

Woodford Resources: Land, Water and Air

Versailles • Midway • Woodford County Planning Commission

Background Study for the 2003 Comprehensive Plan Update

Special points of interest:

- This is the fifth update in the history of planning in Woodford County (1969, 1977, 1989, 1997 and now).
- Woodford County lies in the Watershed of the Kentucky River
- Much of Woodford County is susceptible to the formation of sink-holes.
- Woodford has good air quality, but will need to cooperate with its neighbors to maintain that quality.



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A copy of this report (in PDF format), or any other Background Report can be downloaded from woodfordcountyplanningandzoning.com.

The Update Process

This Report is one of six Background Studies prepared for the Comprehensive Plan Update. Other studies include: People, Jobs and Housing; Regional Coordination; Mobility; Community Facilities and Services; and The Use of Woodford Land.

The purpose of Background Studies is to review historical trends and current conditions, and identify issues and opportunities for the community to address in the planning process.

Trends, issues and opportunities provide a “stepping-off”

point for the community. This information is helpful in measuring the success of prior plans and fine-tuning goals and objectives. This is a necessary first step in updating the Versailles, Midway and Woodford County Comprehensive Plan.

Woodford Resources: Land, Water and Air

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Introduction

The characteristics of land and water can determine much of the economic and built character of a community. What are those characteristics for Woodford County and how will they constrain or sustain Woodford's future.

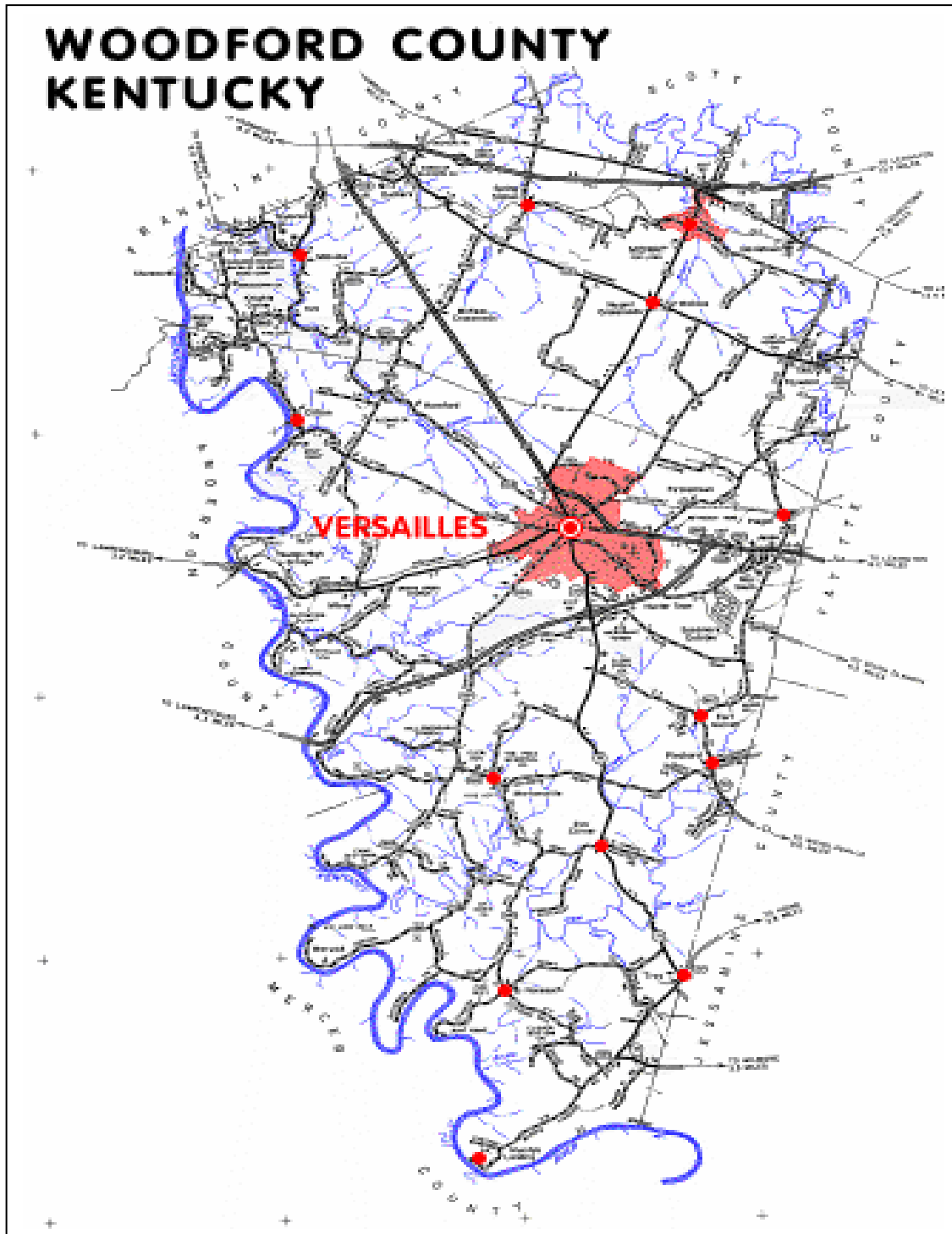
This *Background Report for the Comprehensive Plan Update* provides a basic understanding of the natural land and water features of the County, the relationship of these features to Woodford's growth and development, and possible trends and issues regarding the use and disposition of Woodford's natural resources.

Woodford County's most significant heritage is its land and water resources. The **Kentucky River**, which connects to the Ohio River to the north, comprises the entire eastern boundary of Woodford County. During the 18th and 19th centuries, the river afforded a primary means of transportation for people and goods arriving and departing the area. Today, the importance of the river as a means of transportation has obviously declined but it now serves as a primary source of drinking water not only for Woodford but also for a growing population in the Bluegrass Region (see the People, Jobs and Housing and Regional Coordination Background Reports for a discussion of population characteristics of the Bluegrass Region).

Woodford's land has also been a contributing factor in its history, supporting a substantial agriculture based economy. Today, that agricultural base is changing from one dominated by tobacco to one supporting a growing equine industry. The title for this Background Report includes agriculture as a Woodford resource –although most would think of agriculture as an activity – not a natural resource. However, in Woodford the characteristics and use of the land are so inextricably tied together that we have simply chosen to include the term in our definition of “resource”.

In Chapters 1 and 2, the existing characteristics of land and water in Woodford are identified and described. Chapter 3 is devoted exclusively to the use and disposition of Woodford's natural resources. Chapter 4 provides an overview of trends, issues, opportunities and challenges and is provided as a basis for developing planning goals and objectives. These goals and objectives will be instrumental in shaping the direction of the 2003 Comprehensive Plan Update process, and provide guidance to a host of organizations involved in setting Woodford's agenda for the next generation.

Figure 1.1





Characteristics of Land Resources

The geology, soils and topography of Woodford County

The geology, soils and topography of an area are important to the community planning process for several reasons. Geological conditions determine the existence and extent of sinkholes, an important consideration in roadway, storm water and subdivision design. Soil classifications help to determine the potential of land areas for agricultural use, forage for cattle or horses, and human development at either the urban or rural scale. The type of soil present in a particular location can also be an accurate indicator of the presence of wetlands, as well as the suitability of the land for disposal of waste through septic tanks.

Topographic information, which describes the “lay of the land” or the vertical elevation of land (typically measured as the number of feet above or below mean sea level), can have a wide range of uses. The degree of slope can be used as a measure to establish thresholds for land uses, and the engineering practices that may be necessary to avoid unsafe building conditions. For example, a slope of 15% is probably too steep (without significantly altering the existing grade) to permit the safe operation of a public road.

Land elevation is also critical in determining the direction and velocity of storm water runoff. This is an important consideration for drainage of land as well as the management of storm water in urban and rural areas. Lands with very steep slopes generate greater velocity of storm water runoff and are, therefore, more problematic for human development regardless of its urban or rural scale.

