COMPREHENSIVE PLAN

for

CHRISTIAN COUNTY, MISSOURI

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Center for Resource Planning and Management

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INTRODUCTION

Planning for the future of Christian County

Historically, Christian County has been a rural area of Southwest Missouri, characterized by small communities, scattered low density residential development and agricultural/animal husbandry activities. In the 1980's, however, Christian County began to experience rapid urbanization and development pressures that quickly began to change the rural landscape and had notable impacts on the quality of the County's natural resources, the existing infrastructure system and traditional land use activities and development patterns.

In response to the issues that attend rapid urbanization, including land use conflicts, maintenance of groundwater quality and proper disposal of sewage and solid waste, voters approved planning and zoning authority for Christian County in April of 1990. With the formation of the County's first Planning and Zoning Commission, the Commission was charged with the task of preparing the Comprehensive Plan and related land development regulatory controls for the County. In 1991, the Center for Resource Planning and Management and the Christian County Planning and Zoning Commission initiated a series of information meetings throughout the County to explain the planning process ahead, the purposes of the comprehensive plan and to obtain citizen input on area issues, needs and desires for the future. The result was a Comprehensive Plan intended to serve as a guide for the future development of the County that is responsive to public desires to maintain a high quality of life and protect the County's natural resources while allowing for balanced growth and development. As a result of its continued growth Christian County will be moving from a second class to a first class status which presents several issues the County must prepare to address. This document is intended to act as an assessment of

the County's current condition and to offer continued guidance as Christian County continues to develop.

This current updated version of the comprehensive plan was prepared at the request of the Planning and Zoning Commission. The department staff along with assistance from other planning professionals and interns from the area assembled the information contained herein which is intended to present a current representation of Christian County and to help understand the needs the County faces and how the two translate into the goals and objectives we hope to achieve. A major part of this process was gathering public input. The Planning and Zoning Department held a series of seven public meetings throughout the county in order to gain insight as to what the residents of the County envision for the future.

Purpose of the Plan

The primary purpose of the Comprehensive Plan is to provide a series of goals, objectives and strategies that will serve to guide the daily decision-making process on development and resource management issues. The plan provides the basis for elected officials, advisory boards and citizens to make informed decisions about the County's future growth and development. Decisions

that are made based on the Plan are therefore better able to withstand legal challenges. The Comprehensive Plan is a statement of future desires for Christian County and actions to be undertaken to achieve these desires.

Contents of the Comprehensive Plan

The Christian County Comprehensive Plan is organized in three general sections that include (1) existing conditions and needs, (2) future development strategies and policies, and (3) appendices and support material. Chapters 1-12 provide a summary of existing conditions and development trends in the County, covering topics such as land use patterns, physical characteristics, population and economy, community facilities and existing transportation networks and their relationship to current and projected development. The result of collecting and updating this information has been a greater awareness of the various assets Christian County currently possesses as well as a revelation that there are significant needs and opportunities the County must address. With this information as a reference the developers of this plan have sought to establish goals and objectives for the County which can be used as a guide in preparing recommendations, policies and guidelines for future development.

Chapters 13-17 outline goals and objectives, land development standards and policies, and resource management recommendations on issues of concern to the County, including the transportation plan and future land use. Also outlined are recommended priority actions and implementation strategies.

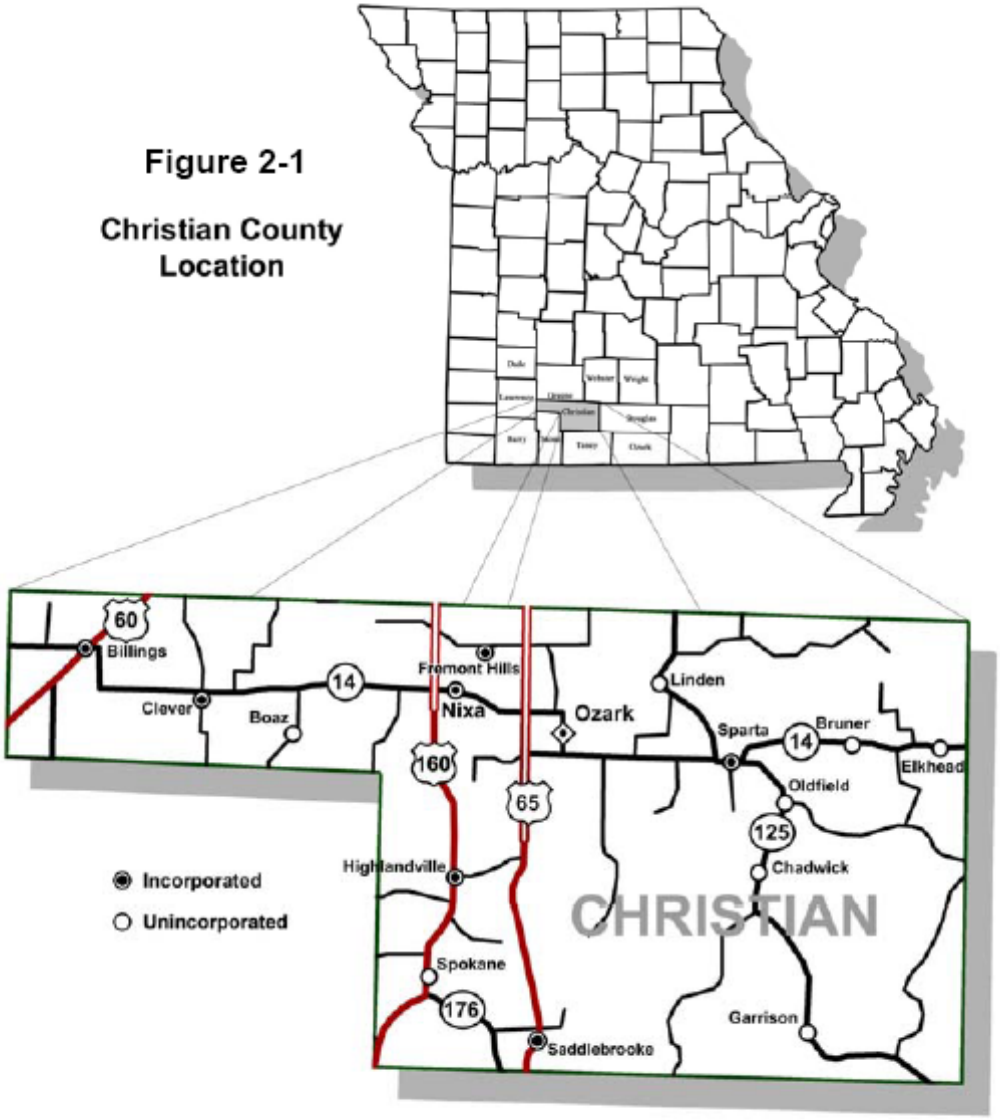
The appendices section of the Plan contains more detailed data, reference materials and standards utilized in the analysis of existing conditions and preparation of policy recommendations for Christian County. Appendices materials are noted throughout the document for reference by persons interested in methodologies employed or specific information.

STUDY AREA

Christian County covers approximately 564 square miles in Southwest Missouri and is bordered by Greene, Lawrence, Stone, Taney, Douglas and Webster Counties (see Figure 2-1). Christian County's northern boundary is situated approximately one mile south of Springfield, the major metropolitan center in Southwest Missouri. Although Christian County is one of the fastest growing counties in the State of Missouri and is considered part of the Springfield Metropolitan Statistical Area (Greene, Christian and Webster Counties), the southern part of the County is predominantly rural in character.

Incorporated cities in Christian County include Billings, Clever, Fremont Hills, Nixa, Highlandville, Ozark, and Sparta (see Figure 2-2). Of these cities, Nixa and Ozark are the largest with 2004 populations of 14,617 and 14,457, respectively. Saddlebrooke, which incorporated in 2002, is the smallest community with an estimated population of 20.

Primary access to Christian County is provided by U.S. Highway 65, U.S. Highway 160, U.S. Highway 60 and MO. Highway 14 (see Figure 2-1). Both Highways 160 and 65 serve as the major north-south routes connecting Nixa and Ozark to Springfield and the growing tourism/recreation centers in the Branson and Table Rock Lake areas to the south. MO. Highways 14 and CC provide the major east-west access route across the northern third of Christian County, linking the County's various cities and villages.



Form of Government

Missouri is divided into 114 counties and the City of St. Louis by the Revised Statutes of Missouri (RSMo) §46.040. Counties are political subdivisions of the State "for governmental, political, and public purposes" (Freyermuth, n.d.) and have a wide range of governmental responsibilities. The Missouri legislature has established four classes of counties, based on the assessed valuation of real and personal property (Freyermuth,

n.d.; RSMo §48.820). Christian County is classified as a second class county and is governed by a three-member Commission. Under the provisions of RSMo §49.010, counties are divided into two districts of nearly equal population. Each district elects one commissioner and the presiding commissioner is elected by the county as a whole. Commissioners serve four-year terms.

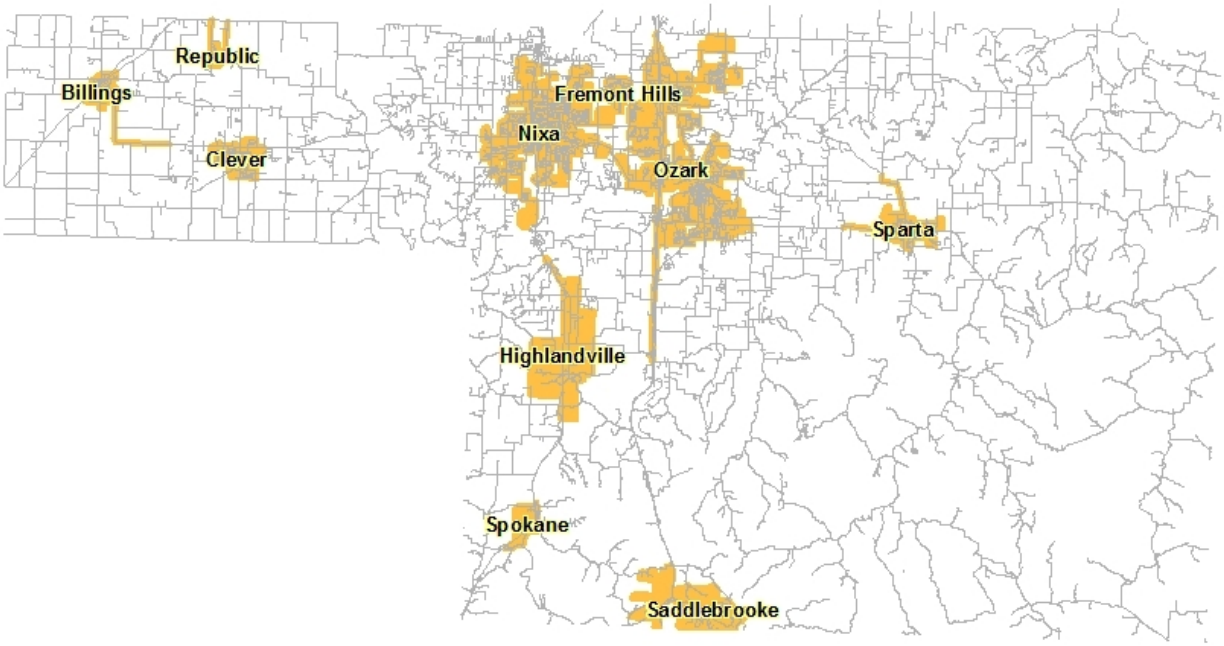
There are currently two classes of cities in Missouri--third and fourth class cities, as well as villages and home rule charter cities (Freyermuth, n.d.). Fourth class cities are those with populations greater than 500 but less than 3,000 inhabitants. Villages/towns are incorporations with less than 500 inhabitants (RSMo §72.050). There are eight municipal subdivisions within Christian County, including the recently incorporated Village of Saddlebrooke and the cities of Billings, Clever, Fremont Hills, Highlandville, Nixa, Ozark, and Sparta. (see Figure 2-2) All of the cities are incorporated as fourth-class cities. Villages are regulated under RSMo §80 and are governed by a board of trustees. The board elects a presiding officer (chair) and a clerk, and appoints the village's officers. Fourth class cities are regulated by RSMo §79. Such cities may have the mayor/board of aldermen or mayor/city administrator/board of aldermen form of government. The mayor presides over the board but may vote only to break a tie. Table 2-1 lists the incorporated communities in Christian County, government form, and meeting dates. The settlement of Spokane is classified by the U.S. Bureau of the Census as a Census-Designated Place (CDP) for statistical reporting purposes. CDPs are delineated to provide data for concentrations of population in identifiable areas that are not incorporated under the laws of the state. Statistical information is provided in this plan for Spokane; however, Spokane is under the governance of Christian County.

Table 2-1 Christian County Local Governments

Local Government	Form of Government	Meeting Dates
Christian County	Commission	Mon and Thurs
Billings	Mayor/Aldermen	2nd Thurs, 7 p.m.
Clever	Mayor/Aldermen	2nd Mon, 6:30 p.m.
Fremont Hills	Mayor/Aldermen	3rd Mon, 6:00 p.m.
Highlandville	Mayor/Aldermen	3rd Tues, 7:00 p.m.
Nixa	Mayor/City Administrator/Aldermen	2nd Mon, 7:00 p.m.
Ozark	Mayor/City Administrator/Aldermen	1st and 3rd Mon, 7:00 p.m.
Saddlebrooke	Chairman/Trustees	As Needed
Sparta	Mayor/Aldermen	2nd Tues, 6:30 p.m.

FIGURE 2-2

INCORPORATED CITIES IN CHRISTIAN COUNTY



HISTORICAL BACKGROUND

The Christian County area has a varied pre-European settlement history. The area was intermittently visited and occupied by several Indian groups, including Paleo-Indians, Archaic peoples, Woodland Indians and Mississippian peoples. When the first hunters and trappers entered the region in the early 1800s, the Christian County area was occupied by the Osage Indians. Control of the Christian County area passed from the Indians to the Spanish and French until it became a territory of the United States through the Louisiana Purchase of 1803 (Christian County Centennial, Inc., 1959, 1).

The rivers of the Ozarks region were the main avenues of exploration. Rivers, such as the White, the James and the Finley, provided early trappers and hunters with food and income as well as transportation through the region. Henry Rowe Schoolcraft explored the area in 1819 and the first permanent settlers followed within two years. The Pettyjohns, Wells and Pattersons were among the first families to move into the area in 1822, settling near the present day communities of Ozark and Nixa. Christian County was formally organized as a county by an act of the Missouri Legislature on March 8, 1859 (Christian County Centennial, Inc., 1959, 2). Because of its central location and accessibility, Ozark was selected as the county seat.

Although settlers arrived in Christian County in a steady but slow stream in the early 1800's, the rate of settlement increased in 1838 with the opening of a United States Land Office in Springfield and the offering of Christian County lands for homesteading. The Land Office made it possible for residents to obtain title to already settled lands and insured ownership titles for future settlers (Christian County Centennial, 1959, 4).

The area's rivers also served as a focal point for the development of permanent communities in Christian County. Early settlers who farmed the rivers' fertile bottomlands also depended on the

rivers for grain milling. The town of Ozark developed around Hoover's Mill, which was built in 1833 on the Finley River. John Hoover constructed another mill at the site of present Lindenlure in 1840, which was then a small settlement replete with a general store and a distillery. The settlement of Riverdale also developed around a mill, with Nixa area residents utilizing its' services.

The City of Billings developed in a fertile agricultural area in the northwestern section of the County. First settled in 1835, this community's population required a post office by 1860. The growth of Billings was spurred by the extension of the St. Louis and San Francisco railroad through the area in 1871. Billings was officially incorporated in 1884.

The advent of the railroads brought new settlement patterns and economic growth to Christian County. Chadwick, which was already a small village by 1842, was transformed into a boomtown by the location of the Springfield and Southern Railroad in 1882. The railroad utilized the area's timber reserves for tie production and industry.

While Chadwick and Ozark became shipping centers for agricultural products to and from southern Missouri and northern Arkansas, Sparta became a center for shipping railroad ties and timber. The rail line between Chadwick and Ozark did a thriving business into the 1920s; however, the line was eventually abandoned in 1934 due to a decline in the timber industry and an increase in automobile and truck transportation.

Nixa and Clever also developed along primary transportation routes. The City of Nixa developed at the intersection of two thoroughfares, the Wilderness Road leading south from Springfield and a route (current MO. Highway 14) leading west from the agricultural areas around Ozark. Nixa was incorporated as a village in 1902. Clever began as a trading post along the Old Wire Road, a principal road west of the Mississippi running from St. Louis to the southwest United States. Incorporated in 1909, Clever's growth was also spurred by its proximity to the railroad.

Settlement in Christian County was not limited to just the river bottom lands and along major transportation routes. Many settled in the less fertile and heavily forested areas of eastern and southern Christian County, dependent on a lumbering and cattle raising economy transplanted from the rugged hills of Tennessee and Kentucky.

Christian County has experienced many changes in its economy since the mid-1800s. Grain crops, fruits, vegetables, dairy and beef cattle dominated the County's early agricultural economy. Through the late 1800s to early 1900s the area's agricultural base also spurred related agricultural businesses, ranging from grist milling to cheese production to vegetable canning. Many of these early industries are no longer in existence. A decreasing demand for the area's grain, fruit and vegetable produce resulted in a shift from field crops to beef and dairy cattle after the Great Depression. While grain production is still found in many areas of the County, dairy and beef cattle production continue to dominate the agricultural sector.

Since WWII, Christian County has experienced steady growth with a more diversified economy. The primary impetus to the County's growth has been proximity and improved road linkages with Springfield to the north. Rapid industrial growth in the Springfield area during the 1960s and 1970s provided employment opportunities within commuting distance for Christian County residents. During the 1980s, the County continued to attract new residents, many who desired to live in a more rural atmosphere but within close proximity to the amenities of the Springfield metropolitan area.

A second major impetus to rapid growth in Christian County over the past several years has been the growing tourism and recreation economy to the south in Branson and along Table Rock Lake and Lake Taneycomo. Christian County has benefited from the tourist flow and the development of recreation related manufacturing and service industries.

Christian County today exhibits a unique pattern of development with a diversifying economic base. Continued growth in southern Springfield is leading to increased residential development and service/convenience commercial development in the northern part of Christian County. While much of southern Christian County retains a more pristine and undeveloped character, due to the Mark Twain National Forest acreage, continued urbanization would undoubtedly signal changing economic growth and land development patterns in these more rural areas as well.

DEMOGRAPHIC TRENDS

Demography refers to the study of population. Demographers are concerned with the size and distribution of the population, the age and gender of the population, social and economic characteristics of the population and the way these components change over time (Shyrock, 1973, 2).

An understanding of local demographic patterns is an important part of the planning process for Christian County. Changes in the population have a direct influence on physical growth and development of the County. The size and composition of the population play a large role in determining how much land is necessary for housing, retail business, industry, streets and community facilities.

This chapter discusses historical population trends and characteristics of the population in Christian County. This demographic information has also been used to develop population projections for the County to the year 2030. Population projections serve as a primary basis for many of the future land development, community services and utility service recommendations noted in later chapters of the Plan.

Components of Population Change in Christian County

Three factors affect population change in any political subdivision, including Christian County. These factors include birth rates, death rates and migration. While a declining birth rate has been the primary component of population change for the State of Missouri over the past decade, migration is the dominant factor affecting Christian County's rate of population growth. The County's growth rate since the 1970s has far outpaced that of both Missouri and the United States. Between 1990 and 2000, the County's population increased by 21,641 persons. Only 16.1% of this number, or 3,501 persons, are attributed to natural increase (number of births less the

number of deaths). From 2000 through 2007 the population has further increased by 18,781 and 17.9% of that total being attributed to natural increase. While in-migration has accounted for the overwhelming majority of new population in Christian County over the past decade, the percentage of natural increase has remained fairly constant. Table 4-1 lists the vital statistics for Christian County between 1990 and 2007.

TABLE 4-1

VITAL STATISTICS, 1990-2007

Year	Births	Deaths	Natural Increase
1990	508	221	287
1991	485	239	246
1992	540	240	300
1993	535	295	240
1994	575	298	277
1995	650	288	362
1996	653	362	291
1997	682	371	311
1998	701	373	328
1999	807	393	414
2000	858	413	445
2001	815	393	422
2002	805	452	353
2003	861	475	386
2004	953	466	487
2005	1094	481	613
2006	1020	479	541
2007	1062	503	559
Totals	13604	6742	6862

Source: Missouri Department of Health, Center for Health Statistics.

Several national and regional trends have contributed to the rate of migration into Christian County. The past few decades have seen a national migration trend to the "sunbelt". Christian County has been on the receiving end of this national migration. In addition to the pattern of migration to the "sunbelt", the County's rapid growth since the 1980's also reflects a second national phenomenon--migration from larger urban areas to small communities and rural areas. This phenomenon is evidenced by the rapid population increases in several of the County's incorporated communities, such as Nixa and Ozark.

A third factor contributing to the County's rapid growth during the 1980s was industrial expansion and increased employment opportunities in nearby Springfield during the same time period. Improvements to major transportation routes that link Christian County with the Springfield metropolitan area, such as U.S. Highway 160, spurred continued population growth during the 1980s and 1990s.

Table 4-2 notes the actual total population for Christian County and its political subdivisions since 1970. Table 4-3 indicates the percentage increases in population from decade to decade. As shown in Table 4-2, Christian County's total population has increased from 15,124 in 1970 to 54,285 in 2000 and then to 73,066 in 2007. The fastest rate of growth, 66.3%, occurred between 1990 and 2000. While overall growth has slowed since 2000, it continues to be strong.

Urban/Rural Growth Trends

Tables 4-2 and 4-3 provide not only a record of population growth for Christian County as a whole, but also a comparison breakdown of rural and urban population in the County. As shown, both the urban and rural populations in Christian County have steadily increased since the 1970s.

Figure 4-1 graphically displays the urban/rural growth trends of Christian County since 1970. Up until 1990 the proportion of rural population to urban had held steady at a roughly 2:1 ratio. Since then the gap has closed steadily. Population data from 2007 now indicates that 56% of the County's residents live within the incorporated areas. In this respect Christian County must be looked upon as more urban than it is rural. From the years 2000 -2007 urban growth outpaced rural at a ratio of better than 2:1 and based upon the fact that as the incorporated areas expand through annexation, the gross acreage remaining in unincorporated areas will decrease and therefore perpetuate and likely accelerate this trend.

Christian County is expected to experience continued rapid growth during the 2000s and into the next decade, with the focus of growth occurring in the northern and central sections of the County, in and around the cities of Nixa and Ozark. This portion of the County is expected to receive the greatest growth over the next decade for two primary reasons:

1. Both Nixa and Ozark are in the path of growth from the Springfield metropolitan area and are connected to the Springfield area by four-lane highways.

2. Approximately 142 square miles of southern and eastern Christian County are within the Mark Twain National Forest. Development of this land area, which is controlled by the National Park Service, is restricted. As such, limited development is anticipated in these areas.

TABLE 4-2

POPULATION GROWTH AND CHANGE

Census Year	1970	1980	1990	2000	2007	% of Total
Christian County	15,124	22,402	32,644	54,285	73,066	100 %
Rural Population	9,534	14,665	21,173	27,782	32188	44 %
Urban Population	5,590	7,747	11,471	26,503	40878	56 %
Billings	760	911	989	1,091	1111	1.5%
Clever	430	551	580	1,010	1414	1.9%
Fremont Hills *	-----	-----	201	597	850	1.2%
Highlandville **	-----	-----	-----	872	908	1.2%
Nixa	1,636	2,662	4,707	12,124	18202	24.9%
Ozark	2,384	2,980	4,243	9,665	17177	23.5%
Sparta	380	643	751	1,144	1144	1.6%
Saddlebrooke***	-----	-----	-----	-----	72	.01%

Source: U.S. Bureau of the Census, *General Social and Economic Characteristics, Missouri, 1900-1980; Fourteenth Census of the U.S., 1920 vol. 1, Population Composition and Characteristics by States; Census of Population, 1990; STF 1 Profile Report for State of Missouri and Selected Counties, 1990; Summary File 1, 2000 Decennial Census., American Fact Finder; 2007 Population Estimates 2009.*

* Fremont Hills incorporated in 1986.

** Highlandville incorporated in 1995.

*** Saddlebrooke incorporated in 2001.

FIGURE 4-1

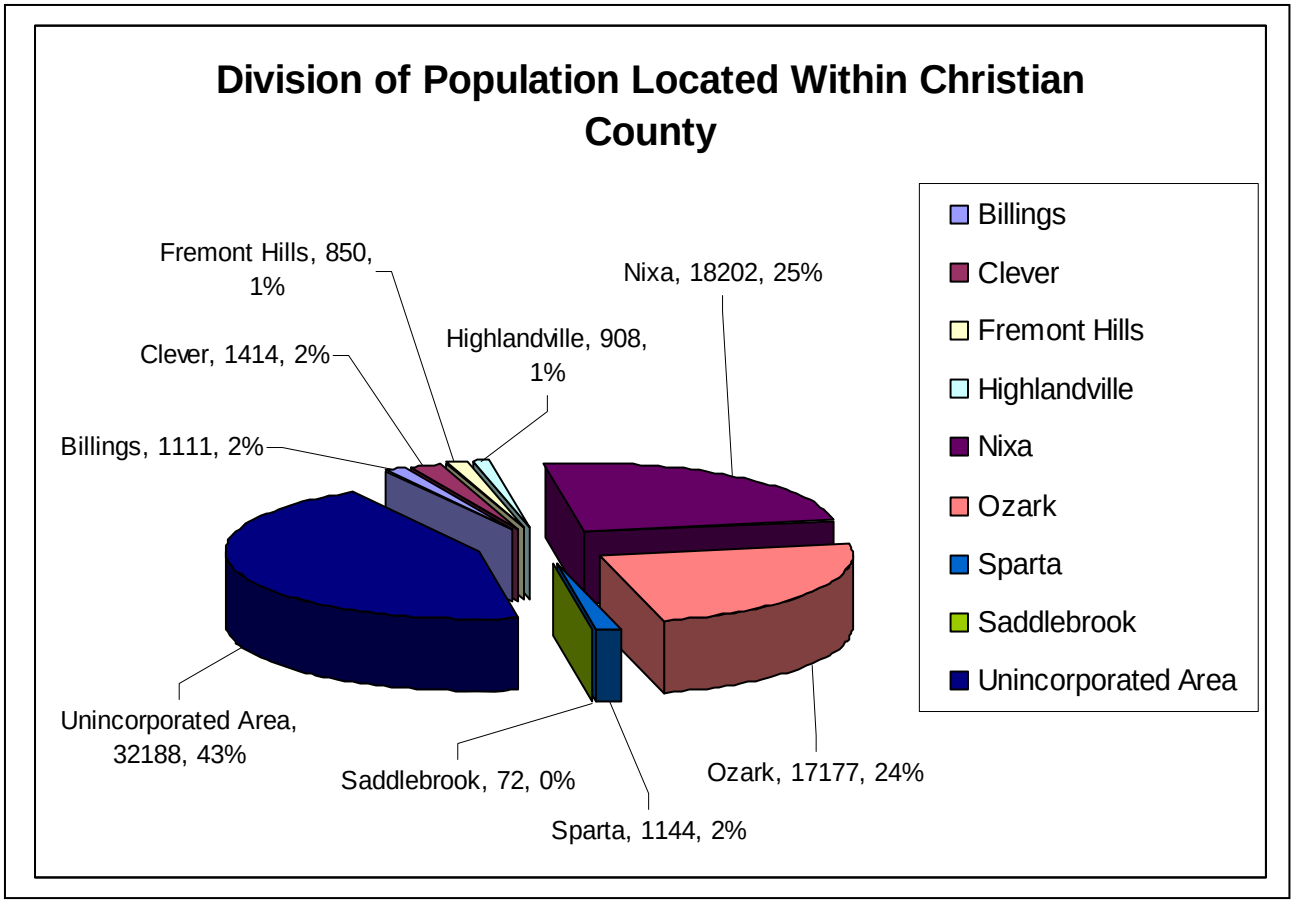

Division of Population Located Within Christian County
Fremont Hills, 850, 1%
Nixa, 18202, 25%
Highlandville, 908, 1%
Clever, 1414, 2%
Billings, 1111, 2%
Unincorporated Area, 32188, 43%
Saddlebrook, 72, 0%
Sparta, 1144, 2%
Ozark, 17177, 24%
Billings
Clever
Fremont Hills
Highlandville
Nixa
Ozark
Sparta
Saddlebrook
Unincorporated Area

TABLE 4-3

POPULATION PERCENT OF CHANGE

	1970-1980	1980-1990	1990-2000	2000-2007
Christian County	48.1%	45.7%	66.3%	34.6%
Rural Population	53.7	44.5	31.2	15.9
Urban Population	38.6	48.1	131.0	54.2
Billings	19.9	8.6	10.3	1.8
Clever	28.1	5.3	74.1	40
Fremont Hills	-----	-----	197.0	42.4
Highlandville	-----	-----	-----	4.1
Nixa	62.7	76.8	157.6	50.1
Ozark	25.0	42.4	127.8	77.7
Sparta	69.2	16.8	52.3	0

Source: U.S. Bureau of Census, *General Social and Economic Characteristics, Missouri, 1900-1980; Fourteenth Census of the U.S., 1920 vol. 1, Population Composition and Characteristics by States; Census of Population, 1990; STF 1 Profile Report for State of Missouri and Selected Counties, 1990; Summary File 1, 2000 Decennial Census. American Fact Finder, 2007 Population Estimates 2009.*

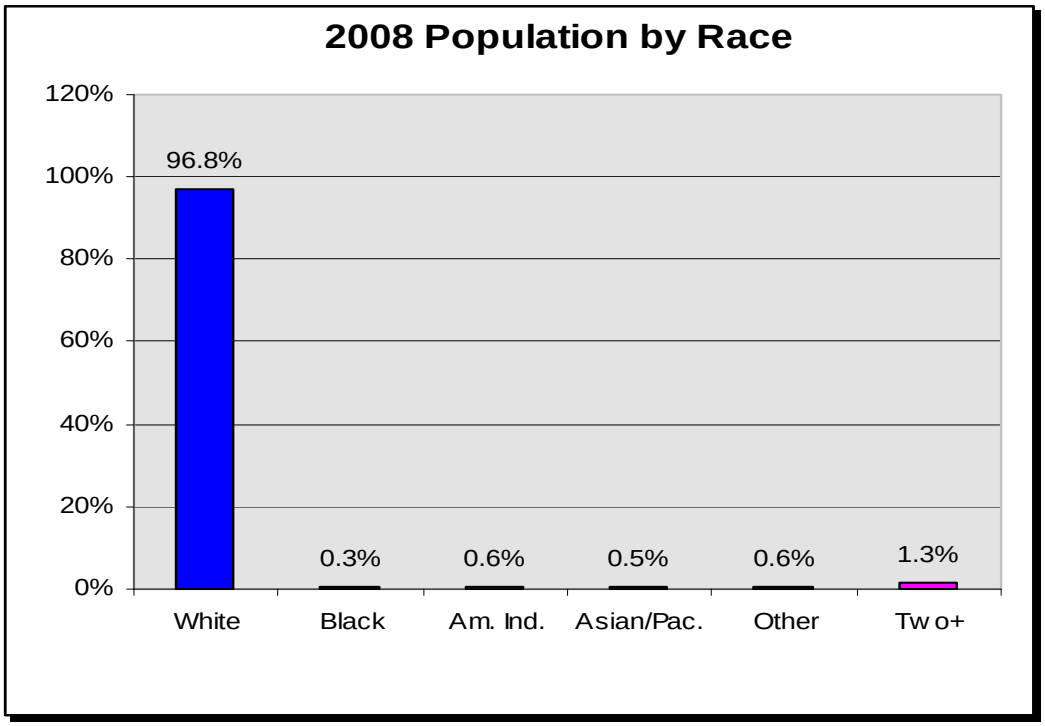
Racial Composition

The 2005 - 2007 American Community Survey from the U.S. Census Bureau indicates that Christian County's racial composition is overwhelmingly white, accounting for approximately 97.4% of the total population. As noted in Table 4-4, the Census Bureau shows the second largest

racial group in the County as Black or African American persons making up 0.7% of the total population. The Hispanic or Latino population is accounted for separately by the Census Bureau and their numbers were estimated at 1420 persons which actually places them as the second largest racial component in Christian County's population mix.

TABLE 4-4

RACIAL COMPOSITION



Source: U.S. Bureau of the Census, 2000 Census of Population and Housing. ESRI forecasts for 2008 and 2013.

The age structure of a population is important to a demographic analysis because it reflects changes in behavior at various stages in the life cycle as well as potential needs of various age groups within the population. Different age groups have their own social and economic needs (Bogue, 1969) which should be taken into consideration in the planning process. For example, age structure of a population influences planning for potential school enrollments, work force and economic development potential, housing needs and elderly services.

Table 4-5 provides a breakdown of Christian County's 2007 population by age cohort (age group). As shown, 28.4% of the County's total population is included in the youth age cohorts 0-19. The County's percentage of youth-aged population is slightly higher than that of the State (27.2%).

Over one-third of the County's population (37.4%) is in the age group 25-44, a proportion only slightly higher than that of the State (26.9%). In addition to validating the County’s mean age being comparatively low, the large percentage of individuals in these age groups reflects two phenomena: (1) the maturing of the baby boom generation--those born between 1946 and the early 1960s, and (2) in-migration of younger population in the family-forming years, attracted by employment opportunities in the County and nearby Springfield and other quality of life factors such as land and housing costs and quality of schools.

TABLE 4-5

AGE SPECIFIC POPULATION, 2007

Christian County Age Specific Population			
Subject	**Total**	**Male**	**Female**
Total population	69,761	34,290	35,471
AGE			
Under 5 years	7.5%	8.3%	6.8%
5 to 9 years	7.6%	7.8%	7.4%
10 to 14 years	6.9%	7.0%	6.7%
15 to 19 years	6.4%	6.9%	5.9%
20 to 24 years	6.7%	6.6%	6.7%
25 to 29 years	8.9%	8.5%	9.3%
30 to 34 years	7.5%	7.7%	7.2%
35 to 39 years	6.8%	6.4%	7.1%
40 to 44 years	7.5%	7.5%	7.5%
45 to 49 years	7.8%	8.1%	7.5%
50 to 54 years	6.1%	6.0%	6.2%
55 to 59 years	5.5%	5.8%	5.2%
60 to 64 years	4.1%	3.8%	4.4%
65 to 69 years	3.6%	3.5%	3.7%
70 to 74 years	2.3%	2.1%	2.4%
75 to 79 years	2.1%	2.2%	2.0%
80 to 84 years	1.4%	1.0%	1.8%
85 years and over	1.5%	0.6%	2.3%

Source: U.S. Bureau of the Census, 2005 - 2007 American Community Survey 3 - Year Estimates

Of interest is the population group aged 65+ (10.9%), which represents a greater percentage of the total population than the age cohort 55-64 (9.6%). This increase in the retirement-aged population indicates not only increased life spans but also in-migration. The Ozarks region in general is attracting retirees due to mild climate, recreational opportunities, lower costs of living and easy access to regional medical facilities.

Although in-migration of retirement-aged population is evident, the County has a lower percentage of retirees aged 65 and over than the State (13.4%). Today, children and baby boom generation adults primarily dominate Christian County's population. Over the next decade, the County will continue to experience an increased demand for educational services and housing to meet the needs of these specific age groups. However, as the baby boom generation continues to move into retirement within the next 20 years, the County will likely see increased demands for housing and social services for the elderly population.

Median Age

An index of age composition is the median age of a population. Median age, which is determined by dividing the population into groups of equal size, can be compared to state and national statistics to determine any significant variances from larger geographic area patterns. For comparison purposes, Table 4-6 shows the median age for Christian County, the State of Missouri, the United States and surrounding Stone, Taney and Greene Counties.

As shown, the median age of Christian County's population has increased from 30.6 years in 1980 to 34 years in 2007. Although an increasing median age is a national trend, due to lower birth rates and the natural aging of the population, Christian County's median age is lower than that of the State, the nation and surrounding counties. This supports the previous observation that the County is primarily attracting younger-aged individuals and families. In contrast, the significantly higher median age figures for Stone and Taney Counties reflects the importance of the Table Rock and Taneycomo Lakes areas as retirement centers.

TABLE 4-6

MEDIAN AGE TRENDS

Area	1980	1990	2000	2007
Christian County	30.6 yrs.	32.6 yrs.	34.5 yrs.	34 yrs.
Greene County	29.2	32.5	35.1	35.5
Stone County	41.2	42.9	44.1	44.5
Taney County	40.5	40.2	38.8	38
Missouri	30.9	33.5	36.1	37.3
United States	30.1	32.9	35.3	36.4

Source*:* U.S. Bureau of the Census, *General Population Characteristics, Missouri, 1980-2000; Census of Population and Housing, 1980-2000, and 2005 - 2007 American Community Survey 3 - Year Estimates*

Age Dependency Ratio

The age dependency ratio is used to measure the impact of age structure on the productive or income earning portion of the population. The ratio of the "dependent" population to the "productive" population is an approximate measure of the number of dependents each productive member of the population must support. For calculation purposes, the "dependent" population is all those persons between the ages 0-14 and over 64. This is an approximate measure, since not all persons between 15 and 64 are actually producing income and some teen-agers and adults over 64 are wage earners.

Table 4-7 notes the trend changes in Christian County's age dependency ratios since 1970. Christian County's age dependency ratio in 2000 was 51.2, which means that for every 100 persons in the income earning age group there were 51.2 dependents.

The County's total age dependency ratio in 2000 was slightly less than the Missouri ratio of 52.9. However, the County's youth dependency ratio of 35.2 was slightly greater than Missouri's youth dependency ratio (32.3). The youth age group is the principal component of the dependent population in Christian County.

Census data from 2007 suggested a continuation in these trends with the exception of the elderly ratio holding steady and showing a very slight increase.

TABLE 4-7

AGE DEPENDENCY RATIOS

Age Group	1970	1980	1990	2000	2007
Youth (0-14)	46.9	39.4	36.7	35.2	32.8
Elderly (65+)	22.0	18.6	17.2	16.0	16.2
Total Population	68.9	58.0	53.9	51.2	49

Source: U.S. Bureau of the Census, *General Social and Economic Characteristics, Missouri 1900-1980; Fourteenth Census of the U.S., 1920. Vol. 1, Population Composition and Characteristics by States; Census of Population, 1990; STF 1 Profile Report for_State of Missouri and Selected Counties, 1990; Census 2000 Summary File (SF 1, and 2005 - 2007 American Community Survey 3 - Year Estimates*

From a historical perspective, the County's age dependency ratio has decreased significantly since the 1960s. This can be attributed to the maturation of the later baby boomers and mini-baby boomers (those born in the 1960s and early 1970s) and movement into the working years. Due to the natural aging process and continued decreases in birth rates, it was expected that Christian County would see a significant increase in its age dependency ratio through the 1990's and 2000's as the baby boomers moved into the retirement years. This however, has not been the case which is largely attributable to the influx of working age people from surrounding counties.

This has created and will continue to provide demand for single-family housing, education and other community services to meet the needs of the youth dependents and working age population. The economic downturn in 2008 has slowed this demand substantially which is reflected in decreased numbers of residential land use permits issued but this must be seen as temporary. As the national economy rebounds in the coming years, Christian County will remain

one of the most relatively attractive places for new development. As previously noted, however, planning for gerontology health care and alternative housing to meet the needs of the elderly will become increasingly warranted over the coming decades.

Sex Composition

The sex composition of a population is an important criteria in many areas of planning--health services, military planning, sales programs and community services (Shyrock, 1973). Defined as the number of males per 100 females in a population, the sex ratio is a common statistical measure of sex composition. A sex ratio greater than 100 indicates an excess of males, while a ratio less than 100 reflects an excess of females in the population. In general, sex ratios tend to fall between 95 and 102 (Shyrock, 1973, 191).

Table 4-8 shows Christian County's sex ratios for the years 1970 through 2000. Since 1970, the County has had a slight excess of females in the population, but this is well within the normal range.

Evaluation of Christian County's sex composition by age group indicates that all groups have experienced an increase in total numbers between 1990 and 2000. Table 4-9 shows the changes in sex ratios for the various age cohorts in the County over the past decade. In general, the trends in the County's sex ratios do not show any significant variances from national norms.

TABLE 4-8

SEX RATIOS

	1970	1980	1990	2000	2007
MALES	7,389	10,986	15,946	26,402	34,290
FEMALES	7,735	11,416	16,698	27,883	35,471
SEX RATIOS	95.53	96.23	95.49	94.69	96.67

Source: U.S. Bureau of the Census, *General Social and Economic Characteristics, Missouri 1900-1980; Census of Population, 1990; STF 1 Profile Report for State of Missouri and Selected Counties, 1990; Census 2000 Summary File 1 (SF 1), and 2005 - 2007 American Community Survey 3 - Year Estimate*

The higher sex ratios in the early youth age cohorts (0-4) reflect the tendency of male births to exceed female births. Also, the lower sex ratios in the elderly age groups reflect the greater life span of the female population. There has been, however, a significant increase in the total numbers of both elderly males and females since 1980, supporting the observation of in-migration of retirement-aged population.

TABLE 4-9

SEX RATIOS BY AGE COHORT

Age Cohort	1990 Males	1990 Females	1990 Sex Ratio	2000 Males	2000 Females	2000 Sex Ratio	2007 Males	2007 Females	2007 Sex Ratio
0-4	1258	1172	107.3	2105	2064	102.0	2846	2412	118.0
5-9	1416	1263	112.1	2171	2065	105.1	2675	2623	101.9
10-14	1383	1297	106.6	2146	2090	102.7	2401	2377	101.0
15-19	1246	1196	104.1	1927	1833	105.1	2366	2093	113.0
20-24	925	1024	90.3	1462	1643	89.0	2264	2377	95.3
25-34	2627	2940	89.3	3920	4168	94.0	5565	5853	95.1
35-44	2543	2640	96.3	4424	4706	94.0	4767	5179	92.0
45-54	1745	1724	101.2	3505	3635	96.4	4835	4860	99.5
55-64	1285	1317	97.5	2262	2408	93.3	3292	3405	96.7
65-74	929	1105	84.0	1520	1703	85.3	1921	2164	88.8
75+	589	1020	57.7	960	1566	61.3	1303	2164	60.2

Source*:* U.S. Bureau of the Census, *Census of Population, General Social and Economic Characteristics, Missouri 1990; STF 1 Profile Report for Missouri and Selected Counties, 2000, and 2005 - 2007 American Community Survey 3 - Year Estimates*

Population Pyramids

A graphic technique used to display the age-sex composition of a population is the population pyramid. The classic population pyramid that shows high birth rates and high death rates typically represents pre-industrial and developing societies. Today, however, the national trend of declining birth rates and increased life spans is evidenced in the smaller base of the classic population pyramid.

Figure 4-2 represents the population pyramids for Christian County's 2000 and 2030 populations. These graphics display the impacts of the natural aging of the population as well as the decline in birth and death rates on the County's population. The bulge in the middle age years represents the baby boom population and in-migration. The most significant inference that can be typically drawn from these graphic representations is the dominance of the youth and younger, working-aged populations and in-migration of retirement population.

Population Projections

In order to develop a plan that will be responsive to the needs of Christian County's population, both now and in the future, it is essential to know what the future population will be. Population projections are necessary in order to provide guidance for the timely planning of community services, such as schools, law enforcement and social services and for necessary public infrastructure, including roads, water, sewer and utilities. Population projections are not the same as predictions. Projections are based on historical and current demographic trends and what the future population may be if these trends continue (Missouri Office of Administration, 1988). Projections are also based on a set of assumptions on how demographic patterns may change in the future. The assumptions used in this report include the following:

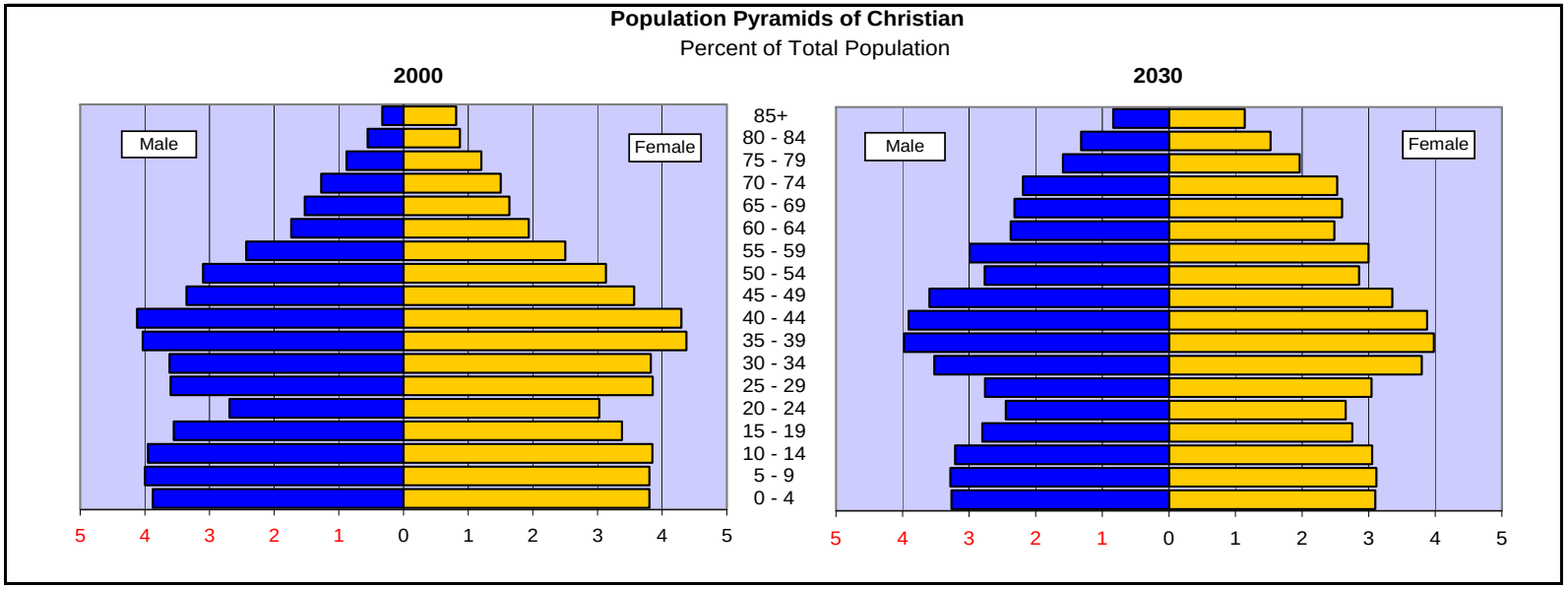
1 Birth rates will remain relatively stable, but low during the coming decade in keeping with national and state trends.

2 Death rates will remain stable through the 2000s, with a slight increase in the period 2010-2020. Life expectancy will continue to increase during the 2010s, accounting for the relatively stable death rate.

3 While changing fertility rates (births) have traditionally been the primary factor affecting population change in the State of Missouri, in-migration has become and will continue to be the dominant component of population change in Christian County during the foreseeable future.

4 The current negative changes in economic conditions and employment opportunities are not regional but nationwide. This means there will be no significant regional negative impact on current migration patterns but may instead only serve to reinforce many of the qualities such as cost of living that tend to draw people to this area.

Figure 4 - 2



Age Group	Census 2000				Projection 2030				2000 - 2030 Change	
	Number			Percent	Number			Percent	Total	
	Total	Male	Female	Total	Total	Male	Female	Total	Number	Percent
Total	54,285	26,402	27,883	100.0	131,066	64,462	66,604	100.0	76,781	141.4%
0 - 4	4,169	2,105	2,064	7.7	8,343	4,279	4,064	6.4	4,174	100.1%
5 - 9	4,236	2,171	2,065	7.8	8,384	4,300	4,084	6.4	4,148	97.9%
10 - 14	4,236	2,146	2,090	7.8	8,212	4,212	4,000	6.3	3,976	93.9%
15 - 19	3,760	1,927	1,833	6.9	7,283	3,672	3,611	5.6	3,523	93.7%
20 - 24	3,105	1,462	1,643	5.7	6,687	3,211	3,476	5.1	3,582	115.4%
25 - 29	4,048	1,956	2,092	7.5	7,606	3,619	3,987	5.8	3,558	87.9%
30 - 34	4,040	1,964	2,076	7.4	9,597	4,620	4,977	7.3	5,557	137.5%
35 - 39	4,562	2,188	2,374	8.4	10,434	5,217	5,217	8.0	5,872	128.7%
40 - 44	4,568	2,236	2,332	8.4	10,203	5,122	5,081	7.8	5,635	123.4%
45 - 49	3,757	1,822	1,935	6.9	9,107	4,713	4,394	6.9	5,350	142.4%
50 - 54	3,383	1,683	1,700	6.2	7,370	3,625	3,745	5.6	3,987	117.9%
55 - 59	2,676	1,320	1,356	4.9	7,855	3,926	3,929	6.0	5,179	193.5%
60 - 64	1,994	942	1,052	3.7	6,373	3,118	3,255	4.9	4,379	219.6%
65 - 69	1,717	829	888	3.2	6,451	3,044	3,407	4.9	4,734	275.7%
70 - 74	1,506	691	815	2.8	6,185	2,871	3,314	4.7	4,679	310.7%
75 - 79	1,131	479	652	2.1	4,658	2,083	2,575	3.6	3,527	311.8%
80 - 84	775	301	474	1.4	3,730	1,731	1,999	2.8	2,955	381.3%
85+	622	180	442	1.1	2,588	1,099	1,489	2.0	1,966	316.1%

Source: Missouri Census Data Center, http://mcdc2.missouri.edu/pub/data/moprojs/charts/Christian.xls

Household Characteristics

Household statistics are used in the planning process as indicators of probable demand for various types of housing and related community facilities and services. In 2007, the U.S. Bureau of the Census defined a household as all persons living in a housing unit. This definition does not make a distinction between a single person and more than one related or unrelated persons living together. One person per household is considered the householder (head of household).

The data in Table 4-10 shows that the majority of the County's households in 2007 were family households (76.9%), a rate higher than that of the State (66.1%). The most striking variances in the County's family household composition and that of the State are the percentages of married couple families and female-headed households. In total, 63.0% of the County's family households are married couple households in comparison to only 50.0% of married couple households for Missouri. Within this category, Christian County has a higher percentage of both married couple households with and without children (see Table 4-10).

The County also has a lower percentage of female-headed households (9.5%) than does the State (11.9%). The numbers of female-headed households with children is a particularly important housing and community services planning indicator as females tend to earn lower wages than their male counterparts and have less disposable income for housing. In addition, such households are often more dependent on public-supported social service programs.

TABLE 4-10

HOUSEHOLDS BY TYPE, 2007

	Christian County		Missouri
	Number	Percent	Percent
Total Households	26,380	100.0%	100.0%
Family Households	20,286	76.9%	66.1%
with Children under 18 yrs	9,919	37.6%	30.3%
Married Couple Family	16,657	63.1%	50.0%
with Children under 18 yrs	7,529	28.5%	20.7%
Male Households, no wife present	1,132	4.3%	4.1%
with Children under 18 yrs	708	2.7%	2.2%
Female Households, no husband present	2,497	9.5%	11.9%
with Children under 18 yrs	1,682	6.4%	7.4%
Non-Family Households	6,094	23.1%	33.9%
Householder living alone	4,831	18.3%	28.4%
65 yrs and over	1,783	6.8%	9.8%
Households with one or more persons under 18 yrs	10,719	40.6%	33.3%
Households with one or more persons 65 yrs or over	5,042	19.1%	23.5%
Average Household Size	2.62		2.46
Average Family Size	2.98		3.03

Source: U.S. Bureau of the Census, *2005 - 2007 American Community Survey 3 - Year Estimates*

Although Christian County has a lower percentage of female-headed households than the State, it should be noted that there has been a regional, state and national trend of increasing numbers of female-headed households over the past two decades and that this trend will most likely continue during the 2010s.

Christian County's greater percentage of family households in comparison to the State also means that the County has a lower percentage of non-family households. In 2007, the County's

non-family households were estimated to be 23.1%, as compared to 33.9% for Missouri as a whole. The number of female headed households more than doubles that of males, supporting the overall national trends of delaying marriage due to career opportunities and changing social attitudes. Also contributing to the greater numbers of single female non-family households is the fact that females tend to have a longer life span.

Average Household Size

Also of interest for housing planning purposes, is the average size of households. As indicated, the average size of Christian County households in 2007 was 2.62 persons, as compared to 2.46 persons for all Missouri households. Household size has been decreasing since the 1970s, due to declining birth rates and an increase in single person households. While single family dwelling units will continue to be the dominant type of housing needed into the 2010s, there will most likely be an increasing demand for alternative housing types to meet the changing lifestyles of smaller family households, single person households and the growing segment of retirement age baby boomers.

ECONOMY

Christian County's physical development pattern and potential for future growth are dependent in part on the structure and pattern of its economic base. This section of the

Comprehensive Plan discusses the components and pattern of economic activity in Christian County, along with related labor force and income characteristics.

The Regional Economy

The economy of Christian County is closely intertwined with that of the City of Springfield and the larger metropolitan area. Linked to the Springfield area by Highways 160, 65 and 60, Christian County residents are within easy commuting distance of Springfield for employment, shopping and services. However, the future prospect of increasing fuel prices could become a deterrent for those wanting to move to Christian County while remaining employed outside the county. The 2005 - 2007 American Community Survey indicates that the estimated average travel time to work for Christian County residents is 23.8 minutes. Creating jobs in Christian County would allow residents to reduce communing time and support the local economy.

The close relationship between the economies of Christian County and greater Springfield is evidenced by the employment patterns and places of employment of the Christian County labor force. The 2000 Census indicates that 17,272 persons, or 61.5% of the employed residents of Christian County, work outside of the County. As shown in Table 5-1, 50.7% of all employed work in Springfield. Overall, 92.1% of the County's employed labor force works in the Springfield Metropolitan Statistical Area (MSA), which includes Greene, Christian and Webster Counties. Christian County's economic future will continue to be influenced by larger regional economic trends, including not only the Springfield area but also the rapidly growing tourism and recreation economy in the Branson area to the south.

TABLE 5-1

PLACE OF EMPLOYMENT

Christian County Employed	Number	Percent of Total
Work in County of Residence	9,777	35.7%
Work Outside County of Residence	17,272	62.9%
Work Outside of State	372	1.4%
Work in MSA of Residence	25,267	92.1%
Work in Central City (Springfield)	13,921	55.1%
Work in Remainder of MSA	11,346	44.9%
Work Outside MSA of Residence	449	1.7%
Work in Central City	269	1.0%
Work in Remainder of MSA	180	0.7%
Work Outside of Any MSA	1,705	6.2%
Total Workers	27,770	100.0%

Source: U.S. Bureau of the Census, *2000 Census of Population and Housing, STF 3 Selected Characteristics.*

Business Sector Analysis

Christian County has experienced significant growth in the number of business establishments over the past 25 years, increasing from 163 businesses in 1965 to 703 establishments in 1999 (County Business Pattern Report, 1999). Since 1999, the number of businesses in Christian County has increased further reaching a total of 2,595 in 2008 (Business Study prepared by Springfield Area Chamber of Commerce, 2008). Since 1980, the greatest

growth has occurred in the Construction sectors. The cities of Nixa and Ozark account for over half of the County's economic activity.

As noted in Table 5-2, the greatest number of businesses is in the service, retail and construction sectors. The largest number of businesses is in the service sector, with health and business services accounting for the majority of payroll dollars. The service and retail sectors together account for over 54.2% of all business establishments in the County. The service sector employs the greatest number of .people (5,574 employees).

TABLE 5-2

NUMBER OF BUSINESSES AND EMPLOYEES, 2008

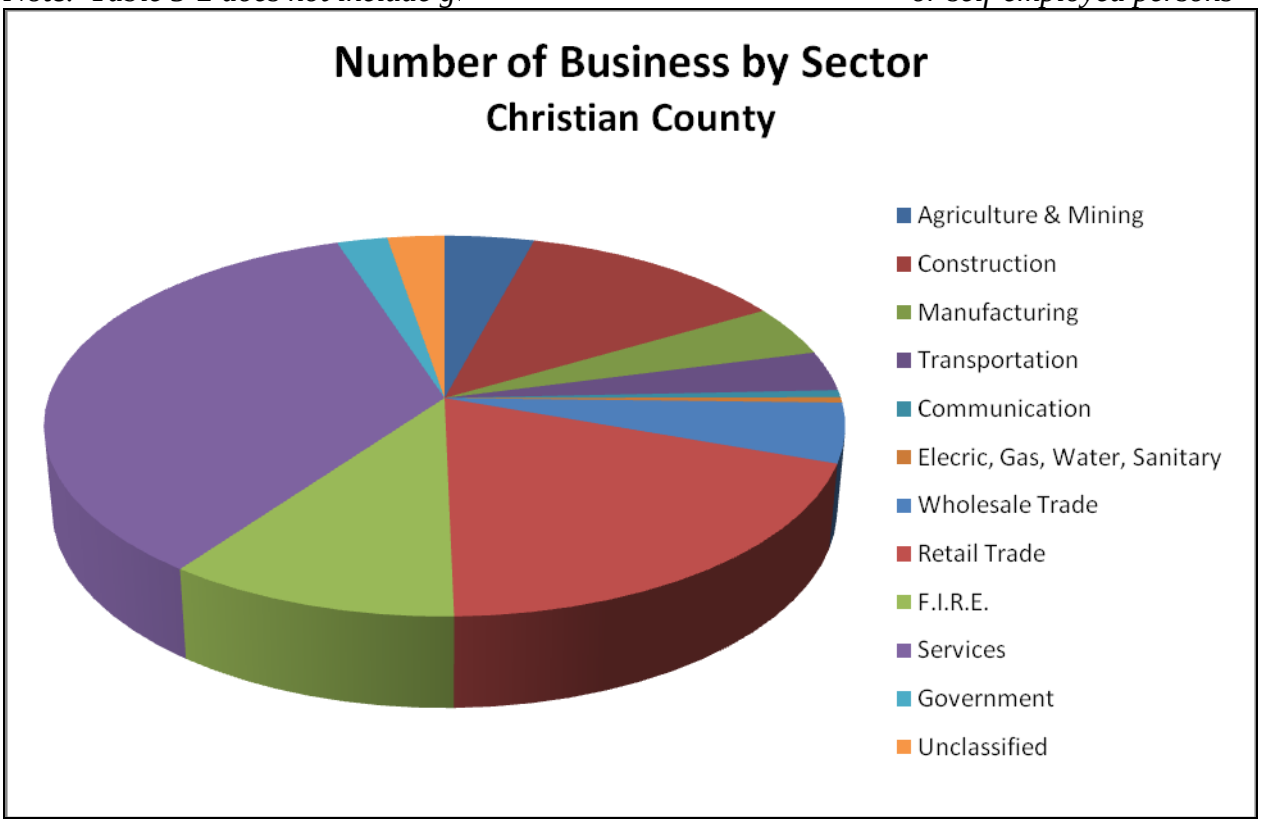
Sector	No. of Businesses	% of Total	No. of Employees	% of Total
Agriculture & Mining	108	4.2%	264	1.6%
Construction	323	12.4%	1,630	9.8%
Manufacturing	112	4.3%	1,702	10.2%
Transportation	88	3.4%	404	2.4%

Communication	16	0.6%	46	0.3%
Electric, Gas, Water, Sanitary	12	0.5%	89	0.5%
Wholesale Trade	131	5.0%	691	4.1%
Retail Trade	499	19.2%	4,584	27.5%
F.I.R.E.	268	10.3%	1,149	6.9%
Services	908	35.0%	5,574	33.4%
Government	61	2.4%	539	3.2%
Unclassified	69	2.7%	3	0.0%
Total	2,595	100.0%	16,675	100.0%

Source: Business data provided by InfoUSA, Omaha NE Copyright 2008, all rights reserved. ESRI forecasts for 2008.

FIGURE 5-1

Note: *Table 5-2 does not include g* *or self-employed persons*



Source: Business data provided by InfoUSA, Omaha NE Copyright 2008, all rights reserved. ESRI forecasts for 2008.

Agricultural Sector

Christian County's most basic economic activity is agriculture and is home to 48 century farms. Historically the mainstay of the County's economy, the agricultural sector is in decline, in terms of both numbers of working farms and percentage of total personal income generated. The decline in the number of farms follows national and state trends. The number of Christian County farms decreased from 1386 in 1997 to 1,294 in 2002, a 6.6% decrease. This percentage decrease is more than that experienced by the State of Missouri during the same time period (-3.8%), but is also more than five times the national trend (-3.9%).

The average farm size in Christian County is increasing. The average farm is approximately 165 acres, that’s up from 156 acres in 2002. There has also been a decrease since 1997 in the number of farms over 1,000 acres in size. The small size of farms and income generated from commodities sales suggest that many farmers are involved in farming activities only part-time and may have other sources of employment and personal income. In 1997, 71.7% of all farms in the County had annual sales of less than $10,000 compared to 64.5% in 2002. (U.S. Department of Agriculture, 1997). Personal income generated from agriculture is also a very small percentage of total personal income in the County.

Retail Sector

Retail trade plays an important role in a local community's economic well-being. It fosters the creation of jobs, income, and tax revenues. It serves as a support industry to the area's industrial base by providing inputs for these enterprises and meeting the consumer needs of its workers. Furthermore, if the local retail trade sector provides goods and services, which are not available in other locations, it attracts dollars from out-of-town shoppers. From a regional perspective, one

community's ability to increase retail sales may come at the expense of a reduction in another community's retail sales. An analysis of the local retail pull factor for each major retail sales category has been evaluated. The retail pull factor provides a precise measure of sales activity in a locality. A pull factor of above 1.00 indicates that a community is attracting business, while one that is below 1.00 indicates that the community is losing businesses to other retail markets. For purposes of this assessment and given that Christian County is Ozark's primary trade area, an assessment of sales leakage for Christian County by major retail reporting category identifies where immediate growth opportunities may be achieved.

An analysis of eight major retail sales reporting categories compared Christian County's pull factors to the other major competing counties for retail activity, Greene and Taney Counties. Both neighboring counties have very strong retail pull factors, as Springfield serves as a regional trade center for the metropolitan area and Branson is a major visitor destination. Not surprisingly, Greene and Taney Counties have very strong pull factors. This comparative data presented in Table 5 - 3 provides insight about the major retail opportunities in the area. Retail pull factor data reveals that sales in Christian County are strongest for building materials, general merchandise and food stores, and sales leakage occurs among motor vehicle and auto parts dealers, furniture and home furnishings, eating and drinking places and miscellaneous retail stores (which includes gift stores, office supplies, art galleries, florists, pet stores, used merchandise stores and others). Clothing and apparel data is not available but it is reasonable to conclude that leakage is also occurring in this area because of the strength of Greene and Taney County's pull factor in this category. Therefore, in addition to serving future population growth, in order to further expand the area's retail base, it is appropriate for the County and its incorporated municipalities to target those retail categories where the trade area is experiencing the most sales leakage.

TABLE 5 - 3

Area County's Retail Pull Factors by Sales Category

Sales Category	Christian	Greene	Taney
Building Material & Garden Supply Stores	2.98	1.99	1.33
General Merchandise Stores	1.30	2.04	1.69
Food Stores	1.01	1.20	2.37
Motor Vehicle, Gasoline & Parts Dealers	0.70	1.40	0.87
Clothing & Clothing Accessories Stores	N/A	1.94	9.22
Furniture & Home Furnishings Stores	0.47	2.21	3.35
Eating & Drinking Places	0.95	1.44	5.02
Miscellaneous Store Retailers	0.70	1.94	2.50
TOTAL RETAIL TRADE PULL FACTOR	**0.98**	**1.76**	**2.85**

Source: MERIC

Labor Force Characteristics

Christian County's labor force is defined as those persons 16 years of age and older who are employed or who are available for employment. The County's labor force has increased greatly over the past 30 years, from 6,800 persons in 1970 to 28,763 persons in 2000. Between 1990 and 2000 the labor force increased by 12,077 persons, a 72.4% increase. This compares to an 11% increase in the labor force for the State of Missouri during the same time period. Between 2000 and 2007 the labor force increased by 10,871 persons, a 37.8% increase. This is a considerable drop compared to the increase between 1990 and 2000 but still considerably higher than the 5.7% increase in the State of Missouri between 2000 and 2007

Labor force participation rates for Christian County and the State of Missouri between 1980 and 2000 are noted in Table 5-4. While participation rates for males have remained relatively constant since 1970, there has been a significant increase in the female participation rate for both Christian County and the State. The substantial increase in the female participation rate follows national trends and supports the observation of increases in two-income households.

TABLE 5-4

LABOR FORCE PARTICIPATION RATES

Area	1970	1980	1990	2000	2007
Christian County					
Male	74.7%	74.9%	78.0%	78.7%	
Female	35.7%	46.8%	60.2%	62.8%	
Missouri					

Male	71.7%	74.2%	73.6%	71.6%
Female	39.3%	49.9%	56.4%	59.2%

Source: U.S. Bureau of the Census, *Missouri Statistical Abstract, 1970, 1980; STF 3 Profile, Selected Characteristics, Christian County and Missouri, 1990, 2000.*

Employment rate trends in Christian County since 1970 have remained fairly consistent with larger state and national trends and have traditionally been comparatively strong within our region as well as the state. As shown in Table 5-5, the County's highest unemployment rate during recent census periods occurred in 1980 when the unemployment rate was 5.5%. Although the County's employment rates have followed state and national trends, the County's economy has been expanding at a faster pace. Overall, the region has maintained an expanding employment market. For example, Christian County's labor force increased by over 72.4% between 1990 and 2000. During this same period, there was only a 15% increase in the number of unemployed persons.

The County's 2007 unemployment rate was 3.8%, an increase over the low water mark of 2.3% established in 2000. It should be noted, however, that these figures represent unemployment levels at moments in time in 2000 and 2007. They do not represent current employment rates being affected by recent economic developments.

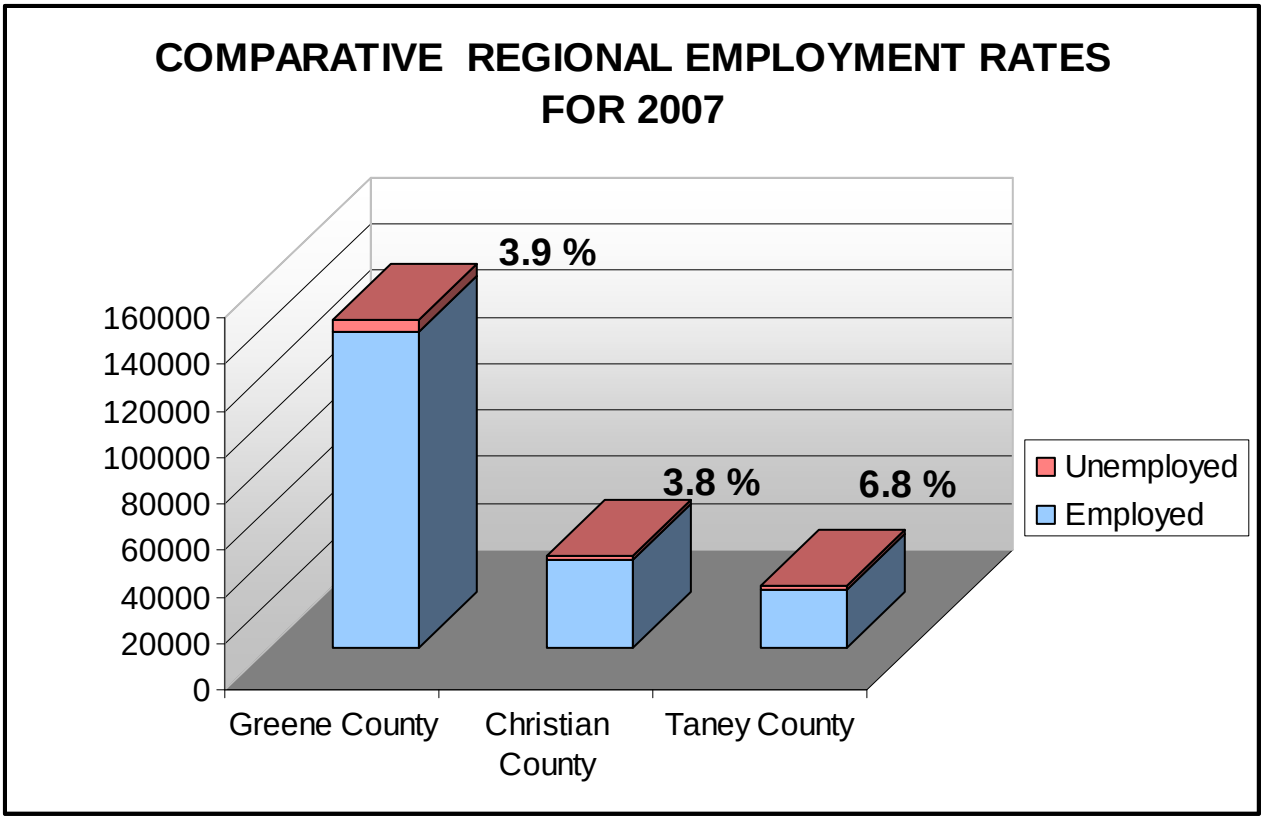
TABLE 5-5

HISTORICAL LABOR FORCE EMPLOYMENT RATES

Year	Labor Force	Number Employed	Number Unemployed	Rate
1970				
Christian Co.	6,800	6,710	90	3.2%
Missouri	1,927,000	1,864,000	63,000	3.3
1980				
Christian Co.	10,680	10,090	590	5.5%
Missouri	2,295,000	2,134,000	161,000	7.0
1990				
Christian Co.	16,686	15,889	766	5.3%
Missouri	2,511,000	2,348,000	163,000	6.1
2000				
Christian Co.	28,763	27,770	921	2.3%
Missouri	2,822,010	2,657,924	148,794	3.4%
2007				
Christian Co.	39,634	38,121	1513	3.8%
Missouri	2,981,717	2,774,004	191,505	4.2%

Source: U.S. Bureau of the Census, *Statistical Abstract of United States, 1961; Missouri Statistical Abstract, 1970, 1980, 1990; STF 3 Profile Report, Selected Characteristics, Christian County, 1990, 2000., 2005-2007 American Community Survey 3-Year Estimates*

FIGURE 5-2



Labor Force by Occupation and Industry

The characteristics of Christian County's labor force may be evaluated by both type of occupation and type of industry. Note that the following census information provided is based on place of residence (Christian County), not place of employment.

The County has experienced significant changes in the occupational structure of its labor force since 1960. All occupations have grown tremendously between 1960 and 1990 with the exception of Farming, Fishing, and Forestry occupations. Farming in particular has experienced significant decline. In 1960, farming was the most common occupation, accounting for 31.4% of employed persons. By 2000, farming had dwindled to the smallest occupation, accounting for only 0.6% of the employed labor force and by 2007 it was 0.3%.

Table 5-6 lists the breakdown in occupation structure between 2000 and 2007. For reference, the top five occupations of employed persons in the County in 2000 by rank order were:

1. Professional Specialty
2. Administration Support, Technical and Clerical
3. Executive, Managerial, Administrative and Professional
4. Technical, Sales and Administrative Support
5. Services (excluding household and protective services)

TABLE 5-6
OCCUPATION OF EMPLOYED PERSONS
(16 Years and Older)

Occupation	Estimate	Percentage
Management, professional & related	11,482	31.9%
Service occupations	5,311	14.8%
Sales & office occupations	10,188	28.3%
Farming, fishing & forestry operations	91	0.3%
Construction, extraction, maint. & repair	4,080	11.3%
Production, transportation & materials moving operations	4807	13.4%

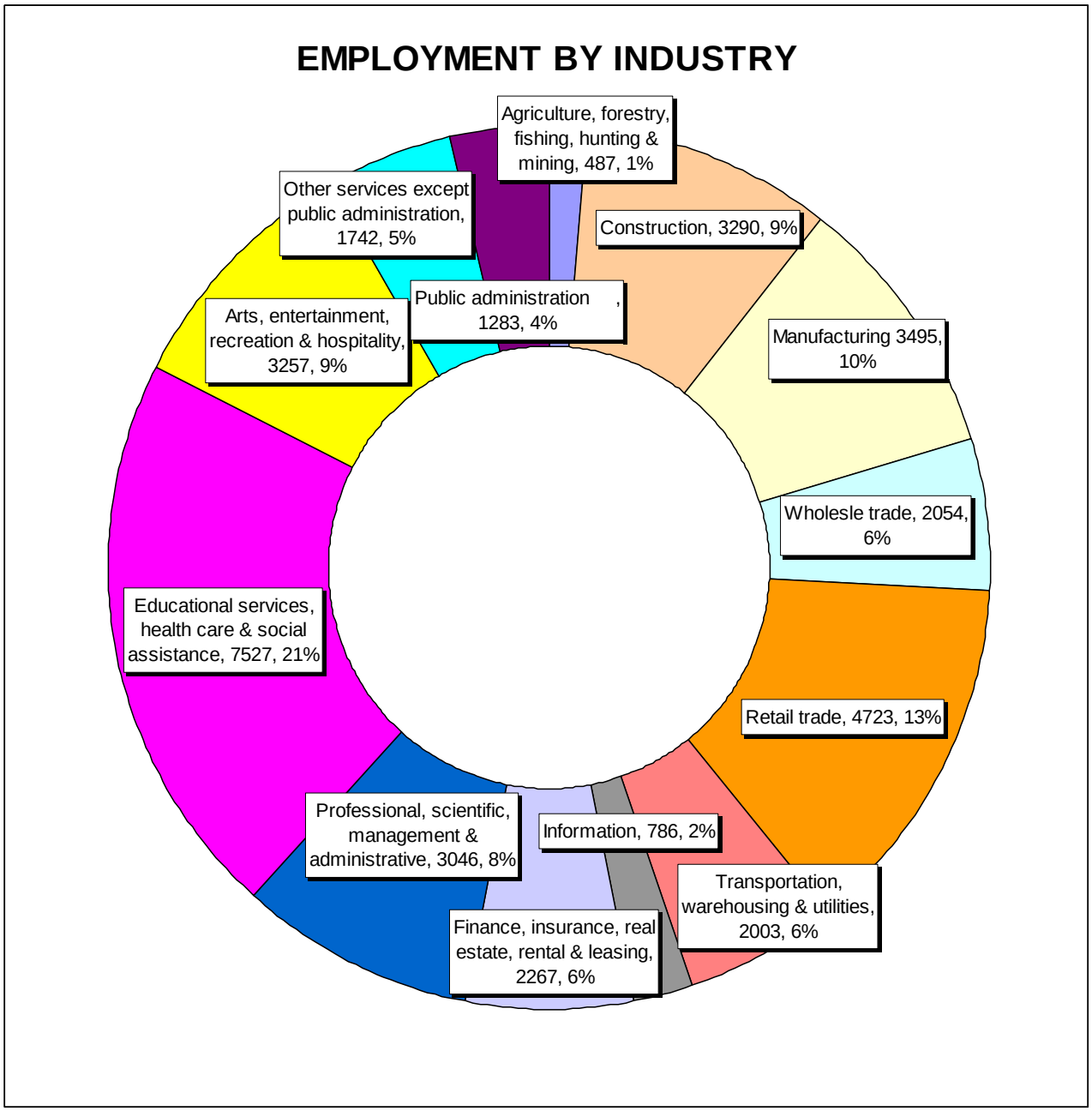
Source: *U.S. Bureau of the Census, 2005 - 2007 American Community Survey 3 - Year Estimates*

Table 5-7 depicts employment patterns by industrial sector in 2007. As shown, over 20% of employed persons work in the Educational Services, Health Care & Social Assistance sector (7,526 persons or 20.9%). As shown in Figure 5 -3, other top employment sectors include Retail Trade (13.1%) and Arts, Entertainment, Recreation & Hospitality. Over the last 10 - 15 years the construction and manufacturing sectors have shown significant decline in their percentage of employment which reflects a growing diversity in employment sectors and also indicates a growing reliance on service related jobs not thought to be "basic" to a healthy local economy.

TABLE 5 - 7
CIVILIAN EMPLOYMENT BY INDUSTRY
(16 Years and Older)

Industry	Estimate	Percent
Agriculture, forestry, fishing, hunting & mining	487	1.4%
Construction	3,290	9.1%
Manufacturing	3,495	9.7%
Wholesale trade	2,054	5.7%
Retail trade	4,723	13.1%
Transportation, warehousing & utilities	2,003	5.6%
Information	786	2.2%
Finance, insurance, real estate, rental & leasing	2,267	6.3%
Professional, scientific, management& administrative	3,046	8.5%
Educational services, health care & social assistance	7,526	20.9%
Arts, entertainment, recreation & hospitality	3,257	9.1%
Other services except public administration	1,742	4.8%
Public administration	1,283	3.6%

FIGURE 5 - 3



Source: *U.S. Bureau of the Census, 2005 - 2007 American Community Survey 3 - Year*

Income Characteristics

In 2007, the median household income in Christian County was $46,542, increasing from $38,085 in 1999. The County's median household income is slightly higher than that of the State of Missouri ($44,545) but is lower than the United States ($50,007). The 2007 per capita income for Christian County ($21,650) is lower than state and national figures (U.S Bureau of the Census, 2005-2007 American Community Survey 3-year estimates).

Table 5-8 categorizes 2007 household income levels for the County. Over 20% of the County's households reported annual income falls within $50,000-$74,999. This is a large increase in income compared to 1989 when the highest percent, 21%, reported an annual income between $15,000 and $24,999.

The economic well being of Christian County, along with the potential need for various public assistance programs, is reflected in part by the number of people with incomes below the poverty level. In 1999, 4,869 persons in the County had incomes below the poverty level. This represents 9.1% of all persons for whom poverty status was determined, a decrease from 10.1% in 1989. Of those persons below the poverty level in 1999, 1,562 or 34.6% had incomes less than 50% of poverty level.

TABLE 5-8

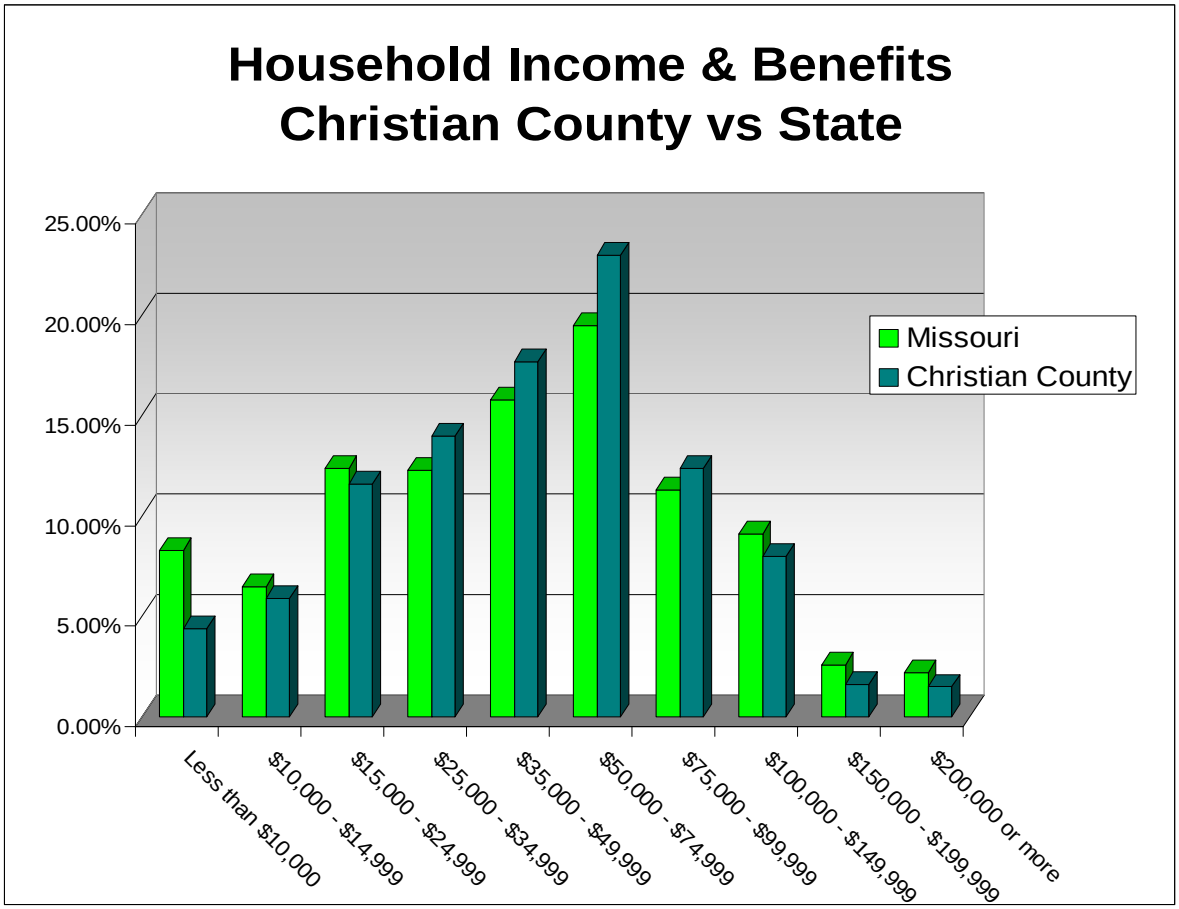
HOUSEHOLD INCOME AND BENEFITS (In 2007 Inflation Adjusted Dollars)

Income	Number Households	Percent of Total
Less than $10,000	1,149	4.4%
$ 10,000 – 14,999	1,560	5.9
$ 15,000 – 24,999	3,071	11.6
$ 25,000 – 34,999	3,682	14
$ 35,000 – 49,999	4,664	17.7
$ 50,000 – 74,999	6,064	23
$ 75,000 – 99,999	3,277	12.4
$100,000 – 149,999	2,105	8
$150,000 – 199,999	419	1.6
$200, 000 or more	389	1.5
Total	26,380	100%

Source: U.S. Bureau of the Census, *2005 - 2007 American Community Survey 3 - Year Estimates*

Over 42% of persons below the poverty level are under the age of 18. Also, 8.6% of persons below the poverty level are retirement-aged (65 years and older). It was previously noted that females tend to have lower incomes than their male counterparts. This observation is supported in the percentage of female-headed households below the poverty level. Of 5,206 persons in households headed by females, 1,684 or 32.3% are below the poverty level. Clearly, poverty status is most acute for persons in the dependent age years, including both children and retirees.

FIGURE 5-4


Household Income & Benefits
Christian County vs State
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Missouri
Christian County
Less than $10,000
$10,000 - $14,999
$15,000 - $24,999
$25,000 - $34,999
$35,000 - $49,999
$50,000 - $74,999
$75,000 - $99,999
$100,000 - $149,999
$150,000 - $199,999
$200,000 or more

PHYSICAL CHARACTERISTICS

Physical variables refer to topography, geology, hydrology, weather and climate, geomorphology, and soils. The physical environment contains each of these variables, all of which may have an impact on development potential. Physical variables are addressed in this chapter of the Comprehensive Plan in order to identify areas where development may be constrained or where development may pose a hazard to environmental quality. Many of the aforementioned physical variables are uniform throughout Christian County; a general overview of these characteristics is provided in the following pages. Emphasis is placed, however, on soils, geomorphology and hydrology due to the constraints each impose upon development potential in the County.

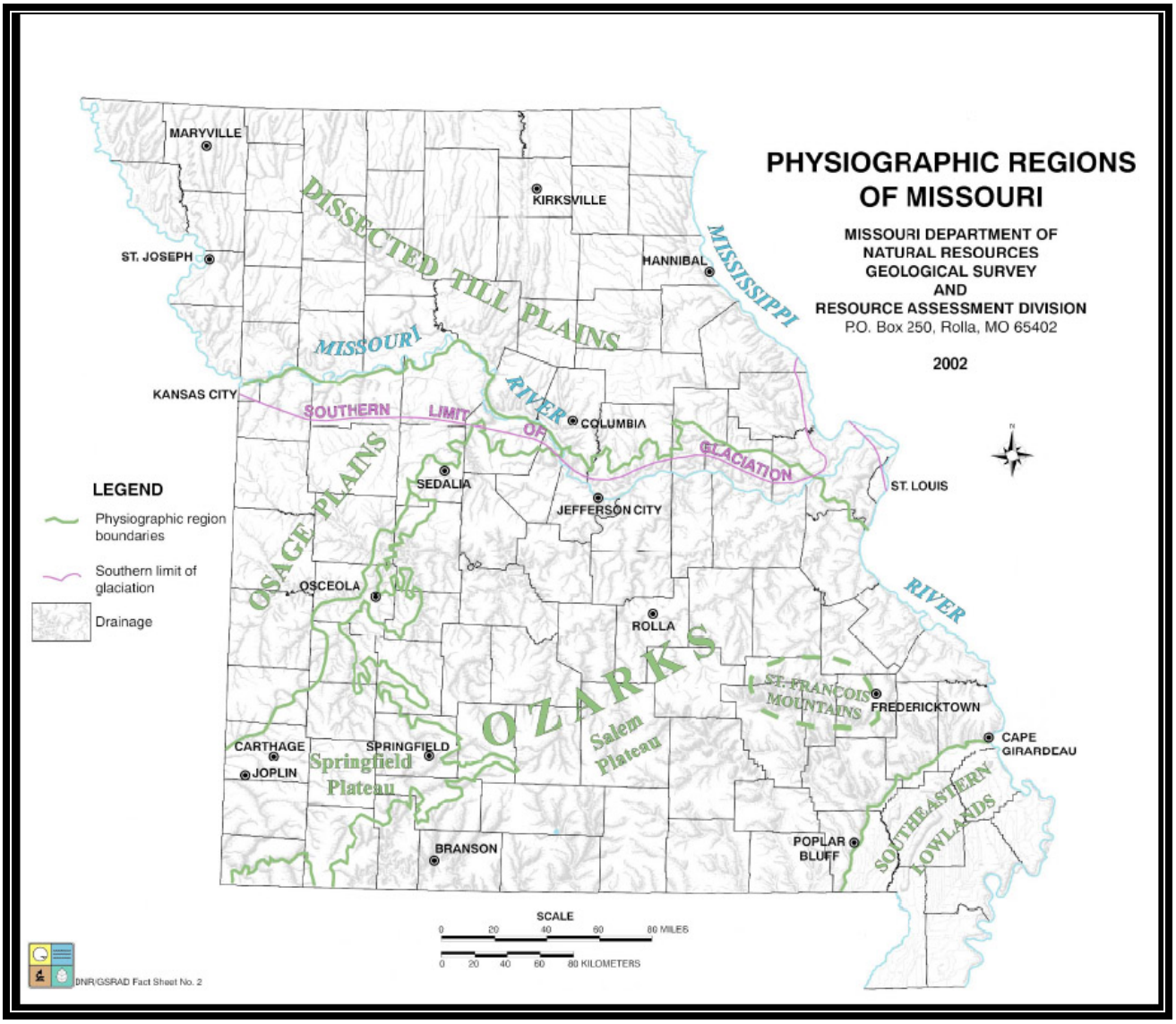
Topography-Elevation

Christian County is situated on three landforms--the Springfield Plateau, the Salem Plateau, and the Eureka Springs Escarpment (see Figure 6-1). Most of the northern portion of Christian County is on the Springfield Plateau. The Salem Plateau is located mainly in the southeastern portion of the County with a small area in the south central region. The Eureka Springs Escarpment crosses the County from the northeast to the southwest, thus dividing the Springfield and Salem Plateaus.

The County exhibits many different topographic features ranging from gently rolling hills to rugged bluffs and valleys. The highest point in the County is located in the northeast portion of the Springfield Plateau with an elevation of 1590 feet. The lowest point of elevation, 830 feet, is located on the Salem Plateau where Swan Creek enters Taney County. With these great variances in elevation throughout Christian County, steep slopes do pose some constraints and hazards to development as well as potential soil erosion from removal of vegetative ground cover.

FIGURE 6-1

REGIONAL PHYSIOGRAPHY



The entire County is marked with sinkholes and karst, indicating that the surface topography is connected with underground geological features. Sinkholes represent a potentially serious hazard to development in several areas of Christian County; sinkholes are discussed further in the section on hydrology and drainage.

Geology

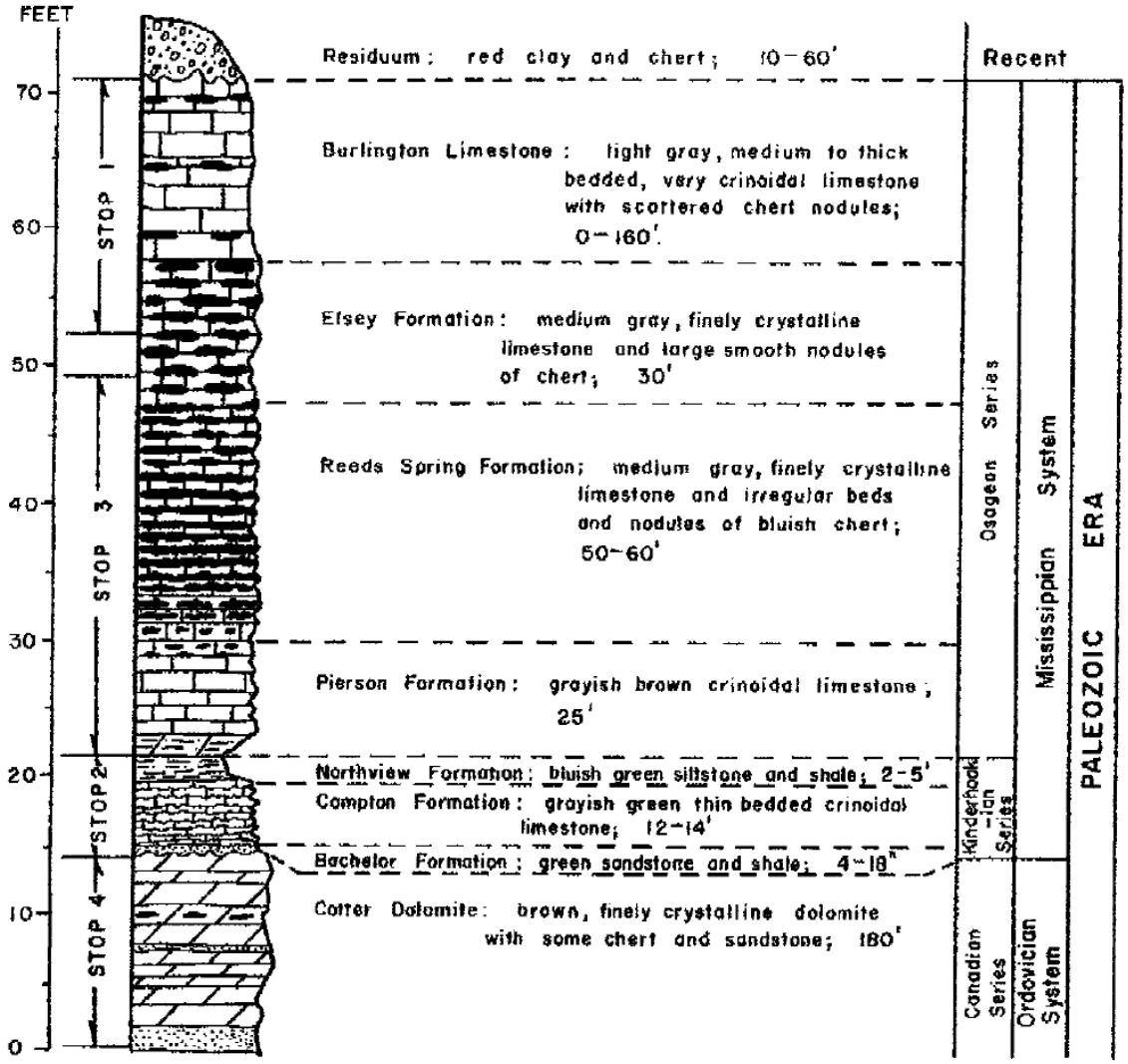
The term geology refers to the earth's crust and the development of its various layers. Christian County is underlain by eight rock units and one unconsolidated unit (see Figure 6-2). Each of these rock formations outcrops in different parts of the County. The depth of the soil and residuum (unconsolidated materials) throughout the County ranges from 10' to 60'. The remaining rock formations range from 0' to 180' below the surface. The most prominent rock formations in Christian County are the Cotter, Northview, Reeds Spring/Elsey, and Burlington/Keokuk Formations.

The Cotter Formation is the oldest and most deeply buried rock unit. It outcrops at the surface in the rugged hills and valleys in the southwestern and south-central portion of the County. There is a sandstone unit within the formation, which furnishes small amounts of groundwater that recharge many springs in the valleys of southern Christian County. This poses some hazard to well construction due to the direct access to surface waters and potential contaminants.

The Northview Formation is a thin but important rock layer ranging in thickness from 5 - 20 feet. The formation consists of siltstone and shale. The shale portion of the formation acts as a barrier against the downward percolation of groundwater. Many springs appear at the top of the Northview Formation;

FIGURE 6-2

GENERALIZED COLUMNAR SECTION OF ROCK UNITS
FOR CHRISTIAN COUNTY



Source: Jerry D. Vineyard and Larry D. Fellows, *Missouri Geological Survey and Water Resources*, R1 37, 1969.

the groundwater percolates downward to the shale and then moves laterally until reaching a gully or valley and resurfacing as a spring. The Northview Formation can be thought of as a divider between shallow and deep groundwater in Christian County. Due to the shallow percolation of

waters, well water from aquifers in the Northview Formation are much more prone to contamination from surface pollutants.

The Reeds Spring and Elsey rock units are difficult to separate from each other, and so are often identified collectively as the Reeds Spring/Elsey Formation. This formation is composed of alternating layers of limestone and chert, ranging from 80' - 150' feet in thickness. The formation appears in all parts of the County, but occurs mainly on the hillsides bordering the James River and Finley Creek. This formation is important in the development of soils. The soils are very cherty and gravelly, with depths ranging from less than 1 foot to more than 15 feet. Development of on-site sewage disposal systems should be carefully monitored in these areas due to the porosity of the soils and potential for groundwater contamination.

The Burlington/Keokuk Formations are also separate rock units, but because they are difficult to distinguish from one another, are considered a single unit. The formation represents the uppermost layers of bedrock in much of Christian County, and is comprised of limestone ranging from 100 - 150 feet in thickness. The formation crops out in the central portion of the County and in northern stream valleys.

The weathering process that takes place in this formation causes a sharp but irregular boundary with the above-lying residual soil material, resulting in pinnacles and cutters. Pinnacles and cutters are peak-and-valley-like variations in the bedrock surface with as much as 12 feet of relief. The pinnacles are hard limestone bedrock, while the cutters are comparatively soft residual materials. Pinnacles and cutters create problems for development because of their irregularity, difficulty of detection prior to excavation and increased costs during construction (Porter and Thomson, 1975).

Structural features are those geologic features formed through the deformation of bedrock, principally by uplifting, faulting, and volcanic activity. Structural features may include uplifts and basing, folds, faults, and joints.

There are four main structural features within Christian County, including the Chesapeake, Sac River, Ponce de Leon, and Highlandville Faults. The Chesapeake Fault is located in the extreme western region of the County. The portion of the fault lying in Christian County runs from the Lawrence-Christian County line west of the town of Billings and extends in a southeasterly direction (McCracken, 1971). Although not a significant threat to development, construction should try to avoid the fault line.

The Sac River Fault parallels the Chesapeake Fault and runs from just north of the City of Nixa to where the James River crosses the Greene-Christian County line. Where exposed at the surface, the displacement is up to 60 feet and is downthrown to the northeast side of the fault. It is common to have brecciated areas along this fault. Breccia is very porous rock composed of coarse angular fragments. Surface water and pollutants can easily pass downward through the brecciated material, thus creating potential for groundwater contamination.

The Ponce de Leon Fault is located principally in Stone County, but extends east-southeasterly into the extreme southwest corner of Christian County, just south of Spokane. This fault area does not pose a great threat to development. However, as with any fault, construction should try to avoid the fault line.

The Highlandville Fault runs from the Stone-Christian County line, northwest of Highlandville, in a southeasterly direction to approximately U.S. Highway 65. This fault area does not pose a significant threat to development.

Hydrology and Drainage

Christian County lies within the Osage River Basin, the Upper White River Basin, and the Spring River Basin. A small portion of the western panhandle of Christian County, including the City of Billings, lies within the Sac River watershed which drains northwest to the Osage River. Also, a small portion of the panhandle area west of MO Highway 13 and south of the City of Billings lies within the Spring River Basin. The Spring River drains in a northwesterly direction to east of the City of Asbury in Jasper County then southwest into Kansas and to the Grand Lake of the Cherokees in Oklahoma. Most of Christian County lies within the James River Basin and the Bull Shoals Lake Basin, sub-basins of the Upper White River Basin (Figure 6-3).

The northern third of the county is located in the James River Basin. From its headwaters in Webster County, the James traverses nearly ninety-nine miles through southern Greene County and Christian County, flowing in a southerly direction to where it is impounded in Table Rock Lake in Stone County. Major tributaries to the James flowing in Christian County include Finley Creek, Flat Creek, Terrell Creek, and Wilson's Creek.

There are four intermittent streams with permanent pools located in the Christian County portion of the James River Basin. "Intermittent" refers to a stream that has intervals of flow interspersed with intervals of no flow. These streams include Stewart Creek, Terrell Creek, and two unnamed laterals to Finley Creek. There are also 62 losing stream reaches. Losing stream reaches, a feature of karst topography, means the surface water goes underground (Kiner and Vitello, n.d.).

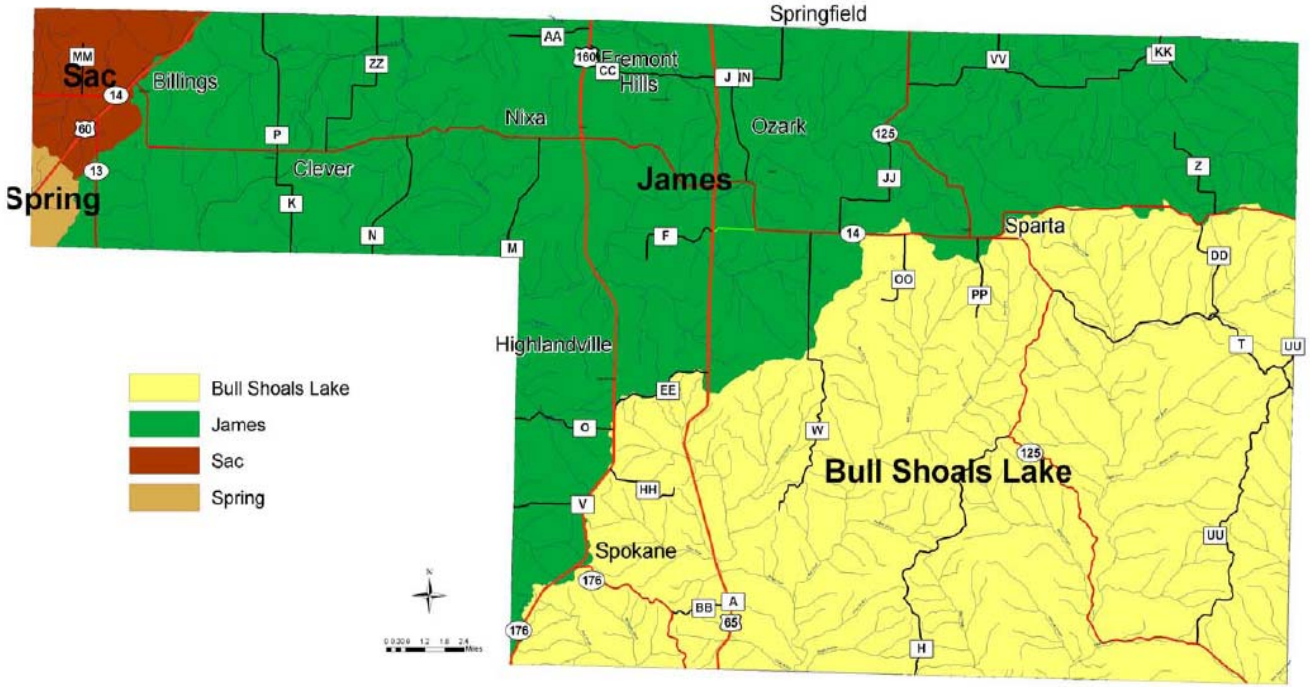
The cities of Fremont Hills, Highlandville, Nixa, and Ozark are located in the James River Basin. Finley Creek flows through the center of the City of Ozark and has caused major flooding in past high water events. Rapid urbanization is occurring in the James River Basin area between the City of Springfield in Greene County and Nixa and Ozark in Christian County.

The southern and eastern half of the County lies within the Bull Shoals Lake watershed, which is a subdivision of the Upper White River Basin. The watershed lies on the Salem Plateau, with a small portion of the northwestern edge of the watershed on the Springfield Plateau. Major Christian County tributaries in the Bull Shoals Lake watershed include Swan, Bull and Bear Creeks, which flow in a southerly direction. There are two intermittent streams in the watershed, an unnamed tributary to the West Fork of Bull Creek and an unnamed tributary to the Woods Fork of Bull Creek. Most of the Bull Shoals Lake watershed is rural, including sizeable acreage in the southern and eastern portion of Christian County in the Mark Twain National Forest.

None of the streams and creeks in the watershed flow through incorporated communities in Christian County. Predominant agricultural activity in the watershed is cattle production. Finley Creek is the only stream or tributary flowing through any of the incorporated communities in Christian County. The smaller streams and creeks mainly affect low water bridges on county roads and low-lying agricultural lands. Contaminated effluent from poorly designed livestock facilities, landfills, or sewage disposal facilities can quickly pass into the groundwater supply, thereby resulting in groundwater pollution.

FIGURE 6-3

Christian County Watersheds



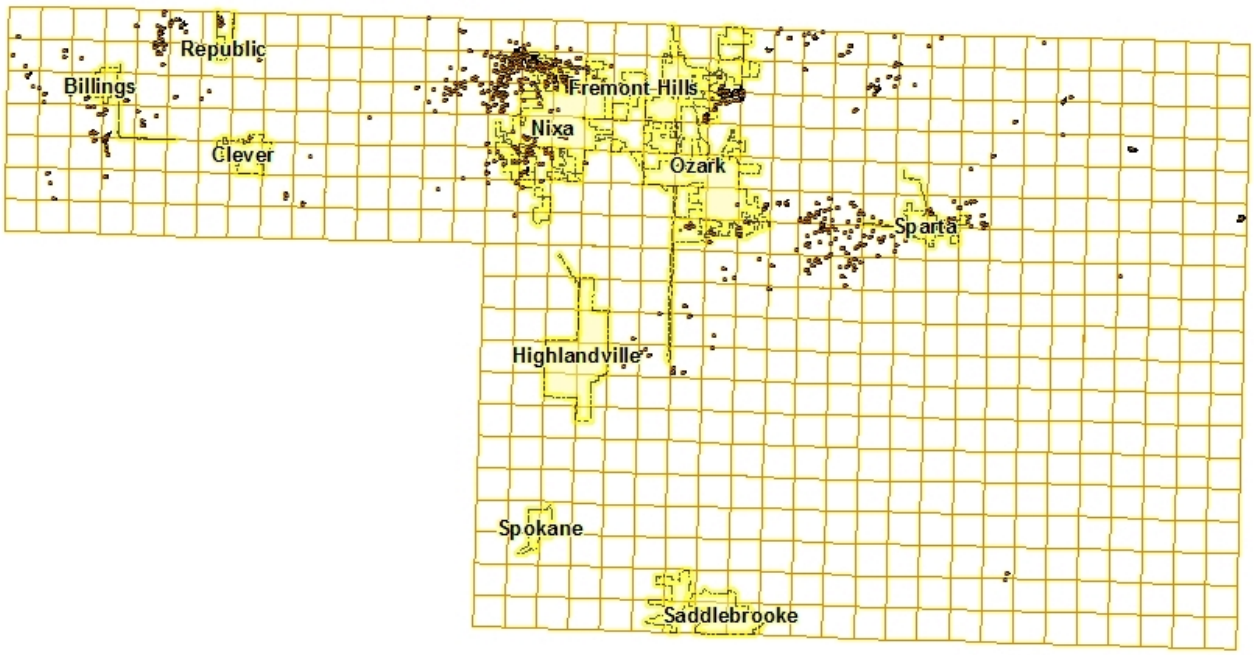
Much of Christian County is considered a sensitive karst region. The northcentral and northwestern parts of the County have been classified by the Missouri Department of Natural Resources (DNR) as a sensitive area for well construction due to the karst topography. A recent study of 60 wells throughout Christian County found that water from 50 percent of the wells was unsafe for human consumption. Of the wells found unsafe, 13.3% tested positive for E. coli.

Overall, the County has hundreds, perhaps thousands, of sinkholes ranging in size from small dimples a few yards in diameter to several acres in area. (see Figure 6-4) There are probably many more sinkholes than those that can be seen on the ground, but they are covered with chert and/or residuum and are therefore hidden from view (U.S. Department of Agriculture, 1985). The most extensive region of sinkholes in the County lies just north and west of the City of Nixa, although it must be assumed that there a many more un-mapped sinkholes which exist in less populated areas which have not yet been identified. The largest sinkholes in this area are the Aven and Deffenderfer Sinks.

Field surveys have indicated that many of the sinkholes in the County are used as trash dumps or serve as conduits for movement of feedlot wastes into the groundwater system. Trash dumping in sinkholes has negative consequences for groundwater quality as pollutants can enter the groundwater with little filtration. Further study to identify the locations of sinkholes as well as direction of subsurface water flow is recommended.

FIGURE 6-4

Mapped Sinkholes in Christian County



Another karst feature common to Christian County is caves. There are some 140 caves that have been identified and documented in the County. These caves are found in limestones and dolomites, with most being located in the Mississippian-aged Burlington and Pierson limestone (260-285 million years), and a few in the Ordovician-aged, Cotter Formation dolomites. Other geologic formations in the County are not conducive to cave formation (Thomson and Martin, 1975).

Climate and Weather

The Christian County area has a continental climate characterized by mild winters and hot summers. Weather data for the area, which have been collected since 1900, are derived from the

nearby Springfield Weather Station. The average annual temperature for the Christian County area has been in the fifties during the data collection period (1900-1990). For agricultural purposes, the area has an average growing season of 192 days. The first killing frost occurs around October 23rd and the last killing frost of spring on approximately April 14th.

Prevailing winds are generally from the south-southwest with an average velocity of eight to ten miles per hour. During the winter months, however, cold northwesterly winds from Canada do sweep across the region. The region has experienced numerous destructive tornadoes, with over 980 tornadoes touching down within a 125-mile radius of Springfield since 1950.

Total precipitation for years of record during the reporting period, including melted snow, varies from a low of 25.21 inches in 1953 to a high of 63.19 inches in 1990. Between 1900 and 1990, the Springfield Weather Station reported seven years with precipitation less than 30 inches and nine years with precipitation in excess of 50 inches. Average annual precipitation is approximately 39.47 inches.

Geomorphology refers to the study of landforms. Landform, or the shape of the land, is affected more by precipitation extremes than average precipitation patterns. The energy available to alter the landscape by running water is maximized during periods of excess precipitation. Dry periods are also important in that the protective ground cover provided by vegetation is reduced during dry years. If these dry years are followed by wet years, increased rates of soil erosion will occur. Erosion from running water is an active geomorphic process in the Christian County area and is most common during the fall and winter seasons.

Soils

The Christian County study area contains 17 individual soil series, which are divided into 23 mappable soil units (see Figure 6-6). There are two major differences between these soils in

terms of formation. In general, the soils of Christian County were formed in either loess (wind blown silts) or in residual materials from the underlying limestone or dolomite bedrock. The loessal soils tend to be of finer texture, consisting of sandy loam to silty clay. Several of the residuum deposited soil series (i.e. Captina, Creldon, Needleye, and Wilderness) have a fragipan, which is a brittle, cement-like subsurface layer. The presence of fragipan limits the penetration of plant roots, greatly reduces downward water movement and limits operation of construction equipment.

Permanent development in low lying areas with a soil fragipan are susceptible to standing water and potential foundation damage during wet periods as downward percolation of water is restricted. Soils with fragipan also have severe limitations for installation of septic tank systems. Substantial land areas along Highway 14, around the cities of Nixa and Ozark have fragipan conditions; standing water during the wet season is common in these areas.

Prime farmland soils are those soils that are best suited for producing feed and crops and which have properties favorable for the sustained high yield of crops. Approximately 28,000 acres (8%) of Christian County are considered prime farmland. These areas are mostly in the northern portion of the County and are used for hay and pasture, with some used for row crops. Many of the County's prime farmland soils lie in the path of urban development. The soil associations that are considered prime farmland include Tonti-Wilderness, Bolivar, Creldon and Peridge-Huntington (see Figure 6-6).

The General Soils Map (Figure 6-7) and Prime Farmland Map (Figure 6-6) should be used as general guides for development purposes. Any expenditure of funds for construction should be preceded by an on-site inspection by a soil scientist to determine specific soil limitations for that site. Due to the severe limitations for septic tank installation in many of the County's soils, it is

further recommended that all construction of on-site individual sewage systems be reviewed by a sanitary engineer to ensure appropriate installation and lateral field design and size.

A narrative description of the 17 soil series in the Christian County area is found in Appendix B. Also included in Appendix B are a series of tables that list average properties and development limitations of the various soil series in Christian County. These tables should be referenced during the development review process.

FIGURE 6 - 5

GENERAL SOILS MAP

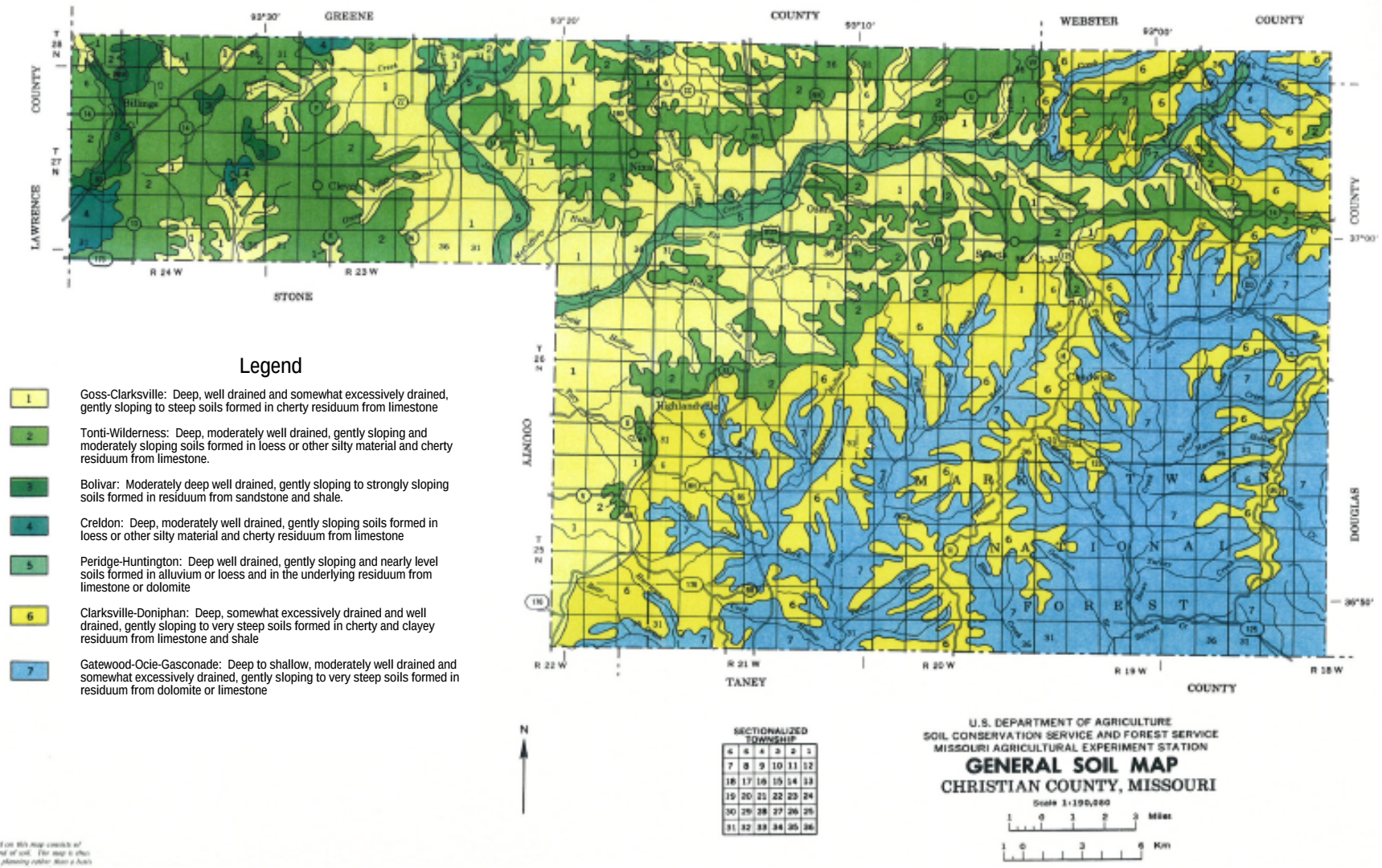
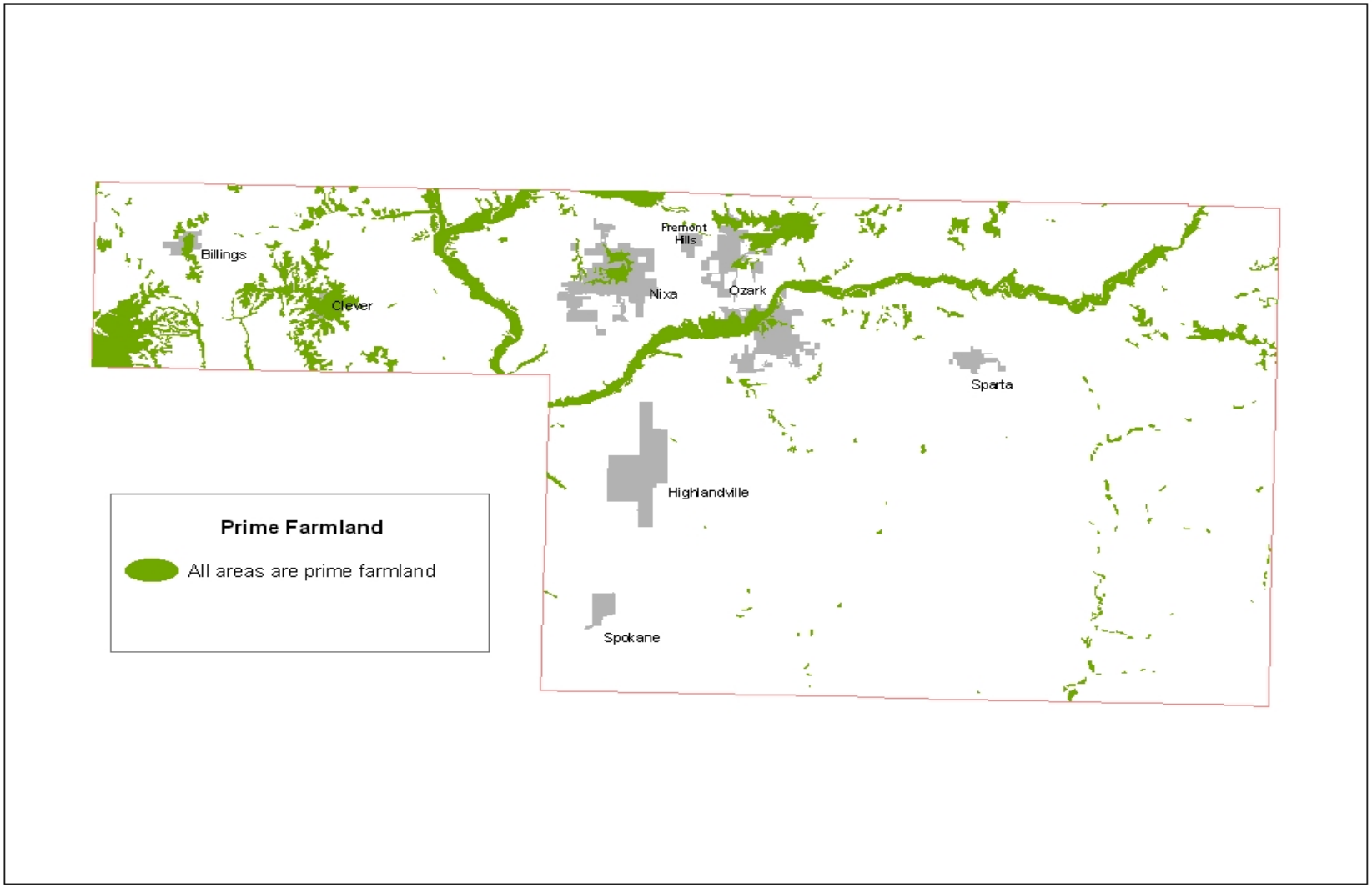


Figure 6 - 6

PRIME FARMLAND SOILS



ENVIRONMENTAL CONCERNS

Water Quality

A primary environmental concern in Christian County is preservation of groundwater quality. In addition to the municipal water systems that rely on groundwater, there are perhaps thousands of private wells drilled in the aquifer. As noted in the Physical Characteristics subsection, much of Christian County is considered a sensitive karst region. There are numerous sinkholes, losing streams, and caves throughout the county which form an underground drainage network connecting the surface water to the groundwater system.

These karst features represent a threat to groundwater quality as surface pollutants from stormwater runoff, agricultural chemical runoff and dumping can quickly enter the groundwater system through these conduits with little filtration. Pollution and soil runoff from construction sites is also a major concern. Most of Christian County's rivers and streams drain to Table Rock Lake or Bull Shoals Lake. The lakes are major resources for the region and degradation of water quality could have significant adverse impact on our citizens quality of life and the regional economy.

Air Quality

Southwest Missouri is the fastest growing area in the State. As the population grows, so do the number of air pollution sources. Sources can include cars, trucks, off-road vehicles/equipment, households, businesses/industry, and electricity production. In 2007, the Ozarks Clean Air Alliance (OCAA) was formed to begin reviewing air quality issues in Southwest Missouri and develop educational programs focused toward proactive and voluntary solutions to reduce air pollution and protect public health and the environment. The OCAA was formed from the Environmental Collaborative of the Community Partnership of the Ozarks. The OCAA is made up of over 40

organizations throughout Southwest Missouri and is facilitated by the Community Partnership of the Ozarks. Christian County is a member of this alliance and will strive to implement appropriate policies and practices recommended in the Clean Air Action Plan.

Hazardous Waste

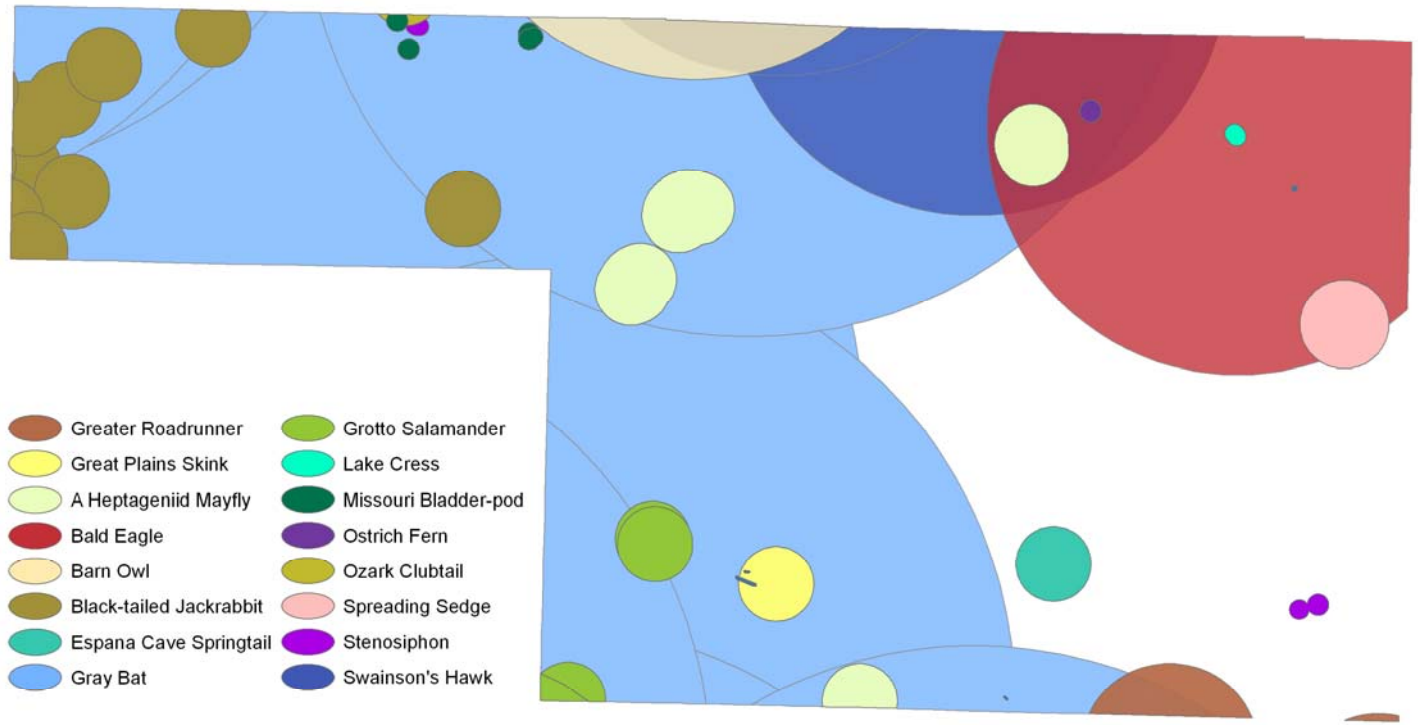
According to the "Registry of Confirmed, Abandoned, or Uncontrolled Hazardous Waste Disposal Sites" from the "Missouri Registry Annual Report" for Fiscal-Year 2004, there is one former lead and zinc smelting site in Christian County. Christian County Furnace is no longer operational and is considered a historic operation from the days of lead and zinc mining in the region. According to the Registry, this site is pending investigation by the Missouri Department of Natural Resources' Site Assessment Unit (SAU). The Registry notes that it is common to find lead or zinc contaminants in soils, groundwater and surface water near smelter sites. There are nine hazardous waste generators located in Christian County, including two located in Nixa and seven in Ozark. All are small quantity waste generators and are registered with the Missouri Department of Natural Resources.

Threatened and Endangered Species

Christian County is home to a variety of plants and animals considered to be either threatened or endangered species. The presence of many of these animals is related to the karst topography and number of caves in the region. The most commonly sighted of these is the gray bat being seen in areas covering over half the County. Figure 7 - 1 illustrates the type of endangered species and also gives some impression of the areas of sightings as well as the proportionality in number of sightings.

FIGURE 7 - 1

Threatened and Endangered Species in Christian County



N

0 0.3 0.6 1.2 1.8 2.4 Miles

Prepared by: David Faucett
Prepared for: Christian County Planning and Zoning Dept.
Source: USDA, Natural Resources Conservation Service

EXISTING LAND USE

Land use refers to the activities of man and natural elements that are affixed to the earth's surface. All land can be described as being used in some manner, whether it is a man-made activity such as housing or agricultural production or a natural use such as trees, water or grasslands. The manner in which land is currently used is a key factor affecting future development potential.

Methodology

Existing land use data for Christian County was compiled by joining data from the County Assessors office with GIS technology as well as field "windshield surveys" of existing uses to produce mapping and statistical analysis with information based on each parcel of land. This information was augmented with aerial photography interpretation as well to consider natural features in assessing the county's existing land usage.

Land use data were aggregated into general use categories, which are discussed in the following pages. For analysis purposes, agricultural uses were grouped into three categories: (1) crop production, (2) dairy and beef cattle production and (3) hogs and poultry production. Acreage totals for agricultural uses represent the predominant use of the ownership parcel.

The existing land use inventory for Christian County was conducted only for the unincorporated portions of the County. Table 8-1, which summarizes land use acreage totals, includes a total acreage figure for the incorporated cities. This table includes all forms of land use within the cities, including streets and rights-of-way. All other data presented are for the unincorporated portions of the County only.

It should also be noted that the land use acreage totals presented here most likely include a degree of error in the determination of forestry acreage and acreage devoted to agricultural activities. Many of the heavily forested areas in the central and southern part of Christian County

are used for cattle grazing, an activity which is not easily detected from road side field surveys or aerial photo interpretation.

The detailed land use classification system used to aggregate specific land uses into general use categories is found in Appendix C. Figure 8-2 displays generalized existing land use patterns.

Residential Uses

Residential uses and Ag/residential uses account for approximately 62.4% of all developed land in Christian County. Single-family homes are the predominant residential use, developed on over 38,444 acres of land. Low-density residential development is the norm; throughout the rural areas of the County, there are few ownership parcels developed in residential use less than three acres. Residential density patterns in close proximity to the County's cities approximate 1-2 dwelling units per acre. Residential density patterns are dictated to a significant degree by lot size required for on-site septic tank absorption fields.

Acreage devoted to moderate or high density residential development (duplexes, apartments) within the County are minimal, with most such uses located in close proximity to the urban areas in the County. Mobile homes and mobile home parks are another major residential use in the County While mobile homes and mobile home parks are found in virtually all sections of the County, these residential structures are generally concentrated along or in close proximity to Highways 160 and 65 in the central section of the County and in the northeastern third of the County.

The greatest concentration of new residential development is occurring in the growth corridors along Highways 160 and 65, running from the Greene County line on the north to south of the cities of Nixa and Ozark.

Commercial Uses

Commercial uses, which include wholesale and retail trade and service activities such as finance, professional services and commercial recreation, are generally located along the County's major road system, particularly along Highways 65, 160 and 14. Commercial uses represent approximately 0.46% of developed land in the County.

Industrial Uses

Industrial activity, which includes light and heavy manufacturing, extractive industries and communications, utilities and transportation, accounts for approximately 22% of all developed land uses. Quarry operations contribute significantly to the acreage totals for industrial activity. As with commercial activity, most industrial activity is concentrated along Highway 65 or along other major roads in the northern section of the County. The largest concentration of industrial activity is located north of the City of Ozark.

Agricultural Uses

Agriculture is the dominant land use in Christian County, with approximately 185,300 acres or 51.38% of the land area in the County devoted to agricultural activity. Most field crop and hay production is found in the prime farmland soils area in the northern third of the County. Dairy and beef cattle production are found throughout the County; however, a concentrated area of dairy cattle production is located in the northern panhandle section of the County, around the communities of Billings and Clever. Beef cattle grazing are also located throughout the forested areas in the central and southern portions of the County. As noted, dairy and beef cattle account for most of the animal husbandry activities in the County. Approximately 100 acres of land is devoted to hog production.

Forestry Uses

Extensive portions of the central and southern part of Christian County are devoted to forest cover, including both privately owned land (21,608 acres) and lands in the Mark Twain National Forest (51,312 acres). The extensive National Forest acreage in the southern third of the County precludes significant concentrations of urban development in this area. As indicated, many of the privately owned forestlands are used for cattle grazing.

Parks and Recreation

Approximately 3,836 acres of land in the unincorporated portions of the County are devoted to parks and recreation use. This figure includes Missouri Department of Conservation Lands, such as Busiek Park and the James River public access sites. Wilson's Creek National Battlefield is also included in this category.

As Christian County moves to First Class status in 2011 there will be new opportunities to enhance and expand amenities for the public in this area. As a First Class County the County Commission will be able to appoint a Board of Parks Commissioners which would have the authority to make suggestions for plans regarding the use and development of recreational land within the County. As a First Class County the County Commission may also levy certain annual taxes specifically for the acquisition, planning, improvement, maintenance and operation of parks within the County.

The County Commission will also have the authority to grant concession rights for refreshment facilities at County parks.

As a First Class County the County Commission will also be authorized to create a County Sports Authority. This Authority would have the power to acquire and operate recreational facilities suitable for all types of sports and recreation, either professional or amateur.

General Land Development Trends

As shown on Figure 8-2, the heaviest concentrations of urban development are found in the northern third and central section of the County, with development occurring along the Highway 65, 160 and 14 corridors in close proximity to Nixa and Ozark. Growth pressures are resulting in the conversion of prime farmland soils in these areas to urban development.

In general, the development pattern throughout the southern half of the County is one of very low density residential on scattered lots or smaller residential subdivisions. Density levels increase in close proximity to the Cities of Nixa and Ozark. However, development patterns in these areas are still considered low density, with most residential uses developed on lots of at least one acre or larger. While this pattern of growth certainly works to preserve a mathematical percentage of open space one must weigh the quality of this “open space” versus the impractical expense and thus inability of the County to provide and maintain quality infrastructure to this growing and ever dispersing population.

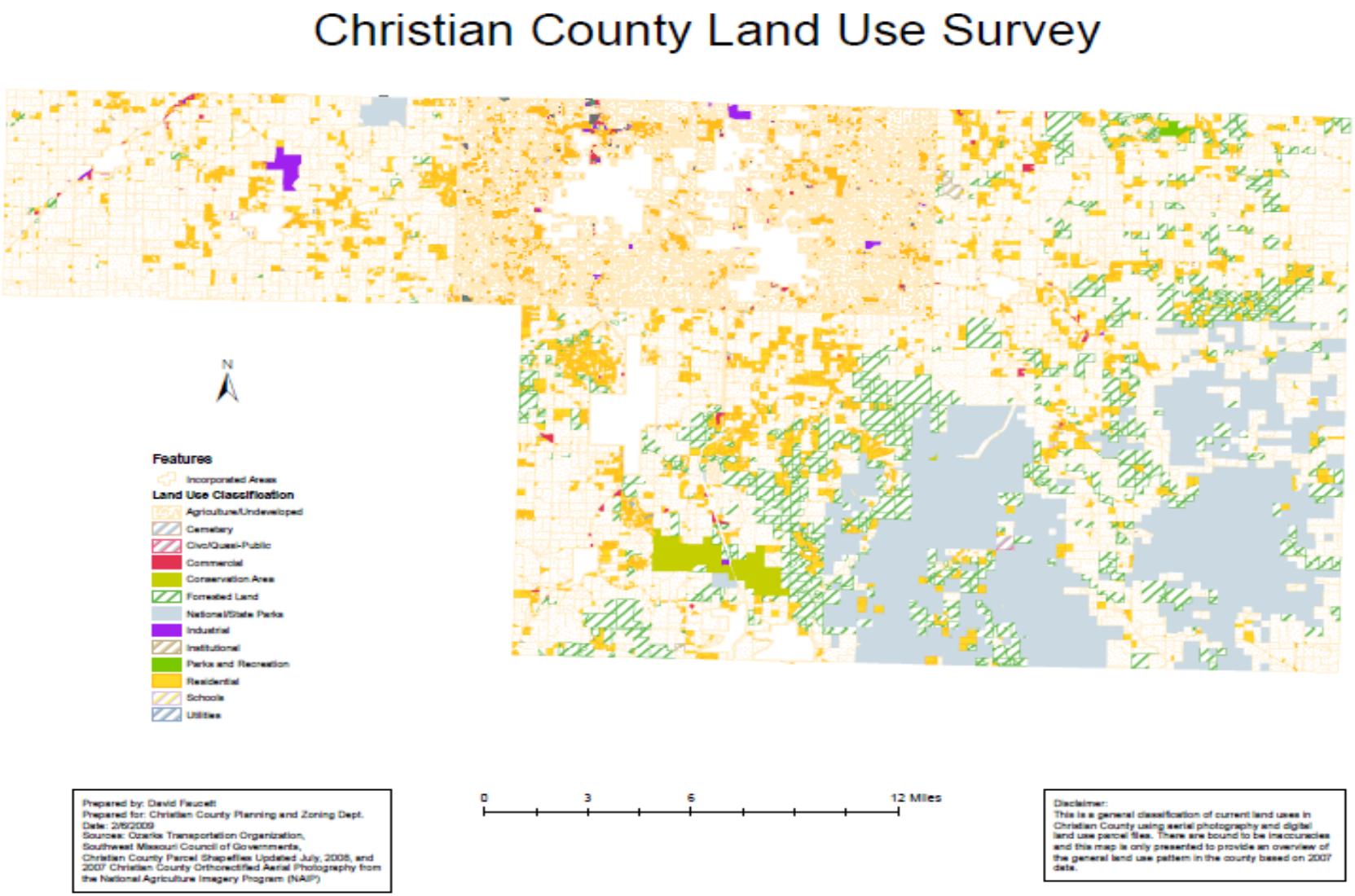
The County has experienced considerable new growth and development over the past twenty years. While there has been an increase in commercial and industrial uses during this time period, the majority of significant new development has been in residential uses. As might be expected, much of the County's new industrial and major commercial development over the past several years has occurred within the incorporated cities due to the availability of municipal water and sewerage services and the lack of alternative solutions to accommodate this type of development in the unincorporated portions of the county.

TABLE 8-1
Existing Land Use 2007

LAND USE	ACRES	PERCENT
Agriculture	185300	51.38%
Single family	38444	10.66%
Multi-family	1265	0.35%
Group Quarters	42.5	0.01%
All Com, retail, office, etc.	1641	0.46%
Industry	789	0.22%
City Hall, Courts, Post Office, etc.	326	0.01%
Quasi-public; church, community center	209	0.06%
Schools	556	0.16%
Parks, Recreation, Golf Course	615	0.17%
Conservation, Busiek, Mark Twain	54490	15.10%
Telecommunications, utilities	324	0.09%
Right of Way	6600	1.80%
Forrested/Undeveloped	69667	19.30%
Unclassed/Brownfields	366	0.14%
TOTAL	**360634.5**	**100.00%**

Source: Center for Resource Planning and Management, field surveys, aerial photography interperetation 2007.

GENERALIZED EXISTING LAND USE
FIGURE 8 - 2



PUBLIC FACILITIES AND SERVICES

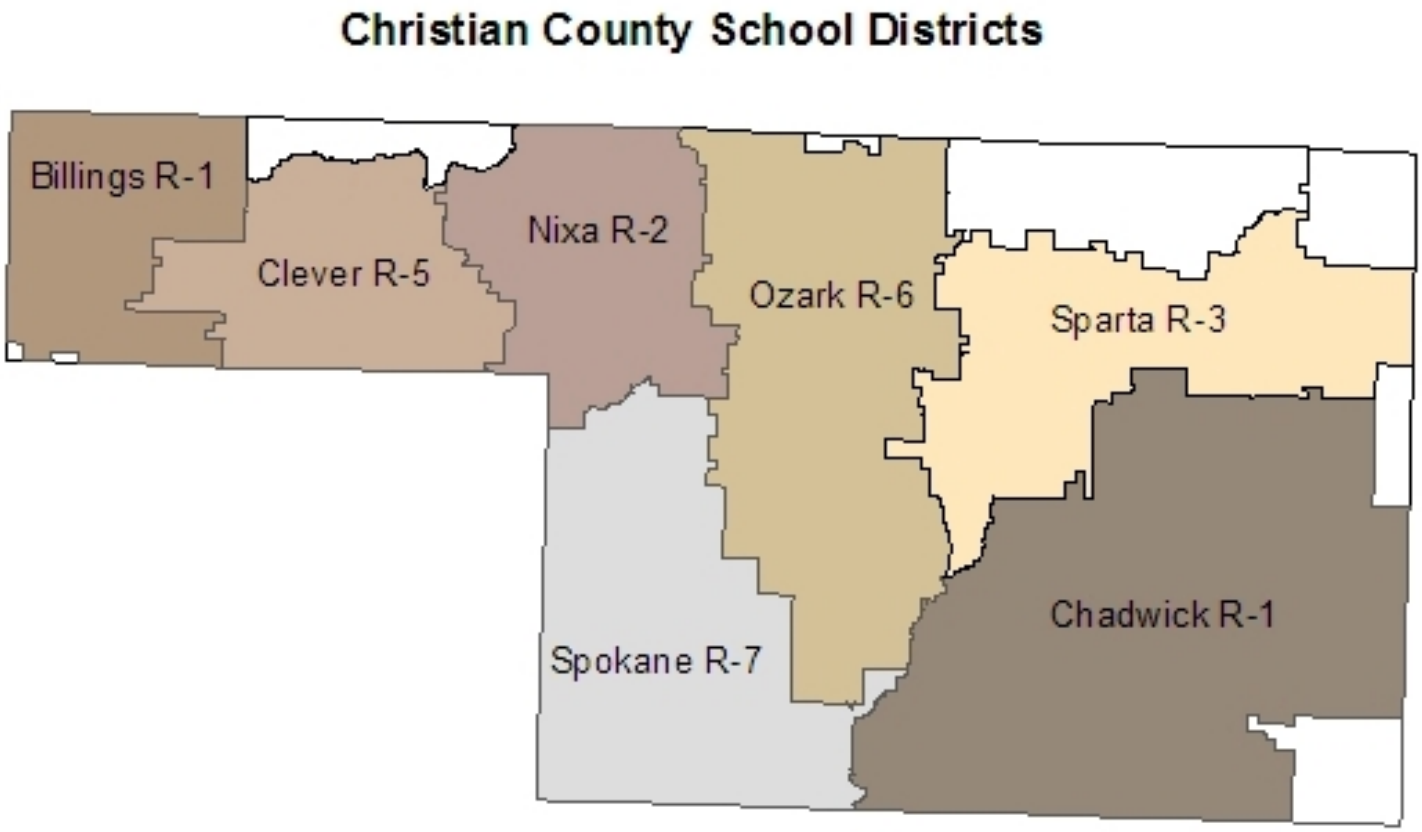
Public facilities and services, such as schools, fire protection, law enforcement and libraries, help to shape not only a community's quality of life but also influence future growth and development potential. These facilities and services can affect the decision making process of where to locate as families and businesses enter an area. As private development tends to follow the location of community services (Daniels, 1988), evaluating and planning for current and future public facility and service needs is as an important element of the County's overall future development strategy.

This section of the Comprehensive Plan addresses Christian County's public facilities and services, including schools, law enforcement, fire protection, ambulance/rescue services, libraries, and parks and recreation.

Public Educational Facilities

Thirteen public school districts serve a rapidly growing school-aged population in Christian County. Of these, the Ava, Bradleyville, Fordland, Marionville, Republic and Rogersville Districts do not have any school facilities in Christian County and serve only a few students from the County (Table 9-1). Figure 9-1 shows the service area boundaries of the school districts in Christian County. Table 9-2 summarizes enrollment, facility capacity and tax levy data for the districts with facilities located in the County. The County is also home to Ozarks Technical Community College-Richwood Valley Campus

FIGURE 9 - 1


Christian County School Districts
Billings R-1
Clever R-5
Nixa R-2
Ozark R-6
Sparta R-3
Spokane R-7
Chadwick R-1

Billings (R-4) School District

The Billings School District covers a 40 square mile area (7.09 %) in the Christian County panhandle. This district is home to one elementary and one high school. The school facilities, located at 118 W. Mt. Vernon St., Billings, are in good condition. Facilities include 42 classrooms, two gymnasiums, one vocational/agriculture facility, eight offices, one cafeteria, one kitchen, one library, and ten restrooms.

Renovations to the PreK-12th grade building were completed in November 2008. This renovation included six new High School classrooms, a new High School computer lab, and two new Preschool-Kindergarten rooms. Expansions to the library, cafeteria and kitchen also occurred in 2008.

Chadwick (R-1) School District

The Chadwick School District covers the largest territory in Christian County (135 square miles or 24.1%). There are three schools located in the district's area--Chadwick R-1. The facilities include 19 classrooms, five mobile classrooms, two gymnasiums, one agricultural building, four offices and a cafeteria.

The school facilities are generally in adequate condition. Currently plans are in place and construction is slated to begin which will improve existing buildings, enlarge the library, enlarge the cafeteria and kitchen area and reconstruct substandard buildings.

Clever (R-5) School District

The Clever School District serves approximately 42 square miles (7.4%) in the panhandle area of the County. There are three schools located within the district, Clever Elementary, Clever Upper Elementary and Middle School, and Clever High School.

The elementary school and high school are in good to excellent condition while the middle school is in average condition. The Elementary School houses grades PK-3 and includes 24 classrooms, a gymnasium, and a cafeteria. The Upper Elementary serves grades 4-5 and is in good condition. The Middle School serves grades 6-8 and facilities include 18 classrooms, a computer lab, a science lab, and a gymnasium. The new high school reported an enrollment of 252 for the 2008-2009 school year and includes 22 classrooms, gymnasium building, vocational/agriculture building, a library, and a cafeteria.

Nixa (R-2) School District

The Nixa School District covers a 55 square mile area (9.75%). The facilities are all in excellent condition and include eleven campuses: The Early Childhood Learning Center, Century Elementary, Matthews Elementary, George Espy Elementary, Thomas Elementary, Inman Elementary, Main Street Elementary, High Pointe Elementary, the S.C.O.R.E school, Nixa Middle School, and Nixa High School.

The Early Childhood Special Education Program is offered to District children ages 3-5. The facility is located at 301 S. Main Street and shares facilities with Main Street Elementary. The school has 10 classrooms plus an additional mobile unit which houses the Parents as Teachers offices. The current enrollment for the Early Childhood Learning Center is 188 which is above the maximum capacity for the facility.

Century Elementary is located east of town on North Street next to Nixa Junior High. The facility was built in 2001, sits on 32 acres, houses grades K-4, and has a total enrollment of 456 for the 2008-2009 school year. It contains 25 classrooms, a computer lab, a library, and a multi-purpose room.

Matthews Elementary is located at 605 S. Gregg Road and sits on 20 acres. The school houses grades K-4 and is in excellent condition. The 2008 enrollment is 521 and 34.55 percent of the students are eligible for free and reduced lunch. The facility contains 27 classrooms, a mobile classroom, a computer lab, a library, and a multi-purpose room.

George Espy Elementary is located west of Nixa on Highway 14 and serves students in grades K-4 with a 2008 total enrollment of 426. The building was constructed in 1987, is in excellent condition and contains 35 classrooms, a library, and a multi-purpose room.

Thomas Elementary is located at the corner of Cherry and Market Streets and houses grades K-4. It has an enrollment of 347 in 2008 and 50.87 percent of the students are eligible for free and reduced lunch. The school was built in 1960 on a 9 ½ acre site and has undergone general maintenance and improvements, including a new roof and four new classrooms in 1985, and then three classrooms, a music room and a library expansion in 1998. The building is in good condition and contains 20 classrooms, a large library, a computer lab, an adaptive PE classroom, and an all purpose room with a stage and a kitchen.

Inman Elementary houses grades 5-6 with a total enrollment of 561 in 2008. Of the total enrollment 25.3% are eligible for free and reduced lunch. The facility located on 40 acres, at 1300 North Nicholas Road, is in good condition. The building has 31 classrooms, two modulars, a computer lab, a library, and a multi purpose gym/ cafeteria.

Main Street School is home to grades PK-6. In 2008 the school had a K-6 enrollment of 292 and a preschool enrollment of 127. The building was constructed in the 1940's and has undergone many improvements over the years. The school contains 19 classrooms, a library, a cafeteria, and a gymnasium with a stage.

High Pointe Elementary is the newest school in the Nixa R-2 district and is located east of town at 900 N. Cheyenne Road. The school was built in 2007 and houses grades K-4 with a total enrollment of 370 for the 2008-2009 school year. The facility has 36 classrooms, a library, a gymnasium, and a cafeteria.

The S.C.O.R.E School is the Nixa alternative high school and has an enrollment of 50 students. The school is located at 1398 W. Mount Vernon and is dedicated to providing alternative methods of learning that meet the individual needs of students. The facility includes six classrooms, a multipurpose room, and a computer lab.

Nixa Junior High School is located in the old high school building on North Street in Nixa and serves grades 7-8. The structure sitting on 10 acres was built in 1969 and contains 46 classrooms, seven classrooms in mobile units, a library, gymnasium, an all purpose room, an auditorium, kitchen, science laboratories, art facilities, industrial arts shop rooms, home economic rooms, and a track and football field. For the 2008-2009 school year Nixa Junior High recorded a total enrollment of 860 students with room to grow at leas another 50 to 100 students with the addition of the mobile classrooms.

Nixa High School was built in 1998 and serves students in grades 9-12. The 225,000 square foot building is in excellent condition and sits on 43 acres located at 514 S. Nicholas Road. The facility capacity is 1,750 students. In 2008, high school enrollment was around 1,600, a 91% occupancy rate. The state of the art facility includes 90 classrooms, an enlarged library, a school theater, a football stadium, and a 3,000 seat gym.

Many changes are planned for the Nixa School District. Master plans include the construction of a new 5th and 6th grade school in 2009, junior high school in 2011 as well as additional high school classrooms, a new elementary school in 2013 and a new high school by

2017. The District will need to continue to revisit the issue of a second High School when planning for additional classrooms for the current High School.

Ozark (R-6) School District

The Ozark School District serves a 90 square mile area (15.95%) of the County and is home to seven schools--Ozark East Elementary, Ozark North Elementary, Ozark South Elementary, Ozark West Elementary, Ozark Upper Elementary, Ozark Junior High, and Ozark High School. All schools are in good to excellent physical condition.

Ozark East Elementary was built in 1994 and is located at 2449 East Hartley Road. The facility is in excellent condition and includes 28 classrooms, a gym, and a library. The facility serves grades K-4 and total enrollment for 2008 was 471.

Ozark North Elementary, located at 3608 North Highway NN, is in excellent condition and houses grades K-4. The building has 28 classrooms, a computer lab, a library, a gym, and a cafeteria/multi-purpose room. Total enrollment for 2008 was 439.

Ozark South Elementary is located at 1250 W. South Street. It is in good condition and houses grades K-4 with a 2008 total enrollment of 573. The building has 27 regular classrooms 3 special education rooms, cafeteria, a gym, and a library.

Ozark West Elementary is the newest school in the Ozark R-6 School District. The school, built in 2007, is located at 3105 W. State Highway CC. The building contains 28 classrooms, a gymnasium, cafeteria, a library, and computer lab. The school house grades K-4 and reported a total enrollment of 621 in 2008.

Ozark Upper Elementary is located along with Ozark North Elementary on Highway NN. The building, constructed in 1993, is in excellent condition and houses grades 5-6. The building

contains 50 classrooms, a computer lab, 2 gymnasiums, 2 libraries, and a cafeteria/multi-purpose room. When the new high school was built, the Upper Elementary expanded into the old junior high building providing the necessary extra classroom space. The school recorded a total enrollment of 823 in 2008.

The junior high, located on Jackson Street in the old high school building, is in good condition. The facility serves grades 7-8 and consists of 3 buildings, the main school, a west wing which is now occupied by the Finley River School, and a shop building, all of which are connected by a canopy. The facilities include a total of 60 classrooms, 2 gyms, a cafeteria, and a library. The junior high had an enrollment of 820 and the Finley River School had an enrollment of 40 for the 2008-2009 school year.

Ozark High School was built in 2004 and houses 1,477 students, grades 9-12. The three story, 247,621 square feet, brick structure contains 78 classrooms, 2 gymnasiums, 11 computer labs, a library, an auditorium, and a cafeteria. When the new high school was built the junior high moved to the old high school facility and the old junior high building was used to expand elementary school needs.

Overcrowding has become an issue for the district. In 2008, South Elementary was at 85% of its absolute capacity and West Elementary at 88% of its max capacity and above its preferred capacity. The capacity numbers listed in Table 9-2 are max capacity numbers that would be the absolute threshold with large class sizes. The school district prefers smaller class sizes therefore the preferred capacity for the Elementary schools is between 500-600 students, 900-1000 students in the Upper Elementary and Junior High School, and 1500-1550 in the high school.

In February 2009 the school district adopted a new long range master plan. The plan outlines the measures that will be taken to accommodate future growth in the Ozark R-VI School

District including the construction of a new middle school, a second high school, and three elementary buildings if growth remains at its current rate.

Sparta (R-3) School District

The Sparta School District serves residents in the east-central section of the county, covering a 66 square mile area (11.7%). There are two schools in the Sparta School District, elementary housing grades PK-5 and the middle school/high school which is the home to grades 6-12. The elementary school contains 31 classrooms, a multipurpose room, a cafeteria, and a library. The middle school/ high school is in good condition and contains 35 classrooms, a library, two gyms and one cafeteria. The elementary school had an enrollment of 360 students and the middle/high school reported an enrollment of 375 for the 2008-2009 school year.

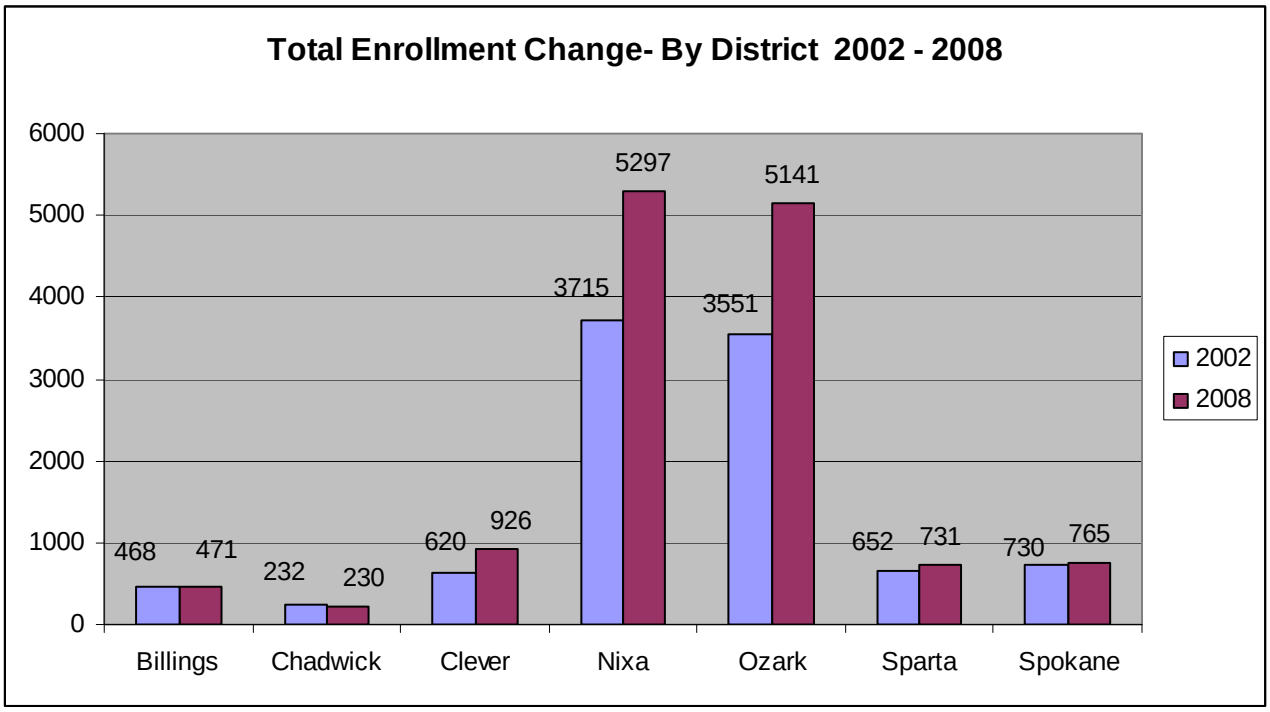
Sparta has seen many changes in the last decade. A new elementary was built in 1993 separating the school district into multiple buildings. In 1997, the high school gymnasium was expanded and renovated. Then in 2000, a cafeteria, a nurse's office, three classrooms, and a bathroom were added to the elementary facility. If funding is available, the District would like to construct a new High School facility by 2014.

Spokane (R-7) School District

The Spokane School District covers 81 square miles (14.36%) and serves residents in the southwestern section of Christian County. There are three schools within the Spokane School District--Highlandville Elementary, Spokane Middle School, and Spokane High School. The high school facilities which was constructed in 1992, includes 19 classrooms, a gymnasium, a library, and a cafeteria. The high school reported an enrollment of 220 students for the 2008-2009 school

year. The Middle School facility, in adequate condition, has 12 classrooms, a gymnasium, a library and a cafeteria. The 2008 enrollment for the Middle School was 145. The elementary facility is generally in good condition and includes 25 classrooms, one library, one gymnasium, two offices, and one cafeteria. The elementary reported an enrollment of 389 students.

FIGURE 9 -2



Outlying School Districts

A total of 385 students from Christian County are served by school districts with facilities located in adjacent counties. These districts are noted in Table 9-1.

TABLE 9-1

SCHOOL DISTRICTS OUTSIDE OF CHRISTIAN COUNTY
2008-2009 CHRISTIAN COUNTY ENROLLMENT

School District	No. Students	Location
Ava R-1	0	Douglas County
Bradleyville R-1	7	Taney County
Fordland R-3	14	Webster County
Marionville R-9	2	Lawrence County
Republic R-3	32	Greene County
Rogersville R-8	330	Webster County

TABLE 9-2
SCHOOL CHARACTERISTICS

District Name	Capacity		Total District Enrollment 2008-2009	Tax Levy
BILLINGS R-4			**471**	$3.631
Elementary	300		256	
High School	400		215	
CHADWICK R-1			**230**	$4.6997
Elementary	135	80%	107	
High School	150	79%	119	
CLEVER R-5			**1064**	$3.43
Elementary	500	86%	434	
Upper Elementary	380	41%	159	
Middle School	300	73%	219	
High School	330	76%	252	
NIXA R-2			**5798**	$4.31
Early Childhood Learning Center	186	101%	188	
Century Elementary	500	91%	456	
High Pointe Elem.	650	56%	370	
Main St. Elementary	500	83%	419	
Espy Elementary	550	77%	426	
Mathews Elementary	600	86%	521	
Thomas Elementary	450	77%	347	
Inman Elementary	600	93%	561	
S.C.O.R.E	60	83%	50	
Junior High	950	90%	860	
High School	1750	91%	1600	
OZARK R-6			**5224**	$4.14
East Elementary	700	67%	471	
North Elementary	700	62%	439	
South Elementary	675	85%	573	
West Elementary	700	88%	621	
Upper Elementary	1100	75%	823	
Junior High	1100	75%	820	
High School	1700	87%	1477	
SPARTA R-3			**735**	$3.500
Elementary	400	90%	360	
Middle/High School	425	88%	375	
SPOKANE R-7			**754**	$4.2231
Elementary	450	86%	389	
Middle School	245	59%	145	
High School	280	78%	220	

Career Training Opportunities

OTC-Richwood Valley Campus

Ozarks Technical Community College Richwood Valley Campus, an extension of OTC's main campus located in Springfield, Missouri, opened in the spring of 2007. The three-story, 60,000 square foot facility is located on Highway 14 between Ozark and Nixa. The Richwood Valley branch of OTC offers The Life Science Technology Center, which houses a variety of general education classrooms, computer and science labs, and faculty offices.

Student amenities include a full-service student services facility, a learning resources center, an academic achievement center, a student café, as well as a 1.5 mile trail system. A community room is also available to outside organizations who wish to host a meeting at OTC - Richwood Valley.

Fire Protection Districts

Nine fire protection districts serve the Christian County area, *all* of which are tax supported. All of the fire protection districts have mutual aid agreements with surrounding districts, with assistance provided on a request basis.

Billings Fire Protection District

The Billings Fire Protection District serves area of Christian County west of Farm Road 14-7. This district also extends into portions of Stone, Lawrence and Greene Counties. Fire protection equipment is housed at 3 stations and the district operates with 40 volunteer firefighters. Stations are located throughout the district. One station is located in Billings on Washington Street, a second Station is located in Lawrence County on Highway 14 West, and a third is located on Highway 13. A fourth station is planned around the Greene County line. Fire protection equipment includes 17 pieces of equipment:

Station #1
- Two 3200 gallon tankers
- 1500 gallon tanker
- Heavy Rescue
- Class A pumper
- Brush Truck
- Two suburbans (medical rescue)

Station #2
- Class A pumper
- 2100 gallon tanker
- 1400 gallon tanker
- Rescue Service Truck
- Brush Truck

Station #3
- Engine
- Utility Truck
- Pumper

The District's average response time is five minutes. The district also has mutual aid agreements with Clever, Republic, Crane, Hurley, Marionville, Marionville Rural, North Stone County, and Aurora.

The Billings District is supported by a $0.3939 property tax levy. In addition to fire protection services, the district also provides first response services and instructors, storm warning, and participate in school programs. Plans to upgrade fire protection services include the addition of a fourth station currently under construction, additional equipment including 2 more engines and an aerial truck.

Brookline Fire Protection District

The Brookline Fire District services a small area of Christian County generally bounded by ZZ Highway on the east, Terrell Creek on the south, and P Highway on the west. The district has two stations; Station #1 is located in Brookline and Station #2 is sited at Farm Roads 97 and 178.

Fire protection services are provided by 26 volunteer firefighters and the district operates on a $0.2435 property tax levy. Brookline has mutual aid agreements with Clever, West Republic, Willard and Battlefield. Equipment housed at the two stations include:

Station #1

1. 2002 KMA pumper rescue
2. 2,800 gallon tanker
3. 1,800 gallon tanker
4. 1,800 gallon tanker
5. Brush truck
6. 1989 Ford 4x4 rescue truck, fully equipped

Station #2

1. 1986 Smeal 1,000 gpm pumper
2. 2,100 gallon Ford tanker
3. 1,200 gallon Ford tanker
4. Brush truck
5. 1986 rescue truck, fully equipped with medical

The Brookline District maintains an average response time of 7 to 8 minutes depending on location and has a Class 8 fire insurance rating without fire hydrants. The district provides a range of public services, including storm warning and rescue services. Anticipated needs over the coming years include building a new station in Greene County and purchasing a hazmat truck and training four new hazmat technicians. The department also wants to train more first responders.

Chadwick Fire Protection District

The Chadwick Fire Protection District serves a 135 square mile area in the southern and eastern part of the County (same as the Chadwick School District boundaries). In November of 2001, the fire protection district was voted in as a tax supported department. The district has cooperative agreements with Sparta and Forsyth and an unwritten agreement with the Conservation Department and the National Park Service (Mark Twain National Forest area).

The district's fire equipment is housed on Highway 125 in Chadwick and includes 2 pumpers, 2 tankers, 1 rescue unit, and a small brush truck . The district operates on a $ 0.2982 tax levy. The District's personnel is comprised of 17 volunteer fire firefighters and 15 first responders. All volunteers respond to calls, with the exception of grass fires. Under agreement with the National Park Service, the Chadwick volunteers will respond to a fire in the Mark Twain National Forest if a member's property is in imminent danger.

The district has several needs that are related to the lack of financial resources and the rural nature of the district's service area. One of the most immediate needs identified is to build new station out around the district and purchase more equipment.

Because the district covers a largely rural area, adequate sources of water supply are also a concern. The district either needs increased water carrying capacity or additional water supply sources in the field. The Chadwick District provides other services besides fire protection. The district also provides first responders and storm watchers. A storm-warning siren was donated to the district, but this must be repaired before it can be put into service.

Clever Fire Protection District

The Clever Fire Protection District serves the portion of Christian County located generally between Billings and Nixa. The district also has mutual aid agreements with Billings, Hurley, Nixa, Republic, Highlandville, Battlefield and Brookline.

The District has 3 fire stations, one is located in Clever, Boaz and another is situated in Stone County at Union City. Fire protection services are provided by 35 volunteers. The district operates on a $0.3784 tax levy. Average response time to a fire is 8 minutes and the district has a fire insurance rating of 7 for rural and 4 for city.

Fire fighting vehicles maintained by the District include four pumper trucks, 5 tanker trucks, two brush trucks, one rescue and one heavy rescue truck.

In addition to fire protection services, the District also provides storm warning and emergency medical services. The District has 18 certified first responders and 5 emergency medical technician to assist on ambulance calls.

Highlandville Fire Protection District

The Highlandville Fire Protection District encompasses a 100 square mile area in the central and southern portions of the County. Fire protection is provided by 30 volunteer firefighters operating out of four stations, one station located south of Highlandville, a second station located in Abesville, third located at Steinert Lane and Highway 160 and a fourth at Saddlebrooke. Main equipment housed at these four facilities includes:

1. Station #1 – pumper, rescue, tanker, brush truck, service truck
2. Station #2 – pumper, tanker, brush truck, rescue vehicle
3. Station #3 – pumper, tanker, brush truck, rescue vehicle
4. Station #4 - (2) engine pumpers, tanker, brush truck, rescue vehicle

In addition to fire protection, the District also provides emergency medical services, first response, and storm warning. Emergency response equipment on hand includes air bags and two sets of jaws.

The District's operations are financed through a $0.3765 tax levy. There are no user fee charges except in unusual circumstances. Written mutual aid agreements are in effect with Ozark, Nixa Western Taney, Hurley, and Southern Stone. The District maintains a fire insurance rating of 9 with a typical response time of four minutes from the point of notification via pagers to manning the fire trucks.

The District anticipates a fifth station, an additional tanker, engine and brush truck. The Highlandville District has also noted the need for additional water supply sources at appropriate locations throughout the County, such as a dry hydrant system.

Logan-Rogersville Fire Protection District

In addition to portions of Greene and Webster Counties, the Logan-Rogersville Fire Protection District also serves the northeast corner of Christian County along Highway U. The District maintains three stations in Greene County. Station #1, located on Highway 125, is the district's headquarters and houses the District's front line apparatus. Station #2 is located on Blackman Road and responds to all fire and medical emergencies on the west side of the district. The third Station, Station #5 is the maintenance station and is located on Farm Road 174 west of Rogersville. Station #4 and Station #6 are located in Webster County. Station #4 located at Highway AD and Highway KK and Station #6 located in the city hall of Rogersville. Station #3 is located in Christian County off of Highway VV, south of Rogersville. Mutual aid agreements are in effect with surrounding fire districts except Springfield.

The District operates on a $0.3526 tax levy and is manned by 40 volunteer fire fighters, 22 full time staff. Of the total personnel, there are 17 emergency medical technicians, 5 paramedics and 30 first responders. Fire fighting equipment located at each of the six stations includes:

1. Station #1--one engine, one tanker, one rescue unit, one brush truck, one hazmat trailer
2. Station #2—one engine, one tanker, a truck, one rescue unit
3. Station #3--one engine, one tanker, one brush truck, one light tower unit
4. Station #4--one engine, one tanker, one brush truck, one hazmat trailer
5. Station #5 – Rehab complete with fans, coolers, bottled water, etc, staff truck
6. Station #6 – Staff truck, chief's car, a service vehicle.

All apparatus are equipped with multi channel radios. In addition to fire fighting equipment, the District also has specialized equipment for rescue services including two sets of Jaws, spreaders-cutters, light and heavy air bags, and six defibrillation unit. The district also

provides storm-warning services. The fire insurance ratings within the District range between 4 and 7 depending on location. Average response time is four minutes.

The District hopes to add a new engine to its apparatus in the coming years. The district has noted the need for additional water sources, such as fill wells located throughout its service area.

Nixa Fire Protection District

The Nixa Fire Protection District covers an area of approximately 53 square miles. District boundaries run north the Christian / Greene County line, west along the James River to the fork where the James meets the Finley River, north on the Finley River, east approximately halfway between Nixa and Ozark, then north to the county line.

The District is supported by a property tax assessment which is currently at $0.6749 per hundred dollars of assessed valuation. All taxes are collected by the Christian and Stone County Assessor's Office.

The full-time staff provides 24 hour coverage. Equipment is located at four stations: Station No. 1 located at 711 N. Main Street and Station No. 2 located at 301 S. Nicholas Road in the city, Station No. 3 located at 1752 W. Tracker Road northwest of the city and Station No. 4 located at 1765 S. Nicholas Road southwest of the city. Administrative offices are located at Station No. 2. Main equipment and staffing includes:

4 – Engines	1 – Fire Chief
1 – Aerial	3 – Assistant Chiefs
2 – Tankers	3 – Battalion Chiefs
2 – Brush Units	6 – Company Officers
1 – Heavy Rescue	18 – Firefighters
4 – Staff Vehicles	1 – Administrative Assistant

1 – Water Rescue	1 – Chaplain
1 – Command Trailer	2 – Inspectors

We respond to all Fire, Rescue and Emergency Medical Services (EMS) calls within the district. Normal response time in the city is 3-4 minutes. The Nixa Fire Protection District has mutual aid agreements with all surrounding fire departments.

100% of our firefighters are state-certified. Firefighters train on a weekly basis throughout the year and also attend training courses at the state and federal level.

The District is involved in several community projects which include MDA fund drives, annual fireworks display, school visitations for fire prevention, Sucker Day, Halloween activities, school athletic programs, all parades and festivals and other community service.

Ozark Rural Fire Protection District

The Ozark Rural Fire Protection District covers the central portion of Christian County surrounding Ozark, between the Greene County line on the north and close to the Taney County line on the south. The District has written mutual aid agreements with the Highlandville Fire Department and the Logan-Rogersville Fire Protection District. The District also has oral agreements with all other departments in the county. The Ozark District is supported by a $0.3888 tax levy.

The District operates with 31 volunteer firefighters and 23 paid staff. Of the total personnel 12 are Emergency Medical Technicians, 2 paramedics, and 25 first responders. The District maintains four stations. Station #1 is located at 604 N. 3rd Street in Ozark, Station #2 is located at

Highway 65 and County Road CC, Station #3 is sited at Highway W at the Christian Center, and station #4 is located at 175 Pippenville Road. Major equipment maintained at the four stations includes:

Station #1—two engines, one squad/heavy rescue, one aerial, one tanker, one brush, three *staff cars, a public education trailer, and a water rescue boat.*
Station #2—one engine, one brush truck/rescue truck, 1 tanker
Station #3—one 1,300 gallon tanker
Station #4—two engines, one tanker

Average response time to fire alarms within the District is 2 1/2 to 3 minutes and fire insurance ratings range from 3 to 5, depending on location. The District also provides rescue services and storm warning. At the present time, the District has no major problems or needs to maintain fire protection services. The District will soon be adding a brush truck to Station #3 and currently is attempting to add another ladder to Station #1 that will help to suppress fires in larger structures.

Sparta Fire Protection District

The Sparta Fire Protection District encompasses an area of 150 square miles in the northeastern part of Christian County. The District's equipment is housed at the Community Building in Sparta. The department has 2 pumpers, a tanker truck, a brusher truck, and a mini pumper.

The Fire District is supported by a $0.2734 cent tax levy. The department has 26 volunteer fire fighters and maintains a 2 minute average response time. The District’s fire insurance rating is 7 for within the city and 1,000 feet of its boundaries. The rating is 9 for farther out in the county.

The fire protection district plans on adding a working station in Bruner. The department also intends to upgrade safety with an anticipated FEMA grant.

Fire Protection Needs Summary

As noted in the preceding discussion several of the fire protection districts in Christian County are in need of additional revenues to finance training and equipment needs, including field communications equipment. All districts are now tax based, this is an improvement from 15 years ago when half the fire protection districts were supported by membership funding. The County and the rural fire districts should jointly work to develop and secure funding to establish fill wells and/or ponds at needed locations throughout the rural areas of the County.

Law Enforcement

Law enforcement in Christian County is provided by the police departments in the County's various cities and by the Christian County Sheriff's Department. The cities of Billings, Nixa and Ozark have 24-hour coverage, while the cities of Clever and Sparta have less than 24-hour coverage. All of the agencies in the county are able to gain assistance from the County's Sheriff's Department.

The Sheriff's Department is housed in the Christian County Justice Center in Ozark. The department has 78 fulltime personnel including the Sheriff, a Chief Deputy, six secretaries, a jail administrator, 30 jailers, five cooks, five investigators, one evidence officer, 26 patrol deputies, and two civil process deputies. In addition, the Department has 13 reserve patrolmen. Major equipment on hand for law enforcement includes vehicles, bullet proof vest, portable radios and cell phones with GPS (Global Positioning Systems).

Law enforcement personnel receive handgun and shotgun training to meet qualification requirements, training is also obtain in areas of communications, domestic violence, crisis intervention and many other areas in order to maintain their certifications. Criminal investigation and law enforcement needs continue to increase significantly in Christian County. Calls for service

(Table 9-3) have increased for some crimes in the County, but there has been also been a decrease in other areas of crime in the County. This decrease can be attributed in part to increased law enforcement and training, neighborhood watch programs, victims advocate programs, and other agencies being able to increase the amount of time and effort they spend working crimes.

TABLE 9-3

CALLS FOR SERVICE, 2006 - 2008

Crime	2006 No.	2007 No.	2008 No.
Burglary	150	139	172
Stealing	290	279	307
Property Damage	111	109	123
Assault	100	67	92
Domestic Violence	166	196	169

Source: Christian County Sheriff's Department, March 2009

In March 2002, the Christian County Sheriff's Department moved into the new Judicial Facility on the Ozark square across from the County Courthouse. The former jail held a maximum of 14 inmates. The new jail has a capacity 96 inmates. This increases our needs for manpower. Current needs identified by the department include a substantial increase in manpower. Also, in order to compete with other agencies, salary increases are needed. These current needs will become more critical as the County's population continues to grow over the next decade. The department's operations are currently funded through two 1/2-cent sales in which the County keeps 40% for the use in County revenue; the remainder is divided with the cities and the special road districts. A percentage of this sales tax contributes to the financing of the new Judicial Building. Once the building is paid off, the sales tax will revert to 3/8-cent where 1/4-cent is for law enforcement and 1/8-cent is for the maintenance and upkeep of the Judicial Building. Unfortunately, when this occurs, the drop in the amount of income will not be sufficient to sustain the maintenance of the building, along with the day to day departmental operations.

Christian County Emergency Management

The Christian County Emergency Management Agency is charged with preparing for disasters. This duty includes advising the County Commission on mitigation measures and implementing those measures deemed appropriate by the commission. In general, the county's policies encourage cooperation between Christian County agencies as well as cooperating county agencies and those of neighboring jurisdictions.

The mission of this office is coordination, resource management, preparedness, recovery, damage assessment, and volunteer management.

The Emergency Management Office is very involved in developing a Citizen Corps Program made up of several sub groups:

- CERT (Community Emergency Response Team)
- VIPS (Volunteers in Police Service)

And two new programs

- Fire Corps
- Neighborhood Watch

These programs are designed to be a supplemental source of assistance in times of special need or for special events.

911 Emergency Communications

In November of 1991 voters approved a countywide 911 emergency communications system, which is funded through a surcharge added to landline telephone bills. This charge went into effect in the Spring of 1992, and the 911 system came on-line in April of 1994. This service is supported through a 15% customer surcharge on telephone services provided by Southwestern Bell, Centurytel (formerly Verizon) and it's subsidiaries. The 911 department is staffed with: a 911 Coordinator, a Director of Communications, and 13 full time telecommunicators. 3 employees of the dispatch staff hold the position of Shift Supervisor, while 2 of the 13 employees serve as Training Officers.

The County 911 Center provides full time dispatch services for 5 Law Enforcement agencies, including the county Sheriffs Department. The Center also provides part time and/or situational

dispatch services for the City of Ozark Police Department. Also, on a full time basis the 911 Center dispatches 6 county Fire Departments. The City of Nixa dispatches law enforcement calls within the city limits, and the Nixa Fire District. However, the 911 area for the city of Nixa is set by the Fire District boundaries. Any law enforcement call that is outside the city limits of Nixa, but within the fire district boundaries, is received by the City of Nixa, then transferred to the County 911 Center for service.

The County 911 Center also maintains all Missouri Uniform Law Enforcement System files, inquiries, and entries. This includes warrant entries for all the county courts, and 4 municipal courts, as well as all lost and/or stolen property reported to the Sheriffs Office, or the 4 municipal departments. All employees must attend and pass the required 40 hour state certification, instructed by the Missouri State Highway Patrol to access and operate the system. The Highway Patrol requires an eight hour recertification class every 3 years there after. Employees must also obtain the required 40 hour certification through the Association of Public-Safety Communications Officials, and maintain 24 hours of continuing education hours/credits every 3 years there after.

Ambulance/Rescue Services

Ambulance services in Christian County are provided by Cox Ambulance Services. Services are provided to two separate districts in the County, one, which is tax supported and the second which is supported by user fees. The tax-supported district includes most of the County, with the exception of western panhandle area (Billings and Clever area). This ambulance district is supported through two separate sources: (1) a property tax levy of $0.137 per $100 assessed valuation and (2) user fees of $653.00 for basic emergency services and $549.00 for transfer/non-emergency services.

The eastern district has three operating stations located in Nixa, Ozark and Sparta. A Total of 32 fulltime and 20 part-time personnel help staff these stations. The average response time from each station is five minutes. A standing mutual aid agreement is available from the surrounding communities.

Cox Paramedics-Republic serves the user-fee ambulance district in the Billings and Clever area. Ambulances are dispatched from the station in the City of Republic. This service has 20 fulltime staff and 6 part-time personnel. In addition to the user-fees, a special membership program for emergency services is provided on a subscription basis. For a $36 annual fee, the district will accept insurance and Medicare payments as payment in full for emergency services.

Air ambulance services for Christian County are available through Cox Air Care and St. John's Lifeline-Air Ambulance. Both air ambulances serve all of Christian County.

Library Services

Residents' informational and recreational needs are served by the Christian County Library District. Founded April 1949 at the minimum ten cent levy, Christian County Library has had a single levy increase in sixty years. In 1972, voters approved supporting library services at twenty cents per hundred dollars. Reduced by reassessment and Hancock, the 2009 collectable levy of $ .087 is a third of Missouri's average twenty-five cent support. Income is inadequate to build, equip, stock, staff or operate adequate facilities. Thus, funding, facilities, collection, programming and collections are well below state and national public library averages.

In 2008, Christian County Library issued new library cards to 3,886 individuals. Attendance at library headquarters was 102,430 and 6,252 visited the Clever Public Library. The library's internet connection was used by 20,296 people within the building, not counting wireless users for the first half of the year, catalog searches or use of the laptop computers in library classes or

scheduled open labs. The library's chief website was used 178,898 times. Materials checked out were 196,201. Not counting the e-books or other virtual sources, 5,408 new books and audio and video materials were added to the collection. In 2008, 466 children registered for the summer reading program.

Christian County Library operates sixty-three hours per week. Services are provided to Clever Public Library twenty hours a week. The library van makes deliveries three half days a week during the school year and less during the summer. Over 73,000 books and audio and video materials are available for public use. Most of the library's thirty-one subscription databases are remotely accessible. Total active card holders are 21,231.

In Missouri, county library districts are governed by a five member Board of Trustees, each appointed for four year terms by the County Commission. The terms are staggered, with one trustee's term expiring for three years out of four and two terms expiring in the fourth year. Insofar as possible, trustees are of different ages, occupations, genders, strengths, interests, backgrounds and residences throughout the county. Outgoing members are replaced with someone from the same general part of the county. Trustees represent the public to the library and the library to the public. At regular meetings, trustees set policy, adopt budgets, keep aware of library progress and hire a library director who is in charge of library operations.

Friends of the Christian County Library's spring and fall book sales and other fundraising efforts pay for library participation in business expos, prizes for summer reading programs, flowers for the picnic area, and many other equipment, materials and services not covered by the library budget.

The library headquarters in Ozark was built in 1972 when County population was a fifth of the 2009 population. An addition was constructed in 1984. Most county libraries serving over

70,000 have branch locations. Typically, branches are within ten miles of all residents. Christian County's single ten thousand square foot building is a bit northwest of the center of the county, leaving some southeast county residents over thirty miles and many residents in south and west Christian County citizens at or near twenty miles from the library. To update services to all residents; to serve residents living far from the library; and to help compensate for budget-restricted facilities, collection and services, the library offers remotely-accessible databases, community pick-up and drop-off sites and a regular van delivery schedule. Still the shortfalls result in many statistics, when computed on the per capita level, being well below average. A standard comparison tool, Hennen's American Public Library Ratings often called HAPLR, uses weighted per capita criteria such as building and collection size, attendance and circulation, income and programming attendance from public libraries' annual statistical reports to compare what each library offers and how citizens use the services. Christian County Library's 2008 HAPLR score, based on the 2007 report on 2006 statistics was 322 of a possible 1,000. The average score of Missouri public libraries is 462. HAPLR places the library at the national percentile of twenty-one percent. Overall, of 550 American public library districts serving between 50,000 and 100,000, the size of Christian County's income, facilities, collection and staffing place it at 423rd.

The Christian County Library District operates primarily on a $0.087 per $100 assessed valuation real and personal property tax levy. In 2008, property tax and in the interest on it made 93% of all library income. The balance of library income derived 5% from state aid and athletes and entertainers' tax, 0 .7% cost recovery from late materials returns, printouts, and photocopies; and 1.3% from gifts and replacement of lost or destroyed materials. These percentages do not include one-time income from major grants.

In addition to operating the Christian County Library, the district in September of 2007 began an annual contract to provide collection, staff, library automation, internet, and materials delivery to the newly-founded Clever Public Library. It is housed in the office of a former fire station. The City of Clever, through a $180,000 bequest restricted for library services, and fund-raising efforts of Friends of the Clever Public Library provide the building, supplies, furnishings, equipment and utilities. If adequate funded becomes available, a branch library will replace the current arrangement. Library users may also request materials to be delivered for them to pick up at J & M Foods in Sparta or the Nixa Community Center during their regular hours. Library users may return borrowed items at bookdrops in all four locations.

The library has available for up to one hour per day per person use ten public-use internet computers, one of them restricted to use by children. In addition, two adult and one children's area computers are library catalogs and a computer is a sign-up and notification station for computer use waiting lines. Internet access is provided on a T-1 line through the Remote Electronic Access to Libraries, REAL, Project of the State of Missouri and Missouri Research Network, MoreNET. The library recently became eligible for T-5 access, possibly later in 2009. In compliance with the Children's Internet Protection Act, internet access arrives pre-filtered. Wireless users are authenticated via an individual access code supplied before log-in.

The Christian County Library uses Innovative Interfaces Inc. (III) library automation system to catalog, locate and track library materials and maintain the records of users and material via barcodes. Resources and personnel for maintaining the system are pooled in the eight-county Consortium of Ozarks Libraries (COOL) Library patrons have access to materials belonging to other library districts through requests staff submit on their behalf to the Missouri Library Network

Corporation (MLNC), the OCLC cooperative, and First Search, a single search method of looking at the catalogs of hundreds of libraries simultaneously.

Three library websites serve users at any computer with internet access. The catalog at coolcat.org allows searches, requests, renewals and checking on personal materials loan records. The transcribed records website at www.rootsweb.com/~moccl provides guidance and information for researching families and history in Christian County. The library home page at christiancounty.lib.mo.us is a frequently updated, customized collection of information about the library and its services and the most useful and reliable websites in the categories of Reference, Christian County, Missouri, the United States, the World, Family and Home, History and Genealogy, Work and Play.

Particularly useful and convenient are the databases, some provided statewide and paid with state funds, others carefully chosen and subscribed to by the district for the use of Christian County residents. Databases of searchable and full-text newspapers and magazines; hundreds of the best reference books; business contacts and information; auto repair; small engine maintenance; hobby and craft information; legal forms; homework help; genealogy; history; literature; educational and vocational practice tests; reader's advisory; over eight thousand electronic books; science and biography are available for use at any internet connection, usually with the library card number. Companies do not offer remote access to a couple of popular subscription databases, Ancestry and the Kansas City Star, for remote access. These must be used in the library at library computers or on personal laptop computers. Access to all is through http://christiancounty.lib.mo.us/databases.html.

Meeting citizens' current and anticipated future library needs will require funding levels nearer those of library districts which better meet those needs. Since 2002, the district has

conducted surveys, focus groups, panel discussions and related means to determine citizen priorities and ways of providing the modern and adequate services available in other better supported districts. Convenient library locations, hours and access for residents throughout the County; a drive-through pick-up service; a diversified collection, in the full range of current formats from print, audio, and video to on-line, to match the increasingly diverse interests of the county's growing population; space for collections, programming, equipment and library users; remote 24-7 on-line access to many of the library sources; and staffing to facilitate full library services are among citizen-identified needs.

As a basis for a decision on a ballot issue, citizens ask most often "Where will it be?" and "What will it look like?" Combined with the disappearance of suitable land and the increasing price of remaining land, the board decided to answer these questions before approaching the voters with a proposal to provide twenty-first century library services to Christian County. In 2008, the district hired a real-estate attorney, Thom Field of Neale & Newman, to identify, negotiate and obtain sites for three library locations using criteria determined from the studies. Proposed are a headquarters building between Nixa and Ozark of approximately 35,000 to 37,000 square feet to serve the over 40,000 residents within or near those cities; and two branches of about 5,000 square feet each, centered in the east and west parts of Christian County at Sparta and Clever to serve the remainder of the County. A list of ideas and requests from previous citizen input and consultant studies will be refined and finalized at public hearings prior to completing library designs. The estimated cost for the three libraries is about eleven million dollars. The district hired Sapp Design Associates, Architects, to coordinate engineering and surveying services to determine site suitability and to design and coordinate construction of library facilities. Carson Elliff of Yates, Mauck, Bohrer, Elliff & Fels was named Bond Attorney and Julie Portman with Edward Jones,

Underwriter. As soon as all sites are determined to be suitable for building sites and under contract, the Library Board of Trustees will set an election date at which voters may decide whether to support convenient, adequate, modern library services for Christian County. The date is expected to be soon after July 2009. Should citizens approve funding, we anticipate plans to be completed, contractors hired and construction begun on all facilities within months. Barring unforeseen delays, all three locations should be open and operating within three years of the election. In addition to the property tax, every effort will be made to raise private funds, cooperate with others, and seek grants to enhance the basics provided by the levy, provide for features not payable with public funds, hasten the time when income can be spent for ongoing and future library services, and to address evolving future expectations and demands.

Table 9-4

COMPARISON OF PUBLIC LIBRARY STATISTICS 2006 – REPORTED 2007

CATAGORIES	US average	MO average	Christian County
Tax Rate (per $100)	various support methods	$0.25	$ 0.0872
Per capita Spending	23.51	26.27	9.55
Volumes per capita	2.37*	5.96	1.21
Library visits per capita	3.98	4.91	1.64
Circulation per capita	5.54	7.15	2.57

Sources: haplr-index.com 2008; CCL statistics; Missouri State Library, Institute for Museum and Library Services; National Center for Educational Statistics.

All per capita statistics are based on 2000 census figures, so CCL actual will be lower than stated, due to population growth. *US average volumes per capita from HAPLR is print only. Missouri and Christian County also includes audio, video and e-book counts.

Parks and Recreation

While Christian County has considerable acreage available for recreation opportunities, there are no parks or recreation facilities that are owned or operated by the County government. The vast majority of lands available for public recreation are contained in the Mark Twain National Forest. Approximately 51,312 acres of national forest are located in Christian County; the Ava/Cassville District Rangers office locally administers this area.

The Mark Twain National Forest in Christian County contains two developed recreation areas--Cobb Ridge and Camp Ridge. Cobb Ridge provides group camping facilities, individual camping units and trailer space. Camp Ridge facilities include camping units, picnic areas and trailer spaces.

One of the more notable recreation opportunities in the Mark Twain Forest is the Glade Top Trail, a 23-mile panoramic trail that winds along narrow ridge tops and valleys in the southern part of the County. Also, 6000 acres of the national forest are available for use by all terrain vehicles. The ATV use areas are administered by a partnership between the Forest Service and the Ozark Enduro Riders, Inc., a Springfield area motorcycle club. This club helps to maintain the ATV trails in the Chadwick Motorcycle Use Area. Other recreation opportunities in the national forest include fishing, hunting and horse and hiking trails.

The National Park Service administers the Wilson's Creek National Battlefield, a portion of which is located in the northwestern panhandle of Christian County. This historic site provides education opportunities for visitors about the history and lifestyle before during and after the battle which took place in 1861. The site also offers walking, hiking, equestrian and jogging trails.

The Missouri Department of Conservation administers Busiek State Park, located along Highway 65 in the southern part of the County. This site offers opportunities for hunting, hiking,

biking and picnicking. The Department of Conservation administers two public access points on the James River. Shelvin Park is a 20-acre access site located southwest of Nixa on Highway M. The 24-acre Delaware Town Access is located west of Nixa.

As growth continues in Christian County, there will be an increasing need for recreation opportunities in the unincorporated portions of the County. It is suggested that planning for future parks, open space and recreation needs should be incorporated in the continuing planning process for Christian County. The County should also encourage developers to provide usable recreation and open space areas in residential developments as urbanization continues.

UTILITIES-

Water and sewerage facilities are primary environmental infrastructure components that provide for basic health and safety needs of the people of Christian County. The availability and capacity of these facilities are also key determinants of future growth and development potential. In addition to water and sewer services, this chapter of the Plan also summarizes electric, gas, and solid waste disposal services in Christian County.

Water Supply/Services

The residents and businesses in Christian County derive their water supply from groundwater supplied through municipal water systems, other public water systems and private wells. The County government itself does not provide public water services. Each of the incorporated cities in Christian County has its own municipal water system with the exception of Fremont Hills. Fremont Hills is connected to the Ozark water system. The City of Nixa and the City of Ozark has also extended water service to some developments outside of their city limits.

According to records maintained by the Missouri Department of Natural Resources (DNR) there are approximately 42 active public water systems in Christian County in addition to the municipal systems. These include systems serving subdivisions, apartment complexes and mobile home parks. The communities of Chadwick and Highlandville also have public water districts serving approximately 300 and 1300 persons, respectively. The vast majority of developments in the unincorporated portions of the County derive water from private wells.

TABLE 10-1

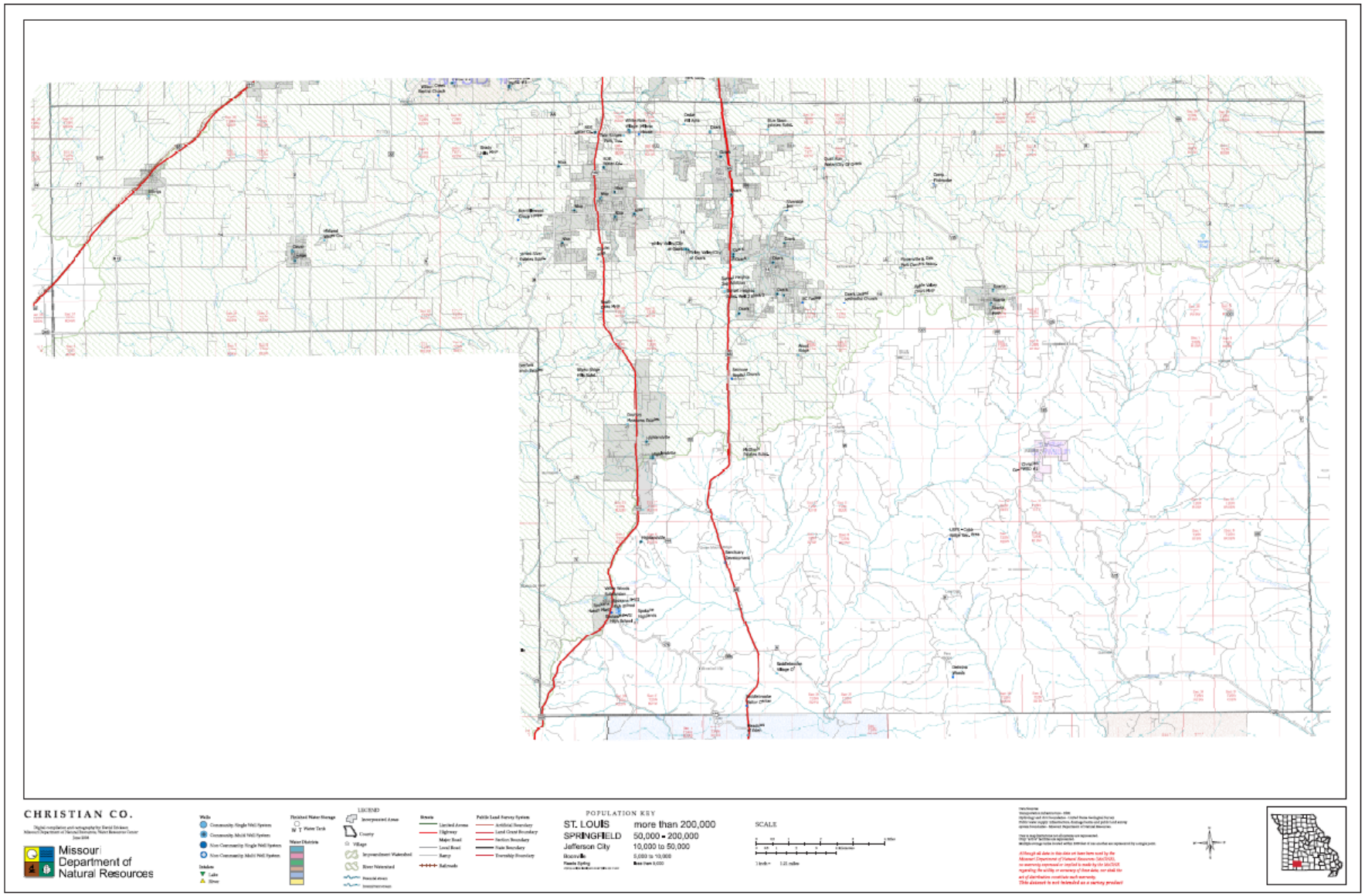
WATER SYSTEMS FOR MUNICIPALITIES AND WATER DISTRICTS

City/ Public Water District (PWD)	Persons Served	Average Daily Consumption	Maximum Daily Consumption	Capacity	Service Connections	Finished Storage	Source of Supply	Permit to Dispense
Billings	1125	.100 MGD	.180 MGD	.475 MGD	1414	.200 MG	3 Wells	1/1/1942
Clever	1010	.100 MGD	.115 MGD	.590 MGD	755	.050 MG	2 Wells	1/1/1948
Nixa	12000	1.0 MGD	2.0 MGD	2.3470 MGD	7346	.715 MG	7 Wells	1/1/1942
Ozark	25945	1.0 MGD	1.50 MGD	6.60 MGD	7328	.725 MG	9 Wells	1/1/1929
Sparta	800	.110 MGD	.163 MGD	.6040 MGD	853	.100 MG	2 Wells	1/1/1960
PWD #1 Chadwick	280	.02 MGD	.027 MGD	.194 MGD	128	.010 MG	1 Well	1/1/1964
PWD # 2 Highlandville	1280	.058 MGD	.078 MGD	.50 MGD	542	.065 MG	3 Wells	1/1/1972
Saddlebrooke	25				12		1 Well	11/20/2003
Spokane	85	N/A	N/A	N/A	49	.015 MG	1 Well	12/29/94

Source: Department of Natural Resources, Water System Details, 2009.

FIGURE 10 - 1

Missouri DNR Well Locations



As discussed in the Physical Characteristics Section, many of the private wells in the County are tapped into the shallow aquifer known as the Springfield Plateau aquifer which ranges in depth of 0 - 450 feet which is prone to pollution from surface contaminants. For this reason many of the wells drilled since 1987 have been constructed to exclude water from the Springfield Plateau aquifer and dug deeper down to the Ozark aquifer.

Maintenance, which refers to protection and restoration of water quality is a critical concern for the current population as well as for future development. While availability of safe drinking water is a general concern throughout the entire County, the issue has been particularly acute in the unincorporated community of Spokane (south of Nixa along Highway 65). Spokane derives its water from private wells; many wells have become contaminated due to improperly designed and/or failing on-site septic systems. The area's soils have a fragipan, which severely limits the functioning of septic tank systems. Resolution of the drinking water problems in the Spokane area will likely require a combination of actions to establish a public water system and public sewage disposal system.

A second concern noted by County residents is the number of private wells being drilled in the in many areas of the County. There is concern that the area's water supply will be depleted due to the sinking of too many wells. Maintenance of adequate water supplies in this area may require controls on minimum lot size to regulate the number of wells permitted.

Christian County is home to both the Springfield Aquifer (surface) and Ozark Aquifer (1st confined water source). These two areas are classified by the Missouri Department of Natural Resources as having the highest level of potential for possible contamination. For this reason it is imperative that the County be vigilant in adopting and enforcing policies which protect this natural resource.

Sewage

As with the water systems in Christian County, there is no one public sanitary sewer system serving the entire County. Outside of the individual municipal sanitary sewer systems and a few public systems serving mobile home parks and subdivisions, most residents in the County rely on septic tank disposal systems. Until recently the only governance of on-site sewage disposal systems has come under the jurisdiction of the Missouri DNR, which regulates commercial systems and residential developments with more than 14 lots.

As noted in the preceding paragraphs, there has been growing concern in Christian County for the safe disposal of sewage and protection of the area's groundwater supply. In order to address these concerns, Christian County adopted regulations in April 1992 that govern residential, on-site sewage disposal systems. These regulations apply to all new individual systems as well as rehabilitation/replacement of existing failing systems. Funded by user fees, the regulations are administered by the Christian County Health Department. In 2001 the Christian County Commission adopted an amendment to the county UDC prohibiting central wastewater systems within the unincorporated areas of the county. The critical key to the ongoing success of this program will be public education on the benefits of proper sewage disposal and cooperation between public regulatory agencies, advisory boards and the development community to achieve implementation.

Electric Services

Electric services in Christian County are provided by a number of rural electric cooperatives and municipally owned systems. The City of Nixa operates its own electric utility. In May of 1992 Nixa entered into agreement with Springfield City Utilities for the purchase of power that will replace power from other contract sources. This is an agreement that was re-approved in August of

2002. Other utility companies serving Christian County include the Webster Electric Cooperative, White River Valley Cooperative, Empire Electric, Ozark Electric Cooperative, KAMO Electric Cooperative and N.W. Electric Power Cooperative. The electric cooperatives serving the County are not restricted to individual geographic service areas and many companies provide service within the same area.

Natural Gas Services

In 1994 Missouri Gas Energy purchased KPL Gas Service, the only natural gas provider in Christian County. The total number of customers (meters) including both residential and commercial in Christian County is 15,046 and can be broken down as follows:

Nixa---8285

Ozark ---5570

Clever---756

Billings---435

Based on the age of the distribution systems in these towns and the leakage and cathodic protection records the rating would be "good".

MGE has three main feeder lines located in Christian County.

I. A 3" high pressure line running from Billings to Clever approximately 5 miles long installed in 1968. (MAOP 90 PSI)

2. A 6"high pressure line running from Weaver Road to Nixa and Ozark installed in 1961, (MAOP 275 PSI)

3. An 8" high pressure line running from a Southern Star Pipeline tap south of James River Power Plant in Springfield to a point between Ozark and Nixa installed in 2006. (MAOP 500 PSI)

Solid Waste Disposal

There are no solid waste disposal sites in Christian County and the County itself provides no services or programs for solid waste disposal. Private trash haulers provide disposal services, with wastes taken to landfills in surrounding counties.

Throughout the rural areas of the County, disposal of solid wastes is becoming a serious concern due to increased dumping along rural County roads, illegal trash dumps on private property and trash dumping in sinkholes. Residents in rural areas of the County have also reported difficulties in securing the services of trash haulers due to travel distances, compounding the problems of on-site trash dumping.

The State of Missouri's solid waste disposal law places stringent limitations on wastes that can now be taken to the area's landfills. These restrictions, along with significantly higher landfill tipping fees, are contributing to the illegal roadside dumping problem throughout the County.

State law (RSMo Section 260.305) also requires Missouri's counties to develop plans for solid waste disposal and reduction of the waste stream. In May 1992 the Missouri DNR approved the formation of Solid Waste Management District "O", which Includes Christian, Greene, Webster, Polk and Dallas Counties. The district is charged with creating a regional disposal plan and maintaining the provisions.

A countywide recycling program for Christian County was established in 1997. The main location of the recycling center is at 1300 West Hall Street in Ozark. The gates are open Tuesday through Saturday with bins available daily. Mobile recycling bins are also placed in the other participating municipalities throughout the county. A recycling schedule with drop-off dates and locations is published weekly in the local newspaper. Accepted materials include: paper,

cardboard, tin cans, aluminum cans, plastic beverage bottles, glass jars and bottles, and window glass. In addition, a compost site is available at the main location for grass clippings.

TRANSPORTATION

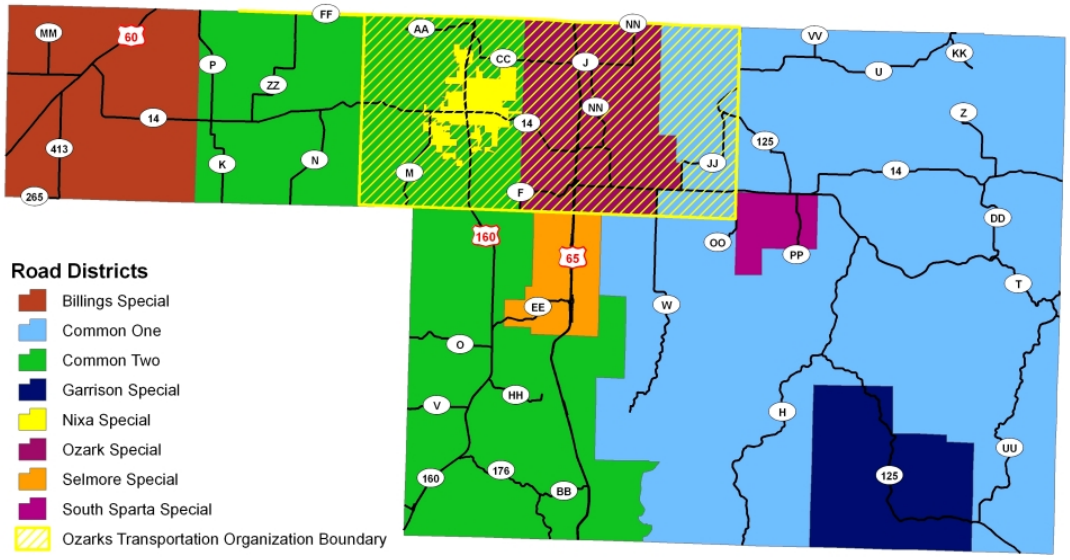
Roads and Highways-Responsible Entities and Planning Agencies

The public roads and highways in Christian County are the responsibility of numerous different public entities and differing levels of government, including city, county, state and special road district entities.

Missouri Department of Transportation (MoDOT)

MoDOT is responsible for the maintenance of state routes and segments of the federal highway system in Christian County. Federal highway system routes include U.S. 65, U.S. 60 and U.S. 160. State routes include all other lettered and numbered routes in the county. (see Figure 11-1)

FIGURE 11 - 1
MoDOT Roads, Ozarks Transportation Organization, and Christian County Road Districts



Ozarks Transportation Organization (OTO)

OTO is the federally designated Metropolitan Planning Organization (MPO) that serves as a forum for cooperative transportation decision-making by state and local governments, and regional transportation and planning agencies. MPOs are charged with maintaining, conducting a "continuing, cooperative, and comprehensive" regional transportation planning, and project programming process. Federal funding for transportation projects and programs are channeled through this planning process. OTO's planning area encompasses the Springfield metro region and extends into Christian County as shown in Figure 11-1 above.

The Southwest Missouri Council of Governments (SMCOG)

Christian County is a part of SMCOG, which is the state authorized Regional Planning Commission (RPC) for a ten county region in southwest Missouri. RPCs serve as planning partners with MoDOT. The role of RPCs is to communicate the transportation needs identified by county and local officials to MoDOT. This framework enables MoDOT to evaluate and program improvement projects in rural areas that are not served by MPOs. It is imperative that Christian County participate in these planning processes to ensure that transportation needs are met in terms of MoDOT maintained roads.

Christian County Special Road Districts

In addition to state maintained highways and roads, the Christian County Commission maintains county roads within two districts--Common 1 and Common 2. Six special road districts also separately maintain numerous roads throughout the County. These special road districts include Billings, Garrison, Nixa, Ozark, Selmore, and South Sparta. This multiplicity of entities responsible for road planning and maintenance poses difficulties for assuring countywide planning of an interrelated road system, such as; application of uniform minimum road standards and equitable levels of road maintenance throughout the County.

The County road districts and the special road districts are funded through a combination of road tax levies, sales tax revenues and county road and bridge gasoline tax revenues. The Billings, Nixa, Ozark, Selmore, and South Sparta Special Road Districts have their own road tax levies as established by the voters in the respective districts. Sales tax and gasoline tax revenues finance Common 1 and 2 along with Garrison districts.

EXISTING CONDITIONS AND NEEDS SUMMARY

The preceding sections of this document have detailed current conditions and needs in Christian County, determined through the processes of several public information forums as well as primary and secondary data collection and analysis. An understanding of the man-made and natural environment is essential to the development of goals and objectives for the future of Christian County and the formulation of action strategies, policies and priorities for achieving the goals and quality of life desired by the residents of Christian County.

The following summary notes the primary conditions, needs and issues affecting future development and growth in Christian County:

Demography and Population Growth

1. Christian County has grown over the past two decades at extremely rapid rates of growth, with in-migration of population being the primary component of population change. Continued in-migration is expected at similar growth rates over the coming decade.

2. Youth and younger, working-aged persons dominate the County's population. The immediate implications of the population structure are the needs for expanded public education facilities, family housing and related community/public services, such as parks and recreation opportunities and day care.

3. While currently the median age in Christian County is comparatively low, over the next twenty years, the baby boom population within the region will enter retirement years. The focus on community services will shift to meeting the needs of an aging population, such as health care and alternative housing types.

4. During this rapid growth period, population increases have outpaced the creation of new jobs in the within the county. This has led to the development of a bedroom community which feeds the economies of adjoining counties while at the same time hampering the ability of Christian County to provide for its citizens.

Physical Characteristics

1. Christian County has a varied natural environment, ranging from relatively flat lowland areas to rugged hills and valleys. The County is characterized by karst topography. The geologic features of karst, such as sinkholes, lineaments, caves and losing streams, place limitations on development due to the potential for surface contaminants to enter the groundwater supply.

2. Maintenance of groundwater quality is a critical environmental concern as development proceeds in the County. This concern is reflected in the need for the appropriate disposal of sewage, solid waste materials and stormwater runoff.

Land Use

1. Christian County is undergoing rapid urbanization. Over the last few years the County has with the focus of growth occurring in the northern portion of the County and along the Highway 65 and Highway 160 corridors. These growth corridor areas are expected to continue to be the focus of future development over the next decade.

2. Although experiencing rapid urban development, agriculture continues to be the primary land use in the County. The greatest levels of urbanization are occurring in many of the prime farmland soils areas. As urban development encroaches on agricultural operations, particularly the animal husbandry industry, there is significant potential for problems arising from incompatible land use activities.

3. Outside of the incorporated cities, very low-density residential development is the norm throughout the County. Single family residential, mobile homes and mobile home parks are the dominant residential structure types in the County.

Public Facilities/Services

1. Maintaining an adequate level of public facilities and services for a rapidly growing population will be a primary concern over the next decade.

2. Although several school districts have new or expanded facility projects underway, there is a need for facility development in some districts to keep up with current and anticipated school enrollment levels.

3. County law enforcement needs have increased, including manpower, equipment and training, due to the growing population and rising criminal activity.

4. Many of the area's fire protection districts are in need of additional revenues for upgrading equipment and training. There is also a need to fill wells, particularly in the more rural parts of the County, and improved field communications.

5. Federal and State agencies maintain several recreation and cultural facilities in Christian County, including the Mark Twain National Forest, Busiek State Park and Wilson's Creek National Battlefield. There are, however, no park and recreation facilities operated by the County. As the population continues to grow and urban densities increase, there will be a need for parks and recreation facility development.

Utilities

1. Christian County derives its water from the ground. Outside of municipal water systems and public water systems serving scattered subdivisions and mobile home parks, most residents use private wells. Many wells throughout the County have been contaminated by effluent from improperly designed/installed septic tank systems. Maintaining groundwater quality is a priority concern.

2. The cities in Christian County and a few private developments have their own sewage disposal systems. Most development in rural areas utilize on-site sewage disposal. Implementation of the County's recently adopted on-site sewage disposal regulations is an essential priority.

3. As residential areas are divided up into more and more parcels it is important for the County to adopt policies which will allow the implementation of central wastewater systems. This will allow the clustering of homes and preservation of open space. It is also imperative that policies are in place to safeguard proper maintenance.

Transportation

1. Increasing population growth and urbanization is placing strains on the many of the primary roads in the County, such as Highway 14, Highway CC and Highway EE. There is the need to establish upgraded standards for securing sufficient right-of-way for road improvements as development proceeds.

2. Road maintenance responsibility is shared by the State, the County and several special road districts. There is a need to establish uniform standards for surface materials and right-of-way for the County level road system.

GOALS AND OBJECTIVES

General Development Philosophy

One of the most pressing challenges for Christian County is how to maintain a quality of life desired by its residents in the face of rapid urbanization. Historically a rural-based, agricultural community, Christian County continues to attract residents desiring to live in a more rural environment while others desire more and more of the amenities found in urbanized areas. This rapid growth has brought change to the physical and cultural landscape of Christian County.

More people means greater and often conflicting demands on the County's resources. Christian County's resources are finite, whether they are natural resources such as land, water and forests, or man-made resources, such as roads, schools and money. What actions will best serve the public good is a central question in the formulation of strategies to guide future growth and resource allocation in Christian County. The general development philosophy of the Christian County Comprehensive Plan, which sets the framework for strategies and programs to implement the County's goals, is to provide for future development that is compatible with and preserves the best qualities of rural life and to maintain the integrity of the County's physical resource base. In looking toward future development we must also look at development which has already occurred and consider how new grow opportunities will best utilize existing infrastructure.

The allocation of resources and implementation of programs and projects should ultimately be based on the desires and expressed needs of the population. Desires and needs are translated into goals and objectives which set the framework for actions to be undertaken in the guidance of future development in the County. Goals are general statements of desired intent to be achieved. Objectives further define aspects of the larger general goal, and then policies are shorter-range actions to be undertaken to achieve the community's desired goals.

The goals and objectives for Christian County are based on evaluation of existing conditions and desires of the population expressed through the public information meetings process.

Overall Land Use Goal

Foster a safe, convenient, attractive, compatible and fiscally responsible land use pattern that includes a variety of housing. recreational and commercial opportunities while respecting agriculture and unique community assets such as historic sites and environmentally sensitive areas.

Countywide Growth Objectives and Policies

Objective: Ensure that new development is compatible with existing and planned uses of surrounding properties.

> **Policy:** Use the generalized land use categories in **Figure 16 -5** for future land use planning. *The "Typical Land Uses" column lists examples and should not be considered all inclusive.* Residential densities are expressed in dwelling units per gross acre of a project.
>
> **Policy:** Use the Future Land Use Map in (Appendix A) to guide land use and development decisions. Zoning decisions shall be consistent with the adopted Future Land Use Map and the other policies of this plan. The Future Land Use Map does not affect existing subdivisions or permitted development. While the map may indicate a particular land use type, the County shall consider the adequacy of infrastructure and the character of the area before approving zoning or other development proposals.
>
> **Policy:** Maintain the Future Land Use Map and map adopted Plan amendments as they occur.

Objective: Require that adequate public facilities and services be available at an acceptable level of service concurrent with development.

> **Policy:** Require development applications within Urban Service Areas (USA's) to include an analysis of the development's infrastructure and service demands relative to the available capacity.
>
> **Policy:** Require development to pay its proportional share of public facilities and services based on the demand created by the development.
>
> **Policy:** Provide developers with a menu of acceptable options to equitably provide adequate public facilities. Finance options may include: Development Agreements; Neighborhood Improvement Districts; or
> other legal and appropriate exactions.
>
> **Policy:** Require developers to provide financial assurances that on-site improvements are constructed and maintained to an acceptable standard. Assurances may be in the form of: an irrevocable letter of credit; an escrow agreement; a surety bond; or a cash deposit.

Objective: Eliminate structural, electrical, mechanical and plumbing hazards and ensure that new housing is built and maintained in a manner that ensures the safety of the occupants.

> **Policy:** Require that all new residential and commercial structures and additions be inspected to meet the standards specified in the applicable IRC, IBC, NEC and IFC codes.
>
> **Policy:** Require dilapidated residential structures to be rehabilitated, or demolished and properly disposed.

Urban Service Area Objectives

Objective: Establish Urban Service Areas (USAs) around each city to ensure that new development is consistent with the rational growth of communities.

> **Policy:** Require land uses and the intensity of development within USAs to be consistent with the land use plan mutually adopted by the County and applicable City.
>
> **Policy:** Require urban and suburban development within the USAs to conform to improvement standards mutually agreed to by the applicable City and County.
>
> **Policy:** For cities without adopted plans, provide the opportunity to comment on development proposals located within their USA.
>
> **Policy:** In areas that can not be developed to urban standards within 5 years of a development application, allow interim development within the USA that is consistent with the agriculture areas (1 dwelling per 10 acres) to minimize construction, septic tanks and land fragmentation within the USA.

Objective: Coordinate public infrastructure improvement requirements with the cities within their respective USAs.

> **Policy:** Coordinate infrastructure and drainage improvements with the cities and other service providers to ensure efficient use of public funds.

Objective: Facilitate the creation of a diverse housing stock within existing communities that caters to different household needs preferences.

> **Policy:** Ensure that USAs provide sufficient land for projected growth of the cities and that USA land use plans allow a mix of dwelling unit types.

Rural Residential Objectives

Objective: Ensure that growth occurring outside the incorporated areas of the County does not create undue stress on the environment or encroachment on lands historically best suited for agricultural purposes.

Policy: Maintain rural residential densities between 1 dwelling per 3 acres and 1 dwelling per 5+ acres. Lot sizes smaller than 3 acres should be limited to PUDs and developments served by approved centralized or community sewer systems.

Policy: Minimize development within the100 year floodplain

Policy: Ensure that development meets appropriate setback requirements from sinkholes, karst areas and other environmentally sensitive areas.

Policy: Develop LESA-based suitability criteria to avoid the premature development of rural residential land.

Objective: Ensure that residential uses are compatible with neighboring uses.

Policy: Review all development proposals for conformance with the Future Land Use Plan.

Policy: Require residential development adjacent to agriculture uses to provide vegetative buffers, windbreaks and other means of mitigating potential incompatibilities to avoid interference with existing agricultural operations.

Policy: Limit commercial activity within Rural Residential areas to home occupations, direct marketing of agricultural products and neighborhood scale commercial services at intersections of 2 paved roads.

General Commercial Objectives

Objective: Establish transit oriented commercial districts at interchanges and in transportation corridors to provide retail and service opportunities for regional and long distance motorists.

Policy: Establish general commercial districts that are designed:
as nodes in close proximity to interchanges and intersections as well as along major transportation corridors; in scale and intensity appropriate to road and public service capacity; to accommodate uses that primarily serve the traveling public and the surface transportation industry; and with landscaping, signage control, hard surface parking and loading, stormwater retention, architectural and performance standards that result in attractive amenities.

Agricultural Lands Objectives

Objective: Minimize negative impacts on agriculture operations from non-agricultural uses.

Policy: Encourage new non-agriculture uses in the agriculture areas to plant a vegetative buffer between the use and agricultural operations.

Policy: Allow commercial activities that are commonly accessory to and support the viability of agricultural operations in agriculture areas.

Policy: Minimize development within 100-year floodplains.

Economic Goal

Create a local economy that provides varied employment and trade opportunities built upon efficient and equitable use of Christian County's cultural, natural, built and human resources.

Objective: Encourage development of non-farm employment within cities to support their roles as energetic centers of diverse commercial and industrial activity.

Policy: Support labor force enhancement efforts that focus on education and training to attract investment and job creation within our communities.

Policy: Encourage employment opportunities within cities to provide stability and a decent living wage through targeted performance-based incentives.

Policy: Coordinate with cities and economic development interests to explore opportunities for joint development of a business and industrial park.

Policy: Limit commercial zoning in unincorporated areas to facilities that serve the needs of rural residents to regional businesses at highway interchanges.

Objective: Create safe, attractive and functional highway-oriented commercial areas that capitalize on regional transportation access without detracting from the economic vitality of cities.

Policy: Participate in state transportation planning to improve the condition, capacity and safety of MoDOT roads within the County.

Objective: Increase the diversity of employment opportunities that meet the needs and capabilities of Christian County residents.

Policy: Coordinate with local school districts and colleges to encourage businesses and governmental entities to extend internship and apprentice opportunities to local students.

Policy: Support efforts to identify and target recruitment efforts to businesses that are complementary to the existing industrial base.

Policy: Facilitate discussions with cities to locate and develop an industrial park in An appropriate area that will provide opportunities for long-term employment growth.

Physical Environment Goal

Ensure that development decisions minimize degradation of natural resources and promote a clean, safe and aesthetically pleasing environment for all current and future citizens.

Objective: Protect land adjacent to lakes, rivers, streams and wetlands.

> **Policy:** Limit construction within 100-year floodplains to necessary infrastructure development.
>
> **Policy:** Require vegetative buffers and natural stormwater filtration systems for all non-agricultural development adjacent to water and major drainage ways.
>
> **Policy:** Encourage the use of vegetative buffers, terracing and other stormwater management techniques that improve the quality of stormwater runoff and limit stream contamination.

Objective: Establish development standards that minimize the impact of human activity on the natural environment.

> **Policy:** Encourage development codes and site planning requirements to integrate reasonable open spaces for conservation, recreation and drainage purposes.
>
> **Policy:** Encourage the retention of specimen trees during site preparation for construction and other development activities.
>
> **Policy:** Support recycling, composting and other legitimate solid waste reduction activities.

Objective: Support long-term conservation of land resources.

> **Policy:** Encourage the placement of conservation easements, deed restrictions and other mechanisms that preserve land resources in conformance with the Future Land Use Plan.
>
> **Policy:** Provide technical support to any person or entity wishing to conserve land resources by providing property data, land use monitoring and educational materials on land conservation tools and practices.

Public Facilities and Services Goal

Ensure that public services, facilities and utilities support community life in a safe, effective and efficient manner, while justly allocating the costs of providing these public goods.

Objective: Ensure adequate water and sewage disposal for all development in Christian County.

Policy: Support and enforce the individual sewage disposal system regulations.

Policy: Provide assistance to the County Health Department in establishing an ongoing public awareness program on the goals and requirements of the sewage disposal regulations.

Policy: Encourage the establishment of special water districts in rural areas of the County impacted by problems of groundwater contamination.

Policy: Regulate the intensity of development to ensure that land absorption capacities for disposal of sewage and maintenance of water table levels for well water production are not exceeded. Establish minimum lot sizes, based on water and sewage capacities, in the land development regulations for the County.

Policy: Support efforts to rehabilitate, replace and/or upgrade failing individual and public sewage systems and water systems.

Policy: Establish a policy providing for centralized wastewater treatment systems that incorporates sufficient bonding or other security measures to protect the County from undue expense yet allows for an alternative means of treating waste water in areas unable to be serviced by municipal infrastructure.

Objective: Encourage cooperation and coordination between area school districts, local and county government and agencies/boards charged with land development responsibilities.

Policy: Promote the sharing of information between planning staffs and school district boards to ensure adequate understanding of respective needs and the diverse criteria utilized in planning to evaluate development potential.

Policy: Support cooperation between school districts, the County and its cities to help maximize the utilization of community facilities.

Policy: Work with local school districts to encourage support for adequate funding levels to maintain a high quality of education for Christian County's residents.

Policy: Encourage the provision of incentives for developers to donate land for future school facilities.

Policy: Coordinate with school districts on sitting decisions to ensure that adequate facilities will be available to future schools.

Objective: Promote the development and preservation of recreational and cultural resources in the County.

Policy: Support adequate funding levels to ensure continued quality delivery of educational and leisure resources through the Christian County Library.

Policy: Actively explore options and opportunities for expanded recreational lands and facilities that can be capitalized on and made available to County residents following transition to first class status as a County.

Transportation Goal

Provide and maintain a quality transportation system that emphasizes safety, cost effectiveness and connectivity while remaining consummate to a diverse range of land use patterns.

Objective: Address transportation safety, capacity and adequacy in the development decision-making process.

Policy: Require traffic impact studies as part of the development applications for projects that will significantly impact street system safety and capacity.

Policy: Invite the input of Road Districts when appropriate by providing detailed development project descriptions.

Policy: Incorporate traffic safety considerations as review elements in the land development regulations and development approval process.

Policy: Require adequate, minimum sight distance clearances at intersections of roads and at property access points along roads in the County. This policy should apply to the location of permanent structures, infrastructure, vegetation and storage of agricultural products and equipment.

Policy: Encourage developers to provide sidewalks in residential areas developed at urban densities.

Policy: Require sidewalks along major collectors and arterials in urbanized areas of the County.

Objective: Coordinate with the Road Districts to ensure that road construction and maintenance is consistent with existing and future traffic patterns.

> **Policy:** Coordinate with the Road Districts to conduct a comprehensive road inventory of the County to assemble and maintain data on surfaces, widths, conditions, traffic counts and other relevant data. Based on this inventory and future traffic demand calculated from the Future Land Use Plan, the functionality of each roadway should be determined and appropriate right-of-way and improvement standards established.
>
> **Policy:** Coordinate with road districts to codify road design standards and work to ensure that new roads are designed and built to meet these standards.
>
> **Policy:** Require right-of-way dedications through the platting process and ensure that the right-of-way allows for the installation of utilities and drainage facilities.
>
> **Policy:** Evaluate the equity and effectiveness of the County's current road improvement system.

Objective: Require development to design and construct adequate internal road systems that are integrated with the existing and future roads and consistent with the County's thoroughfare plan.

> **Policy:** Require platted right-of-way to extend to the adjacent property boundaries to enhance access and connectivity between development projects.
>
> **Policy:** Require that internal local subdivision roads, whether dedicated for public maintenance or other entity approved by the County, be constructed to the adopted minimum road standards.
>
> **Policy:** Internal subdivision roads may be privately owned and maintained by a Home Owners Association or other entity approved by the County, provided that public services may use the right-of-way.

Objective: Support and encourage increased efforts and resource allocation from the Missouri Highway and Transportation Department to meet the current and projected transportation system needs of the County.

> **Policy:** Support the timely implementation of planned improvements to the County's U.S. Highway system, including widening of Highway 65 to four-lanes into the Branson area and the realignment of Highway 160.
>
> **Policy:** Establish a timetable and priority list for repair and replacement of bridges in the County. Work with the Missouri Highway and Transportation Department and other appropriate governmental agencies to identify potential funding sources for bridge improvements.

Community Image Goal

Create an environment that nurtures pride within the community and conveys a positive healthy image to residents, visitors and travelers.

Objective: Create and preserve aesthetically pleasing transportation corridors.

> **Policy:** Adopt landscaping standards that require commercial establishments to provide landscaped parking facilities.
>
> **Policy:** Require screening of outdoor storage materials.
>
> **Policy:** Establish commercial sign standards to minimize negative aesthetic impacts in commercial areas as permitted by state law.
>
> **Policy:** Support the incorporation of aesthetically pleasing design elements into State and Federal transportation projects within Christian County.

Objective: Preserve, promote and enhance historic sites, structures and other community assets that define Christian County's heritage.

> **Policy:** Review development proposal impacts on the historic assets of Christian County as part of the decision-making process.
>
> **Policy:** Coordinate with local and state historic preservation interests to conduct and disseminate an inventory of local historic assets and advise property owners of historic preservation incentives available from the Missouri Department of Natural Resources.
>
> **Policy:** Incorporate historic site review as a review element of the subdivision and site development regulations.
>
> **Policy:** Promote the designation of sites identified as having historical or archeological significance on the National Register of Historic Places.

LAND USE DEVELOPMENT PRINCIPLES

Recommended principles for future land use development and related infrastructure are discussed in this section of the Comprehensive Plan. These principles, applied in conjunction with

related development standards and policies found in the County's zoning ordinance and subdivision regulations, serve as actions to be taken to achieve Christian County's goals and objectives for future development.

Residential Development Standards

The primary urban development pattern in Christian County has been very low density, single-family residential use. This residential development density pattern has resulted from not only a lifestyle choice for rural living, but also from lot size needed for on-site sewage disposal systems. Unless plans are instituted to establish a countywide public sewer system(s), sewage disposal requirements mandated by the Missouri Department of Natural Resources will continue to be a primary determinant of residential density patterns in the County. Although there are residential developments in the County with lot sizes less than one acre, minimum subdivision lot sizes are generally in the range of 3-5 acres. For the purposes of the future land use plan recommendations, the following density standards are used:

Very Low Density Residential	1 dwelling unit per 5+ acres
Low Density Residential	1 dwelling unit per 1-4 acres
Moderate Density Residential	Up to 4 dwelling units per acre

Commercial Development Standards

Most commercial development in Christian County is presently clustered along limited access highways and primary and secondary arterials, with the greatest concentration of development in the northern portion of the County. Most such activities are in the category of

freestanding convenience services, small strip shopping centers and highway-oriented commercial uses.

As urbanization proceeds, additional commercial development will be warranted to serve the growing population. Arguably, this type of development has lagged behind demand creating a loss of economic development to adjoining counties. It is recommended that commercial development be encouraged to locate in clustered developments along major roads and that commercial development should be designed to be reasonably compatible with surrounding land uses.

Industrial Development Standards

Industrial activity in Christian County is predominantly located along the County's limited access highways (Highways 160 and 65) and in scattered locations along other primary and secondary arterials. Future industrial development is limited by the lack of public sewer systems with industrial hookup capacities in the unincorporated portions of the County. It is anticipated that most future industrial activity will locate adjacent to existing municipal sewer systems or in areas where infrastructure expansion is anticipated. It is important that appropriate areas for this type of development be identified in the County's future land use map to encourage major employers to locate in Christian County.

Historic Preservation

"Preservation does not mean merely the setting aside of thousands of buildings as museum pieces. It means retaining the culturally valuable structures as useful objects: a home in which human beings live, a building in the service of some commercial or community purpose. Such preservation insures structural integrity, relates the preserved object to the life of the people around it, and not least, it makes preservation a source of positive financial gain rather than another expense."

- Lady Bird Johnson, (1966)

A critical aspect of planning a sustainable community is the protection and preservation of historically significant places. Christian County has an interesting and colorful history that is the foundation of the cultural and social life of the County. Preservation of historic context is critical for future generations and for maintaining the identity of the area. This section of the Comprehensive Plan outlines historic places within the County and suggestions for preservation and possible economic benefits that may accrue from such actions.

Places of national historic significance within Christian County include Wilson's Creek Battlefield, Mark Twain National Forest, and the County Courthouse in Ozark. These places present great opportunities for attracting tourists and preservation agencies should maintain proper management practices. Of course, many other locations have significant meaning to the local people and shape the character of the area. Places such as the Weaver House, the historic Ozark Mill, Riverside Inn as well as the archeological site of Delaware Town, an early reservation settlement of the Delaware Indians, are all existing locations that are firmly embedded in the heritage of the County.

Other lesser known location and events significant to the historic development of Christian County include J.L. Lee Timber and Tie Company, the Battle of Dug Springs, Smallin Cave, Garrison Cave, and Garrison Spring. The Lee Timber and Tie Company was the largest employer in the County during the early 20th century and is an important cornerstone to the economic and cultural history of the area. The Battle of Dug Springs took place on Old Wire Road a few miles southwest of Clever and involved nearly 12,000 soldiers. This was a significant precursor to the Battle of Wilson's Creek and yet very little is known about it. Smallin Cave once served as a shelter for the Osage Indians and later used as a munitions warehouse by the Union Forces during the Civil War. It was first discovered by Henry Schoolcraft in 1818 and originally named Winoca

cave after an Osage Indian word meaning Underground Spirit. Smallin Cave has the world's largest natural cave opening resulting from acidic ground water. Garrison Cave, associated with historic Garrison Spring, is the longest cave system in southwest Missouri. There are also more than 200 other caves in Christian County as well as hundreds of springs and other geological features.

One of the biggest tourism draws to Christian County is Wilson's Creek National Battlefield which was the site of the first Civil War battle west of the Mississippi River. It is an important location that serves as a reminder of patriotism and the historic events of Christian County. As a unit of the National Park Service, Wilson's Creek is managed and planned to preserve historical buildings and mitigate environmental impacts from human consumption. It is because of the work of the National Park Service and recognition of the need to preserve the past that the battlefield still exists today and serves as a major part of Christian County heritage and revenue. The County should follow this model of preservation in regards to other natural and historic locations. The establishment of historic district ordinances would accomplish this goal and be in conformance with overall goal of creating a more traditional zoning practice.

Building Restoration

Protecting historic locations typically involves saving and refurbishing old buildings which can occur in several different ways. Preservation is considered the maintenance of a property without any additions or other alterations to the site. This technique is most suitable for existing

structures that are in good condition. Some historic buildings may be dilapidated and in need of restoration, returning the structure to its original condition.

Rehabilitation occurs when a building can no longer return to its original function but does maintain its architectural integrity allowing for alterations to certain portions of the building. A Federal tax credit for rehabilitation is applied to reconstruction costs incurred during the restoration process, 10% for buildings constructed before 1936 and 20% for certified historic structures (irs.gov). Reconstruction is another possibility for building restoration when a structure no longer exists but can be rebuilt using replicated design and/or materials. This process is applicable to Christian County due to the number of historic places that no longer contain an existing structure. Investment in rehabilitation projects should be a point of emphasis for local governing bodies.

The National Register of Historic Places

Recently the Ozark Courthouse Square received approval to be listed on the National Register of Historic Places (NRHP), only the third location in the County given such recognition (Wilson's Creek National Battlefield, Prehistoric Rock Shelter and Cave Sites). The process took over a year when the property was nominated by the Ozark Historic Preservation Commission (OHPC) and later approved by the Missouri Advisory Council on Historic Preservation. It might prove beneficial for the Christian County Historical Society to follow a similar process as the OHPC by researching and creating a list of places to be nominated for the NRHP.

Certain benefits result from a building or district being listed on the Register including the potential for investment tax credit for rehabilitation of properties. Even if the properties are not approved for the Register it would still be useful for local agencies to consider these historic places in the early stages of planning projects. It is important for the Historical Society to work with

municipalities in the creation of a list of historic places and the protection buildings, structures, sties, objects, and districts.

The protection and establishment of a Historic District or building creates a way to protect significant historic properties, protect against a specific threat of development, or to maintain property values. This is particularly true in older urbanized areas of Christian County where many historic buildings are located. Restoration of a historic downtown could possibly bring in tourists, entice businesses to locate in the district, and create a strong sense of place and community identity.

TRANSPORTATION PLAN

"The relationships between transportation and society are numerous, deep, varied, ancient, and complex. Any summary of them sounds trite. Everyone has had extensive personal experiences using transportation. Transportation has influenced each of our choices about where to live, spend

vacations, shop and work. So inescapable is the tie between transportation and society that, like gravity, we take it for granted and can't imagine a world without it."

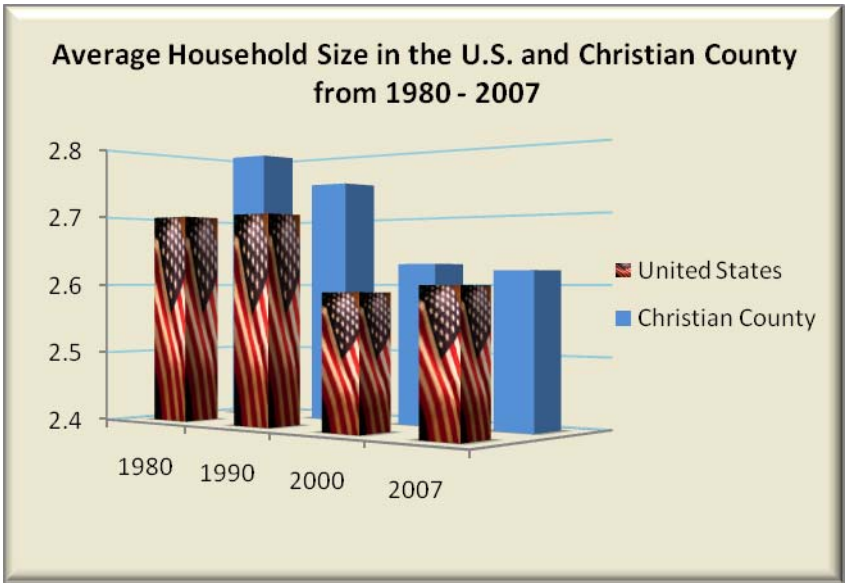
-Damian Kulash, President and CEO, Eno Transportation Foundation

Transportation is vital to contemporary economies and lifestyles. The high degree of mobility and freedom offered by automobiles and the extensive nature of the road network as a public good is the lifeblood of exchange and commerce. This mobility and freedom also allows people to pursue a greater range of activities, opportunities, and interaction, which in turn offers more choices in how and where we live out our lives. Relatively inexpensive farmland close to urban centers has been the target of homebuilders where both profit margins and market demand meet to produce low-density landscapes that require cheap and efficient transportation to support all of our far-flung households. Interdependence and specialization are the hallmarks of successful market economies. However, these same traits have resulted in a society where virtually no one is self-sufficient and it is necessary to leave the home perhaps several times in one day to shuttle kids to and from school, to feed and clothe ourselves, and to generally do what it takes to keep a roof over our heads. The need to travel from place to place to participate in these various activities and the process of shipping freight to production facilities and goods to market represents the demand for transportation.

Emerging trends of shrinking household size in the U.S. and Christian County (Figure 15-1) and "just in time" (JIT) production have increased the demand for travel at a faster rate than concurrent rates growth in population and the economy.

FIGURE 15 - 1

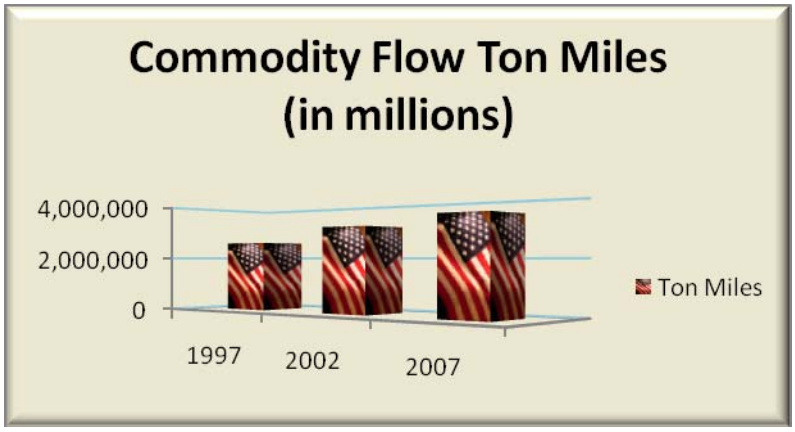
Average Household Size Decline in the U.S. and Christian County from 1980-2007. Sources: U.S. Census Bureau American Community Survey 2005 – 2007 and the Missouri Census Data Center



The classic assembly line production method with its requisite need to stockpile raw materials and warehouse inventory has given way to more efficient JIT production where goods are assembled on demand. This system requires extensive supply-chains and break-in-bulk shipping that feeds more trips in lightweight trucks that may have previously been consolidated in fewer heavy-duty vehicles, onto the transportation network. Figure 15-2 shows the rise in commodity flows by truck from 1997 to 2007. While the need to travel represents demand, the transportation network or system forms the supply-side, constantly changing and expanding to meet the demand of society as a whole. Roads and highways are the primary elements of the transportation system in Christian County. Figure 15.3 depicts the reliance on the individual automobile

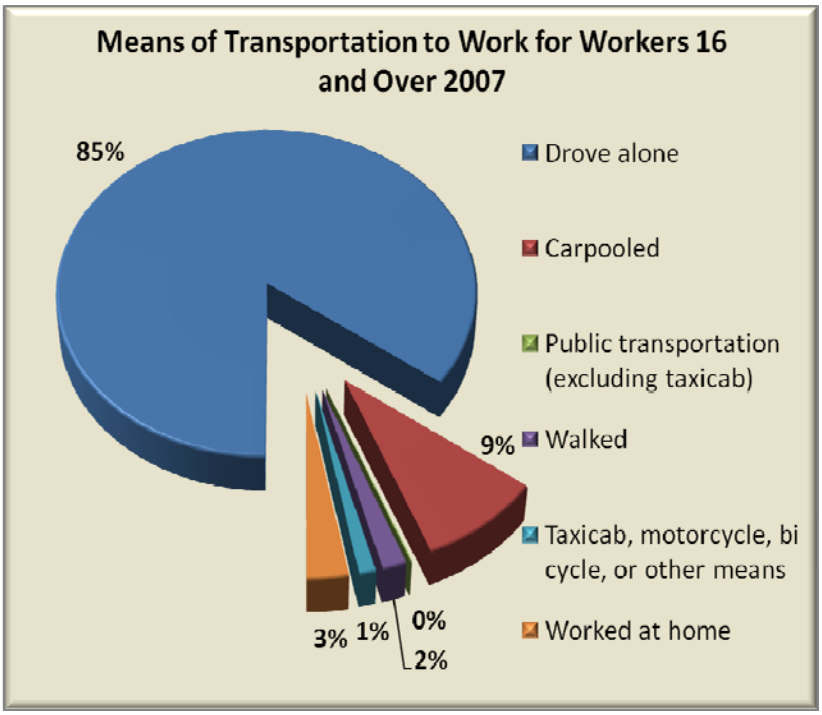
FIGURE 15 - 2

Rise in Commodity Flows
Source: U.S. Census Bureau American Community Survey 2005 – 2007



as the primary means for the trip to work for workers in Christian County. This is indicative of suburban and rural character of Christian County, therefore; the primary concern of transportation planning in Christian County is a safe and efficient surface network that is in tune with emerging environmental issues and the need for economic growth.

FIGURE 15 - 3
Means of Transportation to Work for Christian County Workers
Source: U.S. Census Bureau American Community Survey 2005 – 2007



Auto-oriented transportation systems contribute to poor air quality by increasing ground level ozone due to emissions of volatile organic compounds and nitrogen oxides from the burning of carbon-based fuels. In 2008, the Environmental Protection Agency (EPA) lowered the acceptable standard for the presence of these compounds in the lower atmosphere from 84 parts per million ppm to 75 ppm. At this time, the Springfield Metropolitan Statistical Area (MSA) measure was 77 ppm. If this measure remains above the acceptable standard in consecutive years it is possible that the EPA could classify Christian County, being a part of the Springfield MSA, as a non-attainment area in terms of air quality standards.

The impacts of a non-attainment designation are often overstated. It should be construed, however, as an action forcing mechanism for local decision makers to consider environmental impacts in long term planning. In terms of the transportation system, this has led toward a trend in regional planning to enhance facilities by accommodating alternate methods for getting around such as walking and biking.

Although the design and development of transportation routes affects the future development potential and land development patterns of any community, these facilities are costly to build and may take many years to move from the planning stage to actual construction.

The remainder of this chapter of the plan will provide information on the existing transportation system in Christian County. This will provide a basis for a future thoroughfare plan that balances environmental concerns with economic development and reflects the transportation values and goals of the people of Christian County

Existing Street and Road System Pavement Conditions

There are approximately 938 miles of County and State maintained roads in Christian County. As noted in Table 10-1, the County maintains 730.6 miles of roads and 40% of these roads are surfaced with gravel or stone. The majority of the county roads are paved with low type bituminous, which covers 57.6% of the county's roads.

In general, the hard surfaced roads in Christian County are in good to excellent condition. Road conditions decline on many of the County's gravel and stone-surfaced roads, however. Overall, roads with poorer surface conditions are located in the lowland valleys of the hilly terrain in the southern parts of the County. Several country roads are often impassable during heavy rains due to flooding or washout of surface gravel/stone.

TABLE 15.1

Christian County Comprehensive Plan

MILEAGE OF ROADS BY SURFACE TYPE

Surface Type	County Road Miles	State Road Miles
Gravel or Stone	295.8	0.0
Low Type Bituminous	420.6	387.2
High Type Bituminous	12.8	144.1
P.C. Concrete	1.1	38.1
Retread Surface	---	---
Total Surfaced	730.3	569.4
Graded and Drained	0.0	---
Unimproved	0.3	---
Total Miles Roads	730.6	569.4

Source: Missouri Highway and Transportation Department, Division of Planning, 2002

As previously noted, roads maintained by Christian County and the special road districts are subject to the individual standards adopted by each maintenance entity. In many instances, the special road districts do not have uniform standards for all roads within their particular jurisdiction. Road construction requirements (bedding and paving) are determined on an individual basis. Christian County Common 1 and 2 do require all roads dedicated for County maintenance to have a hard paved surface.

Functional Classification, Access Management and Right of Way

According to the Federal Highway Administration, functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. This process determines how travel is channelized within the network in a logical and efficient manner. Functional classification defines the nature of this channelization process by defining the part that any particular road or street should play in serving the flow of trips through a highway network.

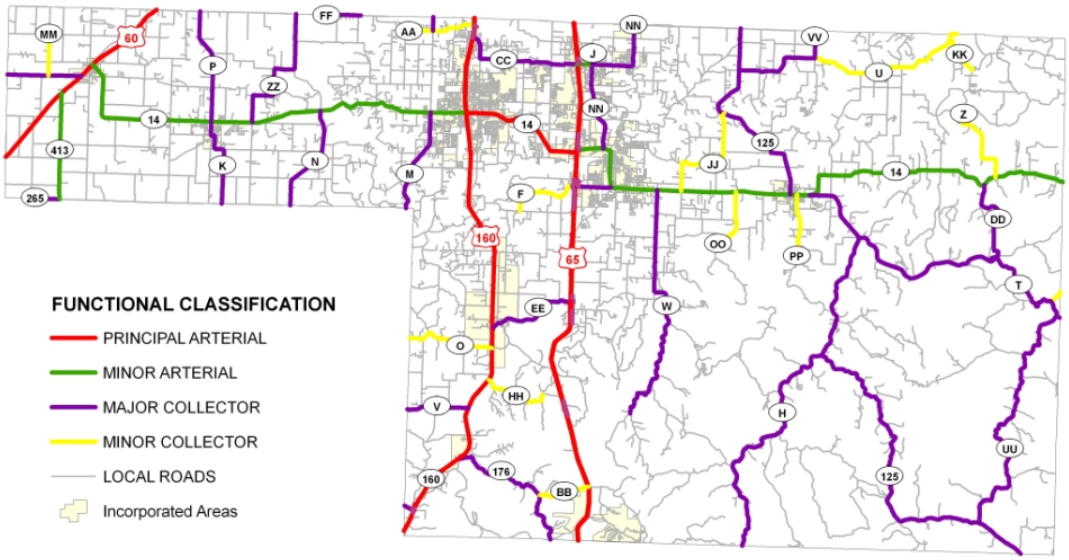


Figure 15-4 Current Rural Functional Classification of Christian County Roads
Source: Missouri Department of Transportation 2007 Planning Data

Figure 15-4 depicts the current functional classification of the road network in Christian County. Table 15-1 provides a general description of the intended function of classified segments and represents the hierarchy of the network. Higher classed roads serve to move traffic through the system and require wider rights of way (ROW) to accommodate several lanes for high volumes of traffic. Access to higher classed roads is strictly limited to reduce delay and impediments to the flow of vehicles. As you step down through the network hierarchy, access to adjacent property becomes the priority and movement becomes secondary.

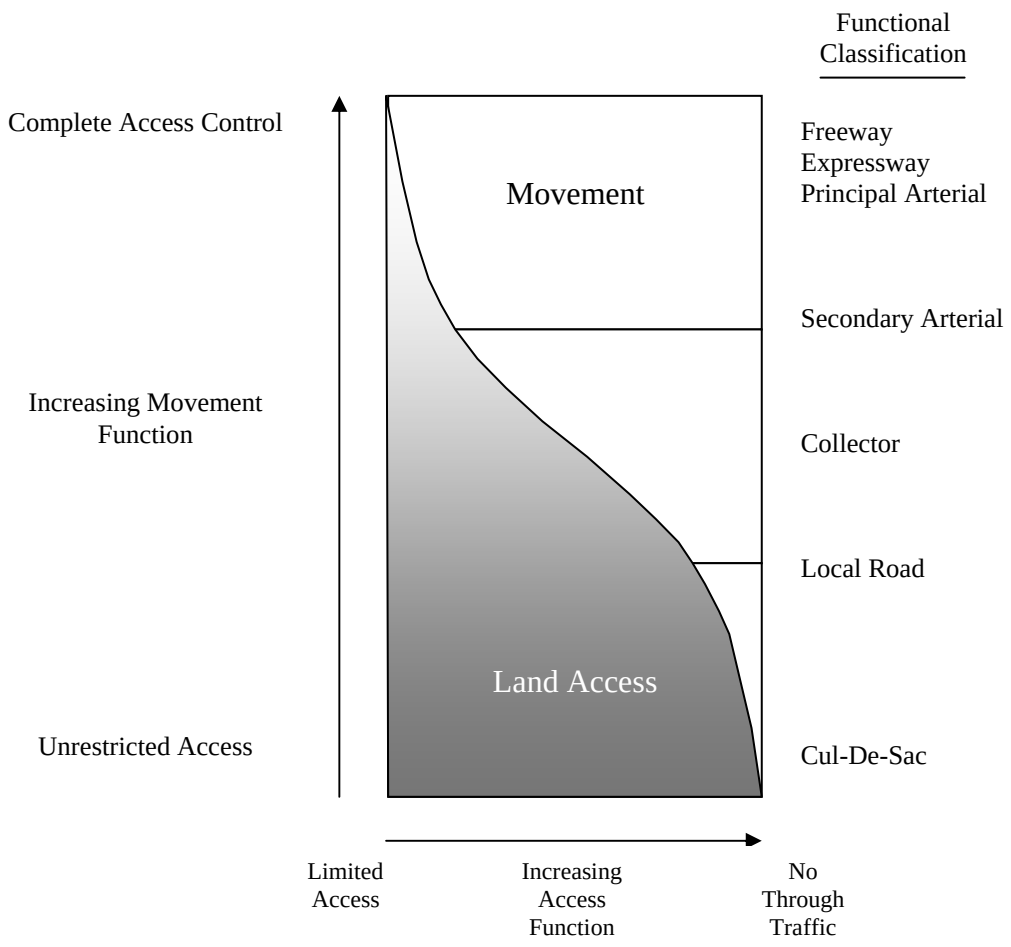


Figure 15-5 Relationship Between Access and Function of Roads

In most cases ROW width narrows as the need to move traffic lessens. As development occurs and vehicle traffic increases, many roadways deteriorate into highly congested routes that experience unacceptable delays and crashes.

While MoDOT retains access management rights along state routes and highways, Christian County has the leeway to develop a jurisdictional future classification system that can serve as the basis for local access management policies, ROW requirements and design standards. The OTO MPO and many incorporated areas within the county have major thoroughfare plans in place. OTO has also developed design standards for classified roads within its planning area in Christian

County. Christian County should update its major thoroughfare plan in coordination with other local plans as much as possible. The lack of adequate right-of-way for future road improvements is the most critical concern for transportation planning in Christian County.

Table 15-2 Roadway Classification System

	Urban	Rural	Description
Interstate/Freeway	U1	R1	Characterized by limited access, designed for high-speed high-volume movements. Access permitted only at interchanges.
Principal Arterial	U2	R2	Key, non-freeway or non-interstate, intercity or interregional routes. Intended to serve long-distance trips at relatively high speeds. These are controlled access facilities where direct access to abutting land is controlled to maximize the movements of through traffic.
Minor Arterial	U3	R3	Used where existing land use and roadway sections have been built out to a greater extent than those roadway segments classified as Principal Arterial and where the probability of major land use change is not as high. Distinguished by existing or planned restrictive medians.
Collector	U4	R4	Nearly the same as minor arterial, but are distinguished by existing or planned non-restrictive medians or centers.
Local Roads	U5	R5	Distinguished by existing land-use and roadway sections that are built out and where significant land-use changes or roadway widening will be limited. These are typically not designed for high speed travel and in rural areas these tend to be residential roads with low traffic volumes.

Source: Access Management Model Ordinance. Southwest Missouri Council of Governments. 2006

Major Corridors

North/South

U.S. Highways 160 and 65 serve as the primary north/south corridors in Christian County. These roadways deliver traffic to the major regional activity centers of Springfield and Branson. Most of Christian County's population growth is centered along these routes in the northern portion of the county. These corridors have seen significant increases in traffic volumes in recent years. In the five year period from 2002-2007 volume has increased significantly along U.S. 65 (see Appendix D for traffic counts on all state roads in Christian County). The 2002 estimated average annual daily traffic (AADT) count along U.S. Highway 65 from the Christian County line to

Highway CC north of Ozark was 42,165. By 2007 AADT had risen 17% to 49,357. Although volume begins to drop off as you continue south towards the Taney County line (AADT 21,966) traffic has increased on all segments of U.S. 65 in Christian County an average of 21.34%.

High growth in traffic volume has occurred along U.S. 160 through Nixa in northern Christian County. From the Greene County line to Highway 14 AADT has increased 31% from 2002 to 2007, growth of nearly 6,500 trips per day. South of Nixa, U.S. 160 becomes a two-lane undivided highway; AADT at this point has grown only 6.6% over the same period. Along the southern portion of U.S. 160 traffic counts drop off and have actually decreased on some segments from 2002 to 2007.

Highway 125 serves the eastern portion of Christian County. The northern portion of this corridor from the Green County line to Sparta has seen a large increase in traffic volume since 2002. From Sparta to Route JJ AADT has increased from 786 in 2002 to 2376 in 2007, a change of 202.3%. Continuing on to Route U volume has increased 108% resulting in an additional 1943 trips per day. Counts along Highway 125 South of Sparta have remained fairly constant during this period before decreasing slightly through the Mark Twain National Forest towards Taney County and beyond.

East/West

U.S. Highway 60 traverses the western panhandle of the county for approximately 7.8 miles at a northeast to southwest orientation from the Greene County line towards Lawrence County. U.S. 60 serves the Town of Billings and through traffic from Monnet to Springfield. Volumes along this segment have remained fairly constant from 2002-2007 at roughly 15,000 AADT north of Billings, decreasing to 12,500 at Rte 413, and then 10,500 at the Lawrence County line.

State Highway 14 is the only east/west corridor that traverses the entire county. State Highway 14 runs from the Douglas County line in the northern portion of the county through to the Lawrence County line in the panhandle. Highway 14 serves nearly every incorporated area within the county with the exceptions of Highlandville and Saddlebrook. Traffic volume has increased 51% along all segments of this route from Sparta to Ozark resulting in an additional 2200 from Highway PP near Sparta to 4200 AADT at Highway W in Ozark. On the western portion of Highway 14 from Highway N to U.S. 60 traffic volume has increased by nearly 12% from 2002 to 2007. Between the cities of Nixa and Ozark traffic volumes on State Highway 14 have increased slightly from 11,574 AADT in 2002 to 11,909 in 2007. These counts reflect the rapid population growth in the north central portion of the County. Traffic flow along Mo. State Highway 14 is of particular concern as this road functions as a primary arterial yet is not designed to modern arterial standards. Existing land development patterns along significant segments of Highway 14, particularly in the Nixa-Ozark area, leave little opportunity to secure additional right-of-way for any future highway widening without extensive costs.

Highways EE and CC serve as major east/west connectors between U.S. 160 and U.S. 65. Highway CC connects the northern portions of the Cities of Nixa and Ozark. Traffic Volume has increased 48.2% from 2002 to 2007 resulting in an additional 3,376 trips per day. Highway EE connects the City of Highlandville along U.S. 160 and U.S. 65. Highway EE serves approximately 4,000 trips per day. Currently, both of these routes are not designed to the standards of their current function. The majority of segments along these roads are two-lane with no shoulders. There are also safety concerns with alignment issues dictated by the nature of the topography in the county.

Planned Transportation System Improvements

This section describes a list of improvements that are currently under way or scheduled to begin over the next few years according to the OTO Transportation Improvement Program (TIP) and the MoDOT Statewide Transportation Improvement Program.

- U.S. 60: Capacity improvements from Chappel Dr. in Monett to Kansas Ave. in Republic; Conversion of 2-lane to 3-lane alternating intermittent passing lanes
- U.S. 65: Pavement improvements from southern MPO boundary to Rte. EE
- MO 14: Improve interchange capacity at U.S. 65 in Ozark
- MO 14: Resurface roadway from Rte. 160 to the Finley River Bridge in Ozark
- Rte CC: Resurface roadway from Rte 160 to Rte 65
- Rte AA: Resurface from U.S. 160 to the end of route
- ROW study for MO 14 bypass from MO W south of Ozark to MO NN north of Ozark
- ROW study for extension of Longview Rd. west of U.S. 65 to MO NN in Ozark

Although not programmed yet, top priorities in the OTO MPO in Christian County include capacity improvements on Rte CC from U.S. 160 to MO NN and Pheasant Rd and capacity improvements on MO 14 from MO NN in Ozark to a new north/south corridor west of Nixa. The OTO is currently studying the property impact of three different alignments for the extension of Kansas Expressway south of the James River Freeway to MO 14 in Christian County.

Other Transportation

Aviation

Christian County is served, in terms of passenger service and airfreight, by the Springfield-Branson Regional Airport located in the northwest section of Springfield. Air services commenced in May 2009 at the new Branson Airport, 8 miles south of the center of Branson in Taney County. This new facility will offer general aviation and commercial aviation facilities with the latest technologies. The 58,000 square ft. terminal will ultimately have capacity to handle more than 1 million enplanements annually. The old airport in Ozark is still classified as a public use airfield. A plan to expand this facility for general aviation purposes through a cooperative partnership with the City of Ozark and the Springfield-Branson Regional Airport has been tabled. There are also several private landing strips, located primarily in the northeastern part of the county.

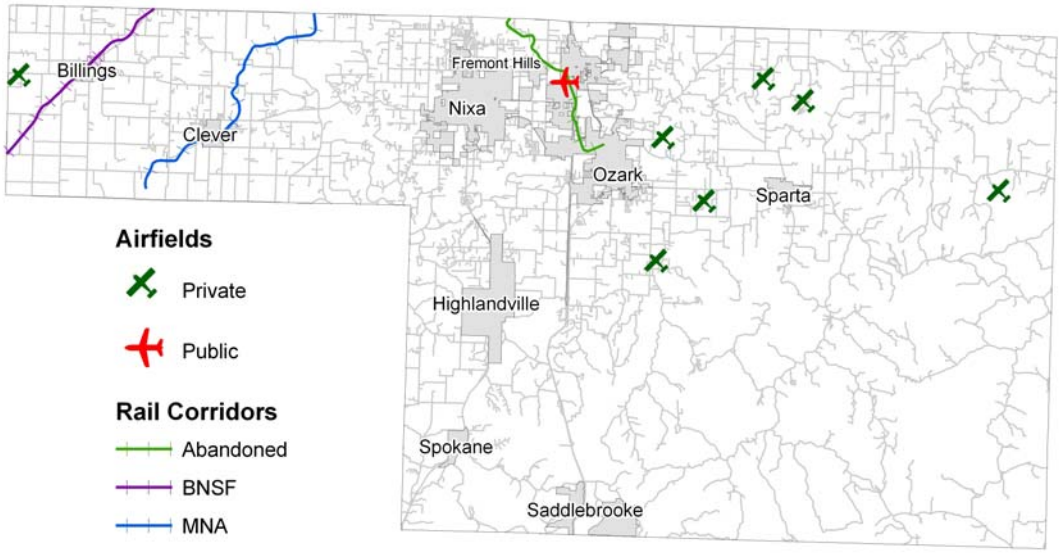


FIGURE 15-6
Airfields and Rail Corridors

Rail

Burlington Nothern/Santa Fe Railroad operates along the only functioning rail line in Christian County running parallel to U.S. Highway 60 through the western panhandle. Figure 10.6 depicts two other rail corridors that are no longer operational but still intact. It may be possible to preserve these corridors for future use for transit or trails.

Public Transportation

No municipal transportation services operate in Christian County with the exception of OATS Inc., which provides specialized route transportation services on a request or limited route basis to anyone regardless of age or income. Days of the week and times of transit to specific towns are available through the internet or by calling an OATS driver in the county. Appointments for pick-up are also made by contacting the driver.

Pedestrian/Bike routes and Greenways

The rural character and large extent of Christian County renders pedestrian accommodations problematic in terms of maintenance and usability. However, as parts of the county become urbanized some consideration should be made as to how to connect those who choose to walk to nearby activities and opportunity. Christian County maintains many well-paved local roads that serve low volumes of traffic that make them ideal bike routes for commuting and recreation. The OTO major thoroughfare plan identifies specific roadways as bike routes. There is a great opportunity for the county to continue these routes outside of the MPO boundary. The OTO also makes provisions for the extension of greenways into northern Christian County. The City of Ozark has begun to develop a trail system to connect the city with the OTC Richwood Campus on

Highway 14 west of U.S. 65. The hydrology of Christian County is well suited for the development of multi-use trails and greenways.

Local Program Funding

Local Programs provides federal funding to cities and counties for their transportation improvements. Please reference the Local Public Agency Manual available online at http://www.modot.mo.gov/business/manuals/localpublicagency.htm for a guide to utilizing federal funding made available to local agencies through the programs listed below.

Transportation Enhancements (TE)

This program provides funding through a competitive selection process for transportation related activities other than routine highway and bridge construction. Transportation Enhancement funds are available to develop a variety of project types, that are located in both rural and urban communities. The projects help create more travel choices by providing funding for such things as sidewalk construction, bike lanes and to convert abandoned railroad rights of way to trails. Communities may also use the Transportation Enhancement Program to revitalize local regional economies by restoring historic buildings, renovating streetscapes or providing transportation museums and visitor centers.

Off-System Bridge Replacement and Rehabilitation (BRO)

This program provides funding to counties for replacement or rehabilitation of deficient bridges. Qualified bridges for this program in Christian County include:

- Bridge 14153 on Terrell Rd across Terrell Creek

- Bridge 28202 on Harper Rd across Pedelo Creek
- Bridge 23796 on Red Bridge Rd. across Bull Creek
- Bridge 24207 on Swan Creek Rd. across Swan Creek
- Bridge 24198 on Chadwick Rd. across Cedar Creek

Programs such as these make use of federal funds. In most of these cases, local matching funds are required. For this purpose there are many different options for Christian County to fund transportation projects including:

- Obligation bonds
- Special assessments
- Impact fees
- Developer agreements

More complex instruments and strategies involve delineating improvement districts such as the ones listed below. These are only some of the alternatives available and are only meant to provide general guidance for funding transportation improvements in the county.

Community Improvement District A Community Improvement District (CID) may be either a political subdivision or a not-for-profit corporation. CID's are organized for the purpose of financing a wide range of public-use facilities and establishing and managing policies and public services relative to the needs of the district.

Tax Increment Financing Tax Increment Financing (Local TIF) permits the use of a portion of local property and sales taxes to assist funding the redevelopment of certain designated areas within your community. Areas eligible for Local TIF must contain property classified as a "Blighted",

"Conservation" or an "Economic Development" area, or any combination thereof, as defined by Missouri Statutes.

Transportation Development Districts Transportation Development Districts (TDDs) are organized under the Missouri Transportation Development District Act, Sections 238.00 to 238.275 of the Missouri State Statutes. The district may be created to fund, promote, plan, design, construct, improve, maintain and operate one or more projects or to assist in such activity.

Transportation Development Corporations Transportation Development Corporations (TDCs) are organized under the Missouri Transportation Corporation Act, Sections 238.300 to 238.367 of the Missouri State Statutes. TDCs act in promoting and developing public transportation facilities and systems and in promoting economic development.

FUTURE LAND USE

Future land use is one of the most important elements of the Comprehensive Plan for Christian County and should serve as the principle guide for growth, development and preservation decisions and actions affecting the future of Christian County over the next decade. The Future Land Use element is closely related to and supported by other recommended policies of the Plan, including policies, on transportation, the environment, community facilities and utilities. Future land use and development pattern recommendations contained in this chapter are shown on the Generalized Future Land Use Map (Appendix A). (To be finalized following approval of draft)

Many factors were taken into consideration in the development of the future land use map. Existing land use patterns, which have developed over the past several decades and environmental characteristics serve as the basic starting point for the framework of future, land use in Christian County. The County's transportation system and availability of utility infrastructure (water and sewage disposal) are also key locational factors influencing not only types of recommended development but also the density of development throughout the County. These as well as numerous other factors were considered within the framework of a modeling program utilizing quantitative and qualitative data. Urban Service areas or planning tiers which have been established by municipalities and are recognized by the County are also an important consideration when identifying future growth patterns.

Methodology

The Generalized Future Land Use Map displays the anticipated land use patterns that would best encourage responsible growth within the parameters of existing development and infrastructure

patterns, environmental constraints and resource management concerns. This land use pattern seeks to reinforce and support the County's goals, including but not limited to:

1. Allowing for growth while preserving the best features of rural life in unincorporated areas.

2. Maintaining and protecting the natural environment, including the groundwater supply.

3. Promoting compatibility and gradual transition in intensity of land use.

The factors of existing land use, existing and proposed transportation networks and their usage patterns, community facilities, utilities, environmental constraints (i.e. sinkholes, floodplains) and environmentally sensitive areas, and goals and objectives were taken into consideration to arrive at the recommended land use for sections of land in Christian County. Geospatial data revealing factors, such as drainage ways, floodplains, sinkholes and soils were examined to determine areas of environmental constraints and areas suitable for agricultural production. Allocation of land areas for specific types of urban land uses, such as residential, commercial and industrial, were then based on a combination of the existing development patterns, land development location standards and population projections to ensure adequate acreage to meet anticipated population growth and related development needs.

Land Use Conflict Identification Strategy (LUCIS)

A part of the process in developing a future land use map was conducting a LUCIS modeling analysis. In this modeling system, planners were able to consider land use suitability in the categories of agricultural, conservation and urban based on specific criteria and represented in terms of low to high levels. (see Figs. 16-1, 2 & 3).

FIGURE 16 - 1

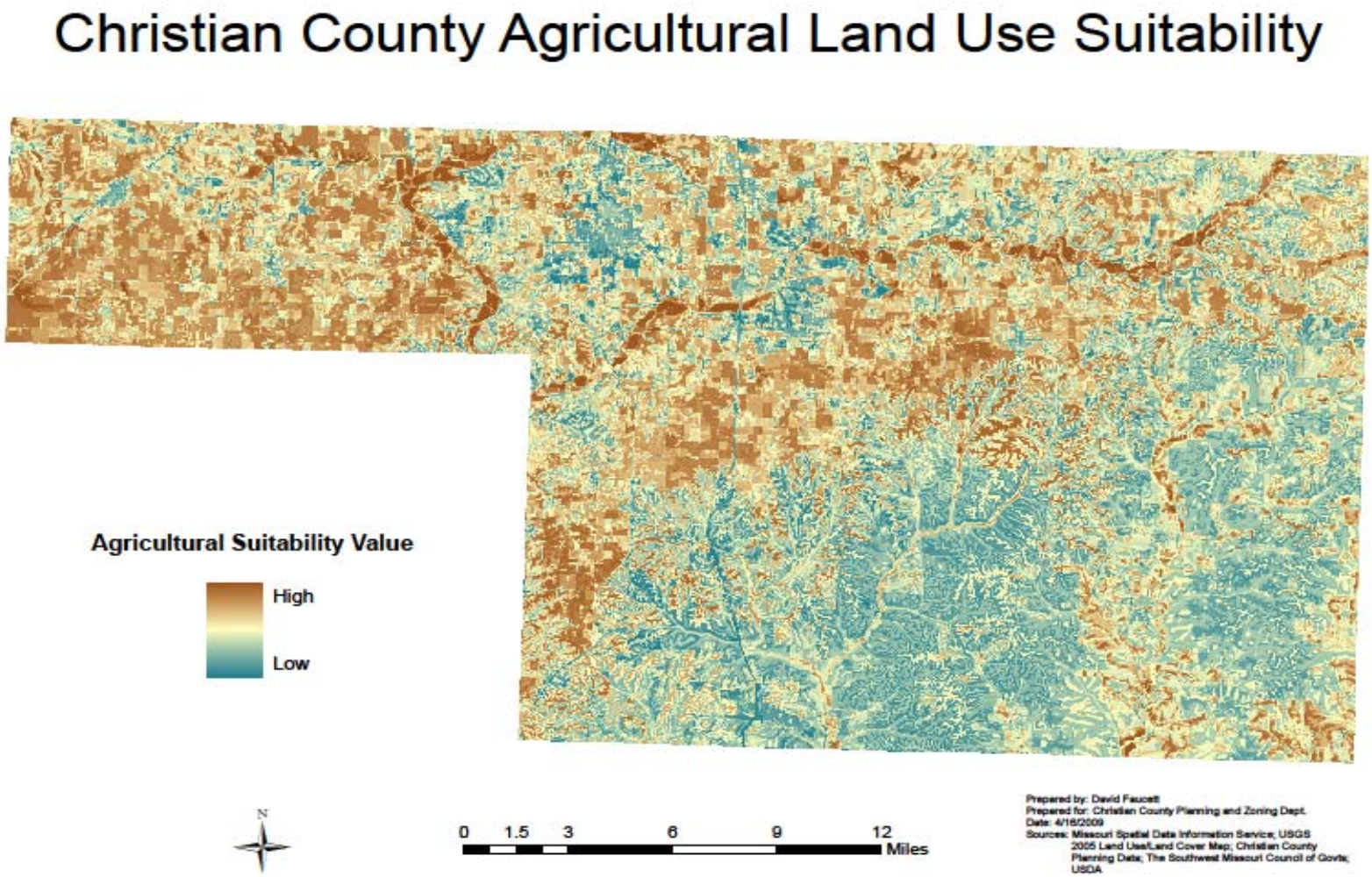

Christian County Agricultural Land Use Suitability
Agricultural Suitability Value
High
Low
N
0 1.5 3 6 9 12
Miles
Prepared by: David Faucett
Prepared for: Christian County Planning and Zoning Dept.
Date: 4/16/2009
Sources: Missouri Spatial Data Information Service; USGS 2005 Land Use/Land Cover Map; Christian County Planning Data; The Southwest Missouri Council of Govts; USDA

FIGURE 16 - 2

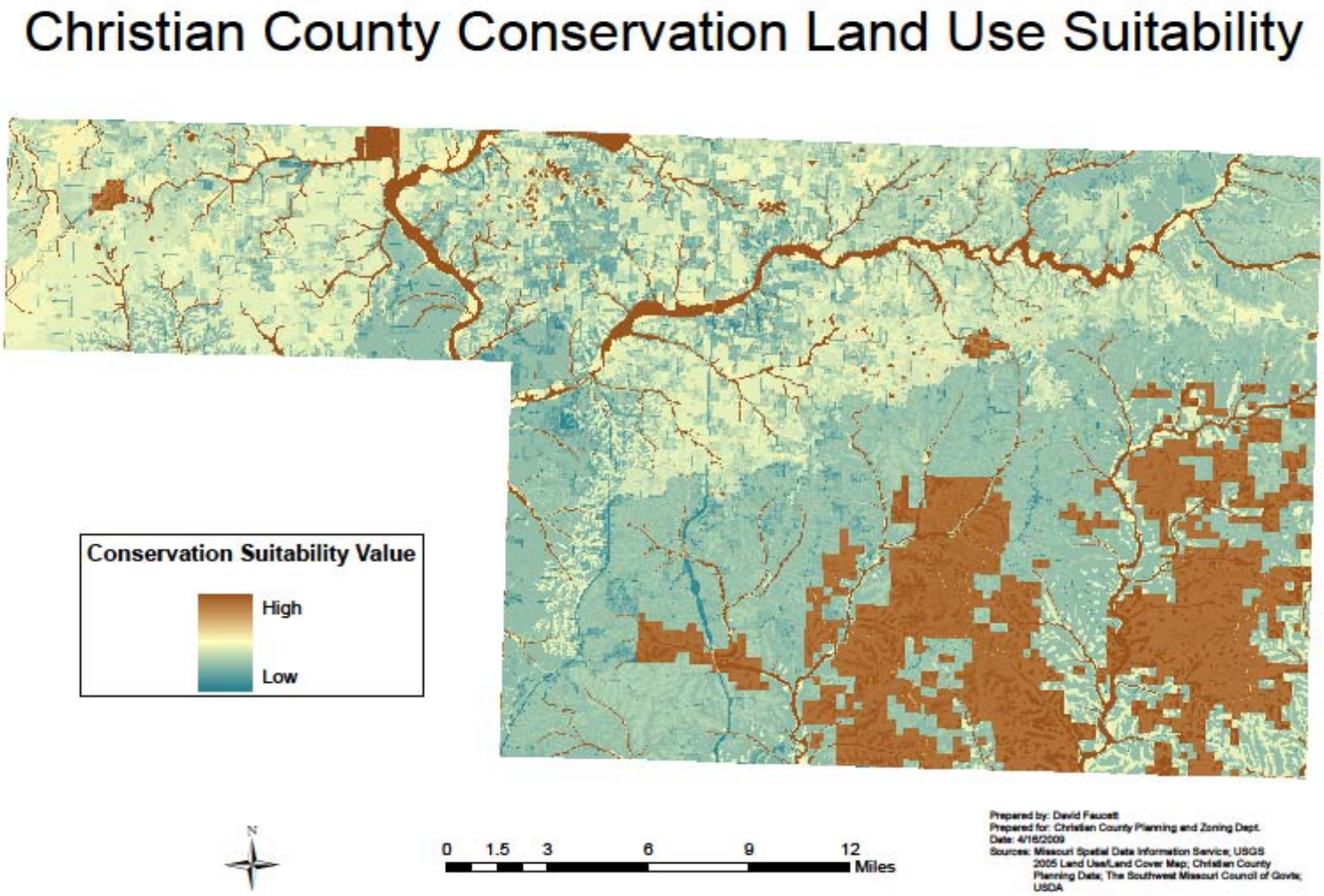
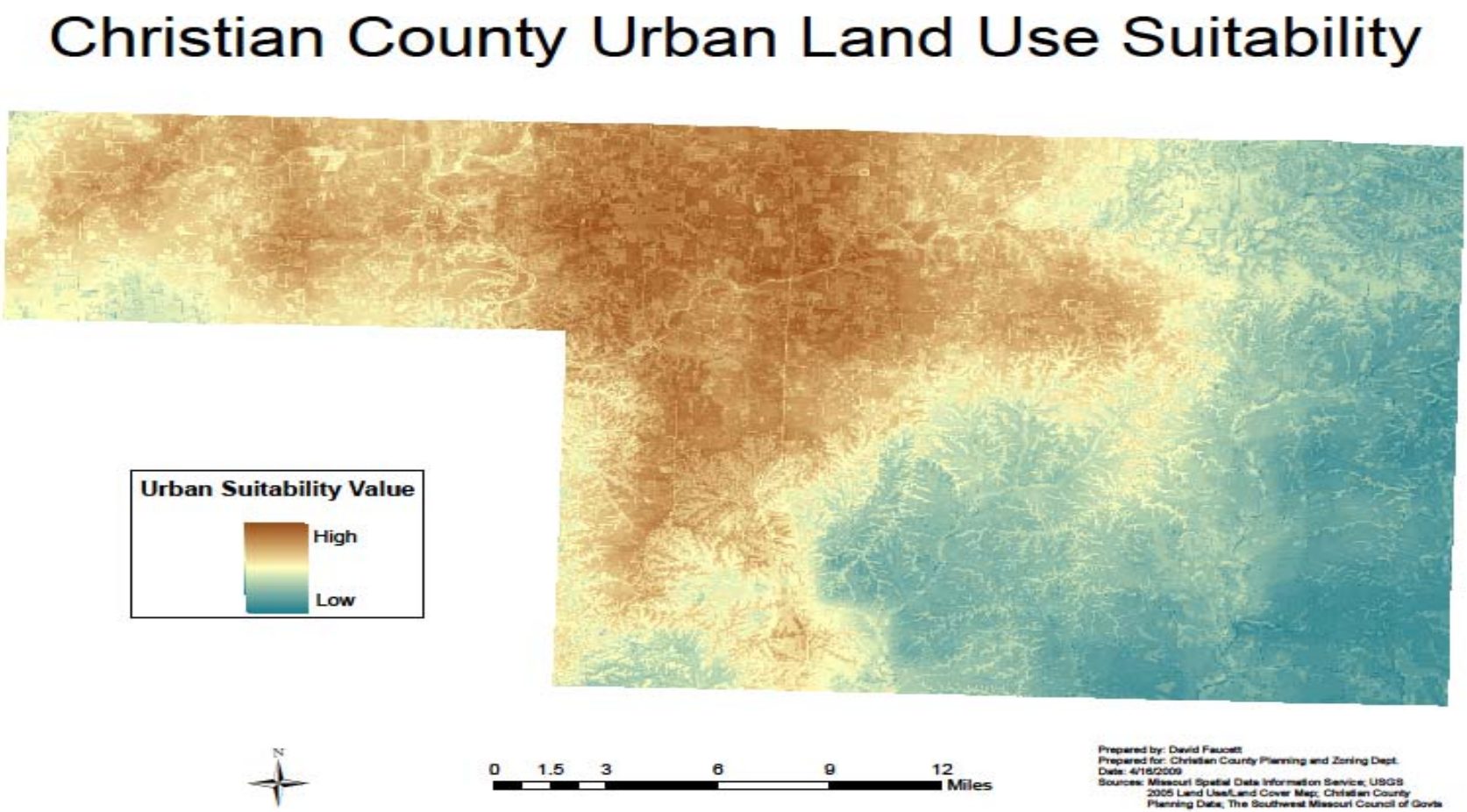


FIG 16 - 2

FIGURE 16-3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Sources: Missouri Spatial Data Information Service; USGS
2005 Land Use/Land Cover Map; Christian County
Planning Data; The Southwest Missouri Council of Govts

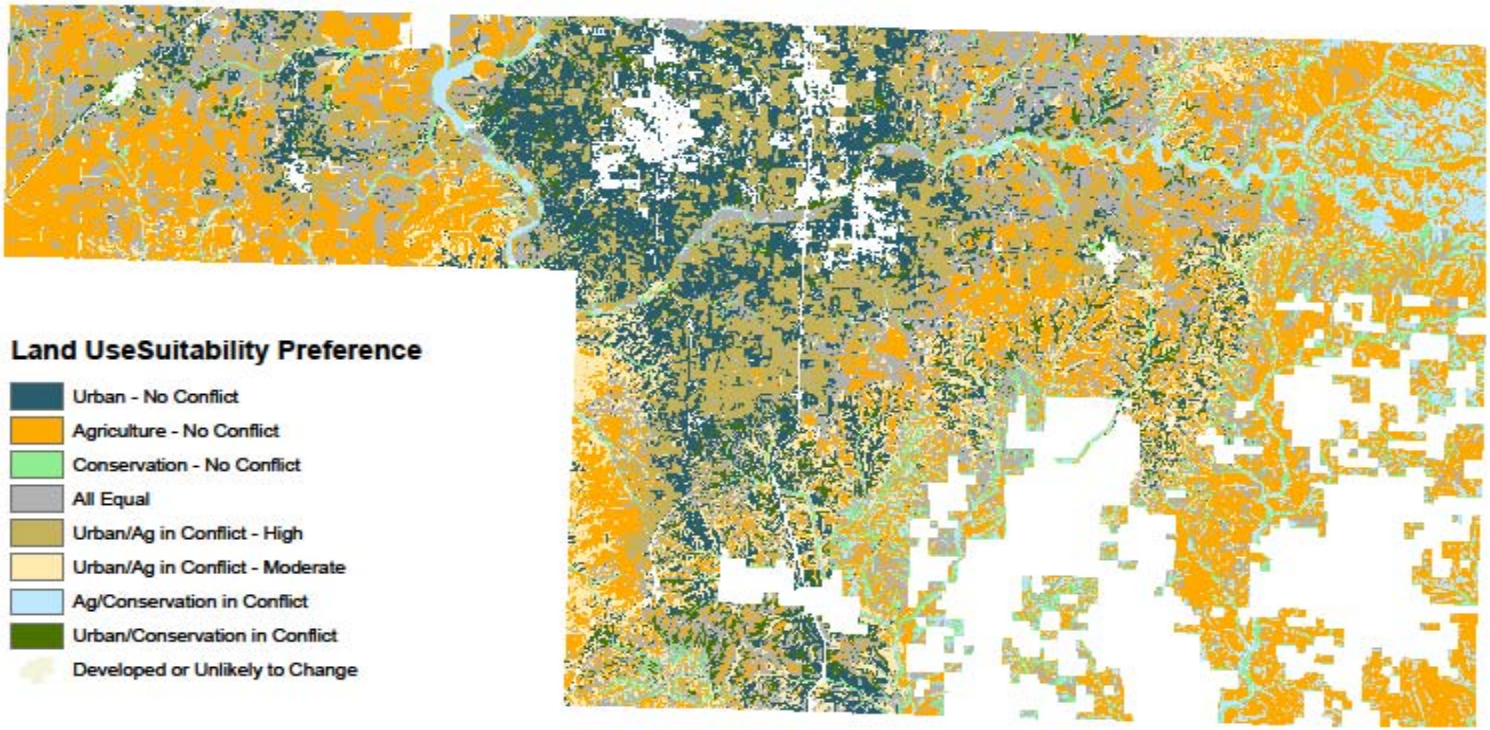
These categorical assessments of suitability were then compared to one another in order to identify areas of conflict. The result is a visual representation of the County in terms of how the land might best be used in the future with the least amount of conflict in projecting appropriate usage.

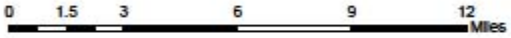
(Fig. 16-4)

FIGURE 16 - 4

Land Use Conflict Identification Strategy Model (LUCIS)

Christian County, Missouri





Prepared by: David Faucett
Prepared for: Christian County Planning and Zoning Dept.
Date: 4/16/2009
Sources: Missouri Spatial Data Information Service; USGS 2005 Land Use/Land Cover Map; Christian County Planning Data; The Southwest Missouri Council of Govts; USDA

This study took data, converted to a GIS format combined with subjective survey data (see Appendix F) in which respondents expressed their preferences in terms their choice for proximity of their residence to various activities and amenities.

Maintaining the quality of the groundwater supply is a primary factor controlling the proposed density levels in Christian County. As most of the unincorporated portions of the County utilize individual, on-site sewage disposal systems, low-density development patterns are recommended in these areas unless approved alternative methods for collective onsite sewage disposal and clustering of homes might offer the opportunity to preserve greater areas of open space.

General Development Pattern

The Generalized Future Land Use Map, which will be shown as shown as Appendix A is a approximate representation of how Christian County intends to develop. It reflects continuity in focusing future urban development in the current growth corridor areas along Highways 160, 65 and 14 as well as other pockets with developing transportation connectivity extending from the Greene County line on the north to south of the cities of Nixa and Ozark. This area has become the core urbanizing area of Christian County over the past decade. Other areas of prime farmland soils and which are predominantly used for agriculture, including the panhandle section of the County west of the James River and the northeastern section of the County, are proposed to remain in agricultural uses with compatible, very low density urban development.

FIGURE 16 - 5

Generalized Land Use Categories

Category	Permitted Land Uses	Density	Location
Agricultural Districts	Agricultural production, very low density residences, conservation subdivisions, home occupations, agriculture services, direct marketing of agriculture products and neighborhood services.	Generally 1 dwelling unit per 10 or more acres.	Throughout the entire County, excluding USA's, commercial corridors, and established rural residential areas.
Residential & Transitional Districts	Single family detached residential dwellings, conservation subdivisions and neighborhood services	Generally 1 dwelling unit per 3 – 5+ acres	Typically located in close proximity to USA's and incorporated areas as well as other areas with good connectivity.
Commercial Districts	Regional commercial trade services, retail and offices serving the local and traveling public, regional research and development; and indoor warehousing.	Lot sizes dependant on development and availability of public services.	Near highway interchanges, major transportation corridors and select intersections of paved arterial roads.
Industrial Districts	Low intensity industrial, business park and warehouse development.	Lot sizes dependant on development and availability of public services.	Adjacent to arterial roads with adequate capacity in USA's and General Commercial areas.
PUD / Mixed Use	Residential, commercial, industrial and other land use types in varying mixtures as appropriate within the adjacent community.	Lot sizes dependant on proposed development, availability of public services and compatibility with adjacent uses.	Within USA's and other areas where adequate services can be provided to support the proposed development.

Generally, the southern portion of the County is shown in forestry and very low density development uses, taking into account the existing road system, rugged topography, septic tank disposal requirements and substantial acreage not available for development (Mark Twain National Forest and Busiek State Park). More intensive urban development in this area is not recommended due to the constraints of inadequate road paving and rights-of-way for urban traffic levels and the potential for significant environmental damage (including erosion and siltation of streams) resulting from removal of vegetative cover on rugged slopes.

Based on future population projections and generally accepted formulas for land use need requirements (see Appendix E) the Generalized Future Land Use Map attempts to represent the appropriate amount of future land needed in generalized use categories in order to accommodate and support the needs of the residents of Christian County into the future.

It should be noted that the Generalized Future Land Use Map depicts general land development patterns only. It is not a zoning map and should not be used alone to determine appropriate land uses for individual pieces of property. This map is a tool to be used in conjunction with the other elements of the Comprehensive Plan, such as goals and objectives, the County's land development controls and specific characteristics of a site to determine the appropriate development pattern for that site.

Residential Land Use Patterns

Figure 16-5 depicts the most common density patterns of residential uses that are xpected to be seen as the unincorporated portions of Christian County continue to develop. These include Rural Residential (1 dwelling unit per 3 - 10 acres), Agricultural Resources (1 dwelling unit per 10 or more acres) and Planned Unit Development (PUD), where development projects are looked at as a whole unit and may be approved for smaller lot sizes, mixture of land uses and other alternative

design factors based on compatibility with adjacent land uses, availability of public services and provisions for open space and common areas.

At present, over 97% of residential uses are either single family or mobile homes on individual ownership lots. It is anticipated that single family will continue to be the predominant residential use, with duplex development and mobile home parks comprising most of the balance of residential uses.

Higher density residential use proposals are recommended to locate in close proximity to already urbanized areas in the Nixa-Ozark growth corridor area. Residential uses developed within these urban service areas will require connection to nearby municipal sewer systems or package sewage treatment systems either immediately or in the foreseeable future. A higher density, including multifamily residential is also recommended as a land use buffer between commercial areas and lower density residential uses.

It is quite possible that densities greater than 4 dwelling units per acre may be appropriate and acceptable on certain sites within the urban growth area. However, any such proposal should be evaluated individually, taking into consideration the factors of sewage disposal, water supply and potential for annexation by an incorporated community with existing zoning and other land development requirements.

Very low-density residential development is proposed to locate outside of the urban growth area and/or wherever individual septic tank systems must be used. Furthermore, only very low density residential uses are recommended in areas with slopes greater than 12%, in order to reduce the potential of deforestation, soil erosion, sedimentation and the higher costs of providing for upgraded transportation infrastructure. Very low-density residential uses are also recommended as a preferred land use buffer between working farms and more intensive urban development.

Based on population projections from the U.S. Census Bureau, a minimum of approximately 60,143 acres of land will be needed to accommodate new residential development by the year 2020 and 101,842 acres by the year 2030. These projections are for the County as a whole and do not distinguish between unincorporated areas and municipalities. This residential acreage need is based on the projection that 85% of the acreage needs will be for very low density and 15% will be for low density. (see Appendix E for space allocation formulas).

Commercial Land Use Patterns

Most future commercial activity is recommended to locate adjacent to or nearby the County's primary road system (arterials and collectors) in the urban growth area. Future commercial activity is clustered near existing commercial development and at intersections of major roads (i.e. along Highway 160, 65, 14) as well as other naturally developing activity centers. Due to the availability of municipal water and sewer, it is expected that most future commercial activity will locate in or in close proximity to the cities. Approximately 786 additional acres of commercial land will be required in Christian County by the year 2020 and 1331 acres by the year 2030.

Industrial Land Use Patterns

Most current industrial activity is located in or adjacent to the cities, with the largest concentration of activity along Highways 160 and 65 near Nixa and Ozark. Future industrial activity is recommended to locate in these areas due to the proximity to municipal water and sewer. In addition to utility concerns, other locational factors considered in the allocation of space for industrial uses include relatively flat topography and convenient access to major roads.

Due to the specific locational requirements for industrial activity, it is recommended that appropriate space be allocated for industrial growth well into the future. Based on the population

projections for the County as it heads toward the year 2030, approximately 696 additional acres of land for industrial activities should be provided. It should be noted that not all anticipated future commercial and industrial growth will occur in the unincorporated portions of the County, regardless of the population growth expected in these areas. A percentage of such growth can be expected to occur in the municipalities due to availability of water, sewer and already existing industrial parks.

Agricultural Land Use Patterns

Existing land use, infrastructure patterns and soil type were the principle factors used to arrive at recommendations for preservation of agricultural uses in Christian County. The County's prime farmland soils (see Figure 6-7) are generally located in the northern portion of the County and in the relatively flat, southwestern section of the County (west of Highway 160). While many of the prime farmland soils have already been converted to urban development in the Nixa-Ozark area, significant acreage of working farmland still remain in the western panhandle section, the northeast and in the southwest parts of the County. These areas are recommended primarily for continued agricultural uses. In the panhandle section, the James River serves as a natural boundary between future urbanization and agricultural uses.

Development occurring in these areas is recommended to be limited to very low-density residential development so as to minimize potential conflicts and incompatibility of urban uses with agricultural activity.

Commercial activities that service or are supportive of the agricultural base in these areas may be warranted at certain locations. Such commercial activity should be located on major roads and should be reviewed on an individual basis for compatibility with surrounding development patterns and needs.

Summary Comments

As noted, the recommended future land use pattern for Christian County to the year 2030 is intended to focus growth in the urbanizing core area in the north and central sections of the County and along developing transportation corridors. It is further intended to discourage urban levels of development in sensitive environmental areas and in areas with inadequate levels of infrastructure (roads, water and sewer) to accommodate such growth.

Not all land shown for urban development on Appendix A will actually develop over the coming decades. Constraints to development, such as site-specific environmental limitations, ownership patterns and configuration of land parcels will limit potential development in some areas. Furthermore, not all land can be expected to develop precisely at the intensity of usage levels shown on the Generalized Future Land Use Map. The potential availability of municipal water and sewerage services may allow for intensity levels slightly greater than or less than those recommended in the Plan. Evaluation of development proposals should take into consideration the availability and capacity of the infrastructure system, along with surrounding development patterns, to determine whether changes in intensity levels are appropriate for the location of a particular development.

IMPLEMENTATION STRATEGIES AND PRIORITIES

Implementing the Comprehensive Plan is an integral element of the planning process for Christian County. The Plan outlines recommendations and strategies for the future development of the County and should be viewed as the official document guiding public and private land development decisions and actions. Success of the Plan will be measured by the degree to which the Plan is put to use. Implementation of the Plan will depend on a combination of regulatory controls and voluntary programs and actions on the part of both the public and private sectors. The source of the Plan's authority is found in Section 64.630 of the Missouri Revised Statutes which addresses the creation of a zoning plan, the division of land into districts, and the regulations pertaining to those districts. It states: "The regulations shall be made in accordance with a comprehensive zoning plan, and shall give reasonable consideration, among other things, to the then existing character of the districts, their suitability for particular uses, conservation of the value of buildings and of existing development, and encouragement of the most appropriate use of land throughout the county."

The implementation phase will be especially critical as the County intends to move toward a more traditional, Euclidian form of zoning. While the County is not "starting from scratch", there are substantial differences in policy, procedure and overall philosophy that will need to be addressed. A significant step in this transition will be the creation of a future land use plan. While this plan (or map) is not intended to depict the future use of specific parcels, it does intend to present an approximate vision for land use patterns which will be compatible with one another, respect the plans of incorporated communities and also facilitate orderly growth and development that serves the County as a whole. The future land use map will also serve as a guide offering support as decisions regarding appropriate zoning classifications are being made. Initiating the

basic tools needed for implementation of the recommendations and policies guiding future land development decisions is the most fundamental and strategic planning priority for the County. A new zoning ordinance and subdivision regulations will be created to amend the existing UDC and permanent zoning districts will replace the land use permitting system currently in use. These districts will be placed on a map with existing land uses helping to provide a starting point for its creation.

While a number of the goals and related policies in the Comprehensive Plan are long term and on-going in nature, there are a number of strategic actions or priorities, which should be the focus of continued planning efforts over the next five years. Table 16-1 summarizes recommended priorities and strategies for implementation of the Christian County Comprehensive Plan between 2009 and 2015. These priorities include both actions needed to establish the basic framework for implementation as well as key land development concerns noted in the various sections of the Comprehensive Plan.

Approximate time frames for addressing individual implementation strategies, along with identification of entities responsible for implementation, are also noted in Table 17-1. More than one entity may be responsible for initiating and carrying out a particular strategy. In these cases, the primary responsible entities are noted.

Due to the County's rapid rate of growth, the goals and objectives of the Comprehensive Plan and the strategic priorities should typically be reviewed and updated in approximately five years. In light of the fact that Christian County is rapidly approaching a transition to “First Class” status it is recommended that a small review be done at that point as well. This action is recommended to determine whether the Plan still reflects public desires and community needs and whether the development recommendations of the Plan are still appropriate.

Table 17 - 1

NEAR TERM ACTIONS (Present through 5 years)					
ACTION STEPS	IMPLEMENTATION RESPONSIBILITY				
	Christian County Commission	Planning & Zoning Dept.	Agencies / Municipalities	Private Developers	Health Department
Land Use Goals					
Use the land use categories in **Figure 16 -5** for future land use planning. Create and use a Future Land Use Map to be used to guide land use and development decisions.		◆			
Amend the current UDC to include a more traditional, Euclidian form of zoning format which will also establish separate documents for subdivision regulations, environmental regulations and road standards.	◆	◆			
Transportation Goals					
Work with adjoining municipalities to ensure completion of planned improvements to Hwy CC between Ozark and Nixa.	◆		◆		
Establish road design standards for County roads which fall within Urban Service Areas which are compatible with existing municipal standards.	◆	◆	◆		
Economic Development Goals					
Coordinate with cities and economic development interests to explore opportunities for joint development of a business and industrial park.	◆	◆	◆	◆	
Support the establishment of commercial businesses in appropriate areas as designated on the Future Land Use map.		◆		◆	
Environmental Goals					
Establish a policy providing for centralized wastewater treatment systems that incorporates sufficient bonding or other security measures to protect the County from undue expense yet allows for an alternative means of treating waste water in areas unable to be serviced by municipal infrastructure.	◆	◆			◆

ONGOING ACTIONS

ACTION STEPS	IMPLEMENTATION RESPONSIBILITY				
	Christian County Commission	Planning & Zoning Dept.	Agencies / Municipalities	Private Developers	Building Inspections Department
Land Use					
Maintain the Future Land Use Map and adopted plan amendments as they occur.		◆			
Require development applications within USA's to include an analysis of the development's infrastructure and service demands relative to the available capacity.		◆	◆	◆	
Require developers to provide financial assurances that on-site improvements are constructed an maintained to an acceptable standard.		◆		◆	
Require that all new residential and commercial structures and additions be inspected to meet applicable adopted building codes.				◆	◆
Require dilapidated residential structures to be rehabilitated, or demolished and properly disposed.					◆
Support the development of transit oriented commercial districts near interchanges and in transportation corridors to provide retail and service opportunities for Christian County residents.	◆	◆		◆	
Minimize negative impacts on agriculture operations from non-agricultural uses		◆			
Limit commercial activity within Rural Residential areas to home occupations, direct marketing of Ag products and neighborhood scale commercial services at intersections of two paved roads.		◆			
Facilitate the creation of a diverse housing stock within existing communities that caters to different household need preferences.		◆	◆	◆	
Physical Environment					
Enforce FEMA's floodplain development regulations within the 100 year floodplain.		◆			
Support and enforce the State and County stormwater and soil and erosion control policies and regulations.		◆			

ONGOING ACTIONS					
ACTION STEPS	IMPLEMENTATION RESPONSIBILITY				
	Christian County Commission	Planning & Zoning Dept.	Agencies / Municipalities	Private Developers	Health Department
Economic Goals					
Support the establishment of commercial businesses in appropriate areas as designated on the Future Land Use map.		◆	◆	◆	
Support labor force enhancement efforts that focus on education and training to attract investment and job creation within our communities.	◆		◆		
Support efforts to identify and target recruitment efforts to businesses that are complimentary to the existing industrial base	◆		◆	◆	
Public Facilities & Services Goals					
Support and enforce the individual disposal system regulations.					◆
Provide assistance to the County Health Department in providing an ongoing public awareness program on the goals and requirements of the sewage disposal regulations.		◆			◆
Encourage the establishment of special water districts in rural areas of the County impacted by the problems of groundwater contamination.	◆	◆			◆
Support efforts to rehabilitate, replace and/or upgrade failing individual and public sewage and water systems.	◆				◆
Support cooperation between school districts, the County and it's cities to help maximize the utilization of community facilities.	◆	◆	◆		
Support adequate funding levels to ensure continued quality delivery of educational and leisure resources through the Christian County Library.	◆		◆		
Actively explore options and opportunities for expanded recreational lands and facilities that can be capitalized on and made available to County residents following transition to first class status as a County.	◆	◆			

ONGOING ACTIONS					
ACTION STEPS	IMPLEMENTATION RESPONSIBILITY				
	Christian County Commission	Planning & Zoning Dept.	Agencies / Municipalities	Private Developers	Health Department
Transportation Goals					
Require traffic impact studies as part of the development applications for projects that will significantly impact street system safety and capacity.		◆		◆	
Incorporate traffic safety considerations as review elements in the land development regulations and development approval process		◆	◆	◆	
Require adequate, minimum sight distance clearances at intersections of roads and at property access points along roads in the County.		◆			
Coordinate with the Road districts to conduct a comprehensive road inventory of the County to assemble and maintain data on surfaces, widths, conditions, traffic counts and other relevant data.	◆	◆	◆		
Establish a timetable and priority list for repair and replacement of bridges in the County. Work with the Missouri Highway and Transportation Department and other appropriate governmental agencies to identify potential funding sources for bridge improvements.	◆		◆		
Community Image Goals					
Create and preserve aesthetically pleasing transportation corridors.	◆	◆	◆		
Support the incorporation of aesthetically pleasing design elements into State and Federal transportation projects within Christian County.	◆		◆		
Review development proposal impacts on the historic assets of Christian County as part of the decision making process.		◆		◆	

Appendix - A
Generalized Future Land Use Map

The Generalized Future Land Use Map (Figure A-1) for the unincorporated areas of Christian County is intended to depict a pattern of general development into the future. This is **not** a "zoning" map. The areas shaded in various colors on this map are not "parcel specific" but instead represent the general areas of desired land use development. Each of the color shades on this map represents a group of related land use zones that may be appropriate in that area. It is, however, further intended that the appropriateness of a specific parcel's zoning within these areas be determined based on the landowner's application and Planning and Zoning analysis.

Land Use Groupings

Mixed Urban Uses - This area corresponds to the Urban Services Areas as agreed to between the County and the cities of Nixa and Ozark. Each of these municipalities has provided a future land use map for those areas, (Figure A-2) and the County will attempt to accommodate these municipalities' future plans with compatible classifications in processing zoning issues.

Commercial / Industrial Corridor - These are areas that are beginning to develop with commercial, industrial and manufacturing uses. These types of land use are intended to have good access to transportation and be as compatible as possible with adjoining land uses. While these corridors currently contain some existing commercial uses any future specific zoning changes will need to be evaluated for their compatibility within the corridor and with less intensive adjoining uses. Zoning districts which might be found in these areas would include 0-1, 0-2, C-l, C-2, C-3, M-l & M-2

Transitional areas - These are areas that surround already urbanized areas and would be appropriate for Suburban residential and possibly some multifamily uses. