Issued April 1968

SOIL SURVEY

Barbour County, West Virginia

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1945-64. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1964. This survey was made cooperatively by the Soil Conservation Service and the West Virginia Agricultural Experiment Station. It is part of the technical assistance furnished to the Tygarts Valley Soil Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Barbour County, W. Va., contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Barbour County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit and the woodland suitability group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the capability units and woodland groups.

Foresters and others can refer to the subsection "Use of Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the subsection "Wildlife."

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the subsection "Soils in Residential Developments" and "Use of Soils for Recreation."

Engineers and builders will find under "Use of Soils in Engineering" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text.

Newcomers in Barbour County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which gives additional information about the county.

***Cover picture.*—Landscape in the Gilpin-Upshur soil association. In the background is Laurel Mountain.**

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NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued April 1968

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF BARBOUR COUNTY, WEST VIRGINIA

BY WOODROW W. BEVERAGE, WALTER J. STEPUTIS, AND WILLIAM F. HATFIELD, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

BARBOUR COUNTY is in the north-central part of West Virginia (fig. 1). It has a total area of 336 square miles, or 215,040 acres, and is a part of the Allegheny Plateau. Philippi, the county seat, is on the Tygart River (also called Tygart Valley River) and is near the geographical center of the county.

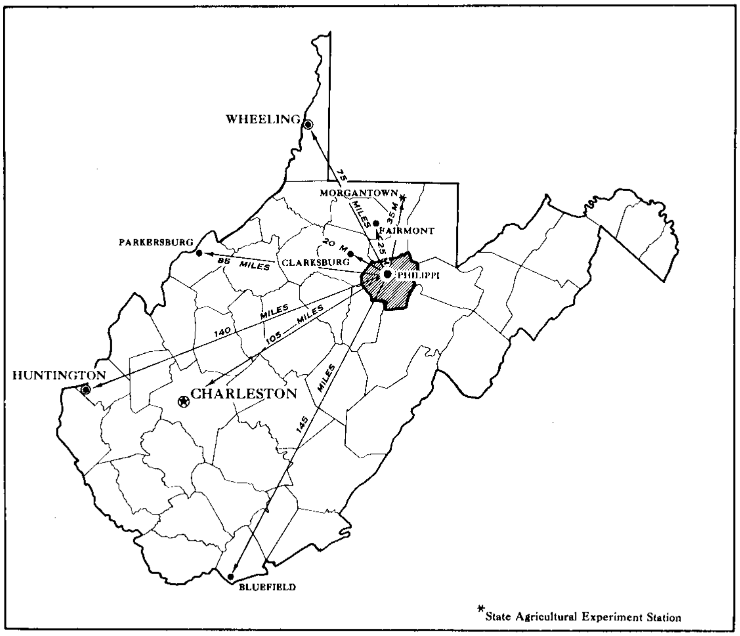

Figure 1.—**Location of Barbour County in West Virginia.**

More than half of Barbour County is covered with hardwood forest. Most of the soils are hilly and are not well suited to intensive farming. Livestock raising is the chief source of farm income. Corn, oats, and mixed legume hay—the principal crops—are grown mainly for livestock feed on farms. Coal mining and lumbering industries furnish part-time work for many farmers.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Barbour County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Clarksburg and Upshur, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Dekalb channery loam is an example of a soil type in Barbour County.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Dekalb channery loam, 3 to 10 percent slopes, is one of several phases of Dekalb channery loam, a soil type that ranges from gently sloping to very steep.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Gilpin-Upshur complex.

The undifferentiated soil group is another group of soils that is mapped as a single mapping unit. The soils in this kind of group do not occur in regular geographic association. An example of an undifferentiated soil group is Belmont and Calvin very stony silt loams, 20 to 35 percent slopes.

Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Alluvial land, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map (fig. 2) shows the four soil associations in Barbour County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

Each soil association in the county is discussed in the following paragraphs.

1. Westmoreland-Gilpin-Clarksburg Association

Strongly sloping to steep, moderately deep and deep silty soils on uplands, and sloping, deep, moderately well drained silty soils on foot slopes

This association generally consists of steep hills and moderately narrow valleys. Most of the hills have side slopes broken by narrow benches. The ridgetops are mainly narrow and gently sloping to strongly sloping. The association occupies about 46,000 acres in the western third of the county.

Dominant in this association are the moderately deep to deep, well-drained Westmoreland soils, which are underlain by interbedded shale, siltstone, sandstone, and limestone. Only about a third of the total acreage is occupied by the moderately deep, well drained Gilpin soils, which developed from acid gray shale and sandstone, and the deep, moderately well drained Clarksburg soils. Westmoreland and Gilpin soils are on the uplands, and Clarksburg soils are on foot slopes (fig. 3).

Also in the association are the Wharton, Upshur, Melvin, and Lindside soils. The Wharton soils lie mainly on benches; they are clayey at a depth of 18 to 26 inches. The reddish Upshur soils occur in small areas and are intermingled with the Gilpin and Westmoreland soils on uplands throughout the association. Upshur soils have a clayey subsoil that is plastic and sticky when wet. Deep, poorly drained Melvin soils and moderately well drained Lindside soils occupy most of the acreage on the flood plains.

Most of this association has been cleared and is used for pasture or crops. Raising beef cattle is the main farm enterprise. Many farms are idle and reverting to woods. Generally, erosion is moderate to severe.

Strip mining has removed about 7,000 acres from use for farm crops (fig. 4). Moreover, it has aggravated soil slips, isolated many ridgetops, and damaged bottom land through the clogging of streams and the deposition of waste material.

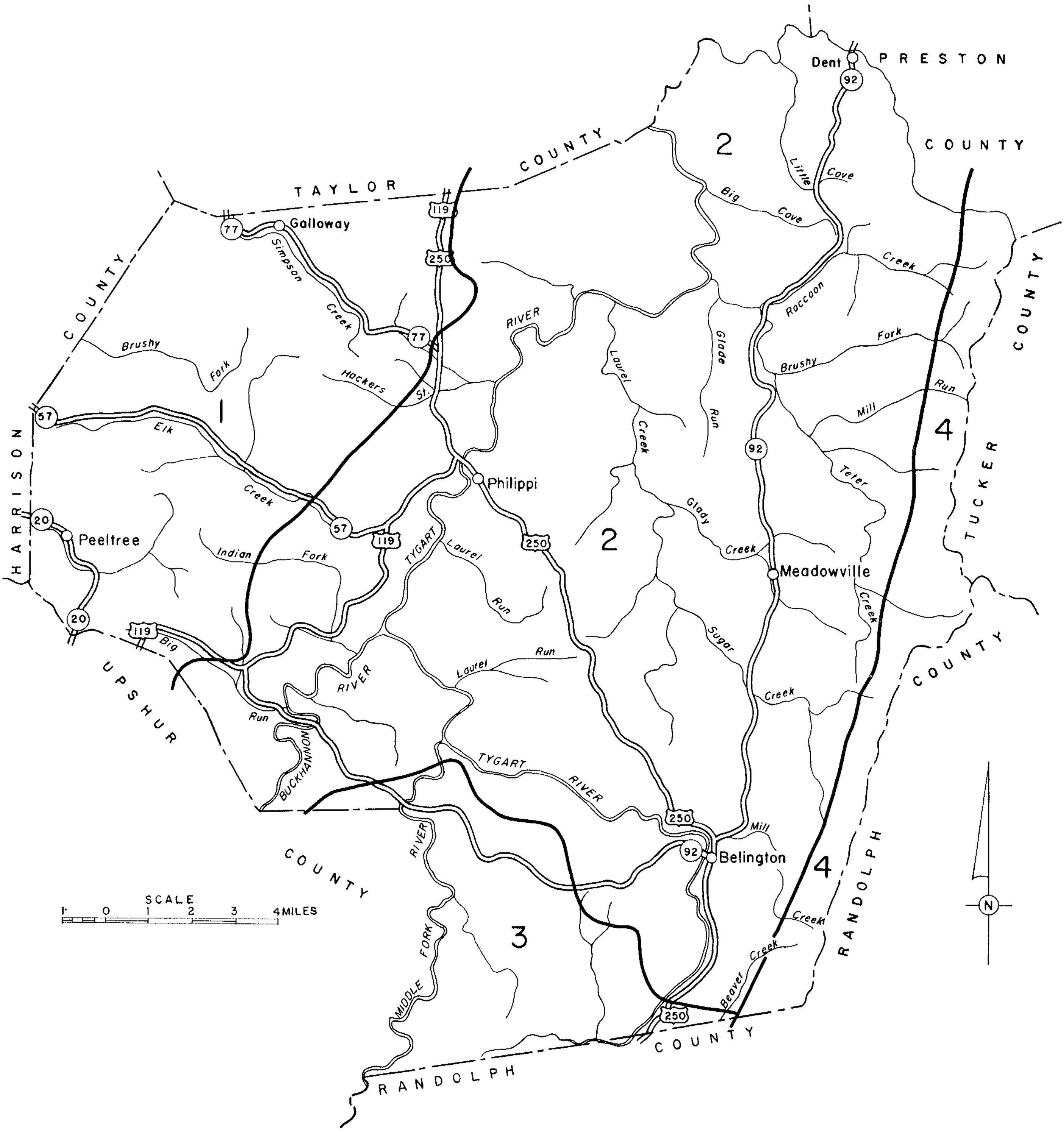

Figure 2.—General Soil Map, Barbour County, West Virginia.

1. Westmoreland-Gilpin-Clarksburg association: Strongly sloping to steep, moderately deep and deep silty soils on uplands, and sloping, deep, moderately well drained silty soils on foot slopes.
2. Gilpin-Upshur association: Strongly sloping to steep, moderately deep to deep, well-drained, brownish silty soils and reddish clayey soils on uplands.
3. Gilpin-Dekalb-Cookport association: Steep, moderately deep and deep, mainly stony soils on hillsides, and gently sloping to sloping, moderately well drained loamy soils on broad ridgetops.
4. Dekalb-Gilpin association: Steep stony soils on mountain slopes.

***Figure 3.*—A typical landscape in the Westmoreland-Gilpin-Clarksburg soil association. Foot slopes in foreground consist of Clarksburg soils. Westmoreland soils occupy uplands in background.**

***Figure 4.*—Strip mining on the Westmoreland-Gilpin-Clarksburg soil association. Soil material has been spread downslope from the mined area.**

2. Gilpin-Upshur Association

Strongly sloping to steep, moderately deep to deep, well-drained, brownish silty soils and reddish clayey soils on uplands

Moderately steep to steep hills and moderately narrow valleys make up most of this association. Ridgetops are broader than in association 1, and there are fewer benches and more plateaus. The roughest part is the gorge along the Tygart River from Moatsville north to the Taylor County line. The association occupies about 136,000 acres, or more than half of the county.

Gilpin soils, the dominant ones, are moderately deep, yellowish brown, and well drained. They are intermingled with red, clayey Upshur soils over much of the association, but they also occur in sizable areas alone.

Other soils on uplands are the Wellston, Cookport, and Wharton. Nearly all the acreage of these soils is on the more nearly level ridgetops and benches. On flood plains the deep, poorly drained Atkins soils and the moderately well drained Philo soils account for most of the acreage, but the well drained Pope soils occupy a few acres. In some places these soils on flood plains are gravelly. Lying next to them, at the foot of hills, are the moderately well drained Ernest soils. The most common soils on terraces are the well drained Allegheny and the moderately well drained Monongahela soils.

Farms on this association are used mainly for raising beef cattle and dairying. They are fairly well distributed, and most of them are operated as a part-time enterprise. Most of the strip mining has been done west of State Route 92 in the vicinity of Meadowville. Generally, erosion is moderate to severe.

3. Gilpin-Dekalb-Cookport Association

Steep, moderately deep and deep, mainly stony soils on hillsides, and gently sloping to sloping, moderately well drained loamy soils on broad ridgetops

Most of this association is a gently sloping plateau, but steep hillsides lie along the Middle Fork River. All of these areas are stony. On the ridgetops, where the soils are underlain by thick limestone, there is a fairly wide range in soil depth. The association covers about 18,000 acres in the southeastern part of the county.

The principal soils are the yellowish-brown, silty, well drained Gilpin soils, the loamy, somewhat droughty Dekalb soils, and the moderately well drained Cookport soils. Gilpin and Dekalb soils are generally steeper than Cookport soils, which have a barely evident to distinct fragipan 16 to 24 inches below the surface.

Common in gently sloping areas are the deep, well drained Wellston soils and the moderately well drained Wharton soils. Other soils are the Ernest and Brinkerton, both of which occur around the heads of streams and in drainageways. The Brinkerton soils are somewhat poorly drained to poorly drained. On flood plains along the Middle Fork River, there are a few acres of Pope soils.

Farming on this association is mainly on the ridgetops. Some corn is grown, but most of the cleared areas are used for pasture and hay for livestock. Generally, the soils are lower in fertility than those in associations 1 and 2. Erosion is moderate.

4. Dekalb-Gilpin Association

Steep stony soils on mountain slopes

This association is the roughest part of Barbour County, mainly because of stoniness. It is a mountainous area dissected by many, moderately steep, stony drainageways. A few benches and flats occur along the mountainside. The association occupies about 15,000 acres on the west side of Laurel Mountain.

The principal soils are the loamy to sandy Dekalb soils and the silty Gilpin soils. These soils are moderately deep to deep and well drained. Extremely stony Ernest soils occupy most of the drainageways, and Wharton or Cookport soils are on the flats and benches.

This association is mainly wooded, except for a few dairy and livestock farms near the center and some open areas adjoining association 2. Erosion is slight to moderate.

Descriptions of the Soils

This section describes the soil series (groups of soils) and single soils (mapping units) of Barbour County. The acreage and proportionate extent of each mapping unit are given in table 1.

The procedure in this section is first to describe the soil series, and then the mapping units in that series. For each soil series, a profile of a soil typical of the series is described. Thus, to get full information on any one mapping unit, it is necessary to read the description of the soil series to which it belongs.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Alluvial land, for example, does not belong to a soil series, but, nevertheless, is listed in alphabetical order along with the soil series.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and the woodland suitability group in which the mapping unit has been placed. The pages on which each capability unit and each woodland group are described can be found by referring to the "Guide to Mapping Units" at the back of the survey.

The color of each soil horizon is described in words, such as dark grayish brown, but it can also be indicated by symbols for the hue, value, and chroma, such as 10YR 4/2. These symbols, called Munsell color notations (*20*),[1] are used by soil scientists to evaluate the color of the soil precisely. For the profiles described, the names of the colors and the color symbols are for moist soils unless stated otherwise.

Many terms used in the soil descriptions and other sections of the survey are defined in the Glossary.

Allegheny Series

The Allegheny series consists of deep, well-drained, mainly gently sloping soils on stream terraces. These soils formed in material washed from uplands underlain by sandstone and shale.

The surface layer of a typical Allegheny soil is dark grayish-brown, friable silt loam about 8 inches thick. The subsoil is dark brown and firm to friable, and in most places it is clay loam.

Allegheny soils occur in small areas along most of the major streams in the county. Generally, they lie on benches several feet above the soils on flood plains. They are older and have more distinct horizons than those soils. They are in the same drainage sequence as the moderately well drained Monongahela soils, which commonly occur on the same benches.

The Allegheny soils are strongly acid, have moderate permeability, and, if well managed, are in good tilth. They have high available moisture capacity and are well suited to all crops grown locally.

Typical profile of Allegheny silt loam, 2 to 8 percent slopes, in a hayfield 1 mile south of Nestorville along State Route 92—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; strongly acid; abrupt, smooth boundary. Horizon is 6 to 9 inches thick.

B21t—8 to 20 inches, dark-brown to brown (7.5YR 4/4) fine sandy clay loam; weak, fine, subangular blocky structure; firm; thin, discontinuous clay coats on ped faces; strongly acid; gradual, smooth boundary. Horizon is 9 to 15 inches thick.

B22t—20 to 40 inches, dark-brown to brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; continuous clay coats; strongly acid; prominent manganese coating at depth below 36 inches; clear, smooth boundary. Horizon is 14 to 22 inches thick.

C—40 to 50 inches, sand, silt, and gravel.

The A horizon is silt loam or loam, but the areas of loam are small in extent. In most places the color of the Ap horizon is 10YR 4/2 or 4/3. The B horizon ranges from heavy loam or clay loam to silty clay loam or sandy clay loam. Its color is mostly 7.5YR 4/4 or 5/6. The depth to bedrock or sand and gravel ranges from 3 to 6 feet. Generally, the profile is free of stones above that depth.

Allegheny silt loam, 2 to 8 percent slopes (AgB).—This nearly level to gently sloping soil is on flats and benches between the flood plains and the uplands. It has the profile described for the series. Included with it are a few somewhat poorly drained and moderately well drained areas; a few gravelly, sandy areas; and a few areas in which the surface layer is loam.

This soil is suited to cultivated crops, permanent hay or pasture, and trees. It has few limitations if used as a site for buildings. (Capability unit IIe-4; woodland suitability group 8)

Alluvial Land

Alluvial land (Al) is a mixture of material that has been recently deposited in areas frequently flooded. It ranges, within short distances, from bouldery and gravelly material to fine-textured material, and from very poorly drained to well drained or excessively drained. In most places there are many depressions and old stream channels.

Alluvial land generally is suitable only for pasture, woodland, or wildlife, though a few acres can be used for crops. (Capability unit VIw-1; woodland suitability group 9)

Atkins Series

The Atkins series consists of deep, nearly level, poorly drained soils that lie along streams, around stream heads, and in gladelike areas. These soils formed in alluvial material washed from gray acid shale, sandstone, and siltstone.

The surface layer of a typical Atkins soil is dark-gray silt loam about 8 inches thick. The gray and strong-brown subsoil contains more clay and is firmer than the surface layer. In most places the subsoil is underlain by

[1] Italic numbers in parentheses refer to Literature Cited, p. 63.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Soil or land type	Area	Extent
		Acres	*Percent*
AgB	Allegheny silt loam, 2 to 8 percent slopes	1, 168	0. 5
Al	Alluvial land	458	. 2
At	Atkins silt loam	5, 202	2. 4
BcE	Belmont and Calvin very stony silt loams, 20 to 35 percent slopes	247	. 1
BcF	Belmont and Calvin very stony silt loams, 35 to 65 percent slopes	274	. 1
BrB	Brinkerton silt loam, 3 to 8 percent slopes	586	. 3
BsB	Brinkerton very stony silt loam, 3 to 8 percent slopes	183	(1)
ClB	Clarksburg silt loam, 3 to 8 percent slopes	250	. 1
ClC	Clarksburg silt loam, 8 to 15 percent slopes	819	. 4
ClD	Clarksburg silt loam, 15 to 25 percent slopes	112	(1)
CpB	Cookport loam, 3 to 10 percent slopes	1, 439	. 7
CpC	Cookport loam, 10 to 20 percent slopes	338	. 1
DaB	Dekalb channery loam, 3 to 10 percent slopes	699	. 3
DaC	Dekalb channery loam, 10 to 20 percent slopes	3, 182	1. 5
DaD	Dekalb channery loam, 20 to 30 percent slopes	4, 619	2. 1
DaE	Dekalb channery loam, 30 to 40 percent slopes	5, 760	2. 7
DaF	Dekalb channery loam, 40 to 65 percent slopes	2, 012	. 9
DbC	Dekalb very stony loam, 3 to 20 percent slopes	5, 767	2. 7
DbE	Dekalb very stony loam, 20 to 40 percent slopes	23, 031	10. 7
DbF	Dekalb very stony loam, 40 to 65 percent slopes	8, 374	3. 9
EnB	Ernest silt loam, 3 to 8 percent slopes	2, 914	1. 4
EnC	Ernest silt loam, 8 to 15 percent slopes	1, 976	. 9
EnD	Ernest silt loam, 15 to 25 percent slopes	431	. 2
ErC	Ernest extremely stony silt loam, 3 to 20 percent slopes	14, 224	6. 6
GcB	Gilpin channery silt loam, 3 to 10 percent slopes	6, 144	2. 9
GcC	Gilpin channery silt loam, 10 to 20 percent slopes	14, 302	6. 7
GcC3	Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded	1, 919	. 9
GcD	Gilpin channery silt loam, 20 to 30 percent slopes	20, 400	9. 5
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	2, 919	1. 3
GcE	Gilpin channery silt loam, 30 to 40 percent slopes	14, 816	6. 9
GcE3	Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded	1, 987	. 9
GcF	Gilpin channery silt loam, 40 to 65 percent slopes	2, 344	1. 1
GdC	Gilpin-Dekalb very stony complex, 3 to 20 percent slopes	1, 867	. 9
GdE	Gilpin-Dekalb very stony complex, 20 to 40 percent slopes	18, 109	8. 4
GdF	Gilpin-Dekalb very stony complex, 40 to 65 percent slopes	2, 472	1. 2
GuB	Gilpin-Upshur complex, 3 to 10 percent slopes	180	(1)
GuC	Gilpin-Upshur complex, 10 to 20 percent slopes	786	. 4
GuD	Gilpin-Upshur complex, 20 to 30 percent slopes	1, 353	. 6
GuD3	Gilpin-Upshur complex, 20 to 30 percent slopes, severely eroded	409	. 2
GuE	Gilpin-Upshur complex, 30 to 40 percent slopes	2, 794	1. 3
GuE3	Gilpin-Upshur complex, 30 to 40 percent slopes, severely eroded	834	. 4
GuF	Gilpin-Upshur complex, 40 to 65 percent slopes	5, 563	2. 6
Ln	Lindside silt loam	1, 425	. 7
Ma	Melvin silt loam	965	. 4
Md	Mine dumps	315	. 1
MoA	Monongahela silt loam, 0 to 3 percent slopes	390	. 2
MoB	Monongahela silt loam, 3 to 8 percent slopes	185	(1)
Ph	Philo silt loam	1, 247	. 6
Pn	Pope fine sandy loam	669	. 3
Sm	Strip mine spoil	7, 350	3. 4
WeB	Wellston silt loam, 3 to 10 percent slopes	1, 867	. 9
WeC	Wellston silt loam, 10 to 20 percent slopes	419	. 2
WmB	Westmoreland silt loam, 3 to 10 percent slopes	182	(1)
WmC	Westmoreland silt loam, 10 to 20 percent slopes	1, 318	. 6
WmD	Westmoreland silt loam, 20 to 30 percent slopes	3, 599	1. 7
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	1, 485	. 7
WmE	Westmoreland silt loam, 30 to 40 percent slopes	2, 022	. 9
WmE3	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded	2, 166	1. 0
WmF	Westmoreland silt loam, 40 to 65 percent slopes	3, 430	1. 6
WmF3	Westmoreland silt loam, 40 to 65 percent slopes, severely eroded	1, 098	. 5
WrB	Wharton silt loam, 3 to 10 percent slopes	370	. 2
WrC	Wharton silt loam, 10 to 20 percent slopes	374	. 2
WrD	Wharton silt loam, 20 to 30 percent slopes	101	(1)
	Water and other areas	800	. 4
	Total	215, 040	100. 0

[1] Less than 0.05 percent.

sand and gravel at a depth of 30 to 36 inches. Bedrock generally occurs below a depth of 5 feet.

These soils commonly occur in the same areas of bottom land as the well drained Pope soils and the moderately well drained Philo soils. They are more acid than the poorly drained Melvin soils. Unless the Atkins soils are drained, they have water on or near the surface most of the year. Some areas are flooded two or three times annually.

The Atkins soils are strongly acid, and a large amount of lime is needed to correct their acidity. Natural fertility is moderate, permeability is moderately slow, and the available moisture capacity is high.

Typical profile of Atkins silt loam in a hayfield near Kasson—

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; common dark-brown to brown (7.5YR 4/4) mottles; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary. Horizon is 6 to 9 inches thick.

C1g—8 to 20 inches, gray to light-gray (10YR 6/1) silty clay loam; many strong-brown (7.5YR 5/8) mottles; weak, coarse, prismatic structure; firm; strongly acid; gradual, smooth boundary. Horizon is 10 to 15 inches thick.

C2g—20 to 42 inches +, mottled strong-brown (7.5YR 5/8) and gray to light-gray (10YR 6/1) heavy silty clay loam; massive (structureless); firm when moist, slightly sticky when wet; strongly acid. Horizon is 10 to 25 inches thick.

The A horizon is generally silt loam but ranges from light silty clay loam to loam or fine sandy loam. The most common color of the Ap horizon is 10YR 4/1 or 5/1. In most places the C horizon is silty clay loam, but it includes heavy silt loam, clay loam, and sandy clay loam. In only a few places is bedrock within a depth of less than 5 feet. The C horizon is mainly 10YR 6/1 or 5/1. The mottles are 10YR 5/6, 5/8, or 4/3 and 7.5YR 5/6, 5/8, or 4/4. The lower values and chromas are more common in the upper part of the profile.

Atkins silt loam (At).—This soil occupies areas along nearly all the streams and drainageways in the eastern two-thirds of the county. Included with it, generally at the heads of drainageways, are areas in which the soil is finer textured than the typical one described. Also included are areas that are sandy loam throughout the profile.

Flooding and a high water table are the main concerns in the management of this soil. Grasses and legumes that tolerate wetness are the most suitable crops, but corn and small grain can be grown occasionally if drainage is improved. Good sites for ponds are generally available, and recreation and wildlife are important uses for this soil. (Capability unit IIIw-1; woodland suitability group 9)

Belmont Series

The Belmont series consists of moderately deep to deep, well-drained soils that developed over interbedded limestone, calcareous red and gray shale, and sandstone.

The surface layer of a typical Belmont soil is friable, dark-brown or dark reddish-brown silt loam about 8 inches thick. The subsoil is reddish-brown silty clay loam that is firm when moist and slightly sticky when wet. Generally, the depth to bedrock is more than 3 feet.

In Barbour County the Belmont soils are on Laurel Mountain at the head of Mill Run. They occur in areas of steep to very steep side slopes and moderately sloping to strongly sloping benches. These soils are redder and less sandy and less acid than the Dekalb soils, and they are not so brown. In addition, they have a finer textured B horizon than the Dekalb soils. The Belmont soils have a finer textured B horizon and are less acid than the Calvin soils, but their horizons are more distinct. They are redder than the Westmoreland soils.

The Belmont soils are medium acid to strongly acid and have moderate to high available moisture capacity. Their fertility is moderately high. Because they are stony and occupy only a small acreage, they are not very important to farming in the county.

Typical profile of a Belmont very stony silt loam in a pastured area having a slope of 15 percent, near a lime quarry near the head of Mill Run—

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) very stony silt loam; moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary. Horizon is 6 to 9 inches thick.

B21t—8 to 18 inches, reddish-brown (5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; discontinuous clay coats; medium acid; gradual, smooth boundary. Horizon is 8 to 12 inches thick.

B22t—18 to 31 inches, reddish-brown (5YR 5/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm; medium acid; continuous, reddish-brown (5YR 5/3) clay coats; gradual, smooth boundary. Horizon is 10 to 16 inches thick.

C—31 to 41 inches, dark-brown to brown (7.5YR 4/4) clay loam; weak, coarse, subangular blocky structure; firm; medium acid; irregular boundary.

R—41 inches +, soft sandstone.

The color is 7.5YR 3/2 or 5YR 3/2 in the Ap horizon and is 5YR 4/4 or 5/4 and 7.5YR 4/4 in the B horizon. In texture the B horizon generally ranges from silty clay loam to light silty clay, but in places there are coarser textured layers in the lower part. The B horizon generally is 10 to 20 percent coarse fragments of limestone and sandstone. The thickness of the solum ranges from 20 to 36 inches, and the depth to bedrock from 24 to 48 inches. In most places 30 percent or more of the C horizon is coarse fragments. Bedrock crops out in some places.

Belmont and Calvin very stony silt loams, 20 to 35 percent slopes (BcE).—The soils in this undifferentiated group are similar to the ones described for their respective series. The areas mapped may be all Belmont soil or all Calvin soil, or they may contain both soils. In many areas that are wooded, the surface layer is thicker and more sandy than that described as typical for either series.

Included in areas mapped as these soils are areas that are gently sloping and nonstony. In most of these included areas, the profile is similar to the typical Belmont profile.

If the soils in this group are protected from erosion and otherwise are properly managed, they are well suited to the production of timber and wildlife. In fields where the gently sloping, nonstony inclusions are adjacent to other tillable soils, they can be used for row crops, hay, or pasture. (Capability unit VIIs-1; woodland suitability group 1)

Belmont and Calvin very stony silt loams, 35 to 65 percent slopes (BcF).—This very steep unit consists mostly of Calvin soil.

Stones, very steep slopes, and a severe hazard of erosion limit the use of these soils to woodland and wildlife. (Capability unit VIIs–1; woodland suitability group 1)

Brinkerton Series

The Brinkerton series consists of deep, gently sloping, somewhat poorly drained or poorly drained soils that generally occur around the heads of streams and on the divides between them. These soils formed in colluvial material from acid gray shale, sandstone, and siltstone.

In a typical Brinkerton soil, the surface layer is very dark grayish-brown or grayish-brown silt loam 5 or 6 inches thick. This layer has granular structure. The silty clay loam subsoil is grayish brown that is mottled with dark brown. It is firm to a depth of 20 inches and has a very firm fragipan below that depth. Nearly everywhere, bedrock is more than 4 feet below the surface.

These soils are in the same drainage sequence as the moderately well drained Ernest soils. In addition, the Brinkerton soils occur with the well drained or moderately well drained Gilpin, Wharton, Dekalb, and Cookport soils on uplands.

Brinkerton soils are strongly acid or very strongly acid, are slowly permeable, and have moderately low natural fertility. Because root growth is restricted in the subsoil, the available moisture capacity is only moderate. Tilth is generally poor. Some areas of these soils are used as hayland, but most of them are used for pasture or are idle. The soils are wet much of the year, and, because of their dense lower subsoil and their position in the landscape, they are difficult to drain.

Typical profile of Brinkerton silt loam, 3 to 8 percent slopes, in an idle field near Chestnut Flat School—

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary. Horizon is 2 to 4 inches thick.

A2—2 to 5 inches, dark grayish-brown (10YR 4/2) light silty clay loam; a few, fine, distinct mottles of dark brown to brown (7.5YR 4/4); weak, medium, subangular blocky structure; friable to firm; strongly acid; clear, wavy boundary. Horizon is 2 to 6 inches thick.

B21g—5 to 10 inches, grayish-brown (2.5Y 5/2) light silty clay loam; many, fine, distinct mottles of dark brown to brown (7.5YR 4/4); massive (structureless); firm; strongly acid; many fine roots; clear, wavy boundary. Horizon is 4 to 8 inches thick.

B22g—10 to 20 inches, grayish-brown (2.5Y 5/2) silty clay loam or clay loam; common, medium, distinct mottles of dark brown to brown (7.5YR 4/4); weak, coarse, subangular blocky structure; friable; strongly acid; gradual, smooth boundary. Horizon is 8 to 15 inches thick.

Bxt—20 to 42 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium and coarse, prominent mottles of strong brown (7.5YR 5/8); weak, medium, prismatic structure; very firm; faces of peds coated with clay; few fine roots; strongly acid. Horizon is 12 to 25 inches thick.

The A horizon is generally silt loam, but in small areas it is light silty clay loam. Some areas are very stony, and in these areas there are large fragments of sandstone, 1 to 4 feet across, that occupy 1 to 3 percent of the surface. In most places the B horizon is silty clay loam, but it may contain layers of clay loam. Coarse fragments range from a few to 15 percent of the soil mass, by volume. The depth to mottling ranges from 0 to 12 inches. The depth to the fragipan is generally about 20 inches but ranges from 18 to 30 inches. Shale or sandstone bedrock is at a depth of 4 to 10 feet.

Brinkerton silt loam, 3 to 8 percent slopes (BrB).—This soil has the profile described for the series. Included with it are a few, nearly level, very poorly drained areas and a few moderately sloping areas. (Capability unit IVw–5; woodland suitability group 9)

Brinkerton very stony silt loam, 3 to 8 percent slopes (BsB).—Except for its stoniness, this soil is similar to the typical one described. A few areas having slopes of less than 3 percent or more than 8 percent were included in mapping. Also included were small areas in which the subsoil is more sandy than the typical one described.

This soil is limited in use because of surface stones. These stones are a severe hazard to farm machinery, and along with wetness, they limit use of the soil mainly to woodland and wildlife. (Capability unit VIIs–5; woodland suitability group 9)

Calvin Series

In the Calvin series are moderately deep or deep, strongly sloping to very steep, well-drained reddish soils that developed in material weathered from sandstone and shale.

In wooded areas the surface layer of a typical Calvin soil is black loam or silt loam 3 or 4 inches thick. This layer is underlain by 4 or 5 inches of dark grayish-brown to brown loam or silt loam. Cultivated fields have a dark-brown plow layer 8 or 9 inches thick. The subsoil normally is moderately firm, brown and reddish-brown heavy silt loam or light silty clay loam. The depth to bedrock is generally about 3 feet but ranges from 24 to 40 inches. In most places the lower 10 inches of the subsoil is very high in content of stone fragments. Generally, from 1 to 3 percent of the surface is covered with stones and boulders of sandstone 1 to 4 feet across.

In Barbour County the Calvin soils are on Laurel Mountain. They occupy mountainous areas, mainly along the headwaters of Mill Run, where they occur with the limy Belmont soils and the brownish, moderately sandy Dekalb soils. The Calvin soils are more acid than the Belmont soils and lack the prominent horizon of clay accumulation of those soils. They are redder, more silty, and less sandy than the Dekalb soils.

Calvin soils are medium acid or strongly acid and have moderately high available moisture capacity. Most of their acreage is wooded. In this county the Calvin soils were mapped only in undifferentiated groups of Belmont and Calvin very stony silt loams. These mapping units are described under the heading "Belmont Series."

Typical profile of a Calvin very stony silt loam in a wooded area having a slope of 30 percent, on State Route 5 at the Tucker County line—

A1—0 to 4 inches, black (N 2/0) silt loam; moderate, medium, granular structure; friable; medium acid; clear, irregular boundary. Horizon is 3 to 5 inches thick.

A2—4 to 6 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable; medium acid; clear, irregular boundary. Horizon is 2 to 4 inches thick.
A3—6 to 9 inches, brown (10YR 5/3) silt loam; moderate, medium, granular structure; friable; strongly acid; gradual, smooth boundary. Horizon is 2 to 4 inches thick.
B21—9 to 15 inches, brown (7.5YR 5/4) silt loam; weak, very fine, subangular blocky structure; firm; strongly acid; 10 percent sandstone fragments; gradual, smooth boundary. Horizon is 5 to 8 inches thick.
B22—15 to 25 inches, reddish-brown (5YR 4/3) heavy silt loam; weak to moderate, fine, subangular blocky structure; firm; no clay films; strongly acid; 20 percent sandstone fragments; gradual, smooth boundary. Horizon is 8 to 12 inches thick.
C—25 to 36 inches, reddish-brown (5YR 4/4) heavy silt loam; massive (structureless); firm; strongly acid; 90 to 95 percent stone fragments (mainly siltstone, more than 3 inches in diameter); gradual, irregular boundary. Horizon is 7 to 17 inches thick.
R—36 inches +, hard shale.

The A horizon is silt loam or loam. In some places the A1 horizon is 2.5YR 3/2 and the A2 horizon is 2.5YR 4/4. The color and loamy texture of the A horizon are commonly influenced by variable amounts of colluvium from sandstone. The B horizon is heavy silt loam and light silty clay loam. The lower part of the B horizon is mainly 5YR 4/3 or 4/4. In only a few places, coarse fragments make up less than 10 percent, by volume, of the upper part of the profile and less than 75 percent, by volume, of the lower part. Carbonates are generally in the underlying shale bedrock at a depth ranging from 8 to 20 feet.

Clarksburg Series

The Clarksburg series consists of deep, gently sloping to strongly sloping, moderately well drained soils. These soils developed in colluvial material from interbedded limestone, shale, siltstone, and sandstone that accumulated at the base of slopes through soil creep and local wash. They have a hard layer, or fragipan, about 2 feet below the surface.

In a typical Clarksburg soil, the surface layer is dark grayish-brown, friable silt loam 7 to 8 inches thick. The subsoil is strong-brown silty clay loam that is firm above a depth of 18 to 30 inches but is very firm below that depth. The subsoil is slightly mottled with dark brown and gray at about 20 inches and is strongly mottled with these colors below 28 inches. Generally, the depth to bedrock is more than 5 feet.

The Clarksburg soils are on lower side slopes and around the heads of streams. Chiefly, they lie on the lower part of hillsides. Most areas are cut by ravines and intermittent streams, and some areas are hummocky.

These soils occur principally with the poorly drained Melvin soils, which occupy adjacent flood plains, and with the well-drained Westmoreland soils on hillsides. The Clarksburg soils are similar to the Ernest soils in drainage and position in the landscape, but they are less acid, have a less yellow subsoil, and generally are not so firm in the fragipan.

The Clarksburg soils are medium acid or strongly acid, are moderate or moderately high in natural fertility, and have moderate available moisture capacity. In most areas the soils are used for hay or pasture, though they are well suited to nearly all the crops grown in the county. Because they lie above flood level in valleys, they are commonly used as sites for homes and as locations for highways. The hazard of soil slips and local seeps should be considered in using these soils.

Typical profile of Clarksburg silt loam, 8 to 15 percent slopes, in a hayfield on Brushy Fork—

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; strongly acid; abrupt, smooth boundary. Horizon is 6 to 8 inches thick.
B21t—7 to 16 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; firm; strongly acid; thin clay coats on ped faces; gradual, smooth boundary. Horizon is 7 to 12 inches thick.
B22t—16 to 27 inches, strong-brown (7.5YR 5/6) silty clay loam; fine, distinct mottles of gray to light gray (10YR 6/1) and dark brown to brown (7.5YR 4/4); moderate, medium, subangular blocky structure; firm; manganese concretions fairly common; medium acid; continuous clay coats; gradual, smooth boundary. Horizon is 9 to 13 inches thick.
Bx—27 to 40 inches, brown (7.5YR 5/4) silty clay loam; many, medium, prominent mottles of gray to light gray (10YR 6/1) and strong brown (7.5YR 5/8); moderate, coarse, prismatic structure; very firm (fragipan); manganese and iron concretions common; few roots on prism faces; medium acid; clear, smooth boundary. Horizon is 10 to 20 inches thick.
IIC—40 to 46 inches +, fine clay material and some coal blossom.

The Ap horizon is normally 10YR 4/2 but may be 7.5YR 4/2. The B horizon is generally silty clay loam but, in places, ranges to silty clay in the lower part. In most places the B horizon is 7.5YR 5/6, 4/4, or 5/4. The mottles are generally 10YR 6/1 and 7.5YR 4/4 or 5/8. The depth to the fragipan ranges from 18 to 30 inches.

Clarksburg silt loam, 3 to 8 percent slopes (CIB).—This soil has a profile similar to the one described as typical for the series. Some included areas are somewhat poorly drained.

Controlling erosion, maintaining good tilth, and improving drainage are the main concerns in the use and management of this soil. (Capability unit IIe–13; woodland suitability group 2)

Clarksburg silt loam, 8 to 15 percent slopes (CIC).—This soil, which has the typical profile described, is the most extensive Clarksburg soil in Barbour County. It is dissected by ravines, and much of it is hummocky and in narrow strips. Otherwise, it is similar to Clarksburg silt loam, 3 to 8 percent slopes. Some included areas are well drained.

Alfalfa and other deep-rooted crops are suited to this soil, but they may be shorter lived than on well-drained soils. Row crops can be grown if erosion is controlled. (Capability unit IIIe–13; woodland suitability group 2)

Clarksburg silt loam, 15 to 25 percent slopes (CID).—This soil is in small areas, mainly narrow bands around the lower part of steep hillsides. Generally, it is dissected by ravines, and it has an uneven surface because of soil slips. In most other respects, it is similar to Clarksburg silt loam, 3 to 8 percent slopes. Included are small areas of soils that are similar to Upshur soils.

This soil is not very suitable as cropland, but it can be used for crops if it is farmed in a satisfactory rotation. (Capability unit IVe–9; woodland suitability group 2)

Cookport Series

In the Cookport series are moderately deep or deep, moderately well drained soils that have a hard layer, or fragipan, at a depth of about 2 feet. These soils formed in material weathered from acid sandstone, siltstone, and shale.

The surface layer of a typical Cookport soil is very dark grayish brown, loamy, and friable. It is about 8 inches thick. The yellowish-brown subsoil also is loamy and friable to a depth of about 18 inches. Beginning at that depth, however, it is mottled with gray and strong brown, and it is very firm below a depth of about 24 inches. The depth to sandstone bedrock ranges from 2 to 4 feet but is about 3 feet in most places.

The Cookport soils occupy broad, gently sloping or moderately sloping ridgetops and benches. In Barbour County their largest acreage is in the plateau area between Belington and Audra State Park. Most of the adjoining soils on the steeper hillsides are well drained and generally are not so deep as the Cookport soils.

Cookport soils occur with the well-drained, loamy Dekalb soils and the silty Gilpin soils, which are generally on the steeper hillsides and lack a fragipan. Cookport soils are on slopes similar to those of the well-drained Wellston soils, which are siltier and do not have a fragipan. They are not so fine textured as the Wharton soils, which lack a fragipan.

The Cookport soils are used principally for hay and pasture. They are strongly acid or very strongly acid and have moderate available moisture capacity. Generally, the soils are in good tilth. Because of the fragipan, however, the root zone for normally deep-rooted plants is limited.

Typical profile of Cookport loam, 3 to 10 percent slopes, in a hayfield 7.5 miles southwest of Belington on the Audra Road—

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam; moderate, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary. Horizon is 6 to 9 inches thick.

A3—8 to 12 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; very friable; strongly acid; clear, smooth boundary. Horizon is 3 to 6 inches thick.

B1—12 to 18 inches, yellowish-brown (10YR 5/6) loam; weak, fine, subangular blocky structure; friable; strongly acid; gradual, smooth boundary. Horizon is 4 to 8 inches thick.

B2t—18 to 24 inches, yellowish-brown (10YR 5/8) loam or clay loam; ped faces pale brown (10YR 6/3); a few, fine, distinct mottles of strong brown (7.5YR 5/8) and gray to light gray (10YR 6/1); weak, fine, subangular blocky structure; firm; strongly acid; thin discontinuous clay coats; clear, smooth boundary. Horizon is 4 to 12 inches thick.

Bx—24 to 42 inches, yellowish-brown (10YR 5/6) fine sandy loam; many, medium, distinct mottles of strong brown (7.5YR 5/8) and gray to light gray (10YR 6/1); coarse prismatic structure that is nearly massive (structureless); very firm; few fine roots and many medium pores; iron coatings are numerous and follow pores in wormlike pattern; strongly acid; abrupt, smooth boundary. Horizon is 4 to 20 inches thick.

R—42 inches +, hard, gray sandstone.

The A horizon ranges from loam or silt loam to sandy loam, and the B horizon is loam, sandy loam, clay loam, or sandy clay loam. The color of the A horizon is generally 10YR 4/2 or 3/2; that of the B horizon is mainly 10YR 5/6 but ranges from 10YR 5/4 to 10YR 5/8. The depth to the fragipan is 16 to 24 inches. Bedrock occurs at a depth of 24 to 48 inches. In most places the profile is free of stones.

Cookport loam, 3 to 10 percent slopes (CpB).—This gently sloping soil is mainly on broad ridgetops and benches. It has the profile described for the series. Included are a few nearly level areas, and some of these are poorly drained. Also included are small areas of Gilpin soils and Dekalb soils.

Controlling erosion and maintaining fertility are the chief concerns in the use and management of this soil. Because wetness is a slight limitation, alfalfa and other deep-rooted crops may be short lived. (Capability unit IIe-13; woodland suitability group 3)

Cookport loam, 10 to 20 percent slopes (CpC).—This moderately sloping soil is mainly on ridgetops. Its profile generally is similar to the one described for the series, but in some places it is finer textured. Small areas of Gilpin soils and Dekalb soils are included.

This soil produces average yields of crops if it is kept fertile and is protected from erosion. (Capability unit IIIe-13; woodland suitability group 3)

Dekalb Series

Soils of the Dekalb series are moderately deep or deep, gently sloping to very steep, and well drained. They developed from acid, gray sandstone that generally was interbedded with thin layers of shale or siltstone.

The surface layer of a typical Dekalb soil contains many stone fragments. This layer is friable loam and normally is 7 to 9 inches thick. It is very dark gray or black in the upper 3 or 4 inches and generally is dark grayish brown in the lower 4 or 5 inches. The subsoil is friable, yellowish-brown loam that contains many stone fragments. In most places sandstone or shale bedrock is about 2½ feet below the surface.

The Dekalb soils, for the most part, occupy the roughest areas of Barbour County. Their largest acreage is in the eastern part of the county, on Laurel Mountain. A smaller but significant acreage lies on the steep and very steep side slopes along the Middle Fork and Tygart Rivers.

These soils occur principally with the Gilpin, Cookport, Wharton, Ernest, Belmont, and Calvin soils. They lack the finer textured B horizon of clay accumulation that is common to all of these soils except the Calvin, which are redder, more silty, and less sandy than the Dekalb soils.

In most areas the Dekalb soils are wooded. They are strongly acid or very strongly acid and have moderately low available moisture capacity. Generally, their tilth is good in nonstony areas. Stones in the channery areas normally do not interfere with cultivation.

Typical profile of Dekalb very stony loam, 20 to 40 percent slopes, in a wooded area along State Route 11 one-half mile east of Audra State Park—

A1—0 to 3 inches, black (10YR 2/1) channery loam; moderate, medium, granular structure; loose; very strongly acid; abrupt, wavy boundary. Horizon is 2 to 4 inches thick.

A2—3 to 9 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable; strongly acid; 25 percent stone fragments; gradual, smooth boundary. Horizon is 4 to 7 inches thick.

B1—9 to 16 inches, yellowish-brown (10YR 5/6) loam; weak, fine, subangular blocky structure; friable; strongly acid; 25 percent stone fragments; gradual, smooth boundary. Horizon is 5 to 9 inches thick.

B2—16 to 32 inches, yellowish-brown (10YR 5/6) loam marginal to clay loam; weak to moderate, fine and medium, subangular blocky structure; firm; strongly acid; 35 percent stone fragments; clear, wavy boundary. Horizon is 12 to 18 inches thick.

R—32 inches +, acid, gray sandstone.

The A horizon is loam or fine sandy loam. The color of the A1 horizon is mostly 10YR 2/1 or 3/1. The A2 horizon is generally 10YR 4/2, and the B horizon is 10YR 5/4 or 5/6. In the B horizon the textures are loam, fine sandy loam, sandy loam, and light sandy clay loam. Bedrock occurs at a depth ranging from 24 to 48 inches. In some places coarse fragments make up 60 to 90 percent of the soil mass in the lower part of the profile. In very stony areas, from 1 to 3 percent of the surface is covered with sandstone fragments 1 to 4 feet across.

Dekalb channery loam, 3 to 10 percent slopes (DaB).—This gently sloping soil is mainly on the ridges. It has a profile that is similar to the typical one described. Included with it are small areas of a soil that is somewhat like the deep, well drained Wellston soils or the moderately well drained Cookport or Wharton soils.

This Dekalb soil can be used rather intensively, but it needs to be protected by practices that control erosion. (Capability unit IIe–12; woodland suitability group 4)

Dekalb channery loam, 10 to 20 percent slopes (DaC).—Most of this soil is on ridgetops, but some of it is on flats and benches that lie on moderately steep or steep hillsides. The profile is similar to that described as typical for the series. Included are a few areas that are moderately well drained and a few areas in which the soil is deeper or more clayey than the typical one.

This soil is suited to most of the common crops that require good drainage. Contour farming or contour stripcropping is needed to control erosion. (Capibility unit IIIe–12; woodland suitability group 4)

Dekalb channery loam, 20 to 30 percent slopes (DaD).—This strongly sloping soil occurs on ridgetops in some areas and on side slopes in others. It has a profile that is similar to that described for the series. Included with it are small areas of a soil that is more clayey than this one.

