U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF THE CONWAY AREA, SOUTH CAROLINA.

BY

W. J. LATIMER AND CORNELIUS VAN DUYNE.

[Advance Sheets—Field Operations of the Bureau of Soils, 1909.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1910.

[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, ninteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., July 22, 1910.

SIR: The Conway area, South Carolina, consisting of a part of Horry County, was surveyed during the field season of 1909. This work was desired by the citizens of the area covered, with the special view of obtaining information of the extent of certain soils adapted to strawberries and other truck crops, in the production of which considerable development has taken place during recent years. The requests bore the indorsement of the Hon. J. E. Ellerbe, within whose district Horry County lies.

The report throws some very interesting light on local conditions in this part of South Carolina. While the soils are well adapted to cotton very much less attention is given to cotton production than in surrounding counties. Tobacco is a much more important crop, and, as indicated above, development along special lines is taking place. The report should be of considerable value as an example of what may be done in this part of the South to avoid placing too great dependence upon the single crop cotton. The report shows that there are wide areas of soil suited to strawberries and other trucking crops still awaiting development. It also shows the need of extensive drainage work.

I have the honor to transmit herewith the report and map covering this work and to recommend that they be published as advance sheets of field operations of the Bureau of Soils for 1909, as authorized by law.

Very respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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SOIL SURVEY OF THE CONWAY AREA, SOUTH CAROLINA.

By W. J. LATIMER and CORNELIUS VAN DUYNE.

DESCRIPTION OF THE AREA.

The Conway area occupies that portion of Horry County, S. C., which lies to the west of the Waccamaw River and the Atlantic Coast Line Railroad and comprises 378,880 acres, or 592 square miles. It is bounded on the north by the North Carolina state line, on the east by Horry County, on the south by Georgetown County, and on

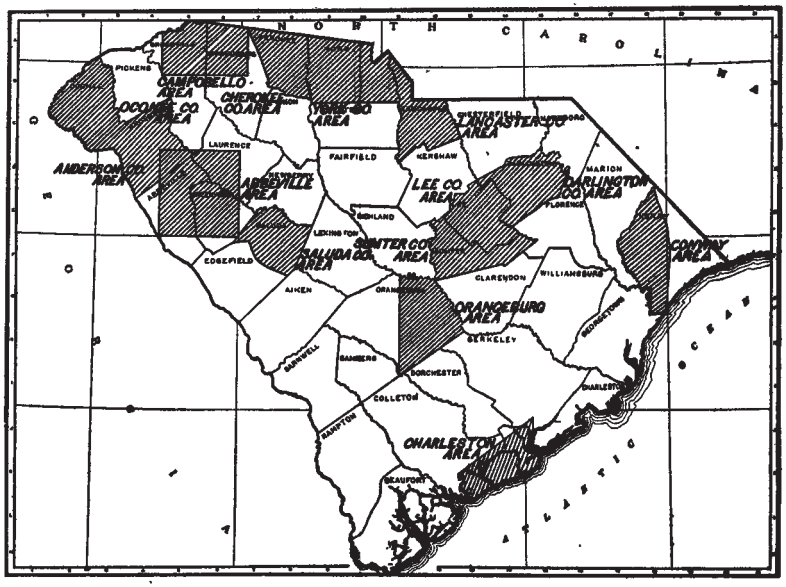

FIG. 1.—Sketch map showing location of the Conway area, South Carolina.

the west by Marion County. North and south the area is nearly 50 miles in length, and its greatest width is about 20 miles. The Little Pee Dee River with its tributary, Lumber River, extends along the entire western boundary of the area; Bull Creek and the Great Pee Dee River form the southern boundary; and the Waccamaw River forms nearly half the eastern boundary. The area lies wholly within the lower pine belt of the Atlantic Coastal Plain.

The topography of the area is rolling, gently rolling in undulating, and level. The surface along the escarpment of the Little Pee Dee Swamp is broken and more rolling than other parts. The bluffs

along the swamp have a general level of 30 to 40 feet above the level of the swamp, but have suffered much from erosion. Many large streams heading in the interior of the area have cut their channels to the swamp level. Passing east from Little Pee Dee Swamp the surface of the country becomes less rolling and undulating until broad expanses of level country are encountered. Along the eastern boundary of the area north of Conway the country is comparatively level, and broken only by an occasional small stream valley. There is a well-defined drop from the higher lands of the Lower Pine Belt to the region nearer the coast, within which the topography is flat to slightly undulating, with broken areas only along the larger streams. The sparsely timbered flat areas are known locally as "savannas."

The larger proportion of the area is drained by the Little Pee Dee River and its tributaries. Gap Way Swamp, Cedar Creek, and Black Creek drain the northern part of the area. Lake Swamp and its tributaries, Play Card, Pleasant Meadow, Mitchell, and Iron Spring swamps, represent the largest drainage system in the area, which drains the northeastern and north-central parts of the area. The south-central and southwestern parts are drained by Chinners, Brunson, and Spring swamps. The southern part is drained by Brown, Hunting, and Pawley swamps, which empty into the Little Pee Dee River, by Cowford Swamp flowing into Bill Creek, and by a few smaller streams, affluents of the Waccamaw River. A small strip along the eastern side of the area is drained by the Waccamaw and its tributaries.

The large streams are usually sluggish, but the smaller ones have enough fall to furnish water power for local mills, and many such are found where the streams break from the plateau to the level of the larger swamps.

There is not a point in the area that is 100 feet above sea level, but there are places in the northern part not very much below this elevation. The southern extremity of the area is a tidal marsh and the highest elevation in the town of Conway is about 50 feet above sea level. The area has a general slope to the southwest and there is ample fall to drain the plateaus.

In 1730 the provincial government of South Carolina laid out a township of 20,000 acres on the Waccamaw River and named it Kingston. Fifty acres were to be given to each man, woman, and child that settled in the township, but this offer did not bring immigrants very fast. At the time of the Revolutionary War there were very few residents in the area, but soon thereafter there was an influx of settlers from other parts of the State. The early settlers were largely English, French, Scotch, and Irish.

Horry County was formed in 1801. From 1820 until the civil war the population increased steadily. Very few slaves were owned, and

they were confined to the rice fields in the lower part of the area. Comparatively few negroes are found in the area now, and most of these are in the section of the area where slaves were owned, between Conway and Bucksport. Nearly all the laboring class in the upper part of the area is white.

A great tide of immigration set in from North Carolina with the introduction of the turpentine industry, about ten years before the civil war, and many more settlers came from that State to engage in lumbering after the opening of the Elrod and Conway Railroad. The Homewood Colony, consisting of about 50 families from the Middle West, was founded in 1898. It took up small farms 4 miles north of Conway and has made a success at trucking.

About 25 per cent of the land in the area is under cultivation. The largest bodies of cultivated land are found around Wanamaker, Green Sea, and north of Conway. There is a considerable acreage of well-drained arable land not under cultivation, and also large areas that are poorly drained and not suited for agricultural purposes in their present condition. The turpentine industry is now of little importance, only a few stills being in operation. Lumbering is still a thriving business and will continue so for some time, as there are large areas of good timber yet untouched. Most of the upland growth of longleaf pine has been cleared away, but the low land and swamps are still covered with pine, cypress, and gum.

Artesian wells are found in nearly all parts of the area. In the region near the coast they have an especially strong flow, and it is only necessary to drill a few hundred feet to obtain a good supply of water.

On all hands are seen the evidences of prosperity and industry, such as the building of houses, barns, and wire fences, and the digging of extensive drainage ditches. Improved farm machinery is used to some extent. The farmers have made a good deal of money in growing tobacco and strawberries during the last few years.