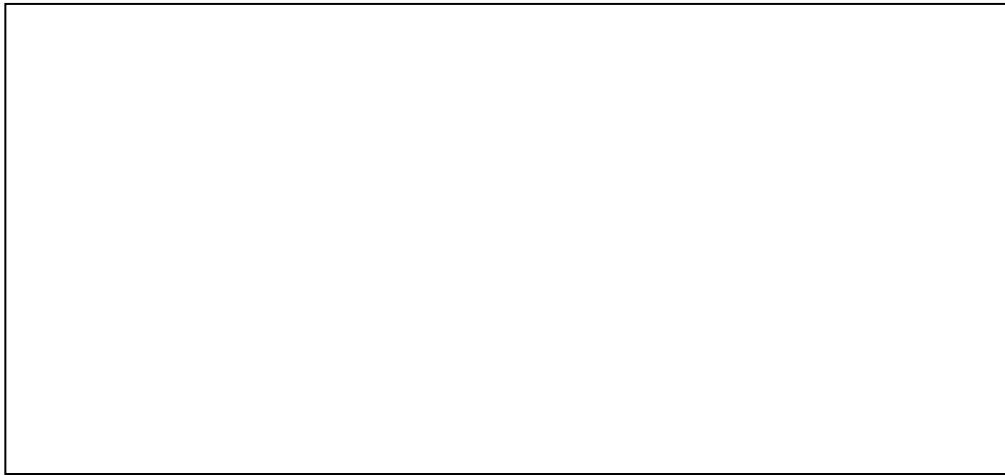
In Woodford County’s case, topography also is a primary ingredient in the usefulness of the land for agricultural purposes, and is an inherent factor in the quality of scenic vista’s. Topography is also a contributing factor to the value of land for the

purpose of producing high quality thoroughbred horses. Land with moderate changes in elevation produce higher quality horses as a result of the aerobic workout that horses gain by exercise through the rolling topography.

Geology of Woodford County

Woodford County is located in the Inner Bluegrass physiographic region. This region is underlain by limestone of the Cynthiana, Lexington, and High Bridge formations. The Cynthiana Formation, located primarily in the northwestern part of the County, is mainly limestone interblended with thin layers of calcareous shale. The High Bridge Formation, found primarily along the Kentucky River Gorge, is massive limestone, the oldest exposed rock in Kentucky. The rest of the County is underlain with the Lexington Formation and these areas are high in phosphate typical of the Maury and McAfee soil types.

While most of the County has gently rolling slopes, steep slopes have been formed in areas with less weather resistant rock formation. Limestone bluffs and gorges have occurred in areas where streams leading to the Kentucky River created deeply cut narrow valleys.



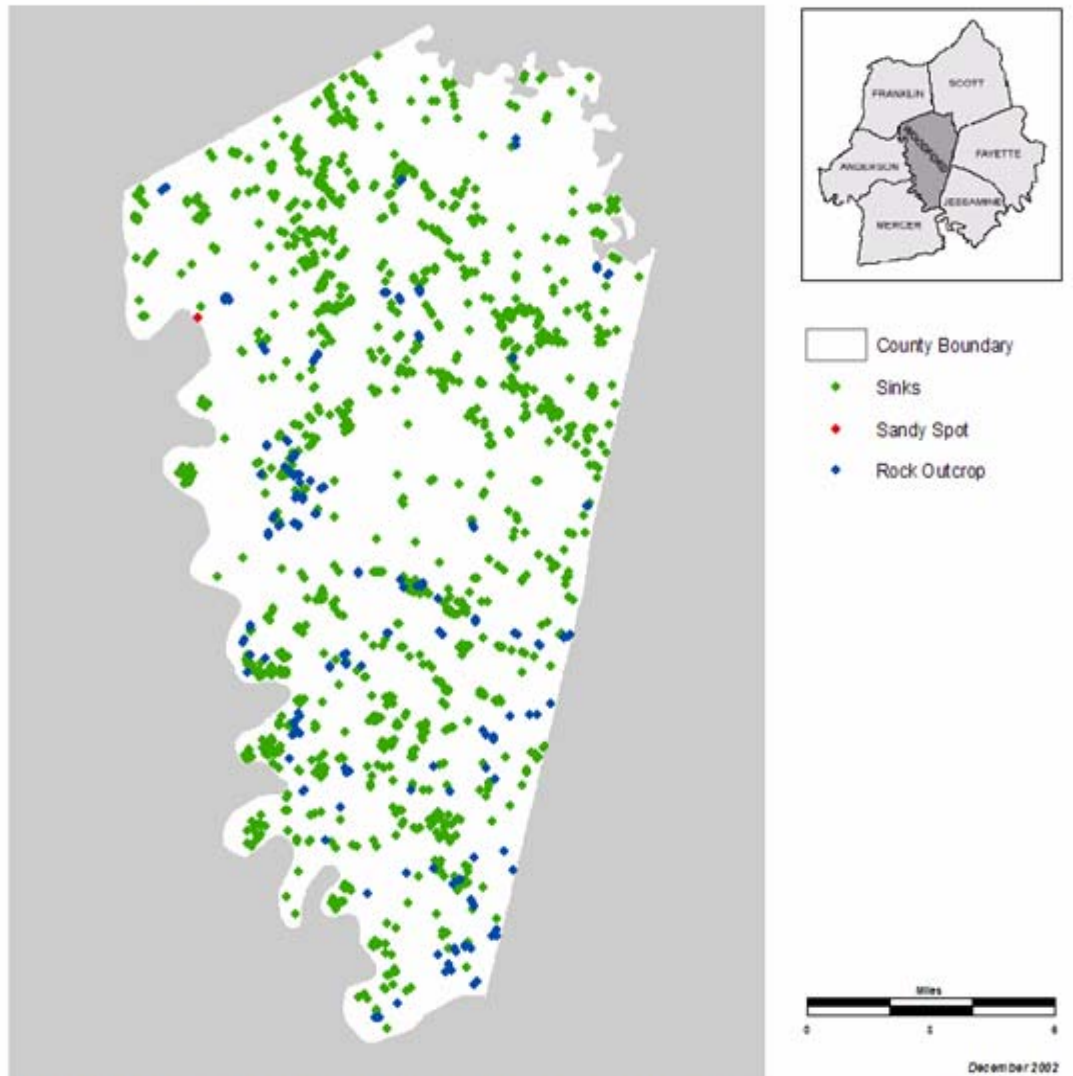
Looking northwest from Lawrencburg Road along the Kentucky River Gorge

The limestone that underlies Woodford County, and most of central Kentucky, is also prone to the formation of sinkholes. Sinkholes are one of the end results of the interaction of limestone and water. As storm water (or groundwater) seeps through a limestone formation it dissolves the stone, forming underground voids that may fill with groundwater or may become dry caves. However, as groundwater levels fluctuate or other conditions occur, the soil above these natural voids subsides into the void – creating a sinkhole.

Without extensive geotechnical analysis it is difficult to determine where sinkholes will occur. At best, it can be inferred that areas of Woodford County with existing

Figure 1.2

Woodford Resources: Land, Water & Air Geologic Formations and Known Sinkholes



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VERSAILLES MIDWAY WOODFORD COUNTY

CONTEXT
A State-Wide Geologic Context
Paul Coomes, PhD, University of Louisville
Michael Price, Kentucky State Data Center
Bluegrass Tomorrow, Inc.

sinkholes are more prone to such activity than areas without. Figure 1.1 depicts areas with sinkhole concentrations based on data generated by the United States Geological Survey.

The significant number of known sinkholes shown on Figure 1.1 can only be interpreted to mean that much of Woodford County is susceptible to additional formations. The largest concentration of known activity appears to be in the northern portion of the County above the line formed by US 33 and US 60. Lands south of this line, which are characterized by more steeply sloped areas, also is prone to sinkhole activity, particularly along stream corridors. This suggests that surface water movement most influences the water and limestone relationship in the southern portion of the County. However, in the northern portion of the County that relationship is most likely to be more susceptible to groundwater conditions.

Should the relationship between water action and limestone formation suggested above, for the southern part of the County, prove to be accurate it suggests that storm water management associated with human uses of the land should be closely monitored. Increased storm water flow in the stream valleys could have the effect of accelerating sinkhole formation activity – to the possible harm of affected property owners

