CHAPTER III

ENVIRONMENTAL ANALYSIS

Introduction

The physical characteristics of the land can often set limitations on the type and intensity of development that can and should occur in an area. They can also affect the layout of buildings, roads, utilities, farming operations, and the like. Physical features greatly affect the cost of developing and maintaining a site.

The Comprehensive Plan for the development of Shelby County presents such environmental factors as climate, geology, topography, soils and ground water. In this analysis, the physical geography of the County is examined, and features of the land that provide either opportunities or limitations to development are identified. Finally, sites of archaeological or historical importance are discussed.

Much of the information presented in this chapter was obtained from the Soil Survey of Shelby County, Kentucky, prepared by the U.S. Soil conservation Service in 1980. Another useful document is Flood Plain Information, Clear Creek - Mulberry Creek prepared by the U.S. Army Corps of Engineers. The reader should refer to these documents for more detailed information.

Climate

Shelby County typically has hot summers and moderately cold winters. July and August are the warmest months of the year with mean temperatures of 74.6 and 73.5 degrees, respectively, in Shelbyville (See Table 3-1 on the following page). The mean daily maximum temperature in the summer is about 86.4 degrees. In contrast, the mean temperature in January, the coldest month is 28.6 degrees. The mean daily minimum temperature in January is 18.6 degrees.

Annual precipitation in Shelbyville varies from about 35-55 inches, with a mean of 45.61. Although precipitation is moderate throughout the year, there is a distinct "rainy" season from March to July. Thunderstorms occur on about 45 days a year, usually in summer.

On the average, Shelbyville receives about 13.1 inches of snowfall a year. Snowfalls are generally light, and the snow cover usually lasts only a few days. At least one inch of snow is on the ground about nine days a year.

The average relative humidity is about 80 percent at dawn and 60 percent in mid-afternoon. The sun shines about 70 percent of the day in summer and 40 percent in winter. The prevailing wind is from the southwest. Average wind speed is highest at 10 miles per hour in the winter.

Table 3-1 – Climatological Data for Shelbyville

Month	Mean Temperature (Degrees)	Mean Precipitation (Inches)	Mean Snowfall (Inches)
Annual	53.3	45.61	13.1
January	28.6	2.95	4.4
February	32.6	2.95	4.4
March	42.9	4.65	2.1
April	53.0	4.09	0.0
May	62.3	5.09	0.0
June	70.8	3.72	0.0
July	74.6	4.84	0.0
August	73.5	3.72	0.0
September	67.0	3.25	0.0
October	54.8	2.89	0.0
November	44.5	3.74	0.7
December	34.1	3.77	1.5

Source: Western Kentucky University, Kentucky Climate Center, 1961 – 1990 (Based on a 30-year computation)

Geology

An area's geology is important to planning efforts primarily because the geological characteristics affect the efficiency of septic systems. In addition, bedrock types and depths affect the construction costs of sewage facilities. Geological characteristics also have a bearing on the availability of ground water since the permeability and porosity of subsurface materials influence groundwater supplies.

About 95 percent of Shelby County is underlain by the Ordovician geologic system. The bedrock in this system consists of interbedded limestone, shale and siltstone. Lowell and Shelbyville soils formed in parent material derived from these rocks. The lower part of the Ordovician is dominated by shale, which formed a more completely dissected landscape. Eden soils developed on this landscape.

A small area in the western most tip of Shelby County is underlain by the Silurian geologic system. The bedrock in this system consists of dolomite, shale and limestone. The parent material of Beasley soils and part of the parent material of Grider soils were derived from these rocks.

Solution caverns are common in both systems, except in the lower part of the Ordovician system. A thin loess mantle lies on the broader ridges.

The most unique geological feature in Shelby County is Jeptha Knob, located between I-64 and

U.S. 60 near Clay Village. Jeptha Knob rises 200 to 300 feet above the surrounding uplands. It is the highest elevation in Shelby County, 1,163 feet above sea level. This uplifted area has many faults and folds and is believed to have been formed by crypto-volcanic or meteoric impact.

Topography

Shelby County lies in two physiographic regions: the Outer Bluegrass in west and central Shelby County and the Hills of the Bluegrass in east and southeast Shelby County.

The Outer Bluegrass is characterized by rolling, undulating hills with moderate slopes. The broader ridges are in the central and north-central parts of the county. The Outer Bluegrass has medium to rapid surface runoff and medium internal drainage.