Conway, the county seat of Horry County, is the principal town in the area and has a population of about 2,500. It has large lumber interests, and is a good cotton, tobacco, and strawberry market. Considerable quantities of resin, turpentine, and wood distillates are shipped from this point. Conway is situated on the Waccamaw River, which is navigable to the sea, and is also the terminus of the Elrod and Conway branch of the Atlantic Coast Line Railroad. The Conway Coast and Western Railroad extends from Conway to Myrtle Beach, a summer resort on the Atlantic Ocean, and to Aynor, a point in the area 18 miles north of Conway. Loris, the second town of importance in the area, is situated on the Atlantic Coast Line Railroad about 20 miles from Conway, and is a thriving tobacco market. Sanford, Bayboro, and Allen are small towns between Con-

way and Loris supported largely by the lumber business. Mount Tabor, N. C., is just across the line from the area and is a good strawberry market. A great many strawberries are shipped out of the area through this point. Although outside the area, Mullins, Nichols, and Fair Bluff are good cotton and tobacco markets for the northwestern corner of the area. Bucksport, near the southern end of the area, is situated at the head of deep-water navigation on the Waccamaw River; and Eddy Lake, 2 miles west of Bucksport, occupies relatively the same position on Bull Creek. Eddy Lake is the terminus of the Eddy Lake and Northern Railroad, which extends about 16 miles along the edge of the Little Pee Dee Swamp. Both of these places have large lumber interests. Galivants Ferry, on the Little Pee Dee River, is an important trading point in the western part of the area.

The Elrod and Conway branch of the Atlantic Coast Line Railroad crosses the Columbia and Wilmington Branch at Chadbourn, N. C., 40 miles from Conway, and connects with the main line at Elrod, N. C. This gives an outlet and direct connections with the northern truck markets in Washington, Baltimore, Philadelphia, New York, and Boston. The Waccamaw line of steamers plies between Conway and Georgetown, S. C., and gives an outlet for lumber, naval stores, and cotton. Georgetown furnishes a good market for the purchase of supplies, especially fertilizers.

The dirt roads of the area are not what they should be, considering the abundance of good road material at hand, and the generally level, unbroken surface of the country. Many of the fine sandy loams of the area make natural roads that can be kept in good condition. Some of the sandy roads in the area have been clayed, but only a very small percentage of the sandy road mileage has been so treated. The roads across the heavy clay soils in the southern part of the area should be well drained and rounded and surfaced with a mixture of sand and clay or marl.

CLIMATE.

The climatic conditions of the Conway area are typical of the southern Atlantic Coastal Plain region. The winters are open and mild, with little snowfall—only a trace in some winters. The area is partly surrounded by large streams and swamps, and the Atlantic Ocean is but 5 miles from the southern end of the area and 25 miles from the northeastern corner, with the Gulf Stream only 50 miles offshore. To these surroundings is due a higher mean winter temperature than that found in the adjoining country farther inland north and west. The influence of the ocean is felt more strongly in the southern part of the area, and the season is two weeks earlier there than at Chadbourn, N. C., 40 miles north of Conway. The sum-

mers are long and hot, but the heat is not as excessive as might be expected in this latitude, being tempered by sea breezes. The cold periods are usually accompanied by relatively high humidity and are the more unpleasant on this account.

The rainfall is well distributed throughout the year, the heaviest precipitation occurring during the summer months, when most needed by the growing crops. There is a long period for growth, and on the whole the climatic conditions are ideal for truck growing. The crops mature midway between those of Florida and of the Norfolk trucking region, and this gives the truckers of the Horry district a market that is not oversupplied.

The following table, compiled from the Weather Bureau records taken at Southport, N. C., Charleston, S. C., and Stateburg, S. C., gives the normal monthly, seasonal, and annual temperature and precipitation, averaged for the three stations:

Normal monthly, seasonal, and annual temperature and precipitation. Average for three stations—Southport, N. C., Charleston, S. C., and Stateburg, S. C.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for driest year.	Total amount for wettest year.	Snow.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	49	76	9	3.2	2.4	4.9	0.17
January	47	78	9	3.6	2.8	2.2	.40
February	50	78	3	3.7	2.6	4.1	2.00
Winter	48			10.5	7.8	11.2	2.60
March	55	80.5	21	3.8	3.2	4.1	Trace.
April	63	89	31	3.1	1.8	4.4	0.00
May	72	98	43	3.3	2.9	2.7	0.00
Spring	63			10.2	8.0	11.2	Trace.
June	78	98	51	4.8	2.9	12.8	0.00
July	80	103	60	6.3	5.9	6.5	0.00
August	79	101	59	6.0	4.2	5.5	0.00
Summer	79			17.1	13.0	24.8	0.00
September	75	96	43	4.4	1.8	9.0	0.00
October	65	90	36	3.9	1.0	8.0	0.00
November	56	83	20	2.7	1.2	3.2	0.00
Fall	65			11.0	4.0	20.2	0.00
Annual	64	103	3	48.8	32.8	67.4	2.60

AGRICULTURE.

It was not until after the decline of the turpentine industry, about 1880, that the people of the area turned their attention to agricultural pursuits. Up to this time there had been very little agricultural produce exported and the crops grown, such as corn, wheat, and

potatoes, were for home consumption. Small herds of stock were kept and nearly all supplies were produced at home. Before the turpentine industry became the chief source of income most of the citizens were engaged in lumbering, fish and game were plentiful, and there was little need of tilling the soil for a livelihood. The growing of indigo was an industry along the coast country during the early days, but very little was grown within the limits of the Conway area. The bonus placed upon indigo by the British Government was not continued by the United States, and the industry rapidly declined after the Revolution. The rice fields in the southern part of the area, along Bull Creek, were allowed to run down during the period of the civil war and were not reclaimed afterwards and were entirely abandoned about 1870.

Compared with other areas of equal size in the cotton-growing States very little cotton is grown in the area. This is due in part to the scarcity of labor and in part to the cultivation of more profitable crops. About twenty years ago bright tobacco was introduced into the area as a money crop. It was first grown in the Wanamaker section and gradually spread over the area. With its help the small farmer, who had been barely making a living growing cotton, became more prosperous. The census report for 1900 gave the tobacco crop of Horry County as 1,000,000 pounds. Within the last few years the tobacco output has increased rapidly and now probably amounts to 10,000,000 pounds, the greater part of which is grown in that part of the county covered by the survey. The growers of tobacco rarely fail to make expenses even in the worst years and, usually, they clear from $50 to $200 an acre. Corn is grown in all parts of the area, and upon an acreage larger than that of all the other crops combined. Many farmers plant cowpeas at the last cultivation of corn. Pea-vine and crab-grass hay are very profitable crops, though not very widely grown. Sweet potatoes are produced in great abundance, but not commercially. Irish potatoes are grown to a very limited extent. Ribbon sugar cane is grown on nearly all farms and produces an excellent quality of sirup on well-drained soils. Peanuts, watermelons, and cantaloupes are not grown for shipment.

Trucking was introduced about ten years ago by the Homewood colony and has developed steadily since that time. All the truck crops grown in the middle Atlantic trucking section can be successfully produced in this area. Lettuce, celery, cucumbers, radishes, and beans are good money crops, but strawberries pay so much better that the truckers have turned their attention almost exclusively to this crop. Of the two varieties of strawberries grown in the area, Klondyke and Lady Thompson, Klondyke has proved by far the most profitable. The cultivation of this variety is restricted to a small section around Conway and Homewood, while the Lady Thompson is grown in the

northern part of the area. The growing of strawberries is necessarily confined within a radius of 5 or 6 miles from a shipping point, as strawberries hauled a greater distance do not ship well.

