils--are very deep to bedrock

[Siloam](#) soils--are shallow to soft bedrock and moderately deep to hard bedrock; on slightly higher landforms

[Spray](#) soils--are very deep to bedrock and formed in residuum from Triassic age materials; on similar landforms

DRAINAGE AND PERMEABILITY:

Depth Class: Moderately deep (20 to 40 inches) to hard bedrock

Drainage Class (Agricultural): Well drained

Internal Free Water Occurrence: Very deep

Flooding Frequency and Duration: None

Ponding Frequency and Duration: None

Index Surface Runoff: Low to very high

Permeability: Moderately slow or slow

Shrink-Swell Potential: High

USE AND VEGETATION:

Major Uses: About one-half of the acreage has been cleared and is used for pasture, hay, and cultivated crops.

Dominant Vegetation: Where cultivated--lespedeza, red clover, small grain, and corn,. Where wooded--upland oaks, hickory, walnut, yellow poplar, sassafras, dogwood, redbud, Virginia pine and red cedar.

DISTRIBUTION AND EXTENT:

Distribution: Virginia, Georgia, and North Carolina

Extent: Small

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina**SERIES ESTABLISHED:** Culpeper County, Virginia, 1943.

REMARKS: The April 1997 relocation of the mesic/thermic line in North Carolina and Virginia triggered the reclassification of Zion to a mesic temperature regime, with the type location already in Orange County, Virginia, well within the mesic area. The Redbrush series was established as a mesic counterpart, but being superactive instead of active, and Typic instead of Ultic. A review of lab data and correspondence show that these two series overlapped and did not justify two series. Redbrush was made inactive as a result of the final correlation of Iredell County, North Carolina.

Diagnostic horizons and soil characteristics recognized in this pedon:

Ochric epipedon--the zone from 0 to 18 inches (A, E, and BEc horizons)

Argillic horizon--the zone from 18 to 26 inches (Bt horizon)

Lithic contact--bedrock contact at 36 inches (R horizon)

ADDITIONAL DATA:

Laboratory Data: 96NC169001, 96NC171001, 96NC171004

Database Information:

Typical Pedon Data Mapunit ID--Unknown

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
VA0042	ZION	2-45	52-57	160-250	40-55	250-1000
VA0227	ZION	2-45	52-57	160-205	40-55	250-1000

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
VA0042	NONE		>6.0	-	-	20-40	HARD
VA0227	NONE		>6.0	-	-	20-40	HARD

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
VA0042	0-10	L SIL	0-5	75-100	10-25	-
VA0042	0-10	SL FSL	0-5	85-100	5-18	-
VA0042	10-18	GRV-CL GR-CL GR-L	0-0	25-50	20-40	-
VA0042	18-26	C SIC SICL	0-0	90-100	35-60	-

VA0042	26-36	GR-C	CL	C	0-20	45-95	35-50	-
VA0042	36-46	UWB			-	-	-	-
VA0227	0-10	GR-L	GR-SIL		0-0	50-75	7-27	15-45
VA0227	10-18	GRV-CL	GR-CL	GR-L	0-0	25-50	20-40	39-71
VA0227	18-26	C	SIC	SICL	0-0	90-100	35-60	55-82
VA0227	26-36	GR-C	CL	C	0-20	45-95	35-50	19-59
VA0227	36-46	UWB			-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
VA0042	0-10	4.5-6.0	0.5-2.	0-0	0.6-2.0	LOW
VA0042	0-10	4.5-6.0	0.5-2.	0-0	2.0-6.0	LOW
VA0042	10-18	4.5-6.0	0.0-.5	0-0	0.06-0.6	LOW
VA0042	18-26	4.5-7.3	0.0-.5	0-0	0.06-0.6	HIGH
VA0042	26-36	5.1-7.3	0.0-.5	0-0	0.2-2.0	HIGH
VA0042	36-46	-	-	-	0.00-0.01	

VA0227	0-10	4.5-6.0	0.5-2.0	0-0	0.6-2.0	LOW
VA0227	10-18	4.5-6.0	0.0 0.5	0-0	0.06-0.6	LOW
VA0227	18-26	4.5-7.3	0.0-0.5	0-0	0.06-0.6	HIGH
VA0227	26-36	4.5-7.3	0.0-0.5	0-0	0.2-2.0	HIGH
VA0227	36-46	-	-	-	0.0-0.01	

APPLING SERIES

The Appling series consists of very deep, well drained, moderately permeable soils on ridges and side slopes of the Piedmont uplands. They are deep to saprolite and very deep to bedrock. They formed in residuum weathered from felsic igneous and metamorphic rocks of the Piedmont uplands. Slopes range from 0 to 25 percent. Near the type location, mean annual precipitation is 45 inches and mean annual temperature is 60 degrees F.