Soils

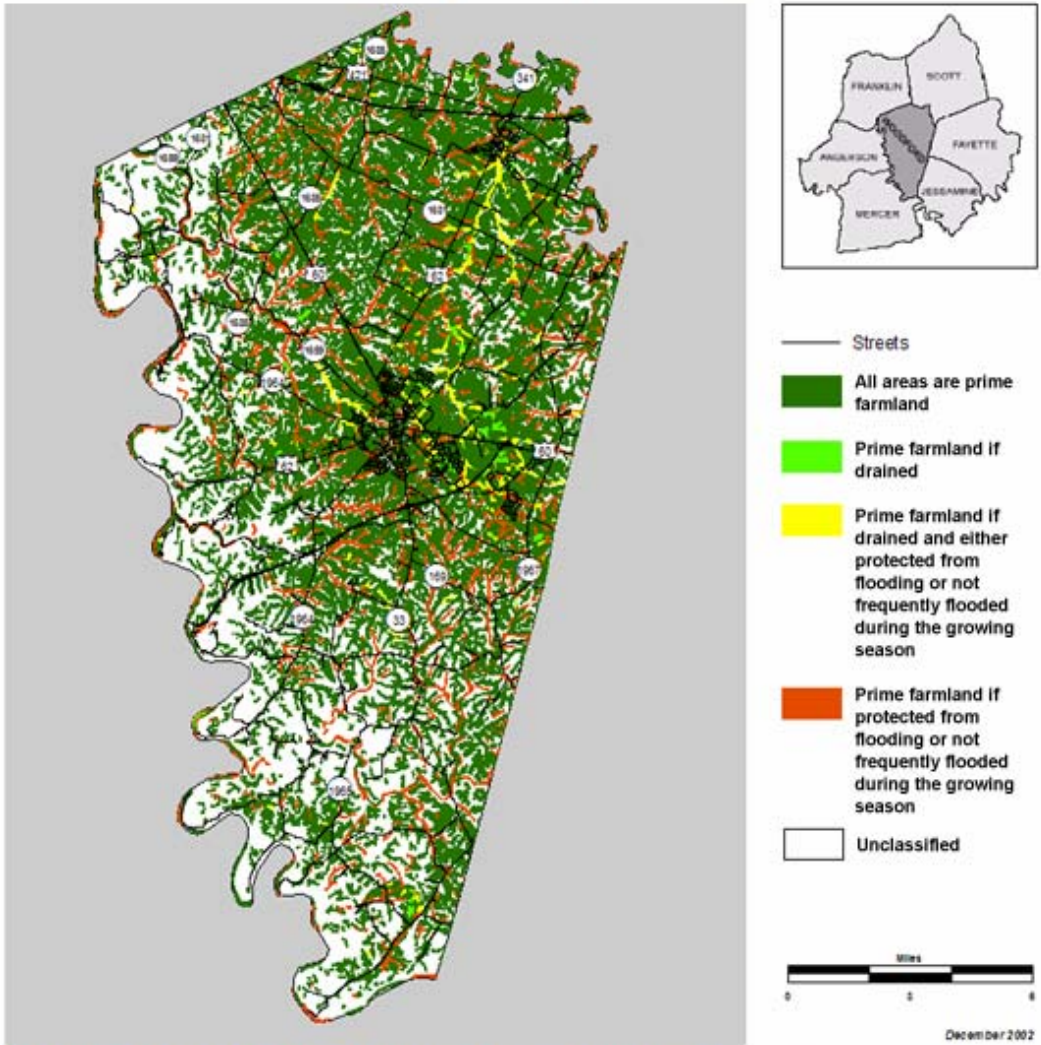
Generalized soil classifications and prime farmlands are depicted on Figure 1.2. Soil data has been developed from a Soil Survey of Woodford County undertaken by the National Resource Conservation Service. Soil types have been grouped into three primary associations with similar characteristics. The prime farmland data is created from a composite of factors, including soils, topography, drainage and floodplain. There are four categories of prime farmland ranging from areas with no constraints to areas with potential flooding constraints.

The **Maury-McAfee** Association, making up about 40 percent of Woodford County's soils, is found in the northern half of the County. This association consists of broad gently sloping ridges and somewhat steeper slopes along drainage ways and around sinkholes. Irregular topography, including sinkholes, are common in this soil unit. Most of this acreage is used for cultivated crops, hay and pasture. Historically, the chief crops have been burley tobacco and Kentucky bluegrass for pasture and hay. This unit has high potential for cultivated crops, some specialty crops, woodland, and intensive recreation facilities except in areas of steeper slopes. In some areas, more intensive uses would be limited by depth to bedrock and flood hazard.

This area encompassed by this association also contains a significant portion of the prime farmland in Woodford County. It is interesting to note the location of Midway and Versailles in relation to the major pockets of prime farmland – both communities were located in close proximity to these pockets.

Figure 1.3

Woodford Resources: Land, Water & Air
Soil Capability for Agricultural Use



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CONTEXT
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The most predominant soil association in Woodford County, the **McAfee-Maury-Fairmont unit**, makes up about 50 percent of County land area. This soil type is found primarily in the southern and western parts of Woodford County. The areas that include this soil unit consist of rolling uplands and moderately steep slopes along the major drainage ways; and, karst topography (rock outcroppings and sinkholes) is also common. Most of the acreage in this association is used for cultivated crops, hay and pasture.

The soils in this unit have medium potential for cultivated farm crops, specialty crops, woodlands and recreation facilities. On steeper cultivated slopes, the hazard of erosion is severe. Crop production and facilities for intensive recreation are limited in many places because of the slope and depth to rock.

The **Fairmount-Rock Outcrop** unit, comprising approximately ten percent of the County's soils, is found along the southern and western boundary of the County bordering the Kentucky River. The landscape in this soil unit consists of long, very steep slopes, massive limestone outcrops, or palisades. Slope varies from fairly level to strongly sloping and this feature combined with periodic flooding impact the soils development potential. Most of the acreage in this association is in low-grade hardwoods, red cedar, and brush. Some of the acreage has been cleared for hay, pasture, tobacco, and corn.

Soils in this map unit generally have low potential for cultivated or specialty crops, woodlands, urban or intensive recreation uses due to erosion hazard, depth to bedrock, the rock outcrop, steep slopes, and flooding hazard areas. There is very little prime farmland within the area encompassed by this soil association.

Soil associations and subsurface geology (depth to bedrock for example) are also key elements in determining the suitability of geographic areas for waste disposal via septic tank systems. Although Woodford County discourages the use of septic tank systems, preferring centralized public collection and disposal systems, a brief overview of this factor may be useful in the review and evaluation of future conservation or rural residential subdivision proposals.

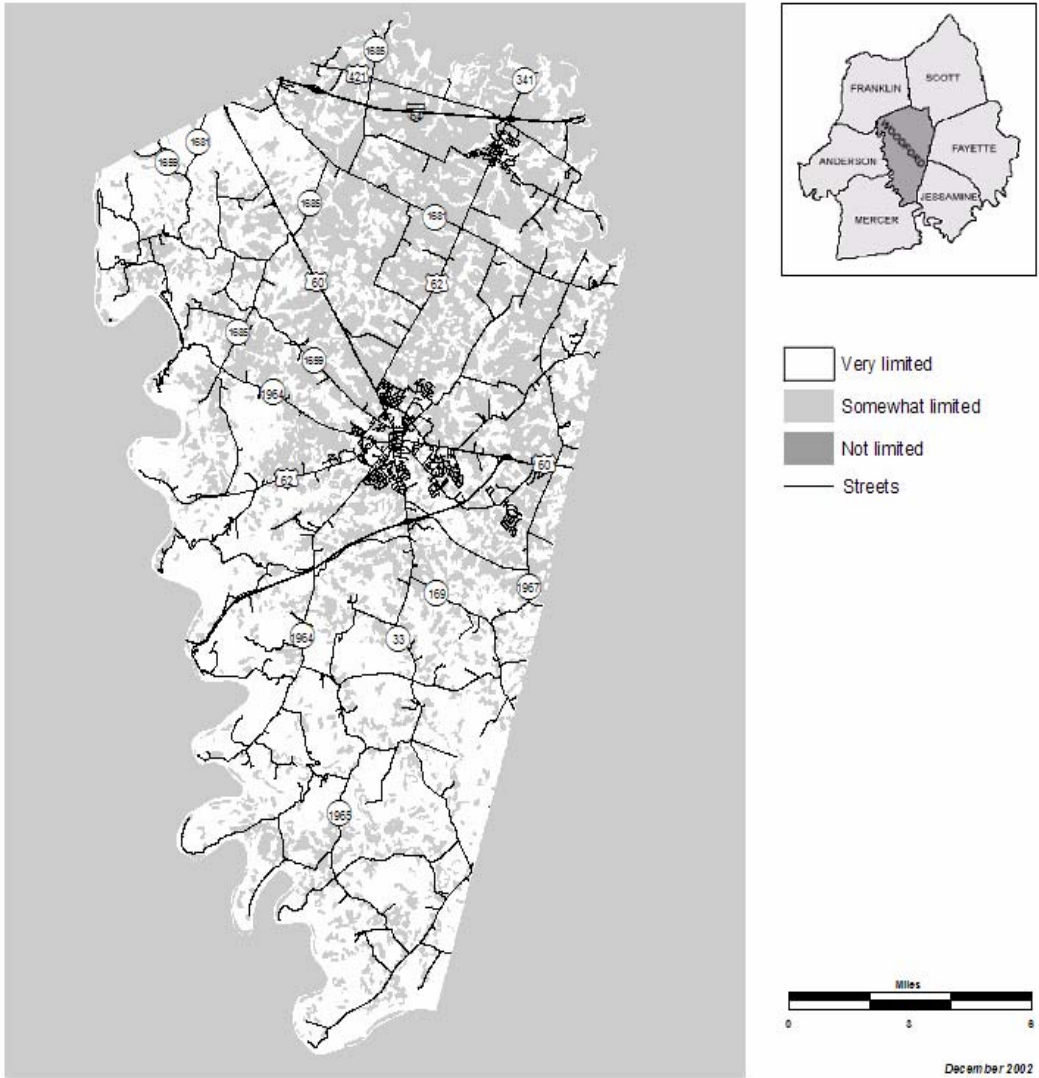
The suitability of a specific site for waste disposal is determined in large part by three factors, soil texture and structure, the depth to bedrock, and the size of the site.