In contrast, the Hills of the Bluegrass are characterized by rugged, hilly terrain with winding ridges and valleys, steep slopes and few level areas. These areas have very rapid surface runoff and slow internal drainage.

Shelby County is dissected by a dendritic stream pattern. Since most of Shelby County lies in the Salt River Basin, most major creeks flow south into Spencer County. A small area in the northeastern part of the County drains to the north.

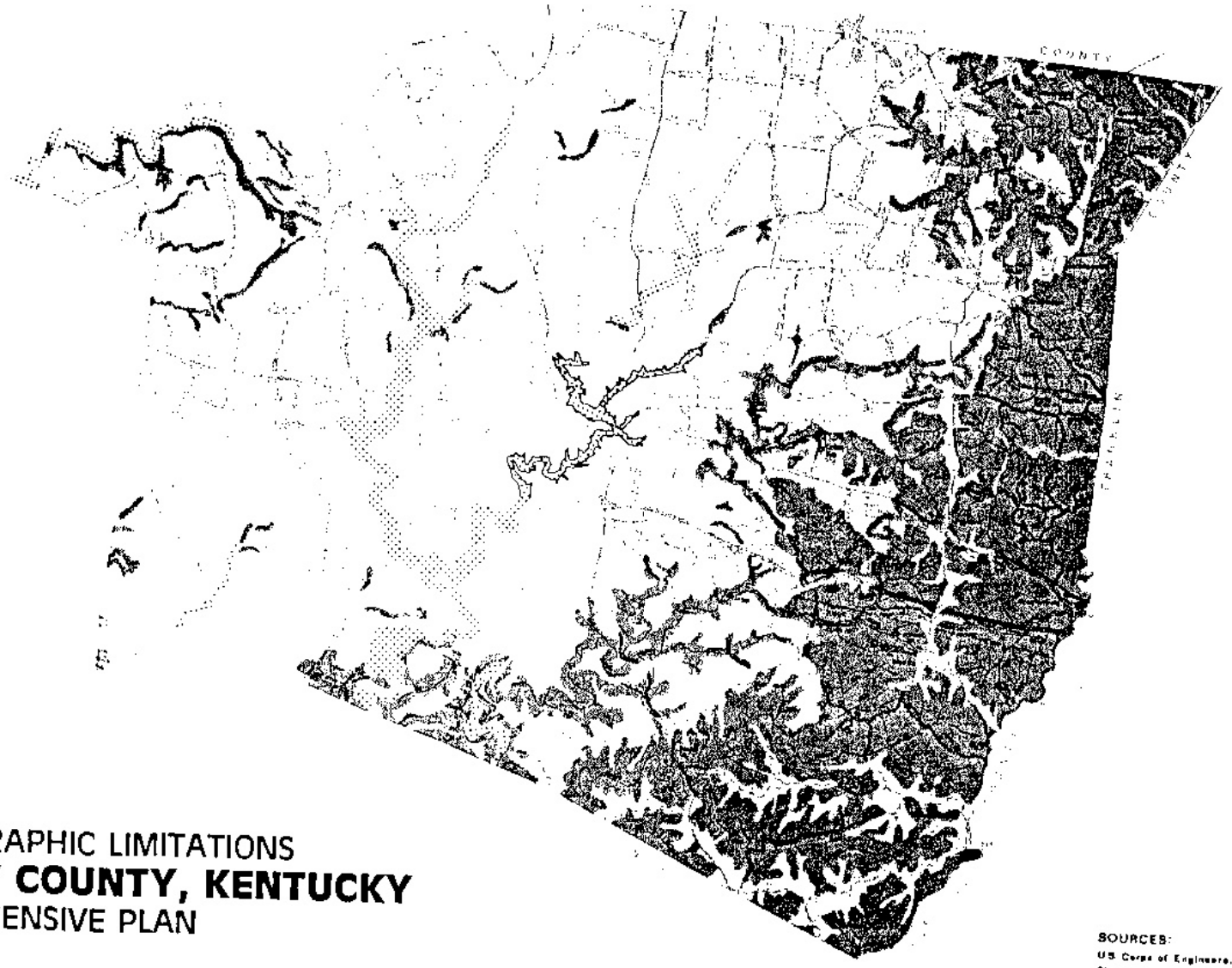
Slopes

The ground slope can be of prime importance in determining the suitability of a site for certain types of development. Slopes under 1 percent generally do not drain well. On the other hand, steep slopes usually have soils that are shallow to bedrock. They may be subject to severe slippage or soil movement due to gravity or water erosion. It is also very costly to provide public utilities, such as water lines and sewers, to areas with rugged terrain. Finally, steep slopes may pose access problems ordinary loaded vehicles can't sustain. Similarly, emergency vehicles may have difficulty accessing a steep grade when roads are slick or icy.

