



Soil & Environmental Consultants, PA

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June 22, 2004

Project #4-1228

Newland Communities
Attn: Mr. Mitch Baron
PO Box 1486
Pittsboro, NC 27312

Dear Mr. Baron:

This report details the findings of a site/soil evaluation performed on the proposed Briar Chapel Site. It is our understanding that the client wishes to develop the Site in accordance with the Chatham County Compact Communities Ordinance. The Site is not located in an area that is served by off-site sewer disposal and requires that the waste water generated must be carefully disposed of on-site. In order to dispose of the generated wastewater, knowledge of the soils and geology of the Site and its surroundings is required.

The Site is located in the metamorphosed granitic rock. This geologic area is located from just west of Lake Jordan on westward to White Cross and south from Chapel Hill to the Bynum area. To the East and South, exist the Triassic Basin, which contains rock that has relatively few fractures and normally gives rise to expansive clays. This area historically has had trouble with both wells and septic systems because of the lack of foliation in the rock and the presence of expansive clays. To the north is the Slate belt area, which is noted for soils high in silt. The soils at the Site, though ranging in clay mineralogy, are by and large more coarse than those found in the slate belt and more permeable than those found in the Triassic Basin.

This evaluation must focus on the State Regulations that govern the disposal of wastewater that is not discharged. You have indicated that the type of wastewater disposal system that you will seek to permit is known as a "re-use" system. The State regulations that govern this type of disposal are the .0200 regulations. Below is a portion of the regulations required by the applicant to fulfill an application for such permits:

Charlotte Office:

236 LePhillip Court, Suite C
Concord, NC 28025
Phone: (704) 720-9405
Fax: (704) 720-9406

Greensboro Office:

3817-E Lawndale Drive
Greensboro, NC 27455
Phone: (336) 540-8234
Fax: (336) 540-8235

Hickory Office:

622 Coon Mountain Lane
Taylorsville, NC 28681
Phone: (828) 635-5820
Fax: (828) 635-5820

(5) For subsurface ground absorption systems including infiltration galleries:

(A) soil evaluation of the disposal site conducted by a soils scientist to adequately evaluate the soils to be utilized for treatment and disposal down to a depth of seven feet to include, but is not limited to, field descriptions of texture; color; structure, the depth thickness and type of restrictive horizons; pH; the presence or absence and depth of evidence of any seasonal high water table; recommendations concerning application rates of liquids, solids, and other wastewater constituents; field estimates of saturated hydraulic conductivity in the most restrictive horizon; and cation exchange capacity. Applicants may be required to dig pits when necessary for proper evaluation of the soils at the site;

(E) For systems treating industrial waste and any system with a design flow of over 25,000 gpd, a hydrogeologic and soils description of the subsurface to a depth of 20 feet or bedrock, whichever is less. The number of borings shall be sufficient to define the following for the area underlying each major soil type at the disposal site:

- (i) significant changes in lithology underlying the site;
- (ii) the vertical permeability of the unsaturated zone and the hydraulic conductivity of the saturated zone, and
- (iii) depth to the mean seasonal high water table (if definable from soil morphology or from evaluation of other applicable available data).

For all projects with a design flow of greater than 25,000 gpd, a determination of transmissivity and specific yield of the unconfined aquifer based on withdrawal or recharge test;

In order to best deliver the required data, we first performed a very preliminary evaluation on the entire tract. During this investigation we gained general knowledge of the location of areas that would be best suited for the disposal of wastewater. We also discovered areas that would be the least conducive to accepting wastewater. From this preliminary map a preliminary site plan was developed. This plan attempted to minimize the impact that the project had on environmentally sensitive areas. At the same time a soils investigation of much greater detail was conducted on the proposed wetted areas.

From this preliminary investigation we found that the Site contained several different types of soils. We identified these different types by using soil series names that were established by the Natural Resource Conservation Service. These designations are called "soil series." Each series denotes many characteristics normally associated with that series name. We have included the Official descriptions of these series and will briefly note the major differences.

Appling – This soil is normally found on uplands. The soil has a clayey subsurface, the clay is designated as a low-activity clay, meaning that it does not greatly shrink and swell with changes in moisture content. The color of the clay is reddish-yellow to yellow in color. This soil is well-drained, is between 40 and 60 inches deep to saprolite and six to ten feet deep to hard rock.

Chewacla – This soil is normally found along drainage ways and creek bottoms. For this reason the soil is only somewhat poorly drained. This series is reserved for soils in the lower portion of the landscape.

Helena – These soils have the lowest permeability of the soils found on this project. This does not mean that they will not allow for any water movement. These soils also exhibit evidence of a perched water table at shallow depths. This is primarily due to this soil having clay minerals that expand when wet and contract when dry.

Louisburg – This upland soil is a very coarse textured soil that is normally associated with shallow depths to coarse grained parent material. This soil is rapidly permeable and well drained.

Pacolet – This soil is well drained, moderately permeable, and clayey in texture. The clays do not shrink and swell and the series is red in color and deep to rock.

Rion – This series is very similar to the Louisburg series except that it is finer in texture and deeper. This soil is well drained and moderately permeable.

Vance – These soils are well drained, and slowly permeable. The clay layer is semi-active which falls between the Pacolet and the Helena in expansiveness. This soil is found on the uplands and is clayey.

Wake – This soil is associated with a shallow depth to rock. The series is excessively drained and is coarse in texture.

Wedowee – This upland soil is well drained and moderately permeable. The series is normally the yellow clay that does not expand. This soil is very similar to the Pacolet series.

Wehadkee – This soil is a flood plain soil that is poorly drained.

We have associated some of these series and grouped them together for two reasons. First, because some of these soils are very similar in nature. The second being that most areas in this parent material vary between similar soil series with a high frequency. The groups that were organized are indicated on the enclosed map as color groups. They are as follows:

Green Unit – This unit consist of only the Helena series. This series is the most restrictive and wettest of the upland soils.

Black Unit – This unit consists of the boulder rich Wedowee and Rion soils. These areas were extremely difficult to hand auger.

Blue Unit – This unit consists of both the Wehadkee and Chewacla series. Both of these series exist in drainage ways and are less than ideal for the intended use. As a result, very little of the area proposed for use consists of this unit.

Purple Unit – This unit is not identified with any series. This represents the heads of drainage ways that should be avoided except on a limited seasonal application.

Red Unit – This unit consists of the Pacolet, Vance, Wedowee, and Appling series. These soils are similar in that they are better drained, and have better permeability of the upland series. This unit would be the most desirable type of area and occupies a greater percentage of the area than any other unit.

Yellow Unit – This unit consists of Wake, Louisburg, and Rion series. These series are usually associated with rock. This does not necessarily mean contiguous bedrock. The rock may be an accumulation of boulders, as is normally the case.

Brown Unit – This unit consists of the Wedowee and Rion series. This unit is normally slightly deeper than the yellow unit but will act much like the Yellow unit.

An additional task completed during the more detailed evaluation was the examination of the wide spread boulder areas. Historically, the presence of such boulders on the surface would lead a soil scientist to suspect that the bedrock is at, or near the surface. In order to investigate these areas we used a backhoe to dig in some of the more difficult sites. We discovered that these rocks were not contiguous with the bedrock. Six areas were chosen due to our expectation of finding shallow soils; however, we found soils at least six feet in depth in all the areas and greater than ten feet in most of the areas. These findings caused us to rethink our expectations of depth to bedrock being correlated to these large boulders. In fact, in these areas, we found the soil types to be most like the Red unit described previously.

In order to allow DWQ to voice their opinions about the surface boulders, I arranged an appointment with Mr. Randy Jones and Mr. Rich Hayes of the Raleigh Regional office. Although we realize that this is not their final evaluation, they seemed to be in agreement that the boulders would not eliminate those areas for potential reuse applications.

Once the areas were mapped and the detailed investigation of the areas was completed we then had minor changes to the proposed site plan. Again, we mapped those proposed changes and began the next phase of the project which was to collect hydrology data from the soil horizons and to make detailed profile descriptions of the different types of areas. Twenty-two sites selected were chosen because they were typical representatives of the areas we found on the Site. We have included a detailed profile description of the Site and its hydraulic conductivity values with this report. Due to the latest changes made by the land planner to the wetted areas, some of these data points are not inside of the proposed wetted area. These points are still included because of the values are important representations of the soil types that are present.

Deep Soil Profile Descriptions For Ksats
Briar Chapel
S&EC Project # 4-1228
RP and WB

Site 1 Wedowee

- A 0"-4" sandy loam, (2.5Y 4/4), granular structure
- E 4"-11" sandy loam, (2.5Y 5/6), granular structure
- Bt 11"-23" clay, (10YR 5/5) with common fine prominent 2.5YR 4/8 mottles, friable to slightly firm medium sub-angular blocky structure, slightly sticky, slightly plastic.
- B/C 23"-24" clay loam, (10YR 5/5) with common fine prominent 2.5YR 4/8 mottles, friable to slightly firm medium sub angular blocky structure, slightly sticky, slightly plastic.
- C 24"-38" loam, (10YR 5/8), structureless with few chunks of partially decomposed rock.
- AR @ 38"

Site 2 Wedowee

- A 0"-6" sandy loam, (2.5Y 5/4), granular structure
- B 6"-26" sandy clay loam, (2.5Y 6/6), granular structure very friable.
- Bt 26"-48" sandy clay loam, (2.5Y 6/1) with common fine distinct 2.5Y 6/6 mottles, weak fine sub angular blocky structure, very friable.
- C1 48"-72" sandy loam, (2.5Y 6/1) with common fine distinct 10YR 6/8 mottles, structureless
- C2 72"-84" loamy sand, (7.5YR 4/5), structureless with many small fragments of partially decomposed rock giving a "salt and pepper" look to the soil.

C3 84"-108" coarse loamy sand, (7.5YR 2.5/1), structureless with many small broken pieces of partially decomposed rock.

AR @ 108"

Site 3 Rion

A1 0"-3" sandy loam, (2.5Y 5/3), granular structure

E 3"-18" sandy loam, (2.5Y 5/6), granular structure

Bt 18"-36" sandy clay loam, (10YR 6/8) friable fine weak sub angular blocky structure, non sticky non plastic.

B/C 36"-60" sandy clay loam, (10YR 6/8) with common medium distinct 10YR 7/1 mottles, friable structureless.

C 60"-150" loamy sand, (10YR 6/8), structureless with many small rock fragment giving the soil a "salt and pepper" look.

AR@ 150"

Site 4 Rion

A 0"-8" loamy sand, (2.5Y 5/3), granular structure.

A/B 8"-14" loamy sand, (2.5Y 5/6), granular structure.

Bt 14"-32" sandy clay loam, (10YR 5/8), friable weak fine sub angular blocky structure.

C1 32"-50" loam, (10YR 6/8) with few fine distinct 10YR 7/1 mottles, structureless, few partially decomposed rock fragments.

C2 50"-120" loam, (10YR 5/6), structureless, many partially decomposed rock chunks.