Although this soil can be used occasionally for cultivated crops, it should be protected by long-term hay crops or pasture most of the time. The soil is also suitable as woodland. (Capability unit IVe–5; woodland suitability group 4)

Dekalb channery loam, 30 to 40 percent slopes (DaE).—This soil is mainly on steep hillsides. It has a profile that is similar to the typical one described. Some included areas are more clayey than this soil, and there are small inclusions of the more silty Gilpin soils.

Most of this Dekalb soil is wooded. Some areas can be used for pasture, but most are too steep for the efficient use of farm equipment. (Capability unit VIIe–2; woodland suitability group 4)

Dekalb channery loam, 40 to 65 percent slopes (DaF).—This soil occupies very steep side slopes. Included with it are some areas that are shallower and some that are deeper than the typical Dekalb soil. Also included are areas of a soil that developed chiefly from siltstone and shale and is more silty than this soil.

The use and management of this soil are limited mainly by very steep slopes. Most of the acreage is woodland, a good use. (Capability unit VIIe–2; woodland suitability group 4)

Dekalb very stony loam, 3 to 20 percent slopes (DbC).—This soil is mainly on the ridgetops. It has a profile that is similar to the one described for the series. Included are small areas in drainageways where the soil is generally deeper than this soil and is only moderately well drained.

Stones limit the use of this Dekalb soil. Generally, from 1 to 3 percent of the surface is covered with stones and boulders. Small areas can be used for pasture, but in most places a more suitable use is woodland. (Capability unit VIIs–2; woodland suitability group 4)

Dekalb very stony loam, 20 to 40 percent slopes (DbE).—This soil has the profile described as typical for the Dekalb series. It occupies strongly sloping and steep side slopes, principally in mountainous areas. Included with it, along the headwaters of Mill Run, are small areas of a reddish soil.

Because of steep slopes and stones, the use of this soil is limited mainly to woodland or recreation. In most places from 1 to 3 percent of the surface is covered with stones and boulders 1 to 4 feet or more across. (Capability unit VIIs–2; woodland suitability group 4)

Dekalb very stony loam, 40 to 65 percent slopes (DbF).—This soil is on very steep side slopes. It has a profile that is similar to the one described.

Steep slopes and stones limit the use of this soil chiefly to woodland or recreation. (Capability unit VIIs–2; woodland suitability group 4)

Ernest Series

Soils of the Ernest series are deep, gently sloping to strongly sloping, and moderately well drained. They developed in colluvial material from acid shale and sandstone that accumulated near the base of slopes through soil creep and local wash. These soils have a hard layer, or fragipan, about 2 feet below the surface.

The surface layer of a typical Ernest soil is crumbly, dark grayish-brown to dark-brown silt loam 6 to 8 inches thick. The subsoil is yellowish-brown silty clay loam that is friable or firm to a depth of about 2 feet but generally is very firm below that depth. This yellowish-brown layer is slightly mottled with strong brown and gray at about 20 inches and is strongly mottled with those colors below that depth. Nearly everywhere the depth to bedrock is more than 4 feet.

The Ernest soils lie mainly along drainageways and on toe slopes below steeper hillsides. Generally on the hills above them are the moderately deep, well-drained Gilpin and Dekalb soils. Most areas of Ernest soils are dissected by ravines and intermittent streams.

These soils commonly occur next to the somewhat poorly drained or poorly drained Brinkerton soils. The Ernest soils have a profile similar to that of the Clarksburg soils, but they are more acid and are not so brown.

They have a thicker, less clayey subsoil than the Wharton soils, which lack a fragipan.

Because the fragipan is slowly permeable, seasonal waterlogging is likely in the Ernest soils. Nevertheless, most nonstony areas are in good tilth and are used for crops, hay, or pasture. They are strongly acid or very strongly acid and have moderate available moisture capacity. In many places the Ernest soils are stony and are used principally as woodland.

Typical profile of Ernest silt loam, 8 to 15 percent slopes, in a hayfield 2 miles east of Belington, along secondary Route 15—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; strongly acid; abrupt, smooth boundary. Horizon is 6 to 9 inches thick.

B1—8 to 16 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, fine, subangular blocky structure; firm; strongly acid; clear, smooth boundary. Horizon is 6 to 15 inches thick.

B2t—16 to 22 inches, yellowish-brown (10YR 5/6) silty clay loam; fine, distinct, strong-brown (7.5YR 5/8) and gray to light-gray (10YR 6/1) mottles; moderate, fine and medium, subangular blocky structure; firm; strongly acid; continuous clay films; clear, smooth boundary. Horizon is 6 to 10 inches thick.

Bx—22 to 43 inches, yellowish-brown (10YR 5/6) silty clay loam; many, medium and coarse, distinct mottles of strong brown (7.5YR 5/8) and gray to light gray (10YR 6/1); coarse prismatic structure or massive (structureless); very firm (fragipan); strongly acid; manganese and iron concretions prominent but more or less in pockets; 50 percent small fragments of stone, less than 3 inches in diameter; gradual, smooth boundary. Horizon is 12 to 20 inches thick.

C—43 to 57 inches, brown (10YR 5/3) silty clay; many, medium and coarse, distinct mottles of strong brown (7.5YR 5/8) and gray to light gray (10YR 6/1); massive (structureless) or coarse prismatic structure; firm to very firm; strongly acid; 85 to 90 percent residual fragments of shale; gradual, smooth boundary. Horizon is 20 to 28 inches thick.

R—57 inches +, slightly weathered gray shale.

The B horizon is dominantly silty clay loam, but it ranges from heavy silt loam to light silty clay. The color of the Ap horizon is generally 10YR 4/2, and that of the B horizon is commonly 10YR 5/6 but may be 10YR 5/4 or 5/8 or 7.5YR 5/6. In most places the depth to the fragipan is about 20 to 24 inches.

Ernest silt loam, 3 to 8 percent slopes (EnB).—This gently sloping soil occurs on many of the lower slopes in the eastern two-thirds of the county. It has a profile similar to the one described as typical for the series. Included with it are small areas in which the soil is not mottled and lacks a fragipan; small areas that have a layer of gray clay in the subsoil; and small areas in which the soil is redder and more clayey than the typical soil.

This soil is suitable for moderately intensive cultivation if erosion is controlled. (Capability unit IIe–13; woodland suitability group 2)

Ernest silt loam, 8 to 15 percent slopes (EnC).—This moderately sloping soil has the profile described for the series. It lies along the lower slopes of hills and around the heads of streams, chiefly in the eastern part of the county. In most places it is dissected by surface drains and intermittent streams. Included with this soil are some small areas that are well drained, some that are poorly drained, and some in which the soil is redder than that described as typical.

Most crops grown in the county do well on this soil. Erosion is a severe hazard, however, unless the soil is protected by close-growing crops about half the time and is farmed on the contour or in contour strips. (Capability unit IIIe–13; woodland suitability group 2)

Ernest silt loam, 15 to 25 percent slopes (EnD).—This strongly sloping soil is mainly in the eastern part of the county. It occupies the lower side slopes of hills, commonly the lower one-third of a hillside. It has a profile similar to the one described for the series. A few included areas are well drained.

For controlling erosion in cultivated fields, close-growing crops are needed on this soil most of the time. (Capability unit IVe–9; woodland suitability group 2)

Ernest extremely stony silt loam, 3 to 20 percent slopes (ErC).—This soil is along drainageways and on the lower side slopes of hills in the eastern two-thirds of the county. It is slightly more sandy than the soil described for the series and has many large stones and boulders of sandstone on the surface. Included are small areas that are well drained, small areas that are poorly drained, and a few areas that are nonstony.

This soil is too stony for cultivated crops and generally is too stony for improved pasture, but it is well suited to trees. Very little of the acreage has been plowed. (Capability unit VIIs–4; woodland suitability group 2)

Gilpin Series

Soils of the Gilpin series are moderately deep, gently sloping to very steep, and well drained. They formed in material weathered from acid, gray shale and siltstone interbedded with thin layers of sandstone.

The surface layer of a typical Gilpin soil is friable, crumbly channery silt loam 7 or 8 inches thick. It is very dark gray in the upper part and yellowish brown in the lower part. The subsoil is firm, yellowish-brown silty clay loam that contains many stones or shale fragments in the lower part. Generally, sandstone or shale bedrock is about 2½ feet below the surface.

The Gilpin soils occur throughout the county, but most of their acreage is in the hilly central part. They occur with the Dekalb, Cookport, Wharton, Wellston, Upshur, and Westmoreland soils. Gilpin soils are more silty and less sandy than the well drained Dekalb soils and the moderately well drained Cookport soils. They are shallower and have a thinner solum than the Wellston and Wharton soils, and they lack the clayey, mottled B horizon of the Wharton soils. The Gilpin soils are much less clayey and are more acid than the reddish Upshur soils, and they are more yellowish and less acid than the Westmoreland soils.

The Gilpin soils cover a larger acreage than the soils of any other series in the county. They are strongly acid or very strongly acid, are moderately permeable, and generally are in good tilth. Because of the limited depth to bedrock, the available moisture capacity is only moderate.

Typical profile of Gilpin channery silt loam, 10 to 20 percent slopes, in a pastured field along State Route 92 one-half mile south of Meadowville—

A1—0 to 3 inches, very dark gray (10YR 3/1) channery silt loam; moderate, medium, granular structure; loose; very strongly acid, clear, smooth boundary. Horizon is 1 to 3 inches thick.
A2—3 to 7 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; very strongly acid; clear, smooth boundary. Horizon is 2 to 5 inches thick.
B21t—7 to 13 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; firm; 15 percent stone fragments; continuous clay flows on ped faces; very strongly acid; clear, wavy boundary. Horizon is 5 to 8 inches thick.
B22t—13 to 22 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, medium, subangular blocky structure; firm; continuous clay flows on ped faces; 15 percent siltstone fragments; very strongly acid; clear, irregular boundary. Horizon is 7 to 12 inches thick.
C—22 to 33 inches, yellowish-brown (10YR 5/8) silty clay loam; massive (structureless); firm; 75 percent weathered fragments of soft shale; very strongly acid; clear, irregular boundary. Horizon is 9 to 15 inches thick.
R—33 inches +, slightly weathered gray shale.

The A horizon is silt loam or loam. It generally contains channery fragments but in some places is very stony. The color of the Ap horizon is 10YR 3/2 or 4/2. The B horizon is mainly silty clay loam, though in places it is heavy silt loam that is marginal to clay loam. In the B horizon the colors are mostly 10YR 5/6 or 7.5YR 5/6, but in some places they are 10YR 5/4 and 5/8. In the lower part of the profile, the soil mass is generally about 80 percent fragments of siltstone or shale. The depth to bedrock ranges from 20 to 36 inches.

Gilpin channery silt loam, 3 to 10 percent slopes (GcB).—This soil occupies gently sloping ridges. It has a profile similar to that described for the series. Some included areas are deeper than the typical soil, and some are only moderately well drained.

If erosion is controlled, this soil is suited to crops that require rather intensive cultivation. (Capability unit IIe–10; woodland suitability group 5)

Gilpin channery silt loam, 10 to 20 percent slopes (GcC).—This soil occurs on moderately sloping ridgetops, benches, and side slopes. It has the profile that is described as typical for the series. Included with it are small areas of Wharton soils, which have a gray, clayey layer in the lower subsoil. Also included are small areas of Dekalb soils.

Controlling erosion is the main concern in fields where this soil is used for crops. (Capability unit IIIe–10; woodland suitability group 5)

Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded (GcC3).—This moderately sloping soil developed mainly from shale and generally has a more clayey subsoil than the typical soil. Unlike Gilpin channery silt loam, 10 to 20 percent slopes, it has lost most of its original surface layer through erosion. In many places the subsoil is exposed. The plow layer is in poor tilth, absorbs moisture slowly, and has a low content of organic matter.

This soil is suited to the same crops as Gilpin channery silt loam, 10 to 20 percent slopes, but it needs more intensive practices for controlling erosion. (Capability unit IVe–3; woodland suitability group 5)

Gilpin channery silt loam, 20 to 30 percent slopes (GcD).—This strongly sloping soil occupies any position in the landscape where Gilpin soils occur. It has a profile similar to that described for the series. Included are small areas of a soil that is more sandy than this one and is somewhat like a Dekalb soil.

Controlling erosion is the main concern in the management of this soil. (Capability unit IVe–3; woodland suitability group 5)

Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded (GcD3).—This strongly sloping soil is similar to Gilpin channery silt loam, 20 to 30 percent slopes, but it has lost all or most of its original surface layer through erosion. In many areas the subsoil is exposed. The plow layer has a low organic-matter content, is in poor tilth, and absorbs moisture slowly. In most places the subsoil of this soil is somewhat more clayey than the one described as typical for the series.

Controlling erosion is the main concern in the management of this soil. Limiting use to grass or trees helps to check erosion, to build fertility in the surface layer, and to increase the available moisture capacity. (Capability unit VIe–2; woodland suitability group 5)

Gilpin channery silt loam, 30 to 40 percent slopes (GcE).—This soil occupies steep hillsides. Its profile is similar to the one described for the series. Small included areas consist of a red, clayey soil that lies in bands and that developed from red clay shale interbedded with the sandstone and shale that formed the parent material of the Gilpin soils. Also included are small areas in which the soil is more sandy than the typical Gilpin soil.

The use and management of this soil are limited mainly by hazardous slopes and the risk of erosion. The soil is so steep that it cannot be kept from eroding if cultivated crops are grown. It is suited to permanent hay or pasture, however. (Capability unit VIe–2; woodland suitability group 5).

Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded (GcE3).—This soil occurs on steep hillsides, where it has lost three-fourths or more of its original surface layer through erosion. The present surface layer has a low organic-matter content and, unless protected, is washed by excessive runoff. In small included areas, commonly shaped as bands, there is a red, clayey soil that developed from red clay shale interbedded with the sandstone and shale that formed the parent material of the Gilpin soils.

Some areas of this severely eroded soil can be used for pasture, but most of them are more suitable as woodland. (Capability unit VIIe–2; woodland suitability group 5)

Gilpin channery silt loam, 40 to 65 percent slopes (GcF).—This soil is on very steep hillsides. In some places it occupies long, continuous side slopes, and in others it lies either above or below benches. Included are a few severely eroded areas, and small areas consisting of a red, clayey soil that developed from red clay shale interbedded with the sandstone and shale that formed the parent material of the Gilpin soils.

This soil is limited in use because of very steep slopes, excessive runoff, a severe risk of erosion, and periodic droughtiness. Slopes are so hazardous that farm equipment cannot be used safely. (Capability unit VIIe–2; woodland suitability group 5)

Gilpin-Dekalb Very Stony Complexes

In some areas in Barbour County, the Gilpin and Dekalb soils occur in such intricate patterns that mapping the soils separately was impractical. Consequently, they were mapped together in very stony complexes. The Gilpin and the Dekalb soils occur in about equal acreages in each complex. They are moderately deep or deep, well-drained soils that have a surface layer of silt loam or loam.

The Gilpin soils developed mainly from shale and are more silty than the Dekalb soils, which developed from sandstone. Soils of both series are stony on the surface. In most areas boulders of sandstone, 1 to 4 feet across, cover 1 to 3 percent of the soil surface. Rock ledges are fairly common.

Gilpin-Dekalb very stony complexes range from gently sloping to very steep, but in most places they are strongly sloping or steep. Nearly all of their acreage is in the eastern two-thirds of the county.

These soils are strongly acid or very strongly acid. Their natural fertility and available moisture capacity are moderate to moderately low. A small acreage is used for pasture, but most areas are better suited to trees.

Gilpin-Dekalb very stony complex, 3 to 20 percent slopes (GdC).—This complex contains Gilpin soils and Dekalb soils in about equal acreages. In some places, particularly the more mildly sloping areas, the Dekalb soils are shallower than the soil described as typical for that series. Sandstone bedrock lies near the surface in places, and it crops out along the outer edge of many flats and benches. Included in the complex are some moderately well drained areas that are deeper than either the Gilpin or the Dekalb soils. These included areas, which commonly are extremely stony, occur along drainageways and around the heads of streams.

Stoniness is the main concern in the use and management of these soils. Stones and rock outcrops make the operation of equipment difficult in many areas. Among the suitable uses for these soils are woodland and wildlife. (Capability unit VIIs–2; woodland suitability group 6)

Gilpin-Dekalb very stony complex, 20 to 40 percent slopes (GdE).—Profiles of these strongly sloping and steep soils are similar to the ones described for the series. Soils of the two series occur in the complex in about equal acreages. Included are some moderately well drained areas in which the soil is deeper than either the Gilpin or the Dekalb soils.

The use and management of these soils are limited mainly by stones, which hinder the operation of equipment. Woodland and wildlife are among the more suitable uses. (Capability unit VIIs–2; woodland suitability group 6)

Gilpin-Dekalb very stony complex, 40 to 65 percent slopes (GdF).—These very steep soils are on short hillsides and on mountain slopes. They have profiles that are similar to the ones described for the two series. The Dekalb soils occupy a larger acreage than the Gilpin soils.

Stones, rock outcrops, and very steep slopes are the main limitations that restrict use of these soils. The efficient operation of equipment is hindered by stoniness and hazardous slopes. Woodland and wildlife are the best uses for these soils. (Capability unit VIIs–2; woodland suitability group 6)

Gilpin-Upshur Complexes

The soils in these complexes occur in such intricate patterns that they were not separated in mapping. They have profiles that are similar to those described for the two series. Gilpin soils make up a larger part of the total acreage than Upshur soils, though the Upshur soils are dominant in the more mildly sloping areas.

The soils of both series developed in areas where level layers of acid, gray shale and sandstone were interbedded with limy, red shale. The Gilpin soils are moderately deep, well-drained silt loams that developed from shale and sandstone. They have a dark grayish-brown surface layer and a yellowish-brown subsoil. The Upshur soils are moderately deep or deep, well-drained soils that developed from red clay shale. They have a surface layer of dark reddish-brown silty clay loam and a subsoil of reddish-brown to red silty clay or clay that is sticky when wet.

Gilpin-Upshur complexes occupy ridges, knobs, saddles, benches, and steep side slopes. Most of their acreage is on the higher points through the center of the county. The largest area extends from near Belington along State Route 92 to the Preston County line.

Because these soils are intermingled, they normally must be managed together. They are used for cultivated crops, hay, pasture, and trees.

Gilpin-Upshur complex, 3 to 10 percent slopes (GuB).—This gently sloping complex is mainly on benches and ridgetops. The Upshur soils are dominant, and the Gilpin soils make up a smaller part. Included with them are a few moderately well drained areas, and some severely eroded areas in which the plow layer is mostly subsoil material. These eroded areas have excessive runoff and a low content of organic matter.

If erosion is controlled, the soils of this complex are suitable for rather intensive use. (Capability unit IIIe–15; woodland suitability group 7)

Gilpin-Upshur complex, 10 to 20 percent slopes (GuC).—This moderately sloping complex occurs mainly on benches and ridgetops. About three-fourths of it is made up of Upshur soils. A few included areas are only moderately well drained. Also included are a few severely eroded areas in which the subsoil is exposed in most places. Here, the plow layer is clay, has a low content of organic matter, and absorbs moisture slowly.

In areas where the soils of this complex are used for crops, controlling erosion is the main concern. (Capability unit IVe–15; woodland suitability group 7)

Gilpin-Upshur complex, 20 to 30 percent slopes (GuD).—This strongly sloping complex occupies any position in the landscape where Gilpin-Upshur complexes occur. It consists of yellowish-brown Gilpin soils and reddish Upshur soils in about equal acreages.

Controlling erosion is the main concern in the management of these soils. (Capability unit IVe–15; woodland suitability group 7)

Gilpin-Upshur complex, 20 to 30 percent slopes, severely eroded (GuD3).—This strongly sloping complex lies mainly near ridgetops, but it has a smaller acreage in other positions. Although the soils are similar to those in the Gilpin-Upshur complex, 20 to 30 percent slopes, they have lost more than three-fourths of their original surface layer through erosion. The plow layer is clayey, has a low organic-matter content, is in poor tilth, and absorbs moisture slowly.

In the use and management of these soils, controlling erosion is the chief concern. (Capability unit VIe–3; woodland suitability group 7)

Gilpin-Upshur complex, 30 to 40 percent slopes (GuE).—This complex occupies steep hillsides. About three-fourths of it consists of Gilpin soils, and most of the rest is Upshur soils. Small areas of Dekalb soils are included.

The use and management of these soils are limited mainly by steep slopes and the erosion hazard. (Capability unit VIe–3; woodland suitability group 7)

Gilpin-Upshur complex, 30 to 40 percent slopes, severely eroded (GuE3).—The soils of this complex occupy steep hillsides, where erosion has washed away the surface layer and exposed the subsoil in most places. Deep gullies have been cut into the subsoil in some areas. The present surface layer is clayey, is low in organic-matter content, and has excessive runoff. About three-fourths of the complex is Gilpin soils, and the rest is Upshur soils. These soils are shallower than the ones described as typical for their respective series.

Some areas of this severely eroded complex can be used for pasture, but most of them are better suited to trees. Pastured areas should be especially well managed so that further erosion is controlled. (Capability unit VIIe–1; woodland suitability group 7)

Gilpin-Upshur complex, 40 to 65 percent slopes (GuF).—This complex is on very steep hillsides. Gilpin soils make up about three-fourths of it, and Upshur soils make up most of the rest. A few included areas are severely eroded. Also included are small areas of Dekalb soils.

These soils are too steep for pasture but are suitable as woodland. They are somewhat droughty if rainfall is below normal during the growing season. (Capability unit VIIe-1: woodland suitability group 7)

Lindside Series

The Lindside series consists of deep, nearly level, moderately well drained soils on flood plains. These soils formed in material that washed from uplands underlain by limestone, sandstone, and shale.

In a typical Lindside soil, the surface layer is friable, dark grayish-brown silt loam. The subsurface layer, to a depth of 15 to 18 inches, is generally about the same color and texture as the surface layer. Below that depth the soil is intermingled gray and brown; it is firmer and contains more clay than in the upper part of the profile. Gravelly and sandy layers occur at a depth of 3 to 5 feet.

In Barbour County the Lindside soils are mainly in the western part. Here, they have been influenced by limestone material that washed from the uplands. They commonly occur with the poorly drained Melvin soils on flood plains. The principal soils on nearby uplands are the well drained Westmoreland soils; and on adjacent colluvial slopes, the moderately well drained Clarksburg soils. The Lindside soils are less acid, less yellow, and generally slightly finer textured than the moderately well drained Philo soils.

Lindside soils are medium acid, are in fair to good tilth, and are moderately fertile. But if they are to produce the most favorable yields, they must be artificially drained. An occasional crop is damaged by floodwater. In some areas recent flooding has deposited a thin layer of silt and sand on the surface.

Typical profile of Lindside silt loam in a pastured area one-half mile west of the Elk City Methodist Church—

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary. Horizon is 6 to 8 inches thick.

C1—6 to 18 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable to firm; medium acid; clear, smooth boundary. Horizon is 10 to 14 inches thick.

C2—18 to 42 inches +, dark-brown to brown (7.5YR 4/4) silty clay loam; ped faces grayish brown (10YR 5/2); common, medium, dark-gray (10YR 4/1) and dark-brown to brown (7.5YR 4/4) mottles; weak, coarse, angular blocky structure; firm; medium acid. Horizon is 20 to 26 inches thick.

The color of the Ap horizon is dominantly 10YR 4/2 or 4/3 but may be 7.5YR 3/2. The C horizon ranges from silt loam to silty clay loam, and in this horizon the dominant color is 7.5YR 4/4. The depth to mottling ranges from 15 to 20 inches. Mottles in the lower subsoil are 10YR 4/1 or 6/1 and 7.5YR 4/4 or 5/8. In some areas these soils are silt loam throughout the profile.

Lindside silt loam (Ln).—This nearly level soil of the flood plains has the profile described for the series. Included with it are a few areas that are well drained and a few that are poorly drained.

Flooding and a seasonally high water table are the main hazards that affect the use of this soil. (Capability unit IIw–7; woodland suitability group 9)

Melvin Series

The Melvin series consists of deep, nearly level, poorly drained soils on flood plains. These soils formed in alluvium that washed from soils of the uplands derived from interbedded shale, sandstone, and limestone.

The surface layer of a typical Melvin soil is mottled dark-brown and gray silt loam and is about 8 inches thick. This layer is friable. It is underlain by a gray silty clay loam subsoil that is strongly mottled with strong brown or reddish brown. The subsoil is firmer than the surface layer and is slightly sticky when wet. Sandy and gravelly layers occur at a depth of about 5 feet.

In Barbour County the Melvin soils are in the western part. Here, they have been influenced by limestone material that washed from the uplands. They commonly occur with the moderately well drained Lindside soils of the flood plains and the moderately deep or deep, well drained Westmoreland soils of the uplands. On nearby colluvial slopes are the deep, moderately well drained Clarksburg soils. Melvin soils are less acid than the poorly drained Atkins soils.

Many areas of the Melvin soils are flooded two or three times annually. In some places recent flooding has left a thin deposit of silt and sand on the surface. In addition, some areas are covered with a foot or more of waste material that washed from strip mine spoil. In areas severely affected by strip mining, the stream channels are clogged. In these areas the soils are swampy or ponded most of the time, and about the only plants growing on them are cattails.

These soils are medium acid or slightly acid. They have moderately high natural fertility but are in fair to poor tilth. The soils are of little value as cropland unless they are artificially drained. Even after drainage is improved, flooding and a high water table are still hazards. Recreation and wildlife, however, are suitable uses for these soils.

Typical profile of Melvin silt loam in a hayfield on Little Hackers Creek—

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; dark-brown to brown (7.5YR 4/4) mottles are common (dark brown to brown (10YR 4/3) when crushed); weak, medium, granular structure; friable; medium acid; abrupt, smooth boundary. Horizon is 7 to 9 inches thick.

C1g—8 to 24 inches, gray (10YR 5/1) silty clay loam; dark reddish-brown (5YR 3/4) mottles are common, medium, and distinct; massive (structureless) or weak, coarse, subangular blocky structure; firm; slightly acid; gradual, smooth boundary. Horizon is 10 to 22 inches thick.

C2g—24 to 56 inches, strong-brown (7.5YR 5/8) and gray (10YR 5/1) gritty silty clay loam; massive (structureless); slightly sticky when wet; slightly acid; gravelly below depth of 56 inches.

The A horizon is mainly silt loam but ranges to light silty clay loam. The C horizon ranges from heavy silt loam to silty clay loam. In some areas the profile is silt loam throughout. Generally, the colors throughout the profile are intermingled dark gray or gray (10YR 4/1 or 5/1) and brown or dark brown to strong brown (7.5YR 4/4 or 5/8).

Melvin silt loam (Ma).—This nearly level soil of the flood plains has the profile described for the Melvin series. Small areas are covered with a foot or more of waste materials that washed from strip mine spoil. In these areas the stream channels are clogged, water stands on the surface, and the vegetation is limited to cattails and other weeds.

Poor drainage is the main limitation. Deepening and straightening the stream channels will help to lower the water table and to reduce the risk of floods. Either open drains or tile are effective. Grasses and legumes that tolerate some wetness are best suited. (Capability unit IIIw-1; woodland suitability group 9)

Mine Dumps

Mine dumps (Md) are accumulations of waste rock, coal, and slate around sites where mining is done. These dumps occur mainly at the mouth of deep mines and at loading points for strip mined coal. Generally, the material is in mounds that have steep side slopes. Most of it is too acid or has too little soil material for plant growth. (Capability unit and woodland suitability group not assigned)

Monongahela Series

Soils of the Monongahela series are deep, nearly level or gently sloping, and moderately well drained. They have a hard, brittle layer (fragipan) at a depth of about 2 feet. These soils developed on old stream terraces in material that washed from soils of the uplands underlain mainly by acid sandstone and shale.

In a typical Monongahela soil, the surface layer is dark grayish-brown silt loam 7 to 9 inches thick. Underlying this layer is a subsoil of yellowish-brown silty clay loam that is mottled with gray and strong brown at a depth of about 18 inches. A fragipan begins at a depth of about 2 feet and generally extends below a depth of 3 feet. In most places the fragipan contains rounded gravel and is sandier than the layers above it.

In Barbour County the Monongahela soils are inextensive. They occupy small areas along most of the major streams and lie on terraces or benches several feet above the flood plains. They are in the same drainage sequence as the well-drained Allegheny soils. Other soils near the Monongahela soils are well drained or somewhat poorly drained, and they lack the fragipan of the Monongahela soils.

Tilth is generally good in the Monongahela soils, but the tight subsoil causes seasonal waterlogging and restricts the growth of roots. The soils are strongly acid or very strongly acid and have moderately low or low natural fertility.

Typical profile of a Monongahela silt loam having a slope of 10 percent, in a pastured area at Boulder—

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary. Horizon is 5 to 8 inches thick.

A2—6 to 9 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; very strongly acid; clear, wavy boundary. Horizon is 3 to 5 inches thick.

B21t—9 to 19 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; thin, discontinuous clay coats; very strongly acid; clear, smooth boundary. Horizon is 8 to 12 inches thick.

B22t—19 to 23 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, distinct mottles of gray (10YR 5/1) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; thin, discontinuous clay coats; firm; very strongly acid; clear, smooth boundary. Horizon is 4 to 6 inches thick.

Bx—23 to 38 inches, yellowish-brown (10YR 5/6) clay loam; many, medium, prominent mottles of strong brown (7.5YR 5/8) and gray (10YR 5/1); moderate, medium, prismatic structure that breaks to weak, thick, platy and coarse subangular blocky structure; very firm; 10 percent rounded and angular stone fragments; strongly acid; clear, smooth boundary. Horizon is 5 to 20 inches thick.

IIC—38 to 45 inches, yellowish-brown (10YR 5/8) loamy sand; few, coarse, distinct mottles of gray to light gray (10YR 6/1) and strong brown (7.5YR 5/8); massive (structureless); firm in places; very strongly acid; abrupt, wavy boundary.

IIIR—45 inches +, hard sandstone.

The color of the Ap horizon is 10YR 4/2 or 4/3. Most areas have an A2 horizon, which is mainly 10YR 5/3 or 5/4. The B horizon is silty clay loam, heavy silt loam or heavy loam, and clay loam. This horizon is dominantly 10YR 5/6 or 5/8 but may be 7.5YR 5/6 or 5/8. Commonly, the mottles are 10YR 5/1 and 7.5YR

5/8. The depth to the fragipan ranges from 20 to 28 inches. The depth to bedrock ranges from 3 to 6 feet.

Monongahela silt loam, 0 to 3 percent slopes (MoA).—This nearly level soil has a profile similar to that described for the series. Some included areas are somewhat poorly drained or poorly drained. Some areas are somewhat more sandy than the typical soil described.

The use of this soil is limited mainly by seasonal wetness. (Capability unit IIw-1; woodland suitability group 9)

Monongahela silt loam, 3 to 8 percent slopes (MoB).—This gently sloping soil is on stream terraces. It has a profile similar to the one described for the series. Included with it are some areas having slopes of more than 8 percent, and small areas in which the soil developed from clay shale and consequently is more clayey than this soil. Small areas are somewhat more sandy than the typical soil described.

Slow internal drainage and a moderate hazard of erosion are the main concerns in the use and management of this soil. (Capability unit IIe-13; woodland suitability group 9)

Philo Series

The Philo series consists of deep, nearly level, moderately well drained soils on flood plains. These soils formed in material that washed from soils underlain by acid, gray sandstone and shale.

In a typical Philo soil, the surface layer is friable, dark-brown silt loam 6 to 8 inches thick. The upper part of the subsoil is much like the surface layer. At a depth of about 18 inches, the profile is colored with intermingled colors, but gray is dominant in the lower subsoil. Typically, sand and gravel occur at a depth of about 3½ feet.

Most of the acreage of the Philo soils is in the eastern two-thirds of the county. These soils are subject to flooding. They commonly occur on flood plains with the poorly drained Atkins soils and the deep, well-drained Pope soils. Other soils that generally lie nearby are the Gilpin and Dekalb soils on uplands and the Ernest soils on colluvial slopes. The Philo soils are similar to the Lindside soils of the flood plains, but Philo soils are more acid and are not so brown.

Philo soils are strongly acid, are moderate in natural fertility, and generally are in good tilth. Their available moisture capacity is high. Flooding and a seasonally high water table are limitations that restrict use of these soils.

Typical profile of Philo silt loam in a hayfield on Big Run, at the intersection of U.S. Highway 119 and State Route 36—

Ap—0 to 6 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; strongly acid; abrupt, smooth boundary. Horizon is 5 to 8 inches thick.

C1—6 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, granular structure; friable; strongly acid; gradual, smooth boundary. Horizon is 8 to 12 inches thick.

C2—16 to 22 inches, brown (10YR 5/3) silt loam; few, fine, distinct mottles of dark brown to brown (7.5YR 4/4) and gray (10YR 5/1); very weak, very fine, subangular blocky structure; friable to firm; strongly acid; clear, smooth boundary. Horizon is 5 to 7 inches thick.

C3—22 to 32 inches, gray (10YR 5/1) gritty silt loam; massive (structureless); friable; common, distinct, strong-brown (7.5YR 5/8) mottles; iron concretions common; strongly acid; clear, smooth boundary. Horizon is 8 to 12 inches thick.

C4—32 to 42 inches, intermingled gray (10YR 5/1) and strong-brown (7.5YR 5/8) loam; massive (structureless); firm; strongly acid; clear, smooth boundary. Horizon is 8 to 12 inches thick.

IIC5—42 to 52 inches, stratified sand and gravel.

The A horizon ranges from silt loam to sandy loam in texture. Its color is 10YR 3/3 and 4/2. The C horizon is silt loam, loam, and sandy loam. In the upper part this horizon may be as yellow as 10YR 5/6, but generally it is 10YR 4/3 or 4/4. The lower B horizon is dominantly 10YR 5/1 mottled with various shades of brown. Mottling begins at a depth ranging from 15 to 24 inches. The depth to sand and gravel is normally about 40 inches but ranges from 2 to 4 feet.

Philo silt loam (Ph).—This nearly level soil of the flood plains has the profile described for the series. Included with it are a few wet areas; some sandy and gravelly areas that are less than 40 inches deep over gravel; and a few areas in which the soil is redder and slightly higher in natural fertility than the typical Philo soil.

Flooding and a seasonally high water table are the main concerns in the use and management of this soil. Alfalfa and other deep-rooted crops are not well suited. (Capability unit IIw-7; woodland suitability group 9)

Pope Series

In the Pope series are deep, nearly level, well-drained soils on flood plains. These soils formed in material that washed from soils on uplands underlain by acid, gray sandstone and shale.

A typical Pope soil has a very dark grayish-brown surface layer and a dark-brown upper subsoil, both of fine sandy loam. The lower subsoil is dark yellowish-brown sandy loam that grades to stratified sand and gravel at a depth of about 36 inches.

In Barbour County the Pope soils are mainly in the eastern two-thirds. They are the only well-drained soils on flood plains in the county. In some areas they are flooded two or three times annually, but in others they are flooded only once in 4 or 5 years. These soils commonly occur on flood plains with the poorly drained Atkins soils and the moderately well drained Philo soils. They also occur below the Dekalb and Gilpin soils of the uplands and the moderately well drained Ernest soils of colluvial slopes.

The Pope soils are strongly acid. Their natural fertility is moderate, and their tilth is generally good. The available moisture capacity is moderate or moderately low. Flooding may damage crops in some places, and the protection of streambanks is a need in many areas.

Typical profile of Pope fine sandy loam in a hayfield near Kirt—

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; moderate, fine, granular structure; friable; strongly acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

C1—8 to 11 inches, dark-brown to brown (10YR 4/3) fine sandy loam; moderate, fine, granular structure; friable; strongly acid; gradual, smooth boundary. Horizon is 3 to 6 inches thick.

C2—11 to 19 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; massive (structureless); friable; strongly acid; gradual, smooth boundary. Horizon is 7 to 11 inches thick.

C3—19 to 32 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive (structureless); loose; strongly acid. Horizon is 12 to 18 inches thick.

C4—32 to 44 inches +, stratified sand, silt, and gravel.

The Pope soils are fine sandy loam, sandy loam, silt loam, or loam throughout the profile. In some areas they are gravelly. Generally, the A horizon is 10YR 3/2 or 3/3 and the C horizon is 10YR 4/4 or 3/3. In some places, however, the C horizon is 7.5YR 4/4. The soils are generally underlain by sand and gravel at a depth of about 3 feet.

Pope fine sandy loam (Pn).—This nearly level soil has the typical profile described. The most common inclusions are small areas that are gravelly throughout. Also included are a few small areas that are not so well drained as this soil, and several acres of a reddish soil on the flood plain of Brushy Fork.

This soil is well suited to crops, and it stays productive under ordinary good management. (Capability unit IIw-6; woodland suitability group 9)

Strip Mine Spoil

Strip mine spoil (Sm) is a mixture of rocks, coal, and soil material. It is a byproduct of strip mining for coal, which lies in seams 20 to 60 feet below the surface. Areas that are successfully revegetated generally have 20 percent or more of soil material in the mixture.

The total acreage disturbed by strip mining is several times the acreage of coal removed. In Barbour County about 7,000 acres have been affected. Most of this acreage is in areas of Westmoreland soils in the western third of the county.

Most strip-mined areas follow the contour of coal outcrops. Single cuts are generally made on narrow benches and steep slopes, but several cuts are likely to be made on the more gentle slopes. The last cut in mined areas leaves a vertical wall, commonly 20 to 40 feet high. Next to the wall is a narrow, sloping area in which the soil material is compacted and has a high content of rock fragments. In most places the outer slopes of the spoil is stony, and it may have a gradient as steep as 70 to 80 percent.

***Figure 5.*—Fresh spoil from strip mining that is being regraded.**

***Figure 6.*—A graded area of Strip mine spoil. On the right is a highwall.**

State laws require that strip-mined land be regraded (fig. 5) and that coal seams be covered and the area planted or seeded to some type of vegetation. Recommendations call for grading in such a way that water draining from the main areas will flow toward the highwall (fig. 6). Although this causes some ponding at the base of the highwall, erosion is considerably reduced.

Reclamation of strip-mined areas has been studied by the West Virginia Agricultural Experiment Station (*19*). The studies show that trees, shrubs, grasses, and legumes can be established in all areas except those that are extremely acid (pH below 4.0) and some of those that are extremely steep.

The acidity of the spoil material commonly varies sharply within a distance of a few feet. Sulfuric acid, released through the breakdown of pyritic material, contributes to the acidity of many spoil areas and causes the extreme acidity of small spots a few feet in diameter that are common in many places.

Black locust is one of the trees suitable for planting in strip-mined areas. Scotch and Virginia pines are suitable, and red and white pines have been used. Wichura rose and autumn-olive are suitable shrubs. Black locust, sycamore, ash, poplar, and aspen are the most common native trees in spoil areas. These trees, as well as other native plants, should be encouraged. Wildlife habitat can be developed in most areas.

Strip mine spoil has been carefully studied by the Soil Conservation Service. Because the material is so variable in characteristics and in suitability for use, it has not been placed in a capability unit in this soil survey, but it has been classified in three groups according to reaction, texture, rockiness, and slope. *Before a plan is prepared for revegetating a spoil area with trees,* *shrubs, or grasses, on-site investigation and classification are required.* Assistance in classifying an area and developing a plan for revegetating it can be obtained from a soil conservationist.

The three groups are discussed in the following paragraphs.

GROUP 1 SPOIL. This material commonly occurs in areas where Bakerstown and Pittsburgh coals have been strip mined. It makes up about half of the spoil areas in the county. Spoil of this kind has a pH value of more than 5.5. Conditions are favorable for the growth of plants, but yields may be limited by droughtiness and other adverse soil features.

GROUP 2 SPOIL. This material commonly occurs where Pittsburgh coal has been mined; it makes up about 40 percent of the spoil areas in the county. Many of the areas are steep and stony. The pH value generally ranges from 4.0 to 5.5, but there are a few extremely acid spots caused by the breakdown of pyritic material. This kind of spoil is favorable for selected species of trees and shrubs, though it is only moderately favorable for grasses and legumes.

GROUP 3 SPOIL. This material occurs in some strip-mined areas of Pittsburgh coal where the spoil contains a large amount of acid-forming pyritic material. Less than 10 percent of the spoil areas in the county are in this group. The spoil is extremely acid and toxic. It has a pH value of less than 4.0 and is unfavorable for most of the woody and herbaceous plants commonly used in the county.

(Strip mine spoil: capability unit and woodland suitability group not assigned)

Upshur Series

Soils of the Upshur series are moderately deep or deep, well drained, and clayey. They formed in weathered, reddish clay shale that contained some carbonates.

The surface layer of a typical Upshur soil is reddish-brown silty clay loam and is about 8 inches thick. The subsoil consists of reddish-brown to red silty clay or clay that is hard when dry and is plastic and sticky when wet. Fragments of clay shale make up 30 percent or more of the subsoil in the lower part, and this part of the subsoil generally contains some carbonates. The depth to bedrock is 24 to 60 inches.

The Upshur soils occupy areas consisting mainly of steep hills that are broken by benches and saddles. In some places they lie in narrow bands on steep or very steep hillsides, but generally they are on benches, saddles, and ridgetops. These soils occur mainly with the Gilpin, Wharton, and Westmoreland soils, though they also occur with the Ernest and Clarksburg soils. Upshur soils are redder and finer textured than all of these soils, and they have a more plastic and more sticky subsoil.

The Upshur soils are medium acid or strongly acid. Generally, they are slowly permeable, have a low content of organic matter, and are highly erodible. Their natural fertility is moderately high. Because of the nature and the large amount of clay they contain, the soils are difficult to work. They tend to shrink and to crack when dry, to expand when wet, and to slip when excessively wet. Consequently, they have severe limitations if used as homesites and as locations for roads.

In Barbour County the Upshur soils occur closely with the Gilpin soils and were mapped only in complexes with those soils. The Gilpin-Upshur complexes are described under the heading "Gilpin Series."

Typical profile of an Upshur silty clay loam having a slope of 5 percent, in a pastured field 2 miles west of Belington—

A1—0 to 3 inches, dark reddish-brown (5YR 3/2) light silty clay loam; moderate, fine, granular structure; friable; strongly acid; abrupt, smooth boundary. Horizon is 2 to 4 inches thick.

A2—3 to 8 inches, reddish-brown (5YR 4/3) silty clay loam; weak, fine, subangular blocky structure; moderately firm; strongly acid; clear, smooth boundary. Horizon is 4 to 6 inches thick.

B21t—8 to 18 inches, reddish-brown (2.5YR 4/4) silty clay; strong, medium, subangular blocky structure; plastic and sticky when wet; continuous clay flows on ped faces; strongly acid; gradual, smooth boundary. Horizon is 8 to 12 inches thick.

B22t—18 to 31 inches, weak-red (10R 4/3) clay; moderate, medium, subangular blocky structure; plastic and sticky when wet; medium acid; clear, irregular boundary. Horizon is 7 to 11 inches thick.

C—31 to 42 inches, dusky-red (10R 3/2) clay; massive (structureless); very firm; 30 percent fine fragments of weathered clay shale; some light-gray (5YR 7/1) and brownish-yellow (10YR 6/6) clayey material in pockets and banks; medium acid; clear, wavy boundary. Horizon is 9 to 12 inches thick.

R—42 inches +, partially weathered red and gray clay shale.

The A horizon is silty clay loam in most places, but it is silty clay in some of the more severely eroded areas. The upper part of the B horizon is silty clay loam or silty clay; the lower part, silty clay or clay. Normally, the color of the A horizon is 5YR 3/2 or 4/2. The B horizon is 2.5YR 4/4 or 10R 4/3 or 4/4. The solum generally ranges from 30 to 34 inches in thickness.

Wellston Series

The Wellston series consists of deep, gently sloping or moderately sloping, well-drained soils that developed in material weathered from sandstone, siltstone, and shale.

The surface layer of a typical Wellston soil is granular, friable, dark grayish-brown silt loam. It is about 8 inches thick and is underlain by a subsurface layer of yellowish-brown silt loam. The subsoil is moderately firm, yellowish-brown silty clay loam, and it contains stone fragments in the lower part. Generally, bedrock is 3 feet or more below the surface.

The Wellston soils occupy broad ridgetops and plateaus in the eastern two-thirds of the county. They occur principally with the Gilpin, Cookport, and Wharton soils. They have a thicker solum than the Gilpin soils, and they lack the mottling and the fragipan or clayey layer in the lower subsoil that are common to the Cookport and the Wharton soils.

Wellston soils are strongly acid, have moderate to moderately low natural fertility, and generally are in good tilth. Their permeability is moderate, and their available moisture capacity is high.

Typical profile of Wellston silt loam, 3 to 10 percent slopes, in a hayfield 2 miles east of Vannoys Mill—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary. Horizon is 7 to 9 inches thick.

A2—8 to 13 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, fine, subangular blocky structure and weak, thin, platy structure; friable; medium acid; clear, wavy boundary. Horizon is 4 to 7 inches thick.

B2t—13 to 24 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, fine, subangular blocky structure; firm; strongly acid; thin, discontinuous clay films on ped faces; clear, irregular boundary. Horizon is 10 to 15 inches thick.

B3—24 to 36 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, fine, subangular blocky structure; particles arranged around flat fragments of sandy shale; firm; strongly acid; discontinuous clay films on ped faces; many fine roots; 75 percent of horizon is fine fragments of weathered sandy shale and siltstone, mostly less than 3 inches across; some iron coatings on faces of stones; clear, irregular boundary. Horizon is 10 to 14 inches thick.

C—36 to 42 inches +, 95 percent of horizon consists of partially weathered siltstone mixed with some clay shale; pockets of silty clay loam soil material; few fine roots; strongly acid; interior of stone fragments is light olive brown (2.5Y 5/4).

The A horizon is silt loam or loam. The color of the Ap horizon is 10YR 4/2 or 3/2. The B horizon is mainly silty clay loam but includes heavy silt loam, and it is mainly 10YR 5/8 but is 10YR 5/6 or 7.5YR 5/6 in some places. Generally, the B horizon is about 24 inches thick. The depth to bedrock is about 40 inches. Normally, the profile is free of stones to a depth of 24 inches but is 20 to 75 percent fine fragments of sandy shale and siltstone below that depth.

Wellston silt loam, 3 to 10 percent slopes (WeB).—This gently sloping soil lies on many of the broad ridgetops in the eastern two-thirds of the county. It has the profile described for the series. Included with it are a few areas that are moderately well drained and a few areas in which the soil is not so deep as the typical Wellston soil.

Most of the common crops are suited to this soil, but management is needed that maintains fertility and controls erosion. (Capability unit IIe-4; woodland suitability group 8)

Wellston silt loam, 10 to 20 percent slopes (WeC).—This moderately sloping soil occupies many of the broad ridgetops in the eastern two-thirds of the county. It has a profile similar to that described for the Wellston series. Included are small areas that are moderately well drained and small areas that are only moderately deep.

This soil is suited to the same crops as Wellston silt loam, 3 to 10 percent slopes, but it needs to be farmed in a longer rotation. (Capability unit IIIe-4; woodland suitability group 8)

Westmoreland Series

Soils of the Westmoreland series are moderately deep or deep, gently sloping to very steep, and well drained. They formed in material weathered from interbedded shale, siltstone, sandstone, and limestone.

The surface layer of a typical Westmoreland soil is crumbly, dark-brown silt loam 7 to 8 inches thick. The subsoil is firm to friable, strong-brown silty clay loam that contains many stone fragments below a depth of 2 feet. In most places sandstone or shale bedrock is about 3 feet below the surface.

The Westmoreland soils are chiefly in the western part of the county. Here, they occupy gently sloping and rolling hills, steep hillsides, benches along the hillsides, flats and saddles, and rounded knobs and points extending above the main ridges.

These soils occur principally with the Gilpin, Upshur, Clarksburg, and Wharton soils. They are less yellow and less acid than the Gilpin soils, and they are neither so red nor so clayey as the Upshur soils. The Westmoreland soils are not so deep as the Clarksburg soils, and they lack the fragipan and the mottled subsoil of those soils. Westmoreland soils are less acid and are coarser textured then the Wharton soils. Unlike those soils, they lack mottling and do not have a gray clayey layer in the lower subsoil.

The Westmoreland soils are important to farming in Barbour County, though a large acreage is idle or wooded because of strip mining and changes in farming methods. The soils are especially well suited to crops that require good drainage. They are moderately permeable, have moderate to high available moisture capacity, and generally are in good tilth. They are medium acid or strongly acid.

Typical profile of Westmoreland silt loam, 30 to 40 percent slopes, in a pastured area near Corder Crossing—

Ap—0 to 7 inches, dark-brown (7.5YR 3/2) silt loam; moderate, medium, granular structure; friable; medium acid; clear, wavy boundary. Horizon is 6 to 8 inches thick.

B1—7 to 12 inches, brown (7.5YR 5/4) light silty clay loam; weak, fine, subangular blocky structure; friable; 15 percent siltstone fragments; medium acid; clear, wavy boundary. Horizon is 5 to 7 inches thick.

B2t—12 to 23 inches, strong-brown (7.5YR 5/8) silty clay loam; moderate, fine and medium, subangular blocky structure; firm; 25 percent stone fragments, one-tenth of which are more than 3 inches across; clay films on ped faces; medium acid; clear, wavy boundary. Horizon is 8 to 15 inches thick.

B3—23 to 29 inches, strong-brown (7.5YR 5/8) silty clay loam; moderate, fine and medium, subangular blocky structure; firm; 60 percent stone fragments, four-tenths of which are more than 3 inches across; clay accumulation on ped faces and upper surface of stones; medium acid; gradual, wavy boundary. Horizon is 4 to 10 inches thick.

C—29 to 40 inches, strong-brown (7.5YR 5/8) silty clay loam; weak, fine, subangular blocky structure; firm; 85 percent stone fragments, one-half of which are more than 3 inches across; medium acid; gradual, irregular boundary. Horizon is 5 to 15 inches thick.

R—40 inches +, slightly weathered siltstone and sandstone.

The B horizon is mostly silty clay loam, but in some places it is marginal to sandy clay loam. In the Ap horizon the dominant colors are 7.5YR and 10YR, the value is generally 3 or 4, and the chroma is 2 or 3. In the main part of the B horizon, the dominant color is most commonly 7.5YR but may be 10YR, the value is generally 5, and the chroma is 6 or 8. The depth to bedrock ranges from 24 to 48 inches.

Westmoreland silt loam, 3 to 10 percent slopes (WmB).—This gently sloping soil occupies ridges and upper benches. It has a profile similar to the one described for the series. Included with it are some areas in which the soil developed mainly from limestone or from alkaline red clay shale. The soil in these inclusions contains more lime than typical for the series, and it has a more clayey subsoil that is sticky and plastic when wet. Also included are a few severely eroded areas.

This Westmoreland soil is well suited to most crops commonly grown in the county. It can be used rather intensively if erosion is controlled. (Capability unit IIe-11; woodland suitability group 1)

Westmoreland silt loam, 10 to 20 percent slopes (WmC).—This moderately sloping soil occurs mainly on benches and ridgetops. Its profile is similar to the typical one described. Included are some areas of a soil that has a more clayey subsoil than this soil. Also included are severely eroded spots.

Controlling erosion is the main concern in the use of this soil for crops. (Capability unit IIIe-11; woodland suitability group 1)

Westmoreland silt loam, 20 to 30 percent slopes (WmD).—This strongly sloping soil may occupy any position in the landscape that is common to soils of the Westmoreland series. It has a profile that is similar to the typical one described, but stones cover a larger area of this soil than of more mildly sloping Westmoreland soils.

Controlling erosion is the main concern in the management of this soil. (Capability unit IVe-11; woodland suitability group 1)

Westmoreland silt loam, 20 to 30 percent slopes, severely eroded (WmD3).—This strongly sloping soil occupies areas that resemble those of Westmoreland silt loam, 20 to 30 percent slopes. It has lost about three-fourths of its original surface layer through erosion, and it has a plow layer that is mainly subsoil material. Gullies have been formed in many areas. In other respects this soil has a profile similar to the one described for the series.

The plow layer of this soil absorbs moisture slowly. It has a low content of organic matter and is in poor tilth. Controlling further erosion and improving fertility are the main concerns. Permanent hay or pasture is a suitable use. (Capability unit VIe-1; woodland suitability group 1)

Westmoreland silt loam, 30 to 40 percent slopes (WmE).—This soil occurs on steep hillsides. It has the profile described for the Westmoreland series. Included with it on some of the side slopes are bands of a red, clayey soil that developed in material derived from red clay shale interbedded with parent material of the Westmoreland soils.

The use and management of this soil are limited mainly by steep slopes. Pasture and woodland are suitable uses. (Capability unit VIe-1; woodland suitability group 1)

Westmoreland silt loam, 30 to 40 percent slopes, severely eroded (WmE3).—This soil is on steep hillsides. It has lost most of its original surface layer through erosion, but in other respects the profile is similar to that described for the series. Some included areas are very severely eroded, and some inclusions consist of a red, clayey soil that is similar to that soil included with Westmoreland silt loam, 30 to 40 percent slopes.

Most areas of this soil are better suited to trees than to pasture. (Capability unit VIIe-1; woodland suitability group 1)

Westmoreland silt loam, 40 to 65 percent slopes (WmF).—This soil occurs on very steep hillsides, generally in areas between benches. It has a profile similar to the typical one described. Included with it are small areas on narrow, less strongly sloping benches. Also included are areas of a red, clayey soil that lies in bands and that developed in material derived from clay shale interbedded with the parent material of the Westmoreland soils.

This soil is suitable as woodland. If used for pasture, it is likely to erode severely. (Capability unit VIIe-1; woodland suitablity group 1)

Westmoreland silt loam, 40 to 65 percent slopes, severely eroded (WmF3).—This soil is similar to Westmoreland silt loam, 40 to 65 percent slopes, but it has had most of its original surface layer washed away. Some included areas consist of a red, clayey soil.

Generally, this Westmoreland soil is so steep, so droughty, and so highly erodible that it should be used as woodland. (Capability unit VIIe-1; woodland suitability group 1)

Wharton Series

In the Wharton series are deep, moderately well drained soils that have a dense, gray, clayey layer at a depth of about 20 inches. These soils developed mainly in material weathered from gray, acid shale.

The surface layer of a typical Wharton soil is friable, dark grayish-brown silt loam and is about 8 inches thick. The upper subsoil is firm, yellowish-brown silty clay loam. In the lower subsoil is very firm, gray silty clay that is mottled with strong brown and yellowish red. Shale bedrock generally lies at a depth of about 40 inches.

The Wharton soils are in areas consisting mainly of steep hills and moderately sloping or gently sloping benches and ridgetops. They occur principally with the well drained Gilpin, Dekalb, and Wellston soils and the moderately well drained Cookport soils. Wharton soils are deeper and have a thicker B horizon than the Gilpin soils. They have a more clayey subsoil than the Wellston soils and are mottled. The Wharton soils are deeper than the Dekalb soils and are not so sandy. They are finer textured than the Cookport soils and lack the fragipan of those soils.

Wharton soils are strongly acid or very strongly acid and are moderate or moderately low in natural fertility. Nevertheless, they are in fair to good tilth and have moderate available moisture capacity. Erosion is a hazard unless runoff is controlled. Most areas are used for hay or pasture.

Typical profile of Wharton silt loam, 3 to 10 percent slopes, in a hayfield north of East Bend School—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderately fine granular structure; friable; very strongly acid; clear, smooth boundary. Horizon is 6 to 8 inches thick.

B1—8 to 14 inches, yellowish-brown (10YR 5/8) light silty clay loam; weak, fine, subangular blocky structure; friable to firm; strongly acid; gradual, smooth boundary. Horizon is 6 to 8 inches thick.

B21t—14 to 22 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, fine and medium, subangular blocky structure; firm; continuous, thin clay films; few fine roots; strongly acid; clear, smooth boundary. Horizon is 7 to 9 inches thick.

B22t—22 to 26 inches, yellowish-brown (10YR 5/8) silty clay loam; ped faces pale brown (10YR 6/3); few, fine, distinct mottles of gray to light gray (10YR 6/1) and strong brown (7.5YR 5/8); moderate, medium and coarse, subangular blocky structure; firm; continuous clay films; very strongly acid; gradual, smooth boundary. Horizon is 3 to 5 inches thick.

B3—26 to 40 inches, gray (N 6/0) silty clay; common, medium, prominent mottles of strong brown (7.5YR 5/8) and few, medium, prominent mottles of yellowish red (5YR 5/8); moderate, coarse, prismatic structure; firm to very firm; fine roots on prism faces; very strongly acid. Horizon is 8 to 24 inches thick.

R—40 inches +, weathered shale.

The color of the Ap horizon ranges from 10YR 3/3 to 10YR 4/2. The B2 horizon is generally 10YR 5/8 but may be 10YR 5/6 and 7.5YR 5/6. In texture the B horizon is normally silty clay but ranges from silty clay loam to clay. Mottling begins at a depth of 18 to 28 inches. The depth to bedrock ranges from 36 to 48 inches.

Wharton silt loam, 3 to 10 percent slopes (WrB).—This gently sloping soil is on benches, ridgetops, and saddles, chiefly in the eastern two-thirds of the county. It has the profile described for the Wharton series. Included with it are small areas that are moderately deep and well drained. Also included are a few clayey, somewhat poorly drained spots, most of which are severely eroded.

This soil is likely to erode unless it is protected. (Capability unit IIe-13; woodland suitability group 3)

Wharton silt loam, 10 to 20 percent slopes (WrC).—This moderately sloping soil occupies many of the benches and ridgetops in the eastern two-thirds of the county. It has a profile similar to the one described as typical for the series. Some included areas are moderately deep and well drained. Also included are a few clayey, somewhat poorly drained spots, most of them severely eroded.

Controlling erosion is the main concern in the use and management of this soil. (Capability unit IIIe-13; woodland suitability group 3)

Wharton silt loam, 20 to 30 percent slopes (WrD).—This strongly sloping soil of the uplands is inextensive in the county. It has a profile similar to that described for the series. Included with it are a few severely eroded areas and a few well-drained areas in which the soil lacks the gray, clayey layer in the subsoil that is typical of Wharton soils.

Controlling erosion is the main concern in the use and management of this soil. (Capability unit IVe-9; woodland suitability group 3)

Use and Management of Soils

The first part of this section explains how soils are grouped according to their capability and describes the capability units in Barbour County. In the second part, estimated acre yields are given for the principal crops under two levels of management. Next are discussions on the use of soils as woodland, for wildlife, and in engineering. Finally, there are parts that give information about the use of soils in residential developments and for recreation.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. Classes are defined as follows:

Class I. Soils have few limitations that restrict their use. (In Barbour County there are no soils in class I.)

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (In Barbour County there are no soils in class V.)

Class VI. Soils have severe limitations that generally make them unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (In Barbour County there are no soils in class VIII.)

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in Barbour County, shows that the chief limitation is climate that is too cold or too dry.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-10. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages the capability units in Barbour County are described and suggestions for the use and management of the soils are given. The capability units are not numbered consecutively, because not all the units used in West Virginia are in this county. Discussed for each unit are the characteristics of the soils in the unit, the suitability of these soils for crops, and management suitable for the soils. If soil tests indicate they are needed, lime and fertilizer should be applied to tilled crops and pasture.

The names of the soil series represented are mentioned in the description of each capability unit, but this does not mean that all the soils of a given series appear in the unit. To find the names of all the soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT IIe-4

This unit consists of deep, well-drained, loamy soils on gently sloping uplands and old stream terraces. These soils are of the Allegheny and Wellston series. They are moderately permeable and have high available moisture capacity. Generally, their tilth is good. They are strongly acid and are moderate or moderately low in natural fertility.

The soils in this unit are well suited to all crops commonly grown in the county. A moderately intensive rotation can be used if organic matter is returned regularly and if erosion is controlled. A suitable rotation is 1 year of corn, 1 year of a small grain, and 1 or 2 years of hay. Erosion can be controlled and a supply of organic matter returned by farming on the contour or in contour strips and by cover cropping or leaving the residue from row crops in the field. Natural drainageways should be maintained as grassed waterways.

In well-managed pasture, yields of tall grasses and legumes are good. Bluegrass is usually short during hot, dry periods in July and August.

CAPABILITY UNIT IIe-10

Only one soil, Gilpin channery silt loam, 3 to 10 percent slopes, is in this unit. It is a gently sloping, moderately deep, well-drained soil on uplands. It is moderately permeable, has moderate available moisture capacity, and is strongly acid or very strongly acid. Tilth is generally good, and natural fertility is moderate to moderately low.

This soil is well suited to crops commonly grown in the county, but management is needed that controls erosion and provides a regular supply of organic matter. A suitable rotation is 1 year of corn, 1 year of a small grain, and 1 or more years of a grass-legume mixture for hay. Contour farming is needed for controlling erosion in narrow fields, and contour stripcropping is needed on long slopes. Residues from row crops should be worked into the soil. Unless a crop of winter grain is grown, corn should be followed by a cover crop. Keeping natural drainageways in grass prevents them from gullying.

Tall grasses and legumes are deeper rooted than bluegrass and provide more forage for grazing animals, particularly in July and August. Pasture should not be overgrazed.

CAPABILITY UNIT IIe-11

The only soil in this unit is Westmoreland silt loam, 3 to 10 percent slopes. This gently sloping, moderately deep or deep soil is on well-drained uplands. It is moderately permeable and has moderate to high available moisture capacity. The soil is generally in good tilth, is medium acid or strongly acid, and is moderately high in natural fertility. A few severely eroded areas are included.

This soil is suited to all the crops common in the county. A moderately intensive rotation can be used if organic matter is supplied regularly, if tillage is kept to a minimum, and if the soil is protected over winter by a cover crop or by residues from a row crop. A suitable rotation is 1 year of corn, 1 year of a small grain, and 1 or more years of hay. To control erosion, the soil should be farmed on the contour or in contour strips. Leave natural drainageways in permanent grass.

If pasture is well managed, yields of deep-rooted legumes and tall grasses are good. Bluegrass and white clover produce well, but they grow slowly in July and August.

CAPABILITY UNIT IIe-12

Only Dekalb channery loam, 3 to 10 percent slopes, is in this unit. It is a moderately deep to deep, well-drained soil on uplands. Movement of water into and through the soil is moderately rapid, and the available moisture capacity is moderate to low. This soil is strongly acid or very strongly acid and is moderately low in natural fertility. Stone fragments on the surface normally do not interfere with cultivation.

Unless rainfall is average or above, this soil produces low yields of corn, small grain, hay, and other crops. A moderately intensive crop rotation is suitable if fertility is maintained and if erosion is controlled. A suitable rotation is 1 year of corn, 1 year of a small grain, and 1 or more years of hay. Regularly returning crop residues to the soil helps to increase the available moisture capacity. Contour farming and contour stripcropping are needed for erosion control.

Bluegrass is not well suited to this droughty soil.

CAPABILITY UNIT IIe-13

The soils in this unit are gently sloping, moderately deep to deep, loamy, and moderately well drained. They are of the Clarksburg, Cookport, Ernest, Monongahela, and Wharton series. Permeability is moderate in the upper subsoil of these soils, but it is slow in the lower subsoil. The available moisture capacity is moderate, and tilth normally is fair to good. The soils are generally moderate in natural fertility and are strongly acid or very strongly acid, except for the Clarksburg soil, which is medium acid or strongly acid.

Maintaining fertility and controlling erosion are the main concerns in using the soils of this unit. Corn, small grain, and most grasses and legumes are suitable crops. Stands of alfalfa may be damaged by excess water that builds up in the subsoil during prolonged wet periods. Some wet spots need drainage before cultivation on them is practical.

These soils can be farmed in a moderately intensive rotation, but management is needed that regularly returns organic matter, keeps tillage to a minimum, and protects the soil with the residues from a row crop or with a cover crop. Erosion can be controlled by cultivating on the contour or using contour strips. In some places diversion terraces are needed to intercept runoff form higher areas. Grassed waterways control erosion in natural draws.

CAPABILITY UNIT IIw-1

The only soil in this unit, Monongahela silt loam, 0 to 3 percent slopes, is deep and moderately well drained. This soil lies on stream terraces. It is moderately permeable in the upper subsoil but is slowly permeable in the dense, firm lower subsoil. Tilth is fairly good. The available moisture capacity is moderate. This soil is strongly acid or very strongly acid and is moderately low or low in natural fertility. Except in seep spots and depressions, surface drainage is generally fair.

Wetness is the principal concern in the use and management of this soil. Drainage is needed in spots, but normally crops that are somewhat tolerant of water can be grown without drainage. Corn, spring-seeded small grain, and red clover are fairly well suited crops. Because the soil is waterlogged during some wet periods, alfalfa may be short lived. The crop rotation can be moderately intensive if tillage is kept to a minimum and if residues from row crops are returned or cover crops are grown. An example of such a rotation is 1 year of a row crop, 1 year of a small grain, and 1 or 2 years of hay. Wet spots can be drained by tiling.

Pasture should not be grazed unless the soil is reasonably firm.

CAPABILITY UNIT IIw-6

Only Pope fine sandy loam is in this unit. This deep, nearly level soil lies on well-drained flood plains. It is generally in good tilth, is strongly acid, and is moderate in natural fertility. Permeability is moderately rapid. The available moisture capacity is moderate or moderately low.

Flooding is the main hazard on this soil, and an occasional crop may be damaged by floodwater. The soil can be used for continuous row crops, for crops grown in rotation, or for permanent hay or pasture. A suitable rotation is 1 year of a row crop, 1 year of a small grain, and 2 or more years of hay. Nearly all crops grown in the county do well if organic matter is returned regularly by working crop residues into the soil. Because of leaching, lime and fertilizer generally are needed in more frequent applications on this soil than on most other soils in the county.

Small gravelly areas where flooding is frequent are better suited to hay or pasture than to row crops. Cutting and gouging along streambanks can be reduced by using tree mats or other measures that divert the current from the banks. Deepening and straightening the stream channels will decrease the hazard of flooding.

CAPABILITY UNIT IIw-7

This unit consists of deep, nearly level, moderately well drained soils that lie on flood plains and are of the Lindside and Philo series. These soils have a surface layer of silt loam. They are moderately permeable and have a seasonally high water table. In some places they are flooded once a year or more often, but in others they are flooded only once in 4 or 5 years. Tilth is generally fair to good, natural fertility is moderate, and the available moisture capacity is high. The Lindside soil is medium acid, and the Philo soil is strongly acid.

Because overflow is a hazard, the use of these soils is somewhat limited. Generally, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 or more years of hay. Some small areas are better suited to permanent hay or pasture than to rotation crops, but they can be row cropped continuously. Alfalfa is only fairly well suited to these soils because the water table is seasonally high. Improved drainage will increase yields of row crops in wet years. Organic matter can be supplied by working residues from row crops into the soil, by plowing under green-manure crops, and by applying barnyard manure. If stream channels are straightened and lowered, the risk of flooding is lessened considerably.

Grazing of pasture should be delayed until the soils are reasonably firm.

CAPABILITY UNIT IIIe-4

Only one soil, Wellston silt loam, 10 to 20 percent slopes, is in this unit. This soil occupies moderately broad ridgetops and is moderately sloping, deep, and well drained. It is moderately permeable and has high available moisture capacity. Generally, tilth is good. The soil is strongly acid and is moderate or moderately low in natural fertility.

Controlling erosion and maintaining the organic-matter content are the primary concerns in the use of this soil. Corn, small grain, and most of the common grasses and legumes grow well if they are well managed. A suitable rotation includes hay at least 2 years in every 4. Residues from row crops should be worked into the soil. To control erosion and to provide organic matter, a row crop should be followed by a cover crop, by a crop of winter grain, or by seeded hay. Using diversion terraces and farming on the contour or in contour strips helps to check soil losses.

In well-managed pasture, tall grasses and legumes that are deep rooted produce favorable yields. Bluegrass grows slowly in July and August.

CAPABILITY UNIT IIIe-10

The only soil in this unit is Gilpin channery silt loam, 10 to 20 percent slopes. This soil is moderately sloping, 20 to 36 inches deep, and well drained. It is moderately permeable, has moderate available moisture capacity, and is strongly acid or very strongly acid. In general, tilth is good. Stones on and in the soil normally do not interfere with cultivation.

Most crops grown in the county are suited to this soil. Controlling erosion is the main concern. Management is needed that provides cover crops, a suitable rotation, diversion ditches, the return of residues from row crops, and either contour farming or contour stripcropping.

These practices will help to control erosion, to maintain good structure, and to keep the soil supplied with organic matter. A suitable rotation is 1 year of corn, 1 year of a small grain, and 2 or more years of hay. A cover of grass prevents soil losses in natural drainageways.

Pasture should not be overgrazed.

CAPABILITY UNIT IIIe-11

Only Westmoreland silt loam, 10 to 20 percent slopes, is in this unit. This soil occurs on moderately sloping uplands and is moderately deep or deep and well drained. It is moderately permeable and has moderate to high available moisture capacity. Generally, tilth is good. The soil is medium acid or strongly acid and is moderately high in natural fertility. A few severely eroded areas are in this unit, and in most of them the subsoil is exposed.

Erosion control and a regular supply of organic matter are required if the soil in this unit is used and kept productive. All crops commonly grown in the county are suitable. A rotation consisting of 1 year of corn, 1 year of a small grain, and 2 or more years of hay is satisfactory if management is good. Such management includes leaving residues from row crops in the field; cover cropping, where needed; using diversion terraces; and farming on the contour or in contour strips. Natural draws should be left unplowed and maintained as grassed waterways.

Because natural fertility is moderately high in this soil, bluegrass and white clover are well-suited plants for pasture. Generally, however, they are short in July and August.

CAPABILITY UNIT IIIe-12

The only soil in this unit is Dekalb channery loam, 10 to 20 percent slopes. This moderately sloping soil lies on uplands and is moderately deep or deep and well drained. It has moderately rapid permeability and low to moderate available moisture capacity, and it tends to be droughty. It is strongly acid or very strongly acid and moderately low in natural fertility. Normally, stone fragments in the plow layer do not interfere with cultivation.

This soil is limited in use mainly because of erosion and droughtiness. It is suited to most crops grown in the county but is apt to produce low yields when rainfall is below normal. Erosion can be controlled by including close-growing crops in the rotation at least 2 years in every 4; using a winter cover crop; leaving crop residues in the field; stripcropping on the contour, together with contour tillage; and constructing diversion terraces, where needed. These practices also help to conserve moisture in the soil and to provide a regular supply of organic matter.

Generally, rather low yields are obtained from bluegrass and white clover grown for pasture on this soil.

CAPABILITY UNIT IIIe-13

The soils in this unit are loamy, moderately sloping, moderately deep or deep, and moderately well drained. They are of the Clarksburg, Cookport, Ernest, and Wharton series. These soils occur on ridgetops, on benches, on lower side slopes, and around the heads of streams. Their permeability is moderate in the upper subsoil but is slow in the lower subsoil. For this reason, water accumulates in the subsoil during prolonged wet periods. The available moisture capacity is moderate to high. As a rule, tilth is good and natural fertility is moderate. Except for the Clarksburg soil, which is medium acid or strongly acid, the soils in this unit are strongly acid or very strongly acid.

Erosion is the main concern in the production of crops on these soils. Corn and small grain grow well, but perennial legumes make limited growth because the root zone is inadequate for such deep-rooted plants and because the subsoil contains excess water at times.

A common rotation is 1 year of corn, 1 year of a small grain, and 2 or more years of hay. This rotation is suitable if tillage is kept to a minimum, if crop residues are left in the field, if a cover crop is grown over winter, and if fields are farmed on the contour or in contour strips. In natural draws, where water collects, a cover of grass prevents gullying. In some places diversion terraces are needed for intercepting runoff from higher slopes.

CAPABILITY UNIT IIIe-15

This unit consists of moderately deep, well-drained Gilpin and Upshur soils that were mapped together on gently sloping uplands. The reddish, clayey Upshur soils, which are dominant, have slow permeability, are moderately acid or strongly acid, and generally are in poor tilth. Their available moisture capacity is moderate. The yellowish-brown, medium-textured Gilpin soils are moderately permeable, strongly acid or very strongly acid, and generally in good tilth. They have moderate available moisture capacity.

Ordinarily, the soils in this unit are not extensively used for row crops, because they are difficult to plow. A row crop can be grown 1 year in every 3 if erosion is controlled by returning organic matter to the soil and by farming on the contour or in contour strips. Working the residues from row crops into the soil and seeding a cover crop after a row crop, unless a small grain or a hay mixture follows the row crop, are other practices that reduce runoff and check soil losses. Diversion terraces are needed in some cultivated fields.

In well-managed pasture, favorable yields can be obtained from deep-rooted legumes and tall grasses. Bluegrass and white clover also produce good forage. Pasture should not be grazed too heavily or when the soils are wet.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level, poorly drained soils on flood plains. These soils are of the Atkins and Melvin series. They have moderately slow permeability and, because of a high water table, are wet most of the year. Their available moisture capacity is moderate to high. Tilth is generally poor.

These soils are limited in use because of flooding and wetness. Unless drained, they are of little value for farming. If drainage is improved, corn and small grain can be grown every 2 or 3 years, but hay or pasture is more likely to maintain good structure and to provide a regular supply of organic matter. In most areas an occasional crop may be damaged by floodwater.

The use of these soils is limited to pasture in small areas that are frequently flooded. The grasses and legumes most suitable for planting are those that tolerate wetness. Grazing should be delayed until the sod is reasonably firm.

The soils in this unit can be drained by tiling or open ditching. Either of these methods generally removes excess water effectively, but tiling is better in areas that are to be cropped. In some areas, however, a dense, heavy subsoil reduces the effectiveness of tile. Flooding can be reduced in some places by deepening and straightening the stream channels.

Some areas included in this unit are covered with a foot or more of waste material that washed from strip mine spoil. In most of these areas, the stream channels are clogged, water stands on the surface, and about the only plants growing are cattails. The areas are of little use for farming but have some value for wildlife.

CAPABILITY UNIT IVe–3

This unit consists of moderately sloping and strongly sloping, moderately deep, channery soils on well-drained uplands. In some areas, where erosion has been severe, more than three-fourths of the original surface layer has been lost, and in places the subsoil is exposed. The soils are of the Gilpin series.

The soils in this unit are moderately permeable and, in uneroded areas, have moderate available moisture capacity. They are strongly acid or very strongly acid and are moderate to moderately low in fertility. In severely eroded areas, runoff is rapid and tilth is generally poor.

Because these soils are highly susceptible to erosion, they are not suitable for intensive use. A row crop can be safely grown only occasionally. A suitable rotation is 1 year of corn, 1 year of a small grain, and 3 or more years of hay. These soils can be supplied with organic matter and kept from seriously eroding if they are farmed on the contour or in contour strips, if crop residues are left on the surface, and if winter cover crops are grown. Diversion terraces are needed in some places.

Deep-rooted grasses and legumes provide more forage than shallow-rooted plants if pasture is well managed.

CAPABILITY UNIT IVe–5

Dekalb channery loam, 20 to 30 percent slopes, is the only soil in this unit. This soil occupies strongly sloping uplands and is moderately deep or deep and well drained. It has moderately rapid permeability and is somewhat droughty. The soil is strongly acid or very strongly acid and is moderately low in natural fertility. Normally, stone fragments on the surface and in the soil do not interfere with cultivation.

This soil is suited to cultivated crops, but yields are generally low because moisture is frequently inadequate. In addition, the hazard of erosion is severe. Soil and water losses can be reduced by farming in a rotation that includes grasses and legumes at least 3 years in every 5, by growing winter cover crops, by leaving crop residues in the field, and by farming on the contour or in contour strips. A suitable rotation is 1 year of corn, 1 year of a small grain, and 3 or more years of hay. Diversion terraces help to control runoff and erosion.

This soil is too droughty for good yields of bluegrass pasture. Yields of deep-rooted grasses and legumes are fair.

CAPABILITY UNIT IVe–9

This unit consists of deep, moderately sloping or strongly sloping, moderately well drained soils that occur in draws, on benches, on the lower slopes of hills, and around the heads of streams. These soils are of the Clarksburg, Ernest, and Wharton series and have a surface layer of silt loam. They are moderately permeable in the upper subsoil but are slowly permeable in the lower subsoil. The available moisture capacity is only moderate because root growth is restricted by a dense, compact layer or a clay layer. The soils are medium acid to very strongly acid and generally have moderate natural fertility.

Because the erosion hazard is severe, the soils in this unit need to be kept in long-term hay or pasture most of the time. Erosion is a risk each time the soils are plowed. For this reason, a suitable rotation is one that includes close-growing crops at least 3 years in every 5. An example of such a rotation is 1 year of corn, 1 year of a small grain, and 3 or more years of hay. Cultivating on the contour or in contour strips, returning crop residues to the soil, and maintaining a cover of grass in drainageways are other practices needed to control erosion.

Bluegrass produces good pasture if it is well managed. For the most favorable yields of forage throughout the grazing season, however, deeper rooted grasses and legumes are better than bluegrass.

CAPABILITY UNIT IVe–11

Only Westmoreland silt loam, 20 to 30 percent slopes, is in this unit. This strongly sloping soil occupies uplands and is moderately deep or deep and well drained. It is medium acid or strongly acid and has moderately high natural fertility. Permeability and the available moisture capacity are moderate.

Because this soil is subject to severe erosion, it should be used mainly for long-term hay or pasture. If tillage is kept to a minimum, a row crop or a small grain can be safely grown every 4 or 5 years. An example of a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 3 or more years of hay. Farming on the contour or in contour strips, using diversion terraces, leaving crop residues on the surface or working them into the soil, and maintaining natural draws in grass are other practices that reduce runoff and control erosion.

Bluegrass and white clover do well on this soil if management is good (fig. 7). In July and August, however, tall grasses generally provide more forage than bluegrass. Soil slips are fairly common in areas of this soil that are overgrazed.

CAPABILITY UNIT IVe–15

This unit consists of moderately deep and deep, well-drained Gilpin and Upshur soils that were mapped together on moderately sloping and strongly sloping uplands. These soils are highly susceptible to erosion. The yellowish-brown, medium-textured Gilpin soils are moderately permeable, strongly acid, and generally in good tilth. They have moderate available moisture capacity. The reddish, clayey Upshur soils are slowly permeable and medium acid or strongly acid. Although they are in poor tilth, they have moderately high natural fertility.

The use of soils in this unit is limited mainly by characteristics of the Upshur soils. Where practical, small areas of Gilpin soils can be managed like the soils in unit IIIe–10.

The soils in unit IVe–15 are better suited to long-term hay crops or pasture than to row crops. A suitable mixture for hay consists of alfalfa and orchardgrass. These plants yield favorably if they are well managed. A row crop or a small grain can be safely grown every 4 or 5 years if soil and water losses are reduced by farming on the contour or in contour strips. An example of a suitable rotation is 1 year of corn, 1 year of a small grain, and 3 or more years of hay. Returning organic matter to the soil reduces runoff and supplies organic matter. Waterways can be protected by keeping them sodded.

Bluegrass does fairly well on these soils, but it grows slowly in the hot months of summer. Deeper rooted grasses and legumes generally yield favorably throughout the growing season. In most places the soils have a high content of potash. Washing and gullying are likely if pasture is overgrazed.

CAPABILITY UNIT IVw–5

The only soil in this unit is Brinkerton silt loam, 3 to 8 percent slopes. This soil is somewhat poorly drained or poorly drained. It has a dense, compact layer in the lower subsoil.

This soil is wet much of the year, for water and air move through it slowly. Because the subsoil has a dense layer, root growth is limited and the available moisture capacity is only moderate. Natural fertility is moderately low, and tilth is generally poor. The soil is strongly acid or very strongly acid.

If this soil is drained, it is suited to water-tolerant grasses and legumes for hay or pasture. A mixture that does well consists of Ladino clover mixed with timothy, orchardgrass, or another tall grass. Yields of corn and small grain are fair in drier years, but they decline in wet years, even in drained areas. Nevertheless, a suitable rotation is 1 year of corn, 1 year of a small grain, and 3 or more years of hay. The soil gets cloddy unless tillage is kept to a minimum and unless organic matter is supplied regularly.

Drainage can be improved by constructing open ditches for removing excess water in the soil and by using interceptor ditches along the base of slopes for diverting runoff from higher areas. Because of the dense subsoil and the position of this soil in the landscape, tiling is seldom used. In some places open ditching lowers the water table.

In drained areas used for pasture, bluegrass and white clover yield fairly well throughout the growing season. In spring grazing should be delayed until the soil is reasonably firm.

CAPABILITY UNIT VIe–1

In this unit are strongly sloping and steep, moderately deep and deep, well-drained soils on uplands. These soils are of the Westmoreland series and have a silt loam surface layer. Some areas are severely eroded, and in these areas excessive runoff has washed away more than three-fourths of the original surface layer. In many places the subsoil is exposed.

Figure 7.—**A well-managed pasture of bluegrass and white clover on Westmoreland silt loam, 20 to 30 percent slopes.**

The soils of this unit are moderately permeable. Their available moisture capacity is moderate to high in uneroded areas, but it is lower in places where erosion is severe. The soils are medium acid or strongly acid and have moderately high natural fertility.

Pasture is a suitable use for these soils (fig. 8), though it should be carefully grazed. The soils are too steep and too erodible for cultivated crops. Bluegrass usually provides an average amount of pasture, but yields are low in July and August. If tall grasses and legumes are used for pasture, they should be seeded in strips that are disked instead of plowed. By seeding the mixture this way, erosion can be reduced and moisture can be conserved.

Woodland is a good use for areas not needed for pasture.

Figure 8.—**Pasture in an area consisting mainly of Westmoreland silt loams, capability unit VIe–1.**

CAPABILITY UNIT VIe-2

This unit consists of strongly sloping and steep, moderately deep, well-drained soils on uplands. These soils are of the Gilpin series and have a surface layer of channery silt loam. Runoff is excessive, especially in severely eroded areas, and the subsoil may be exposed in places where erosion is severe. The soils are moderately permeable, are strongly acid or very strongly acid, and have moderate or moderately low natural fertility. The available moisture capacity is moderate in uneroded areas.

The soils in this unit are well suited to pasture, trees, and wildlife. Pasture should not be overgrazed. Bluegrass does fairly well on these soils, but it makes little forage in the hot, drier months of summer. If a mixture of tall grasses and legumes is seeded for pasture, seeding should be in alternate strips that have been disked rather than plowed. The mulch left from disking helps to control erosion and to conserve moisture.

About half the acreage of these soils is woodland, a good use.

CAPABILITY UNIT VIe-3

Soils in this unit are strongly sloping or steep, moderately deep or deep, and well drained. These soils are of the Gilpin and Upshur series. On some of them, where erosion has been severe, more than three-fourths of the original surface layer has been lost, and in many places the subsoil is exposed.

The yellowish-brown Gilpin soils are strongly acid or very strongly acid and are moderate or moderately low in natural fertility. They are moderately permeable, have moderate available moisture capacity, and, especially in severely eroded areas, have excessive runoff. The reddish Upshur soils are slowly permeable and are sticky and plastic when wet. They are medium acid or strongly acid and have moderately high natural fertility.

These soils are too steep and too erodible for cultivated crops. Pasture is a suitable use, but it should not be overgrazed. Bluegrass is fairly well suited, though it is apt to be short in July and August. If a tall-grass mixture, such as ladino clover mixed with orchardgrass, is seeded for pasture, the seeding should be in strips that have been disked rather than plowed. Planting the mixture this way helps to control erosion and to conserve moisture.

Woodland is a suitable use for these soils.

CAPABILITY UNIT VIw-1

Only Alluvial land is in this unit. This strongly acid, moderately fertile land lies on flood plains that are frequently flooded. Its surface consists of hummocks, depressions, and old, abandoned stream channels. Within short distances this land ranges from bouldery and gravelly material to fine-textured material and from excessively drained to very poorly drained. Permeability ranges from rapid to slow. Some areas are droughty, and some are saturated with water most of the time.

A few small areas of Alluvial land are suitable for row crops, but normally the most intensive use is pasture. Because flooding is frequent, the land has an uneven surface. Some spots are gravelly; some are wet; and seeding tall grasses for pasture is generally not practical. Bluegrass grows fairly well in areas that are not too sandy or gravelly.

This land is well suited to trees, and most areas can be made favorable for wildlife.

CAPABILITY UNIT VIIe-1

This unit consists of steep or very steep, moderately deep or deep, well-drained soils on uplands. These soils are of the Gilpin, Upshur, and Westmoreland series. Most of them are moderately permeable, but the reddish Upshur soils are slowly permeable. The available moisture capacity is moderate in the uneroded soils and is moderately low or low in the severely eroded soils. Runoff is excessive in areas where protective cover is lacking or where erosion is severe. The subsoil is exposed in many severely eroded areas.

The soils of this unit generally are covered with young trees, are reverting to woodland, or are idle. Several thousand acres of spoil from strip mining is in areas where these soils occur, and it may affect their accessibility and use. The soils are too steep for cultivation and are severely limited for pasture. Bluegrass is probably the best plant that can be used for pasture.

These soils are well suited to trees. Information about their use for this purpose is given in the subsection "Use of Soils as Woodland."

CAPABILITY UNIT VIIe-2

This unit consists of steep or very steep, moderately deep or deep, well-drained channery soils on uplands. These soils are of the Dekalb and Gilpin series. They have moderate or moderately rapid permeability and moderate to low available moisture capacity. They are strongly acid or very strongly acid and have moderate or moderately low fertility. Runoff is excessive in areas that are bare or severely eroded.

The soils in this unit are better suited to trees than to other crops. They are generally too steep for pasture, though some areas can be used for limited grazing. Nearly all the acreage is presently wooded or will revert to woodland if protected from fire and grazing, but trees grow a little slower on these soils than on the soils in unit VIIe-1. Some of the open areas can be planted to shrubs that provide food and cover for wildlife.

Information on the use of these soils for trees is given in the subsection "Use of Soils as Woodland."

CAPABILITY UNIT VIIs-1

The soils in this unit are strongly sloping to very steep, moderately deep or deep, very stony, and well drained. They have moderate permeability and are medium acid or strongly acid. The available moisture capacity is moderately high or high except in areas where the depth to bedrock is less than 36 inches. In these areas it is moderate. The soils are of the Belmont and Calvin series.

The soils in this unit are well suited to trees. Most areas are steep and very stony, however, and they are not suitable for farming. In addition, the soils are difficult to manage for pasture, though in some places they can be used for limited grazing.

Suggestions for managing wooded areas of these soils are given in the subsection "Use of Soils as Woodland."

CAPABILITY UNIT VIIs-2

This unit consists of gently sloping to very steep, moderately deep or deep, well-drained soils that are very stony. Generally, from 1 to 3 percent of the surface is covered with sandstone boulders, but as much as 15 percent of the surface is covered in some areas. Ledges and escarpments are fairly common. These soils have moderate or moderately rapid permeability and moderate to low available moisture capacity. They are strongly acid or very strongly acid and are moderate or moderately low in natural fertility. The soils are of the Dekalb and Gilpin series.

Woodland is a suitable use for these soils. Cultivated crops are not suitable, and pasture is difficult to manage, though a small amount of forage is produced in some areas. Even the milder slopes are too stony for mowing, fertilizing, and reseeding. Some of the open areas can be planted to shrubs that provide food and cover for wildlife.

Information about the use of these soils for trees is given in the subsection "Use of Soils as Woodland."

CAPABILITY UNIT VIIs-4

The only soil in this unit is Ernest extremely stony silt loam, 3 to 20 percent slopes. This gently sloping to moderately sloping soil is deep and moderately well drained. In most areas there are large fragments of sandstone on the surface, and in places as much as 15 percent of the surface is covered (fig. 9). Permeability is moderately slow in the lower subsoil. Because root growth is restricted by a dense, compact layer, the available moisture capacity is only moderate. The soil is strongly acid or very strongly acid and is moderate or moderately low in natural fertility.

Although a few areas of this soil produce a limited amount of forage, most areas are too stony for pasture. The soil is well suited to trees, and some areas can be planted to shrubs for wildlife, but stones interfere with roadbuilding and other engineering practices.

Figure 9.—**Ernest extremely stony silt loam, 3 to 20 percent slopes.**

Suggestions for managing wooded areas of this soil are given in the subsection "Use of Soils as Woodland."

CAPABILITY UNIT VIIs-5

Only Brinkerton very stony silt loam, 3 to 8 percent slopes, is in this unit. This gently sloping soil occurs on lower side slopes and around the heads of streams. It is wet much of the year, for air and water move through it slowly. The soil is strongly acid or very strongly acid and has moderately low natural fertility.

This soil is of limited use because it is stony and wet. It is not suited to cultivated crops and is difficult to manage if used for pasture. Improving drainage is not practical, because of the stones.

Presently, this soil is covered mostly with weeds and brush. If it is planted to suitable shrubs and trees, it can be used as woodland or for wildlife. Information about the management of trees on this soil is given in the subsection "Use of Soils as Woodland."

Estimated Yields [2]

In table 2 are listed estimated yields for the major grain and forage crops and for permanent pasture grown on the soils of Barbour County. Yields are estimated for two levels of management and are shown in columns A and B. Those in columns A are estimated for the common management now used by farmers. Those in columns B are estimated for the best management practical on the soils, including proper kinds and amounts of fertilizer. These figures are averages for a 10-year period. In the future, new techniques may increase the average yields over those shown, but there is not likely to be much change in the relative response of the different soils.

Known crop yields, where available from farmers or others, were used to estimate the yields in columns A. The information was obtained from trials made by the West Virginia Experiment Station on known soils and from farmers who have kept records for crops grown on various soils. Where information was lacking, present yields were estimated, taking into consideration the properties of the soils involved.

The estimated yields in columns B are based on experimental results secured from corn trials on soils in Barbour County and on actual experience by farmers using the best management. Where experimental data were lacking, the estimates were made after soil properties and local knowledge were considered. These yields represent about what can be expected from management based on present knowledge and methods that can be practically used. The management needed to obtain these yields consists of liming to the pH required for the crop, fertilizing according to need as determined by soil tests, using good rotations, and using needed soil and water conservation practices, including drainage where necessary. Generally, manure is not used extensively, except on dairy farms. The management needed to obtain the yields estimated for pasture includes the use of enough fertilizer to provide phosphate and potash where needed and enough lime to maintain a pH of 6.0 to 6.5. Irrigation is not considered.

[2] FRANK W. GLOVER, assistant State soil conservationist, helped to prepare this subsection.

TABLE 2.—*Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are those obtained under the management commonly practiced; those in columns B are yields to be expected under improved management. Absence of yield indicates crop is not commonly grown. Soils that are severely limited by steep slopes, stoniness, or rockiness are considered not suitable for the crops listed and do not appear in this table]

Map symbol	Soil	Corn		Wheat		Mixed hay [1]		Alfalfa-grass		Permanent pasture	
		A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
AgB	Allegheny silt loam, 2 to 8 percent slopes	50	120	20	40	1.4	3.2	2.0	4.2	50	140
Al	Alluvial land									50	90
At	Atkins silt loam		85		32	1.2	3.0			60	130
BrB	Brinkerton silt loam, 3 to 8 percent slopes		65		25	1.0	2.2			45	95
ClB	Clarksburg silt loam, 3 to 8 percent slopes	55	90	20	35	1.4	3.0	2.0	3.0	70	150
ClC	Clarksburg silt loam, 8 to 15 percent slopes	55	85	20	35	1.4	3.0	2.0	3.0	70	150
ClD	Clarksburg silt loam, 15 to 25 percent slopes	50	80	15	25	1.4	2.4	2.0	2.8	65	145
CpB	Cookport loam, 3 to 10 percent slopes	40	85	20	35	1.4	3.2	2.0	2.8	50	135
CpC	Cookport loam, 10 to 20 percent slopes	35	75	20	30	1.0	3.0	2.0	2.6	45	130
DaB	Dekalb channery loam, 3 to 10 percent slopes	40	50	20	25	1.0	2.2	1.6	2.4	45	105
DaC	Dekalb channery loam, 10 to 20 percent slopes	40	50	15	25	1.0	2.0	1.4	2.2	45	100
DaD	Dekalb channery loam, 20 to 30 percent slopes	35	45	15	20	1.0	1.8	1.0	2.0	40	95
DaE	Dekalb channery loam, 30 to 40 percent slopes									35	85
EnB	Ernest silt loam, 3 to 8 percent slopes	55	90	20	35	1.0	3.0	2.0	2.8	60	140
EnC	Ernest silt loam, 8 to 15 percent slopes	50	85	20	35	1.0	3.0	2.0	2.8	60	140
EnD	Ernest silt loam, 15 to 25 percent slopes	45	75	15	25	1.0	2.6	2.0	2.6	55	135
GcB	Gilpin channery silt loam, 3 to 10 percent slopes	45	75	20	30	1.0	2.8	1.4	3.4	50	125
GcC	Gilpin channery silt loam, 10 to 20 percent slopes	40	75	15	30	1.0	2.6	1.4	3.2	50	120
GcC3	Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded	40	70	15	25	1.0	2.4	1.0	3.0	45	110
GcD	Gilpin channery silt loam, 20 to 30 percent slopes	40	65	15	30	1.0	2.4	1.0	3.0	45	115
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded				25		2.2		2.8	40	100
GcE	Gilpin channery silt loam, 30 to 40 percent slopes									40	90
GuB	Gilpin-Upshur complex, 3 to 10 percent slopes [3]	55	85	15	32	1.0	2.8	2.6	3.4	75	120
GuC	Gilpin-Upshur complex, 10 to 20 percent slopes [3]	50	80	15	30	1.0	2.8	2.2	3.4	75	120
GuD	Gilpin-Upshur complex, 20 to 30 percent slopes [3]	45	70	15	30	1.0	2.6	2.2	3.2	70	115
GuD3	Gilpin-Upshur complex, 20 to 30 percent slopes, severely eroded [3]									60	110
GuE	Gilpin-Upshur complex, 30 to 40 percent slopes [3]									60	110
Ln	Lindside silt loam	70	110	25	40	2.0	3.4	2.6	4.0	100	145
Ma	Melvin silt loam		85		35		3.0			70	140
MoA	Monongahela silt loam, 0 to 3 percent slopes	40	80	20	30	1.6	3.0	2.0	2.8	50	130
MoB	Monongahela silt loam, 3 to 8 percent slopes	40	85	20	35	1.6	3.2	2.0	3.0	50	130
Ph	Philo silt loam	60	100	25	40	1.6	3.2	1.6	4.0	100	140
Pn	Pope fine sandy loam	65	100	25	35	1.6	3.0	2.4	3.6	80	135
WeB	Wellston silt loam, 3 to 10 percent slopes	55	120	20	40	1.6	3.2	2.0	4.0	60	150
WeC	Wellston silt loam, 10 to 20 percent slopes	50	115	20	40	1.6	3.0	2.0	4.0	60	145
WmB	Westmoreland silt loam, 3 to 10 percent slopes	55	95	20	35	1.6	2.8	2.0	4.0	75	150
WmC	Westmoreland silt loam, 10 to 20 percent slopes	50	90	20	35	1.6	2.8	2.0	3.8	70	145
WmD	Westmoreland silt loam, 20 to 30 percent slopes	45	85	15	30	1.4	2.6	1.4	3.6	65	135
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded						2.4		3.0	60	125
WmE	Westmoreland silt loam, 30 to 40 percent slopes									60	100
WrB	Wharton silt loam, 3 to 10 percent slopes	50	80	20	35	1.0	3.2	2.0	3.0	50	135
WrC	Wharton silt loam, 10 to 20 percent slopes	45	85	20	35	1.0	3.0	2.0	3.0	50	130
WrD	Wharton silt loam, 20 to 30 percent slopes	40	80	15	30	1.0	2.6	1.4	2.8	45	115

[1] Mainly a mixture of clover and grass.

[2] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

[3] Upshur soils only; for estimated yields on the Gilpin soils, see Gilpin channery silt loams.

The response to good management is best on soils such as those in the Wellston series that are deep and have favorable texture and high available moisture capacity. On soils such as those in the Upshur series that are relatively high in natural fertility but have poor physical properties, the response to improved management is limited. Under improved management, yields of hay and pasture increase more than yields of corn and small grain, because practices commonly used to produce corn and small grain are better.

Use of Soils as Woodland

Woodland in Barbour County occupies about 132,000 acres, or more than half of the total land area. Wooded areas are extensive on Laurel Mountain, in the gorge of the Tygart River, and in the valley of the Middle Fork River. In addition, there are relatively small areas of woodland scattered throughout the county.

Two forest types, or natural groups of trees, are most common in the county. The oak-hickory type accounts for about 70 percent of the wooded acreage, and the maple-beech-birch type, about 15 percent. The remaining 15 percent of the woodland is made up of other hardwood types and of pine types (*8*).

The woodland in Barbour County is mainly on soils of the Dekalb, Gilpin, Cookport, Ernest, Upshur, Wharton, and Wellston series. On the Westmoreland soils, most of the acreage has been cleared for farming, and there are only remnant woodlots and scattered stands of volunteer hardwoods. Little woodland now occurs on the Atkins, Brinkerton, Lindside, Melvin, Monongahela, Philo, and Pope soils.

Soil properties have a strong influence on tree growth and the management of woodland. Differences in depth and texture, for example, cause differences in the available moisture capacity and thereby influence the growth rate of trees. Other features, such as slope, aspect, stoniness, rockiness, or a clayey subsoil, also affect woodland management.

Woodland suitability groups

The soils of Barbour County have been placed in nine woodland suitability groups, which are discussed in this subsection. Each group consists of soils that have about the same suitability for wood crops, require about the same management, and have about the same potential productivity. Site index, species suitability, and some of the limitations and hazards that affect management are explained in the following paragraphs.

The potential productivity of a soil for a specified kind, or species, of tree is expressed as *site index*. A site index for a given soil is the average height, in feet, that the dominant and codominant trees of a specified species growing on that soil will reach in 50 years.

For a number of soils in the county, site indexes were obtained by measuring the height and age of certain tree species growing on the soils. These measurements were taken in plots of known size. For soils on which the trees were measured in four or more plots, the site index is given as an average value, together with the standard deviation. For soils on which there were fewer than four plots, or no plots, measured in Barbour County, the site index was estimated and is given as a range, for example, 75 to 85. Each estimated site index is based on measurements made on the same or similar soils in this county or in nearby counties.

The site index for yellow-poplar is consistently higher than that for other species growing on the same soils. Yield tables are not available for the dominant species that make up the maple-beech-birch forest type. For these trees, however, the site indexes and the yields per acre are assumed to be about the same as those for upland oaks.

Although white pine does not occur in natural stands in this county, it is suitable for planting in old fields for wood crops. The site index for white pine is about 10 feet higher than that for upland oaks on the same or similar soils.

On some soils the site index varies from one area to another because of aspect, or the compass direction in which a slope faces. Aspect is listed as north or south. Slopes that face north or east of a line drawn from true northwest to true southeast have a north aspect; those that face south or west of this line have a south aspect. Aspect can be determined by examining the photographic background of the detailed soil map at the back of this survey, by using a topographic map, by using a stereoscope and a pair of plain photographs of a given area, or by examining the area itself.

Species suitability.—Named in the description of each woodland group are the commercially important species that normally grow well on the soils of the group and generally are favored in the management of natural stands. Also named are the species most suitable for planting for wood crops and as Christmas trees. The species are not listed in order of priority.

Erosion hazard.—The erosion hazard is rated on the basis of the risk of gully erosion incurred in managing and harvesting tree crops. The hazard generally is related to layout, construction, and care of roads and skid trails in the woods. It is *slight* if potential erosion is unimportant. The erosion hazard is *moderate* if some attention, such as the diversion of water, is needed to prevent accelerated erosion. It is *severe* if intensive treatment is needed to control soil losses. This means taking special care in locating and constructing roads and skid trails, diverting water during and after logging, and, in some places, seeding grasses.

Equipment limitation.—Internal drainage, texture, slope, number and size of stones, and other soil characteristics commonly restrict or prohibit the use of ordinary equipment in tending and harvesting tree crops. The limitation is *slight* if there is little or no restriction as to kind of equipment or time of year that equipment is used. In places where slope is the main limitation, it is generally less than 15 percent. The limitation is *moderate* if the use of equipment is limited for less than 3 months a year and if slopes generally range from 15 to 35 percent. It is *severe* if the use of equipment is prohibited for more than 3 months a year, if specially designed equipment is needed, if large or numerous stones seriously interfere with cultural and harvesting work, or if slopes are more than 35 percent.

Plant competition.—Competition from brush, grass, vines, or other undesirable plants affects the establishment of planted or naturally occurring tree seedlings. The competition is *slight* if unwanted plants do not

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prevent adequate regeneration or interfere with the early growth of natural or planted seedlings. It is *moderate* if the invading plants delay but do not prevent the establishment of desirable seedlings. Planted seedlings may require some site preparation and some release from unwanted plants after establishment. The competition is *severe* if undesirable plants prevent adequate regeneration of planted or naturally occurring tree seedlings, unless there is intensive site preparation and generally more than one release by chemical or mechanical weeding.

Seedling mortality.—Even when healthy seedlings of a suitable tree are correctly planted or occur naturally in adequate numbers, some of them will not survive if aspect or soil characteristics are unfavorable. Mortality is *slight* if not more than 25 percent of the seedlings die. It is *moderate* if the loss of seedlings is between 25 and 50 percent. Mortality is *severe* if more than 50 percent of the seedlings die, but seedling mortality is not rated severe for any of the soils in Barbour County.

Discussed in the following pages are the woodland suitability groups of the county. The names of soil series represented are mentioned in the description of each woodland group, but this does not mean that all the soils of a given series appear in the group. To find the names of all the soils in any given woodland group, refer to the "Guide to Mapping Units" at the back of this survey.

WOODLAND SUITABILITY GROUP 1

This group consists of moderately deep to deep, medium-textured, well-drained soils on gently sloping to very steep uplands. These soils formed in material weathered mainly from shale, but to some extent from limestone. They occur mostly in the western part of the county. Some of the soils are very stony, and some are severely eroded. All the soils are medium acid to strongly acid and have moderate to high available moisture capacity. They are of the Belmont, Calvin, and Westmoreland series.

These soils are excellent for producing many kinds of the more valuable hardwoods, including red oak, yellow-poplar, sugar maple, and black walnut. Although slopes differ widely, relief has little effect on productivity. The estimated site index is 75 to 84 for upland oaks and is 85 to 95 for yellow-poplar.

Trees suitable for planting in the reforesting of old fields are white pine, yellow-poplar, black locust, and black walnut. Suitable as Christmas trees are white pine, Scotch pine, and Norway spruce. Plantings for Christmas trees should be made only in areas that are nonstony and have slopes of less than 30 percent.

The soils in this group erode readily. Landslips are common, especially in places where deep cuts are made. Special care is needed in locating and constructing roads and skid trails, which should be kept on a grade of less than 10 percent. To control erosion, it is generally necessary to divert water from roads and trails during and after logging, to slope roads so that water runs to the sides instead of accumulating in wheel tracks, and to seed grasses on roads and log landings.

The equipment limitation is moderate to severe on these soils. Because the subsoil has a high clay content, the use either of wheeled or of crawler equipment is restricted to summer and fall and to times in winter when the ground is frozen hard.

Plant competition is moderate for hardwoods and severe for conifers. Large openings in the canopy encourage the growth of grasses and other herbaceous plants that may keep seedlings from establishing naturally. In old fields planted to conifers, invading hardwoods, grasses, and weeds generally compete severely with the planted trees. A common hardwood that invades these areas is black locust. Preparing a site by scalping, furrowing, or treating with chemicals will promote the survival and early growth of planted seedlings.

Seedling mortality is slight on these soils.

WOODLAND SUITABILITY GROUP 2

This group consists of deep, gently sloping to moderately steep, well-drained soils of the Clarksburg and Ernest series. These soils occur mainly along drainageways, around the heads of streams (coves), and on toe slopes along the steeper hillsides. In the lower subsoil there is a very firm layer that is moderately slowly or slowly permeable. More than half the acreage of these soils is extremely stony.

The soils in this group are excellent for hardwoods (fig. 10). Among the common trees are oak, yellow-poplar, ash, cherry, maple, and beech. Slope and aspect have little or no effect on productivity or species suitability. The average site index is 79±7.5 for upland oaks and is 89±12 for yellow-poplar.

***Figure 10.*—A stand of red oak, yellow-poplar, sugar maple, and red maple on Ernest soils.**

Yellow-poplar generally reseeds naturally on these soils, and tree planting for wood crops is seldom needed. If a planting is made, white pine, yellow-poplar, and black locust are suitable. White pine, Scotch pine, and Norway spruce make good Christmas trees, but only the nonstony soils are suitable for such use.

Erosion is a hazard, for the soils of this group commonly lie at the base of long side slopes. The risk is only slight on slopes of 3 to 15 percent but is moderate on slopes that exceed 15 percent.

The water table is seasonally high in these soils. Seeps are common and, wherever possible, should be avoided when roads are laid out. In addition, landslips are a hazard if deep cuts are made. Extremely stony areas severely limit the use of both wheeled and crawler equipment. In these areas there are strips and spots that contain enough stones to hinder tree growth and to reduce the density of the stand. The most suitable times for logging are summer, early in fall, and in winter on packed snow or frozen ground.

Plant competition is only slight for hardwoods but is severe for conifers. In open areas planted to coniferous seedlings, invading hardwoods, grasses, weeds, briers, and brush compete severely with the planted trees.

Seedling mortality is slight on these soils.

WOODLAND SUITABILITY GROUP 3

In this group are gently sloping to strongly sloping, moderately well drained soils of the Cookport and Wharton series. At a depth of about 2 feet, these soils have a firm, brittle layer or a dense, gray clay layer in the subsoil. They occur most commonly on ridgetops and benches, where the water table is seasonally high. The soils are strongly acid or very strongly acid. Included with them are a few small areas that are somewhat poorly drained.

These soils are excellent for producing most kinds of the more valuable oaks, as well as yellow-poplar, maple, and black cherry. The average site index is 79±6.4 for upland oaks, and the estimated site index is 85 to 95 for yellow-poplar.

Trees suitable for planting for wood crops are white pine, Japanese larch, yellow-poplar, and black locust. For Christmas trees the suitable species are white pine, Scotch pine, Norway spruce, and Douglas-fir. Because slopes are favorable, trees planted for Christmas trees grow well and are easily managed.

Although these soils generally are only slightly or moderately sloping, they are subject to erosion unless roads are constructed on a gentle grade and unless water is diverted from roads and trails after logging.

The use of wheeled or crawler equipment is severely limited in winter and early in spring. The periods preferred for logging are summer and early in fall because damage to the soil and to trees is least likely at those times.

For conifers planted in old fields, competition from invading grass is generally severe. Plant competition is only slight for hardwoods.

Seedling mortality is slight on these soils.

WOODLAND SUITABILITY GROUP 4

This group is made up of gently sloping to very steep, moderately deep or deep, well-drained soils that developed from acid sandstone and some shale. These soils are of the Dekalb series and have a high content of stones or channery fragments. They occur on uplands, mainly on Laurel Mountain. Their available moisture capacity is moderately low, and their reaction is strongly acid or very strongly acid.

These soils are fair to excellent sites for hardwoods, but their productivity is strongly affected by aspect. The best sites are on north-facing slopes and in coves, where red oak, yellow-poplar, black cherry, and maple are among the dominant trees. For the most part, slopes having a south aspect are only fairly productive; they generally support stands of black, white, chestnut, and scarlet oaks, and hickory. On north-facing slopes, the average site index is 75±4.2 for upland oaks and the estimated site index is 85 to 95 for yellow-poplar. On south-facing slopes, the average site index is 61±2.6 for upland oaks.

For wood crops the trees suitable for planting in old fields are white pine, red pine, Japanese larch, and black locust. In addition, yellow-poplar can be planted for wood crops on slopes facing north, but it is not well suited to slopes facing south. Plantings for Christmas trees are suitable only in areas where stones and channery fragments do not interfere with mechanical mowing. Species suitable as Christmas trees include white pine, Scotch pine, Norway spruce, and Douglas-fir. Norway spruce and Douglas-fir do best on north-facing slopes.

Erosion is a slight hazard on the gently sloping and moderately sloping soils; it is a moderate hazard on the strongly sloping to very steep soils.

The use of equipment is moderately limited on slopes of 20 to 30 percent and is severely limited on slopes of more than 30 percent. On the gentle and moderate slopes, the equipment limitation is slight.

In old fields planted to conifers, competition from invading hardwoods is moderate on southerly aspects but is severe on northerly aspects. For hardwoods the competition from unwanted plants is only slight.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 5

In this group are moderately deep, gently sloping to very steep, channery soils of the Gilpin series that developed from interbedded layers of acid shale, siltstone, and some sandstone. These extensive soils occupy well-drained, hilly uplands. They are strongly acid or very strongly acid, and most of them have moderate available moisture capacity.

These soils are excellent for hardwoods. Stands on south-facing slopes are dominantly mixed oaks and hickory; those on north-facing slopes consist mainly of yellow-poplar, red oak, sugar maple, basswood, and black cherry. On northerly slopes the estimated site index is 75 to 85 for upland oaks and 85 to 95 for yellow-poplar. On southerly slopes the average site index is 78±4.2 for upland oaks and the estimated site index is 75 to 85 for yellow-poplar.

Trees suitable for planting in old fields include white pine and Japanese larch. Also suitable, particularly on slopes facing north, are black locust, yellow-poplar, and black walnut. Areas selected for producing Christmas trees should have slopes of less than 30 percent, and they should be free of stones that interfere with mechanical mowing. White pine, Scotch pine, Norway spruce, and Douglas-fir make good Christmas trees.

The erosion hazard is slight in gently sloping and moderately sloping areas, moderate in strongly sloping ones, and severe in steeper ones. Special care is needed in locating and constructing roads in woodland. To control erosion, it is generally necessary to divert water from roads and trails, to slope roads so that water runs to the sides instead of accumulating in wheel tracks, and to seed grasses in the steeper areas.

The use of equipment on these soils is limited mainly by slope. The limitation is slight on slopes of 3 to 20 percent, moderate on slopes of 20 to 30 percent, and severe on slopes exceeding 30 percent.

Because the soils are excellent sites for hardwood trees, competition from invading hardwoods is severe if conifers are planted. For hardwoods there is little competition from undesirable plants.

Seedling mortality is slight on these soils.

WOODLAND SUITABILITY GROUP 6

In this group are gently sloping to very steep, very stony soils of the Gilpin and Dekalb series. These soils occur in such intricate patterns that they were not separated in mapping. They are moderately deep or deep and well drained. The soils have moderate or moderately low available moisture capacity, and they are strongly acid or very strongly acid.

These soils are fair to excellent sites for hardwoods. The best sites are on north-facing slopes and on the Gilpin soils. Among the more valuable hardwoods on northerly slopes and in coves are red oak, yellow-poplar, sugar maple, basswood, and black cherry. Dominant on southerly slopes are mixed oaks, hickory, and red maple. The estimated site index on north-facing slopes is 75 to 85 for upland oaks and 75 to 95 for yellow-poplar. On south-facing slopes the site index is 61 ± 2.6 to 78 ± 4.2 for upland oaks and the estimated site index is 75 to 84 for yellow-poplar.

Trees suitable for planting in the reforesting of old fields include white pine, red pine, Japanese larch, and black locust. On slopes that face north, yellow-poplar also is suitable for planting. Because the soils are so stony, they do not provide good sites for the production of Christmas trees.

The hazard of erosion ranges from slight in the gently sloping and moderately sloping areas to severe in some of the very steep areas. Roads should be carefully laid out and constructed on these soils. Generally, erosion can be controlled by diverting water from roads and trails and by sloping roads so that water runs to the sides instead of accumulating in wheel tracks.

Limitations on the use of equipment are severe because of many large stones and, in places, steep slopes. In addition, the use of equipment is severely limited in winter and early in spring when the soils are wet.

For planted pines the competition from invading hardwoods is generally severe, but it is only moderate in areas of Dekalb soils facing south. Plant competition for hardwoods is slight.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 7

This group consists of gently sloping to very steep, well-drained soils in the Gilpin and Upshur series. These soils occur in such intricate patterns that mapping the soils separately was impractical. The channery Gilpin soils are moderately deep; they developed from interbedded layers of acid shale, siltstone, and sandstone. The clayey Upshur soils are moderately deep or deep. They developed from red clay shale, are plastic and sticky when wet, and are hard when dry. Some soils of the group are severely eroded. All the soils have moderate available moisture capacity.

These are good to excellent soils for hardwoods. The best sites are on north-facing slopes and in coves. Here, the more valuable hardwoods are yellow-poplar, red oak, basswood, sugar maple, and black walnut. On south-facing slopes the principal trees are black, white, scarlet, and chestnut oaks, hickory, and red maple. The estimated site index on slopes facing north is 75 to 85 for upland oaks and 85 to 95 for yellow-poplar. On slopes facing south the estimated site index is 65 to 75 for upland oaks.

For planting in old fields, white pine and Japanese larch are among the suitable trees. Also suitable, particularly on north-facing slopes, are black locust, yellow-poplar, and black walnut. Christmas trees can be grown in nonstony areas having slopes of less than 30 percent. White pine and Scotch pine do well as Christmas trees on all sites, and Norway spruce and Douglas-fir are more suitable on northerly slopes.

The soils in this group erode readily. They are moderately susceptible to erosion in gently sloping and moderately sloping areas, and they are highly erodible in steeper areas. Care is needed in locating and constructing roads and skid trails, which should be kept on a gentle grade. Erosion can be controlled if water is diverted from roads and trails, if roads are sloped so that water runs to the sides and does not accumulate in wheel tracks, and if roads and log landings are seeded to grass.

On the Upshur soils, which have a clayey subsoil, the use of wheeled and crawler equipment is severely limited in winter and early in spring when the soils are wet.

Plant competition is slight for hardwoods. For conifers the competition normally is severe, but it is moderate on the upper third of slopes in severely eroded areas.

Seedling mortality is generally slight. It is moderate, however, on the upper third of slopes in areas that are severely eroded.

WOODLAND SUITABILITY GROUP 8

This group consists of deep, medium-textured, well-drained soils of the Allegheny and Wellston series on gently sloping terraces and uplands. These soils developed from acid sandstone, siltstone, and shale. They are strongly acid and have high available moisture capacity.

These are excellent soils for producing Christmas trees and hardwoods of high value. Among the better hardwoods in natural stands are yellow-poplar, red oak, sugar maple, and black cherry. The estimated site index is 75 to 85 for upland oaks and is 85 to 95 for yellow-poplar.

Suitable for planting in old fields are white pine, yellow-poplar, black walnut, and black locust. White pine, Scotch pine, Norway spruce, and Douglas-fir grow well as Christmas trees.

Erosion is only a slight hazard on these soils. The use of equipment is slightly or moderately limited, depending on slope.

For conifers the competition from grasses, weeds, and invading hardwoods is severe. If Christmas trees are to be successfully grown, competing plants must be controlled. Plant competition is slight for hardwoods.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 9

In this group are poorly drained to well-drained soils and the land type, Alluvial land, that occur mainly on flood plains and terraces. The soils are of the Atkins, Brinkerton, Lindside, Melvin, Monongahela, Philo, and Pope series.

Only a few areas of these soils are wooded. Most of the acreage is used for crops or pasture. If wood crops are grown, each site should be examined to determine the potential productivity and the hazards to management.

Yield and growth data

Table 3 gives data obtained by studying the growth of upland oaks and yellow-poplar on seven soil types in four soil series that are extensive in Barbour County. The average age, height, and site index are based on studies of five trees per plot.

TABLE 3.—*Plot data and site indexes for upland oaks and yellow-poplar*

Soil type and plot number	Slope	Position on slope	Aspect (bearing)	Species	Average age of trees	Average height of trees	Average site index [1]
Dekalb channery loam:	*Percent*				*Years*	*Feet*	
Plot 1	48	Middle	S. 10° W.	Upland oaks	57	70	65
Plot 15	30	Middle	N. 50° E.	Yellow-poplar	66	103	92
Dekalb very stony loam:							
Plot 2	36	Middle	S. 25° W.	Upland oaks	47	59	62
Plot 3	45	Middle	N. 15° E.	Upland oaks	50	79	79
Plot 4	50	Upper	N. 15° E.	Upland oaks	53	80	78
Plot 5	30	Middle	S. 15° W.	Upland oaks	45	57	61
Plot 6	25	Upper	N. 30° W.	Upland oaks	46	66	70
Plot 7	30	Middle	S. 80° W.	Upland oaks	45	57	60
Plot 8	30	Upper	S. 20° W.	Upland oaks	46	55	58
Plot 9	45	Middle	S. 20° W.	Upland oaks	46	56	60
Plot 10	40	Lower	S. 25° W.	Upland oaks	47	56	59
Plot 11	36	Upper	S. 30° W.	Upland oaks	47	62	65
Plot 12	30	Upper	N. 20° W.	Upland oaks	45	66	71
Plot 13	23	Middle	N. 85° E.	Upland oaks	44	71	77
Plot 14	20	Middle	N. 65° W.	Yellow-poplar	49	74	75
Plot 16	45	Middle	N. 15° E.	Yellow-poplar	50	82	82
Plot 17	25	Upper	N. 30° W.	Yellow-poplar	46	76	80
Ernest silt loam:							
Plot 18	10	Lower	S. 80° W.	Upland oaks	46	81	85
Plot 19	28	Lower	S. 55° W.	Upland oaks	29	58	85
Plot 25	15	Lower	90° E.	Yellow-poplar	44	96	102
Ernest extremely stony silt loam:							
Plot 20	37	Lower	S. 35° E.	White oak	44	59	65
Plot 21	22	Lower	S. 5° W.	Upland oaks	35	67	80
Plot 22	15	Lower	N. 25° W.	Upland oaks	47	82	85
Plot 23	23	Lower	N. 80° W.	Upland oaks	47	70	73
Plot 24	21	Lower	S. 50° W.	Upland oaks	41	68	78
Plot 26	15	Lower	N. 25° W.	Yellow-poplar	43	88	97
Plot 27	23	Lower	N. 80° W.	Yellow-poplar	43	71	78
Plot 28	37	Lower	S. 35° E.	Yellow-poplar	34	63	80
Gilpin channery silt loam:							
Plot 29	42	Lower	S. 45° W.	Upland oaks	29	57	84
Plot 30	40	Middle	S. 35° E.	Upland oaks	50	75	75
Gilpin very stony silt loam:							
Plot 31	34	Middle	0° S.	Upland oaks	38	65	78
Plot 32	31	Middle	N. 65° W.	Upland oaks	49	74	75
Wharton silt loam:							
Plot 33	18	Upper	S. 75° E.	Upland oaks	52	88	86
Plot 34	21	Upper	S. 25° E.	Upland oaks	55	76	72
Plot 35	18	Upper	N. 70° W.	Upland oaks	38	62	75
Plot 36	20	Middle	N. 50° E.	Upland oaks	45	77	82

[1] Site indexes for upland oaks are from USDA Technical Bulletin 560 (*15*). Site indexes for yellow-poplar are from Southeastern Forest Expt. Sta. Research Note 180 (*6*).

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Table 4 lists potential yields from upland oaks and from yellow-poplar in even-aged, fully stocked stands.

TABLE 4.—*Yields per acre from upland oaks and from yellow-poplar in even-aged, fully stocked, natural stands*

[Compiled from USDA Technical Bulletins 560 and 356 (*15*, *12*)[

Site index	Age of stand	Merchantable volume			
		Upland oaks		Yellow-poplar	
		Cords [1]	Board feet [2]	Cords [3]	Board feet [4]
	Years				
60	30	10	850	----	----
	50	26	6, 300	----	----
	70	39	12, 800	----	----
70	30	15	1, 750	15	2, 650
	50	33	9, 750	31	11, 400
	70	47	17, 700	----	----
80	30	20	3, 350	21	5, 500
	50	41	13, 750	41	17, 620
	70	56	23, 100	----	----
90	30	----	----	27	8, 710
	50	----	----	52	24, 400
	70	----	----	----	----
100	30	----	----	32	12, 150
	50	----	----	62	32, 150
	70	----	----	----	----

[1] Unpeeled volume of merchantable stems to a top diameter of 4 inches, outside bark.
[2] According to International rule, ⅛ inch, for stems to a top diameter of 5 inches, inside bark.
[3] Peeled volume of all trees 5 inches or more in diameter breast high and to a top diameter of 3 inches, inside bark.
[4] According to International rule, ⅛ inch, for stems to a top diameter of 6 inches, inside bark.

Wildlife

This subsection discusses the two wildlife habitat areas in the county. Then, it rates the soils according to their suitability for eight elements of wildlife habitat and for three kinds of wildlife (*1*). Finally, it explains the ratings and discusses the elements and the kinds of wildlife.

One of the wildlife habitat areas in the county consists of three soil associations, and the other is made up of a single soil association. The soil associations are outlined on the general soil map on page 3.

WILDLIFE HABITAT AREA 1

This area consists of soil associations 1, 2, and 3. It occupies about 90 percent of the total acreage in the county. The area generally is one of moderately steep hills and narrow valleys, but it includes a rather large, gently sloping plateau between Belington and Audra State Park.

The most common soils are the well drained Westmoreland, Gilpin, and Dekalb soils and the moderately well drained Cookport and Ernest soils. Fairly common are the red, clayey Upshur soils, and there are moderately well drained and poorly drained soils on flood plains.

About half of the area is woodland or is reverting to trees. The stands consist of mixed oaks, beech, maple, hickory, and yellow-poplar. The main plants that form the understory are blackberry, greenbrier, huckleberry, teaberry, dogwood, and witch-hazel.

Most of the cleared acreage is used for pasture or hay, but a small part is used for row crops and small grain. Nearly all the strip mining in Barbour County is in the western part of this wildlife area. In some places the spoil from strip mining has been revegetated, but generally it is barren.

Deer, grouse, squirrel, raccoon, rabbit, and woodchuck are all fairly common in this area. Acorns, nuts, and berries are usually plentiful. Old orchards, wild grasses, and seed crops that grow on abandoned farms, together with adjacent woodland, pasture, and cropland, make the area a favorable habitat for wildlife.

Flowing through this area are the Buckhannon, Middle Fork, and Tygart Rivers. These are small but relatively clean streams that furnish good fishing for black bass and various pan fish.

WILDLIFE HABITAT AREA 2

This area is made up of soil association 4 and covers about 15,000 acres along the eastern edge of Barbour County. It occurs on Laurel Mountain, the roughest part of the county. This is a mountainous area that is dissected by many, moderately steep, extremely stony drainageways. Along the mountainside there are a few benches and flats.

The soils generally developed from acid sandstone and shale, and they are steep, moderately deep, and stony. Dekalb, Gilpin, and Ernest soils occupy most of the acreage.

Nearly all of this area is covered with second-growth hardwoods, principally mixed oaks, beech, maple, hickory, and yellow-poplar. The understory is mainly greenbrier, mountain-laurel, huckleberry, and blackberry.

Deer, grouse, squirrel, and raccoon are common, and there are a few black bear and wild turkey. A lack of suitable openings lowers the suitability of this area as wildlife habitat, and killing frost late in spring and early in fall may limit the production of food. Some streams in the area support native brook trout.

Habitat elements and kinds of wildlife

Table 5 lists the soils in the county and rates their suitability for seven elements of wildlife habitat and for three kinds, or groups, of wildlife. The ratings are 1, 2, 3, and 4, each number indicating relative suitability for various elements. A rating of 1 denotes well suited; 2 denotes suited; 3, poorly suited; and 4, not suited. Soils that are well suited have few limitations, those that are suited have moderate limitations, and those that are poorly suited have severe limitations. Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

The elements of wildlife habitat are discussed in the following paragraphs.

HABITAT ELEMENTS

Each soil is rated in table 5 according to its suitability for various kinds of plants and other elements that make up wildlife habitat.

Grain and seed crops.—These crops include such seed-producing annual plants as corn, wheat, sorghum, buckwheat, and millet.

TABLE 5.—*Suitability of soils for elements of wildlife habitats and for kinds of wildlife*

[Ratings 1, 2, 3, and 4 are explained in the text]

Soil series and map symbol	Wildlife habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants on uplands	Hardwood plants	Coniferous plants	Wetland food and cover plants	Shallow water developments	Kinds of wildlife: Openland wildlife	Woodland wildlife	Wetland wildlife
Allegheny (AgB)	2	1	1	1	3	4	4	1	1	4
Alluvial land (Al)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Atkins (At)	3	2	2	1	2	2	3	2	1	3
Belmont:										
(BcE)	4	3	2	2	2	4	4	3	2	4
(BcF)	4	4	2	2	2	4	4	3	2	4
(For ratings of Calvin soil in mapping units BcE and BcF, see the Calvin series in this table.)										
Brinkerton:										
(BrB)	3	3	2	2	2	3	4	3	2	4
(BsB)	4	3	2	2	2	3	4	3	2	4
Calvin:										
(BcE)	4	3	2	2	2	4	4	3	2	4
(BcF)	4	4	2	2	2	4	4	3	2	4
Clarksburg:										
(ClB, ClC)	2	1	1	1	3	4	4	1	1	4
(ClD)	3	2	1	1	3	4	4	2	2	4
Cookport:										
(CpB, CpC)	2	1	1	1	3	4	4	1	1	4
Dekalb:										
(DaB, DaC)	2	2	2	2	2	4	4	2	2	4
(DaD)	3	2	2	2	2	4	4	2	2	4
(DaE, DbC, DbE, GdC, GdE)	4	3	2	2	2	4	4	3	2	4
(DaF, DbF, GdF)	4	4	2	2	2	4	4	3	2	4
Ernest:										
(EnB, EnC)	2	1	1	1	3	4	4	1	1	4
(EnD)	3	2	1	1	3	4	4	2	2	4
(ErC)	4	4	1	1	3	4	4	3	2	4
Gilpin:										
(GcB, GcC, GuB, GuC)	2	1	1	1	3	4	4	1	1	4
(GcC3, GcD, GuD)	3	2	1	1	3	4	4	2	2	4
(GcD3, GcE, GdC, GdE, GuD3, GuE, GuE3, GuF)	4	3	1	1	3	4	4	3	2	4
(GcE3, GcF, GdF)	4	4	1	1	3	4	4	3	2	4
(For ratings of Dekalb soil in mapping units GdC, GdE, and GdF, see the Dekalb series in this table. For ratings of Upshur soil in units GuB, GuC, GuD, GuD3, GuE, GuE3, and GuF, see the Upshur series.)										
Lindside (Ln)	2	1	1	1	3	3	3	1	1	3
Melvin (Ma)	3	2	2	1	2	2	3	2	1	3
Mine dumps (Md)	4	4	4	4	4	4	4	4	4	4
Monongahela:										
(MoA)	2	1	1	1	3	3	3	1	1	3
(MoB)	2	1	1	1	3	4	4	1	1	4

See footnote at end of table.

TABLE 5.—*Suitability of soils for elements of wildlife habitats and for kinds of wildlife*—Continued

Soil series and map symbol	Wildlife habitat elements							Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants on uplands	Hardwood plants	Coniferous plants	Wetland food and cover plants	Shallow water developments	Openland wildlife	Woodland wildlife	Wetland wildlife
Philo (Ph)	2	1	1	1	3	3	3	1	1	3
Pope (Pn)	2	1	1	1	3	4	4	1	1	4
Strip mine spoil (Sm)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Upshur:										
(GuB, GuC)	3	1	1	1	3	4	4	1	1	4
(GuD)	4	2	1	1	3	4	4	2	1	4
(GuD3, GuE, GuE3, GuF)	4	3–4	1	1	3	4	4	3	1	4
Wellston (WeB, WeC)	2	1	1	1	3	4	4	1	1	4
Westmoreland:										
(WmB, WmC)	2	1	1	1	3	4	4	1	1	4
(WmD)	3	2	1	1	3	4	4	2	2	4
(WmD3, WmE)	4	3	1	1	3	4	4	3	2	4
(WmE3, WmF, WmF3)	4	4	1	1	3	4	4	3	2	4
Wharton:										
(WrB, WrC)	2	1	1	1	3	4	4	1	1	4
(WrD)	3	2	1	1	3	4	4	2	2	4

[1] Variable.

Grasses and legumes.—Making up this group are domestic perennial grasses and herbaceous legumes that are established by planting. Among the plants are fescue, bluegrass, orchardgrass, tall oatgrass, reed canarygrass, clover, alfalfa, sericia lespedeza, and Korean lespedeza.

Wild herbaceous plants on uplands.—In this group are perennial grasses and weeds that generally are established naturally. The plants include bluestem, indiangrass, wildrye, oatgrass, pokeweed, strawberries, lespedeza, beggarweed, ragweed, and dandelion.

Hardwood plants.—These plants are nonconiferous trees, shrubs, and woody vines that produce nuts and other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are commonly established naturally but may be planted. Among the plants are oak, beech, cherry, hickory, poplar, walnut, wild grape, honeysuckle, greenbrier, huckleberry, mountain-ash, and mountain holly.

Coniferous plants.—These plants are cone-bearing trees and shrubs. They are important to wildlife primarily as cover, but they also furnish browse or seeds. The plants are commonly established naturally but, in many places, are planted. Among them are Virginia pine, white pine, pitch pine, redcedar, and hemlock.

Wetland plants for food and cover.—Making up this group are herbaceous plants of moist to wet sites. They include smartweed, wild millet, rushes, sedges, reeds, wildrice, switchgrass, and cattails.

Shallow water developments.—These developments are impoundments or excavations for controlling water, not more than 5 feet deep, that is used by migratory birds or muskrats. Examples of such developments are low dikes, shallow dugouts, level ditches, and devices that control the water level in marshy streams.

KINDS OF WILDLIFE

Table 5 rates the soils according to their suitability for three kinds of wildlife—openland, woodland, and wetland wildlife.

Openland wildlife consists of birds and mammals that normally frequent cropland, pasture, meadow, nearby fence rows, and areas overgrown with grasses and shrubs. Bobwhite quail, mourning dove, cottontail rabbit, and woodchuck are examples of openland wildlife.

Woodland wildlife consists of birds and mammals that normally frequent stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants. Examples of woodland wildlife are ruffed grouse, wild turkey, white-tailed deer, gray squirrel, fox squirrel, raccoon, and red fox.

Wetland wildlife consists of birds and mammals that normally frequent ponds, water-filled quarry holes, swamps, and other wet areas. Among these animals are duck, muskrat, mink, and beaver.

Each rating under "Kinds of wildlife" in table 5 is based on the ratings listed for the elements of habitat shown in the first part of the table. All elements are considered, but their importance varies from one kind of wildlife to the next. For example, the rating for openland wildlife is based largely on the ratings for grain and seed crops and for grasses and legumes, but it also is based on the rating for hardwood plants.

Use of Soils in Engineering [3]

This subsection gives the engineering characteristics of the soils of Barbour County and points out the principal features that are likely to influence engineering practices. It is provided to help interpret for engineering uses the soil survey information contained in this survey.

Information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations at the selected locations.
4. Locate possible sources of gravel and other construction material.
5. Correlate the performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining certain engineering structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and from aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations in this subsection can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Although the detailed soil map and the tables serve as a guide for evaluating most soils, a detailed investigation at the site of the proposed construction is needed because as much as 15 percent of an area designated as a specific soil on the map may consist of areas of other soils too small to be shown on the published map.

Some of the terms used by soil scientists may not be familiar to the engineer, and some terms may have a special meaning in soil science. Several of these terms are defined in the Glossary at the back of this survey.

Estimated properties of the soils

Table 6 gives some estimated soil properties that are important in engineering. These properties were estimated by comparing the soils in the county with similar soils that have been tested in this area and other areas, as well as by using information gained through field experience. Mine dumps and Strip mine spoil are not listed in the table, because their properties are too variable.

Two systems of classifying soils, the Unified and the AASHO, are given in table 6. The textural terms used to describe the soil material in the main horizons are those used by the U.S. Department of Agriculture and are defined in the Glossary.

The Unified classification system (*22*) is based on the identification of soils according to their texture and plasticity and their performance as engineering construction materials. In this system, two letters are used to designate each of 15 possible classes. The letters G, S, C, M, and O stand for gravel, sand, clay, silt, and organic soils, respectively, and W, P, L, and H refer to well graded, poorly graded, low liquid limit, and high liquid limit, respectively. In this system, SM and GM are sands and gravels that include fines of silt; ML and CL are silts and clays that have a liquid limit below 50; and MH and CH are silts and clays that have a liquid limit above 50. The letters O, W, and P are not used in table 6.

The AASHO system of classifying soils is one approved by the American Association of State Highway Officials (*2*). This system is based on field performance of highways in relation to soils. The soils having the same general load-carrying capacity are grouped together in seven basic groups. These groups range from A–1 (gravelly soils of high bearing capacity, the best soils for subgrade) to A–7 (clayey soils having low bearing capacity when wet, the poorest soils for subgrade). Within each group, the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The group index number is shown in parentheses after the soil group symbol and is given only for the soils tested (as in table 8).

Permeability refers to the rate that water moves through undisturbed soil. It depends largely on soil texture and structure.

Available water capacity is the amount of water a soil can hold available for plants. It is the water held in the range between field capacity and the wilting point.

The shrink-swell potentional indicates how much a soil changes in volume when its moisture content changes. Generally, soils classified as CH and A–7 have a high shrink-swell potential; clean, structureless sands and gravel and soils having small amounts of nonplastic to slightly plastic fines have a low shrink-swell potential.

Engineering interpretations

Table 7 gives engineering interpretations for the soils in Barbour County. The suitability ratings and soil features are based on estimates taken from table 6.

The suitability of soils as a source of topsoil is based on natural fertility, texture, and thickness of suitable layers. Unless otherwise indicated, the ratings do not apply to stony soils. Normally, only the surface layer is used for topsoil, but the subsurface layers of soils on flood plains may be suitable.

[3] ARTHUR B. HOLLAND, assistant State conservation engineer, Soil Conservation Service, assisted in preparing this subsection.

TABLE 6.—*Estimated*

Soil and map symbol	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification	
				USDA texture	Unified
	Feet	*Feet*	*Inches*		
Allegheny (AgB)	3–6	4+	0–8	Silt loam	ML
			8–20	Fine sandy clay loam	CL
			20–40	Clay loam	GM, SC, CL
Alluvial land (Al)	3+	0–3	0–36	Variable; mainly fine sandy loam or sandy loam.	(1)
Atkins (At)	5+	0	0–8	Silt loam	ML
			8–42	Silty clay loam	CL, ML
Belmont (BcE, BcF) (For properties of Calvin soil in these mapping units, refer to the Calvin series in this table.)	2–4	4+	0–8	Silt loam	ML, CL
			8–31	Silty clay loam	CL, ML
			31–41	Clay loam	CL
Brinkerton (BrB, BsB)	4–10	0	0–5	Silt loam	ML, CL
			5–20	Silty clay loam	CL or ML
			20–42	Silty clay loam	CL, ML
Calvin (BcE, BcF)	2– 3½	3+	0–9	Silt loam	ML, SM
			9–25	Silt loam	SM, GM
			25–36	Silt loam	GC, GM
Clarksburg (ClB, ClC, ClD)	4–10	1½–2	0–7	Silt loam	ML
			7–27	Silty clay loam	CL, ML
			27–40	Silty clay loam	ML, CL
Cookport (CpB, CpC)	2–4	1½ –2	0–18	Loam	ML, CL
			18–24	Clay loam	SM, ML, CL
			24–42	Fine sandy loam	SM
Dekalb (DaB, DaC, DaD, DaE, DaF, DbC, DbE, DbF, GdC, GdE, GdF).	2–4	4+	0–9	Loam	ML, SM, GM
			9–16	Loam	ML, SM, GM
			16–32	Loam	SM, GM
Ernest (EnB, EnC, EnD, ErC)	4–12	1½ –2	0–8	Silt loam	ML, CL
			8–22	Silty clay loam	ML, CL
			22–43	Silty clay loam	CL, ML, SM
Gilpin (GcB, GcC, GcC3, GcD, GcD3, GcE, GcE3, GcF, GdC, GdE, GdF, GuB, GuC, GuD, GuD3, GuE, GuE3, GuF). (For properties of Dekalb soil in mapping units GdC, GdE, and GdF, see the Dekalb series in this table. For properties of Upshur soil in units GuB, GuC, GuD, GuD3, GuE, GuE3, and GuF, see the Upshur series.)	1½–3	3+	0–7	Silt loam	ML
			7–22	Silty clay loam	CL, MH
			22–33	Silty clay loam	GM, GC
Lindside (Ln)	4+	1–2	0–18	Silt loam	ML, CL
			18–42	Silty clay loam	CL, ML
Melvin (Ma)	4+	0	0–8	Silt loam	ML, CL
			8–56	Silty clay loam	ML, CL
Monongahela (MoA, MoB)	3–6	1½–2	0–9	Silt loam	ML, CL
			9–23	Silty clay loam	ML, CL
			23–38	Clay loam	ML, CL
Philo (Ph)	4+	1½–2	0–6	Silt loam	ML
			6–32	Silt loam	ML, CL
			32–42	Loam	ML
Pope (Pn)	4+	3+	0–19	Fine sandy loam	SM, ML
			19–32	Sandy loam	SM

See footnote at end of table.

properties of soils

Classification—Continued	Percentage passing sieve—			Permeability	Available water capacity	Shrink-swell potential
AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
				Inches per hour	*Inches per inch of soil*	
A-4	90-100	85-100	60-75	2.0-6.3	0.18-0.24	Low.
A-6	80-100	80-95	55-80	0.63-2.0	0.15-0.18	Moderate.
A-7, A-6, A-2	50-95	50-90	25-75	0.63-2.0	0.15-0.18	Low.
(1)	(1)	(1)	(1)	(1)	(1)	(1)
A-4	90-100	90-100	75-90	0.63-2.0	0.18+	Low.
A-6, A-7	95-100	85-100	75-90	0.2-0.63	0.12-0.15	Moderate.
A-4, A-6	80-95	80-95	60-85	2.0-6.3	0.18+	Low.
A-4	80-95	75-90	50-80	0.63-2.0	0.15-0.18	Moderate.
A-4, A-6	70-95	60-85	50-80	0.63-2.0	0.15-0.18	Moderate.
A-4, A-6	90-100	90-100	80-95	0.63-2.0	0.18-0.20	Moderate.
A-6, A-4	90-100	90-100	80-95	0.2-0.63	0.18-0.20	Moderate.
A-4, A-5	85-100	80-100	60-75	<0.2	0.08-0.12	Moderate.
A-4	70-90	60-85	40-55	2.0-6.3	0.18-0.24	Low.
A-2, A-4, A-6	50-70	40-60	30-50	2.0-6.3	0.15-0.18	Low.
A-2	35-50	25-40	20-30	2.0-6.3	0.12-0.15	Low.
A-4	75-85	70-80	60-70	2.0-6.3	0.18-0.24	Low.
A-4, A-6	85-95	80-95	65-90	0.63-2.0	0.18-0.20	Moderate.
A-4, A-6	80-95	75-85	60-75	<0.2	0.12-0.15	Moderate.
A-4	90-100	75-95	50-75	2.0-6.3	0.15-0.18	Low.
A-4, A-6	65-95	65-95	45-65	0.63-2.0	0.15-0.18	Low.
A-2, A-4	70-90	65-85	30-50	0.2-0.63	0.08-0.12	Low.
A-2, A-4	50-85	40-75	15-55	2.0-6.3	0.15-0.18	Low.
A-2, A-4	50-85	40-75	20-55	2.0-6.3	0.08-0.12	Low.
A-2, A-4	45-85	40-80	15-45	2.0-6.3	0.08-0.12	Low.
A-4, A-6	75-85	70-80	60-70	2.0-6.3	0.18-0.24	Low.
A-4, A-6	70-100	75-95	65-85	0.63-2.0	0.15-0.18	Moderate.
A-6, A-7	75-100	70-90	45-70	0.2-0.63	0.12-0.15	Moderate.
A-4	60-80	55-80	50-75	2.0-6.3	0.18-0.24	Low.
A-6, A-7	80-95	70-85	50-80	0.63-2.0	0.15-0.18	Moderate.
A-2	45-65	35-50	20-35	0.63-2.0	0.08-0.12	Moderate.
A-4, A-6	95-100	90-100	70-85	2.0-6.3	0.18-0.24	Low.
A-4, A-6	95-100	90-100	80-90	0.63-2.0	0.15-0.18	Moderate.
A-4, A-6	90-100	90-100	70-90	2.0-6.3	0.18-0.24	Low.
A-4, A-6	90-100	85-100	75-90	0.2-0.63	0.12-0.15	Moderate.
A-4, A-6	90-100	85-100	70-95	0.63-2.0	0.15-0.18	Low.
A-4, A-6, A-7	90-100	85-100	70-100	0.20-0.63	0.15-0.18	Moderate.
A-4, A-6	85-100	80-100	55-85	<0.2	0.12-0.15	Moderate.
A-4	95-100	90-100	70-85	2.0-6.3	0.18-0.24	Low.
A-4, A-6	95-100	90-100	80-90	0.63-2.0	0.15-0.18	Moderate.
A-4, A-6	85-100	80-100	50-80	2.0-6.3	0.12-0.15	Low.
A-2, A-4	80-100	75-100	30-60	2.0-6.3	0.15-0.18	Low.
A-2, A-4	85-100	75-100	25-50	2.0-6.3	0.08-0.12	Low.

TABLE 6.—*Estimated properties*

Soil and map symbol	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification	
				USDA texture	Unified
	Feet	*Feet*	*Inches*		
Upshur (GuB, GuC, GuD, GuD3, GuE, GuE3, GuF).	2–5	4+	0–8	Silty clay loam	CL, CH
			8–18	Silty clay	MH, CH, ML, CL
			18–42	Clay	ML-CL, MH, CH
Wellston (WeB, WeC)	3–5	4+	0–8	Silt loam	ML, CL
			8–24	Silty clay loam	CL
			24–36	Silty clay loam	SM, SC
Westmoreland (WmB, WmC, WmD, WmD3, WmE, WmE3, WmF, WmF3).	2–4	4+	0–7	Silt loam	ML, CL
			7–23	Silty clay loam	CL, ML
			23–40	Silty clay loam	GC
Wharton (WrB, WrC, WrD)	3–4	1½–2	0–8	Silt loam	ML, CL
			8–26	Silty clay loam	ML, CL
			26–40	Silty clay	ML, CL

[1] Variable.

TABLE 7.—*Engineering*

[Dashes indicate soil material is so variable

Soil and map symbol	Suitability as source of—		Soil features affecting engineering practices	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Allegheny (AgB)	Good	Fair	Soil features favorable	Sandy layers in substratum
Alluvial land (Al)	Poor to fair	Fair to poor	Frequent flooding	
Atkins (At)	Fair	Poor	Frequent flooding; high water table.	A few sandy layers; flood hazard.
Belmont (BcE, BcF) (For interpretations of the Calvin soil in these mapping units, see the Calvin series in this table.)	Poor; stony	Fair	Limestone and sandstone bedrock; steep slopes.	Steep slopes; limited depth to bedrock; solution channels in limestone.
Brinkerton (BrB, BsB)	Fair to poor	Poor	High water table	Stoniness
Calvin (BcE, BcF)	Poor; stony	Fair	Limestone and sandstone bedrock; steep slopes.	Steep slopes; limited depth to bedrock; solution channels in limestone.
Clarksburg (ClB, ClC, ClD)	Fair	Fair	Seasonally high water table; seeps; susceptible to slipping.	Small seepage losses
Cookport (CpB, CpC)	Fair	Fair	High water table; seepage on pan; sandstone bedrock.	Limited depth to bedrock; poorly graded material.
Dekalb (DaB, DaC, DaD, DaE, DaF, DbC, DbE, DbF, GdC, GdE, GdF).	Poor	Good	Shallow to sandstone bedrock; stoniness.	Shallow over sandstone; pervious substratum.
Ernest (EnB, EnC, EnD, ErC)	Fair; poor in stony areas.	Fair to poor	Seasonally high water table; seeps; susceptible to slipping.	Small seepage losses; stones in many areas.