Up-to-date methods of cultivation are used by the strawberry growers of this area. The best growers, before setting the plants, sow the land to cowpeas, vetch, or some other legume. Large quantities of nitrogen are thus supplied to the soil and it is left in ideal condition in other respects. About 500 pounds of fertilizer is applied after the land has been broken and thoroughly pulverized and smoothed with disk and smoothing harrows. The rows are laid off 3½ feet apart and plants set 20 inches in the row, thus leaving room for two plants to be grown by runners from each original plant. The young plants, while not yielding so much as the older plants, give a better quality of berry, which ripens a little earlier. At least 1 ton of fertilizer (8–2½–3) is applied per acre—one-third after the picking season, one-third in September, and the balance in January. For the season of 1908—one of the best in recent years—one of the Klondyke berry growers secured a net profit of $500 an acre, and his best plats netted $1,000 an acre. Growers usually expect from $200 to $300 profit an acre. The Klondyke strawberry usually brings a little more than double the price of the Lady Thompson. In 1908 the Klondyke averaged $5.07 per crate of 32 quarts and in 1909, $4.40 per crate. The shipping season usually begins about the second week in April and ends the first of June. From 75 to 100 cars of 250 crates each are shipped out of the area each season. Strawberries are no longer consigned to commission houses, but are sold direct to buyers. New York and Boston furnish the best markets.

A great many cattle and hogs, practically all scrub stock, are raised in the area. There is very little chance of improving the breeds as long as the present stock law is in force. The law requires that all crops must be planted in fenced areas and stock may be allowed to run at large. The law is a serious drawback to extensive agricultural operations.

The amount and grade of the fertilizers in general use are: 200 to 1,200 pounds of 8–2–2 or 8–3–3 for cotton, and 200 to 500 pounds of the same grade for corn; 800 to 1,000 pounds of 8–4–4 for tobacco. Fifty to 250 pounds of nitrate of soda is used as a top dressing for cotton, corn, and oats, and 200 pounds of acid phosphate is often used on cotton, corn, and oats in addition to the fertilizers mentioned above. Fertilizer distributers are in common use.

Many farmers recognize in a general way the adaptation of certain soils to certain crops. Tobacco is usually grown on the Norfolk soils or the well-drained Coxville soils. The Portsmouth soils are recognized as good corn and oats soils. Cotton is grown on nearly all the heavy sandy loams. The Klondyke strawberry does best

upon the Coxville soils, and the Lady Thompson thrives upon the Norfolk soils. Truck crops in general mature earlier and do best upon the Norfolk soils. The sandy soils are recognized as the best for sweet potatoes, although they tend to "string" in deep sand. In a sandy loam soil the roots are more rounded and better on this account. Peanuts are not grown very extensively but do well upon the Norfolk types. Ribbon sugar cane does best upon the well-drained fine sandy loams. Although many farmers recognize these differences in soils, nearly all the staple crops are grown on all the soils without regard to their special fitness for the purpose.

Systematic rotation of crops could be practiced in the Conway area without any difficulty. Conditions are very different in this area and in most cotton-growing regions, where nearly all the land is rented and a large acreage is in cotton year after year. There is little excuse for not rotating the crops in this area, where so many different crops are grown. As a matter of fact, rotation is practiced to some extent, though not always in a way to obtain the best results. A rotation in common use by the best farmers is cotton, corn and cowpeas, oats, and cowpeas.

The cultural methods used in the area are very much the same as used over the entire South Atlantic Coastal Plain, and as practiced by the best farmers give good results. The chief cause of failure to produce good crops lies not so much in methods used as in the haphazard way in which these methods are applied by a majority of the farmers. In the culture of cotton they are negligent in "breaking the middles," and by this lose the opportunity of properly placing the cultivations that follow. In a general way, it is understood that crops planted in wet ground should be planted on a ridge, and upon dry ground in a furrow. Little difference is made between the cultivation of poorly drained and well-drained soils or between heavy and light soils. Plowing is usually shallow, 3 or 4 inches being the average depth.

A large part of the Conway area is low-lying and the natural drainage conditions are very poor. Only in case of the Norfolk series, Orangeburg fine sandy loam, Sandhill, and the Coxville fine sandy loam is natural drainage adequate, and even the heavier of these types should be supplied with ditches to remove the surplus water during wet seasons. Much of the land needing drainage would, if drained, become valuable for agriculture. Corn, oats, onions, cabbage, lettuce, celery, and strawberries could be produced with profit. This is shown in the few scattered areas where partial drainage has been secured.

Rainfall is heaviest during the growing season, and this generally aggravates the poor drainage conditions. The soil types bordering swamps and having savannas between them and the upland and nar-

row strips occupying the same position with higher ground behind them suffer from the accumulation of seepage water and should be protected by ditching.

While something can be done through individual effort to better the drainage conditions of isolated fields by ditching to natural waterways, the only way in which the many large areas can be successfully reclaimed is through cooperation among the landowners or through state or county projects. It will be necessary to lower the water table over wide areas, and to accomplish this the larger swamps will have to be canaled. Such extensive drainage would not only reclaim the soils for agricultural purposes, but also improve the general healthfulness of the area.

Three-fourths of the field labor of the area is white, and help on the farm is scarce. This is due to the large number employed in the lumber mills and logging camps. Field labor is paid 75 cents to $1 a day, or $20 a month. But very little field labor is hired, most of the work being done by the owner or tenant with the aid of other members of his family. Under the share system the owner furnishes the land and fertilizer, the tenant furnishes stock and implements, and one-half of the proceeds of the staple crops go to each. There is very little land rented for cash.

The average size of the farms in Horry County, as given by the census of 1900, is 143.3[a] acres, and 67.5 per cent of the farms are operated by the owners. These figures show a very healthy condition. The price of farm land ranges from $5 to $50 an acre. In the lower part of the area, where negro labor is plentiful, the farms are large and cotton is the money crop; in the upper part the farms are smaller and the field work is done largely by the owners. Under the latter conditions the area has a wonderful opportunity to develop into an important trucking section.

Other truck crops besides strawberries should be grown. While they may not pay so well, the growing of other crops will, to a certain extent, eliminate the possibility of overproduction.

Rotations that include cowpeas, vetch, and peanuts should be used. Vetch as a cover crop can be sown in cotton at the last working or with cowpeas at the last working of corn. The use of the leguminous crops will add humus to the soil and will supply nitrogen, thus reducing the quantity of nitrogenous fertilizers which it is now necessary to purchase at high prices. A good growth of cowpeas or vetch turned under is equivalent to the addition of about 400 pounds of nitrogen per acre, or enough to take the place of nitrogen in about 1,000 pounds per acre of an 8–2–3 mixture. Deep plowing and the

[a] The average size of individual holding is probably somewhat larger, as the census tabulated each tenancy as a farm.

incorporation of as much organic matter as possible by turning under of cover crops is recommended for all the well-drained soils. The Williamson method of growing corn is recommended upon the light Norfolk soils, where it is not practicable to apply large quantities of organic matter.

Where field labor is so scarce more machinery could be used to advantage. There is especial need of sulky plows, multiple-toothed cultivators, and tobacco transplanters.

The favorable climatic conditions, the varied soils, and the marked progress being made along special lines of farming point to a marked development of agriculture in this section of the State.

SOILS.

The Conway area lies wholly within the flat seaward portion of the Atlantic Coastal Plain section of South Carolina known as the Lower Pine Belt. Geologically the uplands of this region have been classed as the Columbia formation. This formation comprises unconsolidated materials which were washed from the Piedmont plateau and deposited in an ocean that covered the region in prehistoric time.

The coarser particles were deposited near the shore, while the finer particles, fine and very fine sands, silts, and clays, remained in suspension longer and were carried farther out and laid down in deep water. The original deposits were altered and assorted by the action of waves and tides, so that there were considerable differences in the character of the materials in different places at the time of the recession of the sea. Subsequently these materials were subjected to still further change by weathering. In many places the finer particles of the surface have been removed by the drainage water, leaving a surface layer of coarse material. Again, fine material washed from higher areas has been deposited in the depressions, giving rise to the heavier soils of such situations. Other changes have taken place as the result of drainage conditions. In many of the depressions without adequate drainage outlets, the soil-forming material subject to continuous or intermittent water-logged conditions and poor aeration has been rendered more or less plastic in structure and mottled in color. Where these conditions have existed large quantities of organic matter have accumulated in the soil. On the other hand, the good aeration existing along slopes and ridges, where the drainage conditions have been nearly perfect, has assisted in the formation of soils having good structural and uniform color conditions, and the thorough oxidation induced by good aeration has in many places given rise to a red subsoil.