Soil texture and structure determine how quickly or slowly water will move through the medium (drain). Depth to bedrock will be a partial indicator of the capacity of a site to dissipate a given volume of wastewater. If the depth, as measured from the surface soil is very shallow, the site may have insufficient area in which a drain field can properly function. Finally, size of site is also an indicator of whether there is sufficient area for disposal purposes.

The area of Woodford County that falls within the prime farmland classification (no constraints or conditions) generally represents the area that would be most suitable

Figure 1.4

Woodford Resources: Land, Water & Air Soil Capability for Waste Disposal by Septic Tank



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for use of septic tank disposal systems. This is borne out by the information depicted in Figure 1.3, which confirms that a large percentage of septic tanks systems permitted and continuing to function are located within prime agricultural lands in the northern portion of the County.

It is unfortunate however, that the depth of bedrock for much of this area is also fairly shallow and susceptible to sinkhole formation. This means that existing septic tank systems, while capable of proper functioning within a given site, may likely have a cumulative negative impact to the groundwater system. Data maintained by the Woodford County Health Department indicates that approximately 10 septic tank systems are reported to fail each year.

The gently rolling topography of northern Woodford County, shallow soil profile to bedrock and septic tank operations is also problematic because this combination of factors can result in wastes transmitted to the surface through springs created by a perched groundwater table. The potential health threat from this scenario could be severe for humans, horses and cattle.

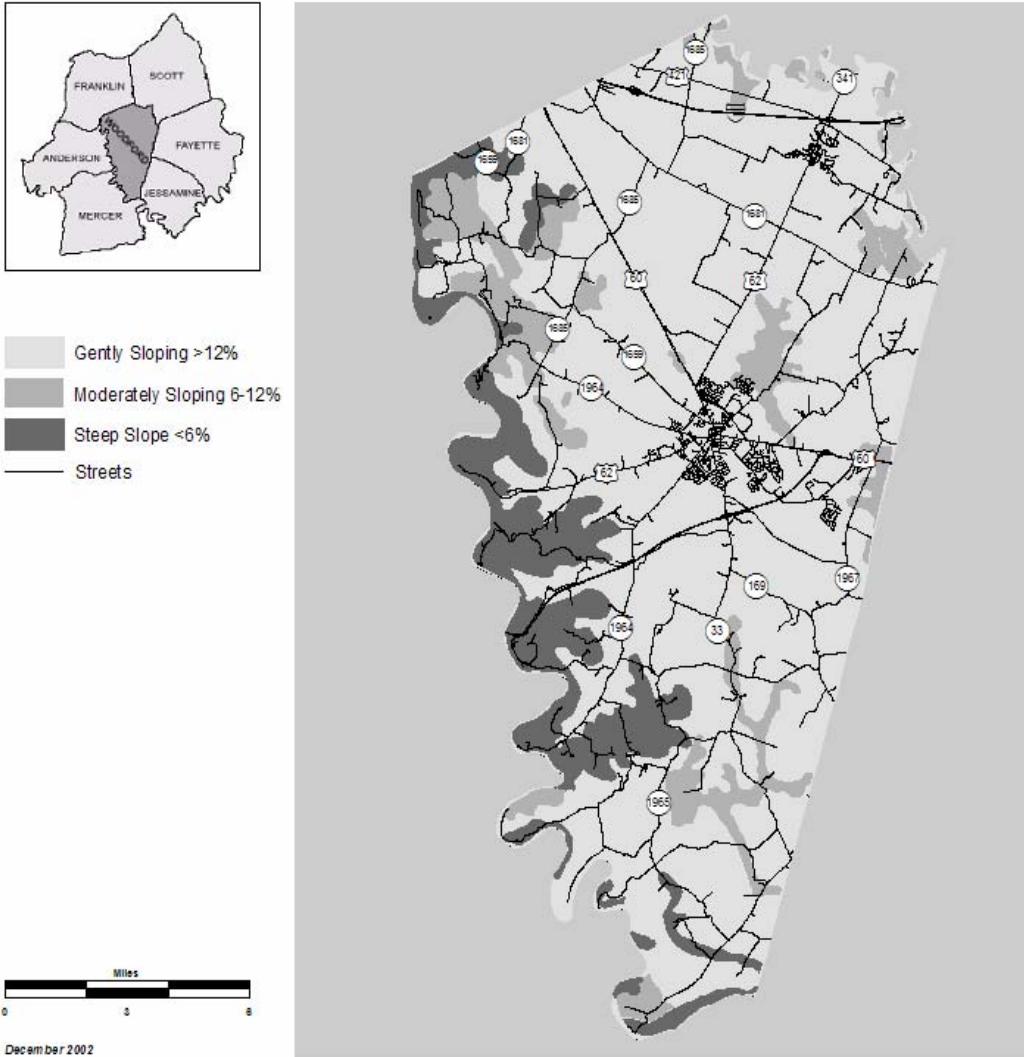
Topography

The topography of Woodford County can vary significantly depending on location – from the steeply sloped areas adjoining the Kentucky River to the gently rolling landscapes of the northern part of the County. For analysis purposes, topographic features have been grouped into three classifications: areas with slopes less than 6 percent; areas with slopes between 6 and 12 percent, and areas with slopes greater than 12 percent. These categories represent benchmarks relative to the use of land for human use at either urban or rural scales. These topographic categories are depicted on Figure 1.5



Figure 1.5

Woodford Resources: Land, Water & Air Topographic Contours/Slopes



CONTEXT
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Generally, the greater the slope the more constrained the land is for development and agriculture. Why? Development or agricultural practices on steeply sloped areas require special engineering for foundations and structures as well as altered agricultural production practices that are not economically feasible for most types of crops. In addition, more difficult to address erosion control and storm water management in areas of steep slopes. The velocity of storm water runoff in areas of steep slopes simply overwhelms the capabilities of most types of silt fences and detention facilities.

The analysis of the data presented in Figure 1.5 indicates what other components of this review have also revealed, the western most areas of the County are significantly constrained. In this case the constraint is the presence of slopes greater than 12 percent. The southern portion of the County does not have severe changes in topography, but still exhibits some areas of steep slopes. Lands north of Versailles are characterized as gently rolling and there are few areas constrained in any way by topographic features.

Natural Vegetation, Woodlands and Wildlife Habitat

This aspect of land resources in Woodford County has not been previously addressed in the Comprehensive Plan, yet it is an integral part of the natural environment that residents and visitors can enjoy.

Woodford's natural environment ceased to be "natural" some time ago. Farming and other land altering practices have permanently changed the Woodford landscape. What remains today is still very valuable in terms of wildlife habitat and scenic vista's.

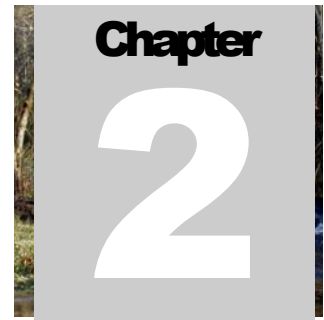
Figure 1.6 contains an aerial photograph of Woodford County. It is evident from this photograph that Woodford's former natural environment still predominates in the western part of the County adjacent to the Kentucky River. However, in the northern and southern parts of the County, extensive former woodlands have been transformed through agricultural operations. Significant stretches of woodland still remain, particularly in the Pisgah area and lands around Nonesuch.

Figure 1.6
Aerial Photograph of Woodford County depicting Woodlands and Vegetation

To be inserted in final draft.

Summary

The karst geology of Woodford County, which contributes significantly to the high quality of the soil and scenic topography of the land, is also the reason for the incidence of so many sinkholes. Water is the element that binds all of these characteristics together – providing the medium for the dissolution of the calcium carbonates that make up the limestone deposits, and in turn the limestone provides storage and avenues of movement for water from area to area. A land management strategy designed to minimize the sinkhole potential on human operations and structures should also manage the relationship of water and geology in terms of storm water surface flow, groundwater recharge and pollutant loadings.



Water Resources

Surface and ground water resources of Woodford County have supported the urban and agricultural needs of the community for more than 200 years. Will the quantity and quality of these resources be sufficient to sustain the Woodford community in the future?

Woodford County water resources include the Kentucky River, four major tributaries to the River, numerous small streams, springs and seeps, and a substantial groundwater aquifer. These resources have readily sustained the people, agriculture, cattle, horses and countryside of Woodford County, usually without restriction.