See footnote at end of table.

of soils—Continued

Classification—Continued	Percentage passing sieve—			Permeability	Available water capacity	Shrink-swell potential
AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
				Inches per hour	*Inches per inch of soil*	
A–6, A–7	90–100	90–100	80–100	0. 2–0. 63	0. 15–0. 18	High.
A–4, A–6, A–7	90–100	80–100	70–100	<0. 2	0. 12–0. 15	High.
A–4, A–6, A–7	75–100	70–100	65–100	<0. 2	0. 08–0. 12	High.
A–4, A–6	85–100	80–100	65–80	2. 0–6. 3	0. 18–0. 24	Low.
A–4, A–6	80–100	70–90	60–85	0. 63–2. 0	0. 15–0. 18	Moderate.
A–2	70–90	25–80	20–40	0. 63–2. 0	0. 08–0. 12	Low.
A–4, A–6	90–100	90–100	65–85	2. 0–6. 3	0. 18–0. 24	Low.
A–4, A–6, A–7	75–100	70–100	60–85	0. 63–2. 0	0. 15–0. 18	Moderate.
A–2, A–6, A–7	30–65	25–55	20–45	0. 63–2. 0	0. 08–0. 12	Low.
A–4, A–6	95–100	90–100	80–95	2. 0–6. 3	0. 15–0. 18	Low.
A–4, A–6	95–100	90–100	80–95	0. 63–2. 0	0. 12–0. 15	Moderate.
A–4, A–6	85–95	75–95	65–85	0. 20–0. 63	0. 08–0. 12	Moderate.

interpretations

that interpretations were not made]

	Soil features affecting engineering practices—Continued		
Farm ponds—Continued Embankment	Agricultural drainage [1]	Terraces and diversions	Construction and maintenance of pipelines
Stable; may be pervious in foundations.	Not needed	Soil features favorable	Soil features favorable.
------	------	------	
Instability	Flood hazard; slow permeability; high water table.	High water table; flood hazard	High water table; flood hazard; high corrosion potential (steel).
Fair stability	Not needed	Stoniness; rock outcrops; slopes.	Stoniness; rock outcrops.
Instability; surface stones	Slow permeability; stoniness	High water table; stoniness	High water table; high corrosion potential (steel).
Fair stability	Not needed	Stoniness; rock outcrops; slopes	Stoniness; rock outcrops.
Instability	Spot drainage needed; slow permeability; seasonally high water table.	Erodible; irregular slopes; seepage.	Seasonally high water table; high corrosion potential (steel).
Fair stability in subsoil	Spot drainage may be needed; slow permeability in fragipan.	Limited depth to bedrock; seepage.	Seasonally high water table; moderate to high corrosion potential (steel).
Pervious material; stoniness	Not needed	Limited depth to bedrock; stoniness.	Shallow to bedrock; stoniness.
Instability; stones	Spot drainage needed; slow permeability; seasonally high water table.	Erodible; stoniness; irregular slopes; seepage.	Seasonally high water table; high corrosion potential (steel).

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TABLE 7.—*Engineering*

[Dashes indicate soil material is so variable

Soil and map symbol	Suitability as source of—		Soil features affecting engineering practices	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Gilpin (GcB, GcC, GcC3, GcD, GcD3, GcE, GcE3, GcF, GdC, GdE, GdF, GuB, GuC, GuD, GuD3, GuE, GuE3, GuF). (For interpretations of the Dekalb soil in mapping units GdC, GdE, and GdF, see the Dekalb series in this table. For interpretations of the Upshur soil in units GuB, GuC, GuD, GuD3, GuE, GuE3, and GuF, see the Upshur series.)	Good; poor in stony areas.	Fair	Shallow to shale bedrock; steep slopes.	Steep slopes; limited depth to bedrock.
Lindside (Ln)	Good	Fair	High water table; flooding	Flood hazard; sandy layers in substratum.
Melvin (Ma)	Fair	Poor	High water table; flooding	Flood hazard
Mine dumps (Md)	Poor	Fair to good	----------	----------
Monongahela (MoA, MoB)	Fair	Fair	Seasonally high water table; seepage on top of fragipan.	May have sandy layers in substratum.
Philo (Ph)	Good	Fair	High water table; flooding	Sandy layers in substratum; flood hazard.
Pope (Pn)	Good	Good	Flooding	Rapid permeability; flood hazard.
Strip mine spoil (Sm)	Poor	Fair to good	----------	----------
Upshur (GuB, GuC, GuD, GuD3, GuE, GuE3, GuF).	Fair to poor	Poor	Susceptible to slipping; instability; plastic clay.	Small seepage losses
Wellston (WeB, WeC)	Good	Fair	Bedrock at depth of 3 or 4 feet.	Limited depth to bedrock
Westmoreland (WmB, WmC, WmD, WmD3, WmE, WmE3, WmF, WmF3).	Good	Fair	Steep slopes; susceptible to slipping; limited depth to bedrock.	Steep slopes; limited depth to bedrock.
Wharton (WrB, WrC, WrD)	Fair	Poor	Seasonally high water table; instability.	Small seepage losses

[1] Spot drainage consists of draining small areas by random tiling. Complete drainage may be by either tiling or ditching.

The ratings as a source of material for road fill are based on the Unified and AASHO classifications.

Soil features affecting highway location are depth to bedrock, hazard of flooding, a high water table, degree of slope, and susceptibility to slippage.

Some soils may be suitable for farm pond reservoirs but not for embankments; others may be suitable for embankments but not for reservoir areas. Soil features that affect use for reservoirs are slope, rockiness, permeability, layers of sand, and the presence of solution channels in limestone areas. For materials used in constructing embankments, the features considered are stoniness and the stability and permeability of the materials.

In the construction of terraces and diversions, the hazard of flooding, presence of suitable outlets, depth to bedrock, hazard of slippage, and stoniness are of primary concern.

Among the soil features affecting the construction and maintenance of pipelines are depth to bedrock, kind of bedrock, flooding hazard, a high water table, soil texture, *interpretations*—Continued

that interpretations were not made]

Soil features affecting engineering practices—Continued			
Farm ponds—Continued: Embankment	Agricultural drainage [1]	Terraces and diversions	Construction and maintenance of pipelines
Fair stability	Not needed	Limited depth to bedrock; stoniness; slope.	Shallow to bedrock; stoniness.
Fair stability; flood hazard	Complete drainage system generally not needed; moderately permeable; flood hazard.	Seasonally high water table; flood hazard.	Flood hazard; seasonally high water table; moderate corrosion potential (steel).
Instability; erodible; flood hazard.	High water table; slow permeability; flood hazard.	High water table; flood hazard	High water table; flood hazard; high corrosion potential (steel).
Fair stability	Spot drainage may be needed; slowly permeable at depth of 20 to 28 inches; seepage on top of fragipan.	Seepage on top of pan	Moderate corrosion potential (steel); seasonally high water table.
Fair stability· flood hazard	Complete drainage system generally not needed; moderately permeable; flood hazard.	Seasonally high water table; flood hazard.	Flood hazard; seasonally high water table; moderate corrosion potential (steel).
Stable; permeable; flood hazard.	Not needed	Flood hazard	Flood hazard.
Instability; susceptible to slipping.	Not needed	Erodible; land slips	Plastic clay; land slips; moderate corrosion potential (steel).
Fair stability	Not needed	Soil features favorable	Bedrock at depth of 3 or 4 feet.
Fair stability	Not needed	Erodible; land slips; limited depth to bedrock in places.	Limited depth to bedrock; land slips.
Instability; erodible	May need spot drainage; slowly permeable at depth of about 2 feet.	Erodible; seepage	Seasonally high water table; moderately high corrosion potential (steel).

slippage, and stoniness. Also shown, for some soils, is the potential of corrosion on steel pipe.

Natural sources of coarse material (sand and gravel) are scarce in this county. The only natural sources of gravel are gravelly areas of Pope soils. Slipping of soil material is a hazard in the Clarksburg, Ernest, Gilpin, Upshur, and Westmoreland soils.

Limitations on use of the soils of the county as disposal fields for septic tanks are discussed in the subsection "Use of Soils for Recreation."

Engineering test data

To help evaluate the soils of Barbour County for engineering purposes, 11 soil samples were tested according to standard procedures. The results of these tests are given in table 8. The samples represent the Ernest, Gilpin, Monongahela, Upshur, and Westmoreland series. They were taken from eight soil profiles in Barbour County and three soil profiles in adjacent counties.

TABLE 8.—*Engineering*

[Samples taken from eight soil profiles in Barbour County, two soil profiles in Upshur County, and one soil profile in Taylor County. Public Roads, in accordance with standard procedures of the

Soil name and location	Parent material	West Virginia report No.	Depth	Horizon	Moisture-density [1]		Mechanical analysis [2]		
							Percentage passing sieve [3]		
					Maximum dry density	Optimum moisture	3-in.	¾-in.	No. 4 (4.7 mm.)
			Inches		*Lb. per cu. ft.*	*Percent*			
Ernest extremely stony silt loam: 6.5 miles E. of Philippi and 50 feet N. of U.S. Highway No. 250. (Modal profile.)	Colluvium from sandstone and shale.	1-4-3	8-20	B21t	104	20	------	100	99
		1-4-6	36-72	Bx	118	14	100	97	82
Ernest silt loam: 1.8 miles SW. of Philippi and 100 feet W. of U.S. Highway No. 119. (Fine-textured profile.)	Colluvium from sandstone and shale.	1-5-2	6-21	B2t	113	18	100	90	73
		1-5-3	21-31	Bx1	116	16	100	97	84
		1-5-4	31-51	Bx2	110	18	100	88	75
Gilpin channery silt loam: 0.75 mile SW. of Tacy and 50 feet N. of State Route 38. (Modal profile.)	Sandstone and shale (Conemaugh formation).	1-2-2	7-17	B2t	109	19	[5] 95	93	87
3 miles E. of Philippi along N. side of U.S. Highway No. 250. (More clayey than modal.)	Sandstone and shale (Conemaugh formation).	1-3-5	13-22	B22t	102	24	100	96	90
Monongahela silt loam: 600 feet SW. of Boulder. (Heavy-textured subsoil).	Old alluvium	1-7-3	9-19	B21t	110	18	100	94	87
		1-7-5	23-38	Bx3	114	16	100	99	97
Upshur silty clay loam: 2 miles W. of Belington on State Route 11 at Route 15. (Modal profile.)	Shale (Conemaugh formation).	1-8-4	18-31	B22t	97	25	------	------	100
		1-8-5	31-42	C	105	20	------	------	100
2.6 miles S. of Rock Cave and 0.5 mile W. of Route 4, Upshur County. (Neutral substratum.)	Shale (Conemaugh formation).	49-2-5	20-36	B22t	107	19	------	------	------
		49-2-6	36-48	C	116	16	------	100	99
0.75 mile W. of Lorentz and 200 feet N. of U.S. Highway No. 33 and 50 feet E. of the Lewis County line, Upshur County. (Coarse-textured subsoil.)	Shale (Monongahela formation).	49-1-3	14-29	B22t	108	20	100	98	89
		49-1-4	29-41	B3	114	16	100	88	63
Westmoreland silt loam: 1.5 miles NW. of Corder Crossing. (Modal profile.)	Shale and sandstone (Monongahela formation).	1-1-3	12-23	B2t	109	19	[5] 90	87	77
		1-1-5	29-40	C	111	18	[5] 50	48	43
6.9 miles SW. of Philippi and 1,000 feet N. of State Route 57. (Coarse-textured subsoil.)	Shale and sandstone (Monongahela formation).	1-6-4	9-24	B2	120	15	[5] 70	66	52

See footnotes at end of table.

test data

Tests performed by West Virginia University, in cooperation with the West Virginia State Road Commission and the Bureau of American Association of State Highway Officials (AASHO) (2)]

Mechanical analysis [2]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]—Con.			Percentage smaller than—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [4]
98	93	80	74	64	40	27	41	17	A-7-6(11)	ML-CL.
75	60	40	34	27	17	12	33	[6] NP	A-4(1)	SM.
67	64	55	51	41	26	19	44	15	A-7-6(6)	ML.
77	73	60	55	45	26	16	37	12	A-6(6)	ML-CL.
70	69	56	54	44	28	19	40	17	A-6(7)	CL.
76	72	63	59	50	32	23	42	19	A-7-6(10)	CL.
87	86	81	76	68	48	35	52	21	A-7-6(15)	MH.
83	81	67	62	50	30	21	36	12	A-6(7)	ML-CL.
95	93	60	53	41	28	22	30	8	A-4(5)	ML-CL.
99	99	97	95	87	65	49	54	25	A-7-6(17)	MH-CH.
99	99	96	94	85	57	37	47	20	A-7-6(13)	ML-CL.
-----------	100	98	96	87	58	39	49	20	1-7-6(14)	ML-CL.
98	98	96	94	80	42	25	37	10	A-4(8)	ML.
82	80	73	69	60	42	31	45	18	A-7-6(12)	ML-CL.
55	52	47	44	36	23	16	43	16	A-7-6(5)	SM-SC.
71	68	63	59	50	32	20	41	16	A-7-6(10)	ML-CL.
38	36	33	30	24	16	12	41	16	A-7-6(9)	ML-CL.
47	45	35	32	31	14	9	28	NP	A-4(3)	GM.

See footnotes at end of table.

TABLE 8.—*Engineering*

Soil name and location	Parent material	West Virginia report No.	Depth	Horizon	Moisture-density[1]		Mechanical analysis[2]		
					Maximum dry density	Optimum moisture	Percentage passing sieve[3]		
							3-in.	¾-in.	No. 4 (4.7 mm.)
			Inches		*Lb. per cu. ft.*	*Percent*			
Westmoreland silt loam—Continued 5 miles N. of Bridgeport and 2.5 miles WNW. of State Route 73 and 300 feet W. of Corbin Branch Road, Taylor County. (Deep, gravelly substratum.)	Shale and sandstone (Monongahela formation).	46-1-4	17-25	B22t	109	19	100	97	89
		46-1-6	35-45	C	110	19	100	89	67

[1] Based on AASHO Designation: T 99-57, Methods A and C (*2*).
[2] Mechanical analyses according to the AASHO Designation: T 88-57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for naming textural classes for soils.
[3] Based on total material. Laboratory test data corrected for amount discarded in field sampling.

Soils in Residential Developments

At the present time the county is almost entirely rural, but a significant growth in the development of recreational areas and facilities is likely, and an accompanying increase in the building of homes and cottages seems probable. The use of a site for residential development can be limited by such soil features as drainage, slope, stones, depth to bedrock, nature of the subsoil, and hazard of flooding.

Soils that have slow internal drainage or a high water table are poor sites for buildings, especially those with basements. Drainage fields for septic tanks do not function properly if the subsoil is slowly permeable or if bedrock is near the surface.

Construction costs are increased if the site is shallow to hard bedrock. Houses should not be built on soils that are subject to flooding, such as the Melvin, Lindside, Pope, Philo, and Atkins soils. The Clarksburg and Ernest soils are seepy and subject to slipping, and they may not have enough stability for foundations, particularly in the steeper areas. Landslips are also hazards on the Westmoreland, Upshur, and Wharton soils, especially on the steeper ones.

The subsections "Use of Soils in Engineering" and "Use of Soils for Recreation" give soil properties and interpretations that are useful in planning residential developments, though on-site investigation is necessary. In table 9 the degrees and kinds of limitations listed for "Locations for service buildings" also apply to houses. Limitations shown for "Drainage fields for effluent disposal" also apply to sewage disposal systems for residences.

Use of Soils for Recreation

Audra State Park and Teter Creek Lake are the main recreational areas in Barbour County at the present time, but other areas have attractive features that make them suitable for development. One of these is Laurel Ridge in the eastern part of the county. From the top of that ridge, the Allegheny Mountains can be viewed to the east, and miles of hills and plateaus are visible to the west. Game is fairly plentiful in the Laurel Ridge area, and some of the streams support native trout.

In considering the use of soils for recreation, the general soil map (p. 3) can be useful as a guide in broad planning. In planning and developing selected kinds of recreational facilities, it is necessary to know the characteristics of the soils, including slope, stoniness, texture, hazard of flooding, presence of a high water table, permeability, depth to bedrock or other impervious layer, and kind of bedrock.

Table 9 shows the estimated degree and kind of limitations that affect the use of soils in the county for various purposes. Mine dumps, Strip mine spoil, and Westmoreland silt loam, 40 to 65 percent slopes, severely eroded, are not listed in the table. Because only small areas are required for some kinds of recreational facilities, the ratings given in table 9 do not eliminate the need for on-site investigation. The ratings are expressed in relative terms—slight, moderate, or severe. A rating of severe for a particular use does imply difficulties but does not imply that a soil so rated cannot be put to that use. (Tables 6 and 7 in the subsection "Use of Soils in Engineering" should be helpful in planning the use of soils for recreation.)

The recreational uses rated in table 9 are discussed in the following paragraphs.

Extensive play areas.—These are fairly large areas used for hiking, picnicking, and similar kinds of recreation and are left essentially in their natural state. However, stones are removed from the surface in some areas, trails are cleared, and picnic sites are developed. The main features that affect use of soils for extensive play *test data*—Continued

Mechanical analysis [2]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]—Con.			Percentage smaller than—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [4]
84	82	74	72	61	37	24	40	14	A-6(9)	ML-CL.
59	59	51	46	37	21	14	36	11	A-6(4)	ML-CL.

[4] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are ML-CL, MH-CH, and SM-SC.

[5] Fragments larger than 3 inches were discarded in field sampling. These fragments make up 5 percent of the material in the B2t horizon of Gilpin channery silt loam (modal profile); 10 percent of the material in the B2t horizon and 50 percent of the material in the C horizon of Westmoreland silt loam (modal profile); and 30 percent of the material in the B2 horizon of Westmoreland silt loam (coarse-textured subsoil).

[6] Nonplastic.

areas are natural drainage, flood hazard, rockiness and stoniness, texture of the surface layer, and slope.

Athletic fields and other intensive play areas.—These areas are used for tennis courts, baseball fields, and facilities for other sports. Because the areas must be nearly level, heavy grading and shaping may be needed. For this reason, all the major properties of the soils should be considered in selecting suitable locations.

Tent sites.—These areas are fairly small but should be level and large enough to include a parking area, picnic tables, and fireplaces. Generally, the depth of a soil to bedrock is not a limitation. Among the features that can limit use are natural drainage, hazard of flooding, stoniness, and slope. In table 9 flooding is rated a severe limitation only for soils that are flooded as often as two or three times a year, but precautions should be taken in areas where flash flooding is a hazard.

Locations for service buildings.—In recreational areas service buildings generally are used as headquarters or clubhouses. They are three stories or less in height and have a basement. Considered in rating the soils are depth to and kind of bedrock, drainage, hazard of flooding, rockiness, stoniness, texture of the surface layer, and degree of slope.

Drainage fields for effluent disposal.—Table 9 rates the soils as to degree and kind of limitations for use as drainage fields for septic tanks. In planning a system for disposing of sewage, the suitability of the soil should be the first consideration (*7*). How well and how long a system functions depends largely on the absorptive capacity of the soil. This capacity, in turn, depends on natural drainage, permeability, flood hazard, slope, depth to bedrock, and kind of bedrock.

Impoundments and sewage lagoons.—Impoundments generally are ponds one-half acre or more in size. It is assumed that at least part of the pond is excavated. Sewage lagoons are shallow ponds built to dispose of sewage through oxidation. Among the features that affect the degree of limitation are depth to and kind of bedrock, soil permeability, hazard of overflow, stoniness, and slope.

Access roads and parking lots.—Access roads carry traffic to, and between, recreational areas and buildings. Parking lots are needed near facilities that are heavily used. Soil features affecting the degree of limitation are depth to and kind of bedrock, natural drainage, rockiness, and slope. Slipping is a hazard on some soils.

Formation and Classification of Soils

The first part of this section explains the factors of soil formation as they relate to the formation of soils in Barbour County, and the second part deals with the classification of soils. The third part gives laboratory data for selected soils in the county.

Factors of Soil Formation

Soil is a natural body on the earth's surface, capable of supporting plant life. It has properties that result from the integrated effect of climate and living organisms acting on parent material as conditioned by relief over a period of time. Although climate, living organisms, and time are of primary importance in soil formation, parent material and relief account for most of the differences among the soils of Barbour County.

Parent material

The parent material of the soils in this county is of three kinds: (1) residuum, or material that weathered from the underlying bedrock; (2) colluvium, or material that moved downhill by the force of gravity and accumulated near the base of slopes; and (3) alluvium, or material carried by streams and deposited on flood plains.

TABLE 9.—*Estimated degree and kind of limitations*

["Slight" indicates few or no limitations; "moderate" indicates

Soil series and map symbols	Extensive play areas	Athletic fields and other intensive play areas	Tent sites
Allegheny (AgB)	Slight	Moderate: gentle slopes	Slight
Alluvial land (Al)	Severe: flooding; high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.
Atkins (At)	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Belmont (BcE, BcF) (For limitations to use of Calvin soil in mapping units BcE and BcF, see the Calvin series in this table.)	Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness.
Brinkerton:			
(BrB)	Severe: high water table	Severe: high water table	Severe: high water table
(BsB)	Severe: high water table	Severe: high water table; stones.	Severe: high water table
Calvin (BcE, BcF)	Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness.
Clarksburg:			
(ClB)	Slight	Moderate: seasonally high water table; slow permeability.	Moderate: seasonally high water table.
(ClC)	Moderate: moderate slopes; seasonally high water table.	Severe: moderate slopes	Moderate: moderate slopes; seasonally high water table.
(ClD)	Severe: strong slopes	Severe: strong slopes	Severe: strong slopes.
Cookport:			
(CpB)	Slight	Moderate: seasonally high water table; gentle slopes.	Moderate: seasonally high water table; moderately slow permeability.
(CpC)	Moderate: seasonally high water table; moderate slopes.	Severe: moderate slopes	Moderate to severe: moderate slopes; seasonally high water table.
Dekalb:			
(DaB)	Slight to moderate: gentle slopes.	Moderate: limited depth to bedrock; gentle slopes.	Slight to moderate: gentle slopes; limited depth to bedrock.
(DaC)	Moderate: moderate slopes	Severe: moderate slopes; limited depth to bedrock.	Moderate to severe: moderate slopes.
(DbC, GdC)	Moderate: gentle to moderate slopes.	Severe: stones; limited depth to bedrock; gentle to moderate slopes.	Moderate to severe: gentle to moderate slopes; stones.
(DaD, DaE, DaF, DbE, DbF, GdC, GdE, GdF). (For limitations to use of Gilpin soil in mapping units GdC, GdE, and GdF, see the Gilpin series in this table.)	Severe: strong to steep slopes; stones.	Severe: strong to steep slopes; limited depth to bedrock; stones.	Severe: strong to steep slopes; limited depth to bedrock; stones.
Ernest:			
(EnB)	Slight	Moderate: seasonally high water table; moderately slow permeability.	Moderate: seasonally high water table.

See footnotes at end of table.

affecting use of soils for recreational facilities

some limitations; and "severe" indicates serious limitations]

Locations for service buildings	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Access roads and parking lots [1]
Slight	Slight	Moderate: gentle slopes; sandy layers.	Slight.
Severe: flooding; high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: subject to flooding	Severe: high water table; flooding.
Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness; limited depth to bedrock.	Severe: steep slopes; stoniness.
Severe: high water table	Severe: high water table; slow permeability.	Slight to moderate: gentle slopes.	Severe: high water table.
Severe: high water table	Severe: high water table; slow permeability.	Moderate: gentle slopes; very stony surface layer.	Severe: high water table.
Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness.	Severe: steep slopes; stoniness; limited depth to bedrock.	Severe: steep slopes; stoniness.
Moderate: slipping hazard; seasonally high water table.	Severe: seasonally high water table; slow permeability.	Moderate: gentle slopes	Moderate: seasonally high water table; slipping hazard.
Moderate: slipping hazard; seasonally high water table.	Severe: moderate slopes; slow permeability.	Severe: moderate slopes	Moderate: seasonally high water table; slipping hazard; moderate slopes.
Moderate: strong slopes; slipping hazard.	Severe: strong slopes; slow permeability.	Severe: strong slopes	Severe: strong slopes; slipping hazard.
Moderate: seasonally high water table; bedrock.	Severe: seasonally high water table; moderately slow permeability.	Moderate: limited depth to bedrock; sandy layers.	Moderate: seasonally high water table; gentle slopes.
Moderate: moderate slopes; limited depth to bedrock; seasonally high water table.	Severe: moderate slopes; seasonally high water table; slow permeability.	Severe: limited depth to bedrock; moderate slopes.	Moderate: seasonally high water table; moderate slopes.
Severe: limited depth to bedrock.	Severe: limited depth to bedrock.	Severe: pervious substratum; limited depth to bedrock.	Moderate: gentle slopes; limited depth to bedrock.
Severe: limited depth to bedrock.	Severe: limited depth to bedrock; moderate slopes.	Severe: moderate slopes; pervious substratum.	Moderate to severe: limited depth to bedrock; moderate slopes.
Moderate: limited depth to bedrock; gentle to moderate slopes; stones.	Moderate to severe: gentle to moderate slopes.	Severe: gentle to moderate slopes; stoniness; limited depth to bedrock pervious substratum.	Moderate to severe: limited depth to bedrock; gentle to moderate slopes; stones.
Severe: strong to steep slopes; limited depth to bedrock; stones.	Severe: strong to steep slopes; limited depth to bedrock; stones.	Severe: limited depth to bedrock; strong to steep slopes; stones.	Severe: limited depth to bedrock; strong to steep slopes; stones.
Moderate: slipping hazard; seasonally high water table; seeps.	Severe: seasonally high water table; moderately slow permeability.	Moderate: gentle slopes	Moderate: seasonally high water table; slipping hazard; seeps.

TABLE 9.—*Estimated degree and kind of limitations*

Soil series and map symbols	Extensive play areas	Athletic fields and other intensive play areas	Tent sites
(EnC)	Moderate: seasonally high water table; moderate slopes.	Severe: moderate slopes	Moderate: seasonally high water table; moderate slopes.
(EnD)	Severe: strong slopes	Severe: strong slopes	Severe: strong slopes
(ErC)	Moderate: gentle to moderate slopes; seasonally high water table; stoniness.	Severe: stoniness; gentle to moderate slopes.	Severe: stoniness; gentle to moderate slopes; seasonally high water table.
Gilpin:			
(GcB, GuB)	Slight	Moderate: limited depth to bedrock; gentle slopes.	Slight
(GcC, GuC)	Moderate: moderate slopes	Severe: moderate slopes; limited depth to bedrock.	Moderate: moderate slopes
(GcC3)	Moderate: moderate slopes; erosion hazard.	Severe: moderate slopes; limited depth to bedrock.	Moderate: moderate slopes; erosion hazard.
(GcD, GcD3, GcE, GcE3, GcF, GuD, GuD3, GuE, GuE3, GuF).	Severe: strong to very steep slopes; erosion hazard.	Severe: strong to very steep slopes; limited depth to bedrock.	Severe: strong to very steep slopes; limited depth to bedrock.
(GdC)	Slight to moderate: gentle to moderate slopes.	Moderate to severe: stones; limited depth to bedrock; gentle to moderate slopes.	Moderate: gentle to moderate slopes; very stony.
(GdE, GdF) (For limitations to use of Upshur soil in mapping units GuB, GuC, GuD, GuD3, GuE, GuE3, and GuF, see the Upshur series in this table.)	Severe: strong to very steep slopes; stones.	Severe: strong to very steep slopes; stones; limited depth to bedrock.	Severe: strong to very steep slopes; stones; limited depth to bedrock.
Lindside (Ln)	Moderate: flood hazard; seasonally high water table.	Moderate: flood hazard; seasonally high water table.	Moderate: [2] flood hazard; seasonally high water table.
Melvin (Ma)	Severe: water table; flooding.	Severe: water table; flooding.	Severe: water table; flooding.
Monongahela (MoA, MoB)	Slight to moderate: seasonally high water table.	Moderate: seasonally high water table; slow permeability.	Moderate: seasonally high water table; slow permeability.
Philo (Ph)	Moderate: flood hazard; seasonally high water table.	Moderate: flood hazard; seasonally high water table.	Moderate: flood hazard; seasonally high water table.
Pope (Pn)	Moderate: subject to flooding.	Moderate: subject to flooding.	Moderate: subject to flooding.
Upshur:			
(GuB)	Moderate: clayey surface layer; gentle slopes.	Moderate: clayey surface layer; gentle slopes.	Moderate to severe: slow permeability; clayey surface layer; gentle slopes.
(GuC)	Severe: clayey surface layer; slipping hazard.	Severe: moderate slopes; clayey surface layer.	Severe: moderate slopes; clayey surface layer; slipping hazard.
(GuD, GuD3, GuE, GuE3, GuF)	Severe: fine clayey texture; strong to very steep slopes; slipping hazard.	Severe: strong to very steep slopes; clayey texture.	Severe: strong to very steep slopes; clayey texture.
Wellston:			
(WeB)	Slight	Moderate: gentle slopes; limited depth to bedrock.	Slight
(WeC)	Moderate: moderate slopes	Severe: moderate slopes; limited depth to bedrock.	Moderate: moderate slopes.
Westmoreland:			
(WmB)	Slight	Moderate: limited depth to bedrock; gentle slopes.	Slight

See footnotes at end of table.

affecting use of soils for recreational facilities—Continued

Locations for service buildings	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Access roads and parking lots [1]
Moderate: moderate slopes; seasonally high water table; slipping hazard; seeps.	Severe: seasonally high water table; moderately slow permeability; slopes.	Severe: moderate slopes.	Moderate: seasonally high water table; moderate slopes; slipping hazard; seeps.
Moderate: strong slopes; water table; slipping hazard; seeps.	Severe: strong slopes; moderately slow permeability.	Severe: strong slopes.	Severe: strong slopes; slipping hazard; seeps.
Severe: stoniness; seasonally high water table; seeps.	Severe: stoniness; seasonally high water table; slow permeability.	Severe: stoniness; gentle to moderate slopes.	Severe: stoniness; slipping hazard; gentle to moderate slopes; seeps.
Moderate: limited depth to bedrock.	Severe: limited depth to bedrock.	Moderate: gentle slopes; limited depth to bedrock; moderate permeability.	Slight.
Moderate: limited depth to bedrock; moderate slopes.	Severe: limited depth to bedrock.	Severe: moderate slopes.	Moderate to severe: moderate slopes; limited depth to bedrock.
Moderate: limited depth to bedrock; moderate slopes; erosion hazard.	Severe: limited depth to bedrock.	Severe: moderate slopes.	Moderate to severe: moderate slopes; limited depth to bedrock.
Severe: strong to very steep slopes; limited depth to bedrock.	Severe: strong to very steep slopes; limited depth to bedrock.	Severe: strong to very steep slopes; limited depth to bedrock.	Severe: strong to very steep slopes; limited depth to bedrock.
Moderate: stoniness; gentle to moderate slopes; limited depth to bedrock.	Severe: limited depth to bedrock.	Severe: gentle to moderate slopes; stoniness; pervious substratum.	Moderate to severe: limited depth to bedrock; gentle to moderate slopes.
Severe: strong to very steep slopes; stones; limited depth to bedrock.	Severe: strong to very steep slopes; stones; limited depth to bedrock.	Severe: strong to very steep slopes; stones; limited depth to bedrock.	Severe: strong to very steep slopes; stones; limited depth to bedrock.
Severe: flood hazard.	Severe: flood hazard; seasonally high water table.	Moderate to severe: flood hazard; sandy layers.	Moderate to severe: flood hazard; seasonally high water table.
Severe: water table; flooding.	Severe: water table; flooding.	Severe: subject to flooding.	Severe: water table; flooding.
Moderate: seasonally high water table.	Severe: seasonally high water table; slow permeability.	Moderate: high silt content; sandy layers.	Moderate: seasonally high water table; gentle slopes in some areas.
Severe: flood hazard.	Severe: flood hazard; seasonally high water table.	Severe: sandy layers; flood hazard.	Moderate to severe: flood hazard; seasonally high water table.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: moderately rapid permeability; subject to flooding.	Moderate to severe: subject to flooding.
Moderate to severe: clayey surface layer; slipping hazard; gentle slopes.	Severe: slow permeability.	Moderate: gentle slopes; slipping hazard.	Moderate to severe: slipping hazard; clayey texture.
Severe: clayey surface layer; moderate slopes; slipping hazard.	Severe: moderate slopes; slow permeability.	Severe: moderate slopes; slipping hazard.	Moderate to severe: moderate slopes; slipping hazard; clayey texture.
Severe: strong to very steep slopes; clayey texture; slipping hazard.	Severe: strong to very steep slopes; clayey texture; slipping hazard.	Severe: strong to very steep slopes; clayey texture; slipping hazard.	Severe: strong to very steep slopes; clayey texture; slipping hazard.
Moderate: limited depth to bedrock.	Moderate: limited depth to bedrock.	Moderate: gentle slopes; limited depth to bedrock.	Moderate: gentle slopes.
Moderate: moderate slopes; limited depth to bedrock.	Severe: moderate slopes; limited depth to bedrock.	Severe: moderate slopes; limited depth to bedrock.	Moderate to severe: moderate slopes; limited depth to bedrock.
Moderate: limited depth to bedrock.	Severe: limited depth to bedrock.	Moderate: gentle slopes; limited depth to bedrock; moderate permeability.	Moderate: limited depth to bedrock; gentle slopes.

TABLE 9.—*Estimated degree and kind of limitations*

Soil series and map symbols	Extensive play areas	Athletic fields and other intensive play areas	Tent sites
(WmC)	Moderate: moderate slopes	Severe: moderate slopes; limited depth to bedrock.	Moderate: moderate slopes; limited depth to bedrock.
(WmD, WmD3, WmE, WmE3, WmF).	Severe: strong to very steep slopes; erosion hazard.	Severe: strong to very steep slopes; limited depth to bedrock.	Severe: Strong to very steep slopes; limited depth to bedrock.
Wharton:			
(WrB)	Slight	Moderate: slow permeability; limited depth to bedrock: gentle slopes; seasonally high water table.	Moderate: seasonally high water table; gentle slopes; slow permeability.
(WrC)	Moderate: seasonally high water table.	Severe: moderate slopes; seasonally high water table; slow permeability.	Moderate: moderate slopes; seasonally high water table; slow permeability.
(WrD)	Severe: strong slopes; seasonally high water table.	Severe: strong slopes; seasonally high water table.	Severe: strong slopes; seasonally high water table.

[1] Ratings are mainly for access roads. For parking lots the limitation is moderate on slopes of 3 to 8 percent and severe on slopes exceeding 8 percent.

About 85 percent of Barbour County is occupied by soils that developed in residuum. This material weathered from level-bedded sedimentary rocks of Pennsylvanian age, mainly sandstone and shale and partly limestone. Rocks of the Pottsville, Allegheny, Conemaugh, and Monongahela formations—all of which are of Pennsylvanian age—crop out in the county, and there are a few outcrops of the still younger Dunkard formation on some hilltops.

Many of the soils that developed in residuum strongly reflect characteristics of the parent rock. The Dekalb soils occur mainly in areas underlain by the Pottsville sandstone. These soils are on Laurel Mountain in the eastern part of the county and on steep or very steep hills along the Middle Fork and Tygart Rivers. The Cookport and Wellston soils occur on plateaus, mainly in the south-central part of the county, where the underlying rocks are sandstone and shale of the Allegheny formation. The western third of the county is occupied chiefly by the Westmoreland soils, which developed in material weathered from interbedded limestone, sandstone, siltstone, and shale, mostly of the Monongahela formation. In the remaining major part of the county, soils of the Gilpin and Upshur series are dominant. These soils overlie acid gray shale, limy red clay shale, acid siltstone, and sandstone, mainly of the Conemaugh formation. The Wharton soils developed from clayey shale, principally of this formation.

In these soils that developed from residuum, the variable content of coarse fragments, the kind and amount of clay, the differences in natural fertility, and, in the Upshur soils, the reddish colors are some of the features closely related to parent material.

Less than 15 percent of the county is occupied by soils that developed in alluvium or colluvium. The colluvium and much of the alluvium came from nearby uplands underlain by shale, sandstone, and limestone. Soils that developed in alluvium lie along streams; those that developed in colluvium are on foot slopes and around the heads of streams. The principal soils are the Atkins, Lindside, Melvin, Philo, and Pope soils on flood plains and the Clarksburg and Ernest soils on colluvial slopes. The Atkins, Ernest, Philo, and Pope soils developed from acid material and generally are more acid than the Clarksburg, Lindside, and Melvin soils, which developed partly from calcareous material.

Living organisms

Plants, micro-organisms, earthworms, and other forms of life that live on or in the soil are active in the soil-forming processes.

Plants provide shade and cover and thus reduce losses of water from runoff and evaporation. They add organic matter to the soils, thereby influencing the soil structure and physical condition. Their roots loosen the soil and help to keep the soil supplied with minerals by bringing elements from the parent material to the surface layer in a form more usable to plants. Animals also help loosen the soil by burrowing.

Generally, the plant cover in an area strongly affects some of the major soil properties. In Barbour County all the soils developed under forest, principally oaks, hickories, and yellow-poplar. Hardwoods use much of the calcium, magnesium, and other bases in the soil, but these bases are returned at least partially each year in the fallen leaves. In this humid, temperate climate, this recycling, or return of soluble bases, helps to counteract the tendency of the soils to lose bases through leaching. In this county, however, all the soils are acid in the upper part of the profile and are relatively low in organic-matter content.

Man's use of the land has brought about significant changes in soil development, at least in some areas, by accelerating erosion through improper tillage, changing *affecting use of soils for recreational facilities*—Continued

Locations for service buildings	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Access roads and parking lots [1]
Moderate: limited depth to bedrock; moderate slopes; slipping hazard. Severe: limited depth to bedrock; strong to very steep slopes; slipping hazard.	Severe: moderate slopes; limited depth to bedrock. Severe: limited depth to bedrock; strong to very steep slopes; slipping hazard.	Severe: moderate slopes; limited depth to bedrock. Severe: limited depth: to bedrock; strong to very steep slopes; slipping hazard.	Moderate to severe: moderate slopes; limited depth to bedrock; slipping hazard. Severe: limited depth to bedrock; strong to very steep slopes; slipping hazard.
Moderate: seasonally high water table: limited depth to bedrock.	Severe: Seasonally high water table; slow permeability.	Moderate: limited depth to bedrock; gentle slopes.	Moderate: gentle slopes; seasonally high water table; soil slips.
Moderate to severe. seasonally high water table; limited depth to bedrock; soil slips. Severe: strong slopes; seasonally high water table limited depth to bedrock; slips.	Severe: moderate slopes; seasonally high water table; slow permeability. Severe: Strong slopes; seasonally high water table; limited depth to bedrock; slips.	Severe: moderate slopes. Severe: Strong slopes; seasonally high water table; limited depth to bedrock; slips.	Moderate to severe: moderate slopes; limited depth to bedrock; seasonally high water table; soil slips. Severe: Strong slopes; seasonally high water table; limited depth to bedrock; slips.

[2] Rating is for areas that are seldom if ever flooded during the normal camping season.

the plant cover, applying lime and fertilizer, using drainage and irrigation practices, and constructing buildings, roads, and structures.

Climate

Climate influences chemical and physical weathering, as well as the plant and animal life at work in the soil material. The soils of Barbour County have developed under a moderately cool, temperate climate. Ample rainfall has resulted in rapid chemical changes, much weathering and leaching, and an environment that is favorable for trees and other forms of life. Climatic data for the county are given in the section "General Nature of the Area."

Time

The length of time required for soils to develop depends largely on the other factors of soil formation, particularly climate and the nature of the parent material. The comparative age of most soils can be estimated from the geologic history of the area, especially the relative dates at which the parent material was deposited or exposed.

Soil material on flood plains has been in place for only a short time and shows poorly defined horizons. An example is the Pope series. The Dekalb soils and other soils on steep hillsides are more mature than those on flood plains, but they are still relatively young because of geologic erosion, which tends to remove or to mix the soil material almost as fast as it is formed. The Wellston soils on large upland flats and the Monongahela soils on stream terraces are among the most strongly weathered soils in Barbour County. The soil-forming processes have acted on these soils long enough for a mature profile to be formed.

Relief

Relief affects the formation of soils through its effect on drainage, runoff, erosion, ponding, depth of water table, and other phenomena. Thus, it modifies the effects of other soil-forming factors, particularly climate and time.

The hilly relief in Barbour County favors rapid surface runoff and generally does not favor the development of mature soils. Depressional soils and those at the base of slopes, such as the Brinkerton, Clarksburg, and Ernest soils, are frequently wet because of seepage and runoff from surrounding soils.

Classification of Soils

Soils are placed in narrowly defined classes so that knowledge about their behavior within farms and counties can be organized and applied. They are placed in broadly defined categories so that large areas, such as continents, can be studied and compared.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*4*) and revised later (*18*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 (*21*).

Current classification

Under the current system of classification, all soils are placed in six categories. They are, beginning with the most inclusive, the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as bases for classification are observable or measurable properties. The properties are so chosen, however, that soils of similar mode of origin are grouped together. The current system is under continual study (*16*, *21*). Therefore, readers interested in developments of the system should search for the latest literature available.

In table 10 each soil series of Barbour County is placed in its family, subgroup, and order of the current classification.

1938 classification

The 1938 classification, with later revisions, also consists of six categories. In the highest of these, the soils of the whole country have been placed in three orders. Two categories, suborder and family, were never fully developed and have not been used much. More attention has been centered on the categories, great soil group, soil series, and soil type. A further subdivision of the soil type, called a soil phase, is defined, along with soil type and soil series, in the section "How This Survey Was Made," in the front of this survey.

A great soil group is made up of soils that have similar major profile characteristics. Their horizons are arranged in the same way, though the soils may differ in such features as thickness of profile and degree of development in the different horizons.

The great soil groups in this county are Gray-Brown Podzolic soils, Red-Yellow Podzolic soils, Sols Bruns Acides, Low-Humic Gley soils, and Alluvial soils.

In table 10 each soil series of Barbour County is placed in its great soil group and order of the 1938 system, and in the following paragraphs each great soil group is discussed. Some soils in some of the great soil groups intergrade toward other great soil groups. That is, they have characteristics of two groups.

TABLE 10.—*Soil series classified according to the current system of classification and the 1938 system with its later revisions*

Series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Allegheny	Fine loamy, mixed, mesic.	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.
Atkins	Fine loamy, mixed, acid, mesic.	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Belmont	Fine loamy, mixed, mesic.	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Brinkerton	Fine loamy, mixed, mesic.	Typic Fragiaqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Calvin	Fine loamy, mixed, mesic.	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Clarksburg	Fine loamy, mixed, mesic.	Aquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Cookport	Fine loamy, mixed, mesic.	Aquic Fragiudults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.
Dekalb	Coarse loamy, mixed, mesic.	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Ernest	Fine loamy, mixed, mesic.	Aquic Fragiudults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.
Gilpin	Fine loamy, mixed, mesic.	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.
Lindside	Fine silty, mixed, nonacid, mesic.	Aquic Udifluvents	Entisols	Alluvial soils	Azonal.
Melvin	Fine silty, mixed, nonacid, mesic.	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Monongahela	Fine silty, mixed, mesic	Aquic Fragiudults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.
Philo	Coarse loamy, mixed, acid, mesic.	Aquic Udifluvents	Entisols	Alluvial soils	Azonal.
Pope	Coarse loamy, siliceous, acid, mesic.	Typic Udifluvents	Entisols	Alluvial soils	Azonal.
Upshur	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Wellston	Fine silty, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.
Westmoreland	Fine loamy, mixed, mesic.	Alfic Hapludalfs	Alfisols	Gray-Brown Podzolic soils (intergrading toward Red-Yellow Podzolic soils).	Zonal.
Wharton	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils (intergrading toward Gray-Brown Podzolic soils).	Zonal.

GRAY-BROWN PODZOLIC SOILS

Undisturbed soils of this great soil group have distinct, well-developed horizons. Typically, the dark-colored A1 horizon is 2 to 3 inches thick. The A2 horizon is about 6 inches thick and grayish brown or yellowish brown. In most places there is a weakly to moderately developed transitional horizon, 5 to 10 inches thick and generally dark grayish brown, that grades to a brown, well-developed B horizon of clay accumulation. The B horizon has moderate to strong, blocky or subangular blocky structure. In the B horizon of a typical soil, chroma is 3 or 4 and base saturation is high. The normal thickness of the solum is 30 to 50 inches. The Belmont soils are considered typical Gray-Brown Podzolic soils in Barbour County.

In this county the Westmoreland soils are Gray-Brown Podzolic soils that have some characteristics of Red-Yellow Podzolic soils.

RED-YELLOW PODZOLIC SOILS

This great soil group is made up of soils that have distinct, well-developed horizons. The sequence and thickness of horizons are similar to those described for the Gray-Brown Podzolic soils, but the B horizon of a typical Red-Yellow Podzolic soil has chroma of 6 or 8 and low base saturation. Generally, the A horizon is more leached in Red-Yellow Podzolic soils than in Gray-Brown Podzolic soils, and in both groups this horizon is more leached in moderately well drained soils than in well drained soils. Strictly speaking, there are no typical Red-Yellow Podzolic soils in Barbour County.

The Cookport soils are examples of Red-Yellow Podzolic soils that intergrade toward Gray-Brown Podzolic soils. They are light-colored, podzolized soils of timbered areas in which the color of the B horizon is somewhat similar to that of Gray-Brown Podzolic soils.

SOLS BRUNS ACIDES

Sols Bruns Acides have weak profile development. In unplowed areas these soils typically have a thin A1 horizon that consists of organic and mineral material 2 or 3 inches thick. Underlying this horizon is a poorly differentiated A2 horizon that grades to a B horizon having uniform color and showing little if any accumulation of clay. Sols Bruns Acides developed under forest in areas where the average annual rainfall is 35 to 45 inches. They developed in material weathered from acid sandstone and siltstone. Their base saturation is low. These soils have been described by Baur and Lyford (*5*).

The Dekalb and the Calvin soils are the only Sols Bruns Acides in Barbour County.

LOW-HUMIC GLEY SOILS

Low-Humic Gley soils have a thin, dark-colored A horizon in which the organic-matter content is moderately high. The B horizon shows the effects of waterlogging and of exclusion of air for long periods. Gleization is strong. This process results in grayish colors and in intense mottling. There has been little eluviation, or downward movement of fine material into the B horizon. However, the surface horizon generally is coarser textured than the subsurface horizons.

This great soil group is represented in Barbour County by the Brinkerton, Atkins, and Melvin soils, all of which are somewhat poorly drained or poorly drained. Their percentage of base saturation ranges from low to high.

ALLUVIAL SOILS

Alluvial soils developed in material that was recently laid down by water and that has been altered only a little by soil-forming processes. These soils have a thin, moderately dark colored A horizon. This is underlain by material that is commonly uniform in color and shows little or no horizon development. In many places the material is stratified.

Alluvial soils lie on flood plains along streams and at the mouth of streams. Their properties depend on the character of the alluvial deposits from which they formed. The Alluvial soils in this county are the Pope, Philo, and Lindside soils.

Laboratory Data on Selected Soil Profiles

This subsection gives laboratory data and profile descriptions for soils of two major series in the county. The physical and chemical properties of these soils are shown in tables 11 and 12. The data will be helpful in characterizing and classifying the soils and in understanding their genesis. The information will also be useful in making interpretations for use and management and will serve as a check against field methods and determinations.

The soils from which samples were taken are considered representative of their respective series. The laboratory analyses were made at the Soil Survey laboratory at Beltsville, Md.

Particle size distribution was determined by the pipette method (*10, 11*). Organic carbon was determined by wet combustion (*13*). Total nitrogen was determined by the Kjeldahl method (*3*). Exchangeable cations and exchange capacity were determined by a method developed by Peech, Alexander, Dean, and Reed (*13*), except that sodium and potassium were determined by flame spectrophotometry. The pH was determined by glass electrode, using a soil-water ratio of 1:1 and a soil-normal potassium chloride ratio of 1:1. Aluminum was extracted with normal potassium chloride.