The former sea floor, as originally exposed, has been more or less dissected and altered by the cutting of stream channels, while the

original materials have been displaced in a measure by material from outside sources deposited in the stream bottoms.

There is in the area a range in soil texture and condition from incoherent sand to heavy plastic clays and from well-drained arable upland to frequently inundated stream bottoms. As determined by difference in such important characteristics as origin, color, structure, and drainage conditions the soils have been grouped into series. The series have been still further divided into soil classes or types according to the texture or relative content of sand, silt, and clay.

The soils derived from the heavy plastic clay deposits of the more level low-lying areas confined largely to the southern portion of the area have been grouped in the Coxville series. From the position and character of the clayey formation giving rise to this series it seems that the material was deposited in quiet, deep water and at an earlier date than the material giving rise to the Norfolk and Portsmouth soils. In fact, the formation giving rise to these soils underlies, in some places at least, the formation from which the Norfolk and Portsmouth soils are derived. The materials of this formation in some respects, particularly in plasticity and texture, are somewhat similar to those giving the Susquehanna soils in other parts of the Coastal Plain. There are, however, some very striking differences between the Coxville soils and the corresponding types of the Susquehanna series, as for instance, the more nearly flat surfaces, the frequent absence of forest cover or the presence at most of only a spare timber growth, the yellow color of the upper part of the subsoil, the brilliant red mottling, and usual compact character of the subsoil below 30 inches, and the relatively higher agricultural value.

The more recently deposited or overlying materials, representing the higher and usually more rolling country forming the greater part of the northern two-thirds of the area, give rise to the Norfolk and Portsmouth series. This more recently deposited portion of the uplands belongs strictly to the geological formation known as the Columbia. The soils resulting under the best drainage conditions have been included in the Norfolk series, and those formed under poor drainage conditions have been included in the Portsmouth series.

The Norfolk soils, as characteristically developed in the Conway area, range in color from gray to dark gray on the surface and from pale yellow to bright yellow in the subsoil. The color of the surface soil averages a little darker and the content of organic matter a little higher than in the series as typically developed in the higher and more rolling portions of the Coastal Plain farther inland. This darker color is due to a greater accummulation of organic matter as the result of poorer drainage, and is more marked where the land has never been cultivated—a condition obtaining in much of the type. The deep subsoil of the Norfolk type has been locally influenced by

the underlying clay formation mentioned above, causing the lower subsoil to be slightly more plastic than in typical areas.

The Portsmouth series comprises the flat, low-lying poorly drained areas of heavy dark-colored soils rich in organic matter, with slightly plastic subsoils of light-gray, mottled-gray, drab, yellow, or brown color.

The coarser members of the Norfolk and Portsmouth series are confined to a comparatively small belt in the extreme northwest part of the area.

The more recent soils of the area are confined to the strictly alluvial bottoms along the drainage ways. This alluvium, deposited from the overflow waters of the streams, is composed of materials washed down from the lands of the various drainage basins. Two types, Sandhill and Swamp, have been derived from this class of materials. The former is probably the result of combined river and wind action; the latter is strictly alluvial.

Beds of marl rich in calcium carbonate occur in a number of localities. The better grades could be used to good advantage as fertilizer on a number of the soils, especially the members of the Coxville and Portsmouth series, which are markedly benefited by applications of lime.

The following table gives the names and the area of the several types of soil shown in the accompanying map:

Areas of different soils.

Soils.	Acres.	Per cent.	Soils.	Acres.	Per cent.
Swamp	88,000	23.2	Sandhill	9,024	2.4
Norfolk fine sand	68,480	18.1	Norfolk silt loam	8,512	2.2
Norfolk fine sandy loam	67,328	17.8	Coxville clay	6,656	1.8
Norfolk sand	24,960	6.6	Portsmouth sandy loam	5,248	1.4
Coxville fine sandy loam	24,896	6.6	Norfolk sandy loam	5,184	1.4
Portsmouth fine sand	20,608	5.4	Orangeburg fine sandy loam	3,072	.8
Portsmouth fine sandy loam	19,200	5.1	Coxville silt loam	1,216	.3
Portsmouth sand	14,208	3.7	Total	378,880	
Coxville very fine sandy loam	12,288	3.2			

NORFOLK FINE SANDY LOAM.

The soil of the Norfolk fine sandy loam consists of a loose loamy fine sand to a light fine sandy loam. There is a range in color from gray, slightly darkened with organic matter in the immediate surface, through pale yellow at a few inches below to bright yellow as the subsoil is approached. In the poorly drained spots and slight depressions the surface is very dark in color, the subsurface being gray; while in fields long under cultivation the prevailing color of the soil is light gray. The soil varies from 8 to 24 inches in depth,

but over a large proportion of the area it is less than 15 inches deep. The subsoil to 3 feet or more is a bright yellow friable fine sandy clay. Where the soil is shallow the first 10 inches of the subsoil may be a fine sandy loam. In depressions and poorly drained spots the deep subsoil becomes slightly plastic, with an occasional slight mottling of red. The structure of the subsoil of this type enables it to retain moisture and fertilizers more readily than the coarser and more open types of the Norfolk series.

A light open texture and structure make the soil easy to till, though there is enough finer material present to cause the formation of clods if the fields be plowed when too wet. The clods, however, are easily broken down by harrowing.

Areas of Norfolk fine sandy loam have a gently rolling to level surface and are usually well drained. Only the slight depressions need draining, but it is best to have ditches in the more level portions to carry off the excess rainfall during very wet seasons. A shallow phase of this type is found around Wanamaker, Green Sea, and Loris. Spots of the deeper phase are found in all parts of the area. Another variation of this type is found along the Lewisville and Galivants Ferry road, where the deep subsoil contains an abnormally high percentage of sand. This last phase has a very limited extent and is not important.

The Norfolk fine sandy loam is one of the most widely distributed and without doubt the best of the medium late trucking and general farming soils in the Atlantic Coastal Plain. In the Conway area it has a larger area than any other type, is more largely under cultivation, and supports the more important farming interests of the area. Good yields of cotton, corn, bright tobacco, sweet and Irish potatoes, oats, and cowpeas are produced. Trucking has not been developed to any appreciable extent, except in the case of strawberries. The Lady Thompson strawberry is grown almost exclusively. The type is not suited to the growing of early vegetables, but will produce large yields of late truck.

Under ordinary conditions 1 bale of cotton per acre can be produced, with 600 to 800 pounds of complete fertilizer, and 1,000 pounds of tobacco per acre with 1,000 pounds of fertilizer. Fifteen to 50 bushels of corn and 300 bushels of sweet potatoes are ordinary yields for these products. Under good management Irish potatoes yield about 150 bushels per acre. Sugar cane makes a fine grade of sirup. Peanuts and vetch do well. Grapes, peaches, and pears do better upon this type than upon any other soil in the area. The native forest consists largely of longleaf pine.

The natural productiveness of Norfolk fine sandy loam, the ease with which it is cultivated, the retentiveness of the subsoil, its ready

response to fertilizers, and the readiness with which it may be built up and kept in good condition make it one of the most desirable soils in the area for trucking or for general farming. Farms on this soil may be purchased for $15 an acre, and the best areas are held at $50 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21003	Soil	0.0	1.4	1.2	28.8	32.2	27.8	8.4
21004	Subsoil	.1	.9	.8	21.3	15.9	35.5	25.6

NORFOLK SANDY LOAM.