For these reasons, development is not encouraged on steep slopes; especially those over 20 percent (see Map 3-1 on the following page). However, some sites on steep hillsides may be suitable for development depending on the characteristics of the site and measures taken by the developer to control landslides, erosion and flooding of nearby lowlands. Hilly areas may also provide ideal sites for outdoor recreation.

The best building sites are usually on well-drained ridge tops or gently sloping hillsides. These areas do not have the problems associated with steep slopes and generally have fewer problems with surface runoff and internal drainage.

* A slope of 20 percent rises 20 feet vertically in a horizon a total distance of 100 feet.



MAP 3-1

PHYSIOGRAPHIC LIMITATIONS
SHELBY COUNTY, KENTUCKY
COMPREHENSIVE PLAN

BASE MAP PREPARED BY KENTUCKY TRANSPORTATION CABINET

0 5 1 2 4 miles

NOTES:

- A 1 percent flood plain indicates that in any one year, there is a 1 percent chance of a flood occurring which would cause significant property damage.
- The Clear Creek - Mulberry Creek Flood Plain is outlined on the map because it is recognized by the Federal Flood Insurance Administration as a 1 percent flood plain and has been delineated by the Corps of Engineers.

For Comprehensive Planning Purposes Only.

SOURCES:

U.S. Corps of Engineers, Clear Creek - Mulberry Creek Flood Plain Information (1973)

KIPDA, Regional Growth Suitability Plan (1975)

KIPDA, Regional Comprehensive Plan (1977)

LEGEND

Flood Plain Area (1 percent flood plain) +

Steep Slopes (20% or greater)

Flood Plains

Some of the major creeks and their tributaries lie in flood plains, which are not suited to most land uses due to periodic flooding (see Map 3-1). The U.S. Army Corps of Engineers has delineated the one percent flood plain along Clear Creek between Interstate 64 and Shelby Lake. A one percent (100-year) flood plain indicates that in any one year, there is a one percent chance of a flood occurring which would cause significant property damage. Other flood plains exist along Brashears Creek, Bullskin Creek, Clear Creek (south of Interstate 64 and north of Lake Shelby), Plum Creek, Floyds Fork and Guist Creek (near the Spencer County line).

Damaging floods have occurred several times in the Shelbyville area: In 1928, 1937, 1943, 1948, 1957, 1961, 1964, 1970 and 1997. The most damaging of these was on March 1, 1997. Development in flood plains should be severely limited due to the potential hazards involved. However, flood plains are often well suited for parks and open space.

Consideration should be given to new and existing construction in or near to the flood plain. The impact of new developments around creek and or drainage systems can change the existing flow of streams; thus effecting residences and businesses already located along the flood plain. There are requirements in the National Flood Insurance Program, of which Shelby County is a participant and are required to follow the guidelines of the program.

A Flood Damage Prevention Ordinance has been adopted by Shelby County as of June 8, 1996 in Court Order Book 1995, page 127, located in the Shelby County Clerk Office.

A Flood Damage Plan for the City of Shelbyville, Ordinance No. 97-5-15 (A) was adopted May 15, 1997, located in Shelbyville City Hall.

Karst Topography

Much of Shelby County is underlain by limestone. Karst topography results when this limestone bedrock dissolves in differing degrees, forming solution caverns, sinkholes, depressions or small basins. Areas of Karst topography are common in Shelby County. Development on particular sites may be limited due to dissolution of the underlying bedrock.