TAXONOMIC CLASS: Fine, kaolinitic, thermic Typic Kanhapludults

TYPICAL PEDON: Appling sandy loam, in a cultivated field. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 6 inches; brown (10YR 5/3) sandy loam; weak medium granular structure; very friable; common medium pores; common fine roots; about 10 percent angular quartz gravel; slightly acid; clear smooth boundary. (5 to 12 inches thick)

E--6 to 9 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; common medium pores; common fine roots; about 5 percent angular quartz gravel; slightly acid; clear smooth boundary. (0 to 5 inches thick)

BE--9 to 12 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; gradual smooth boundary. (0 to 7 inches thick)

Bt--12 to 48 inches; strong brown (7.5YR 5/6) clay; common medium distinct yellowish brown (10YR 5/6) and prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; sticky and plastic; few fine and medium roots; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary. (Combined thickness of the Bt horizon is 24 to 50 inches)

BC--48 to 53 inches; mottled red (2.5YR 4/8) and brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky and slightly plastic; few fine and medium roots; few bodies of saprolite; common fine flakes of mica; strongly acid; gradual wavy boundary. (0 to 30 inches)

C--53 to 80 inches; reddish yellow (7.5YR 7/6), red (2.5YR 4/8), and yellow (10YR 8/6) sandy clay loam that weathered from saprolite; massive; friable; common fine flakes of mica; very strongly acid.

TYPE LOCATION: Union County, North Carolina; about 1.8 miles west of Wesley Chapel on North Carolina Highway 84, about 2.2 miles north on Secondary Road 1338 to its intersection with Secondary Road 1358, about 250 feet northwest of the intersection, in a cultivated field; USGS Matthews topographic quadrangle; lat. 35 degrees 03 minutes 18 seconds N. and long. 80 degrees 43 minutes 25 seconds W..

RANGE IN CHARACTERISTICS: The Bt horizon is at least 24 to 50 inches thick and extends to 40 inches or more. Depth to bedrock ranges from 6 to 10 feet or more. The soil is very strongly acid or strongly acid throughout, unless limed. Limed soils typically are moderately acid or slightly acid in the upper part. Content of coarse fragments ranges from 0 to 35 percent by volume in the A and E horizons and 0 to 10 percent by volume in

the Bt horizon. Fragments are dominantly gravel in size. Most pedons have few to common flakes of mica in the A and Bt horizons and few to many flakes of mica in the BC and C horizons.

The A or Ap horizon has hue of 5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. The A horizon is sandy loam, fine sandy loam, coarse sandy loam, loamy sand, loamy coarse sand, in the fine earth fraction. Eroded phases are sandy clay loam or clay loam in the fine earth fraction.

The E horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 6. It is sandy loam, fine sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand in the fine earth fraction.

The BA or BE horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 3 to 8. It is sandy clay loam or sandy loam.

The Bt horizon contains 35 to 60 percent clay and extends to depths of 30 to 60 inches. It has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Pedons of 5YR hue have evident patterns of mottling in a subhorizon of the Bt horizon. Mottles in shades of red, yellow, and brown range from few to many throughout most pedons. The Bt horizon is sandy clay, clay loam, or clay with thin layers of sandy clay loam and contains less than 30 percent silt.

The BC horizon has hue of 5YR to 2.5Y, value of the 4 to 7 and chroma of 4 to 8, or is mottled in these colors. BC horizons that have hue of 5YR have evident patterns of mottling. The BC horizon is clay loam, sandy clay loam, or sandy clay.

The C horizon is similar in color to the BC horizon or is multicolored. It is saprolite weathered from felsic high-grade metamorphic or igneous rock that typically has a loamy texture.

COMPETING SERIES: These are the [Bethlehem](#), [Cecil](#), [Georgeville](#), [Herndon](#), [Madison](#), [Nanford](#), [Nankin](#), [Pacolet](#), [Saw](#), [Tarrus](#), and [Wedowee](#) series in the same family. Those in closely related families are the [Cataula](#), [Chestatee](#), [Cullen](#), [Durham](#), [Grover](#), [Hard Labor](#), [Helena](#), [Hulett](#), [Lloyd](#), [Mayodan](#), [Rion](#), and [Vance](#) series. Bethlehem soils have soft bedrock at depths of 20 to 40 inches and sola less than 40 inches thick. Cataula soils have a perched water table at 2 to 4 feet. Cecil soils have dominant hue of 5YR or redder; where hue is 5YR, evident patterns of mottling are absent in the Bt and BC horizon. Chestatee soils contain more than 15 percent, by volume, coarse fragments throughout. Cullen soils have more clay in the Bt horizon. Helena, Mayodan and Vance soils have mixed mineralogy, and in addition Helena soils have a perched water table at 1.5 to 2.5 feet and Mayodan soils formed in Triassic age sediments. Durham, Grover and Rion soils are fine-loamy. Georgeville, Herndon, Nanford, and Tarrus soils formed in Carolina slate and contain more than 30 percent silt. Hard Labor soils have a perched water table at 2.5 to 5 feet. Hulett, Madison, Pacolet and Wedowee soils have thinner Bt horizons, and, in addition Hulett and Madison soils contain more mica. Nankin soils formed from marine sediments. Lloyd soils have at least one subhorizon in the Bt horizon that has moist value of 3. Saw soils have hard bedrock at depths of 20 to 40 inches.