The soil of the Norfolk sandy loam is an incoherent gray sand or gray to dark-yellow light sandy loam, usually 20 to 24 inches deep, though varying in depth from 12 to 30 inches. The first few inches of the soil is tarnished by organic matter, becoming, as a result of greater accumulations, almost black in depressions. The subsoil is a pale-yellow to bright-yellow friable sandy clay, slightly compact in the deep portions. The bright-yellow color is prominent where the drainage conditions are good. Between Galivants Ferry and Sandy Plain schoolhouse there occurs a phase of this type in which the soil is a comparatively heavy sandy loam and the subsoil, below 24 inches, is almost a sand.

The topography is gently rolling and the drainage good. The soil is more retentive of moisture than the more sandy members of the series, but can be improved in this respect by adding organic matter, in which the cultivated areas are deficient.

This is one of the best soils in the area for general farming, and one of the best cotton soils of the Coastal Plain. It is a good soil for light tobacco, peas, melons, and light trucking crops. Peaches, pears, grapes, and pecans do well. It is not recommended for strawberries on account of its open structure and the tendency of the fruit to be sandy. It is a good sweet-potato soil, but only moderately well adapted to Irish potatoes.

The type is easily tilled and responds readily to fertilizers. It has about the same relative crop producing power as Norfolk fine sandy loam, but is much more difficult to maintain in good productive condition. The price of farms situated on this type varies from $15 to $30 an acre.

The following table gives the result of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21005	Soil	3.5	25.1	15.9	29.2	4.8	17.8	3.8
21006	Subsoil	3.2	22.6	13.2	21.9	2.4	17.1	19.6

NORFOLK FINE SAND.

The soil of the Norfolk fine sand consists of a uniform fine sand, dark gray in color to about 4 inches and light gray below this depth. At an average depth of 8 inches the soil changes abruptly into a yellow subsoil, which becomes pale yellow below 20 inches. Throughout the whole profile the texture is the same. The type is loose and open when dry, but has a tendency to pack slightly when wet.

This type is most extensively developed in the central part of the area and occurs usually upon ridges. The topography is rolling to undulating and level stretches rarely ever occur. Natural drainage is excessive and the type has a tendency to droughtiness, even in a dry period of moderate duration. The natural growth is scrub oak and pine. The more level places support a heavier growth of pine, are less subject to drought, and are the best for agricultural purposes. A yellow clay material is usually found at 3 to 6 feet below the surface, but this is too deep to have much influence on the soil. The type leaches badly and will not retain soluble fertilizers for any length of time. This may be best remedied by the addition of organic matter.

Very little of the Norfolk fine sand is under cultivation, and it produces very poor crops. The yields can be increased by growing cowpeas and vetch, occasionally turning under a crop of these green. The type is easy to till and can be cultivated at any time without impairing its physical condition. The Norfolk fine sand is not adapted to cotton, corn, or strawberries. It is a good soil for early truck crops, and produces a good grade of light tobacco, though the yields are small. Farms of this type of soil bring from $5 to $20 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21001	Soil	0.0	0.9	1.0	74.9	10.1	10.8	2.4
21002	Subsoil	.2	.7	1.0	72.7	9.0	12.5	3.9

NORFOLK SAND.

The Norfolk sand, to a depth of about 8 inches, is an incoherent dark-gray sand, slightly darkened at the immediate surface by accumulations of organic matter. The subsoil, from 8 to 36 inches and deeper, is a bright-yellow incoherent sand of the same texture as the soil. A yellow clay is usually found from 3 to 6 feet below the surface, though in some places it lies at much greater depths.

A loose and open structure, aided by a rolling topography that favors rapid surface drainage, make the type very droughty and crops usually suffer during dry seasons of moderate duration. Areas of the Norfolk sand occur largely in the northwestern part of the area. The total extent of the type is 24,960 acres, or 6.6 per cent of the area surveyed.

The Norfolk sand is easily tilled and deep plowing can be done with very light draft. Little difficulty is encountered in handling the soil as regards moisture conditions. It produces a good quality of light tobacco, and when heavily fertilized gives fairly good yields. Cotton produces from one-fourth to one-half bale per acre, where the soil has been carefully treated. It is not adapted to corn or oats, but is best suited to the growing of early truck crops. Strawberries do not find the conditions required for successful growth. It is one of the best melon soils of the area. Small fruits, peaches, and scuppernong grapes do better than other fruits. It supports a natural growth of longleaf pine, scrub oak, and gallberry bushes. The price of such land varies from $5 to $15 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20999	Soil	2.2	5.1	42.0	39.3	3.3	3.2	4.9
21000	Subsoil	1.4	27.9	30.0	33.0	1.3	2.7	3.6

NORFOLK SILT LOAM.

The soil of Norfolk silt loam is a gray silt loam with an average depth of 12 inches. On the ridges the soil contains a somewhat larger percentage of fine sand and in the more level tracts the silt content increases. The subsoil is a pale-yellow to bright-yellow, fairly friable heavy silt loam, which extends to a depth of 36 inches or more. In depressions the content of clay is considerably greater than elsewhere, and the material in lower depths is slightly mottled with red.

Only limited areas of this soil are found. They occur mostly around the headwaters of Lake Swamp. The type is associated with the Coxville silt loam and occupies the adjacent land of higher elevation. The topography is gently rolling to level and the drainage is good.

The Norfolk silt loam is naturally a strong soil. In its natural state it supports a heavy growth of longleaf pine, roundleaf oak, and dogwood. It is an easy soil to build up and to maintain in a high state of productiveness. Leguminous crops do especially well and should be used in all rotations. With proper cultivation and fertilization, yields of 1 bale of cotton and 1,200 pounds of tobacco per acre are secured. From 400 to 600 pounds of fertilizer is used for cotton and as much as 1,000 pounds for tobacco. The use of a smaller amount of fertilizer upon the tobacco fields, it is said, gives a better grade of leaf. The Norfolk silt loam is not especially adapted to corn, but gives fair yields of this crop. It produces fine oats, crab grass and pea-vine hay, and sweet potatoes, and is one of the best Irish potato soils in the Coastal Plain. It is the highest priced land in the area, owing not only to its advantageous position, but also to its natural productiveness and the ease with which this may be maintained.

The soil is inclined to run together and compact after rains. This tendency can be reduced to a minimum by deep fall plowing and by keeping the soil well supplied with organic matter. A broadcast surface application of something like one-half to 1 ton of burnt lime per acre following deep fall plowing would likely benefit land of this character. Such an application would be sufficient for a period of five years or more.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20326, 21007, 21009.	Soil	0.1	0.7	0.4	13.1	16.5	46.4	22.8
20327, 21008, 21010.	Subsoil.....	.0	. .2	.2	6.9	13.8	54.3	21.1

PORTSMOUTH FINE SANDY LOAM.

The soil of the Portsmouth fine sandy loam, which averages about 15 inches in depth, consists of a dark-gray to nearly black sandy loam, somewhat mucky in the first 3 or 4 inches, owing to the high content of organic matter. The subsoil is a gray to drab fine sandy clay with yellow mottlings, becoming slightly plastic below 30 inches.

The type has very poor natural drainage and is waterlogged during a large part of the year. Thin strata of bog iron ore are found in many places, usually between 3 and 4 feet below the surface.

Areas of this soil are found largely upon the level upland stretches of country in the northeastern and central part of the area. The most typical development occurs between Loris and the state line. Small areas are also found occupying slight depressions in nearly all parts of the area.

Very little of the Portsmouth fine sandy loam has been drained and put under cultivation. It is best adapted to corn, oats, and strawberries. It is not at all adapted to tobacco and not very well adapted to cotton. Such truck crops as celery, lettuce, and onions do well. The waterlogged condition of the type hinders bacterial activity, and for this reason leguminous crops are not successful.

The type is generally sour and is in need of some form of lime. An acreage application of from 1 to 2 tons following the first plowing after draining would assist in hastening the development of good soil conditions. The original forest growth is largely longleaf pine. The price of land of this type ranges from $5 to $10 an acre.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Portsmouth fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21021, 21023.....	Soil	0.2	1.1	1.1	42.9	10.9	31.6	12.1
21022, 21024.....	Subsoil.....	.0	1.0	.9	38.8	9.7	30.8	18.8

PORTSMOUTH SANDY LOAM.