Bulk densities and percentages of moisture held at ⅓ atmosphere were determined by the plastic-coated clod method. Percentages of moisture held at 15 atmospheres were determined by use of sieved samples.

Field pH tests were made at the time the soils were sampled, using bromcresol green and chlorphenol red indicators with a colorimetric scale. The field values for the Gilpin soil were very close to the laboratory values, but field values for the Westmoreland soil were generally about 1.0 pH unit higher than the laboratory values, particularly in the lower part of the profile. This may be due mainly to the effect of drying the soil samples.

The textural determinations generally confirm the field identification of texture. However, the clay content of the B horizon was overestimated, particularly for the Gilpin soil. Laboratory data for the Gilpin soils in adjacent Preston and Randolph Counties show the clay content to be about 30 percent in the main part of the B horizon. The data further indicate that in areas

TABLE 11.—*Particle-size distribution*

Soil type and sample number	Depth	Horizon	Particle size distribution: Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)
	Inches		*Percent*	*Pecent*	*Percent*	*Percent*	*Percent*	*Percent*
Gilpin channery silt loam, S62WVa-1-2(1-4).	0-7	Ap	2.1	4.0	6.7	13.4	8.3	45.3
	7-17	B2t	5.4	5.3	3.6	6.6	5.7	48.6
	17-21	B3	7.6	7.4	2.4	2.8	3.1	54.1
	21-29	C	11.3	11.2	3.1	3.4	4.0	46.8
Westmoreland silt loam, S62WVa-1-1(1-5).	0-7	Ap	4.0	2.4	1.7	5.7	8.9	52.1
	7-12	B1	3.6	2.6	1.7	5.1	8.2	55.2
	12-23	B2t	3.3	2.4	1.4	3.8	6.5	55.0
	23-29	B3	2.4	2.0	2.0	5.4	10.2	48.2
	29-40	C	4.2	3.5	2.4	6.0	11.8	44.3

where the parent material of the Gilpin soils was derived about equally from sandstone and shale, a surface layer of loam is as common or is more common than one of silt loam, and a B horizon having a textured marginal to heavy loam or clay loam occurs in more places than one having a texture of silty clay loam.

Comparing the laboratory data for the Gilpin soil with that for the Westmoreland soil shows that the only significant difference is in base saturation. Except in the Ap horizon, which probably reflects past treatment with soil amendments, the base saturation is three to four times higher in the Westmoreland soil than in the Gilpin soil. Field observations indicate that natural fertility is significantly higher in the Westmoreland soils than it is in the Gilpin soils.

Following are the profile descriptions of the two soils sampled.

GILPIN SOILS

The Gilpin soils are classed as Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils. The profile described, however, appears to be in the range of Red-Yellow Podzolic soils. The B2 horizon is one of clay accumulation. Clay films are continuous, and the structure is moderate. The base saturation is about 7 percent.

Gilpin channery silt loam, S62WVa-1-2-(1-4).—Profile in an idle field, on a slope of 25 percent, three-fourths mile southwest of Tacy along State Route 38.

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) loam; moderate, medium, granular structure; friable; very strongly acid; clear, smooth boundary.

B2t—7 to 17 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; continuous clay coats on ped faces; 20 percent stone fragments; very strongly acid; clear, smooth boundary.

B3—17 to 21 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, fine, subangular blocky structure; firm; roots common; 30 percent soft siltstone fragments; very strongly acid; clear, irregular boundary.

C—21 to 29 inches, yellowish-brown (10YR 5/4) gravelly clay loam; massive (structureless); firm; 80 percent soft siltstone fragments; very strongly acid; clear, irregular boundary.

R—29 inches +, very slightly weathered siltstone.

WESTMORELAND SOILS

The Westmoreland soils are classed as Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils. The increase in clay content that is necessary for the B horizon to qualify as a horizon of clay accumulation is borderline. Structure is moderate in the B2 and B3 horizons. The B1 horizon has chromas of less than 6, and the B2 horizon has base saturation of more than 35 percent.

Westmoreland silt loam, S62WVA-1-1(1-5).—Profile in a pastured field, on a slope of 35 percent, above a strip-mined area about 1 mile northwest of Corder Crossing. This profile is described on page 20.

General Nature of the Area

This section provides general information about Barbour County. It discusses settlement, population, and industries; physiography, relief, and drainage; geology; climate; agriculture; and other subjects of general interest.

Settlement, Population, and Industries

Barbour County was created from parts of Randolph, Harrison, and Lewis Counties in 1843. It is named for Judge Philip Pendleton Barbour. In 1960, the population in the county was 15,474 and that of Philippi, the largest town, was 2,228. Other towns are Belington (population 1,528) and Junior (population 552).

Coal mining and lumbering are leading industries, and dairying, livestock, poultry, and grain are of major importance on farms. In 1962, the county produced 2,722,048 tons of soft coal from underground, surface, and auger mining. Several sawmills are scattered over *and moisture data of selected soils*

Particle size distribution—Continued				Textural class	Moisture held at tensions of—		Bulk density	
Clay (less than 0.002 mm.)	0.2–0.02 mm.	0.02–0.002 mm.	Greater than 2.0 mm.		⅓ atmosphere	15 atmospheres	Oven-dry	⅓ atmosphere of tension
Percent	*Percent*	*Percent*	*Percent*		*Percent*	*Percent*	*Gm./cc.*	*Gm./cc.*
20.2	24.6	35.4	15	Loam	27.1	9.0	1.40	1.35
24.8	19.0	38.7	14	Loam	19.5	10.7	1.74	1.66
22.6	56.4	2.4	5	Silt loam	20.3	9.8	1.76	1.66
20.2	18.8	33.8	16	Loam	----------	8.5	----------	----------
25.2	26.7	38.2	10	Silt loam	28.7	11.7	1.36	1.30
23.6	25.7	41.2	7	Silt loam	20.4	9.5	1.67	1.62
27.6	21.6	42.4	20	Silty clay loam or silt loam	22.4	11.2	1.70	1.61
29.8	27.1	34.9	25	Clay loam	22.3	12.6	1.74	1.62
27.8	30.3	29.7	20	Clay loam or loam	20.6	11.5	1.79	1.68

the county, but little lumber is manufactured locally. In 1964, there were a few gas wells operating.

Alderson-Broaddus College, a liberal arts college, is located at Philippi, and so are the two hospitals in the county. Audra State Park, which occupies 355 acres, provides good sites for camping, swimming, picnicking, hiking, and fishing. Teter Creek Lake also offers good fishing and areas for picnicking.

Physiography, Relief, and Drainage

Except for Laurel Mountain, in the eastern part, the relief in Barbour County is mainly hilly. It consists of moderately steep to steep, detached hills, narrow to moderately broad ridgetops, and benches and plateaus. In the western part of the county, the hills are steeper, the ridgetops are narrower, and there are more benches but fewer plateaus than in other parts. The elevation ranges from 1,000 feet at the junction of the Tygart River and the Taylor County line to 3,300 feet at the top of Laurel Ridge.

Barbour County is drained principally by the Tygart River and its tributary streams. The chief tributaries are Pleasant, Sandy, Teter, Laurel, Hackers, Beaver, and Zebs Creeks, Big Cove Run, and the Buckhannon and Middle Fork Rivers. In the western part of the county, an area is drained by Simpson and Elk Creeks, both of which are tributaries of the West Fork River.

Most valleys in the county are narrow, for the streams are cutting through hard sandstone and are slow in reaching base level. Gorges are fairly common along the streams, particularly along the Tygart River from Moatsville to the Taylor County line.

Geology

The geologic formations exposed in the county are of sedimentary origin. Subsequent periods of compaction, uplift, folding, and erosion have produced the present bedrock and relief.

The surface rocks belong mainly to the Pennsylvanian system of the Carboniferous period (*14*). In the eastern part of the county, however, there are small areas near the Tucker County and Randolph County lines in which the rocks that crop out are of the Mississippian system of the Carboniferous period, as well as of the Devonian period.

The rocks of the Pennsylvanian system exposed in Barbour County are of the Monongahela, Conemaugh, Allegheny, and Pottsville formations.

Rocks of the Monongahela formation occur in the western part of the county and are about 400 feet thick. On some of the ridges, they are capped by thin rocks from the Dunkard group. The Monongahela formation consists of gray and greenish sandstone alternating with red or gray sandy shale, siltstone, and limestone. The Pittsburgh coal is at the base of the Monongahela rocks.

The Conemaugh formation occupies two-thirds or more of the county and consists of rocks 550 to 650 feet thick. These rocks are made up of gray and brown sandstone lying in beds separated by red and gray shale, impure fire clay, and siltstone.

The Allegheny formation occurs mainly along the foot of Laurel Ridge and in the south-central part of the county. This formation consists mostly of gray sandstone and sandy shale in beds about 250 feet thick. It contains the Lower Kittanning coal.

Rocks of the Pottsville formation are in several areas of the county but generally crop out along Laurel Ridge and on the steep side slopes along the Tygart and Middle Fork Rivers. These rocks are about 350 feet thick. They consist chiefly of hard, massive, gray sandstone that lies in beds separated by thin layers of shale. Because the sandstone is fairly resistant to weathering but the shale weathers rapidly, the areas are made up of sandstone ledges and shallow caves and generally have a rugged appearance.

TABLE 12.—*Chemical data for selected soils*

[Dashed lines indicate absence of data for that horizon]

Soil type and sample number	Depth	Horizon	Reaction		Organic matter			Cation exchange capacity (sum)	Extractable cations (meq./100 g. of soil)					Base saturation (sum)	Extractable aluminum
			H_2O 1:1	KCI 1:1	Organic carbon	Nitrogen	C/N ratio		Ca	Mg	Na	K	H		
	Inches		*pH*	*pH*	*Percent*	*Percent*		*Meq./100 g. of soil*						*Meq./100 g. of soil*	*Meq./100 g. of soil*
Gilpin channery silt loam, S62WVa-1-2 (1-4).	0-7	Ap	4.4	3.8	2.68	0.154	17	16.6	1.3	0.6	(1)	0.3	14.4	13	3.3
	7-17	B2t	4.5	3.6	.41	.056	7	11.4	.4	.2	(1)	.2	10.6	7	7.2
	17-21	B3	4.5	3.6	.12	----	----	12.2	.4	.2	(1)	.2	11.4	7	8.3
	21-29	C	4.8	3.6	.09	----	----	11.7	.4	.5	(1)	.2	10.6	9	7.4
Westmoreland silt loam, S62WVa-1-1 (1-5).	0-7	Ap	5.0	4.0	2.34	.170	14	19.0	3.2	1.0	(1)	.4	14.4	24	1.5
	7-12	B1	5.3	4.0	.54	.076	7	12.7	2.6	.6	(1)	.2	9.3	27	2.0
	12-23	B2t	4.9	3.8	.20	----	----	13.9	3.8	1.3	(1)	.2	8.6	38	3.0
	23-29	B3	4.8	3.5	.22	----	----	14.8	2.6	1.4	(1)	.2	10.6	28	6.1
	29-40	C	4.5	3.6	.08	----	----	13.7	2.1	1.4	(1)	.2	10.0	27	5.7

[1] Trace.

Climate [4]

Because Barbour County is located west of the Allegheny Mountains, it is exposed to invasions of cold, dry air from the north and to masses of warm, moist air from the Gulf of Mexico. In addition, the climate is affected by large storms that move northeastward up the Ohio River valley. Generally, the temperature varies widely during the year, and changes from fair to stormy weather are frequent. The prevailing wind is westerly most of the year, but it is southerly or southwesterly some of the time in summer and fall. Although the Atlantic Ocean is only 300 miles away, it has relatively little influence on climate in the county.

Barbour County is part of the Appalachian Plateau, and nearly all of it is sloping. Generally, the elevation is more than 1,000 feet above sea level and gradually rises toward the east. Along the eastern edge of the county is Laurel Mountain, where the crest is about 3,300 feet above sea level. The differences in elevation can cause local variations in daily weather. Particularly important are the differences in temperature between hilltops and valley bottoms. Table 13 gives temperature and precipitation data compiled from records of the U.S. Weather Bureau at Philippi, which lies at an elevation of 1,280 feet.

The average annual temperature at Philippi is about 52° F. It can be seen in table 13 that the average daily temperatures in December, January, and February indicate frequent freezing and thawing. The average highest daily temperature for these months is in the low 40's, and the average lowest is in the low 20's. Each winter about three cold waves bring temperatures of near zero or below, but a cold wave ordinarily lasts for only a few days. An extreme low temperature of —21° can be expected once every 10 years and of —27° once every 25 years. In summer the moderate temperature generally favors the production of forage and pasture, and it has a beneficial effect on livestock and milk production.

[4] By Robert O. Weedfall, State climatologist, U.S. Weather Bureau.

At Clarksburg, Harrison County, the average date of the last freeze in spring is April 30, and that of the first in fall is October 11. The interval between these dates, or the average growing season, is 164 days. At Elkins, Randolph County, the average date of the last freeze in spring is May 9, and that of the first in fall is October 5. The average growing season at Elkins is 149 days.

Table 14 shows the probability of freezing temperatures at Clarksburg and at Elkins on or after given dates in spring and on or before given dates in fall (*9*).

Clarksburg is at an elevation of 977 feet, and Elkins, 1,970 feet. These stations are about 40 miles apart, and Barbour County lies between them. Data for Clarksburg are useful in the western part of Barbour County, where the elevation is near 1,000 feet, and data for Elkins can be used at the higher elevations in the eastern part of the county.

Precipitation is greater in this county than in areas to the west. The average annual rainfall is 47.6 inches at Philippi, but it is 50 inches along the eastern edge of the county and is only 45 inches along the western edge. Precipitation is fairly uniform throughout the year, though it is somewhat greater and more intense in summer. At this time of year, maritime tropical air from the Gulf of Mexico is dominant over the county.

One of the most intense rainfalls ever recorded in West Virginia occurred at Hall on June 24, 1950. During a

Table 13.—*Temperature and precipitation, Barbour County, W. Va.*

[All data, except those on snow cover and depth, are from the Philippi Station; snow data are from the station at Parsons, Tucker County]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average monthly total	One year in 10 will have—		Days with snow cover of 1.0 inch or more	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	° F.	° F.	° F.	° F.	Inches	Inches	Inches	Number	Inches
January	44	22	63	2	4.0	2.0	6.4	9	2
February	44	21	64	−1	3.5	1.6	5.3	6	3
March	56	31	75	14	4.1	2.6	5.7	7	2
April	66	38	82	23	3.6	2.2	5.0	2	2
May	75	47	87	33	4.6	2.4	6.8	0	0
June	82	56	92	43	4.6	2.6	7.2	0	0
July	85	60	92	49	5.3	2.8	8.4	0	0
August	84	58	90	48	4.9	2.1	8.0	0	0
September	79	51	90	36	3.3	1.2	6.0	0	0
October	68	41	83	26	3.2	1.1	5.4	0	0
November	55	31	81	17	3.1	1.4	5.3	3	4
December	45	24	62	3	3.5	1.6	6.0	10	3
Year	65	40	[1] 95	[2] −8	47.7	39.0	57.0	37	3

[1] Average annual highest temperature.

[2] Average annual lowest temperature.

TABLE 14.—*Probability of last freezing temperature in spring and first in fall*

[Data from 30-year records]

CLARKSBURG, HARRISON COUNTY

Probability	Dates for given probability and temperature		
	16° F. or colder	24° F. or colder	32° F. or colder
Spring:			
1 year in 10, later than	March 27	April 26	May 11.
1 year in 4, later than	March 19	April 17	May 6.
1 year in 3, later than	March 15	April 14	May 4.
2 years in 3, later than	March 3	April 1	April 27.
3 years in 4, later than	February 27	March 28	April 25.
9 years in 10, later than	February 19	March 19	April 20.
Fall:			
1 year in 10, earlier than	November 8	October 19	September 29.
1 year in 4, earlier than	November 16	October 26	October 4.
1 year in 3, earlier than	November 20	October 29	October 7.
2 years in 3, earlier than	December 2	November 8	October 15.
3 years in 4, earlier than	December 5	November 11	October 18.
9 years in 10, earlier than	December 14	November 18	October 23.
ELKINS, RANDOLPH COUNTY			
Spring:			
1 year in 10, later than	April 2	April 29	May 24.
1 year in 4, later than	March 25	April 21	May 17.
1 year in 3, later than	March 21	April 17	May 14.
2 years in 3, later than	March 8	April 5	May 4.
3 years in 4, later than	March 5	April 2	May 1.
9 years in 10, later than	February 23	March 24	April 24.
Fall:			
1 year in 10, earlier than	November 6	October 15	September 22.
1 year in 4, earlier than	November 14	October 22	September 28.
1 year in 3, earlier than	November 17	October 25	September 30.
2 years in 3, earlier than	November 29	November 4	October 9.
3 years in 4, earlier than	December 2	November 7	October 12.
9 years in 10, earlier than	December 9	November 14	October 18.

1-hour period, the total rainfall was 3.75 inches—the greatest hourly amount, for any month, in the official U.S. Weather Bureau records in the State. The same storm brought 4 inches of rain to Hall in a 6-hour period. Cloudbursts of this kind can be dangerous because they generally produce flash flooding with little or no warning. Ordinarily, they strike in late afternoon and evening. Flooding that accompanies large general storms usually occurs in winter but does not cause much damage in Barbour County.

Thunderstorms occur on an average of 40 to 50 days a year in any one place. They are most frequent in June and July and in the eastern part of the county.

Destructive hailstorms occur about three times a year throughout the State, but they are much less frequent in this county. Damaging winds that accompany large storms or low-pressure areas frequently pass across the State in the colder half of the year. The strongest winds are from the southwest. Only two tornadoes passed over the county between 1875 and 1965.

As summer progresses into fall, precipitation decreases to a minimum. October is usually the driest month, and in some years there are warm, cloudless days of Indian summer most of the month. Although dry years occur, the county is about as immune from the effects of drought as any area in the State. Streamflow during dry periods is not so low in this county as it is in other areas, because the Pottsville sandstone, which underlies much of the county, stores ground water in large amounts and releases it slowly.

Rainfall in the county is adequate for the needs of most crops. Computations made by Thornthwaite's method (*17*) indicate that rainfall during the period May through September exceeds potential evapotranspiration. Evapotranspiration is the combined loss of water through evaporation and through transpiration by plants. At Philippi the total rainfall for the period is 22.65 inches, whereas the potential evapotranspiration for the same period is 21.93 inches.

No records of evaporation have been kept in the county, but an analysis of data from nearby points suggests that the average evaporation from a Class A 4-foot pan would amount to about 40 inches a year and about 28 inches during the growing season (May to October). Evaporation from ponds and reservoirs would be about 75 percent of this amount.

In winter precipitation is more than adequate, and more than 40 percent of it is snow. During a normal winter the total snowfall is 42 inches at Philippi. There, snowfall usually begins in November but frequently occurs in October. Snow falls as late as April, and occasionally it has fallen in measurable amounts early in May. Normal snowfall is slightly more at Philippi than it is in areas farther west and in many areas at higher elevations. In many places along Laurel Mountain, however, a total snowfall of 75 to 100 inches is normal. At Belington the snowfall in an average winter is 57 inches.

In this hilly county, local differences in relief have a great effect on the duration of snow cover in winter. On south-facing slopes the snow melts rapidly in the frequent lulls between storms, when solar radiation is effective. Also, there are many warm days and a large number of thaws. This repeated freezing and thawing causes the soil to heave and damages certain crops and other plants. In contrast, north-facing slopes are less effected by rays of the sun and are covered with snow for a much longer time.

On the basis of records kept at nearby Elkins, the average relative humidity in Barbour County is 80 to 95 percent at 1 a.m. and 8 a.m. The high humidity is the result of fog in the valleys during the early morning hours. At such times the air temperature is moderate, however, and the high humidity causes little discomfort. During the rest of the day, the relative humidity is generally at a comfortable level.

Low clouds and fog that hang over the ridges are normally caused by the movement of moist air upslope. Although the cover of clouds and fog may vary considerably from ridge to ridge, the county is subject to considerable cloudiness because moisture is favorable. During the growing season, however, sunshine is usually adequate.

Agriculture

According to the U.S. Bureau of the Census, about 53 percent of the total land area of Barbour County was in farms in 1964. About 27 percent of the farmland was used as cropland, and 40 percent was used for pasture. Most of the remaining acreage was wooded. Wooded areas are extensive on Laurel Ridge in the eastern part of the county and along the Tygart and Middle Fork Rivers. Cropland and pasture are in areas fairly well distributed throughout the rest of the county.

The trend in recent years has been toward a decrease in the number of farms, a decrease in the acreage used for farm crops, and an increase in the size of farms. There were 1,110 farms in the county in 1959 and 835 farms in 1964. The average size was 119.5 acres in 1959 and 135.5 acres in 1964.

In 1964, there were 587 miscellaneous and unclassified farms in the county. According to their main source of income, the rest of the farms were classified as follows:

	Number
Field-crop farms, other than fruit or vegetable	2
Fruit and nut farms	1
Poultry farms	9
Dairy farms	39
Livestock farms, other than poultry or dairy	171
General farms	26

The principal field crops are corn, wheat, oats, red clover, timothy, and alfalfa. Hay consisting of mixed legumes and grasses is the most common forage crop. In 1964, the acreage of the principal crops was as follows:

	Acres
Corn	624
For grain	406
For silage	210
Wheat	51
Oats	116
Hay crops, total	17, 792
Alfalfa and alfalfa mixtures	1, 461
Clover and grasses	13, 333
Small grain cut for hay	176
Other hay cut	2, 822
Irish potatoes harvested for home use or for sale	84

Livestock is the chief source of farm income in the county. The number of livestock sold in 1964 was as follows:

	Number
Cattle and calves	7, 460
Swine	603
Sheep and lambs	1, 148
Chickens and broilers	52, 638

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Glossary

Aggregate, soil. Many fine particles, held in a single mass or cluster, such as a clod, crumb, block or prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Azonal soils. Any group of soils that lack well-developed profile characteristics because of their youth, or because the nature of the parent material or the relief prevents normal development of such characteristics.

Base saturation (soil chemistry). The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A compact, slowly premeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse-textured soils. Sand and loamy sand.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable.—When moist, soil crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Plastic.—When wet, soil is readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, soil adheres to other material; tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, soil is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A dense, brittle subsurface horizon very low in organic matter and clay but rich in silt or very fine sand. The layer seems to be cemented when dry, is hard or very hard, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur 15 to 40 inches below the surface.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the subsoil or substratum, as a result of poor aeration and drainage expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Gravelly soil material. From 15 to 50 percent of material by volume, consists of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Great soil group. Any one of several broad groups of soils that have fundamental characteristics in common.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Inclusion. A kind of soil that has been included in mapping a soil of a different kind because the area was too small to be mapped separately on a map of the scale used.

Intrazonal soil. Any of the great groups of soils that have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal effects of climate and vegetation.

Leaching, soil. The removal of soluble materials from soils or other material by percolating water.

Mapping unit, soil. Areas of soil of the same kind outlined on the soil map and identified by a symbol.

Medium-textured soils. Very fine sandy loam, loam, silt loam, and silt.

Miscellaneous land type. An area that has little true soil. These areas are not classified by series and types but are identified by a descriptive name, such as Alluvial land.

Moderately coarse textured soils. Sandy loam and fine sandy loam.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many;* size—*fine*, *medium*, and *coarse;* and contrast—*faint; distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slopes, stoniness, thickness, or some other characteristic that affects management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values, or in words, as follows:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

Runoff. Rainwater that flows over the surface of the soil without sinking in; or the total volume of surface flow during a specified time.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 millimeter to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent of clay.

Second bottom. The first terrace above the normal flood plain of a stream.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Shale. A sedimentary rock formed by the hardening of clay deposits.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. Living roots and other plant and animal life are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Includes A horizons and part of B horizon; has no depth limit.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. See also Clay, Sand, and Silt. The basic textural classes, in order of increasing proportion of fine particles are as follows: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Weathering, soil. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

Zonal soil. Any one of the great groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms—chiefly vegetation.

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 1, page 6, for approximate acreage and proportionate extent of the soils and table 2, page 30, for estimated yields of principal crops. For information significant to engineering see section beginning on page 39]

Map symbol	Soil	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Symbol	Page
AgB	Allegheny silt loam, 2 to 8 percent slopes	5	IIe-4	23	8	34
Al	Alluvial land	5	VIw-1	28	9	35
At	Atkins silt loam	7	IIIw-1	25	9	5
BcE	Belmont and Calvin very stony silt loams, 20 to 35 percent slopes	7	VIIs-1	28	1	32
BcF	Belmont and Calvin very stony silt loams, 35 to 65 percent slopes	8	VIIs-1	28	1	32
BrB	Brinkerton silt loam, 3 to 8 percent slopes	8	IVw-5	27	9	35
BsB	Brinkerton very stony silt loam, 3 to 8 percent slopes	8	VIIs-5	29	9	35
ClB	Clarksburg silt loam, 3 to 8 percent slopes	9	IIe-13	23	2	32
ClC	Clarksburg silt loam, 8 to 15 percent slopes	9	IIIe-13	25	2	32
ClD	Clarksburg silt loam, 15 to 25 percent slopes	9	IVe-9	26	2	32
CpB	Cookport loam, 3 to 10 percent slopes	10	IIe-13	23	3	33
CpC	Cookport loam, 10 to 20 percent slopes	10	IIIe-13	25	3	33
DaB	Dekalb channery loam, 3 to 10 percent slopes	11	IIe-12	23	4	33
DaC	Dekalb channery loam, 10 to 20 percent slopes	11	IIIe-12	25	4	33
DaB	Dekalb channery loam, 20 to 30 percent slopes	11	IVe-5	26	4	33
DaE	Dekalb channery loam, 30 to 40 percent slopes	11	VIIe-2	28	4	33
DaF	Dekalb channery loam, 40 to 65 percent slopes	11	VIIe-2	28	4	33
DbC	Dekalb very stony loam, 3 to 20 percent slopes	11	VIIs-2	29	4	33
DbE	Dekalb very stony loam, 20 to 40 percent slopes	11	VIIs-2	29	4	33
DbF	Dekalb very stony loam, 40 to 65 percent slopes	11	VIIs-2	29	4	33
EnB	Ernest silt loam, 3 to 8 percent slopes	12	IIe-13	23	2	32
EnC	Ernest silt loam, 8 to 15 percent slopes	12	IIIe-13	25	2	32
EnD	Ernest silt loam, 15 to 25 percent slopes	12	IVe-9	26	2	32
ErC	Ernest extremely stony silt loam, 3 to 20 percent slopes	12	VIIs-4	29	2	32
GcB	Gilpin channery silt loam, 3 to 10 percent slopes	13	IIe-10	23	5	33
GcC	Gilpin channery silt loam, 10 to 20 percent slopes	13	IIIe-10	24	5	33
GcC3	Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded	13	IVe-3	26	5	33
GcD	Gilpin channery silt loam, 20 to 30 percent slopes	13	IVe-3	26	5	33
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	13	VIe-2	28	5	33
GcE	Gilpin channery silt loam, 30 to 40 percent slopes	13	VIe-2	28	5	33
GcE3	Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded	13	VIIe-2	28	5	33
GcF	Gilpin channery silt loam, 40 to 65 percent slopes	13	VIIe-2	28	5	33
GdC	Gilpin-Dekalb very stony complex, 3 to 20 percent slopes	14	VIIs-2	29	6	34
GdE	Gilpin-Dekalb very stony complex, 20 to 40 percent slopes	14	VIIs-2	29	6	34
GdF	Gilpin-Dekalb very stony complex, 40 to 65 percent slopes	14	VIIs-2	29	6	34
GuB	Gilpin-Upshur complex, 3 to 10 percent slopes	14	IIIe-15	25	7	34
GuC	Gilpin-Upshur complex, 10 to 20 percent slopes	14	IVe-15	26	7	34
GuD	Gilpin-Upshur complex, 20 to 30 percent slopes	14	IVe-15	26	7	34
GuD3	Gilpin-Upshur complex, 20 to 30 percent slopes, severely eroded	14	VIe-13	28	7	34
GuE	Gilpin-Upshur complex, 30 to 40 percent slopes	15	VIe-3	28	7	34
GuE3	Gilpin-Upshur complex, 30 to 40 percent slopes, severely eroded	15	VIIe-1	28	7	34
GuF	Gilpin-Upshur complex, 40 to 65 percent slopes	15	VIIe-1	28	7	34
Ln	Lindside silt loam	15	IIw-7	24	9	35
Ma	Melvin silt loam	16	IIIw-1	25	9	35
Md	Mine dumps	16	------	--	-	--
MoA	Monongahela silt loam, 0 to 3 percent slopes	17	IIw-1	24	9	35
MoB	Monongahela silt loam, 3 to 8 percent slopes	17	IIe-13	23	9	35
Ph	Philo silt loam	17	IIw-7	24	9	35
Pn	Pope fine sandy loam	18	IIw-6	24	9	35
Sm	Strip mine spoil	18	------	--	-	--
WeB	Wellston silt loam, 3 to 10 percent slopes	20	IIe-4	23	8	34
WeC	Wellston silt loam, 10 to 20 percent slopes	20	IIIe-4	24	8	34
WmB	Westmoreland silt loam, 3 to 10 percent slopes	20	IIe-11	23	1	32
WmC	Westmoreland silt loam, 10 to 20 percent slopes	21	IIIe-11	25	1	32
WmD	Westmoreland silt loam, 20 to 30 percent slopes	21	IVe-11	26	1	32
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	21	VIe-1	27	1	32
WmE	Westmoreland silt loam, 30 to 40 percent slopes	21	VIe-1	27	1	32
WmE3	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded	21	VIIe-1	28	1	32
WmF	Westmoreland silt loam, 40 to 65 percent slopes	21	VIIe-1	28	1	32
WmF3	Westmoreland silt loam, 40 to 65 percent slopes, severely eroded	21	VIIe-1	28	1	32
WrB	Wharton silt loam, 3 to 10 percent slopes	22	IIe-13	23	3	33
WrC	Wharton silt loam, 10 to 20 percent slopes	22	IIIe-13	25	3	33
WrD	Wharton silt loam, 20 to 30 percent slopes	22	IVe-9	26	3	33

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry (FY)
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church

Sawmill

Mine tunnel opening

Mine dump

Pits, gravel or other

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

BOUNDARIES

- National or state
- County
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches (CANAL)

Lakes and ponds
- Perennial (water, w)
- Intermittent

Wells, water (flowing)

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

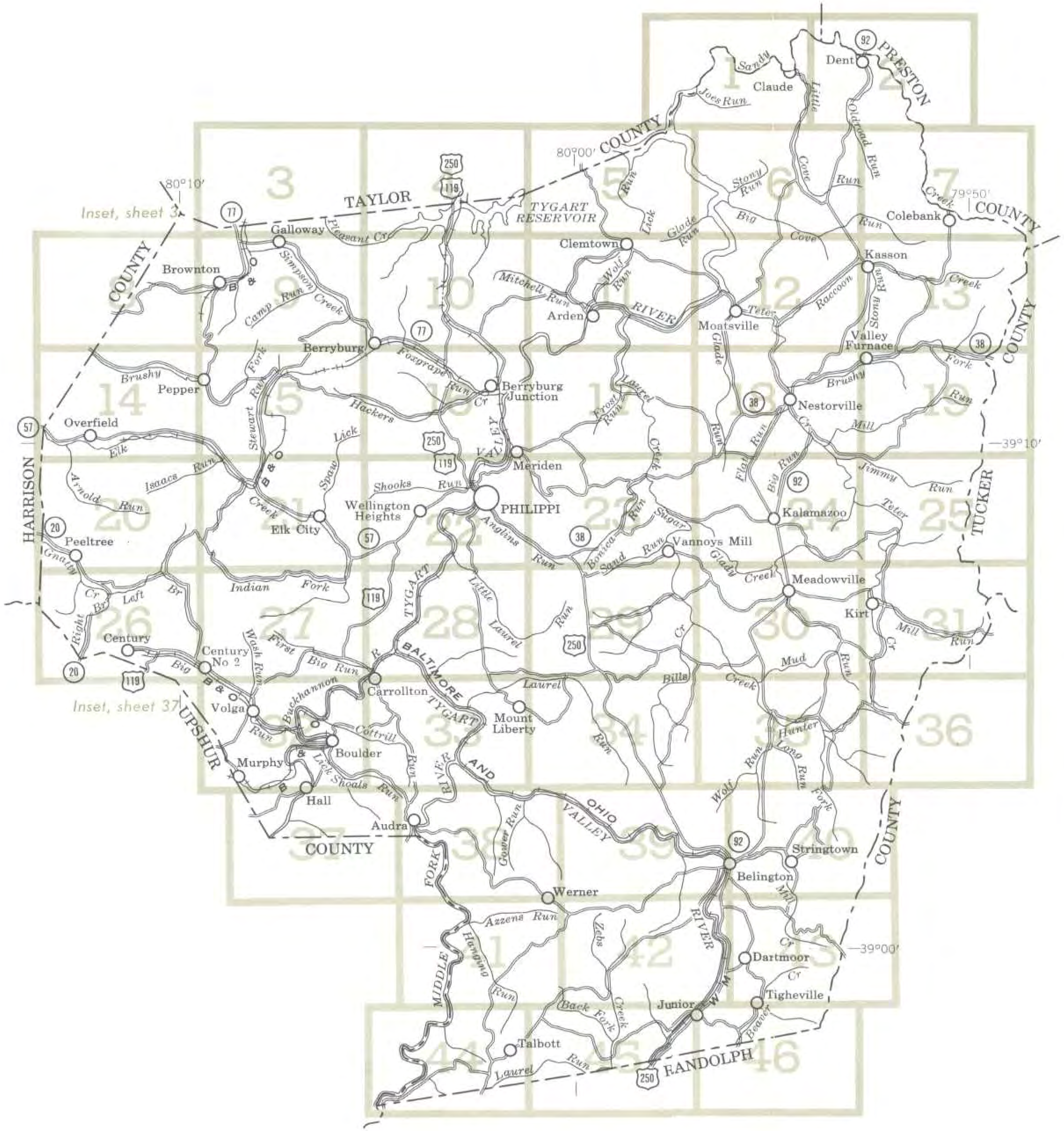
- Soil boundary and symbol (Dx)
- Gravel
- Stony, very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully

Soil map constructed 1967 by Cartographic Division, Soil Conservation Service, USDA, from 1958 aerial photographs. Controlled mosaic based on West Virginia plane coordinate system, north zone, Lambert conformal conic projection, 1927 North American datum.

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level or gently sloping soils on flood plains, but some are for land types that have a considerable range in slope. The number, 3, in a symbol shows that the soil has been severely eroded.

SYMBOL	NAME
AgB	Allegheny silt loam, 2 to 8 percent slopes
Al	Alluvial land
At	Atkins silt loam
BcE	Belmont and Calvin very stony silt loams, 20 to 35 percent slopes
BcF	Belmont and Calvin very stony silt loams, 35 to 65 percent slopes
BrB	Brinkerton silt loam, 3 to 8 percent slopes
BsB	Brinkerton very stony silt loam, 3 to 8 percent slopes
ClB	Clarksburg silt loam, 3 to 8 percent slopes
ClC	Clarksburg silt loam, 8 to 15 percent slopes
ClD	Clarksburg silt loam, 15 to 25 percent slopes
CpB	Cookport loam, 3 to 10 percent slopes
CpC	Cookport loam, 10 to 20 percent slopes
DaB	Dekalb channery loam, 3 to 10 percent slopes
DaC	Dekalb channery loam, 10 to 20 percent slopes
DaD	Dekalb channery loam, 20 to 30 percent slopes
DaE	Dekalb channery loam, 30 to 40 percent slopes
DaF	Dekalb channery loam, 40 to 65 percent slopes
DbC	Dekalb very stony loam, 3 to 20 percent slopes
DbE	Dekalb very stony loam, 20 to 40 percent slopes
DbF	Dekalb very stony loam, 40 to 65 percent slopes
EnB	Ernest silt loam, 3 to 8 percent slopes
EnC	Ernest silt loam, 8 to 15 percent slopes
EnD	Ernest silt loam, 15 to 25 percent slopes
ErC	Ernest extremely stony silt loam, 3 to 20 percent slopes
GcB	Gilpin channery silt loam, 3 to 10 percent slopes
GcC	Gilpin channery silt loam, 10 to 20 percent slopes
GcC3	Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded
GcD	Gilpin channery silt loam, 20 to 30 percent slopes
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded
GcE	Gilpin channery silt loam, 30 to 40 percent slopes
GcE3	Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded
GcF	Gilpin channery silt loam, 40 to 65 percent slopes
GdC	Gilpin–Dekalb very stony complex, 3 to 20 percent slopes
GdE	Gilpin–Dekalb very stony complex, 20 to 40 percent slopes
GdF	Gilpin–Dekalb very stony complex, 40 to 65 percent slopes
GuB	Gilpin–Upshur complex, 3 to 10 percent slopes
GuC	Gilpin–Upshur complex, 10 to 20 percent slopes
GuD	Gilpin–Upshur complex, 20 to 30 percent slopes
GuD3	Gilpin–Upshur complex, 20 to 30 percent slopes, severely eroded
GuE	Gilpin–Upshur complex, 30 to 40 percent slopes
GuE3	Gilpin–Upshur complex, 30 to 40 percent slopes, severely eroded
GuF	Gilpin–Upshur complex, 40 to 65 percent slopes
Ln	Lindside silt loam
Mo	Melvin silt loam
Md	Mine dumps
MoA	Monongahela silt loam, 0 to 3 percent slopes
MoB	Monongahela silt loam, 3 to 8 percent slopes
Ph	Philo silt loam
Pn	Pope fine sandy loam
Sm	Strip mine spoil
WeB	Wellston silt loam, 3 to 10 percent slopes
WeC	Wellston silt loam, 10 to 20 percent slopes
WmB	Westmoreland silt loam, 3 to 10 percent slopes
WmC	Westmoreland silt loam, 10 to 20 percent slopes
WmD	Westmoreland silt loam, 20 to 30 percent slopes
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded
WmE	Westmoreland silt loam, 30 to 40 percent slopes
WmE3	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded
WmF	Westmoreland silt loam, 40 to 65 percent slopes
WmF3	Westmoreland silt loam, 40 to 65 percent slopes, severely eroded
WrB	Wharton silt loam, 3 to 10 percent slopes
WrC	Wharton silt loam, 10 to 20 percent slopes
WrD	Wharton silt loam, 20 to 30 percent slopes



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

INDEX TO MAP SHEETS

BARBOUR COUNTY, WEST VIRGINIA

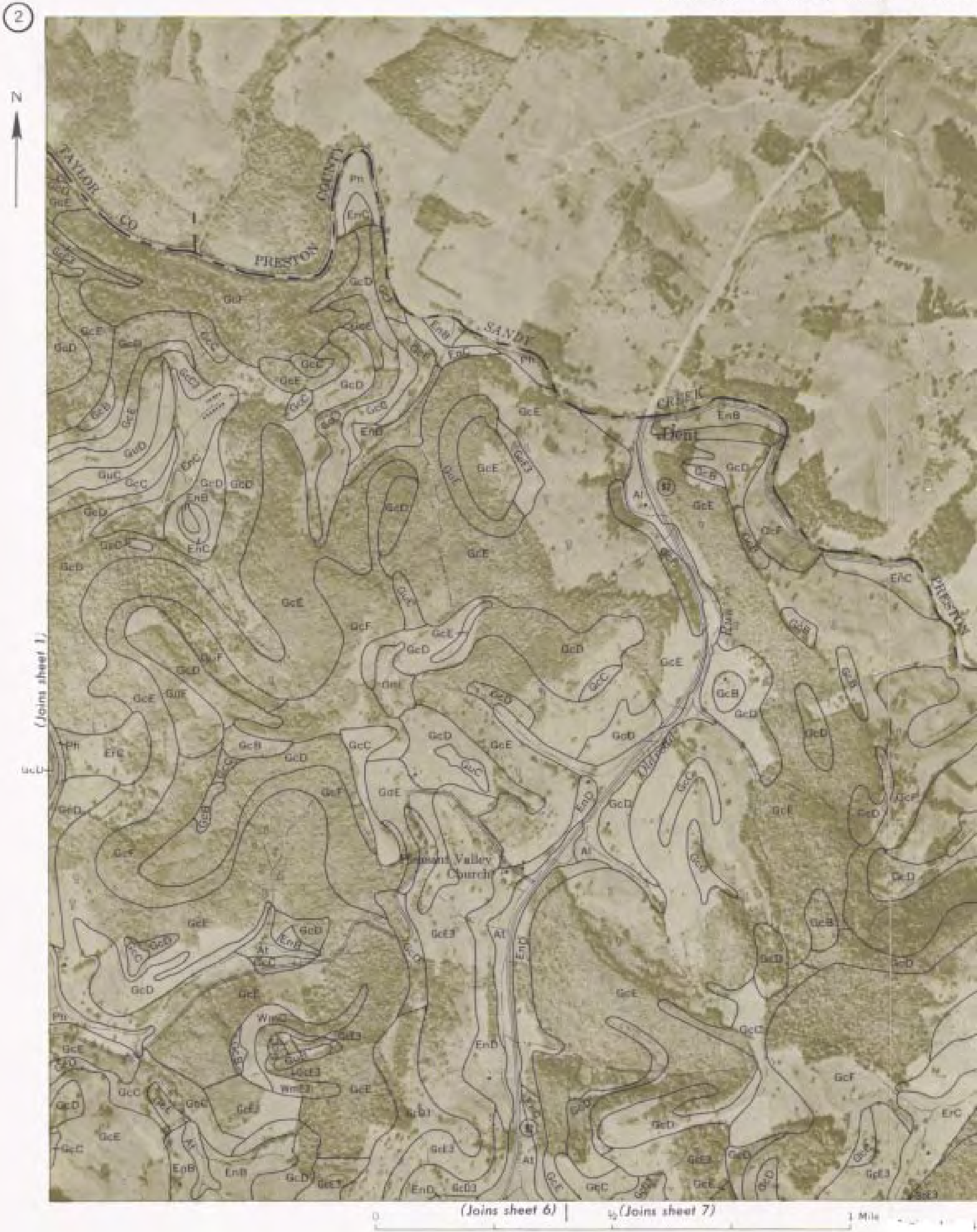
SCALE IN MILES

1 0 1 2 3 4

(Joins sheet 5) | (Joins sheet 6)

0 ½ 1 Mile


1
N
TAYLOR COUNTY
SANDY CREEK
Claude
Little
Martin Beulah Church
Union School
(Joins sheet 2)
0
5000 Feet


N
TAYLOR CO
PRESTON COUNTY
PRESTON
SANDY CREEK
Pleasant Valley Church
(Joins sheet 1)
(Joins sheet 6)
(Joins sheet 7)
0
½
1 Mile
GcE
GcD
GcF
GcC
GcB
GcE3
EnB
EnC
EnD
ErC
ErE
Ph
At
WmD
WmE3

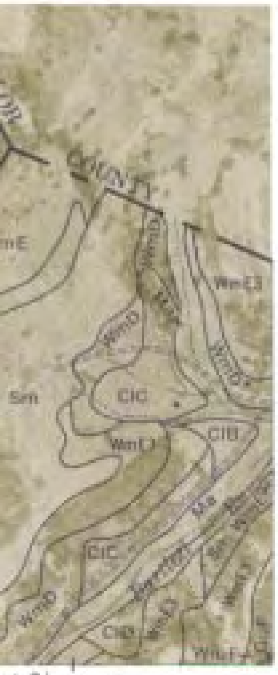

PRESTON
COUNTY
GcE
ErC
ErB
GcF
GcE
GcD
Creek
ErC
Ph
GcD
GcE3
0
5000 Feet

(Joins sheet 8)

(Joins upper right)

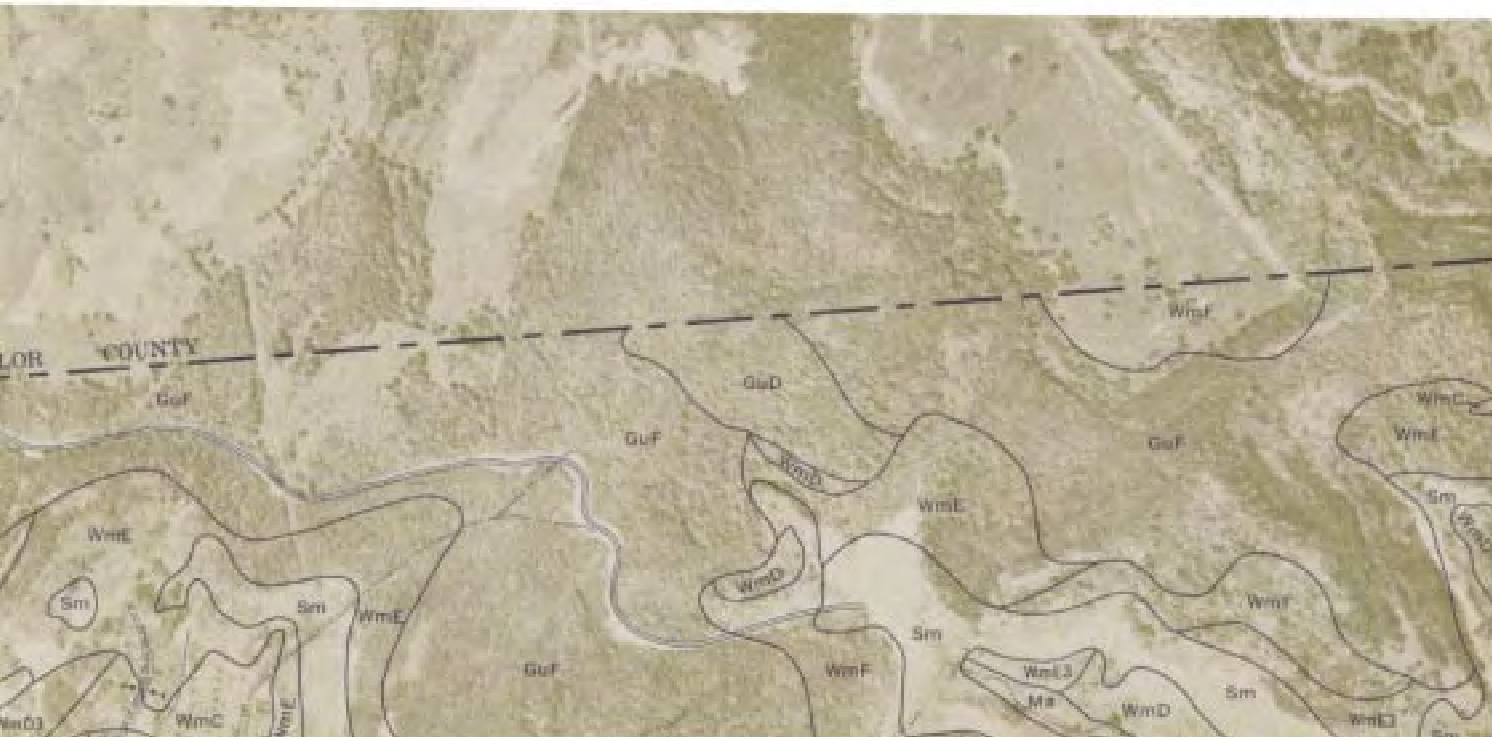
0 ½ 1 Mile

N



(Joins lower left)

(Joins sheet 8) WmD



(Joins sheet 4)