GEOGRAPHIC SETTING: Appling soils are on broad nearly level to gently sloping ridges and on sloping to moderately steep sides of ridges between intermittent and permanent streams in the southern Piedmont. Slopes are mostly from 2 to 10 percent but range from 0 to 15 percent. Appling soils formed in residuum weathered from felsic igneous and high-grade metamorphic rock. Near the type location, the mean annual precipitation is 45 inches and the mean annual air temperature is 60 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing [Cecil](#), [Durham](#), [Hard Labor](#), [Helena](#), [Pacolet](#), [Rion](#), [Vance](#) and [Wedowee](#) series, these are [Colfax](#), [Louisburg](#), and [Worsham](#) series. Colfax soils are somewhat poorly drained to moderately well drained and have a fragipan. Louisburg soils contain less than 18 percent clay in the Bt horizon. Worsham soils are poorly drained and are around the heads of drains.

DRAINAGE AND PERMEABILITY: Well drained; medium to rapid runoff; moderate permeability.

USE AND VEGETATION: Most of the acreage is in cultivation or pasture and the remainder is in forests of mixed hardwoods and pine. Common crops are corn, tobacco, soybeans, cotton, and small grains.

DISTRIBUTION AND EXTENT: The Piedmont of Alabama, Georgia, North Carolina, South Carolina, and Virginia. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Columbia County, Georgia; 1911.

REMARKS: The June 1988 revision recognized low activity clay properties of this soil as defined in the Low Activity Clay Amendment to Soil Taxonomy, August, 1986 and changed the classification from Typic Hapludults to Typic Kanhapludults. The December 2005 revision changed the type location from a mesic region (Rockingham County, North Carolina) to a thermic region.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 12 inches (Ap, E, and BE horizons)

Kandic horizon - the zone between 12 and 48 inches has low activity clay in more than 50 percent of the horizon (Bt horizon)

Argillic horizon - the zone between 12 and 48 inches (Bt horizon)

ADDITIONAL DATA: Perkins, H.F. Southern Cooperative Series Bulletin 61, January, 1959, Virginia Agricultural Experiment Station, Blacksburg, Virginia.

MLRA: 136

REVISED: 6/5/97-RLV; 12/30/2000-DTA

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
NC0032	APPLING	0- 25	58-65	185-240	37-69	350-900

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0032	NONE		>6.0		-		>60

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0032	0-9	FSL SL LS	0- 5	80-100	5-20	1- 5
NC0032	0-9	GR-SL GR-SCL	5-15	55- 85	5-30	2- 6
NC0032	0-9	SCL CL	0- 5	85-100	20-35	5- 10

NC0032	9-12	SCL, SL		0- 5	90-100	20-35	5- 10
NC0032	12-48	SC CL C		0- 5	90-100	35-60	3- 12
NC0032	48-53	SC CL SCL		0- 5	85-100	20-45	2- 8
NC0032	53-80	VAR		-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0032	0-9	4.5-6.5	.5-2.	0-0	2.0- 6.0	LOW
NC0032	0-9	4.5-6.5	.5-2.	0-0	2.0- 6.0	LOW
NC0032	0-9	4.5-6.5	.5-1.	0-0	0.6- 2.0	LOW
NC0032	9-12	4.5-6.5	0.-.5	0-0	0.6-2.0	LOW
NC0032	12-48	4.5-5.5	0.-.5	0-0	0.6- 2.0	LOW
NC0032	48-53	4.5-5.5	0.-.5	0-0	0.6- 2.0	LOW
NC0032	53-80	-	-	-	-	

National Cooperative Soil Survey
U.S.A.

LOCATION CECIL
Established Series
Rev. DTA, RHB
02/2007

NC+AL GA SC VA

CECIL SERIES

The Cecil series consists of very deep, well drained moderately permeable soils on ridges and side slopes of the Piedmont uplands. They are deep to saprolite and very deep to bedrock. They formed in residuum weathered from felsic, igneous and high-grade metamorphic rocks of the Piedmont uplands. Slopes range from 0 to 25 percent. Mean annual precipitation is 48 inches and mean annual temperature is 59 degrees F. near the type location.

TAXONOMIC CLASS: Fine, kaolinitic, thermic Typic Kanhapludults

TYPICAL PEDON: Cecil sandy loam--forested. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; slightly acid; abrupt smooth boundary. (2 to 8 inches thick)

Bt1--8 to 26 inches; red (10R 4/8) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2--26 to 42 inches; red (10R 4/8) clay; few fine prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; common clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary. (Combined thickness of the Bt horizon is 24 to 50 inches)

BC--42 to 50 inches; red (2.5YR 4/8) clay loam; few distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; gradual wavy boundary. (0 to 10 inches thick)

C--50 to 80 inches; red (2.5YR 4/8) loam saprolite; common medium distinct pale yellow (2.5Y 7/4) and common distinct brown (7.5YR 5/4) mottles; massive; very friable; few fine flakes of mica; very strongly acid.

TYPE LOCATION: Franklin County, North Carolina; about 9.7 miles west of Louisburg on North Carolina Highway 56 to Franklinton, about 4.4 miles south on U.S. Highway 1, about 0.4 mile east on North Carolina Highway 96, about 500 feet north of the road, in a field; Franklinton USGS topographic quadrangle; lat. 36 degrees 02 minutes 24 seconds N. and long. 78 degrees 29 minutes 27 seconds W.