Site 5 Pacolet

- A 0"-14" sandy loam, (2.5Y 5/6), granular structureless.
- Bt 14"-28" sandy clay loam, (10YR 5/8) with few faint medium 10YR 6/8 and 7.5YR 5/8 mottles, friable fine sub angular blocky structure, slightly sticky and slightly plastic.
- C 28"-144" loam (7.5YR 5/8) with few faint fine 10YR 6/6 mottles, structureless.
- AR @ 144"

Site 6 Pacolet

- A 0"-8" sandy loam, (10YR 5/3), granular structureless.
- Bt 8"-24" sandy clay loam, (5YR 5/6), friable medium sub angular blocky structure, slightly sticky slightly plastic.
- B/C 24"-36" clay loam, (7.5YR 5/8), friable structureless, small pieces of partially decomposed rock fragments.
- C 36"-60" loam, mix of 7.5YR 7/6 and 7.5YR 7/1, very friable structureless, many small pieces of partially decomposed rock fragments giving the soil a "salt and pepper" look.
- AR@ 60"

Site 7 Wedowee

- A 0"-12" sandy loam, (10YR 4/3), granular structureless.
- Bt 12"-30" sandy clay loam, (10YR 5/8), weak medium sub angular blocky structure, slightly sticky and slightly plastic, common coarse sand grains.
- B/C 30"-42" sandy clay loam-sandy loam, (10YR 6/8) with few medium distinct 7.5YR 5/8 mottles, very weak medium sub angular blocky structure, slightly sticky and slightly plastic, common coarse sand grains.
- C1 42"-84" sandy loam, (10YR 6/8), friable structureless.

C2 84"- 180" sandy loam, (10YR 7/6) with common fine distinct 10YR 6/8 and 10YR 7/1 mottles, friable structureless.

C3 180"-192" Same as C2 except with many coarse partially decomposed rock fragments.

AR @ 192"

Site 8 Chewacla

A 0"-6" sandy loam, (10YR 4/4), friable granular.

Bt 6"-24" sandy clay loam, (10YR 6/8), weak medium sub angular blocky structure, slightly sticky and slightly plastic.

C1g 24"-50" sandy loam, (10YR 6/8) with few medium distinct 10YR 6/1 mottles, granular friable structureless, with some fine fragments of partially decomposed rock.

C2g 50"-74" sandy loam, (10YR 4/6) with few medium distinct 10YR 6/1 mottles, friable granular structureless, with many fine fragments of partially decomposed rock fragments.

AR @ 74"

Site 9 Helena

A1 0"-6" sandy loam, (2.5Y 4/4), friable granular.

A2 6"-14" sandy loam, (2.5Y 5/4) with common fine distinct 10YR 5/6 and 2.5Y 5/1 mottles, friable granular.

Bt 14"-26" sandy clay loam, (2.5Y 5/1) with few fine distinct 10YR 4/6 mottles, friable medium weak sub angular blocky structure, nonsticky non plastic.

B/C 26"-36" sandy loam, (2.5Y 5/1) with few fine distinct 10YR 4/6 mottles, granular structureless.

C 36"-48" sandy loam, (10YR 6/1) coarse granular structureless.

AR @ 48"

Site 10 Wedowee

Bt 0"-12" sandy clay loam, (7.5YR 5/8), medium fine sub angular blocky structure, slightly sticky and slightly plastic.

B/C 12"-36" loam, (7.5YR 5/8) with common fine distinct 7.5YR 7/6 mottles, granular structureless.

C1 36"-60" sandy loam, (7.5YR 7/8) with common fine faint 7.5YR 8/6 mottles, granular structureless.

C2 60"-144" sandy loam, (evenly mixed colors of 7.5YR 8/4 and 7.5 YR 8/1), granular single grained structureless.

AR @ 144"

Site 11 Appling

A 0"-6" sandy loam, (10YR 5/4), granular.

E1 6"-16" sandy loam, (7.5YR 6/6), granular.

E2 16"-36" sandy loam, (10YR 6/6) with 10YR 8/2 mottles, sub angular blocky structure.

Bt 36"-50" clay loam, (10YR 6/6) with 5 YR 5/8 mottles, sub angular blocky structure.

BC 50"-72" loamy sand, (10YR 6/6) with 5 YR 5/8 mottles, structureless.

C1 72"-86" coarse loamy sand, (10YR 6/8) with 10 YR 8/2 mottles, structureless.

C2 86"-148" coarse loamy sand, (10YR 8/2) with 10 YR 8/2 mottles, structureless.

C3 148"-180" coarse loamy sand, (10YR 6/6) with 10 YR 8/1 mottles, structureless.

Site 12

- A 0"-4" sandy loam, (10YR 6/1), granular.
- E 4"-9" sandy loam, (7.5YR 5/6), granular.
- Bt1 9"-17" sandy clay, (7.5YR 5/6), sub angular blocky structure.
- Bt2 17"-27" silty clay, (5YR 6/8) with 5 YR 6/8 and 5YR 7/4 mottles, sub angular blocky structure.
- BC 27"-38" silt loam, (5YR 6/8), structureless.
- C1 38"-60" silt loam, (5YR 6/8), structureless.
- C2 60"-76" silt loam, (5YR 6/8), structureless.
- C3 76"-133" coarse loamy sand, (7.5YR 6/6) with 5 YR 2.5/1 mottles, structureless.
- AR @133"

Site 14 Rion

- A 0"-24" sandy loam, (10YR 4/4) friable granular.
- Bt 24"-46" sandy clay loam, (7.5YR 5/6) friable very weak fine sub angular blocky structure, non sticky non plastic.
- B/C 46"-60" sandy loam, (7.5YR 5/8), friable granular structureless, with common pieces of partially decomposed rock.
- C1 60"-132" same as B/C with more coarse chunks of partially decomposed rock.
- Water table @ 132"

Site 16 Rion

- A 0"-8" sandy loam, (10YR 5/4), friable granular structure.

- Bt 8"-36" sandy clay loam, (7.5YR 6/8), slightly firm medium sub angular blocky structure, slightly sticky slightly plastic.
- B/C 36"-50" sandy loam, (7.5YR 6/8) with common fine 10YR 4/1 mottles, friable structureless.
- C1 50"-85" sandy loam, (10YR 6/8) friable structureless, with very fine pieces of partially decomposed rock fragments.
- C2 85"-86" clay loam, (10YR 4/1), massive sticky plastic band of clay.
- C3 86"-156" sandy loam, (10YR 6/6), friable structureless with many partially decomposed rocks present.

Water Table @ 156"

Site 17 Wake/Louisburg

- A 0"-14" sandy loam, (2.5Y 6/4) with common faint medium 2.5Y 6/3 mottles, friable granular structure.
- Bt1 14"-26" clay loam, (2.5y 6/4) with common medium prominent 10YR 6/8 mottles, friable weak fine sub angular blocky structure, non sticky non plastic.
- Bt2 26"-46" clay loam, (even mix of colors between 2.5Y 6/4 and 10YR 7/1), friable weak fine sub angular blocky structure, non sticky non plastic.
- C1 46"-62" sandy loam, (10YR 6/8) granular structureless, many fine rock chunks of porphyritic granite.
- C2 62"- 90" coarse sandy loam, same as C1 except with coarser rock fragments.

AR @ 90"

Site 18 Louisburg

- A 0"-7" sandy loam, (10YR 5/4) granular.
- Bt 7"-32" sandy clay, (10YR 6/8), firm sub angular blocky, slightly sticky slightly plastic.
- B/C 32"-66" sandy loam, (10YR 7/8) with common medium prominent 5YR 5/8 and few medium faint 7.5YR 5/6 mottles, structureless.
- C1 66"-93" sandy loam, (10YR 6/8), granular structureless.
- C2 93"-123" sandy loam, (7.5YR 6/8), granular structureless.
- C3 123"-193" sandy loam, (10YR 6/8), granular structureless.
- C4 193"-222" sandy loam, (10YR 7/8) granular structureless.

Site 19 Rion

- A 0"-14" sandy loam, (5YR 6/6), granular structure.
- Bt 14"-26" sandy clay loam, (5YR 5/8) medium sub angular blocky structure, firm, slightly sticky.
- B/C 26"-36" sandy clay loam, (5YR 5/8) with common fine prominent 7.5YR 7/8 mottles, medium sub angular blocky structure, friable to slightly firm, slightly sticky, slightly plastic.
- C1 36"-96" sandy loam, (5YR 5/8), with common fine prominent with 5YR 8/2 and 7.5YR 7/8 mottles, structureless
- C1 96"-207" sandy loam, (5YR 6/6), structureless

Site 20 Louisburg

A 0"-13" sandy loam, (10YR 6/6), granular structure.

Bw 13"-30" sandy loam, (10YR 4/6) weak, medium granular structure.

C 30"-69" sandy loam, (10YR 7/4), structureless

Actual water table at 69"