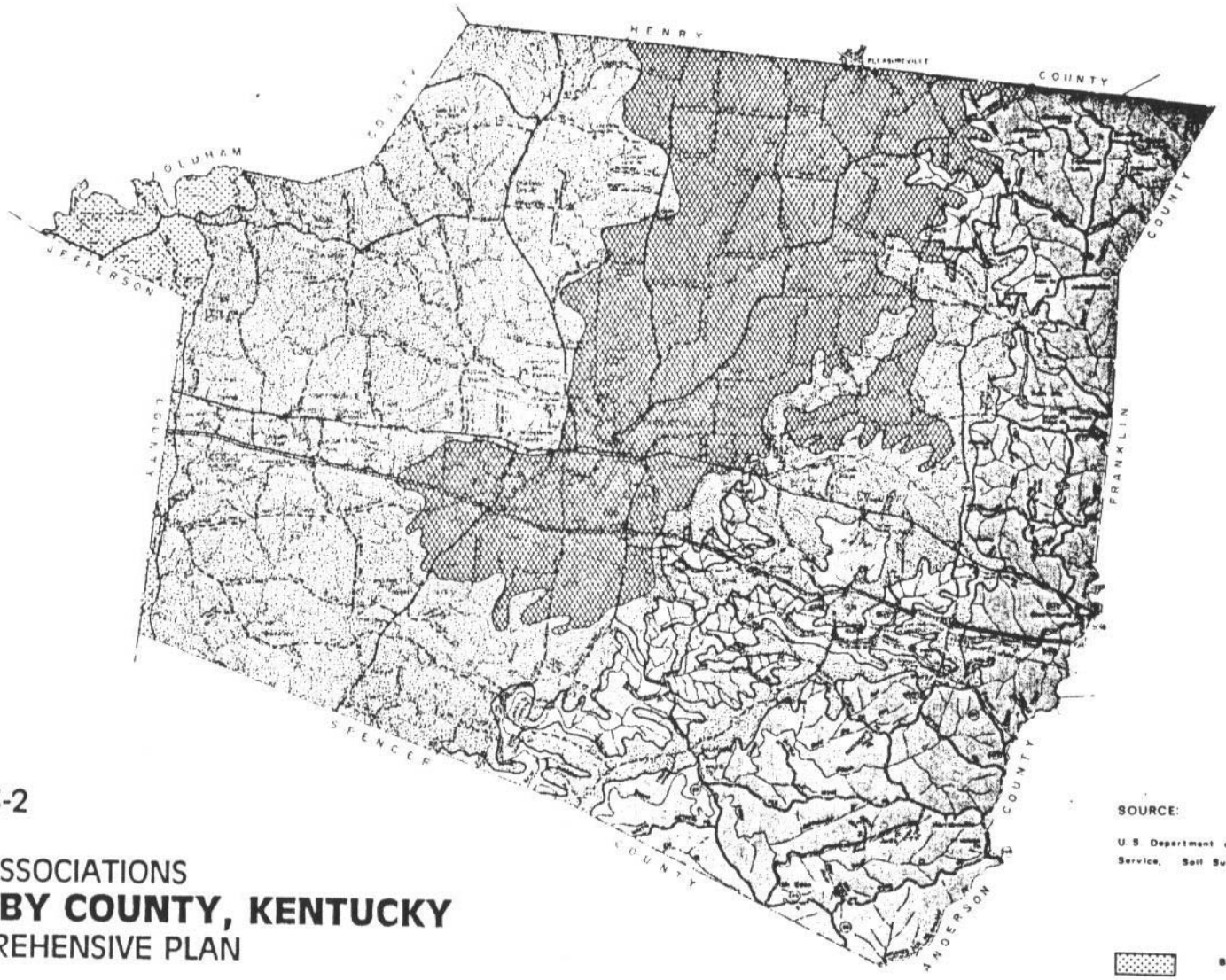
Soils

A study of soils in an area provides much useful information for planning: probable drainage, runoff and erosion; the suitability of the soils for various land uses; and the area's potential for supplies of water, sand and gravel. Soil characteristics of particular importance are depth to bedrock, slope, stability and permeability. The permeability of the soil is especially important because it affects surface runoff and the absorption of wastes from septic tank sewage systems.

The five major soil associations in Shelby County are shown on Map 3-2 on page 31. These associations represent broad areas consisting of one or more major soils and some minor soils. They are named after the major ones. Soils in one association may occur in others but in a different pattern. Each soil association represents a unique natural landscape that has a

distinctive pattern of soils, relief and drainage.

The soil associations map can be used along with Table 3-2 on page 32 to compare the suitability of large areas for general land uses such as urban development, recreation and agriculture. Each soil association is described below. The characteristics of the major soils in Shelby County are analyzed using more detailed soil maps found in the Soil Survey of Shelby County.