RANGE IN CHARACTERISTICS: The Bt horizon is at least 24 to 50 inches thick and extends to 40 inches or more. Depth to bedrock ranges from 6 to 10 feet or more. The soil ranges from very strongly acid to moderately acid in the A horizons and is strongly acid or very strongly acid in the B and C horizons. Limed soils are typically moderately acid or slightly acid in the upper part. Content of coarse fragments range from 0 to 35 percent by volume in the A horizon and 0 to 10 percent by volume in the Bt horizon. Fragments are dominantly gravel or cobble in size. Most pedons have few to common flakes of mica in the Bt horizon and few to many flakes of mica in the BC and C horizons.

The A or Ap horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 8. A horizons with value of 3 are less than 6 inches thick. The texture is sandy loam, fine sandy loam, or loam in the fine earth fraction. Eroded phases are sandy clay loam, or clay loam in the fine earth fraction.

The E horizon, where present, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The BA or BE horizon, where present, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy clay loam, loam, or clay loam.

The Bt horizon averages 35 to 60 percent clay in the control section but may range to 70 percent in some subhorizons. It has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Hue also ranges to 5YR if evident patterns of mottling are lacking in the Bt and BC horizons. Mottles that are few and random are included. The Bt horizon is clay loam, clay, or sandy clay and contains less than 30 percent silt.

The BC horizon has hue of 10R to 5YR, value of 4 or 6, and chroma of 4 to 8. Mottles in shades of yellow or brown are few to common in some pedons. The texture is sandy clay loam, clay loam, or loam.

The C horizon is similar in color to the BC horizon or it is variegated. It is loamy saprolite weathered from felsic, igneous and high-grade metamorphic rocks.

COMPETING SERIES: These are the [Appling](#), [Bethlehem](#), [Georgeville](#), [Herndon](#), [Madison](#), [Nanford](#), [Nankin](#), [Pacolet](#), [Saw](#), [Tarrus](#), and [Wedowee](#) series in the same family. Those in closely related families are the [Cataula](#), [Chestatee](#), [Cullen](#), [Hulett](#), [Lloyd](#), [Mayodan](#), and [Mecklenburg](#) series. Appling soils have dominant hue of 7.5YR or yellower or where hue is 5YR it has evident patterns of mottling in a subhorizon of the Bt or BC horizon. Bethlehem soils have soft bedrock at depths of 20 to 40 inches. Cataula soils have a perched water table at 2 to 4 feet, Chestatee soils contain more than 15 percent, by volume, coarse fragments throughout. Cullen soils have more clay in the Bt horizon. Mayodan and Mecklenburg soils have mixed mineralogy and in addition, Mayodan soils formed in Triassic age sediments and Mecklenburg soils formed from basic diabase parent material. Georgeville, Herndon, Nanford, and Tarrus soils formed in Carolina slate and contain more than 30 percent silt. Hulett, Nankin, and Wedowee soils have a Bt horizon with hue of 5YR or yellower. In addition, Nankin soils formed from marine sediments. Lloyd soils have rhodic colors to depths of 40 inches or more.

Madison, Pacolet, and Wedowee soils have thinner argillic horizons. Saw soils have hard bedrock at depths of 20 to 40 inches.

GEOGRAPHIC SETTING: Cecil soils are on nearly level to steep Piedmont uplands. Slope gradients are 0 to 25 percent, most commonly between 2 and 15 percent. These soils have developed in weathered felsic igneous and high-grade metamorphic rocks. Average annual precipitation is about 48 inches. Mean annual soil temperature is about 59 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing [Appling](#), [Bethlehem](#), [Cataula](#), [Chestatee](#), [Cullen](#), [Lloyd](#), [Madison](#), [Mecklenburg](#), [Pacolet](#), [Saw](#), and [Wedowee](#) series these are the [Durham](#), [Louisburg](#), [Rion](#), and [Worsham](#) series. Durham, Louisburg, and Rion soils have less clay in the Bt horizon. Worsham soils are poorly drained and are around the heads of drains.

DRAINAGE AND PERMEABILITY: Well drained; medium to rapid runoff; moderate permeability.

USE AND VEGETATION: About half of the total acreage is in cultivation, with the remainder in pasture and forest. Common crops are small grains, corn, cotton, and tobacco.

DISTRIBUTION AND EXTENT: The Piedmont of Alabama, Georgia, North Carolina, South Carolina, and Virginia. The series is of large extent, with an area of more than 10 million acres.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Cecil County, Maryland; 1899.

REMARKS: The June 1988 revision changed the classification to Typic Kanhapludults and recognized the low activity clay properties of this soil as defined in the Low Activity Clay Amendment to Soil Taxonomy, August 1986. The December 2005 revision changed the type location from Catawba County, North Carolina to a more representative location. The May 2006 revision changed language in competing series for Wedowee.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon--the zone from the surface of the soil to a depth of 8 inches (Ap horizon)

Kandic horizon--the zone between 8 and 42 inches meets the low activity clay requirement in more than 50 percent of the horizon (Bt1 and Bt2 horizons)

Argillic horizon--the zone between 8 and 42 inches (Bt1 and Bt2 horizons)

ADDITIONAL DATA: McCracken, R. J., editor: Southern Cooperative Series Bulletin 61, issued January, 1959, Virginia Agricultural Experiment Station, Blacksburg, Virginia. Soil Survey of Catawba County, North Carolina, issued 1975. Soil Survey of Forsyth County, North Carolina, issued 1976.