Hydraulic Conductivity Data

BRIAR CHAPEL																
SITE 1	RED SHADED															
Bt		Ksat	>	0.0331	cm/hr	~	0.31	in./day	~	0.19	gpd/sq. ft	~	2.19	in/wk	0.13	wetted in./wk.
C		Ksat	>	0.0395	cm/hr	~	0.37	in./day	~	0.23	gpd/sq. ft	~	2.61	in/wk	0.16	wetted in./wk.
SITE 2	GREEN SHADED															
Bt1		Ksat	>	0.1415	cm/hr	~	1.34	in./day	~	0.83	gpd/sq. ft		9.36	in/wk	0.56	wetted in./wk.
Bt2		Ksat	>	0.0236	cm/hr	~	0.22	in./day	~	0.14	gpd/sq. ft		1.56	in/wk	0.09	wetted in./wk.
SITE 3	GREEN SHADED															
Bt		Ksat	>	0.3055	cm/hr	~	2.89	in./day	~	1.80	gpd/sq. ft		20.21	in/wk	1.21	wetted in./wk.
BC		Ksat	>	0.1316	cm/hr	~	1.24	in./day	~	0.77	gpd/sq. ft		8.71	in/wk	0.52	wetted in./wk.
SITE 4	RED SHADED															
Bt		Ksat	>	0.1348	cm/hr	~	1.27	in./day	~	0.79	gpd/sq. ft		8.92	in/wk	0.54	wetted in./wk.
C		Ksat	>	0.079	cm/hr	~	0.75	in./day	~	0.47	gpd/sq. ft		5.23	in/wk	0.31	wetted in./wk.
SITE 5	RED SHADED															
Bt		Ksat	>	0.0696	cm/hr	~	0.66	in./day	~	0.41	gpd/sq. ft		4.60	in/wk	0.28	wetted in./wk.
C		Ksat	>	0.1131	cm/hr	~	1.07	in./day	~	0.67	gpd/sq. ft		7.48	in/wk	0.45	wetted in./wk.
SITE 6	BROWN SHADED															
Bt		Ksat	>	1.2178	cm/hr	~	11.51	in./day	~	7.17	gpd/sq. ft		80.56	in/wk	4.83	wetted in./wk.
BC		Ksat	>	0.0339	cm/hr	~	0.32	in./day	~	0.20	gpd/sq. ft		2.24	in/wk	0.13	wetted in./wk.
SITE 7	RED SHADED															
Bt		Ksat	>	0.1937	cm/hr	~	1.83	in./day	~	1.14	gpd/sq. ft		12.81	in/wk	0.77	wetted in./wk.
BC		Ksat	>	0.8911	cm/hr	~	8.42	in./day	~	5.25	gpd/sq. ft		58.95	in/wk	3.54	wetted in./wk.
C		Ksat	>	0.1386	cm/hr	~	1.31	in./day	~	0.82	gpd/sq. ft		9.17	in/wk	0.55	wetted in./wk.
SITE 8	BLUE SHADED															
Bt		Ksat	>	0.063	cm/hr	~	0.60	in./day	~	0.37	gpd/sq. ft		4.17	in/wk	0.25	wetted in./wk.
BC		Ksat	>	0.2048	cm/hr	~	1.94	in./day	~	1.21	gpd/sq. ft		13.55	in/wk	0.81	wetted in./wk.
SITE 9	GREEN SHADED															
Bt		Ksat	>	0.1393	cm/hr	~	1.32	in./day	~	0.82	gpd/sq. ft		9.21	in/wk	0.55	wetted in./wk.
SITE 10	BROWN SHADED															
Bt		Ksat	>	0.1114	cm/hr	~	1.05	in./day	~	0.66	gpd/sq. ft		7.37	in/wk	0.44	wetted in./wk.
BC		Ksat	>	0.117	cm/hr	~	1.11	in./day	~	0.69	gpd/sq. ft		7.74	in/wk	0.46	wetted in./wk.
C		Ksat	>	1.0303	cm/hr	~	9.74	in./day	~	6.07	gpd/sq. ft		68.15	in/wk	4.09	wetted in./wk.
SITE 11	RED SHADED															
Bt		Ksat	>	0.4753	cm/hr	~	4.49	in./day	~	2.80	gpd/sq. ft		31.44	in/wk	1.89	wetted in./wk.
BC		Ksat	>	0.0063	cm/hr	~	0.06	in./day	~	0.04	gpd/sq. ft		0.42	in/wk	0.03	wetted in./wk.
C		Ksat	>	0.1897	cm/hr	~	1.79	in./day	~	1.12	gpd/sq. ft		12.55	in/wk	0.75	wetted in./wk.
SITE 12	BROWN SHADED															
Bt		Ksat	>	2.173	cm/hr	~	20.53	in./day	~	12.79	gpd/sq. ft		143.74	in/wk	8.62	wetted in./wk.
BC		Ksat	>	0.1162	cm/hr	~	1.10	in./day	~	0.68	gpd/sq. ft		7.69	in/wk	0.46	wetted in./wk.
C		Ksat	>	0.258	cm/hr	~	2.44	in./day	~	1.52	gpd/sq. ft		17.07	in/wk	1.02	wetted in./wk.
SITE 13	PURPLE SHADED															
		Ksat	>	3.4945	cm/hr	~	33.02	in./day	~	20.57	gpd/sq. ft		231.16	in/wk	13.87	wetted in./wk.
SITE 14	ORANGE SHADED															
Bt		Ksat	>	0.2514	cm/hr	~	2.38	in./day	~	1.48	gpd/sq. ft		16.63	in/wk	1.00	wetted in./wk.
BC		Ksat	>	0.0934	cm/hr	~	0.88	in./day	~	0.55	gpd/sq. ft		6.18	in/wk	0.37	wetted in./wk.
C		Ksat	>	0.1554	cm/hr	~	1.47	in./day	~	0.91	gpd/sq. ft		10.28	in/wk	0.62	wetted in./wk.
SITE 15	BLUE SHADED															
		Ksat	>	7.6633	cm/hr	~	72.42	in./day	~	45.12	gpd/sq. ft		506.93	in/wk	30.42	wetted in./wk.

<u>SITE 16</u> RED HATCH														
Bt	Ksat	>	0.6622	cm/hr	~	6.26	in./day	~	3.90	gpd/sq. ft	43.80	in/wk	2.63	wetted in./wk.
Bt	Ksat	>	0.0772	cm/hr	~	0.73	in./day	~	0.45	gpd/sq. ft	5.11	in/wk	0.31	wetted in./wk.
C	Ksat	>	0.1241	cm/hr	~	1.17	in./day	~	0.73	gpd/sq. ft	8.21	in/wk	0.49	wetted in./wk.
<u>SITE 17</u> ORANGE SHADED														
Bt1	Ksat	>	0.1356	cm/hr	~	1.28	in./day	~	0.80	gpd/sq. ft	8.97	in/wk	0.54	wetted in./wk.
Bt2	Ksat	>	0.0514	cm/hr	~	0.49	in./day	~	0.30	gpd/sq. ft	3.40	in/wk	0.20	wetted in./wk.
C	Ksat	>	0.0442	cm/hr	~	0.42	in./day	~	0.26	gpd/sq. ft	2.92	in/wk	0.18	wetted in./wk.
<u>SITE 18</u> ORANGE SHADED														
Bt	Ksat	>	0.2326	cm/hr	~	2.20	in./day	~	1.37	gpd/sq. ft	15.39	in/wk	0.92	wetted in./wk.
BC	Ksat	>	0.3029	cm/hr	~	2.86	in./day	~	1.78	gpd/sq. ft	20.04	in/wk	1.20	wetted in./wk.
C	Ksat	>	0.4233	cm/hr	~	4.00	in./day	~	2.49	gpd/sq. ft	28.00	in/wk	1.68	wetted in./wk.
<u>SITE 19</u> RED HATCH														
Bt	Ksat	>	0.28	cm/hr	~	2.65	in./day	~	1.65	gpd/sq. ft	18.52	in/wk	1.11	wetted in./wk.
BC	Ksat	>	0.0372	cm/hr	~	0.35	in./day	~	0.22	gpd/sq. ft	2.46	in/wk	0.15	wetted in./wk.
C	Ksat	>	0.1492	cm/hr	~	1.41	in./day	~	0.88	gpd/sq. ft	9.87	in/wk	0.59	wetted in./wk.
<u>SITE 20</u> BLUE SHADED														
BW	Ksat	>	1.0156	cm/hr	~	9.60	in./day	~	5.98	gpd/sq. ft	67.18	in/wk	4.03	wetted in./wk.
<u>SITE 22</u> BROWN SHADED														
Bt	Ksat	>	0.0567	cm/hr	~	0.54	in./day	~	0.33	gpd/sq. ft	3.75	in/wk	0.23	wetted in./wk.
BC	Ksat	>	0.3601	cm/hr	~	3.40	in./day	~	2.12	gpd/sq. ft	23.82	in/wk	1.43	wetted in./wk.
C	Ksat	>	0.2483	cm/hr	~	2.35	in./day	~	1.46	gpd/sq. ft	16.43	in/wk	0.99	wetted in./wk.

Average Ksat Values

in/wk

Red

Bt	15.92
BC	20.61
C	7.87

Yellow

Bt	16.01
BC	13.11
C	13.73

Brown

Bt	58.86
BC	10.37
C	33.88

Green

Bt	10.09
BC	8.71
C	

	Blue	
Bt		35.67
BC		13.55
C		

With the latest version of the wetted area mapped, the detailed soil descriptions noted, we next looked at the hydraulic characteristics associated with the various soil type units. This was completed using constant head permeameters. Multiple tests were completed on each horizon for each unit that was accepting wastewater. The tests introduce water into test holes and the level of ponded water in the hole is maintained. This results in a constant head pressure being exerted on the water column in the test hole. The rate of water is the fastest at the beginning of the test. The rate drops during the test until it reaches a steady state. This steady, diminished rate is the rate used to convey the hydraulic characteristics of the site.

In reviewing the soil hydraulic characteristics the averages for the type units is reported at the end of the Ksat data sheet. The layers noted are the B or Bt layer, which is normally the clayey layer. The C layer, which is the parent material or saprolite layer, is the material between the bedrock and the soil profile. And the BC layer which is the transition between the B and the C layers.

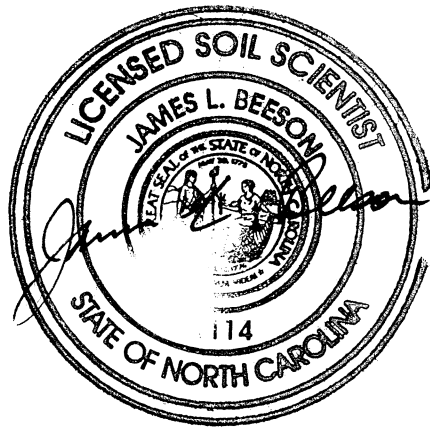
Please note that this is not the final factor in determining the application rate for the site. These numbers are the raw numbers for each horizon. Other factors such as slope, geology, vegetation, and wastewater strength all play important roles in arriving at the application rate. This portion of the evaluation will be completed by the Hydrogeologist.

In conclusion, we have gone to great lengths to characterize, identify, and report exactly what exists at Briar Chapel. We have put forth the effort to discover and reveal any weakness that would endanger the public or environmental health of the residence in or around briar Chapel. At the proposed application rate with an annual average in the range of .45 inches per week or approximately 23.4 inches per year this would seem to be a conservative approach. Please keep in mind that the final application rate will be determined by the Hydrogeologist. A significant factor to keep in mind is that much of the wetted area will not be significantly graded. In fact, much of this area will be left natural. Most of the re-use type of applications are normally incorporated with golf course developments. This requires grading in order to form the course which impacts the rate of infiltration. Another difference in this tract from many re-use projects is its

location. This application rate would be a typical rate applied to sites in the Slate or Triassic regions. The soils areas as a whole are much better on this type of parent material. Another aspect of the proposed approach is that the application areas are spread over the entire tract. As opposed to dedicating one section of the project to the application area, this approach tends to lessen the hydraulic impact of the wastewater by allowing it to occupy a bigger footprint.

In my opinion, as compared with single-family septic systems, this approach has one large benefit. Instead of allowing this wastewater to return to the ground water “unused” this approach allows us to use the water multiple times before returning to the ground water aquifer. In many developments the use of water and nutrients, which are the components of wastewater, are overlooked. Irrigation water is taken from the drinking water supply, while nutrients are purchased at the local gardening shop. Many times, this results in the over application of nutrients which then find their way into the local creeks and rivers. In summary, I feel that lowering the demand on the drinking water supply and making use of nutrients instead of disposing of them, is the more responsible approach. If you have any further questions please feel free to call.

Sincerely,



James L. Beeson NCLSS

LOCATION APPLING

NC+AL GA SC VA

Established Series

Rev. AG

07/1999

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, on a 4 percent slope in cultivated field. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 9 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; very friable; common fine and medium roots; few pebbles of quartz; slightly acid; clear smooth boundary. (5 to 12 inches thick)

BA--9 to 12 inches; reddish yellow (7.5YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; common fine roots; common fine and medium pores; few pebbles of quartz; strongly acid; clear smooth boundary. (0 to 7 inches thick)

Bt1--12 to 19 inches; reddish yellow (7.5YR 6/8) clay loam; common medium prominent red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; few fine roots; common fine and medium pores; few thin distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2--19 to 35 inches; strong brown (7.5YR 5/8) clay; common medium prominent red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium pores; common thick distinct clay films on faces of peds; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3--35 to 42 inches; strong brown (7.5YR 5/6) clay loam; common medium distinct yellowish red (5YR 5/6) and few fine distinct yellow (10YR 8/6) mottles; weak medium subangular blocky structure; firm, sticky, slightly plastic; few fine pores; few distinct clay films on faces of peds; common fine flakes of mica; about 15 percent saprolite; very strongly acid; gradual wavy boundary. (Combined thickness of Bt horizon is 18 to 50 inches)

BC--42 to 46 inches; reddish yellow (5YR 6/8) clay loam; common medium distinct red (2.5YR 5/8) and yellow (10YR 8/6) mottles; weak medium subangular blocky structure; friable; slightly sticky; common fine flakes of mica; about 25 percent saprolite; very strongly acid; gradual wavy boundary. (0 to 30 inches)

C--46 to 65 inches; reddish yellow (7.5YR 7/6), red (2.5YR 5/8), and yellow (10YR 8/6) saprolite that has a sandy clay loam texture; massive; friable; common fine flakes of mica; few bodies of clay loam; very strongly acid.