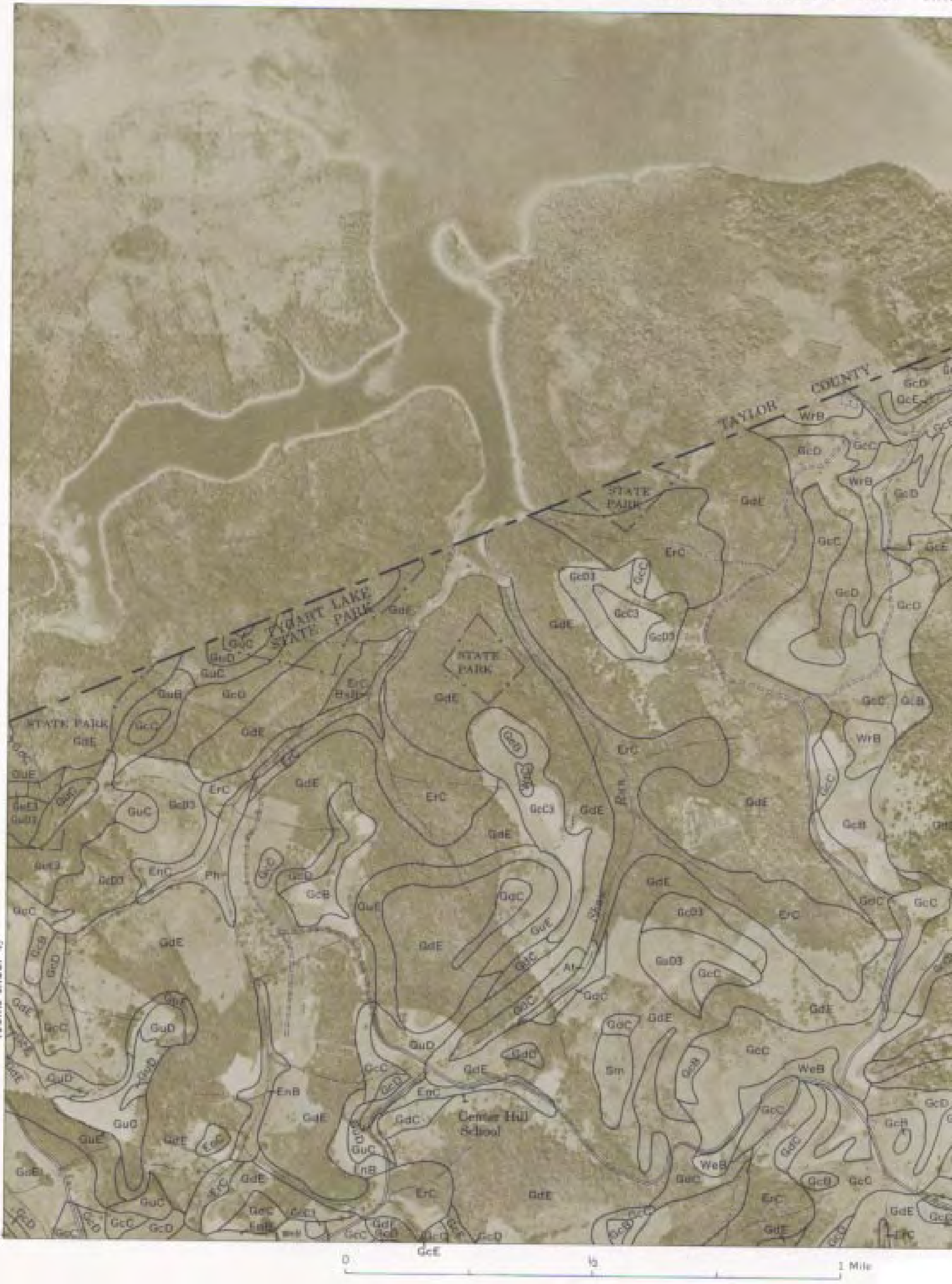
0 5000 Feet

(Joins sheet 9)

4


TAYLOR COUNTY
TYGART LAKE STATE PARK
RESERVOIR
STATE PARK
TYGART
(Joins sheet 5)
0
5000 Feet

(Joins sheet 4)



(Joins sheet 1)

5

N

(Joins sheet 6)

(Joins sheet 11)

0 5000 Feet

6

N

(Joins sheet 5)

(Joins sheet 12)

0 ½ 1 Mile

(Joins sheet 1) | (Joins sheet 2)

0 5000 Feet

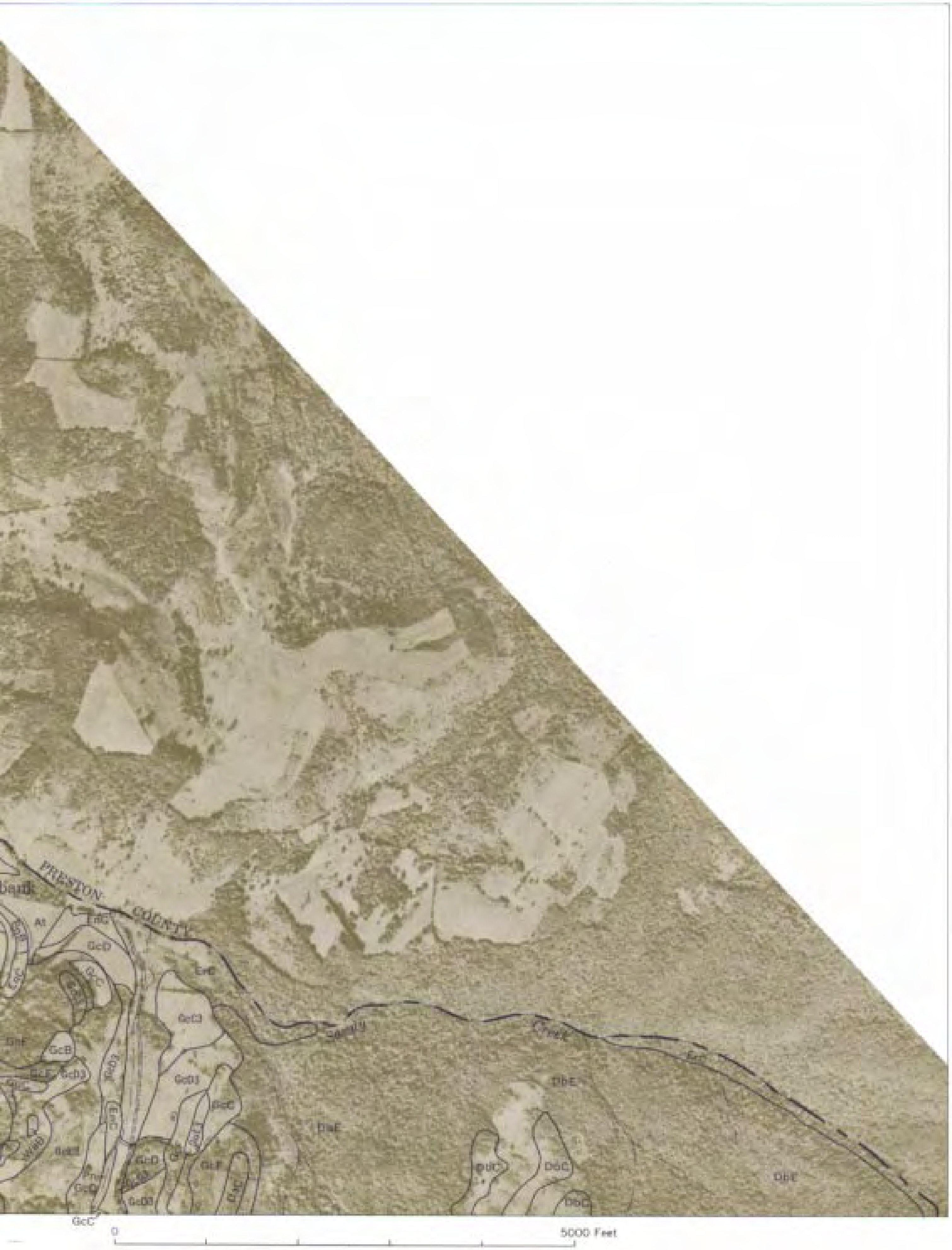
(Joins sheet 2)

(Joins sheet 6)

(Joins sheet 13)

0 ½ 1 Mile

N

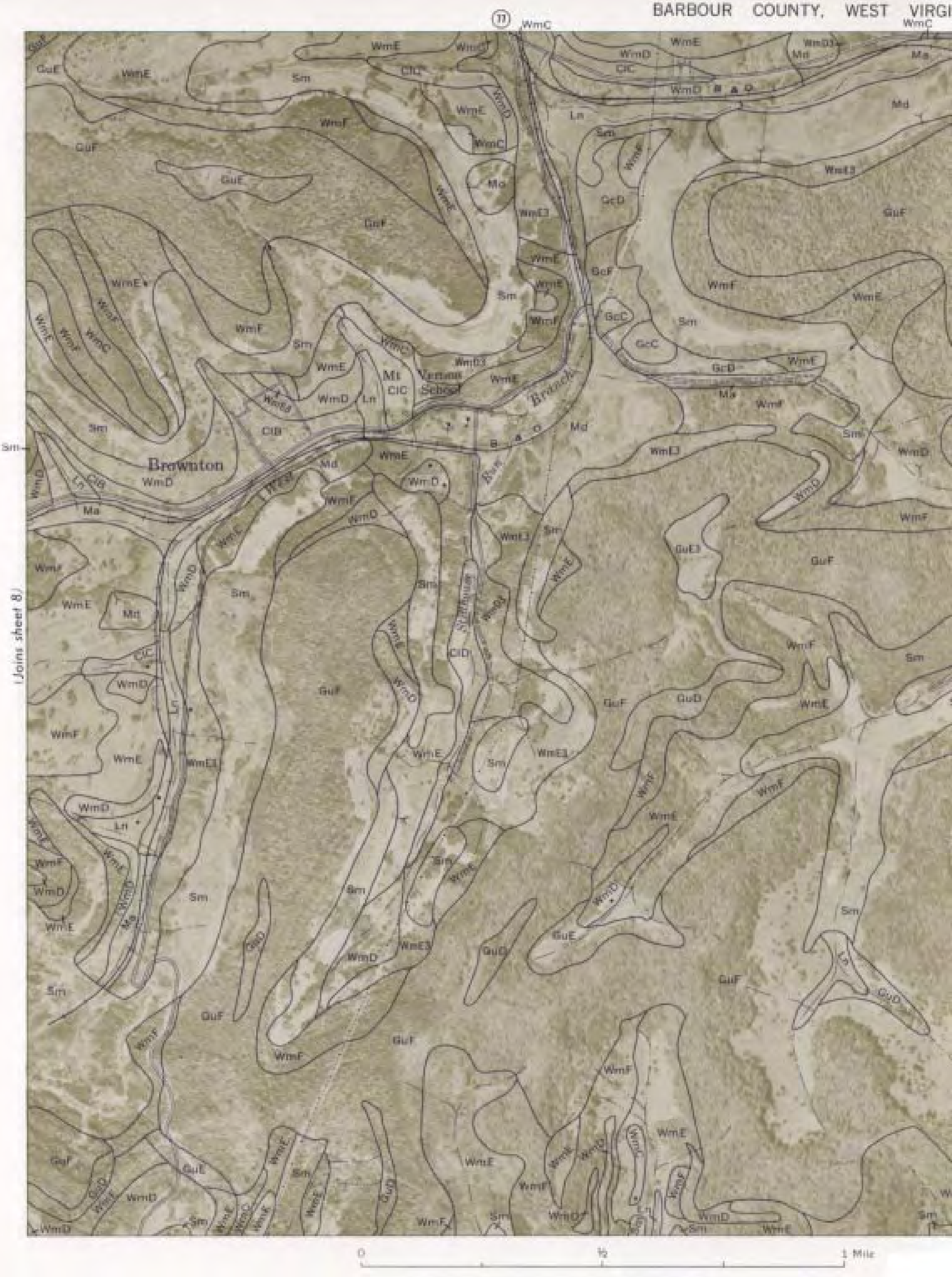

PRESTON COUNTY
Sandy Creek
At
GcD
GcC
GcC3
GcB
GcD3
EeC
GcC
DbE
DbE
DbE
DbC
DbC
DbC
GcC
0
5000 Feet

8

(Joins inset, sheet 3)

(Joins sheet 9)

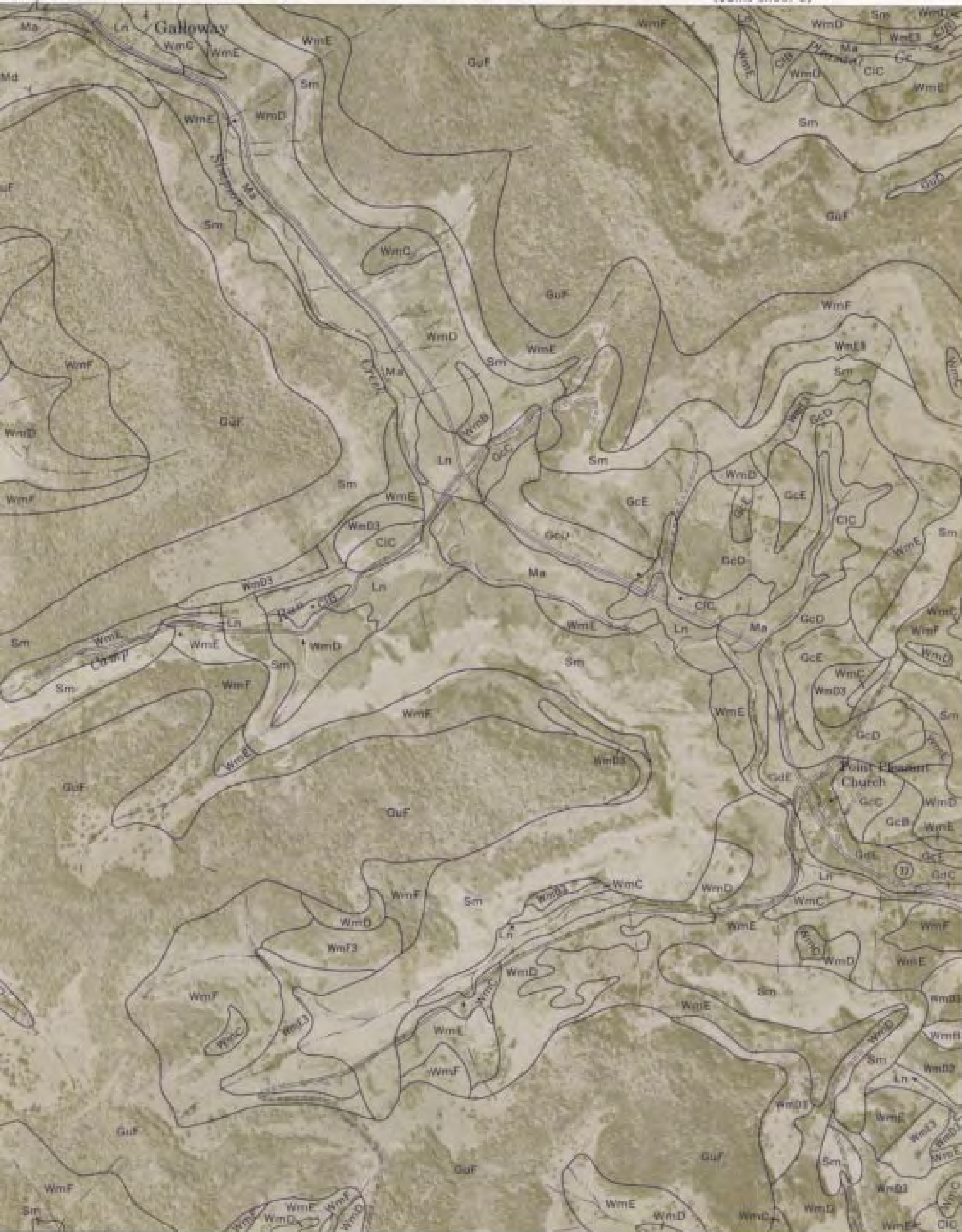
(Joins sheet 14)



77
Brownton
Vernon School
Mt
Branch
B & O
BARBOUR COUNTY, WEST VIRGINIA NO. 6
(Joins sheet 8)
0
½
1 Mile

(Joins sheet 3)

9



(Joins sheet 10)

(Joins sheet 15)

0 5000 Feet

(Joins sheet 4)

N

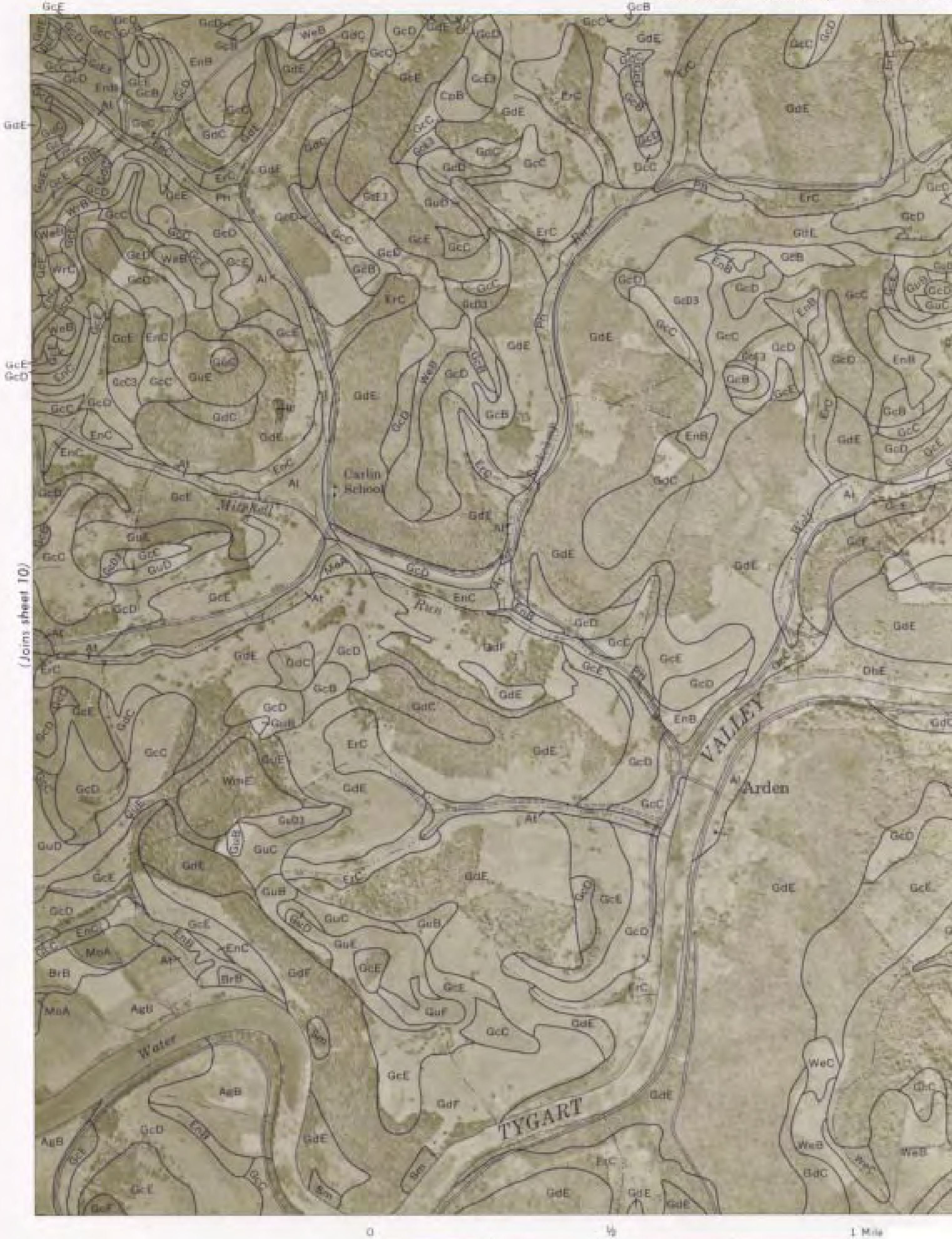
(Joins sheet 9)

(Joins sheet 16)

0 ½ 1 Mile


Hopewell
Marys Chapel
BALTIMORE AND OHIO
BALTIMORE
(Joins sheet 11)
0
5000 Feet

(Joins sheet 10)



(Joins sheet 5)

11

N

(Joins sheet 12)

(Joins sheet 17)

0 5000 Feet

(Joins sheet 6)

N

(Joins sheet 11)

(Joins sheet 18)

0 ½ 1 Mile

(Joins sheet 13)

0 5000 Feet

(Joins sheet 7)

(Joins sheet 12)

(Joins sheet 19)


13
N
MOUNTAIN
LAUREL
TUCKER
COUNTY
0
5000 Feet

(14)

N


HARRISON COUNTY
Overfield
Overfield School
Brushy
Elk
Arnold
Run

0 ½ 1 Mile

(Joins sheet 8)

(Joins sheet 15)

(Joins sheet 20)

0 5000 Feet

BARBOUR COUNTY WEST VIRGINIA NO 11

(Joins sheet 14)

0 ½ 1 Mile


(Joins sheet 9)
15
N
(Joins sheet 16)
(Joins sheet 21)
0
5000 Feet

16

(Joins sheet 10)

N

(Joins sheet 15)

(Joins sheet 22)

0 ½ 1 Mile

(Joins sheet 17)

(Joins sheet 16)

(Joins sheet 11)

17

(Joins sheet 18)

(Joins sheet 23)

0 5000 Feet

18

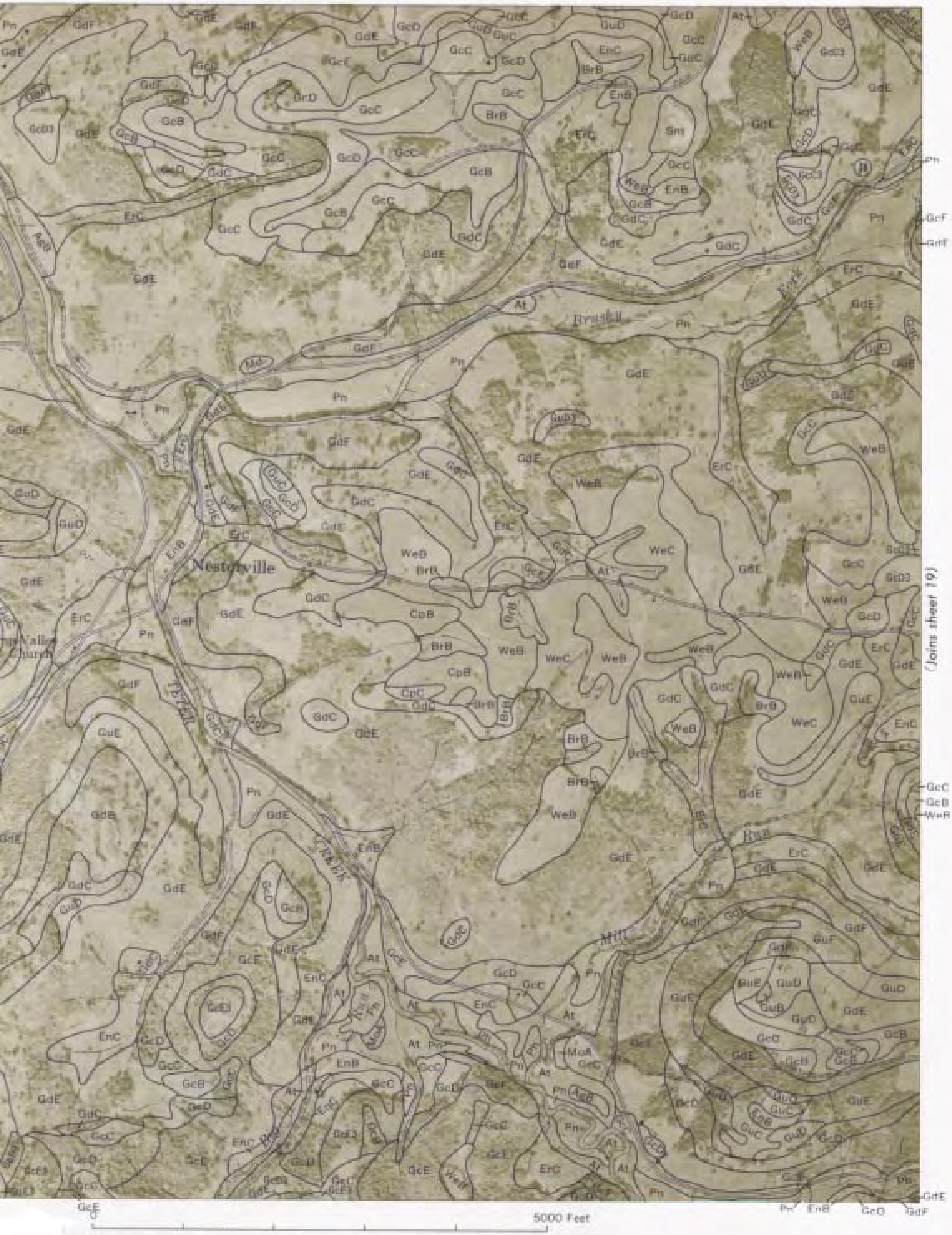
N

(Joins sheet 12)

(Joins sheet 17)

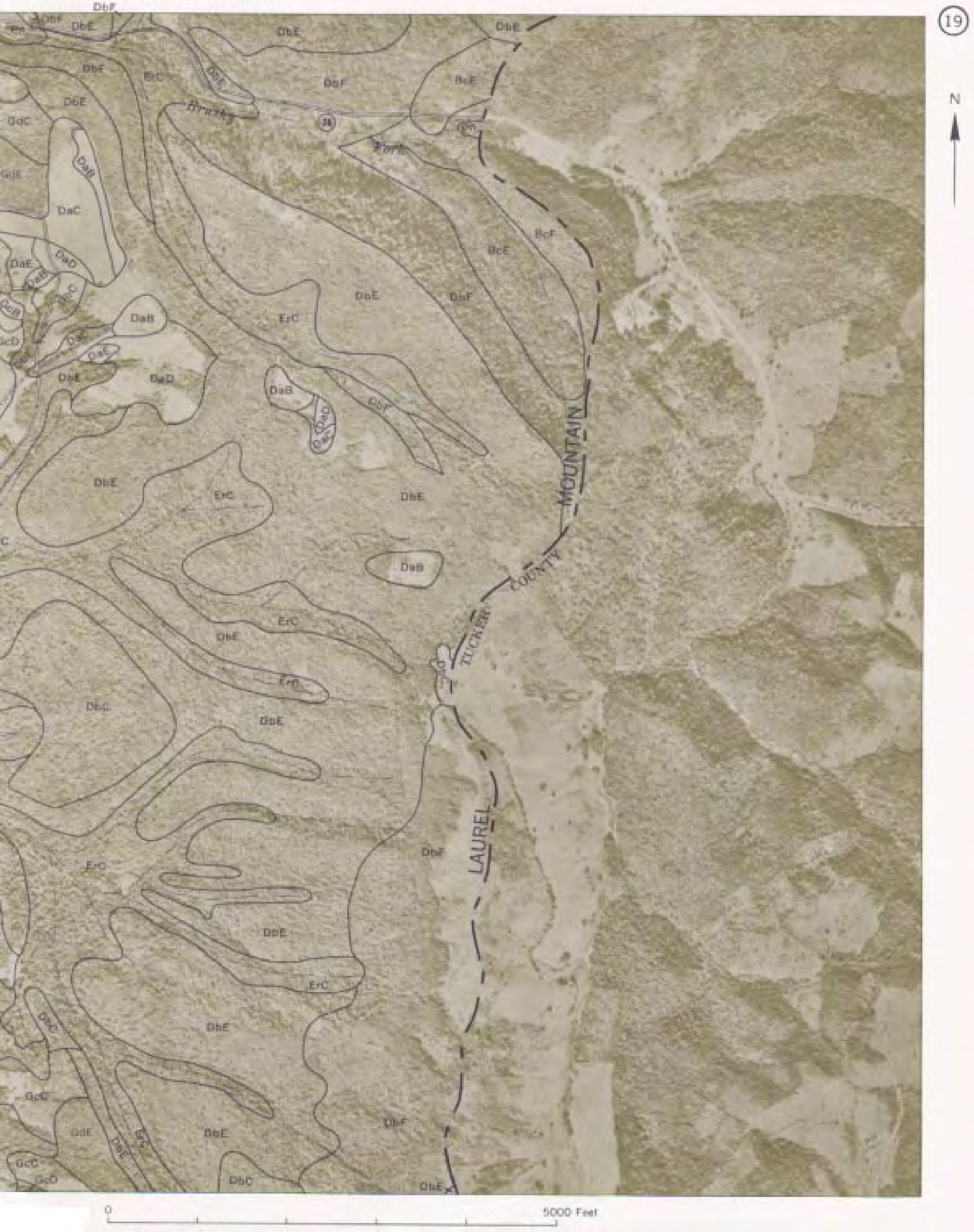
(Joins sheet 24)

0 ½ 1 Mile



BARBOUR COUNTY, WEST VIRGINIA NO. 18


(Joins sheet 13)
(Joins sheet 18)
(Joins sheet 25)
New Hope Valley Church
Valley Furnace
Brushy
Fork
Mt. Zion Church
Run
0
½
1 Mile


19
N
Brushy
Fork
MOUNTAIN
TUCKER
COUNTY
LAUREL
DbE
DbF
BcE
BcF
DaB
DaC
DaD
DaE
ErC
GdC
GdE
GcC
GcD
DbC
0
5000 Feet


N
HARRISON COUNTY
Arnold Run
Gnatty Creek
Peeltree
0
½
1 Mile

(Joins sheet 14)

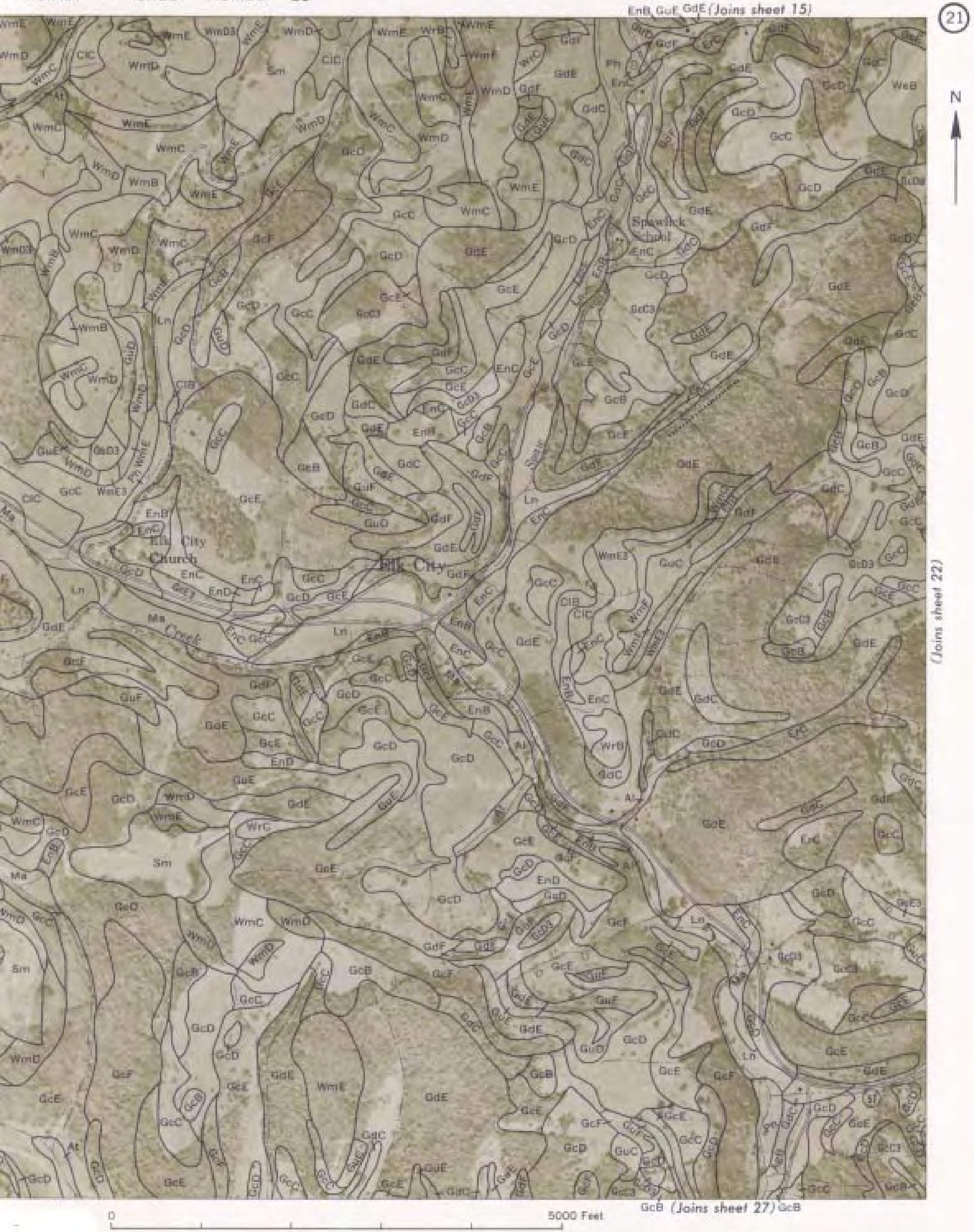
(Joins sheet 21)

(Joins sheet 26)

0 5000 Feet

(Joins sheet 20)

0 ½ 1 Mile


21
EnB GuE GdE (Joins sheet 15)
N
(Joins sheet 22)
GcB (Joins sheet 27) GcB
Spawick School
Elk City Church
Elk City
Creek
0
5000 Feet

(22)

(Joins sheet 16)

(Joins sheet 21)

(Joins sheet 28)

0 ½ 1 Mile

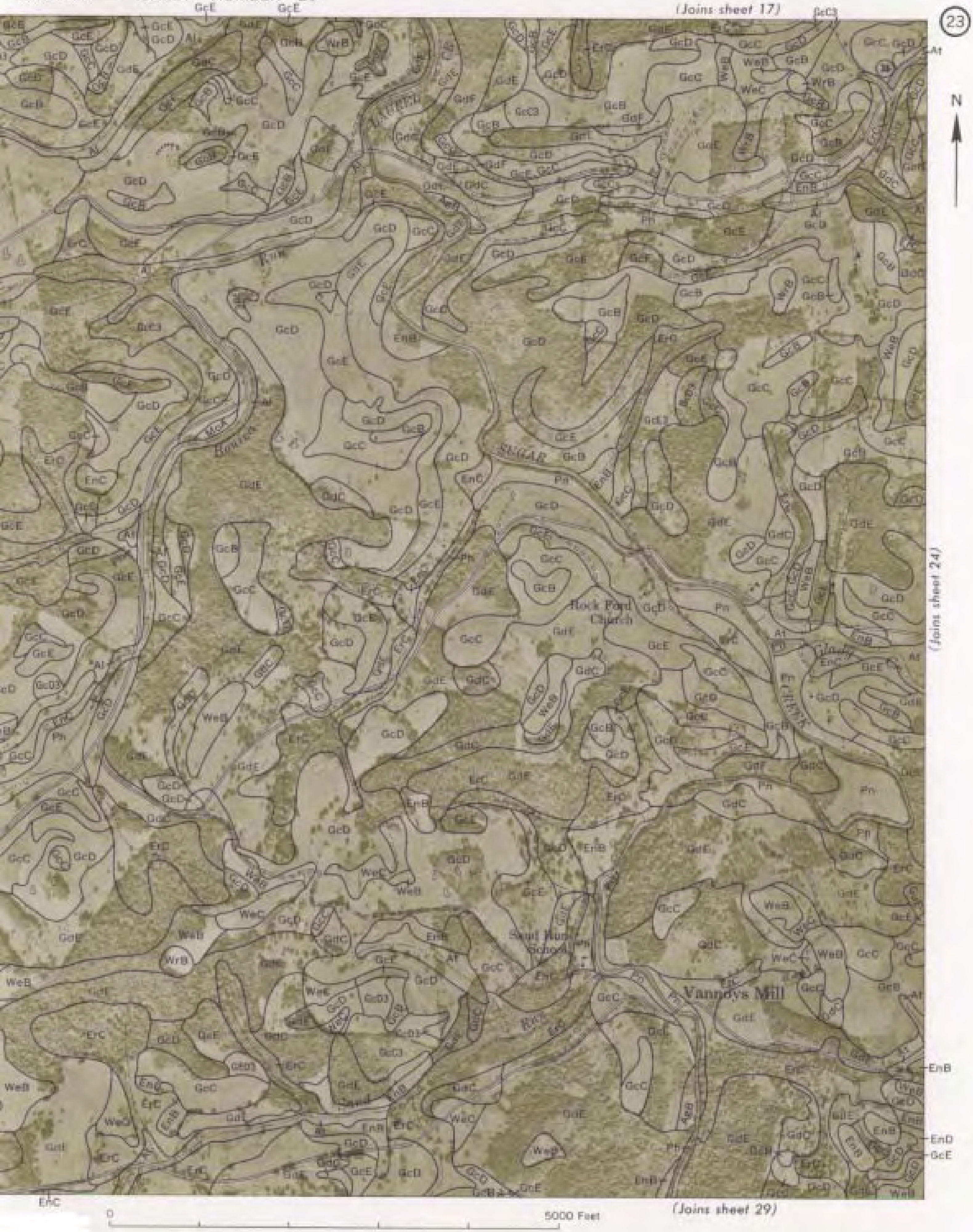
0 5000 Feet

(Joins sheet 23)

BARBOUR COUNTY, WEST VIRGINIA NO. 2

(Joins sheet 22)

0 ½ 1 Mile



(Joins sheet 17)
23
N
(Joins sheet 24)
(Joins sheet 29)
Rock Ford Church
Sand Run School
Vanndys Mill
SUGAR
Glady
CREEK
Run
0
5000 Feet

24

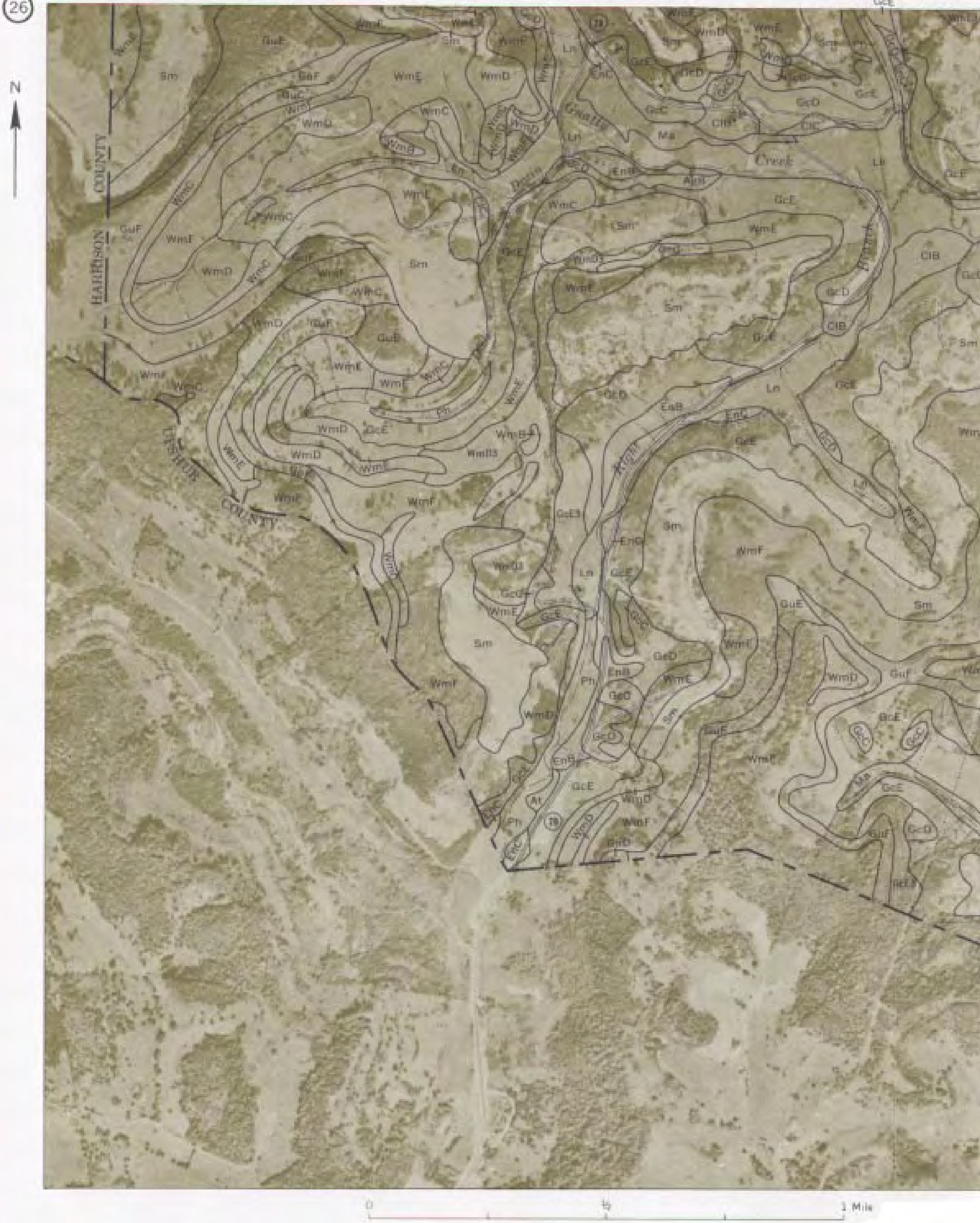

(Joins sheet 18)
(Joins sheet 23)
(Joins sheet 30)
N
White Oak Church
Center Chapel Church
Glady
0
½
1 Mile

(Joins sheet 25)

0 5000 Feet


(Joins sheet 19)
(Joins sheet 24)
(Joins sheet 31)
Jumping
Run
Teter
Creek
GdE
ErC
DbE
DbF
DbC
GcB
GcC
GcD
WeB
AgB
0
½
1 Mile


25
N
GdE
GcG
GcD
DbE
DbF
DbC
ErC
MOUNTAIN
NATIONAL
FOREST
BOUNDARY
LAUREL
COUNTY
TUCKER
BcF
BdE
BcE
DaC
DaE
0
5000 Feet


N
HARRISON COUNTY
UPSHUR COUNTY
Creek
0
½
1 Mile

(Joins sheet 20)

(Joins sheet 27)

(Joins inset, sheet 37)

0 5000 Feet

BARBOUR COUNTY, WEST VIRGINIA NO. 2

(Joins sheet 26)

0 ½ 1 Mile

(Joins sheet 21)

27

(Joins sheet 28)

(Joins sheet 32)

0 5000 Feet


28
(Joins sheet 22)
(Joins sheet 27)
(Joins sheet 33)
N
TYGART VALLEY RIVER
BUCKHANNON RIVER
BALTIMORE AND OHIO
Tygart Junction
Carrollton
0
½
1 Mile


Independence School
Union School
Little
Laurel
(Joins sheet 29)
0
5000 Feet


(Joins sheet 28)
Jerusalem Church
Valley Dell School
0
½
1 Mile

(Joins sheet 23)

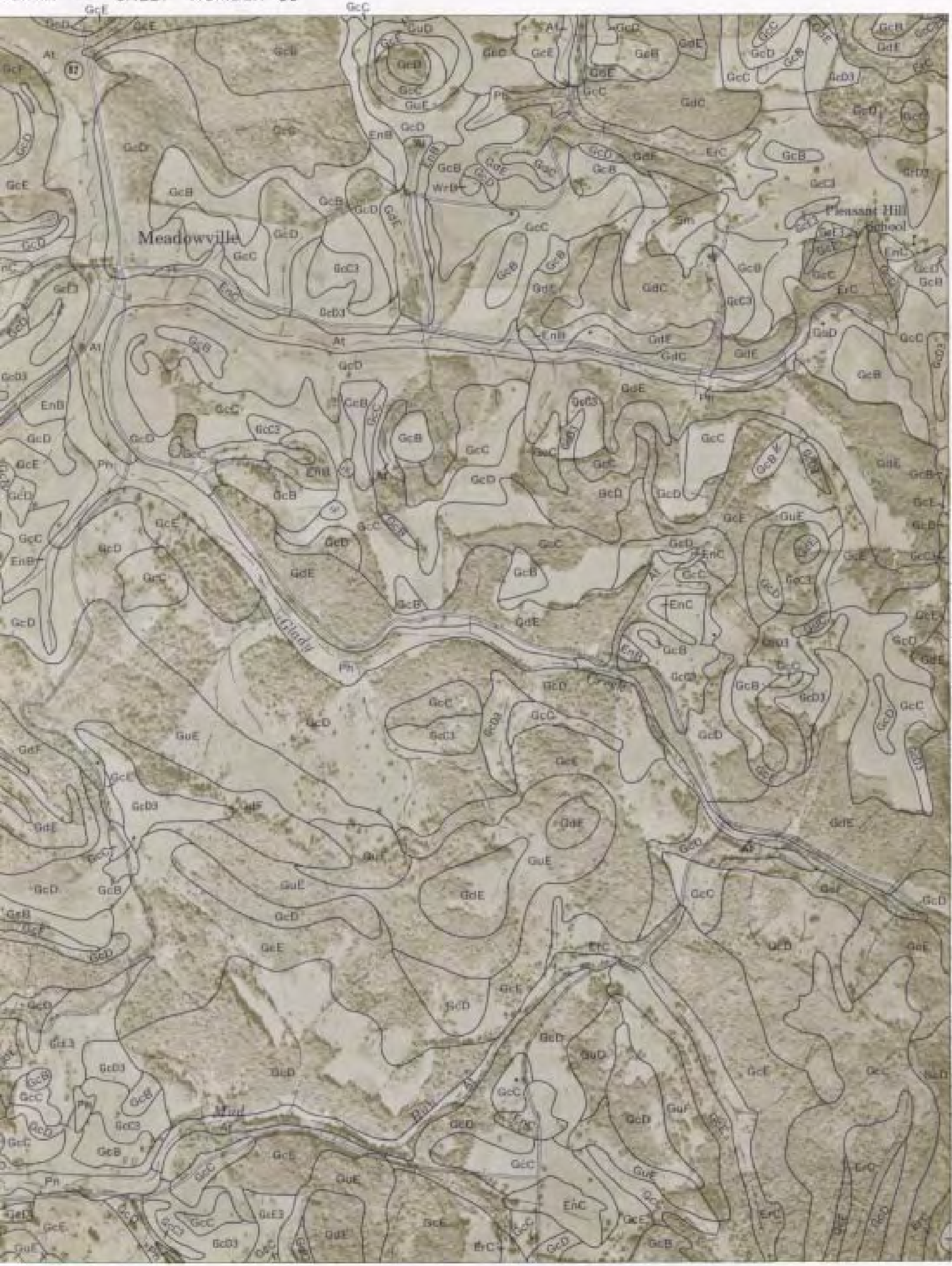
(Joins sheet 30)

(Joins sheet 34)

0

5000 Feet


30
(Joins sheet 24)
(Joins sheet 29)
(Joins sheet 35)
N
Glady
Creek
Sand Ridge School
Sugar
Creek
Mountain View School
0
½
1 Mile


Meadowville
Pleasant Hill School
Glady
Creek
Mud
(Joins sheet 31)