MLRA--136

REVISED--09/1997, RLV; 12/2005, DTA; 05/2006, RHB

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
NC0018	CECIL	0-25	57-65	175-200	45-55	200-900
NC0268	CECIL	0-25	57-65	160-190	44-55	300-800

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0018	NONE		>6.0	-	-		>60
NC0268	NONE		>6.0	-	-		>60

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0018	0-8	SL FSL L	0-5	80-100	5-20	1-5
NC0018	0-8	GR-SL GR-L GR-FSL	5-15	55-85	5-20	1-5
NC0018	0-8	SCL CL	0-5	75-100	20-35	5-10
NC0018	8-50	C CL	0-5	92-100	35-70	3-12
NC0018	50-80	VAR	-	-	-	-
NC0268	0-8	GR-SCL GR-CL	0-10	60-85	20-35	5-10
NC0268	8-50	C CL	0-5	90-100	35-70	3-12
NC0268	50-80	VAR	-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0018	0-8	4.5-6.5	0.5-1.0	0-0	2.0-6.0	LOW
NC0018	0-8	4.5-6.5	0.5-1.0	0-0	2.0-6.0	LOW
NC0018	0-8	4.5-6.5	0.5-1.0	0-0	0.6-2.0	LOW
NC0018	8-50	4.5-5.5	0.0-0.5	0-0	0.6-2.0	LOW
NC0018	50-80	-	-	-	-	-
NC0268	0-8	4.5-6.0	0.5-1.0	0-0	0.6-2.0	LOW
NC0268	8-50	4.5-5.5	0.0-0.5	0-0	0.6-2.0	LOW
NC0268	50-80	-	-	-	-	-

Established Series

Rev. ECH-DJD;DTA

08/2008

PACOLET SERIES

The Pacolet series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered mostly from felsic igneous and metamorphic rocks of the Piedmont uplands. Slopes commonly are 15 to 25 percent but range from 2 to 60 percent.

TAXONOMIC CLASS: Fine, kaolinitic, thermic Typic Kanhapludults

TYPICAL PEDON: Pacolet sandy loam - forested. (Colors are for moist soil.)

A--0 to 3 inches; brown (7.5YR 5/4) sandy loam; few fine distinct yellowish red (5YR 5/8) mottles; moderate medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary. (1 to 12 inches thick)

Bt1--3 to 23 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, slightly sticky; common distinct clay films on faces of peds; common fine and medium roots; common very fine pores; moderately acid; gradual wavy boundary.

Bt2--23 to 29 inches; red (2.5YR 4/6) clay; common fine prominent reddish yellow (7.5YR 7/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky; common distinct clay films on faces of peds; common very fine pores; few fine flakes of mica; moderately acid; gradual wavy boundary. (Combined thickness of the Bt horizon is 12 to 26 inches)

BC--29 to 37 inches; red (2.5YR 4/6) clay loam; many medium prominent reddish yellow (7.5YR 7/8) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary. (3 to 15 inches thick)

C1--37 to 52 inches; mottled red (2.5YR 4/6) and reddish yellow (7.5YR 7/8) clay loam saprolite; massive; friable; thin discontinuous distinct clay seams in cracks; few fine flakes of mica; strongly acid; gradual wavy boundary. (10 to 20 inches thick)

C2--52 to 80 inches; light yellowish brown (10YR 6/4) loam saprolite; common medium prominent red (2.5YR 4/6) and strong brown (7.5YR 5/8) mottles; massive; friable; strongly acid.

TYPE LOCATION: Chester County, South Carolina; 3.4 miles south of Chester in Chester County; 1.3 miles south of junction of State Highways 16 and 350; 3,700 feet northeast of junction of State Highways 16 and 171; 0.9 mile northeast of junction of unpaved State Highway 394 and unmarked county road and unpaved private road leading north; 35 feet northeast of unpaved private road.

RANGE IN CHARACTERISTICS: The Bt horizon is at least 10 to 24 inches thick and extends to a depth of 18 to 30 inches. Depth to a lithic contact is more than 60 inches. The soil is very strongly acid to slightly acid in the A horizon, and very strongly acid to moderately acid throughout the rest of the profile. Content of rock fragments, dominantly gravel, ranges from 0 to 35 percent in the A and E horizons, and 0 to 15 percent in the Bt horizon. Most pedons have few to common flakes of mica in the solum, and few to many in the C horizon.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 6. In eroded areas, hue ranges to 2.5YR and chroma ranges to 8. The A horizon commonly is sandy loam, but ranges to loamy coarse sand, loamy sand, fine sandy loam or loam in the fine-earth fraction. In eroded areas, it is clay loam or sandy clay loam in the fine-earth fraction.

The E horizon, where present, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It commonly is sandy loam, but ranges to loamy coarse sand, loamy sand, fine sandy loam, loam in the fine-earth fraction.

The BA or BE horizon, where present, and the upper part of the Bt in most pedons, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is clay loam, sandy clay loam, or loam.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Mottles in shades of red, yellow, or brown are in the upper part of the Bt horizon in some pedons and in the lower part of the Bt horizon in most pedons. Texture is clay, sandy clay, or clay loam.