TYPE LOCATION: Rockingham County, North Carolina; 3 miles southwest of Monroeton on U.S. 158, 1350 feet north of Midway on SR 1001, 300 feet west of SR 1001.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to more than 60 inches. Depth to hard 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 horizon 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, where present, 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, where present, 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, Madison, Nankin, Pacolet, Tumbleton, and Wedowee series in the same family. Those in closely related families are the Argon, Braddock, Cataula, Chestatee, Cullen, Durham, Georgeville, Grover, Hard Labor (T), Helena, Herndon, Hulett, Kolomoki, Lloyd, Mayodan, Nectar, Rion, Spotsylvania, and Vance series. Aragon soils contain fragments of chert and have a cherty limestone C horizon. Bethlehem soils have soft bedrock at depths of 20 to 40 inches and sola less than 40 inches thick. Braddock soils are mesic. Cataula soils have a fragipan. 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, of coarse fragments throughout. Cullen, Helena, Mayodan and Vance soils have mixed mineralogy, and in addition Helena soils have low chroma mottles in the control section and Mayodan formed in Triassic age sediments. Durham, Grover and Rion soils are fine-loamy. Georgeville and Herndon soils contain more than 30 percent silt. Hard Labor (T) soils have redox depletions in the lower part of the subsoil. Hulett, Madison,

Pacolet and Wedowee soils have thinner Bt horizons, and, in addition Hulett and Madison soils contain more mica. Kolomoki and Nankin soils have C horizons of stratified marine sediments. Lloyd soils have at least one subhorizon in the Bt horizon that has moist value of 3. Nectar soils have an R horizon of sandstone. Spotsylvania soils have a lithologic discontinuity with the upper horizons formed in marine sediments. Tumbleton soils formed in marine sediments and do not have saprolite from crystalline igneous and metamorphic rock.

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 (T), 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 and have discontinuous Bt horizons. Worsham soils are poorly drained and are around the heads of drains and for short distances along the 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 OFFICE 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.

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 and BA horizons)

Kandic horizon - the zone between 12 and 46 inches has low activity clay in more than 50 percent of the horizon (Bt1 and Bt2 horizons)

Argillic horizon - the zone between depths of 12 and 42 inches (Bt1 and Bt2 horizons)

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

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		6.0-6.0		-	60-60	

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	9-35	SC CL C	0- 5	90-100	35-60	3- 12
NC0032	35-46	SC CL SCL	0- 5	85-100	20-45	2- 8
NC0032	46-65	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	9-35	4.5- 5.5	0.-.5	0- 0	0.6- 2.0	LOW
NC0032	35-46	4.5- 5.5	0.-.5	0- 0	0.6- 2.0	LOW
NC0032	46-65	-	-	-	-	

National Cooperative Soil Survey
U.S.A.

LOCATION LOUISBURG

GA+AL NC SC VA

Established Series

Rev. RLV

09/2003

LOUISBURG SERIES

The Louisburg Series consists of very deep, well drained, rapidly permeable soils that formed in material weathered from felsic igneous and metamorphic rock, primarily granite and granite gneiss. The Louisburg soils are on summits and side slopes of the Piedmont uplands. Slope ranges from 6 to 45 percent. Near the type location, the mean annual temperature is 60 degrees F, and the mean annual precipitation is 45 inches.

TAXONOMIC CLASS: Coarse-loamy, mixed, semiactive, thermic Typic Hapludults

TYPICAL PEDON: Louisburg gravelly sandy loam in an area of Rawlings-Louisburg-Buckhead complex, 15 to 45 percent slopes, very stony--forested.
(Colors are for moist soil unless otherwise stated.)

A--0 to 4 inches; dark brown (10YR 3/3) gravelly sandy loam; moderate medium granular structure; very friable; many very fine, fine, and medium and common coarse roots; few fine flakes of mica; 12 percent gravel, 5 percent cobbles, and 3 percent stones; moderately acid; abrupt smooth boundary. (2 to 9 inches thick)

E--4 to 7 inches; light yellowish brown (10YR 6/4) gravelly sandy loam; weak fine subangular blocky structure; very friable; common very fine, fine, and medium and few coarse roots; few fine flakes of mica; 12 percent gravel and 5 percent cobbles; moderately acid; clear smooth boundary. (0 to 8 inches thick)

Bt1--7 to 14 inches; brown (7.5YR 5/4) sandy loam; weak medium subangular blocky structure; friable, common very fine, fine, and medium and few coarse roots; few faint brown (7.5YR 4/3) clay films on faces of peds; few fine flakes of mica; 10 percent gravel and 2 percent cobbles; moderately acid; clear wavy boundary.

Bt2--14 to 26 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common very fine, fine, and medium, and few coarse roots; few distinct brown (7.5YR 4/3) clay films on faces of peds; few fine flakes of mica; 8 percent gravel, 2 percent cobbles; moderately acid; clear wavy boundary.
(Combined thickness of the Bt horizon is 15 to 30 inches)

BC--26 to 36 inches; strong brown (7.5YR 4/6) sandy loam; weak medium subangular blocky structure; friable; few very fine, fine, medium, and coarse roots; common fine flakes of mica; 10 percent gravel, 2 percent cobbles; moderately acid; clear irregular boundary. (0 to 20 inches thick)

C--36 to 60 inches; 50 percent light brown (7.5YR 6/4), 40 percent red (2.5YR 4/6), and 10 percent very pale brown (10YR 8/3) saprolite that crushes to gravelly sandy loam; massive; friable; few very fine, fine, medium, and coarse roots in fractures; common fine

flakes of mica; 10 percent gravel, 5 percent cobbles, and 2 percent highly weathered stones; strongly acid.

TYPE LOCATION: Morgan County, Georgia; 800 feet east of Rutledge Road and 4,600 feet north of the Fambaugh Bridge Road bridge over Hard Labor Creek; (USGS Quadrangle, Rutledge North, GA (1971), lat. 33 degrees 38 minutes 59 seconds N., long. 83 degrees 34 minutes 37 seconds W.):

RANGE IN CHARACTERISTICS: Solum thickness ranges from 20 to 40 inches. The solum is underlain by saprolite. Depth to bedrock, both hard and weathered, is more than 5 feet. Content of rock fragments ranges from 0 to 35 percent throughout, but individual subhorizons range up to 60 percent. Rock fragments consist of gravel, cobbles, stones and boulders. Reaction ranges from very strongly acid to moderately acid. Flakes of mica range from none to common in all horizons.

The A horizon is has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4. It is fine sandy loam, sandy loam, loamy sand, or loamy coarse sand in the fine-earth fraction.

The E horizon, where present, has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4. It is fine sandy loam, sandy loam, loamy sand, or loamy coarse sand in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 4 to 8. Mottles range from none to common and are in shades of red, brown, and yellow. Texture is dominantly sandy loam, coarse sandy loam, or loam in the fine-earth fraction. Some pedons may have thin subhorizons of sandy clay loam.

The C horizon is highly weathered saprolite from felsic igneous and metamorphic rock, primarily granite and granite gneiss.

The Cr horizon, where present, is weathered felsic igneous and metamorphic rock, primarily granite and granite gneiss.

The R horizon, where present, is hard felsic igneous and metamorphic rock, primarily granite and granite gneiss.

COMPETING SERIES: The Bojac series is the only competitor. Bojac soils formed in loamy and sandy stratified fluvial sediments and are flood plains and stream terraces.

GEOGRAPHIC SETTING: Louisburg soils are on sloping ridgetops and sideslopes of the Piedmont uplands. Slopes range from 6 to about 45 percent. The soil formed in material weathered from felsic igneous and metamorphic rock, primarily granite and granite gneiss. The mean annual temperature ranges from 59 to 65 degrees F, and the mean annual precipitation ranges from 45 to 52 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the Appling, Ashlar, Buckhead, Cecil, Hard Labor, Madison, Pacolet, Rawlings, Rion, Saw,

Wateree, Wedowee, and Wilkes series. Appling, Cecil, Hard Labor, Madison, Pacolet, Saw and Wedowee soils are in a fine family. In addition, Saw soils have bedrock at a depth of 20 to 40 inches. Buckhead, Rawlings and Rion soils are in a fine-loamy family. In addition, Rawlings soils have bedrock at a depth of 20 to 40 inches. Ashlar and Wateree soils have bedrock at a depth of 20 to 40 inches. Wilkes soils are in a shallow family.

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

USE AND VEGETATION: Mostly forested with post oak, white oak, and red oaks but there are some hickories, dogwoods, and shortleaf and loblolly pines. Cultivated areas are used for corn, oats, vegetables, and pasture.

DISTRIBUTION AND EXTENT: The Southern Piedmont MLRA 136 of Georgia, Alabama, South Carolina, North Carolina, and Virginia. The series is not extensive.

MLRA OFFICE RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: DeKalb County, Georgia; 1938.

REMARKS: Louisburg soils were formerly classified in the Lithosol great soil group. The July 1975 revision changed the series from a moderately deep Typic Dystrochrept to a very deep Ruptic Ultic Dystrochrept with variable depth to lithic or paralithic contact. The purpose was to describe a complex of Dytrochrepts and Hapludults. The series was little used after the 1975 revision as the Ashlar, Wateree and Rion soils were used for these complexes. This revision restores part of the concept of the Louisburg series for the very deep component that occurs in many or most of these map units.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 4 inches (A and E horizons)

Argillic horizon - the zone from 7 to 26 inches below the surface (Bt1 and Bt2 horizons).