The Regional Coordination and People, Jobs and Housing Background Reports point to the fact that growth with the Bluegrass Region is extending, and some would say sprawling, into areas ill prepared to either protect important resources or to provide necessary services. Over the next twenty years the Region is projected to add close to 200,000 new residents, and there are concerns that existing sources of drinking water may not be sufficient.

The impacts of growth and development along Woodford's borders, and within watershed basins that Woodford shares with other counties, also may be experienced in terms of declining water quality and increased flow in the channels of local streams and drainage ways. When post development storm water runoff exceeds predevelopment conditions, the results can include increased soil erosion, poor water quality, loss of aquatic and upland habitat, and flood damage to downstream landowners.

WOODFORD RESOURCES: LAND, WATER AND AIR

This review and analysis of Woodford's water resources sets the stage for the Plan Update to address how these resources will be protected in the future and possibly how Woodford County can work with its neighbors to avoid some or all of the potential problems discussed above. The following section of this Chapter addresses the surface water resources available to Woodford County.



Aerial View of the Kentucky River Watershed

The Kentucky River Watershed

The Kentucky River Basin includes an area of about 7,000 square miles and 16,000 linear miles of river and streams. The river system originates in the uplands of southeastern Kentucky and flows northwest through the rolling topography of Central Kentucky to join the Ohio River near Carrollton in north-central Kentucky.¹

Woodford County is one of 41 Kentucky counties encompassed within the River Basin. It is the most densely populated river basin in Kentucky, according

¹ Kentucky River Basin Status Report, Page 2, November 1997, Prepared by the Kentucky River Authority and Kentucky Department of Natural Resources and Environmental Protection- Division of Water.

to population figures from the 1990 Census. The north-central portion of the Kentucky River Basin, which includes Woodford, is located in the Inner Bluegrass region. This region is characterized by karst topography, with numerous sinkholes and caves in limestone bedrock. The main stem of the Kentucky River has formed an incised meander in the Ordovician limestone that is highly susceptible to physical and chemical weathering resulting in scenic palisades².

The Kentucky River Basin Status Report, prepared in 1997 by the agencies listed in the preceding footnote, is an excellent source of information about the Basin and its conditions and characteristics. What follows below is a summary of key points in the Report that specifically relate to Woodford County.

- ❑ Approximately 56% of Kentucky's freshwater mussel species are found in this Basin and many have been severely impacted by pollution, physical alterations to streams and siltation.
- ❑ About 81 percent of the Basin population derives its drinking water from surface water resources extracted and treated by 68 water systems.
- ❑ Groundwater resources supply 19 percent of people living in the Basin, with a majority of these living in the easternmost stretches of the Basin.
- ❑ Bacterial contamination of water supplies is frequently a problem, and many domestic water systems do not achieve the level of treatment that is technically possible. Contamination of Inner Bluegrass karst aquifers can occur quickly and in high concentrations due to rapid underground flow.
- ❑ Woodford County has between 10-29 soil and groundwater contamination sites. Contamination may be from underground storage tanks, old landfills, or hazardous waste sites. What is equally important for Woodford is that the neighboring counties of Fayette and Franklin have the largest and second largest number of contaminated sites within the Basin. This represents one of the regional issues referenced in the Regional Coordination Background Report.
- ❑ Woodford County did not have any reports of violation of KPDES permit limits by any point source dischargers between 1995 and 1997. Furthermore, it had a relatively small number of households (between 36 and 94) not on public sewer or septic system, generally restricted to the southern portion of the County.
- ❑ Although violations of KPDES permits limits have been nonexistent in Woodford County, there have been numerous violations reported in areas of Fayette, Franklin and Anderson immediately adjacent to Woodford.

² Ibid

This is particularly troubling given that many of the sites are located in the South Elkhorn Creek subwatershed that encompasses much of the prime farmland and equine forage area of Woodford County.

- Based on 1994 data, Woodford County had the highest relative risk from toxic releases of all counties within the Basin. The three chemicals posing the highest relative risk include lead compounds, xylene and ammonia. Two of the more than 25 toxic release inventory sites are located in Woodford County, near Versailles.

The Kentucky Division of Water, in fulfillment of Section 305(B) of the Federal Clean Water Act, assesses current water quality conditions every two years. At present, the Woodford County portion of the River “fails to fully meet the standards for people to swim in the water (primary contact recreation support)”. The primary reason for this assessment is the presence of pathogens from agriculture and combined sewer outfalls. The latter causal agent is primarily from upstream sites.

Watersheds Within the Lower Basin of the Kentucky River

There are five subwatersheds of the Kentucky River that encompass Woodford County lands. The Subwatersheds are the drainage areas of major stream tributaries that discharge to the River and include Kentucky River 205 140, South Elkhorn Creek, Griers Creek, Glenss Creek and Clear Creek. The Kentucky River Basin Assessment Report³ contains a detailed inventory and analysis of surface and groundwater conditions for each of these areas. Copies of the assessment tables are included in the appendix to this Background Report. A brief overview of the outcomes of these individual assessments is provided below.

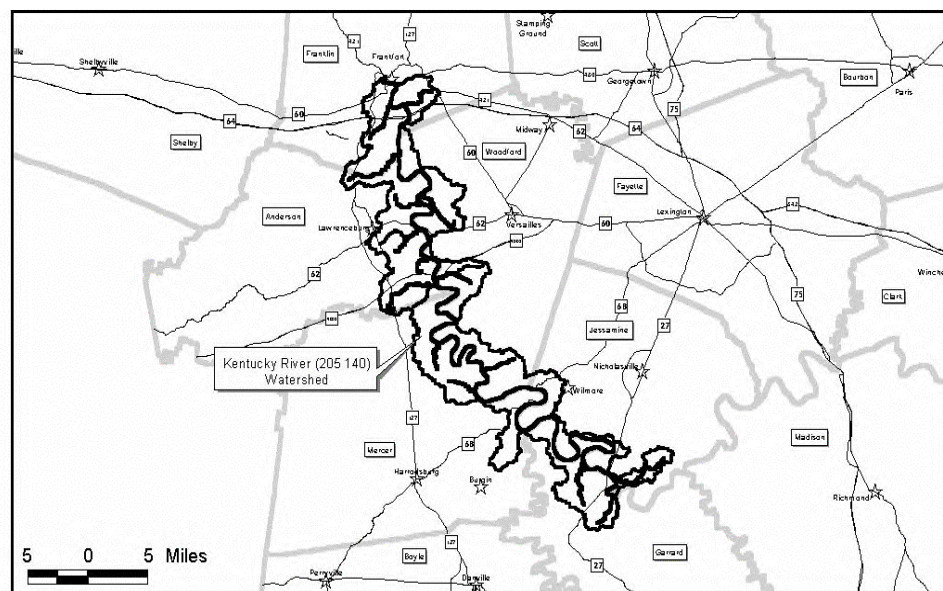
Kentucky River 205 140

This subwatershed includes the Kentucky River from just below Lock and Dam Number 8 to the mouth of Benson Creek in Frankfort. Of the 105,000 acres of land within this watershed, two-thirds is agricultural, one-fourth rural and wooded and the remainder is urban. The surface waters of the watershed supply the drinking water for municipal systems in Frankfort, Harrodsburg, Lawrenceburg, Versailles, and Wilmore.

³ Produced by the Kentucky Department of Natural Resources and Environmental Protection, 2000.

WOODFORD RESOURCES: LAND, WATER AND AIR

There are a significant number of wetlands (78 acres) located within the watershed, located at various points along the River in Anderson, Woodford and Franklin Counties. These wetlands are important to restoration potential of the Kentucky River, and have helped to offset adverse impacts from fertilizer loadings and agricultural erosion. However, if these loadings continue to increase in the future, the ability of the riverine wetlands to filter surface water runoff will be compromised. Increases in the volume and/or rate of surface water runoff from the major tributaries should also be considered and addressed as part of storm water management and design for agricultural, equine and urban uses.