The BC horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8 commonly with mottles in shades of red, yellow, or brown. The BC horizon of some pedons is mottled in shades of red, yellow, or brown. It is clay loam, sandy clay loam, loam, or sandy loam.

The C horizon has hue of 10R to 10YR, value of 4 or 5, and chroma of 3 to 8 commonly with mottles in shades of red, yellow, or brown or is multicolored. Texture is loamy saprolite weathered from felsic crystalline rock.

COMPETING SERIES: These are the [Appling](#), [Bethlehem](#), [Cecil](#), [Georgeville](#), [Herndon](#), [Lloyd](#), [Madison](#), [Nanford](#), [Nankin](#), [Saw](#), [Tarrus](#), and [Wedowee](#) series. Appling and Cecil soils have a thicker clayey Bt horizon. Bethlehem soils have a paralithic contact within 20 to 40 inches of the surface. Georgeville, Herndon, Nanford, and Tarrus soils formed from Carolina slate and have more than 30 percent silt. Lloyd soils have value of 3 in at least part of the Bt horizon. Madison soils contain more mica. Nankin soils formed from marine sediments. Saw soils have a lithic contact within 20 to 40 inches of the surface. Wedowee soils have Bt horizons with hue of 5YR or yellower.

GEOGRAPHIC SETTING: Pacolet soils are on gently sloping to very steep Piedmont uplands. Slopes commonly are 15 to 25 percent but range from 2 to 60 percent. The soils formed in material weathered mostly from felsic igneous and metamorphic rocks. The mean annual temperature ranges from 59 to 66 degrees F, the frost-free season ranges from 190 to 240 days, and the mean annual precipitation ranges from 37 to 60 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing [Appling](#), [Bethlehem](#), [Cecil](#), [Lloyd](#), [Madison](#), [Saw](#), and [Wedowee](#) series, these are the [Cataula](#), [Lockhart](#), [Louisburg](#), [Rion](#), and [Wateree](#) series. Cataula soils have a perched water table at 2 to 4 feet. Lockhart soils have more than 35 percent rock fragments in the particle-size control section. Louisburg, Rion, and Wateree soils have less than 35 percent clay in the particle-size control section.

DRAINAGE AND PERMEABILITY: Well drained; runoff is medium to rapid; permeability is moderate.

USE AND VEGETATION: Most areas are in forests of pine and mixed hardwoods. Cleared areas are used for small grain, hay, and pasture.

DISTRIBUTION AND EXTENT: The Piedmont of Alabama, Georgia, North Carolina, South Carolina, and Virginia. The series is of large extent

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Catawba County, North Carolina, 1969.

REMARKS: The December 1987 revision recognized the low activity clay property of this soil and reclassification to Kanhapludults. Pacolet soils were formerly mapped as a thin solum phase of the Cecil series.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 3 inches (A horizon).

Argillic and Kandic horizon - the zone from 3 to 29 inches below the surface (Bt1 and Bt2 horizons).

MLRA=136

ADDITIONAL DATA:

TABULAR SERIES DATA:

SOI-5 Soil Name Slope Airtemp FrFr/Seas Precip Elevation

SC0015 PACOLET 2-60 59-66 190-240 37-60 200-900

SC0107 PACOLET 2-60 59-66 190-240 37-60 200-900

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
SC0015	NONE		>6.0		-	>60	
SC0107	NONE		>6.0		-	>60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
SC0015	0-3	SL FSL L	0-2	80-100	8-20	4-7
SC0015	0-3	CL SCL	0-1	90-100	20-35	4-10

SC0015	0-3	LS LCOS	0-3	70-100	4-15	2-5
SC0015	3-29	SC CL C	0-1	80-100	35-65	6-18
SC0015	29-52	CL SCL SL	0-2	70-100	15-30	5-12
SC0015	52-80	SL FSL L	0-2	70-100	10-25	4-10

SC0107	0-3	GR-LS GR-LCOS	0-3	65-85	4-15	2-5
SC0107	0-3	GR-SL GR-FSL	0-3	70-85	8-20	4-7
SC0107	0-3	GR-CL GR-SCL	0-3	70-90	27-35	4-10
SC0107	3-29	SC CL C	0-1	80-100	35-65	6-18
SC0107	29-52	CL SCL SL	0-2	70-100	15-30	5-12
SC0107	52-80	SL FSL L	0-2	70-100	10-25	4-10

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
SC0015	0-3	4.5-6.5	.5-2.	0-0	2.0-6.0	LOW
SC0015	0-3	4.5-6.5	.5-1.	0-0	0.6-2.0	LOW
SC0015	0-3	4.5-6.5	.5-2.	0-0	2.0-6.0	LOW
SC0015	3-29	4.5-6.0	0.-.5	0-0	0.6-2.0	LOW
SC0015	29-52	4.5-6.0	0.-.5	0-0	0.6-2.0	LOW
SC0015	52-80	4.5-6.0	0.-.5	0-0	0.6-2.0	LOW
SC0107	0-3	4.5-6.5	.5-2.	-	2.0-6.0	LOW
SC0107	0-3	4.5-6.5	.5-2.	0-0	2.0-6.0	LOW
SC0107	0-3	4.5-6.0	.5-2.	0-0	0.6-2.0	LOW
SC0107	3-29	4.5-6.0	0.-.5	0-0	0.6-2.0	LOW
SC0107	29-52	4.5-6.0	0.-.5	0-0	0.6-2.0	LOW
SC0107	52-80	4.5-6.0	0.-.5	0-0	0.6-2.0	LOW

WEDOWEE SERIES

The Wedowee series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered from felsic igneous and metamorphic rocks of the Piedmont uplands. These soils are on narrow ridges and on side slopes of uplands. Slope is dominantly between 6 and 25 percent but ranges from 0 to 60 percent. Near the type location, the average annual temperature is about 63 degrees F. and average annual precipitation is about 53 inches.