MLRA=136

ADDITIONAL DATA:

SOI-5 Soil Name Slope Airtemp FrFr/Seas Precip Elevation
GA0038 LOUISBURG 2- 50 60- 65 210-240 45- 52 500- 800
GA0059 LOUISBURG 6- 50 60- 65 210-240 45- 52 500- 800
GA0086 LOUISBURG 2- 50 60- 65 210-240 45- 52 500- 800

SOI-5 FloodL FloodH Watertable Kind Months Bedrock Hardness
GA0038 NONE 6.0-6.0 - 40-40 HARD
GA0059 NONE 6.0-6.0 - 40-40 HARD
GA0086 NONE 6.0-6.0 - 40-40 HARD

SOI-5 Depth Texture 3-Inch No-10 Clay% -CEC-
 GA0038 0- 7 LS LCOS 0- 15 70- 98 2-12 -
 GA0038 0- 7 SL FSL 0- 15 75- 95 5-15 -
 GA0038 7-24 SL 0- 15 75- 98 7-18 -
 GA0038 24-60 WB - - - -
 GA0059 0- 7 ST-SL ST-LS ST-LCOS 25- 38 70- 83 2-15 -
 GA0059 0- 7 STV-SL 35- 50 70- 83 2-15 -
 GA0059 7-24 ST-SL 25- 38 75- 83 7-18 -
 GA0059 24-60 WB - - - -
 GA0086 0- 7 GR-LS GR-LCOS 0- 15 50- 75 2-12 -
 GA0086 0- 7 GR-SL GR-FSL GR-COSL 0- 15 50- 75 5-15 -
 GA0086 7-24 SL GR-SL GR-COSL 0- 15 60- 90 7-18 -
 GA0086 24-60 WB - - - -

SOI-5 Depth -pH- O.M. Salin Permeab Shnk-Swll
 GA0038 0- 7 4.5- 6.0 .5-2. 0- 0 6.0- 20 LOW
 GA0038 0- 7 4.5- 6.0 .5-2. 0- 0 6.0- 20 LOW
 GA0038 7-24 4.5- 6.0 - 0- 0 6.0- 20 LOW
 GA0038 24-60 - - - -
 GA0059 0- 7 4.5- 6.0 .5-2. 0- 0 6.0- 20 LOW
 GA0059 0- 7 4.5- 6.0 .5-2. 0- 0 6.0- 20 LOW
 GA0059 7-24 4.5- 6.0 - 0- 0 6.0- 20 LOW
 GA0059 24-60 - - - -
 GA0086 0- 7 4.5- 6.0 .5-2. 0- 0 6.0- 20 LOW
 GA0086 0- 7 4.5- 6.0 .5-2. 0- 0 6.0- 20 LOW
 GA0086 7-24 4.5- 6.0 - 0- 0 6.0- 20 LOW
 GA0086 24-60 - - - -

National Cooperative Soil Survey
 U.S.A.

LOCATION HELENA

NC+AL GA SC VA

Established Series
Rev. AG
05/2000

HELENA SERIES

The Helena series consists of very deep, moderately well drained, slowly permeable soils that formed in residuum weathered from a mixture of felsic, intermediate, or mafic igneous or high-grade metamorphic rocks such as aplitic granite or granite gneiss that is cut by dykes of gabbro and diorite, or mixed with hornblende schist or hornblende gneiss. These soils are on broad ridges and toeslopes of the Piedmont uplands. Slope is dominantly between 2 to 10 percent but ranges from 0 to 15 percent. Mean annual precipitation is 46 inches, and mean annual temperature is 61 degrees F, near the type location.

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

TYPICAL PEDON: Helena sandy loam - in a cultivated field on a 4 percent slope. (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 horizon 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 SR 1603; 400 feet north on a farm road and 400 feet east in a cultivated field.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to more than 60 inches. Depth to bedrock is greater than 5 feet. The soil is extremely acid to strongly acid except where the surface has been limed. Limed soils are typically moderately acid or slightly acid in the upper part. Gravel fragments range from 0 to 35 percent, by volume, throughout the profile. Some pedons may have few to common dark concretions in the upper part of the profile.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4. It is loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, sandy loam, or loam in the fine-earth fraction. In eroded phases the Ap horizon is clay loam or sandy clay loam in the fine-earth fraction.

The E horizon, where present, has hue of 10YR to 5Y, value of 5 to 8, and chroma of 2 to 4. Texture is loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The BE or BA horizon, where present, has hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8. It is sandy clay loam or clay loam in the fine-earth fraction.

The Bt horizon has 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. Iron depletions with chroma of 2 or less occur within 24 inches of the upper boundary of the Bt horizon. Soft masses of iron accumulation in shades of yellow, brown, or red may also be present. Texture is dominantly clay loam, sandy clay, or clay in the fine-earth fraction, but some pedons have thin subhorizons of sandy clay loam.

The Btg horizon, where present, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. Soft masses of iron accumulation in shades of yellow, brown, or red commonly are present. Texture is clay loam, sandy clay, or clay in the fine-earth fraction. Some pedons have thin subhorizons of sandy clay loam.

The BC and BCg horizons, where present, have colors similar to the Bt horizon or the Btg horizon, respectively. Texture is clay loam, sandy clay loam, loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon has 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. The Cg horizon, where present, has 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. The C and Cg horizons are saprolite that has a texture of sandy loam, fine sandy loam, sandy clay loam, or loam in the fine-earth fraction. Bodies or seams of clay loam or clay are in some pedons.

COMPETING SERIES: These are the Annemaine, Beason, Cid, Craven, Creedmoor, Dogue, Eulonia, Gritney, Lignum, Maubila, Nemours, Nevarc, Peawick, Sacul, and Telfair series. Annemaine, Benson,

Craven, Dogue, Eulonia, Gritney, Maubila, Nemours, Nevarc, Peawick, Sacul, and Wolftever soils lack a C horizon of saprolite. In addition, Annemaine, Eulonia, Nemours, Newco, and Sacul soils have redder hue, and Beason, Craven and Dogue soils contain more silt. Also, Peawick soils commonly have aluminum saturation greater than 50 percent. Cid soils have a lithic contact between depths of 20 and 40 inches. Creedmoor soils have a higher coefficient of linear extensibility, more exchangeable aluminum than Helena, and the C horizon is weathered Triassic saprolite. Lignum and Prosperity soils have paralithic contact within 40 to 60 inches.

GEOGRAPHIC SETTING: The Helena soils are on broad ridges, toe slopes and heads of drains in the Piedmont uplands. Slopes are mostly between 2 and 10 percent and range from 0 to 15 percent. The soil formed in residuum weathered from a mixture of felsic, intermediate, or mafic igneous or high-grade metamorphic rocks such as aplitic granite or granite gneiss that is cut by dykes of gabbro and diorite, or mixed with hornblende schist or hornblende gneiss. Mean annual precipitation ranges from 37 to 69 inches, and mean annual temperature ranges from 58 to 65 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are Appling, Cecil, Cullen, Durham, Enon, Hard Labor, Iredell, Louisburg, Mecklenburg, Pacolet, Prosperity, Rion, Santuc, Sedgefield, Vance, Wedowee, Wilkes, and Worsham series. Appling, Cecil, Hard Labor, Pacolet, and Wedowee soils have kaolinitic mineralogy. Cullen and Vance soils are well drained. Durham and Rion soils have less than 35 percent clay in the Bt horizon. Enon, Iredell, Mecklenburg, Sedgefield, and Wilkes soils have base saturation of more than 35 percent. In addition, Wilkes soils are loamy and shallow. All of these except for Iredell, Sedgefield, and Worsham soils are on landscape positions that have better surface drainage. Iredell, Prosperity, Santuc, and Sedgefield soils are in similar landscape positions to Helena. Worsham soils are in heads of drains and upland drainageways. Santuc soils have a fine-loamy particle size class

DRAINAGE AND PERMEABILITY: Moderately well drained; medium to rapid runoff; slow permeability. There is a perched water table in late winter and early spring.

USE AND VEGETATION: About two-thirds of this soil is used for crops and pasture. Common crops are tobacco, corn, soybeans, small grain, and vegetables. Less common are cotton and hay. The remaining acreage is in forests of mixed 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: Piedmont of Alabama, Georgia, North Carolina, South Carolina, and Virginia. The series is of large extent; the area is more than 300,000 acres.

MLRA OFFICE RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Person County, North Carolina, 1928.

REMARKS: The August 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 of the soil to 12 inches (Ap and E horizons)

Argillic horizon - the zone between depths of 12 and 46 inches below the surface (BE, Bt1, Bt2, Bt3 and BCg horizons)

Aquic conditions - periodic episaturation and redox depletions within 24 inches of the upper boundary of the argillic horizon (beginning in the Bt1 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 85-240 37- 69 350- 900

NC0176 HELENA 0- 15 58- 65 185-240 37- 69 350- 900

NC0266 HELENA 0- 15 58- 65 185-240 37- 69 350- 900

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

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.

LOCATION CHEWACLA

NC+AL FL GA MS SC TN VA

Established Series
Rev. AG; DTA
04/2003

CHEWACLA SERIES

The Chewacla series consists of very deep, moderately permeable, somewhat poorly drained soils on flood plains. They formed in recent alluvium washed largely from soils formed in residuum from schist, gneiss, granite, phyllite, and other metamorphic and igneous rocks. Slopes range from 0 to 2 percent. Mean annual precipitation is about 44 inches, and mean annual temperature is about 59 degrees near the type location.

TAXONOMIC CLASS: Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts

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

Ap--0 to 4 inches; brown (7.5YR 4/4) loam; weak medium granular structure; friable; common very fine, fine, and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary. (4 to 10 inches thick)

Bw1--4 to 14 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; common fine flakes of mica; few medium faint brown (10YR 5/3) iron depletions; very strongly acid; gradual wavy boundary.

Bw2--14 to 26 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; many fine flakes of mica; common medium faint grayish brown (10YR 5/2) iron depletions and common medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; very strongly acid; gradual wavy boundary.

Bw3--26 to 38 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common fine roots; many fine flakes of mica; common medium distinct gray (10YR 5/1) iron depletions; very strongly acid; gradual wavy boundary.

Bw4--38 to 47 inches; strong brown (7.5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few fine roots; many fine flakes of mica; common medium distinct gray (10YR 5/1) iron depletions; very strongly acid; gradual wavy boundary.

Bw5--47 to 60 inches; gray (10YR 5/1), strong brown (7.5YR 5/8), and red (2.5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few fine roots; many fine flakes of mica; very strongly acid; gradual wavy boundary. (Combined thickness of the Bw horizons is 6 to 60 inches)

C--60 to 72 inches; brown (7.5YR 4/4) and gray (7.5YR 5/1) loam; massive; friable; many fine flakes of mica; very strongly acid.

TYPE LOCATION: Halifax County, North Carolina; 1.0 mile east southeast of Norfleet on Secondary Road 1800, 1.3 miles east southeast on a farm path, 1.0 mile south southwest on farm path, 0.5 mile

southeast of the farm path, in a wooded area.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 15 to 70 inches. Depth to bedrock is greater than 6 feet. Few to many mica flakes are throughout the soil. Content of coarse fragments is less than 5 percent by volume in the A and upper B horizons. In some pedons, gravel content ranges to 15 percent by volume in the lower B horizons. Reaction ranges from very strongly acid to slightly acid to a depth of 40 inches, except for soils that have been limed. Below 40 inches reaction ranges from very strongly acid to mildly alkaline. Concretions are few to common in some pedons.

The A or Ap horizon has hue of 5YR to 2.5Y, value of 3 to 5, and chroma of 1 to 6. A1 or Ap horizons with value less than 4 are less than 7 inches thick. The texture is fine sandy loam, sandy loam, loam, silt loam, or clay loam.

The Ab horizon, where present, has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. It is fine sandy loam, sandy loam, loam, silt loam, clay loam, sandy clay loam, loamy fine sand, or loamy sand.

The AB or BA horizon, where present, has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. It is loam, silt loam, sandy clay loam, clay loam, or silty clay loam.

The Bw horizon has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. Iron depletions of chroma 2 or less are within 24 inches of the surface. Masses of iron accumulation in shades of brown, yellow or red are also common in the Bw horizon. Some subhorizons are without dominant matrix hue and have iron depletions and masses of iron accumulation in shades of brown, red and gray. Texture is sandy clay loam, sandy loam, fine sandy loam, loam, clay loam, silt loam or silty clay loam. Weighted average clay content of the particle size control section is 18 to 35 percent and sand coarser than very fine is more than 15 percent.

The Bg horizon, where present, is neutral, or has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2. Many pedons contain masses of iron accumulation in shades of yellow, brown or red. Texture is sandy clay loam, sandy loam, fine sandy loam, loam, clay loam, silt loam or silty clay loam.

The BC horizon, where present, has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. Iron depletions in shades of gray and masses of iron accumulation in shades of brown, yellow, or red are common. Texture is sandy clay loam, sandy loam, fine sandy loam, loam, clay loam, silt loam or silty clay loam.

The BCg horizon, where present, is neutral, or has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2. Many pedons contain masses of iron accumulation in shades of yellow, brown or red. Texture is sandy clay loam, sandy loam, fine sandy loam, loam, clay loam, silt loam or silty clay loam.

The C horizon has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. Iron depletions in shades of gray and masses of iron accumulation in shades of brown, yellow, or red are common. Texture is sandy clay loam, sandy loam, fine sandy loam, loam, clay loam, silt loam or silty clay loam. Below 40 inches, texture is variable, ranging from extremely gravelly sand to clay.

The Cg horizon, where present, is neutral, or has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2. Many pedons contain masses of iron accumulation in shades of yellow, brown or red. Texture is sandy clay loam, sandy loam, fine sandy loam, loam, clay loam, silt loam or silty clay loam. Below 40 inches, texture is variable, ranging from extremely gravelly sand to clay.

COMPETING SERIES: Oakboro is the only other series in this family. Oakboro soils have bedrock at depths of 40 to 60 inches.

GEOGRAPHIC SETTING: Chewacla soils formed in recent alluvium on nearly level flood plains along streams that drain from the mountains and piedmont. Slopes are less than 2 percent. The loamy sediments washed largely from soils formed in residuum from schist, gneiss, granite, phyllite, and other metamorphic and igneous rocks. Mean annual precipitation is about 44 inches and the average annual temperature is more than 59 degrees F. near the type location.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing Oakboro series, these include the Buncombe, Cartecay, Chastain, Chenneby, Congaree, Enoree, Riverview, Shellbluff, Tawcaw, and Wehadkee series on flood plains, and the Altavista, Augusta, Dogue, Merry Oaks, Moncure, Roanoke, Wahee, and Wickham series on stream terraces. Altavista, Augusta, Dogue, Merry Oaks, Moncure, Roanoke, and Wickham soils have argillic horizons. Buncombe soils are sand or loamy sand and are excessively drained. Cartecay and Enoree soils are coarse-loamy. Chastain and Tawcaw soils are clayey. Chenneby soils are fine-silty. Congaree soils do not have a cambic horizon. Riverview soils are well drained. Shellbluff soils are well drained and fine silty. Wehadkee soils are poorly drained.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; slow runoff; moderate permeability. Most areas flood frequently, but flooding frequency ranges from rare to frequent.

USE AND VEGETATION: Much of the soil is cleared and is in pasture or cropland. The remainder is in forest. Corn is the principal crop, and small grains and hay account for most of the remainder. Common trees in forested areas include yellow poplar, sweetgum, water oak, eastern cottonwood, green ash, blackgum, red maple, willow oak, and American sycamore. Loblolly pines are in some areas that are not subject to frequent flooding. Common understory plants include river birch, winged elm, hackberry, greenbrier, American holly, black willow, sourwood, eastern and hophornbeam.

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

MLRA OFFICE RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Hall County, Georgia; 1937.

REMARKS: Diagnostic horizons recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 4 inches (the A horizon).

Cambic horizon - the zone between depths of 4 and 60 inches (the Bw horizons).

Aquic conditions - periodic endosaturation and redox depletions within a 24 inch depth (Bw2 horizon)

MLRAs 136, 133A, 153A, 153B

REVISED 9/5/97, RLV. 4/18/03, DTA. The April, 2003 version moves the type location from Burke County, North Carolina to Halifax County, North Carolina. The former type location is located in the mesic part of MLRA 136.

ADDITIONAL DATA:

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
NC0055	CHEWACLA	0-2	58-68	185-250	37-69	10-700
NC0296	CHEWACLA	0-2	58-68	185-250	37-69	10-700

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0055	RARE	FREQ	0.5-2.0	APPARENT	NOV-APR	60-60	
NC0296	COMMON		+1.0-3.0	APPARENT	OCT-JUN	60-60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
NC0055	0-4	FSL SL	0-0	95-100	5-20	4-20
NC0055	0-4	SIL L CL	0-0	95-100	10-35	5-30
NC0055	4-26	SIL SICL CL	0-0	95-100	18-35	10-25
NC0055	26-38	SCL L SL	0-0	95-100	18-35	10-25
NC0055	38-60	SIL CL SICL	0-0	75-100	18-35	10-25
NC0055	60-72	VAR	-	-	-	-

NC0296	0-4	FSL SL	0-0	95-100	5-20	2-8
NC0296	0-4	SIL L CL	0-0	95-100	10-35	2-11
NC0296	4-26	SIL SICL CL	0-0	95-100	18-35	4-9
NC0296	26-38	SCL L SL	0-0	95-100	18-35	4-9
NC0296	38-60	SIL CL SICL	0-0	75-100	18-35	4-9
NC0296	60-72	VAR	-	-	-	-

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
NC0055	0-4	4.5-6.5	1.-4.	0-0	0.6-2.0	LOW
NC0055	0-4	4.5-6.5	1.-4.	0-0	0.6-2.0	LOW
NC0055	4-26	4.5-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0055	26-38	4.5-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0055	38-60	4.5-7.8	.5-2.	0-0	0.6-2.0	LOW
NC0055	60-72	-	-	-	-	-

NC0296	0-4	4.5-6.5	1.-4.	0-0	0.6-2.0	LOW
NC0296	0-4	4.5-6.5	1.-4.	0-0	0.6-2.0	LOW
NC0296	4-26	4.5-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0296	26-38	4.5-6.5	.5-2.	0-0	0.6-2.0	LOW
NC0296	38-60	4.5-7.8	.5-2.	0-0	0.6-2.0	LOW
NC0296	60-72	-	-	-	-	-

National Cooperative Soil Survey
U.S.A.

LOCATION PACOLET

SC+AL GA NC VA

Established Series
Rev. ECH-DJD
07/1999

PACOLET SERIES

The Pacolet series consists of very deep, well drained, moderately permeable soils that formed in material weathered mostly from acid crystalline rocks of the Piedmont uplands. Slopes commonly are 15 to 25 percent but range from 2 to 80 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) saprolite that has a clay loam texture; 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 70 inches; light yellowish brown (10YR 6/4) saprolite that has a loam texture; 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 12 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 or 5, 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. The Bt horizon 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 5YR, value of 4 or 5, and chroma of 6 or 8 commonly with mottles in shades of red, yellow, or brown or is multicolored, and is loamy saprolite weathered from felsic crystalline rock.

COMPETING SERIES: These are the Appling, Bethlehem, Cecil, Lloyd, Madison, Nankin, Tumbleton, and Wedowee series. Appling and Cecil soils have a thicker clayey Bt horizon. Bethlehem soils have a paralithic contact within 40 inches. Lloyd soils have value of 3 in at least part of the Bt horizon. Nankin soils commonly have a thicker Bt horizon and formed in marine sediments. Madison soils have many flakes of mica in the solum. Tumbleton soils have a Bt horizon thicker than 36 inches and formed in marine sediments. 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 80 percent. The soils formed in material weathered mostly from felsic crystalline 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: These are the competing Appling, Cecil, Lloyd, Madison, and Wedowee series, and the Cataula, Hayesville, Lockhart, Louisburg, Rion, Wateree series. Cataula soils have a layer in the Bt horizon that is dense and partially brittle. Hayesville soils have a mesic temperature regime. 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; internal drainage is

medium; 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 OFFICE 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

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
SC0015	PACOLET	2- 80	59- 66	190-240	37- 60	200-1400
SC0107	PACOLET	2- 80	59- 66	190-240	37- 60	200-1400

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

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	52-70	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	52-70	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	52-70	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	52-70	4.5-	6.0	0.-.5	0- 0	0.6-	2.0	LOW

National Cooperative Soil Survey
U.S.A.

LOCATION RION

SC+GA NC VA

Established Series
Rev. RLV:DJD
10/2003

RION SERIES

The Rion series consists of very deep, well drained, moderately permeable soils that formed in material mostly weathered from acid crystalline rocks of the Piedmont Uplands. Slopes commonly are 15 to 25 percent but range from 2 to 60 percent.

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

TYPICAL PEDON: Rion loamy sand on a 20 percent slope with a southern aspect; recently planted pines. (Colors are for moist soil unless otherwise stated.)

A--0 to 3 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; very friable; many fine and few medium roots; 5 percent quartz gravel; strongly acid; abrupt smooth boundary. (2 to 10 inches thick)

E--3 to 7 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; common fine and few medium roots; 5 percent quartz gravel; moderately acid; clear smooth boundary. (0 to 12 inches thick)

Bt1--7 to 12 inches; brownish yellow (10YR 6/6) sandy loam; weak fine granular structure; very friable; few fine roots; common fine and very fine pores; 2 percent quartz gravel; strongly acid; clear smooth boundary.

Bt2--12 to 17 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; common faint clay films on faces of peds and in pores; many very fine and few fine pores; 5 percent quartz gravel; very strongly acid; abrupt smooth boundary.

Bt3--17 to 26 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium prominent red (2.5YR 4/6) and common medium distinct grayish brown (10YR 5/2) mottles; weak medium angular blocky structure; friable; common faint clay films on faces of peds and in pores; many very fine and few fine pores; 5 percent quartz gravel; 2 percent feldspar gravel; grayish brown mottles are relic weathered rock material and are not due to wetness; very strongly acid; clear smooth boundary.

Bt4--26 to 31 inches; reddish yellow (7.5YR 6/8) sandy clay loam; common medium prominent very pale brown (10YR 7/4) and light brownish gray (10YR 6/2) mottles weak medium subangular blocky structure; friable; 5 percent quartz gravel; 5 percent feldspar gravel; pockets of white clay; light brownish gray mottles and pockets of white clay are relic weathered rock material and are not due to wetness; very strongly acid; gradual smooth boundary.

BC--31 to 38 inches; mottled white (10YR 8/1), brownish yellow (10YR 6/8), light brownish gray (10YR 6/2) sandy clay loam; massive; friable; 5 percent feldspar gravel; 5 percent quartz gravel; white and light brownish gray mottles are relic weathered rock material and are not due to wetness; very

strongly acid; gradual smooth boundary.

C--38 to 60 inches; mottled white, gray, and brownish yellow sandy loam; massive; friable; few pockets of gray clay; 90 percent granite saprolite; very strongly acid.

TYPE LOCATION: Fairfield County, South Carolina; 6.2 miles southeast of Winnsboro; 1.4 miles northwest of junction of U.S. Highway and State Secondary Highway 21 to Good Hope Church; 200 feet south of South Carolina Secondary 21.

RANGE IN CHARACTERISTICS: Solum thickness is from 20 to 50 inches. Depth to a lithic contact is more than 60 inches. The soil is very strongly acid to slightly acid throughout. Content of mica flakes typically ranges from none to common. In some pedons, the C horizon below a depth of 40 inches has many flakes of mica. Content of rock fragments commonly is 0 to 12 percent. Some pedons have stones or boulders on the surface.

The A horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. Value also ranges to 3 in pedons with A horizons less than 6 inches thick. The A horizon is loamy coarse sand, loamy sand, coarse sandy loam, sandy loam, fine sandy loam, or loam.