MAP 3-2

SOIL ASSOCIATIONS
SHELBY COUNTY, KENTUCKY
COMPREHENSIVE PLAN

BASE MAP PREPARED BY KENTUCKY TRANSPORTATION CABINET

0 5 1 2 4 miles

NOTE: For Comprehensive Planning Purposes Only

SOURCE:

U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Shelby County (1978)

LEGEND

- Beasley-Crider-Nicholson
- Lowell-Nicholson
- Shelbyville-Lowell
- Lowell-Eden
- Eden-Lowell

Table 3-2 – Characteristics of Major Soil in Shelby County

						Septic Tank	
Soil Association	**Percentage of Association**	**Dominant Slope**	**Depth to Rock**	**Depth of Seasonal High Water Table**	**Drainage**	**Permeability**	**Absorption Field**
Beasley	48%	2-12%	over 40”	over 72”	Well-drained	Moderately slow	Severe (a)
Crider	18%	2-6%	Over 60”	Over 72”	Well-drained	Moderate	Slight
Nicholson	11%	2-8%	Over 60”	18-30”	Moderately well-drained	Moderate to slow	Severe (a,d)
Lowell	58%	6-12%	Over 40”	Over 72”	Well-drained	Moderately slow	Severe (a)
Nicholson	16%	2-8%	Over 60”	18-30”	Moderately well-drained	Moderate to slow	Severe (a,d)
Shelbyville	40%	2-12%	Over 60”	Over 72”	Well-drained	Moderate to Mod. Slow	Severe (a)
Lowell	36%	6-12%	Over 40”	Over 72”	Well-drained	Moderately slow	Severe (a)
Lowell	40%	6-12%	Over 40”	Over 72”	Well-drained	Moderately slow	Severe (a)
Eden	25%	15-30%	20-40”	Over 72”	Well-drained	Slow	Severe (a,b,c)
Eden	69%	15-30%	20-40”	Over 72”	Well-drained	Slow	Severe (a,b,c)
Lowell	16%	6-12%	Over 40”	Over 72”	Well-drained	Moderately slow	Severe (a)

1. Seven classes of natural soil drainage are recognized (only two are described): Excessively drained; Somewhat excessively drained; Well-drained; Moderately well-drained; Somewhat poorly drained; Poorly drained; and very poorly drained.

   Well-drained: water is removed from the soil readily, but not rapidly; it is available to plants throughout most of the growing season; wetness does not inhibit growth of roots for significant periods during most growing seasons.

   Moderately well-drained: water is removed from the soil somewhat slowly during some periods; soils are wet for only a short time during the growing season, but periodically for long enough that mesophytic crops are affected.

2. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil:

   Very slow……less than 0.06 inches
   Slow……0.06 to 0.2 inches
   Moderately……0.2 to 0.6 inches
   Moderate……0.6 to 2.0 inches
   Moderately Rapid……2.0 to 6.0 inches
   Rapid……6.0 to 20 inches
   Very Rapid……more than 20 inches

3. Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Absorption of the effluent is affected by: (a) slow percolation; (b) excessive slope; (c) shallow depth to bedrock; and (d) wetness due to high water table.

Source: U.S. Soil Conservation Service, Soil Survey of Shelby County, Kentucky.

Important Agricultural Land

The soils in Shelby County generally have good potential for row crops, which are usually grown on uplands because of the limited acreage on bottomland and terraces. The broader ridges and more level areas are suited for grain production, while deep, well drained soils, such as Shelbyville and Lowell, are preferred for tobacco and alfalfa. The more sloping Lowell, Faywood and Eden soils are commonly used for hay and pasture.

The U.S. Soil Conservation Service considers 180,170 acres (73.5%) of Shelby County to be Farmland of Statewide Importance (See Table 3-3 below). Most of this land consists of Shelbyville, Nicholson, Lowell, and Nolin soils on slopes between 2 and 6 percent (See Table 3-4 on page 35). These soils are generally found in the Shelbyville-Lowell, Lowell-Nicholson and Beasley-Crider-Nicholson associations.