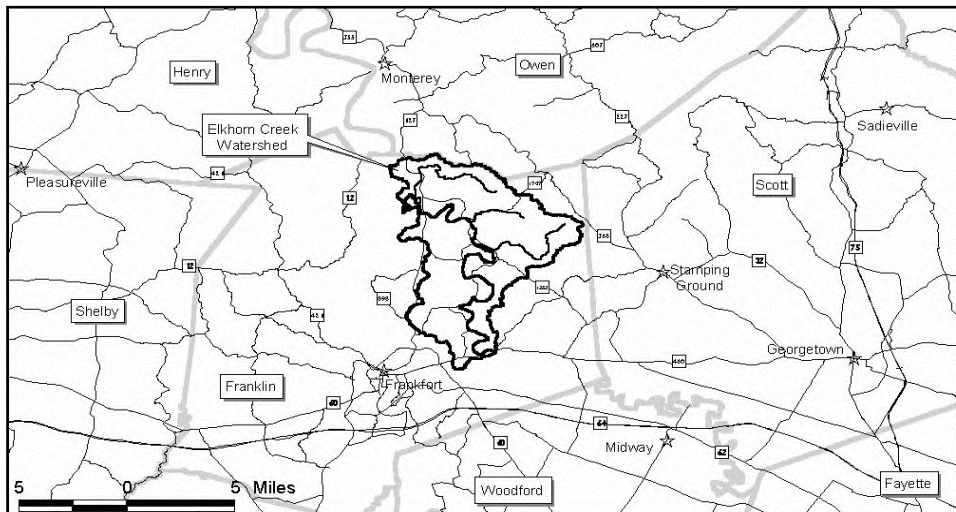
Among the creeks that feed the Kentucky River within this watershed are Canoe Creek, Little Hickman Creek, White Oak Creek, Cedar Brook, Brushy Run, Landing Run, Craig Creek, Gilbert Creek, Clay Lick Creek, Bear Branch, Cedar Brook, Bailey Run, Cedar Run, Sharps Run, Vaughn Branch, and Little Benson Creek. Water from the Kentucky River 205 060, Hickman Creek, Jessamine Creek, Clear Creek, Griers Creek, Glenss Creek, Dix River (lower), and Shaker Creek watersheds also flows into this watershed.

South Elkhorn Creek

The South Elkhorn Creek Watershed covers western Fayette County, northeastern Woodford County, and the southern edges of Scott and Franklin Counties. Land in the watershed (114,700 acres) is more than 80% agricultural

and 18% developed with residential, commercial or industrial land uses. Among the creeks that feed South Elkhorn are Vaughns Branch, Wolf Run, Steeles Run, Town Branch Creek, Shannon Run, Lee Branch, Beals Run, Buck Run, Hickman Branch and Slickway Branch.

This basin contains 86 acres of wetlands in 56 separate sites, primarily comprised of the riverine type associated with the creek and its tributaries. There are 48 contamination sites impacting human health within this watershed – significantly more than most other watersheds within the Kentucky River system – with an additional 34 potential sites. In all other assessment categories, including 260 KPDES discharge violations, South Elkhorn Creek demonstrates a high level of observed and potential adverse impacts from a variety of sources. These sources include soil erosion, agricultural fertilizer, urban uses and toxic chemical releases.



The fact that this watershed encompasses much of the prime farmland and horse farms of northeast Woodford County should be considered when evaluating future agricultural and urban development proposals. A regional effort to address stormwater management and stream restoration has already begun.

The South Elkhorn Creek watershed is one of the areas “targeted” for restoration efforts due to the fact that it is among the most polluted and most populated in the Kentucky River Basin. These efforts have resulted in a Watershed Plan prepared by a Task Force in which Woodford County representatives participated.

The Plan consists of a number of prioritized actions that will begin to address the conditions that are at the core of the water quality problems for this

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subwatershed. The actions that most involve Woodford County and require its action are summarized below.

- Establish streamside vegetation zones (to provide filtration of stormwater entering the stream).
- Create better standards for siting new septic tank/onsite wastewater systems and rehabilitating existing systems.
- Enforce floodplain construction laws and permits more thoroughly.
- Encourage local governments to undertake stream restoration than drainageways.
- Increase the size of riparian buffers by involving both public support and private landowners.
- In the Huntertown Road area near Shannon Run, septic systems are built low and close to the bedrock and not adequately installed.
- Monitor runoff from pastures turned into horse farms, with increased spraying for pasture maintenance.
- Dispel the misconception that properly installed and maintained septic systems will protect groundwater in karst. Encourage better design of septic systems.

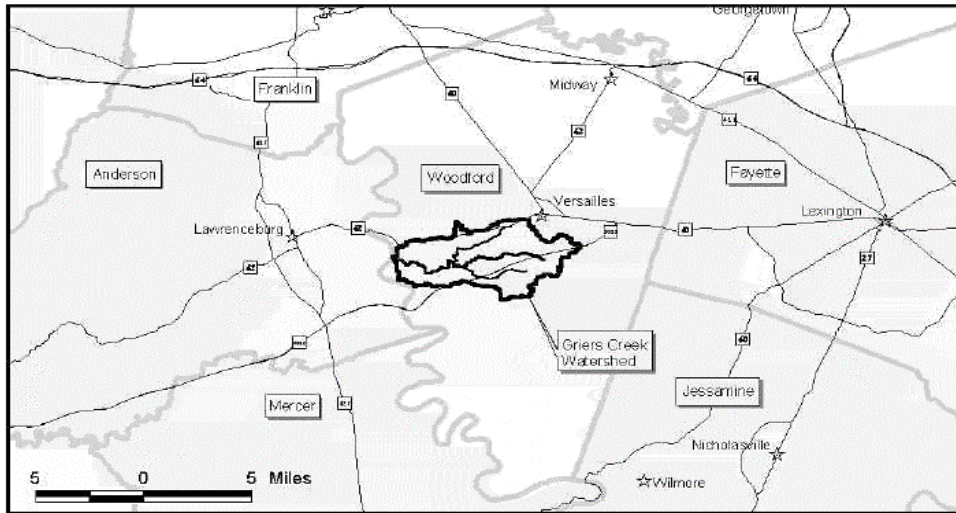
Implementation of the plan is ongoing, and Woodford officials and the Kentucky River Watershed Watch have expressed interest in finding ways to better monitor, inspect and regulate septic tanks in the watershed. There may also be opportunities to improve streamside buffers through planning for parks and open space, and alternative development practices in sensitive areas.



The creek at Labrot and Graham

Griers Creek

The Griers Creek Watershed is in west central Woodford County and it empties into the Kentucky River above Tyrone. Its branches drain the area south of downtown Versailles. Land in the watershed is 92% agricultural, rural or wooded, with a little more than 7% developed with residential, commercial or industrial uses.



The 10,000 plus acres of the watershed include only 3 acres of wetlands. It is assumed that agricultural and other land clearing operations have significantly reduced naturally occurring wetlands. There are very few observed or potential contamination sites, with only no KPDES discharge violations recorded for the period.

A portion of this watershed, west of downtown Versailles, lies in an area that may experience significant development in the future. With the recent announcement of the future Osram Sylvania manufacturing facility near the intersection of KY 62 and the Connector Road, the area is expected to benefit from other similar economic development activities. It will be important to ensure that future development sites have adequate on-site storm water detention and retention facilities to ensure that watershed branches and creeks are not adversely affected.

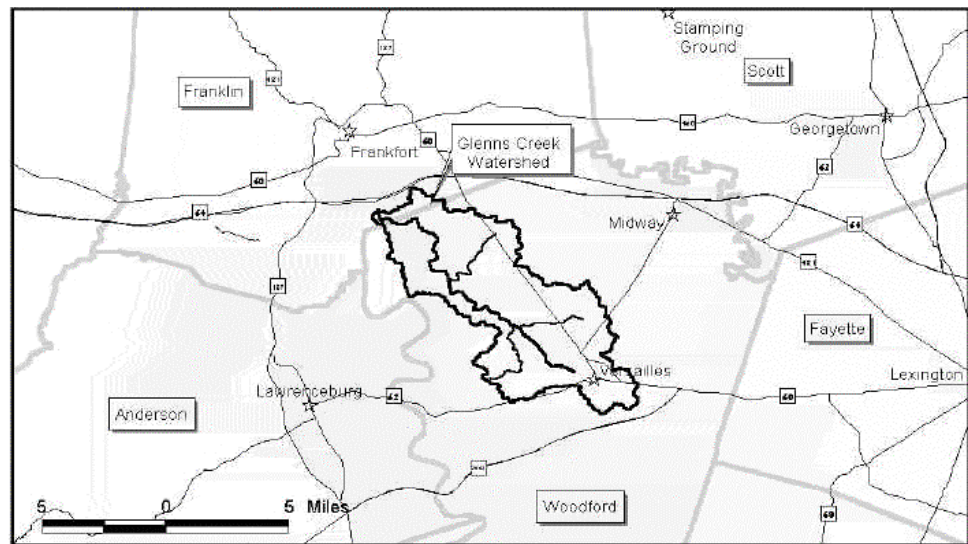
Glenns Creek

The Glenns Creek Watershed occupies a large portion of north central Woodford County and empties into the Kentucky River just south of Frankfort. Among the creeks and branches that feed this Watershed are

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Camden Creek and Buck Run. The City of Versailles draws some of its potable water supply from the surface waters of this Watershed. Its' land use characteristics are very similar to those of Griers Creek. It is also the location of several horse farms and the historic Labrot and Graham distillery.

The future viability of the County's equine industry and the basis for much of the existing agri-tourism business in Woodford County should be special priorities for planning. Maintaining water quality in the creek system feeding Labrot and Graham should be a high priority for storm water planning – particularly in addressing streamside buffers, storm water and equine/livestock waste management practices.