The E horizon, where present, has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loamy coarse sand, loamy sand, sandy loam, fine sandy loam, or loam.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Brownish, reddish, yellowish, or grayish mottles range from none to common. It commonly is sandy clay loam but includes coarse sandy loam, fine sandy loam, sandy loam or clay loam. Thin layers of sandy clay are in some pedons.

The BC horizon, where present, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8, with mottles in shades of red, brown, yellow, gray, or white; or it is mottled in shades of the above. The gray and white mottles in the B horizon are relic weathered rock material and are not due to wetness. The BC horizon is loam, clay loam, sandy clay loam, sandy loam, or fine sandy loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8, with mottles in shades of red, brown, yellow, gray, or white, or is mottled in shades of red, brown, yellow, or white. It is loamy sand, coarse sandy loam, sandy loam, fine sandy loam, or sandy clay loam.

COMPETING SERIES: These are the Buckhead (tentative) Cheaha, Fruithurst, Montonia, Rawlings (tentative) Rome, Shady, Sherless, Sherwood, State, Sugargrove, Tidings, and Wickham series of the same family. Buckhead soils have more than 15 percent rock fragments throughout. Cheaha and Rawlings soils have bedrock at depths of 20 to 40 inches. Fruithurst, Montonia and Sherless soils have a paralithic contact at depths of 20 to 40 inches. Rome, Shady, State, and Wickham soils have a solum thickness of more than 40 inches, formed in alluvium and are on low stream terraces. Sherwood soils have bedrock at depths of 30 to 60 inches. Sugargrove and Tidings soils have a paralithic contact at a depth of 40 to 60 inches, and in addition have a Cr horizon of weathered sedimentary rock.

GEOGRAPHIC SETTING: Rion 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 soil formed in material mostly weathered from acid crystalline rocks. The mean annual precipitation ranges from 46 to 60 inches, the mean annual temperature ranges from 59 to 66 degrees F., and the frost-free season ranges from 200 to 230 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Ashlar, Cecil, Lloyd, Louisburg, Madison, Pacolet, Rawlings (tentative), Rion, Saw, Wateree, and Wedowee soils. Ashlar, Louisburg, and Wateree soils are Dystrochrepts, in addition, Ashlar and Wateree soils have bedrock within a depth of 40 inches. Cecil, Lloyd, Madison, Pacolet, Saw, and Wedowee soils are in fine families. Saw soils have bedrock within a depth of 40 inches.

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 primarily used for small grain, hay, and pasture.

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

MLRA OFFICE RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Fairfield County, South Carolina; 1977.

REMARKS: The Rion series was formerly included with the Wedowee and Pacolet series. Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to 7 inches (A and E horizons)

Argillic horizon - the zone from 7 to 31 inches (Bt1, Bt2, Bt3, and Bt4 horizons)

ADDITIONAL DATA: Grain count by South Carolina Agricultural Experiment Station is: 78 percent Quartz, 19.3 percent Feldspar, and 2.7 percent opaques and heavy minerals.

MLRA = 136

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
SC0090	RION	2- 60	59- 66	200-230	46- 60	200-1400
SC0136	RION	2- 40	59- 66	200-230	46- 60	200-1400

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
SC0090	NONE		6.0-6.0		-	60-60	
SC0136	NONE		6.0-6.0		-	60-60	

SOI-5	Depth	Texture	3-Inch	No-10	Clay%	-CEC-
SC0090	0- 7	LS LCOS	0- 2	70-100	2-15	2- 5
SC0090	0- 7	SL FSL L	0- 2	85-100	5-20	4- 7
SC0090	0- 7	SCL CL	0- 2	90-100	18-35	5- 10
SC0090	7-38	SL SCL CL	0- 2	85-100	18-35	4- 10

SC0090	38-60	SL SCL LS		0-	2	80-100	2-20	2-	8
SC0136	0- 7	BYV-LS		0-	5	70- 85	2-15	2-	5
SC0136	0- 7	BYV-SL BYV-FSL		0-	5	70- 85	5-20	4-	7
SC0136	7-38	SL SCL CL		0-	3	85-100	18-33	4-	10
SC0136	38-60	SL SCL LS		0-	2	80-100	2-20	2-	8

SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll
SC0090	0- 7	4.5- 6.5	.5-2.	0- 0	2.0- 6.0	LOW
SC0090	0- 7	4.5- 6.5	.5-2.	0- 0	2.0- 6.0	LOW
SC0090	0- 7	4.5- 6.5	.5-2.	0- 0	0.6- 2.0	LOW
SC0090	7-38	4.5- 6.5	0.-.5	0- 0	0.6- 2.0	LOW
SC0090	38-60	4.5- 6.5	0.-.5	0- 0	2.0- 6.0	LOW
SC0136	0- 7	4.5- 6.5	.5-2.	0- 0	2.0- 6.0	LOW
SC0136	0- 7	4.5- 6.5	.5-2.	0- 0	2.0- 6.0	LOW
SC0136	7-38	4.5- 6.5	0.-.5	0- 0	0.6- 2.0	LOW
SC0136	38-60	4.5- 6.5	0.-.5	0- 0	2.0- 6.0	LOW

National Cooperative Soil Survey
U.S.A.

LOCATION VANCE

NC+AL GA SC VA

Established Series
Rev. ENH:RAG
07/1999

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 OFFICE 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	-	-	-	-	-

LOCATION WAKE

NC

Established Series
Rev. AG-DTA
11/2002

WAKE SERIES

The Wake series consists of excessively drained, shallow, sandy soils on uplands of the Southern Piedmont. They formed in residuum weathered from igneous and high-grade metamorphic rocks such as granite and gneiss. Slope ranges from 2 to 45 percent. Near the type location, the mean annual rainfall is about 48 inches, and the mean annual temperature is about 61 degrees F.

TAXONOMIC CLASS: Mixed, thermic Lithic Udipsamments

TYPICAL PEDON: Wake loamy sand -- wooded. (Colors for moist soil unless otherwise stated.)

A--0 to 5 inches; dark yellowish brown (10YR 3/4) loamy sand; weak fine granular; very friable; about 10 percent gravel by volume; many fine, common medium, and many coarse roots; strongly acid; clear wavy boundary. (3 to 9 inches thick)

Bw--5 to 10 inches; dark yellowish brown (10YR 4/6) loamy sand; weak fine subangular blocky structure; very friable; about 10 percent gravel by volume; many fine, common medium, and many coarse roots; strongly acid; clear wavy boundary. (0 to 7 inches thick)

C--10 to 12 inches; dark yellowish brown (10YR 4/4) gravelly loamy coarse sand; single grained; loose; about 18 percent gravel by volume; many grains of feldspar; few flakes of mica and dark mineral grains; strongly acid; abrupt wavy boundary. (2 to 16 inches thick)

R--12 inches; hard, slightly fractured, unweathered granite.

TYPE LOCATION: Wake County, North Carolina. From Raleigh, 6.2 miles north on Secondary Road 2217 (Old Milburnie Road) from intersection with US Highway 64E; 1.8 miles east on Secondary Road 22 (Watkins Road); 0.5 mile south on private road (first driveway past Deep Cedar subdivision); 0.25 mile west on path that forks right; in wooded area near path 20 yards south of road.

RANGE IN CHARACTERISTICS: Depth to lithic contact with hard bedrock ranges from 11 to 20 inches. Surface stones and boulders are common in many areas. Content of coarse fragments ranges from 0 to 35 percent by volume. Mica content ranges from few to common throughout, and grains of feldspar range from few to many. Reaction of the soil ranges from very strongly acid to moderately acid throughout unless the surface has been limed.

The A horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is loamy sand, loamy coarse sand, or sand in the fine-earth fraction.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 6. It is loamy sand, loamy coarse sand, or sand in the fine-earth fraction.

The C horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is loamy sand, loamy coarse sand, or sand in the fine-earth fraction.

A thin Cr horizon is present in some pedons. It is multicolored, weathered igneous or high-grade metamorphic bedrock such as granite or gneiss.

The R horizon is unweathered igneous or high-grade metamorphic bedrock such as granite or gneiss.

COMPETING SERIES: There are no competing series in this family.

GEOGRAPHIC SETTING: Wake soils are gently sloping to steep and are on ridges and side slopes on the Piedmont uplands. Slope ranges from 2 to 45 percent. The soil formed in residuum weathered from felsic igneous and high-grade metamorphic rocks such as granite and gneiss. Mean annual rainfall ranges from about 35 to 54 inches, and mean annual air temperature ranges from about 58 to 62 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the Appling, Ashlar, Durham, Louisburg, Pacolet, Rion, Rolesville (T), Saw, Wateree, and Wedowee series. All of these are more than 20 inches deep to rock, and all except Ashlar, Louisburg, and Wateree have argillic horizons.

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

USE AND VEGETATION: Mostly in mixed hardwood forest of post oak, blackjack oak, northern red oak, and hickory along with shortleaf pine, Virginia pine and loblolly pine. Small areas are used for corn, small grain, orchards, and pasture.

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

MLRA OFFICE RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Wake County, North Carolina, 1966.

REMARKS: The April 1994 revision changed the classification from thermic, coated Lithic Quartzipsamments to mixed, thermic Lithic Udipsamments. Laboratory data documents more than 10 percent weatherable minerals in the control section of these soils in North Carolina. North Carolina is the only state that the Wake series has been correlated in. The November 2002 revision moved the type location to another site in Wake County. It also removed the coarse fragment requirement of 15 to 35 percent throughout.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - The zone from 0 to 5 inches (A horizon)

Lithic contact - The occurrence of hard bedrock at 12 inches (R horizon)

ADDITIONAL DATA:

MLRA: 136

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation	
NC0079	WAKE	2- 45	58- 62	180-270	35- 54	350-1200	
SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
NC0079	NONE		6.0-6.0		-	11-20	HARD
SOI-5	Depth	Texture		3-Inch	No-10	Clay%	-CEC-
NC0079	0-5	LCOS LS S		0- 10	90-100	3-12	-
NC0079	5-12	LCOS LS S		0- 10	90-100	3-15	-
NC0079	12	UWB		-	-	-	-
SOI-5	Depth	-pH-	O.M.	Salin	Permeab	Shnk-Swll	
NC0079	0-5	4.5- 6.0	.5-1.	0- 0	6.0-20	LOW	
NC0079	5-12	4.5- 6.0	0-.5	0- 0	6.0-20	LOW	
NC0079	12	-	-	-	-		

National Cooperative Soil Survey
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LOCATION WEDOWEE

AL+GA NC SC VA

Established Series
Rev. WBP:PGM
07/1999

WEDOWEE SERIES

The Wedowee series consists of very deep, well drained, moderately permeable soils that formed in residuum from weathered crystalline rock of the Piedmont Plateau. These soils are on narrow ridges and on side slopes of uplands. Slope is dominantly less than 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, on a convex 12 percent slope, in forest. (Colors are for moist soil.)

A--0 to 4 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; strongly acid; clear smooth boundary. (1 to 5 inches thick)

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

BE--10 to 14 inches; brownish yellow (10YR 6/6) loam; weak fine subangular blocky structure; friable; strongly acid; clear smooth boundary. (0 to 6 inches thick)

Bt--14 to 24 inches; strong brown (7.5YR 5/6) sandy clay; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary. (8 to 24 inches thick)

BC--24 to 32 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct very pale brown (10YR 7/4) and yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; strongly acid; gradual smooth boundary. (6 to 12 inches thick)

C--32 to 60 inches; mottled strong brown (7.5YR 5/6), very pale brown (10YR 7/4), and yellowish red (5YR 5/8) saprolite of sandy clay loam texture; rock structure; friable; strongly acid.