The soil of Portsmouth sandy loam is about 12 inches deep. The first 2 or 3 inches are black or dark gray, but the color grades quickly into a dark brown. The subsoil is a dark-gray sandy clay, changing to a light-gray sandy loam below 30 inches. A few quartz pebbles are usually scattered on the surface. The type is extensively developed in the northwestern part of the area. The total extent is 5,248 acres, or 1.4 per cent of the area covered by the survey.

A phase of the type is found in the cypress bays north of Lake Swamp. Here the soil is black to dark-gray heavy sandy loam, 10 to 15 inches deep, containing an unusually large proportion of organic matter in the first 6 inches. The subsoil is a dark-gray to brown sandy loam. In some places a gray sand stratum is found below 20 inches, and throughout the areas it occurs at 30 to 40 inches below the surface. This stratum of sand rests upon a heavy plastic clay at an

average depth of 5 feet. The natural drainage of this phase is very poor, water standing upon the surface most of the year.

A typical area of this phase is found in Fifteen Mile Bay, where 600 acres have been drained by cutting a canal to Cedar Creek and connecting it with lateral ditches. While crops can be grown successfully during dry seasons, they usually are not able to withstand the unfavorable conditions existing in wet seasons. In favorable seasons 1 bale of cotton and 50 bushels of corn per acre can be grown without fertilizers. Apparently good crops can not be secured two years in succession. The heavy character of the soil and its water-soaked condition make cultivation very difficult. The partial failure of crops in alternate years may be the result of plowing the soil while too wet, one year being required for the soil to regain its former condition. This phase should be thoroughly drained and treated very much the same as muck. It should produce good crops of celery, onions, and lettuce.

The topography of the Portsmouth sandy loam as a whole is level, and drainage is poor. Only a small part of the type is cleared and under cultivation. The natural growth is largely longleaf pine. The typical soil, while not so productive as the cypress bay phase, produces good crops of cotton, corn, and oats. Legumes do not do well on account of the poor drainage. Strawberries give fair returns, but there are so many other types in the area that are better adapted to the crop that it is not likely to be used for this crop. Cotton is an uncertain crop, failing in wet seasons. The use of basic slag is recommended, as the soil is too acid and too poorly drained for ordinary fertilizers to be of much benefit.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Portsmouth sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21025	Soil	0.4	7.1	11.4	49.1	7.6	10.8	13.5
21026	Subsoil	1.9	16.0	10.9	38.0	5.5	10.8	16.7

PORTSMOUTH FINE SAND.

The Portsmouth fine sand has a soil that contains large quantities of organic matter in the first 4 inches, and is black in color. This changes quickly into a dark-brown or dark-gray fine sand that remains uniform in color to depths of 10 or 12 inches below the surface. The subsoil is of the same texture as the soil but of a lighter gray color, though in places the dark-brown color extends to the lower

limit of the profile, 36 inches. Where this condition is found the soil is black and usually about 8 inches deep. The subsoil is usually water soaked below 24 inches and lighter in color than above this depth. A phase of this type is found around Lewisville, where the subsoil is mottled yellow and contains enough clay to make it sticky. This phase covers large areas of flat, poorly drained land and is used only for grazing. To drain these large flat areas would be almost impossible, owing to the unstable character of the subsoil, which in many places along the streams and margins of the swamps is quicksand, and causes much trouble in ditching.

Little Portsmouth fine sand is cultivated, and poor crops are the rule. It is best adapted to corn and it will grow good crops of celery, onions, and lettuce. The soil is usually sour, and moderate applications of carbonates should be used to correct the acidity and yet to destroy as little of the organic matter as possible, for this forms a very valuable part of the soil, the mineral particles being chiefly fine sand. Even when drained this type is of little agricultural value and sells at a low price. The natural forest growth is largely longleaf pine, with a thick undergrowth of gallberry and white bay bushes.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Portsmouth fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21019	Soil	0.0	2.0	1.2	67.8	4.7	17.7	6.7
21020	Subsoil	0.0	.6	1.6	72.1	3.7	11.8	10.1

PORTSMOUTH SAND.

The soil of the Portsmouth sand, to a depth of about 8 inches, is a medium to coarse sand with a high organic matter content. The color of the surface 2 or 3 inches is black, while the lower portion of the soil is brown in color. The subsoil, to 36 inches or more, is a dark-gray sand to coarse sand, somewhat sticky in places owing to a slightly increased clay content. The type occupies depressions and stretches of low, flat country, and has very poor natural drainage. It is not a strong soil and its productiveness depends on the amount of organic matter it contains. Where this is depleted, organic matter should be added to the soil by turning under green manuring crops. This type is usually acid and should be limed. Good drainage and deep plowing greatly increase the yields.

The Portsmouth sand is found in the northwestern part of the area. It occurs only in small areas and is not an important type. Very

little of the type is under cultivation, and it produces poor crops. It is better adapted to corn than to any other crop, and will produce moderate yields without the aid of fertilizers where other conditions are favorable. Celery and onions do well upon this type. Strawberries also do well but are likely to be sandy. The natural vegetation consists of a scattering growth of longleaf pine, with a thick undergrowth of gallberry and bay laurel.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Portsmouth sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21015, 21017.....	Soil	1.1	22.3	21.3	29.9	3.1	11.5	10.6
21016, 21018.....	Subsoil.....	1.6	25.1	23.9	31.7	3.2	8.2	6.2

COXVILLE FINE SANDY LOAM.

The soil of the Coxville fine sandy loam consists of 10 inches of dark-gray fine sand to fine sandy loam, changing to light gray at about 6 inches below the surface. The subsoil to 36 inches and deeper may be separated into three strata grading imperceptibly one into another. The first of these has a thickness of about 6 inches and consists of a yellow or orange-yellow slightly plastic clay, containing some fine sand. Underlying this occurs a mottled drab, red, and yellow plastic clay. Below 30 inches the red mottling becomes more pronounced and the plasticity increases. The last few inches of the profile is very compact and often contains thin bands of very fine sand. In areas of good drainage the drab mottling is less in evidence, but in no place is it entirely lacking. Red mottling is found in all cases below 24 inches. In wooded land and new ground the surface soil is dark gray to almost black, while in fields long under cultivation, owing to depletion of organic matter, the soil is light gray.

Iron concretions and small fragments of quartz, together with grains of coarse sand, are found scattered on the surface and through the soil and subsoil. In many places the gravel occurs in such large quantities as to result in a gravelly phase of the type. This condition is found most extensively developed along the north side of Crab Tree Swamp. Such areas are known locally as "gravel land" and are considered very difficult to handle. The subsoil is usually close structured and impervious, and the best yields can not be secured without artificial drainage.

A phase of this type, covering a little more than 5 square miles, occurs along the edge of the larger streams and swamps and upon elevated places and hammocks where good drainage conditions exist. Through better drainage the upper 8 to 10 inches of the subsoil has become more thoroughly oxidized and more friable. The material has a red color, very similar to the subsoil of the Orangeburg series. The deep subsoil is not as mottled and is not near so plastic as the deep subsoil of the remainder of the type. The surface soil of this phase often has a red color also, the result of turning up the subsoil in plowing. This phase is more productive than the rest of the type and is valued more highly. One field of this phase was found giving 1 bale of cotton per acre, with the use of 200 pounds of an 8–2.5–2 fertilizer and a light top dressing of nitrate of soda. Its natural drainage conditions render it ready to plow before the rest of the type and it is a little easier to handle. This phase occurs largely along Hunting Swamp and the Waccamaw River Swamp, and is represented upon the map by cross lining.

The topography of the type is gently undulating to flat and drainage is usually fairly good. Improvement would result from ditching, as the close structure of the subsoil prevents the free movement of water and air. The soil is derived from materials deposited in quiet water.