This watershed also has limited wetlands (18 acres) but a much larger drainage area than Griers Creek (more than 21,000 acres). Erosion potential is in the low end of the mean of all watersheds and there are 6 potential contamination sites. Of concern are the 600 plus persons living in the watershed without the benefit of public sewer systems. The terrain is moderately undulating and has a high potential for sinkholes. This combination of physical characteristics and the number of potential septic systems in the watershed is not a good combination for maintaining a high level of groundwater or surface water quality.

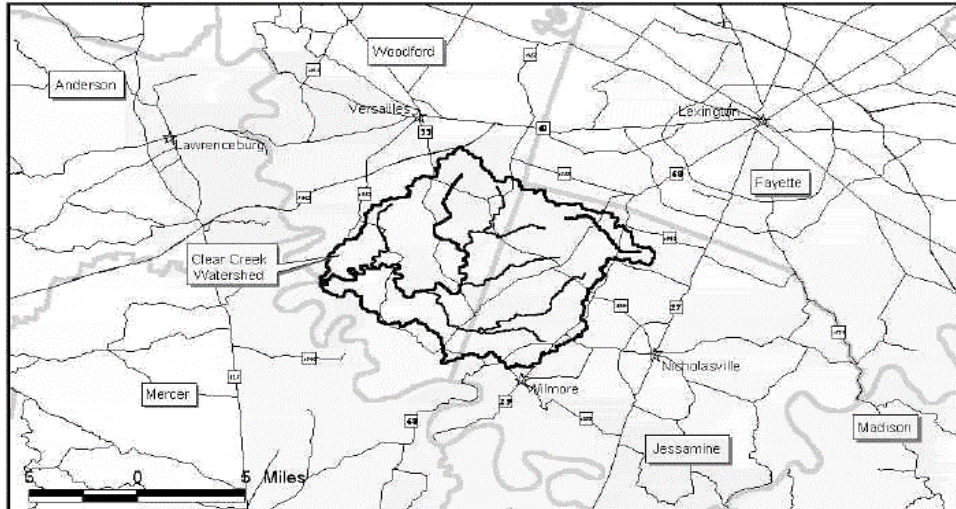
Clear Creek

The Clear Creek Watershed covers northern Jessamine County and southern Woodford County. Clear Creek empties into the Kentucky River below Lock and Dam Number 6, and its tributaries include Tanners Creek, Spring Creek

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and East Fork Clear Creek. Land use within the watershed is predominately agricultural, with 93% of the total watershed area of 46,500 acres.

This watershed has more than double the number of persons not on a public sewer system, but in all other categories the observed impacts from agricultural and urban uses are considered to be low.



Summary

The water resources of Woodford County are obviously one of its strengths and the basis for its agriculture, equine and agri-tourism operations. There should be considerable concern for the quality of waters flowing in the Kentucky River – a source of potable water for Woodford County residents.

In many ways, Woodford is not the master of its own destiny in terms of its' water resources. It's neighbors to the south and east are the source of existing water quality deficiencies that Woodford has and will continue to inherit. It will be in the best interests of Woodford County to take a leadership position in resolving regional problems originating outside its boundaries – if it is to effectively protect the assets that are its heritage and basis for continued prosperity.



Air Resources

Woodford has yet to experience any air quality problems. What is the current state of air quality in the Bluegrass Region and how does it affect Woodford County?

Woodford's rural heritage and urban service area policies have protected it from most of the adverse impacts of increased urbanization in the Bluegrass Region. However, as was discussed in the Regional Coordination, People/Jobs/Housing and Mobility Background Reports, Woodford's future is becoming more closely tied to that of the Region. Its workers commute to jobs outside Woodford, and traffic is increasing on major thoroughfares traversing Woodford – beyond what would be expected from local population and employment increases.

These conditions suggest that the air quality deficiencies (in terms of ozone and nitrogen dioxide) of Fayette County (and Scott and Jessamine levels are close to Fayette levels although exceedances of standards have not be recorded for these counties) may spread outward based on regional traffic flows and economic development, and that Woodford residents and workers will experience the problems even though these problems do not exist at home. This Chapter identifies air quality conditions in the Bluegrass Region based on the Kentucky Ambient Air Quality Annual Report of 2001⁴. This Report provides a broad overview of conditions for many types of pollutants, and is update annually.

⁴ This Report was prepared by the Division of Air Quality, Department for Environmental Resources, Natural Resources & Environmental Protection Cabinet.

Ambient Air Quality Standards

The Kentucky Air Monitoring System managed by the Division of Air Quality and the Environmental Protection Agency maintains 122 monitoring sites throughout the Commonwealth. These sites collect air samples that are analyzed for one or more of seven types of pollutants. This includes carbon monoxide, sulfur oxides, nitrogen dioxide, lead, ozone, and two levels of particulate matter.

Although there are no monitoring sites in Woodford County, there are several in adjoining counties. Franklin County has one site that is monitored for one of the levels of particulate matter and Fayette County has 9 sites that monitor for all types of pollutants. Scott County also has a monitoring site for ozone. Table 3.1 summarizes federal standards for each type of pollutant as reported by the Division of Air Quality.

**Table 3.1
Ambient Air Quality Standards**

Pollutant	Maximum Concentration	
	Primary Standard	Secondary Standard
Carbon Monoxide 8 hour average 1 hour average	9 ppm (1) 35 ppm (1)	9 ppm (1) 35 ppm (1)
Sulfur Oxides 24 hour average Annual average 3 hour average	0.14 ppm (1) 0.03 ppm NA	NA NA 0.50 ppm (1)
Nitrogen Dioxide Annual average	0.05 ppm	0.5 ppm
Ozone 1 hour average 8 hour average	0.12 ppm 0.08 ppm	0.12 ppm 0.08 ppm
Particulate Matter Measured as PM/10th 24 hour average Annual average	150 g/m ³ rd 50 g/m ³ rd	150 g/m ³ rd 50 g/m ³ rd
Particulate Matter Measured as PM/2.5th 24 hour average Annual average	65 g/m ³ rd 15 g/m ³ rd	65 g/m ³ rd 15 g/m ³ rd
Lead Calendar Qtr. Ave.	1.5 g/m ³ rd	1.5 g/m ³ rd

- (1) This average is not to be exceeded more than once per year.
- (2) Units of measurement in chart are micrograms of pollutants per cubic meter of air and parts of pollutants per million (ppm) parts of air.

Following is a summary of monitoring results as reported for calendar year 2001 and a brief overview of characteristics, sources and impacts for each type of pollutant. The data and analysis was taken from the Annual Report for 2001.

Carbon monoxide (CO) is an odorless, colorless, poisonous gas that is produced by the incomplete combustion of carbon containing fuels. The primary source of carbon monoxide is the exhaust from motor vehicles that includes highway and non-road vehicles such as construction equipment. Other sources include industrial processes and coal, kerosene and wood burning stoves in homes.

Neither the one-hour or 8 hour standards were exceeded at any of the monitoring sites in 2001. Carbon monoxide levels in Kentucky and the Bluegrass Region have substantially declined since 1976, with the 2001 level for the Bluegrass Region approximately one-third the level reported in 1976. This reduction is most likely due to cleaner burning fuels and more fuel- efficient combustion processes.

Sulfur dioxide is also a colorless gas that has a pungent odor at concentrations exceeding 0.5 ppm. Sulfur dioxide is produced by the combustion of sulfur containing fuels, ore smelting, petroleum processing and the manufacture of sulfuric acid. Nationwide, coal-fired power plants are the largest sources of this gas. Other industrial sources include petroleum refineries and paper mills.

There were no exceedances of any of the sulfur dioxide standards in 2001. The levels of this gas in the Bluegrass Region have also been on the decline since 1976, and the current level in the Region is second lowest of all regions in the Commonwealth.

Nitrogen dioxide is a reddish brown gas that is produced during the high temperature combustion of fossil fuels. During combustion, nitrogen and oxygen are combined, or oxidized, to form a family of highly reactive gases called nitrogen oxides that includes nitrogen dioxide.

Major combustion or oxidation sources that produce this gas include motor vehicles, power plants, incinerators, industrial boilers and some chemical processes. There were no exceedances of the nitrogen dioxide standards in 2001, with no recorded exceedances since monitoring began in 1970.

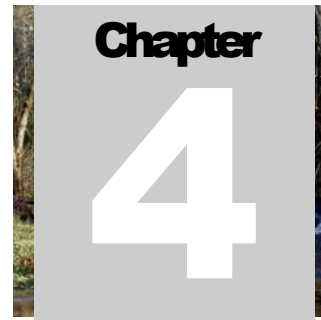
Ozone is another of the colorless gases and is not emitted directly into the atmosphere from sources but forms in the atmosphere from a photochemical reaction between volatile organic compounds and nitrogen oxides in the presence of sunlight. Sources of volatile organic compounds include motor vehicle exhaust, dry cleaning and paint solvents and evaporation of gasoline from storage and transfer facilities.