TYPE LOCATION: Randolph County, Alabama. One mile north of Rock Mills on north side of State Highway 22.

RANGE IN CHARACTERISTICS: Depth to hard 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 horizon and the 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, present in most pedons, has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. Texture and coarse fragment content are the same as the A horizon.

The BE horizon, present in most pedons, 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 typically 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 are in the lower part of the Bt horizon in most pedons and in the upper part of the Bt horizon 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 45 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, highly weathered gneiss, granite, or schist saprolite with a crushed texture of sandy clay loam, clay loam, loam, fine sandy loam, sandy loam, or sandy clay.

COMPETING SERIES: These include the Appling, Bethlehem, Cecil, Madison, Nankin, Pacolet, and Tumbleton 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. Madison soils have hue of 5YR or redder dominant in the Bt horizon and have many flakes of mica in the lower part of the solum. Nankin and Tumbleton soils developed in unconsolidated clayey and loamy sediments and have a solum thickness of more than 40 inches. Pacolet soils have Bt horizons with hue of 2.5YR or redder.

GEOGRAPHIC SETTING: Wedowee soils are on sloping to steep uplands of the Southern Piedmont MLRA. Slopes are mainly 5 to 25 percent, but range from 0 to 60 percent. The soils have formed in residuum from weathered acid crystalline rocks. The climate is warm and humid. Average annual precipitation ranges from 42 to 56 inches and average annual temperature ranges from 58 to 65 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: In addition to the competing Appling, Cecil, Madison, and Pacolet series, these are the Durham, Louisburg, and Worsham series. Durham soils are fine-loamy. Louisburg soils do not have a continuous Bt horizon and are coarse-loamy. Worsham soils are poorly drained.

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. Principal crops grown are cotton, corn, tobacco, small grain, hay, peaches, pecans, and pasture.

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

MLRA OFFICE 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.

Revised: RLV 11/24/97

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface of the soil to a depth of 14 inches (A, E, and BE horizons)
 Argillic and kandic horizon - the zone from approximately 14 to 24 inches (Bt horizon)

TABULAR SERIES DATA:

SOI-5	Soil Name	Slope	Airtemp	FrFr/Seas	Precip	Elevation
AL0046	WEDOWEE	0- 60	58- 65	175-225	42- 56	300-1200
AL0138	WEDOWEE	0- 60	58- 65	175-225	42- 56	300-1200
AL0146	WEDOWEE	0- 60	58- 65	175-225	42- 56	300-1200

SOI-5	FloodL	FloodH	Watertable	Kind	Months	Bedrock	Hardness
AL0046	NONE		6.0-6.0		-	60-60	
AL0138	NONE		6.0-6.0		-	60-60	
AL0146	NONE		6.0-6.0		-	60-60	

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	35-45	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	35-45	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	35-45	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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LOCATION WEHADKEE

NC+AL AR FL GA MS SC TN VA

Established Series
Rev. RM:AG
10/2000

WEHADKEE SERIES

The Wehadkee series consists of very deep, poorly drained and very poorly drained soils on flood plains along streams that drain from the mountains and piedmont. They are formed in loamy sediments. Slopes range from 0 to 2 percent. Near the type location, mean annual precipitation is about 48 inches, and mean annual temperature is about 60 degrees F.

TAXONOMIC CLASS: Fine-loamy, mixed, active, nonacid, thermic Fluvaquentic Endoaquepts

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

Ap--0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few flakes of mica; moderately acid; abrupt smooth boundary. (6 to 14 inches thick)

Bg1--8 to 17 inches; dark gray (10YR 4/1) loam; common medium prominent strong brown (7.5YR 5/6) soft masses of iron accumulation; weak fine and medium subangular blocky structure; friable; few flakes of mica; moderately acid; clear smooth boundary. (8 to 20 inches thick)

Bg2--17 to 40 inches; gray (10YR 6/1) sandy clay loam; common medium prominent strong brown (7.5YR 5/6) soft masses of iron accumulation; weak medium subangular blocky structure; friable; common flakes of mica; moderately acid; clear smooth boundary. (0 to 30 inches thick)

Cg--40 to 50 inches; gray (10YR 6/1) sandy loam; common medium faint grayish brown (10YR 5/2) iron depletions and prominent strong brown (7.5YR 5/6) soft masses of iron accumulation; massive; friable; common flakes of mica; moderately acid.

TYPE LOCATION: Catawba County, North Carolina; 1/2 mile south of Witherspoon Crossroads on SR 1801, 3/4 mile east on SR 1807, and 650 feet north of bridge on Hogan Creek.

RANGE IN CHARACTERISTICS: Solum thickness ranges from about 20 to more than 60 inches. The content of mica flakes ranges from few to many. The soil ranges from very strongly acid through neutral, but some part of the 10 to 40 inch control section is moderately acid through neutral. Content of rock fragments ranges from 0 to 5 percent by volume in the A and B horizons, and from 0 to 20 percent by volume in the C horizons. Fragments are dominantly pebbles in size.

The Ap or A horizon has hue of 10YR or 2.5Y or is neutral, value of 3 to 6, and chroma of 0 to 4. Some pedons have soft masses of iron accumulation in shades of brown or red. Texture is fine sandy loam, very fine sandy loam, loam, silty clay loam, sandy loam, or silt loam. Some pedons have recent layers of overwash as much as 20 inches thick that are loamy and variable in color. Many pedons have an Ab horizon that has the same color and texture range as the A horizon.

The Bg horizon has hue of 10YR to 5Y or is neutral, value of 4 to 6, and chroma of 0 to 2. Soft masses of iron accumulation are in shades of red, yellow, and brown. Texture is sandy clay loam, silt loam, loam, clay loam, or silty clay loam.

The Cg horizon has hue of 10YR to 5Y or is neutral, value of 4 to 7, and chroma of 0 to 2. Soft masses of iron accumulation are in shades of brown, red, and yellow. Texture is commonly sandy loam, loam, or silt loam, but in some pedons the Cg horizon contains stratified layers of sandy clay loam, clay loam, silty clay loam, loamy sand, sand, and gravel. Sandy textures are restricted to depths below 40 inches.

COMPETING SERIES: There are no other known series in this family. Series in closely related families are Bibb, Chastain, Chewacla, Chowan, Englehard, Hatboro, Kinston, Lee, Mantachie, Mhoon, Muckalee, Rosebloom, and Una series. Bibb and Muckalee soils are coarse-loamy with siliceous mineralogy. Bibb soils have reaction of strongly acid or more acid throughout the control section. Chastain and Una soils are clayey and reaction is strongly acid or more acid throughout the control section. Chewacla soils have dominant chroma of more than 2 in the upper 20 inches of the soil. Chewacla soils are Fluvaqueptic Dystrochrepts. Chowan, Mhoon, and Rosebloom soils are fine-silty. The subgroup for Chowan is Thapto-Histic. Englehard soils are coarse-silty and their subgroup is Humaqueptic. Hatboro soils are mesic. Kinston and Lee soils have siliceous mineralogy and reaction is strongly acid or more acid throughout the control section. Mantachie soils have siliceous mineralogy and reaction is strongly acid or more acid throughout the control section.

GEOGRAPHIC SETTING: Wehadkee soils occur on flood plains, along streams that drain from the mountains and piedmont. Slopes are generally less than 2 percent. Wehadkee soils formed in loamy sediments washed from soils that formed from schist, gneiss, granite, phyllite, and other metamorphic and igneous rocks. Mean annual precipitation is about 48 inches near the type location and mean annual temperature is about 60 degrees F. Mean annual precipitation ranges from 37 to 69 inches, and mean annual air temperature ranges from 58 to 68 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Chewacla series and Altavista, Augusta, Buncombe, Congaree, Riverview, Roanoke, State, and Wickham series. Altavista, Augusta, Roanoke, State, and Wickham soils are on terraces and have argillic horizons. Buncombe soils are on flood plains typically beside stream channels and are sandy and excessively drained. Chewacla soils are on flood plain positions that are higher or nearer to stream channels and are somewhat poorly drained. Congaree and Riverview soils are on flood plains adjacent or near stream channels and are better drained.

DRAINAGE AND PERMEABILITY: Poorly drained and very poorly drained. Runoff is very slow and internal drainage is very slow. Permeability is moderate. Most areas are frequently flooded.

USE AND VEGETATION: Most of the area is in forest; chiefly water tolerant hardwoods such as sweetgum, blackgum, water oak, willow, oak, poplar, hickories, beech, and elm. Drained areas are used for pasture, corn, and hay.

DISTRIBUTION AND EXTENT: Alabama, Arkansas, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. The soil is of moderate extent.

MLRA OFFICE RESPONSIBLE: Raleigh, North Carolina

SERIES ESTABLISHED: Johnston County, North Carolina; 1911.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - The zone from 0 to 8 inches (Ap horizon)

Irregular decrease in organic carbon with depth

Aquic conditions - redoximorphic features associated with wetness in the zone from 8 to 50 inches (Bg1, Bg2, and Cg horizons)

MLRA = 133A, 133B, 136, 153A, 153B

REVISED = 10/2000 KSL

ADDITIONAL DATA:

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

NC0052 WEHADKEE 0- 2 58- 68 185-250 37- 69 5- 700

NC0233 WEHADKEE 0- 2 58- 68 185-250 37- 69 5- 700

SOI-5 FloodL FloodH Watertable Kind Months Bedrock Hardness

NC0052 COMMON 0-1.0 APPARENT NOV-MAY 60-60

NC0233 COMMON - APPARENT - 60-60

SOI-5 Depth Texture 3-Inch No-10 Clay% -CEC-

NC0052 0- 8 FSL L SL 0- 0 95-100 5-20 5- 20

NC0052 0- 8 SIL SICL 0- 0 98-100 6-40 5- 35

NC0052 8-40 SICL L SCL 0- 0 99-100 18-35 5- 25

NC0052 40-50 VAR - - - -

NC0233 0- 8 FSL L SL 0- 0 95-100 5-20 3- 9

NC0233 0- 8 SIL SICL 0- 0 95-100 6-40 3- 12

NC0233 8-40 SIL SICL VFSL 0- 0 95-100 18-35 4- 9

NC0233 40-50 VAR - - - -

SOI-5 Depth -pH- O.M. Salin Permeab Shnk-Swll

NC0052 0- 8 4.5- 6.5 2.-5. 0- 0 2.0- 6.0 LOW

NC0052 0- 8 4.5- 6.5 2.-5. 0- 0 0.6- 2.0 LOW

NC0052 8-40 4.5- 6.5 0.-2. 0- 0 0.6- 2.0 LOW

NC0052 40-50 - - - -

NC0233 0- 8 4.5- 6.5 2.-5. 0- 0 2.0- 6.0 LOW

NC0233 0- 8 4.5- 6.5 2.-5. 0- 0 0.6- 2.0 LOW

NC0233 8-40 4.5- 6.5 0.-2. 0- 0 0.6- 2.0 LOW

NC0233 40-50 - - - -

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