Table 3-3 – Farmland of Statewide Importance in Shelby County

Soil Name	Acres
Beasley silt loam	2,780
Boonesboro silt loam	720
Cider silt loam	1,190
Elk silt loam	2,690
Faywood silt loam	2,400
Lowell silt loam	95,920
McGary silt loam	270
Newark silt loam	700
Nicholson silt loam	25,730
Nolin silt loam	8,130
Otwell silt loam	930
Shelbyville silt loam	38,470
Woolper silt clay loam	240
Total	**180,170**
SUMMARY	
TOTAL LAND ACRES	245,120
TOTAL WATER ACRES	640
TOTAL ALL ACRES	245,760

Source: U.S. Soil Conservation Service, Soil Survey of Shelby County, Kentucky. (NOTE: Urban & Growth areas not deleted from this table)

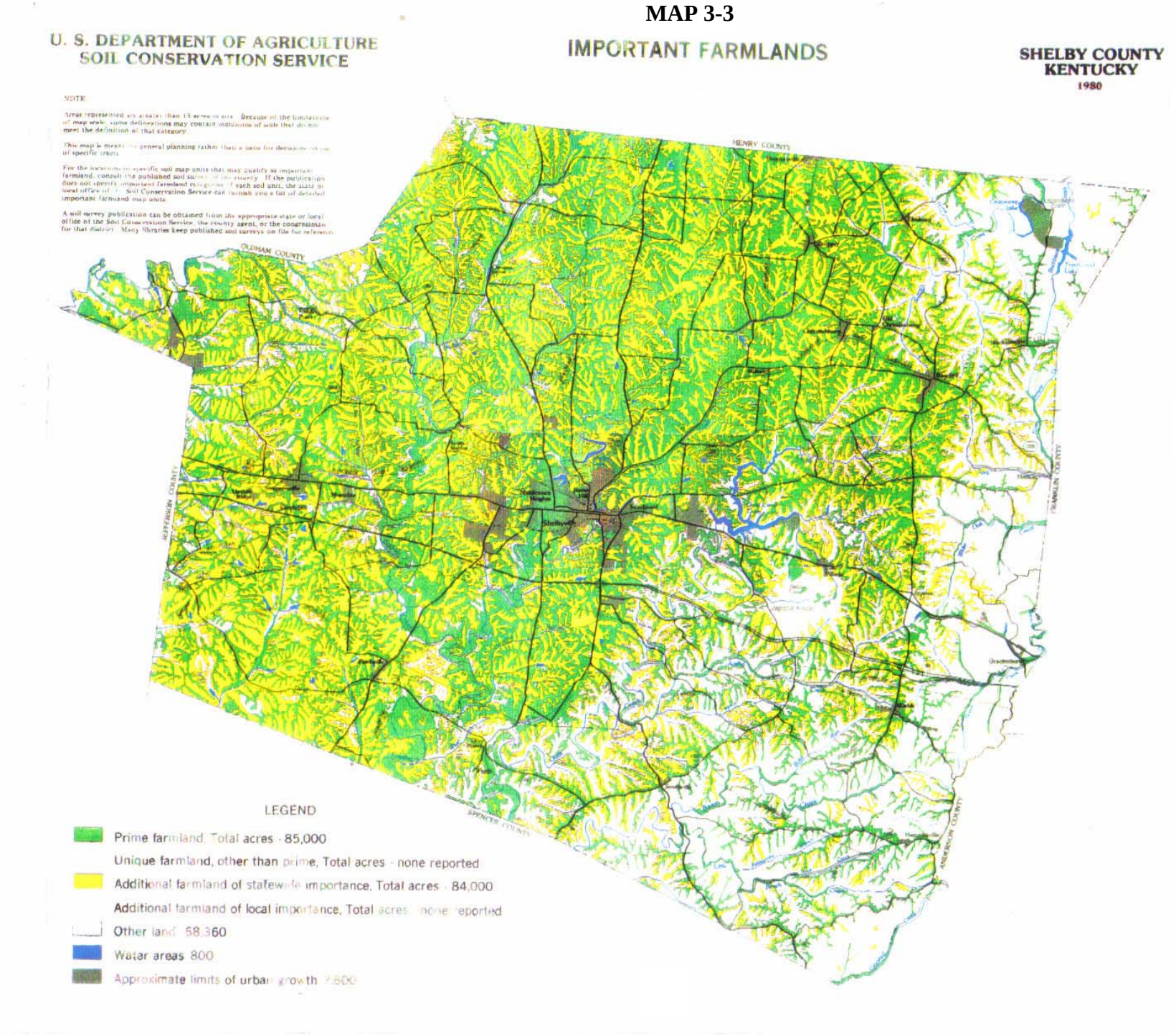
Table 3-4 – Prime Agricultural Land in Shelby County

Soil Name	Acres
Beasley silt loam, 2 to 6 percent slopes	660
Boonesboro silt loam	720
Cider silt loam, 2 to 6 percent slopes	1,900
Elk silt loam, 0 to 2 percent slopes	670
Elk silt loam, 2 to 6 percent slopes	1,780
Lowell silt loam, 2 to 6 percent slopes	3,600
Newark silt loam	700
Nicholson silt loam, 2 to 6 percent slopes	24,650
Nolin silt loam	8,130
Otwell silt loam, 2 to 6 percent slopes	930
Shelbyville silt loam, 2 to 6 percent slopes	37,990
Woolper silt clay loam, 2 to 6 percent slopes	240
Total	**91,260**

Source: U.S. Soil Conservation Service, Soil Survey of Shelby County, Kentucky. (NOTE: Urban & Growth areas not deleted from this table)

Considering the importance of agriculture to the economy of Shelby County, Important Farmland should be conserved. This non-replaceable natural resource should be protected, whenever possible, by discouraging nonagricultural uses of this land. See Map 3-3 on the following page for the Important Farmlands in Shelby County.

MAP 3-3


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
IMPORTANT FARMLANDS
SHELBY COUNTY
KENTUCKY
1980
NOTE
HENRY COUNTY
OLDHAM COUNTY
JEFFERSON COUNTY
FRANKLIN COUNTY
SPENCER COUNTY
ANDERSON COUNTY
LEGEND
Prime farmland, Total acres - 85,000
Unique farmland, other than prime, Total acres - none reported
Additional farmland of statewide importance, Total acres - 84,000
Additional farmland of local importance, Total acres - none reported
Other land 58,360
Water areas 800
Approximate limits of urban growth 7,600

Ground Water

Ground water is an important subsurface feature of the land. The depth of the water table is of particular significance. The water table is the underground surface below which all area between soil grains is filled with water. A high water table can lead to flooded basements, flooded utilities, unstable building foundations, and difficulty in excavation work. The depth of the water table can vary markedly due to the topography of the land. In general, the water table is deepest beneath hills and ridges and shallowest alongside lakes, ponds, streams, and seeps or springs where it intersects the ground surface. Its depth can also fluctuate seasonally or over longer periods. The depth of the seasonal high water table is important in the planning of development of Shelby County. For most soil types, the water table remains below a depth of 72 inches. However, the seasonal high water table is between 18 and 30 inches below the surface of Nicholson soils. These areas are often subject to wetness. This in turn adversely affects the absorption of the effluent from septic tank sewage systems.

There are no areas in Shelby County where wells produce over 500 gallons of water per day. Many areas along flood plains and streambeds produce between 100 and 499 gallons per day. Most wells in the remainder of the County produce less than 100 gallons of water per day.

Archaeological and Historical Sites

Most of the preceding discussion concerned the physical environment. Another important environmental concern is the preservation of the County's cultural heritage. This can be accomplished primarily through the preservation of sites of archaeological, historical or architectural interest. The following discussion presents an inventory of archaeological and historical sites in Shelby County and offers recommendations for the preservation of these irreplaceable cultural landmarks.

Archaeological Sites

There have been a total of 22 prehistoric and historic archaeological sites recorded in Shelby County. The relatively small number of sites does not reflect an absence of sites in the County, but merely the small amount of archaeological research that has been conducted. The County undoubtedly has a large number of unreported sites. About one-third of the sites have been reported from the Shelbyville vicinity. The specific locations of archaeological sites are not normally disclosed to the general public to protect them from vandalism.

Projects in the early planning stage should be reviewed in order to assess their potential impact on archaeological sites. In some cases it will be necessary to conduct an archaeological survey to determine the presence or absence of sites in a specific project area. In other cases, the type of construction or the fact that the land has been previously disturbed would make a survey unnecessary.

Projects involving federal funds or programs must be reviewed (as part of the A-95 review process) by the Kentucky Heritage Council and the Office of State archaeological sites. State law (KRS 164.705 - 164.735) prohibits persons from injuring, destroying or defacing any archaeological site or object of antiquity situated on lands owned or leased by state or local

government. Persons who plan excavation or disturbance of such sites must obtain a permit from the Office of State Archaeology at the University of Kentucky. Any person who discovers an archaeological site or object of antiquity in the course of construction work shall report this discovery to the Office of State Archaeology. Notification is necessary so that appropriate actions can be taken. Such actions include archaeological surveys and the collection of artifacts.

Historical Sites

The National Register of Historic Places is a listing of the nation's historical and cultural resources that are worth preserving. Nomination to the register is handled by a state review board. The Kentucky Heritage Council is the Kentucky agency that accepts applications for review. The Council lists 277 sites in Shelby County and 132 sites in Shelbyville that are either on or eligible for the National Register of Historic Places. A total of 409 have been surveyed. In addition to the historic buildings, there are 13 locations of stations and fortified houses that were the locations of the first settlements in Shelby County that are being investigated. The Shelby County Courthouse and the surrounding commercial area have been placed on the register as a Historic District. Sources for more information and mapping regarding historical surveys are the Kentucky Heritage Council and the Shelby County Historical Society.

Projects involving federal funds or programs must be reviewed as part of the A-95 review process by the Kentucky Heritage Council, which determines the potential impact of the project on historical sites. Laws such as the Historic Structures Act (October 1976) offer tax incentives or grants in aid to owners of properties on the register to encourage preservation of these places. The Commonwealth of Kentucky has not adopted legislation providing preservation safeguards in the use of state funds like those required under federal law. For example, Kentucky does not offer tax incentives to encourage the preservation of historic properties. However, the state does allow local governments to enact legislation to protect historic sites or districts under the same law that permits zoning.

Elements listed under Environmental Design in Chapter 1 encourage the preservation of buildings, sites and districts that are recognized as having historical or architectural value. Public agencies can encourage historic preservation by providing technical advice on preservation-related tax incentives, rehabilitation strategies and the conversion of historic structures to other uses.

The City of Shelbyville has a historic zoning overlay in an area along Main Street that is administered by the Historic District Commission which has an Architectural Review Board. It is recommended that specific sites in the City and County that are worthy of listing on the National Register also be zoned Historic. Either the present review board would assume the review authority outside the corporate limits or a new County board should be established. There are historic sites in the City of Simpsonville that should be zoned Historic and this presents the future option of establishing a County wide architectural review board that would involve the County with both cities.

Summary

Shelby County typically has hot summers and moderately cold winters. Average monthly temperatures range from about 28 to 74 degrees. Annual precipitation averages about 45 inches a year.

Shelby County lies in two physiographic regions: The Outer Bluegrass in west and central Shelby County and the Hills of the Bluegrass in east and southeast Shelby County. The Outer Bluegrass is characterized by rolling hills with moderate slopes. The Hills of the Bluegrass is characterized by rugged, hilly terrain with steep slopes. For several reasons, development is not generally recommended on steep slopes, especially those over 20 percent. Thus much of east and southeast Shelby County is unsuitable for many types of development.

Some of the major creeks and their tributaries lie in flood plains, which are subject to periodic flooding. Development in these flood plains should be severely limited due to the potential hazards involved by the establishment of conservation zoning districts. Ground water is important in two main ways. The depth of the water table can affect flooding conditions and the absorption of the soil. Ground water may also be important as a water supply for uses other than domestic.

There are five major soil associations in Shelby County: Beasley-Crider-Nicholson; Lowell-Nicholson; Shelbyville-Lowell; Lowell-Eden; and, Eden-Lowell. The latter two soil associations, found in the east and southeast part of the county, are generally unsuited for urban development, recreational uses and agriculture. The best soils for these uses are the Shelbyville-Lowell association in central Shelby County. The other two soil associations are generally suitable for most uses. Most soils in the county are unsuitable for the use of septic tanks due to clay subsoil’s and slow permeability.

About 91,260 acres, or 37.2 percent of the County's land, are considered to be Prime Farmland. About 180,170 acres, or 73.5 percent, of the County's land are considered to be Farmland of Statewide Importance. These lands, and particularly Prime Farmlands, should be conserved to protect the important agricultural sector of the economy.

The preservation of the County's cultural heritage is an important environmental concern. About 409 historical sites, 13 early settlement sites and at least 22 archaeological sites should be protected. A number of federal and state laws encourage the preservation of these sites. Historic Zoning is recommended to be the local method of encouraging preservation.