TAXONOMIC CLASS: Fine, kaolinitic, thermic Typic Kanhapludults

TYPICAL PEDON: Wedowee sandy loam, in a field. (Colors are for moist soil.)

A--0 to 4 inches; dark grayish brown (10YR 4/2) sandy loam; moderate fine granular structure; very friable; strongly acid; abrupt smooth boundary. (1 to 8 inches thick)

E--4 to 7 inches; brownish yellow (10YR 6/6) coarse sandy loam; weak fine granular structure; very friable; very strongly acid; clear smooth boundary. (0 to 6 inches thick)

Bt--7 to 23 inches; strong brown (7.5YR 5/6) clay; few fine distinct brownish yellow (10YR 6/6) and red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; slightly sticky, slightly plastic; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary. (10 to 24 inches thick)

BC--23 to 35 inches; strong brown (7.5YR 5/6) clay loam; many fine distinct red (2.5YR 4/6) and common fine distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; slightly sticky, nonplastic; very strongly acid; gradual wavy boundary. (0 to 12 inches thick)

C--35 to 80 inches; mottled strong brown (7.5YR 5/6), brownish yellow (10YR 6/6), yellowish red (5YR 5/8), and white (10YR 8/1) sandy clay loam saprolite; massive; very friable; very strongly acid.

TYPE LOCATION: Granville County, North Carolina; about 2.5 miles east of Wilton on North Carolina Highway 56, about 1.5 miles northeast on Secondary Road 1625, about 1,000 feet north of the intersection with Secondary Road 1628, in a field; Wilton USGS topographic quadrangle; lat. 36 degrees 08 minutes 33 seconds N. and long. 78 degrees 31 minutes 18 seconds W.

RANGE IN CHARACTERISTICS: The Bt horizon is at least 10 to 24 inches thick and extends to a depth of 18 to 30 inches. Depth to rock is more than 60 inches. Reaction ranges from extremely

acid to strongly acid throughout except where lime has been added. Flakes of mica range from none to few in the A horizon and the upper part of the B horizon and from none to common in the lower part of the B and C horizon.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 6 and chroma of 2 to 8. It is coarse loamy sand, coarse sandy loam, sandy loam, fine sandy loam, loam; or their gravelly analogues. In eroded areas, the A horizon is sandy clay loam or clay loam, or their gravelly analogues. Content of coarse fragments, dominantly gravel size, range from 0 to 35 percent by volume.

The E horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. It is coarse loamy sand, coarse sandy loam, sandy loam, fine sandy loam, loam; or their gravelly analogues.

The BE horizon, where present, has hue of 5YR to 10YR, value of 4 to 7 and chroma of 3 to 8. It is loam, fine sandy loam, sandy loam, sandy clay loam or clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6 and chroma of 6 to 8, but includes hue of 5YR with the same range in value and chroma. Mottles in shades of brown, yellow, and red may be in some pedons. Texture of the Bt horizon is sandy clay loam, clay loam, sandy clay, or clay. Clay content of the particle-size control section averages 35 to 60 percent.

The BC horizon has hue of 2.5YR to 10YR, value of 5 to 7 and chroma of 4 to 8. Mottles in shades of red, brown, and yellow range from none to common. It is sandy clay loam, clay loam, loam, or fine sandy loam.

The C horizon is multicolored sandy clay loam, loam, fine sandy loam, or sandy loam saprolite.

COMPETING SERIES: These include the [Appling](#), [Bethlehem](#), [Cecil](#), [Georgeville](#), [Herndon](#), [Madison](#), [Nanford](#), [Nankin](#), [Pacolet](#), [Saw](#), and [Tarrus](#) series in the same family. Appling and Cecil soils have thicker Bt horizons. Additionally, Cecil soils have dominant hue of 5YR or redder throughout the Bt horizon. Bethlehem soils have a paralithic contact within 20 to 40 inches of the surface. Georgeville, Herndon, Nanford, and Tarrus soils formed from Carolina slate and have more than 30 percent silt. Madison soils have dominant hue of 5YR or redder in the Bt horizon and contain more mica. Nankin soils formed from marine sediments. Pacolet soils have Bt horizons with hue of 2.5YR or redder. Saw soils have a lithic contact within 20 to 40 inches of the surface.