The Coxville fine sandy loam occurs largely along the bluff of the Waccamaw River Swamp and tributary swamps, but is distributed throughout the southern part of the survey. On account of its position with reference to water transportation and labor, the portion of the type that occurs along the Waccamaw River is well suited to the growing of cotton on an extensive scale, and good yields of this crop and of tobacco are secured without the aid of fertilizers. It is largely upon this type that the Klondyke strawberry is grown, and upon no other soil has it given such success. Good yields of crab grass and peavine hay are obtained, but better yields could be obtained by the use of phosphatic fertilizers. The sweet potato does not show a tendency to "string" upon this type as it does on sandy soils. The type also produces a mealy potato—a quality demanded by the northern markets. Tobacco has a tendency to produce a thick leaf of rather poor quality, but makes up in weight what it lacks in quality. The Coxville fine sandy loam is not as valuable an early truck soil as the Norfolk soil of similar texture and, excepting strawberries, it does not mature such crops early enough for the northern markets. As a rule fruits do not do well.

In cultivating the Coxville fine sandy loam, especially the shallow phase, care should be taken not to stir the soil while it is too wet. The heavy clay subsoil clods badly when plowed in this con-

dition and a hard plow sole soon forms. Once clods are formed they may persist for several seasons. The use of the subsoil plow should prove beneficial. Nearly all the type is cleared and under cultivation. The natural growth consists of longleaf pine, oak, and dogwood. The price ranges from $20 to $50 an acre.

The following table gives the average results of mechanical analyses of the typical soil and phase of this type:

Mechanical analyses of Coxville fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21029, 21031.....	Soil	1.0	2.8	0.8	31.2	35.2	23.5	5.6
21030, 21032.....	Subsoil.....	.5	2.1	.2	21.3	19.3	16.6	39.9

COXVILLE VERY FINE SANDY LOAM.

The soil of the Coxville very fine sandy loam consists of a black sandy loam about 4 inches deep grading into a dark-brown very fine sandy loam. The subsoil, from 10 to 24 inches and deeper, is a drab clay loam with orange mottling. Below this point the subsoil changes to a very fine sandy clay, slightly compact and plastic, with red mottling at irregular intervals. The surface soil contains large quantities of organic matter. A level topography results in poor drainage. The surface is much the same as that of the savannas and the type is closely associated with the Coxville clay on the savannas in the southern part of the area and occurs to a smaller extent in the low poorly drained areas adjoining the Coxville fine sandy loam.

Only small bodies of this type have been drained and put under cultivation. It produces good crops of cotton, corn, oats, hay, and strawberries. It is best adapted to corn and oats, and can not be recommended for general trucking or fruit growing. The type is often acid and should be limed if difficulty is had in producing good crops after thorough drainage. When drained this type is slightly inferior to the Coxville fine sandy loam. Little or no timber is found on the "savannas," and the surface is covered with a mat of wild grasses, which are burned off every year to improve the grazing. The young tree sprouts are killed by the fire and a forest growth thus prevented. Upon the other phases of this type a heavy growth of longleaf pine is found.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Coxville very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21033	Soil	0.0	0.3	0.8	18.8	40.6	22.7	16.4
21034	Subsoil	.0	.1	.1	15.3	26.6	16.4	41.5

COXVILLE SILT LOAM.

The Coxville silt loam is found associated with the Norfolk silt loam and occupies flat, low-lying, and rather poorly drained situations. The surface is usually dark gray to black, owing to the accumulation of organic matter. The soil is a silt loam that has very much the same feel when passed between the fingers as meal. At about 10 inches below the surface the soil grades quickly into a light-gray silt loam subsoil marked with drab and yellow mottlings and below 24 inches with large red splotches and iron stains. The subsoil is slightly plastic and compact below 30 inches.

The Coxville silt loam occurs in very small areas around the headwaters of Lake Swamp. Very little of it is under cultivation. In its natural state it supports a heavy growth of longleaf pine and gum. It is best adapted to the growing of corn and oats. Cotton and strawberries do fairly well, but the fields must be thoroughly drained before any crops can be successfully grown, for in its present condition crops suffer in even moderately wet seasons.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Coxville silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21035	Soil	0.0	0.9	0.2	4.4	16.4	66.2	11.5
21036	Subsoil	.1	.3	.2	4.4	13.3	59.9	21.8

COXVILLE CLAY.

The soil of the Coxville clay is very thin in places and has an average depth of 4 inches. It is dark gray to black in color and a fine sandy loam to loam in texture. The loam is found in the depressions and is darker in color than the more sandy areas. The subsoil, from 4 to 36 inches or more, is a drab-colored plastic clay, with yellow and red mottlings. The plasticity increases with depth and the red mottlings become more pronounced. Below 24 inches the material is

thickly mottled with brick red and is very heavy and compact, although in some places a small amount of sand is found in the deeper subsoil.

Soil of this type is confined almost entirely to the low, flat stretches of land (savannas) in the southern part of the area. The drainage is very poor and the soil is waterlogged the greater part of the year. During droughts the surface bakes hard and cracks.

Naturally, the Coxville clay is a very strong soil, but in its present condition it is not capable of producing even fair crops. If thoroughly drained and properly handled, good crops of cotton, oats, corn, cowpeas, strawberries, and possibly wheat could be grown. At present very little of it is under cultivation, and that is neither well drained nor properly farmed.

To bring this type under cultivation the first step will be to provide drainage, which can only be accomplished on an extensive scale. Next an application of about 2,000 pounds of lime to the acre should be made to correct the natural acidity of the soil and to improve its physical condition. Plowing should be deep, and large quantities of organic matter should be added, further to change the compact, heavy structure of the soil. To facilitate surface drainage, the soil should be plowed in comparatively narrow "bands," with the water furrows running in the direction of the slope. Much care must be exercised in handling this soil. It remains longer too wet to plow after rains than any other type in the area and the unfavorable conditions resulting from stirring at the wrong time are more lasting. Where this has been done years are required to break down the clods and put the soil in good condition again. When once reclaimed by the methods suggested, the present difficulty of cultivation will be removed to considerable extent.

The same vegetation is found on this type as on the "savannas" of the Coxville very fine sandy loam. The price of this land is about $10 an acre, and under the present conditions it would cost more to drain it than it is worth. As there is plenty of more desirable land in the area still unoccupied, some time will elapse before very much of the Coxville clay is reclaimed; but as conditions change, more and more of it will be used, and at some future time it will represent one of the more productive, as well as more desirable, types of the area.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Coxville clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21037, 21039.....	Soil	0.2	2.8	2.5	18.1	18.1	39.9	18.0
21038, 21040.....	Subsoil.....	.2	.9	1.1	11.1	14.6	31.4	40.8

SANDHILL.

The soil of the Sandhill is a gray incoherent sand, from 6 to 15 inches deep. The surface is covered by a mantle, 1 to 3 inches deep, of white sand that from a distance has the appearance of snow. Beneath this the soil is tarnished by organic matter for a few inches. The subsoil usually is a pale yellow incoherent sand. In places the yellow color is very faint, and in others the color is a light cream or nearly white. This material averages about 30 feet in depth, and in some places reaches a depth of 50 feet. The soil particles are angular and almost entirely of quartz.

Areas of the Sandhill occur along Lumber River, the Little Pee Dee River, and Bull Creek, and intermittently along the entire western boundary of the survey. On the Little Pee Dee and Lumber rivers it forms sand dunes or sand islands in the swamps. Along Bull Creek it occurs as a bluff or escarpment about 30 or 40 feet above the bed of the river. The surface has the distinctive appearance of Sandhill in the southern part of the area, where it reaches its most typical development. Here dunes and hills 20 to 30 feet higher than the body of the type are found, and the area is more extensive, reaching a maximum width of 2 miles.