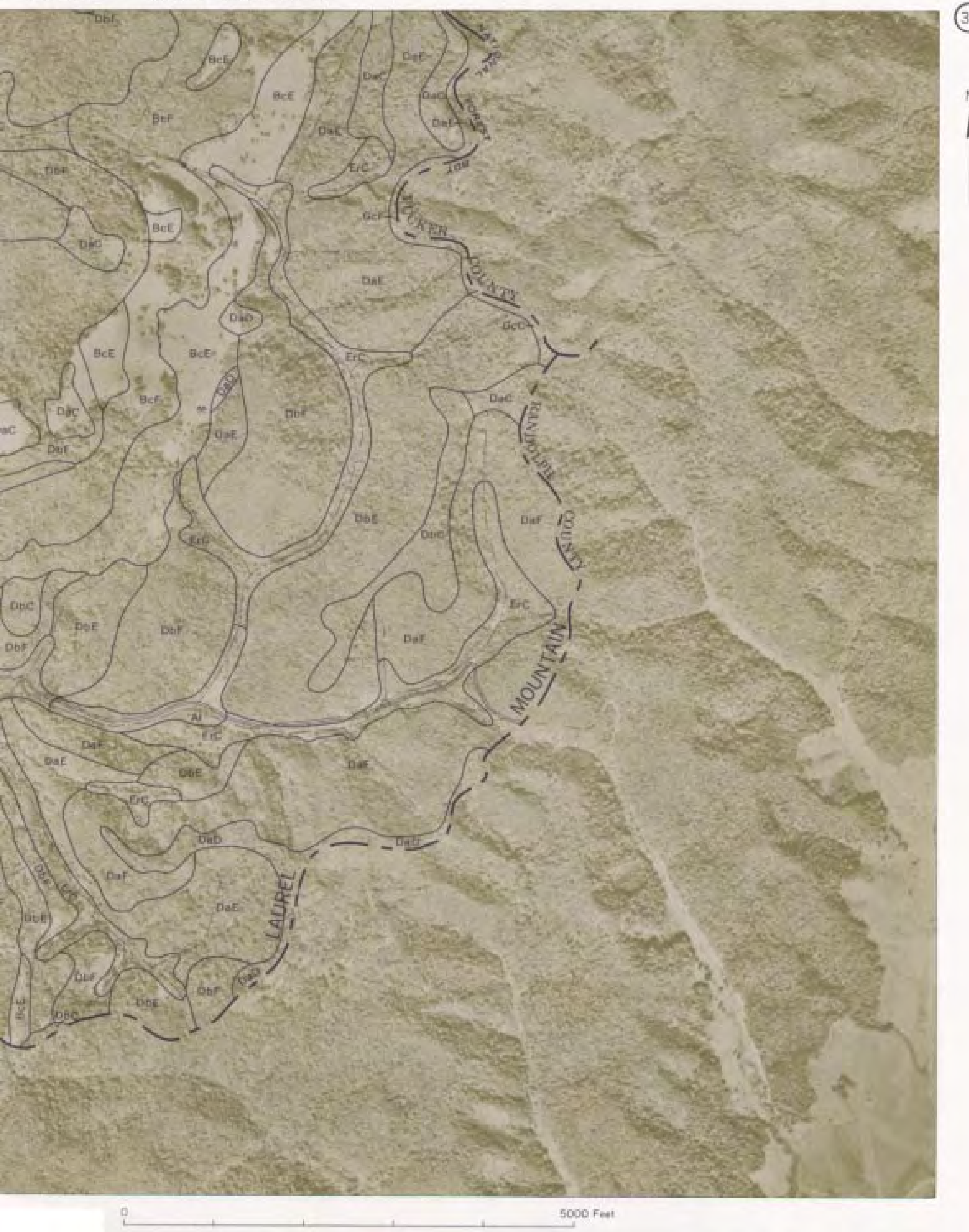
0 5000 Feet

(Joins sheet 25)

(Joins sheet 30)

(Joins sheet 36)

0 ½ 1 Mile


31
N
TUCKER COUNTY
RANDOLPH COUNTY
LAUREL
MOUNTAIN
0
5000 Feet


N
(Joins inset, sheet 37)
Longview
Volga
Reger Church
Murphy
BALTIMORE AND OHIO
UPSHUR COUNTY
Run
0
½
1 Mile

(Joins sheet 27)

(Joins sheet 33)

(Joins sheet 37)

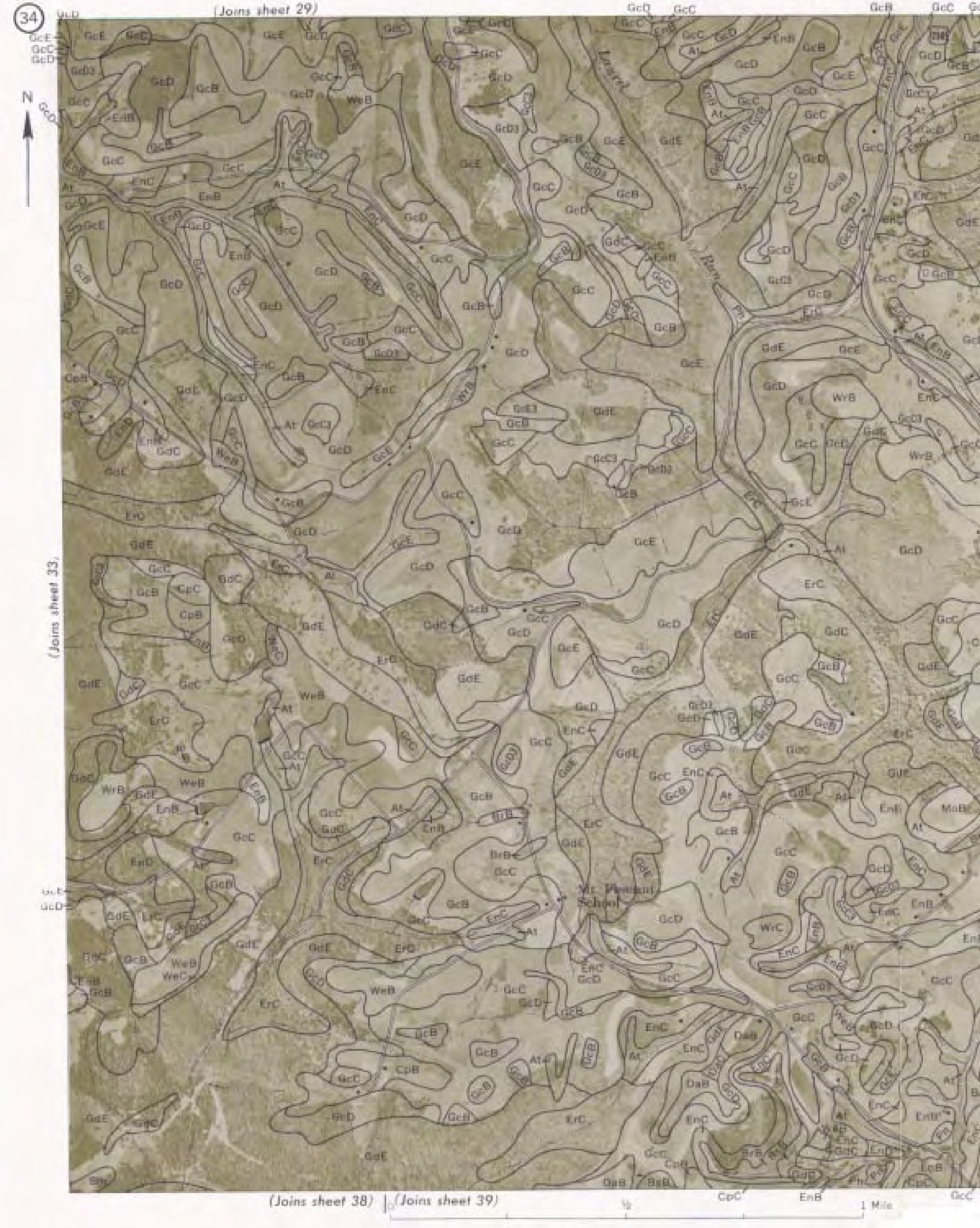
0 5000 Feet

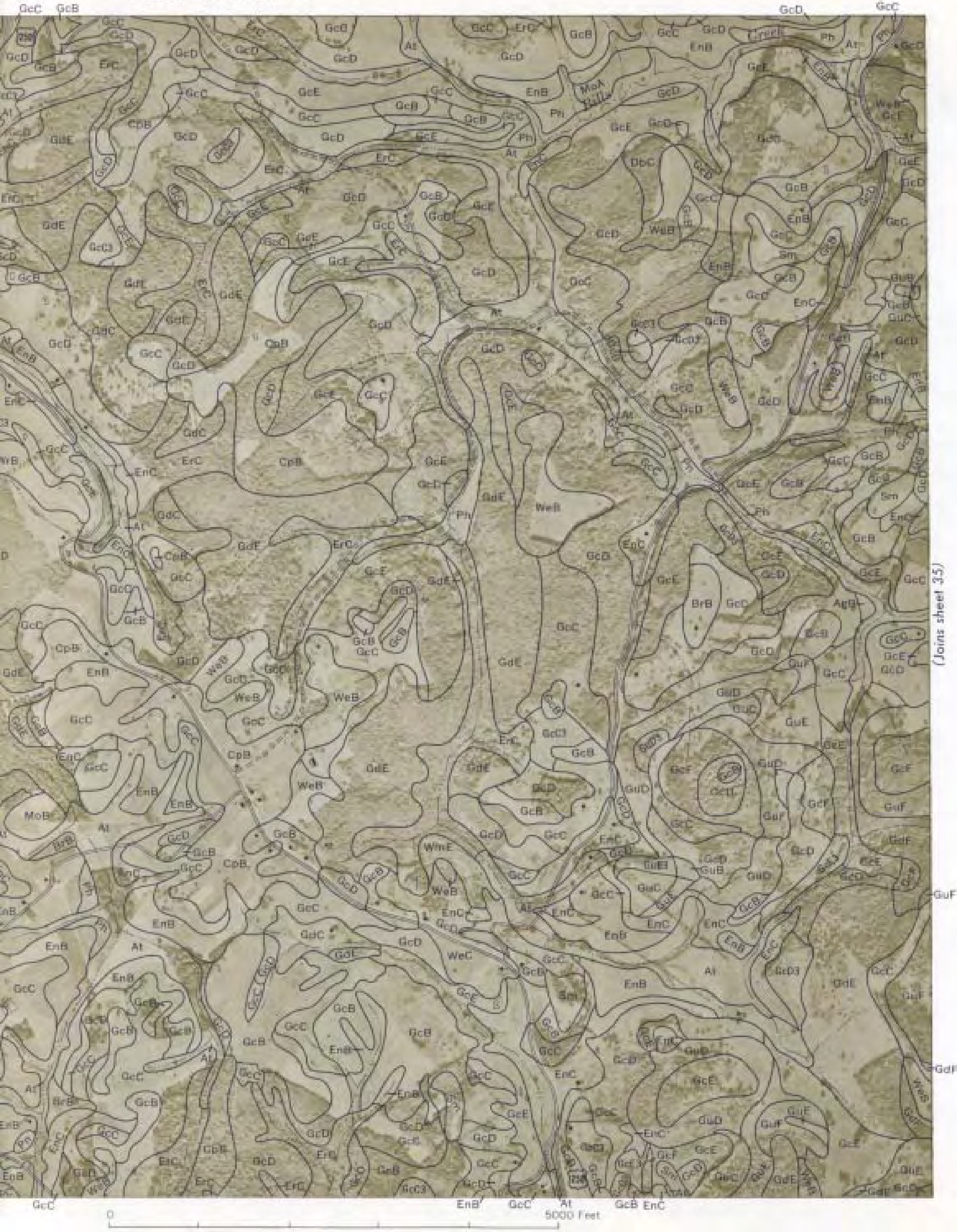
(Joins sheet 32)

(Joins sheet 37) | (Joins sheet 38)

½ 1 Mile


(Joins sheet 28)
33
N
Mount Liberty
Middle Fork
TYGART VALLEY RIVER
MIDDLE FORK RIVER
BALTIMORE AND OHIO
(Joins sheet 34)
0
5000 Feet


34
(Joins sheet 29)
N
(Joins sheet 33)
Laurel Run
Mt. Pleasant School
(Joins sheet 38)
(Joins sheet 39)
½
1 Mile

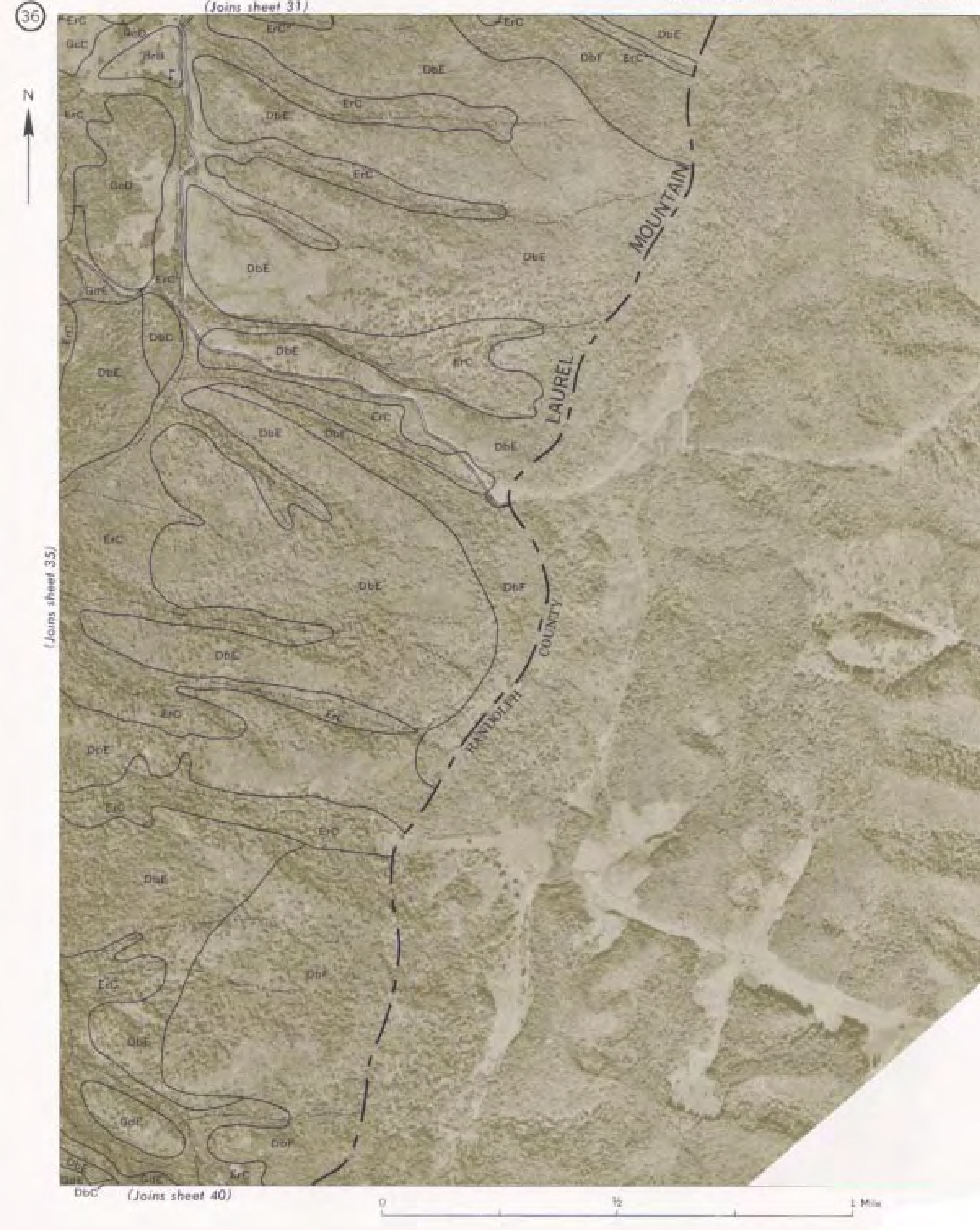

(Joins sheet 35)
Creek
0
5000 Feet

(Joins sheet 34)

(Joins sheet 39) | (Joins sheet 40)

0 ½ 1 Mile

(Joins sheet 30)


36
(Joins sheet 31)
N
(Joins sheet 35)
(Joins sheet 40)
LAUREL MOUNTAIN
RANDOLPH COUNTY
DbE
DbF
ErC
DbC
GnD
0
½
1 Mile

BARBOUR COUNTY, WEST VIRGINIA NO. 36

0 5000 Feet


UPSHUR
COUNTY
BUCKHANNON
RIVER
GcD
GdE
ErC
GdC
WeB
WeC
GcB
GcC
GdF
GcE
GcF
EnB
EnC
PrC
GcE3

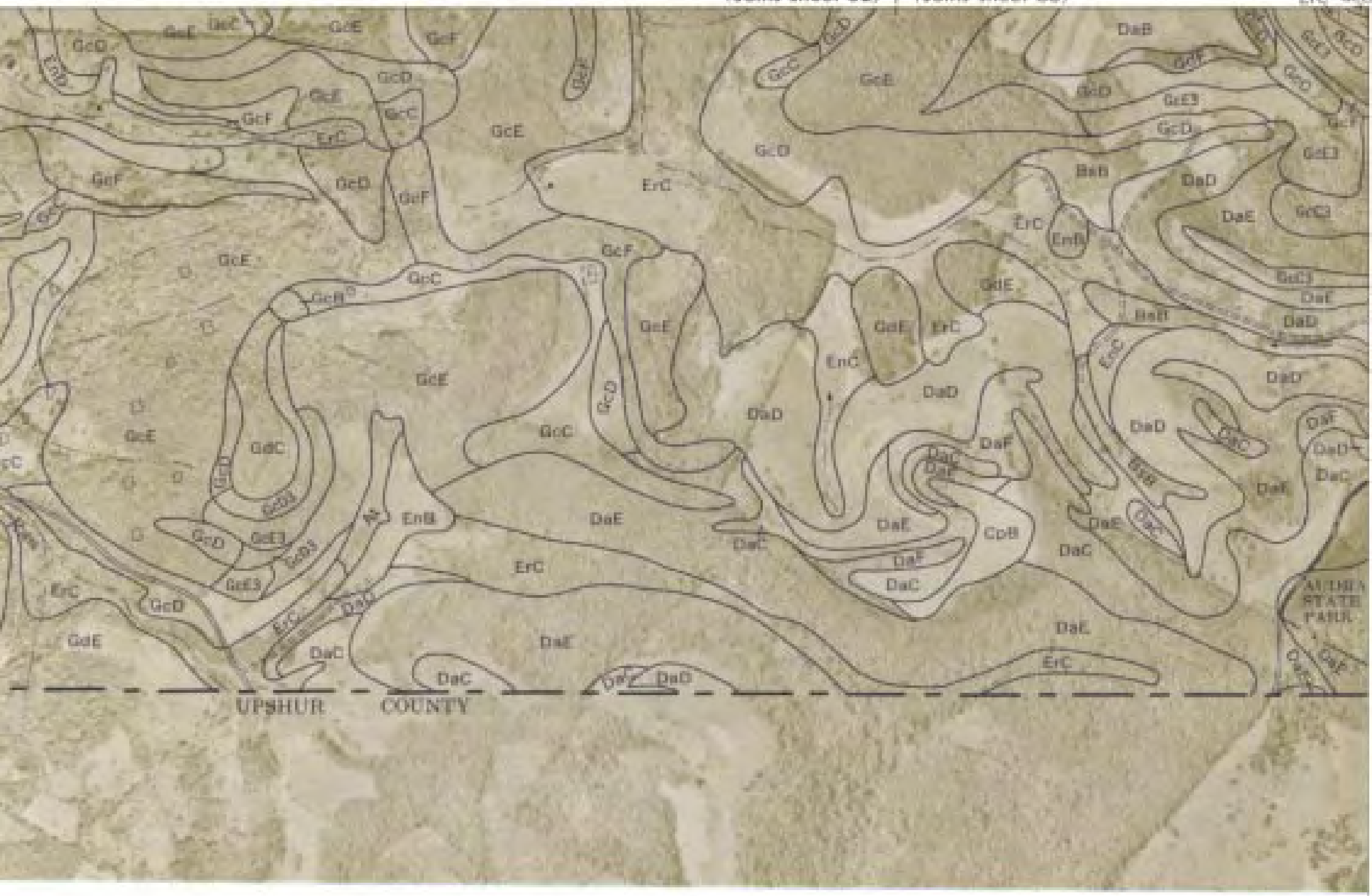
0 ½ 1 Mile

(Joins sheet 32) | (Joins sheet 33)

ErC GcD

(37)

N



(Joins sheet 38)

(Joins sheet 26)

(Joins sheet 32)

0 5000 Feet

(38)

N

(Joins sheet 37)

0 ½ 1 Mile

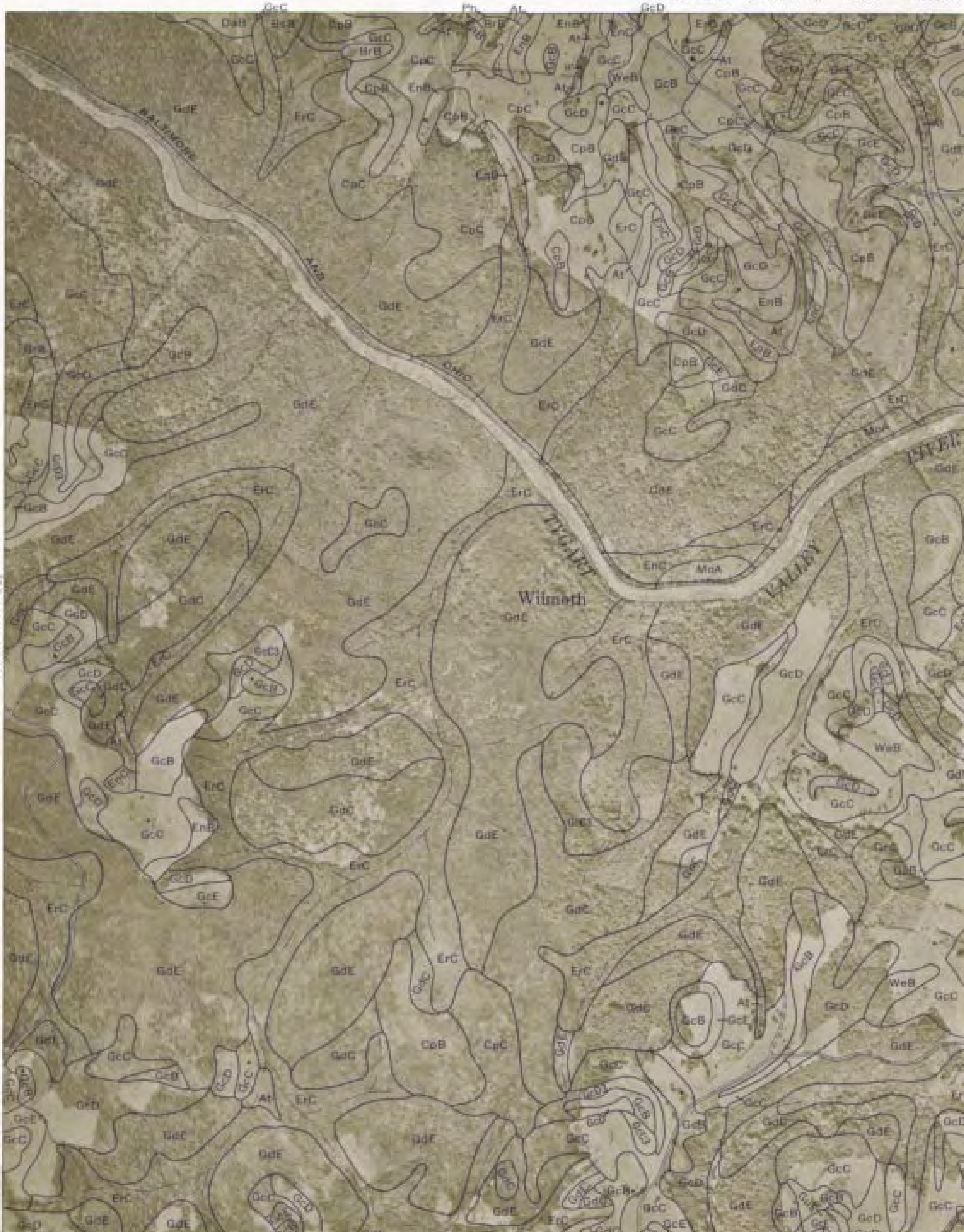
(Joins sheet 33) | (Joins sheet 34)

(Joins sheet 39)

(Joins sheet 41)

0 — 5000 Feet

(Joins sheet 38)



0 ½ 1 Mile

(Joins sheet 34) | (Joins sheet 35)

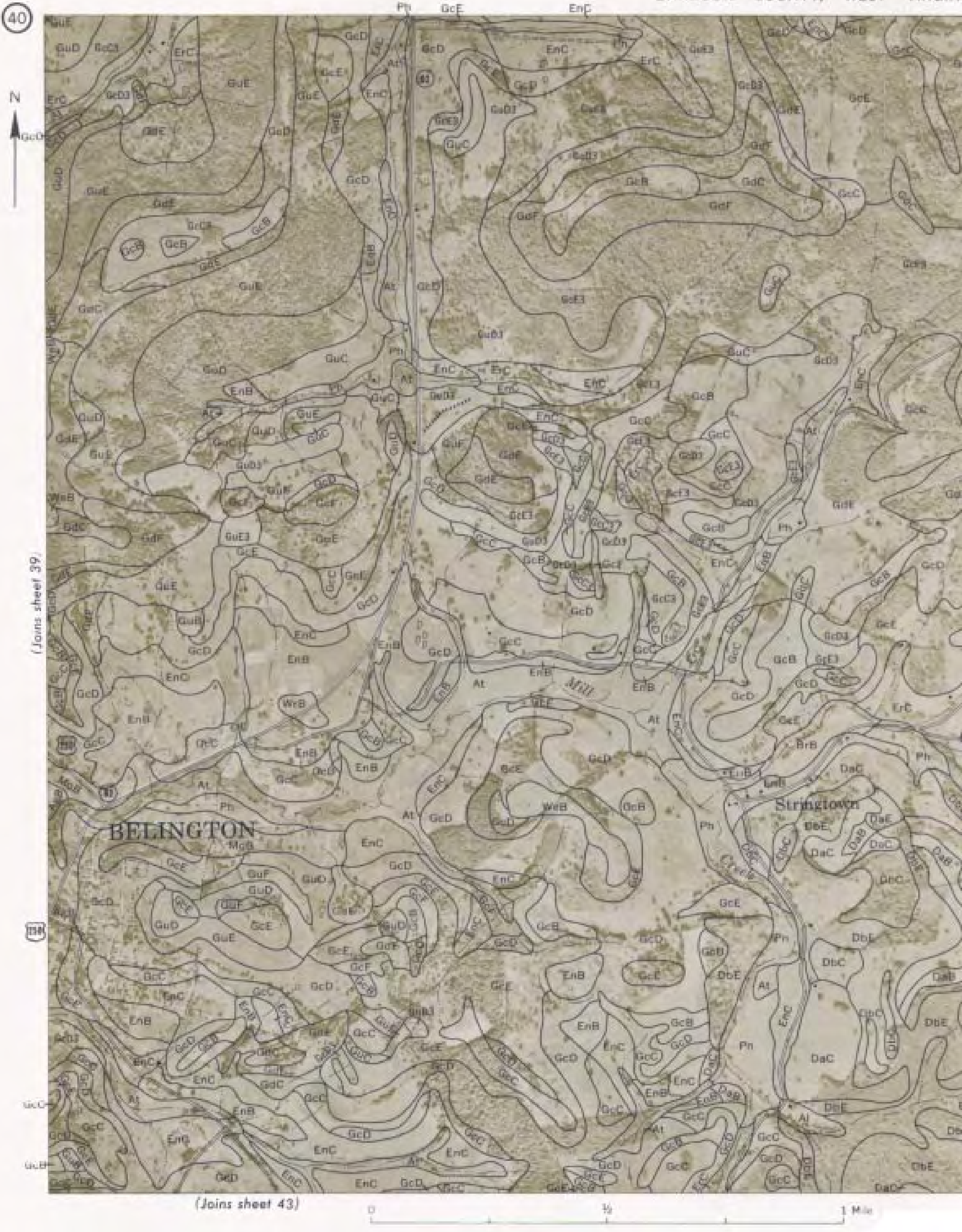
39

(Joins sheet 40)

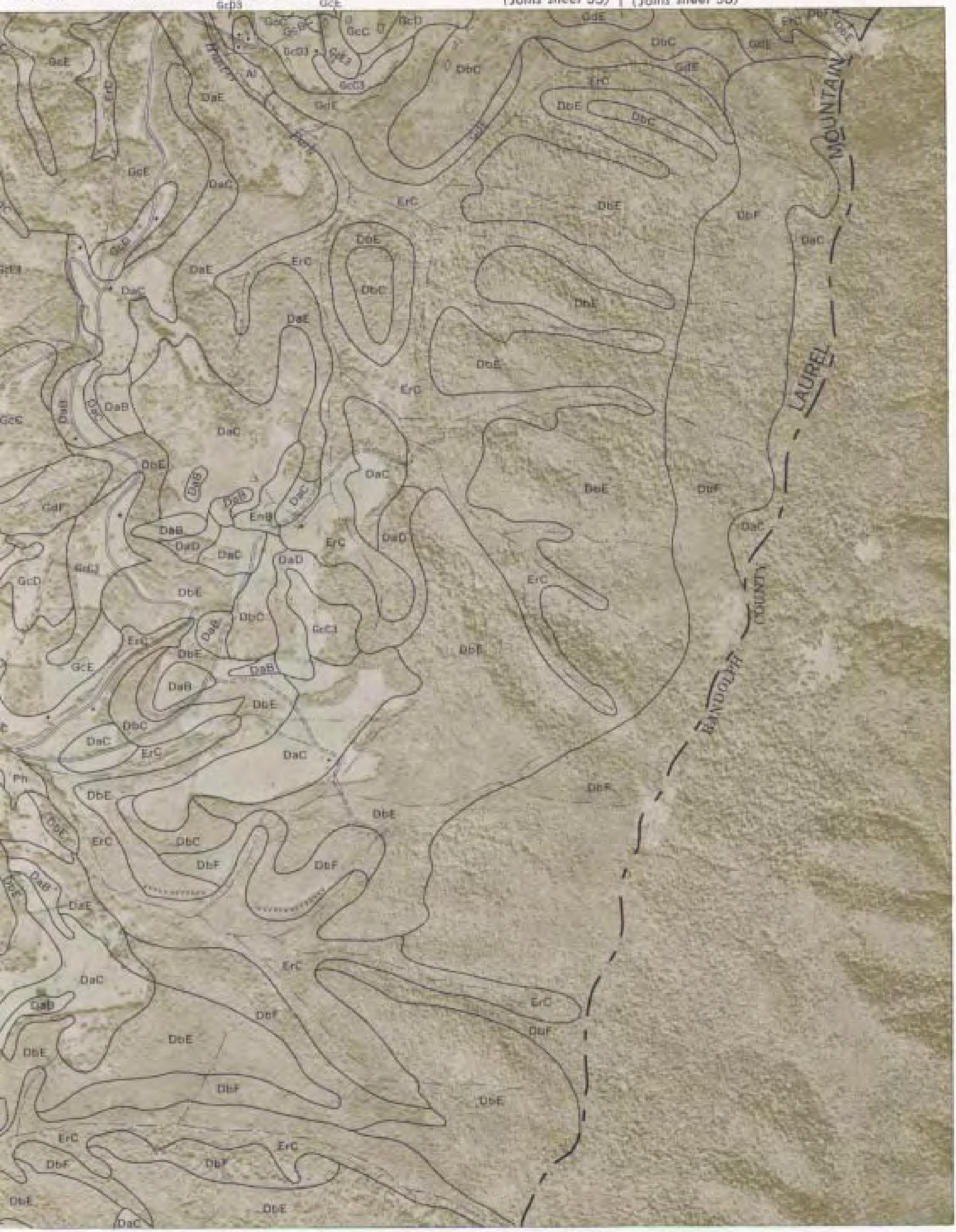
(Joins sheet 42)

0 5000 Feet

40


N
BELINGTON
Stringtown
Mill
Creek
(Joins sheet 39)
(Joins sheet 43)
0
½
1 Mile

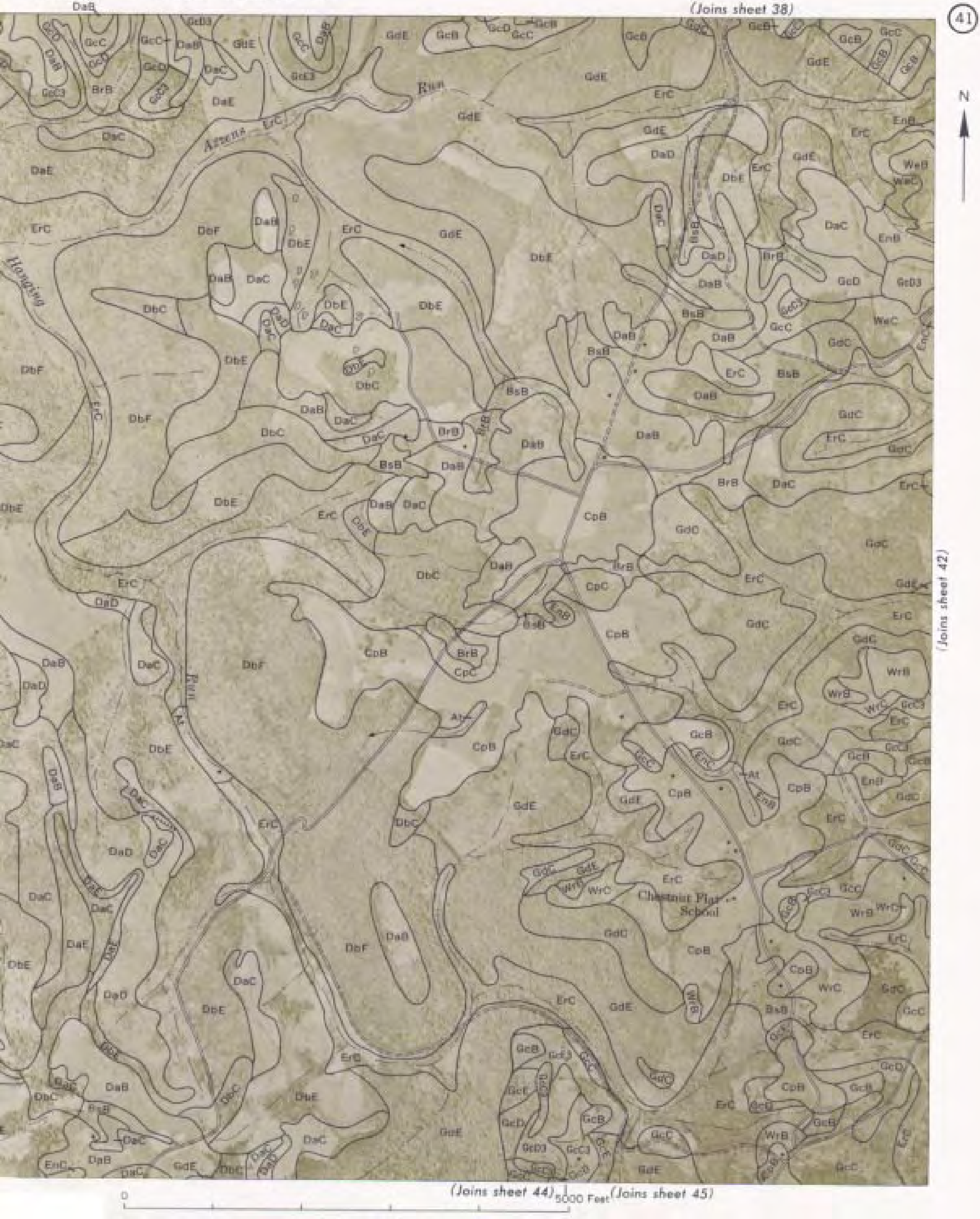
(Joins sheet 35) | (Joins sheet 36)



0 5000 Feet


DbE
DaE
ErC
Hanging
DbF
DbE
DaC
DaC
DbF
DbC
DbE
UPSHUR COUNTY
DbF
DaB
DaD
DaC
DaB
MIDDLE FORK RIVER
DbF
DaC
DaC
ErC
DaD
DaE
DaC
DbE
DbF
DbC
DbE
GdE
EnC

0 ½ 1 Mile


(Joins sheet 38)
41
N
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 45)
0
5000 Feet
Run
Run
Chestnut Flat School
ErC
DbE
DbF
DbC
DaB
DaC
DaD
DaE
GdE
GdC
GcB
GcC
GcD
GcD3
CpB
CpC
BrB
BsB
EnB
WrB
WrC
WeB
WeC
At

(Joins sheet 39)

N

(Joins sheet 41)

0 ½ 1 Mile

Scale

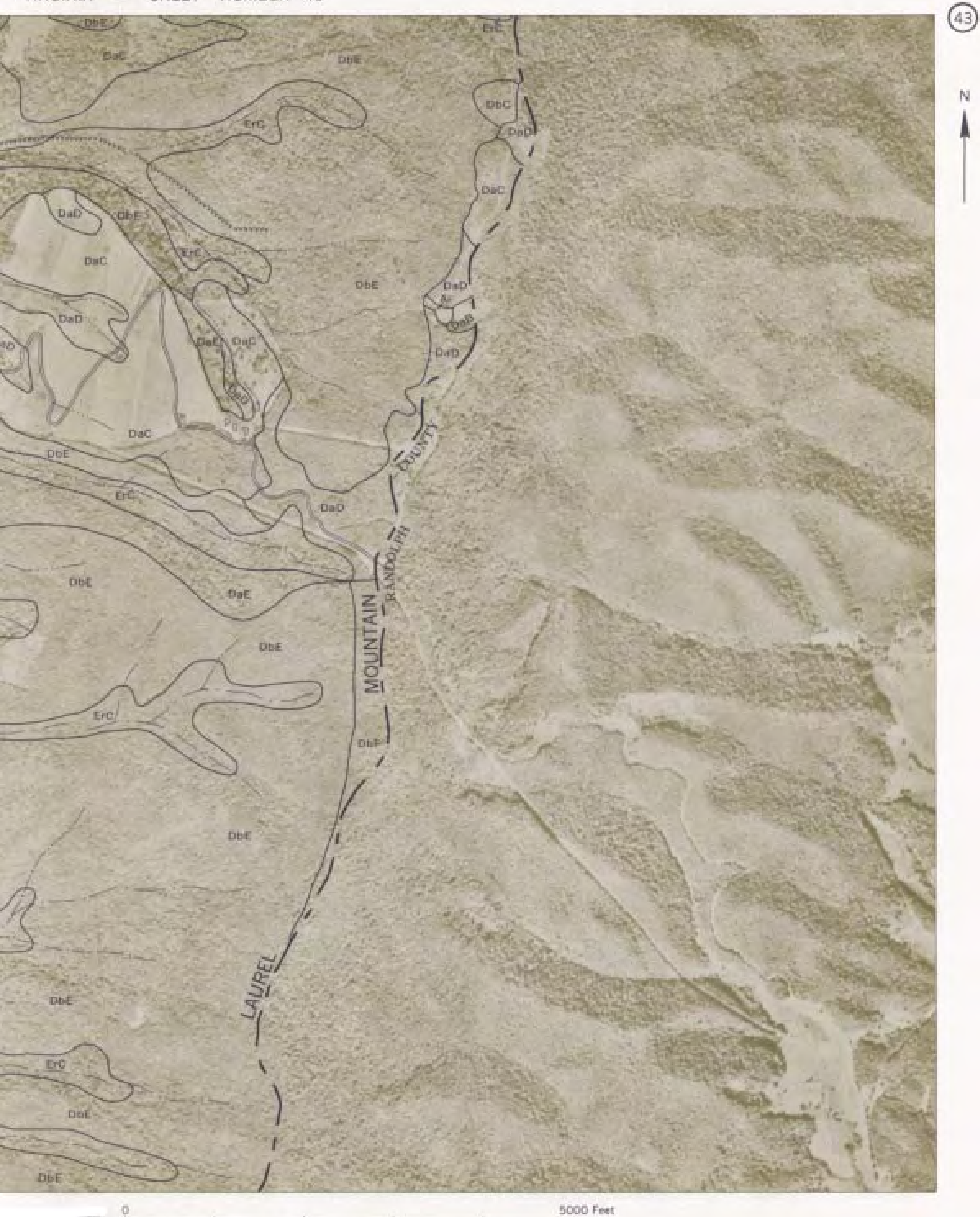

RIVER
VALLEY
TYGART
Trinity Church
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 46)
0
5000 Feet

(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 46)

0 ½ 1 Mile


N
DbE
DaC
ErC
DbC
DaD
DaE
LAUREL MOUNTAIN
RANDOLPH COUNTY
DbF
0
5000 Feet

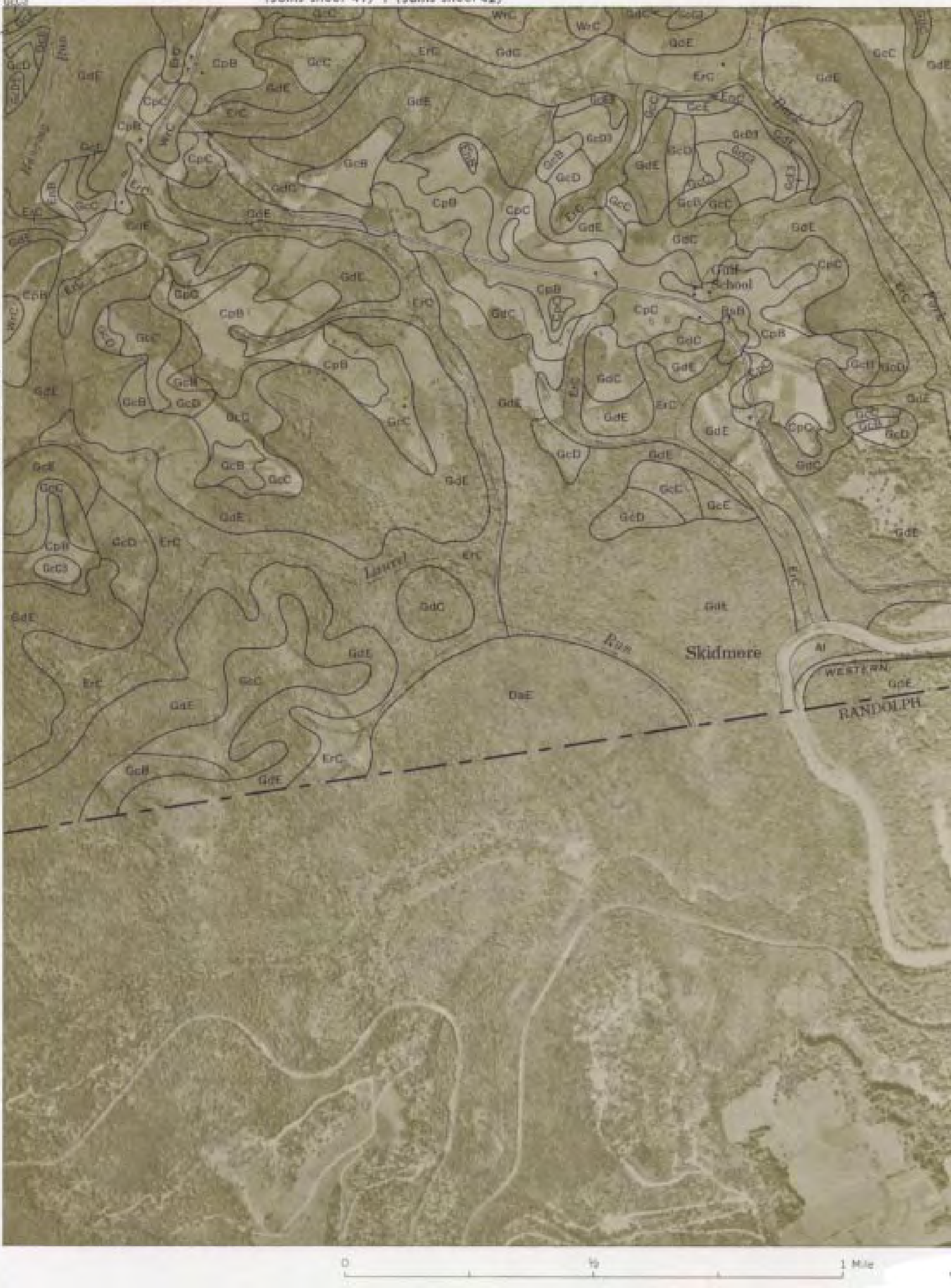
(44)


N
UPSHUR COUNTY
MIDDLE FORK RIVER
GdF
GdE
GdC
GcC
GcD
GcB
Pn
ErC
DaE
DaD
Lantz
BALTIMORE AND OHIO
RANDOLPH COUNTY
UPSHUR COUNTY
0
½
1 Mile


(Joins sheet 41)
(Joins sheet 45)
Water Camp School
Talbott
RANDOLPH COUNTY
0
5000 Feet

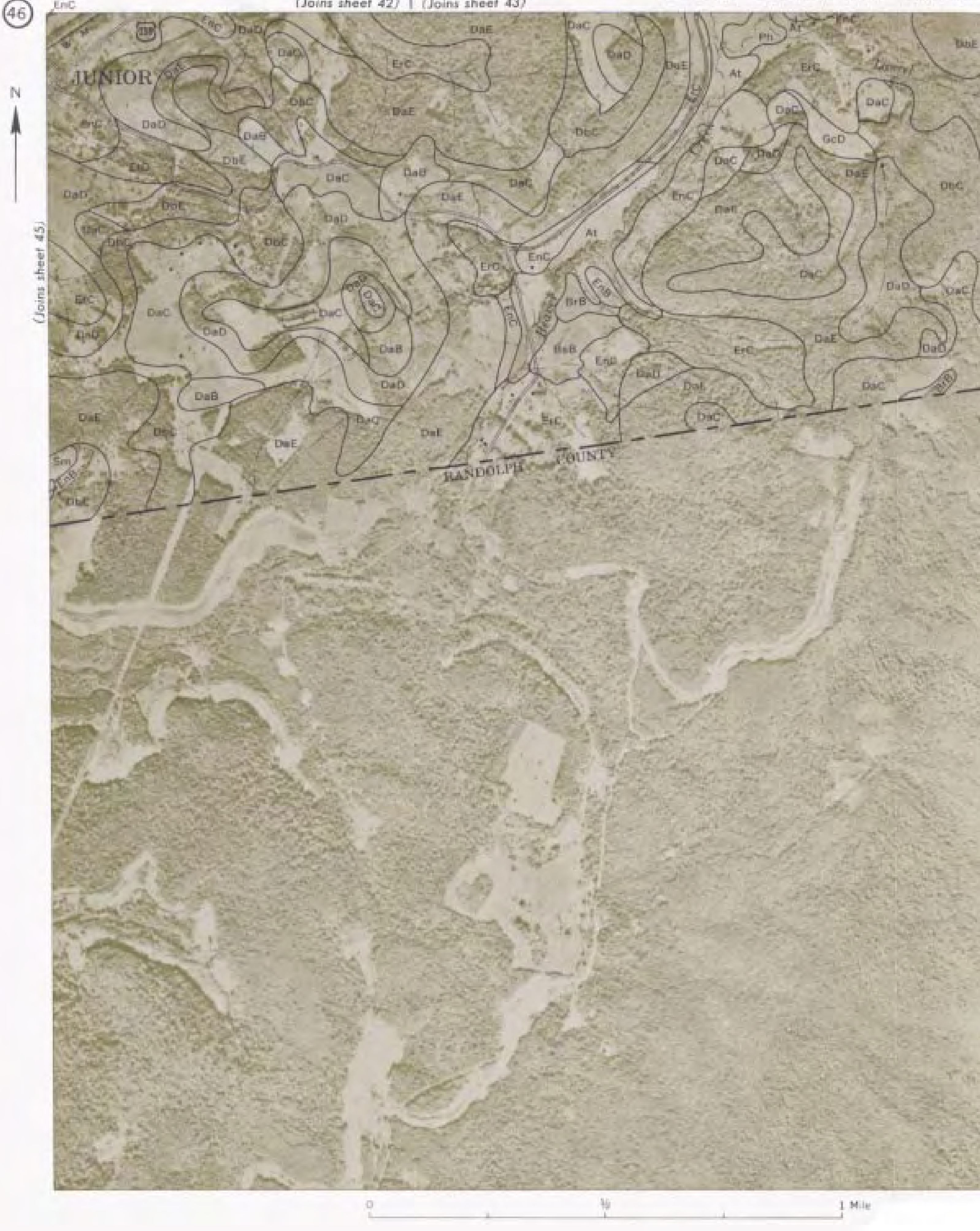
(Joins sheet 41) | (Joins sheet 42)

(Joins sheet 44)




45
West Junior
N
Joins sheet 46
TYGART
VALLEY
RIVER
Island
Fork
MARYLAND
COUNTY
OLPH
GdE
GcE
GcD
GcC
GcB
EnB
EnC
CpB
CpC
DaB
DaC
DaD
DaE
DbC
Bm
Sm
Pn
At
0
5000 Feet

(Joins sheet 42) | (Joins sheet 43)




DbE
DbE
DbE
DaC
DbE
DbE
ErC
ErC
DbC
DbE
RANDOLPH COUNTY
DbE
DaC
DaD
ErC
DbE
0
5000 Feet