GEOGRAPHIC SETTING: Wedowee soils are on sloping to steep uplands of the Southern Piedmont MLRA. Slopes are mainly 6 to 25 percent, but range from 0 to 60 percent. The soils have formed in residuum from weathered felsic igneous and metamorphic rocks. Near the type location, the mean annual precipitation ranges from 42 to 56 inches and the mean annual temperature ranges from 58 to 65 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing [Appling](#), [Bethlehem](#), [Cecil](#), [Madison](#), [Pacolet](#), and [Saw](#) series, these are the [Ashlar](#), [Durham](#), [Hard Labor](#), [Helena](#), [Lockhart](#), [Louisburg](#), [Rion](#), [Rolesville](#), [Vance](#), [Wake](#), [Wateree](#), and [Worsham](#) series.

Ashlar soils are coarse-loamy and have a lithic contact within 20 to 40 inches. Durham soils are fine-loamy. Hard Labor soils have a perched water table at 2.5 to 5 feet. Helena and Vance soils have a mixed mineralogy and, in addition, Helena soils have a perched water table 1.5 to 2.5 feet. Lockhart soils have more than 35 percent rock fragments in the particle-size control section. Louisburg soils are coarse-loamy. Rion soils are fine-loamy. Rolesville soils are sandy throughout and have a lithic contact within 20 to 40 inches. Wake soils are sandy throughout and have a lithic contact within 20 inches. Wateree soils are coarse-loamy and have a paralthic contact within 20 to 40 inches. Worsham soils are poorly drained and are around the heads of drains.

DRAINAGE AND PERMEABILITY: Well drained. Runoff is medium to rapid and internal drainage is medium. Permeability is moderate.

USE AND VEGETATION: Most areas are wooded. Common trees include loblolly pine, Virginia pine, red oak, white oak, post oak, hickory, blackgum, maple, and dogwood. Cleared areas are used for cotton, corn, tobacco, small grain, hay, and pasture.

DISTRIBUTION AND EXTENT: The Piedmont of Alabama, Georgia, North Carolina, South Carolina and Virginia. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Randolph County, Alabama; 1969.

REMARKS: Wedowee soils were formerly mapped as thin solum phases of the Appling series. The 5/90 revision changed the classification to Typic Kanhapludults in recognition of the low activity clay content of the argillic horizon. The December 2005 revision moved the type location from Randolph County, Alabama to a more representative site.

Revised: RLV 11/24/97; DTA 12/30/2005

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 7 inches (A and E horizons)
Argillic and kandic horizon - the zone from 7 to 23 inches (Bt horizon)

ADDITIONAL DATA:

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
AL0046	WEDOWEE	0-60	58-65	175-225	42-56	200-800
AL0138	WEDOWEE	0-60	58-65	175-225	42-56	200-800
AL0146	WEDOWEE	0-60	58-65	175-225	42-56	200-800

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
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AL0046	NONE		>6.0		-		>60
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AL0138 NONE >6.0 - >60

AL0146 NONE >6.0 - >60

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
AL0046	0-10	SL FSL L	0-0	80-100	5-20	2-8
AL0046	0-10	SCL CL	0-0	90-100	20-30	2-8
AL0046	10-14	L SCL	0-0	90-100	14-30	3-10
AL0046	14-32	SC CL C	0-0	95-100	35-60	3-10
AL0046	32-60	SCL CL SL	0-0	70-100	15-30	3-8

AL0138	0-10	BY-SL BY-L	10-20	70-90	5-20	2-8
AL0138	10-14	L SCL	0-5	90-100	14-30	3-10
AL0138	14-32	SC CL C	0-0	95-100	35-60	3-10
AL0138	32-60	SCL CL SL	0-0	70-100	15-30	3-8

AL0146	0-10	GR-SL GR-FSL GR-L	0-5	50-80	6-20	2-8
AL0146	0-10	GR-SCL GR-CL	0-5	50-80	20-30	2-8
AL0146	10-14	L SCL	0-0	90-100	14-30	3-10
AL0146	14-32	SC CL C	0-0	95-100	35-60	3-10
AL0146	32-60	SCL CL SL	0-0	70-100	15-30	3-8

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
AL0046	0-10	3.6- 5.5	.5-3.	0-0	2.0-6.0	LOW
AL0046	0-10	3.6- 5.5	.5-3.	0-0	0.6-2.0	LOW
AL0046	10-14	3.6- 5.5	0.-.5	0-0	0.6-2.0	LOW
AL0046	14-32	3.6- 5.5	0.-.5	0-0	0.6-2.0	LOW
AL0046	32-60	3.6- 5.5	0.-.5	0-0	0.6-2.0	LOW

AL0138	0-10	3.6-	5.5	0.-1.	0-0	2.0-6.0	LOW
AL0138	10-14	3.6-	5.5	0.-.5	0-0	0.6-2.0	LOW
AL0138	14-32	3.6-	5.5	0.-.5	0-0	0.6-2.0	LOW
AL0138	32-60	3.6-	5.5	0.-.5	0-0	0.6-2.0	LOW
AL0146	0-10	3.6-	5.5	.5-3.	0-0	2.0-6.0	LOW
AL0146	0-10	3.6-	5.5	.5-3.	0-0	0.6-2.0	LOW
AL0146	10-14	3.6-	5.5	0.-.5	0-0	0.6-2.0	LOW
AL0146	14-32	3.6-	5.5	0.-.5	0-0	0.6-2.0	LOW
AL0146	32-60	3.6-	5.5	0.-.5	0-0	0.6-2.0	LOW

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