The Sandhill has been formed by wind and river action. The deposits were originally laid down when the rivers flowed at much higher levels than at present. Owing to open structure and the uneven surface, the drainage is excessive.

A scattering growth of longleaf pine and black-jack oak is found on this soil. Practically all the valuable timber has been removed and only the scrubby growth is left. The agricultural value is very low, and all attempts to cultivate the soil have met with failure. It could be made to produce certain vegetables and perhaps corn and cotton with a fair degree of success, if enough organic matter were added to enable the soil to retain some moisture, but this is not at present practicable, and as long as there is plenty of good land unoccupied there is little reason for attempting reclamation. In the lower lying places, where some organic matter has accumulated, peaches of fairly good quality are produced, but the soil can hardly be recommended for commercial peach growing.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Sandhill.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21011, 21013.....	Soil	1.1	31.2	39.9	26.2	0.4	0.5	0.6
21012, 21014.....	Subsoil.....	.7	29.4	40.0	27.2	.6	.5	1.7

ORANGEBURG FINE SANDY LOAM.

The soil of the Orangeburg fine sandy loam is a gray, light textured fine sandy loam from 10 to 20 inches deep. The subsoil is a red sandy clay of friable structure to a depth of 30 inches, below which the clay content increases slightly and the structure becomes more compact. There is in most cases an abrupt change from the soil to the subsoil. Iron concretions and small rounded quartz pebbles are found in small numbers scattered upon the surface and through the soil and subsoil.

Areas of Orangeburg fine sandy loam occupy high well-drained places, usually along the streams and swamps. The topography is in general rolling, although many stretches of level to gently rolling land are found. Drainage is always good, and erosion is very active.

The Orangeburg fine sandy loam occurs for the most part along the bluffs of Brown, Brunson, and Chinners swamps and is found in narrow detached strips. The type is very closely associated with the Norfolk soils in origin, but has had better drainage conditions and the subsoil is more thoroughly weathered. Tillage is easy, owing to the open friable nature of the surface soil, and at the same time the moisture conditions are favorable, the heavier subsoil preventing too rapid percolation of the rain water.

The soil is very productive and is recognized as one of the best types in the area. It was originally covered with forests of longleaf pine, oaks, and dogwood, but is nearly all cleared and under cultivation. It is a general farming type and good crops of cotton, corn, bright tobacco, sweet potatoes, sugar cane, oats, vetch, and cowpeas are secured. It is not especially adapted to the growing of truck crops. Many fields of this soil could be improved by the growing of legumes for green manuring.

SWAMP.

The areas mapped as Swamp comprise the low-lying territory next the streams and so slightly elevated above the water level as to be inundated a greater part of the year. This land would require extensive ditching and diking in order to bring it into condition for agricultural use. There is a considerable total area of Swamp along the smaller streams that could be profitably drained by the dredging of main canals and the construction of laterals. The river swamps as well as much of the Swamp along the larger creeks would require diking against overflow and ditching to remove surplus rainfall and seepage water. A small proportion of the Swamp along Bull Creek consists of old rice fields, once very productive but abandoned because the floods from Bull Creek (the outlet of the Great Pee Dee River) made crops uncertain. The fields are now covered with water, and could not be very well classified as anything except Swamp.

The soil of the Swamp areas ranges from mucky sandy loam to clay and would prove extremely productive if thoroughly drained, especially for corn, forage crops, and, where irrigation could be provided, for rice.

The largest body of Swamp is found along the Little Pee Dee River, the area here averaging several miles in width. The Waccamaw River Swamp is not so wide, and the Lake Swamp area averages about 1 mile in width. The Swamp areas in general support a heavy growth of cypress, gum, and pine.

SUMMARY.

The Conway area is situated in the northeastern part of South Carolina, and consists of the western half of Horry County. It contains 378,880 acres or 592 square miles.

No point in the survey is more than 100 feet above sea level, and most of the area lies between the 20 and the 60 foot contours. The topography is level to gently rolling. Much of the surface is level and poorly drained. The Little Pee Dee River on the west and the Waccamaw River on the east receive the drainage water of the area. Lake Swamp, the largest stream within the area, empties into the Little Pee Dee River.

Although the population per square mile is about that in adjoining counties, the proportion of cleared land is smaller. The farms are small, labor scarce, and the agriculture is more intensive than in the adjoining country.

Conway, the principal town of the area and county seat of Horry County, has a population of about 2,500. It is an important lumber center.

Transportation facilities are afforded by the Elrod and Conway branch of the Atlantic Coast Line Railroad and the Waccamaw line of steamers plying between Georgetown and Conway on the Waccamaw River. The other railroads of the area are spur lines used chiefly in lumbering.

Climatic conditions are favorable for general farming and trucking. The winters are unusually mild and the summer heat is moderated to some extent by sea breezes. The rainfall is well destributed throughout the year, the heaviest rains coming during the growing season. During most winters the snowfall only amounts to a trace.

Corn, tobacco, and cotton are the principal crops. Cotton is not grown as much as in other sections of the cotton-growing States on account of the scarcity of labor. Oats, sweet potatoes, sugar cane, cowpeas, peanuts, melons, and vegetables are secondary crops. The growing of strawberries, the only special industry, is meeting with great success.

Commercial fertilizers are used extensively on all types of soil and for all crops.

Little improved or labor-saving machinery is used upon the farms and little help is hired, most of the work being done by the farmers and their families. There are very few negroes in the area and the lumber industries absorb most of the floating labor. Field labor is paid from 75 cents to $1 a day.

Sixteen types of soil were mapped. They are derived from three formations—a Tertiary formation, the Columbia formation, and Recent alluvium. The Tertiary gives the Orangeburg fine sandy loam and the better drained phase of the Coxville fine sandy loam series; the Columbia the Norfolk, Portsmouth, and one type of the Coxville; and the Recent is represented by the Sandhill and Swamp.

The Norfolk fine sandy loam is the most widely distributed soil type in the area and the best soil for general farming and truck growing.

The Norfolk fine sand is widely distributed, but it is droughty and not so productive nor so desirable a soil as the fine sandy loam. It is a good early truck soil and produces a good grade of light tobacco.

The Norfolk sand is more subject to drought than the fine sand, and like the fine sand is a very poor soil for general farming, but suitable for growing early truck.

The Norfolk sandy loam has about the same crop value as the fine sandy loam, though it is more difficult to keep in good condition.

The Norfolk silt loam, occurring only in small areas, is an excellent soil for diversified farming. It produces 1 bale of cotton and 1,000 pounds of tobacco per acre.

Little of the Portsmouth sandy loam and fine sandy loam—both poorly drained soils—is under cultivation. Where drained they produce only fair crops of cotton, but good crops of corn and oats. The fine sandy loam is more extensive than the sandy loam.

The Portsmouth fine sand and sand are both poorly drained and of low agricultural value. They produce very poor crops and for the most part are uncleared. The fine sand is very extensive.

The Coxville fine sandy loam is a strong soil producing good crops of cotton, corn, tobacco, oats, cowpeas, and hay. The Klondyke strawberry does best upon this type.

The Coxville very fine sandy loam occupies poorly drained depressions. Where properly drained it produces good crops of corn, oats, and strawberries.

The Coxville clay occurs in the poorly drained savannas in the southern part of the area. The impervious structure of the subsoil makes thorough drainage almost impossible. Where drained and properly handled the type will produce good crops of cotton, corn, oats, hay, and strawberries.

The Coxville silt loam is very closely associated with the Norfolk silt loam, being derived from the same formation. Only limited areas are found, and a small acreage is under cultivation. Good crops of oats and corn and fair crops of cotton and hay are secured.

The Orangeburg fine sandy loam is developed to a small extent along the escarpments of the larger swamp. It is one of the best general farming soils in the area. It has a rolling surface and is well drained. Erosion is active.

On account of the open structure and rolling topography of the Sandhill it is very droughty and of very little agricultural value.

Swamp areas are covered with water most of the year and are unfit for agricultural use.

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