There has been a general decline in ozone levels over the past twenty-five years based on one-hour data. However, in 1997 the federal EPA adopted a new eight-hour standard based on scientific and medical research that indicated that extended exposure to lower levels of ozone may be as harmful as short term exposure to elevated levels. In 2001 there were 51 exceedances of the 8-hour standard and Fayette County experienced one of those recorded exceedances.

Particulate matter is a broad classification of non-gaseous pollutants that consists of very fine solid particles and liquid droplets or aerosols. Particulates are produced from many sources, including utility plants, wood burning stoves, leaf burning, vehicle exhaust, incinerators, rock quarries, coal processing, smelting, construction, farming and roadways. Particulate matter is categorized according to particle diameter due to the health impacts caused by particles of differing sizes. There have been no exceedances of the 24 hour standards for either particle size, but there have been several exceedances of the annual standard. However, none of these exceedances were recorded in the Bluegrass Region.

Summary

The data presented in the 2001 Report indicates that air quality in the Bluegrass Region, and Woodford County in particular, continues to be within national standards. However, a close review of the data indicates that monitoring sites in the Bluegrass Region are recording increasing levels of nitrogen dioxide and ozone. These increasing levels are most likely due to increasing traffic on regional roadways and the combustion of greater amounts of carbon based fuels, although other sources also contribute to monitoring results.



Setting the Stage

What issues and opportunities have been presented in the previous three chapters that may have an impact on the goals and objectives for long-range planning in Woodford County?

Land, water and air. In the planning business these resources are the “big three”. Woodford County’s location in the inner bluegrass physiographic region and proximity to the Kentucky River have afforded it the luxury of having some of the best agricultural lands in the Commonwealth and the water resources to support a highly productive agriculture based economy.

Woodford’s growth, and more importantly the growth of its neighboring counties, is now beginning to stress the capacity and function of its natural systems and resources. This has been pointed out not only in the preceding chapters but also in other Background Studies. Woodford has taken significant steps to preserve its prime agricultural lands by enacting urban service areas around its two most prominent municipalities, and it is currently acting to ensure sustainable sources of potable water for the future. However, it will need to address other potential trends and issues related to land, water and air that may prevent the achievement of its long range planning goals and objectives.

These trends and issues are identified on the following pages, and will serve as a beginning point for community discussions and goal setting activities. Storm water management, stream restoration and management, rural area development, equine/agricultural production and management practices, and other terms will come to forefront of the 2003 Plan Update as the long term health of Woodford’s land, water and air resources is considered.

Trend/Issue No. 1

What role should agriculture and the equine industry play in Woodford's Future?

The transition from tobacco to other agricultural products has already begun. The horse industry certainly has helped this transition, securing an important role in Woodford's economic future.

Are there sufficient equine industry support services in place to serve this growing sector and should local governments play a greater role in promoting, protecting or enhancing this industry?

The future success of the Urban Service Areas (USA) of Versailles and Midway will depend on the continued economic viability of agricultural/equine industry use of non-USA lands. This is particularly true for lands at or near a USA boundary.

What other agricultural products and services are likely to remain or become viable options in the future? With the success of the Equus Run vineyards and wine making enterprise, what agricultural and agri-tourism inroads can be made through this type of product?

Trend/Issue No. 2

More than 1,000 acres of Woodford farmland has been preserved through private conservation easements or agricultural preservation easements acquired through the State's PACE program. Does Woodford have all the tools it needs to preserve lands for agriculture and equine needs?

Conservation or agricultural preservation easements obtained through the state's PACE program (Purchase of Agricultural Conservation Easement), and through private actions, are very important tools to preserve lands for agriculture use. However, funds for the PACE program are very limited and there is substantial competition for funds within the Commonwealth.

A planning issue for Woodford is whether it should, in some capacity, identify and develop local funding resources to purchase easements or support the development of essential agricultural/equine industry infrastructure? At present, the only county in Kentucky that has established a locally (at least partially) funded PACE program is

Fayette. Woodford County has one farm easement purchased through the PACE program.

If Woodford determines to create a local funding source for the purchase of agricultural easements, there is a related issue. That issue will become the method and manner by which Woodford and/or the State will acquire easements. Will there be geographic priority areas or priorities among the types of agricultural/equine enterprises? These are just a few of the issues that will emerge if Woodford determines to preserve lands for agricultural purposes.

Trend/Issue No. 3

The Kentucky River forms the western boundary of Woodford County and is one of its' primary sources of drinking water. Is Woodford doing all it can to protect this water resource?

The Kentucky River Authority has performed assessments of the River through its entire basin. In the Woodford portion of the basin, the River's waters failed to meet standards for human contact because of pathogens found. The source of those pathogens included agricultural operations and combined sewer overflow. Although the combined sewer overflow is most likely a problem created by upstream communities, Woodford and other communities will continue to experience the impacts of the problem unless a regional forum is identified for discussion, prioritization and resolution of this issue.

In addition to the issue of water quality in the Kentucky River, there are also questions about its value as a recreational resource and potential to support an eco-tourism element of the local economy.

Trend/Issue No. 4

Does Woodford protect the water quality of its streams, as well as the adjoining upland habitat?

The other major streams in and around Woodford—including Lee Branch and South Elkhorn Creek—are experiencing water quality problems. An issue that will emerge more fully as a result of Woodford's equine industry is the relationship between stream water quality and waste generated by animal operations.

The current trend toward 25-foot riparian setbacks may not be sufficient to ensure appropriate filtering of sheet flow waters entering the stream channel. Additional buffers, with vegetative and maintenance requirements, may be needed to address the existing problem. How this issue is addressed will have a significant impact not only on Woodford's water resources, but on the quality and viability of associated wetlands and upland habitat. Storm water management and erosion control practices may need to be implemented in conjunction with animal operations to preserve stream water quality. Just what those practices should be is a planning issue.

Trend/Issue No. 5

Woodford's rural roads and natural lands (scenic views, farmlands, dry laid stone walls, etc.) are parts of the formula for underlying the agri-tourism business. Has this linkage been adequately addressed in planning efforts (Preserving Town and Country)?

Although Old Frankfort Pike is considered to be an historic resource, the issue that surrounds all similar Woodford roads is whether there are sufficient teeth in local regulations to ensure the original relationship between land and road is maintained.

An example of where this relationship is in question is US 62 from US 60 to Midway. The level, type and speed of traffic, in combination with the road characteristics, has resulted in safety and capacity problems. Improvements to address these problems would undoubtedly impact the current road and land relationship in a negative way.

Too often, local governments are passive and reactive to these issues, lacking the money or authority to address this issue in a proactive way. At issue in Woodford County is a definitive statement of the importance of such road/land corridors to the economic and cultural well being of the community.

Trend/Issue No. 6

Woodford's land resources exhibit a significant potential for sinkhole formation. The karst geology underlying much of Woodford County is a potential hazard not only for construction but also for potential degradation of groundwater resources. Are Woodford's development

regulations sufficient to ensure these issues are addressed during the development process – whether that development is for urban, rural or agricultural purposes?

Karst geology and sinkholes is a subject that many worry about only when it may affect proposed development of homes, businesses or workplaces. It is rare that sinkholes rise to a high level of community concern when the areas most prone to sinkhole formation are in rural areas comprised of farms.

Most of the information presented in Chapter 1 would seem to indicate that the potential adverse impacts from karst geology extend beyond the human habitat. Of concern is the groundwater aquifer and the connections between surface waters and groundwaters provided via karst geology. Agricultural and equine industry practices can have a significant effect on groundwater quality. Why is groundwater quality important? Because many farm owner utilize wells to provide potable water, if not for human consumption then for irrigation and animals. In addition, the City of Versailles derives some of its drinking water supply through surface and groundwater resources of the Clear Creek watershed.

Trend/Issue No. 7

Although Woodford County’s air has not yet been impacted by continued urbanization, automobile traffic utilizing Woodford roads may contribute to future problems. Is the potential for future air quality problems an issue now? Is it a regional issue?

As is the case so often with air quality, communities don’t act to protect it until a problem already exists. It is difficult, if not impossible in today’s world to increase public awareness and mobilize public opinion for a problem that “may occur”. Woodford’s air quality meets all nationally accepted standards at the moment, although some of its neighbors are beginning to experience problems. The Mobility Background Report suggests that Woodford can expect more traffic in the future – a concern because traffic increases tend to also create air quality problems.

The issues for Woodford County to address include whether this is a priority for immediate action, what avenues are available for regional actions to protect air quality, and what local actions can be either taken or planned to proactively preserve air quality?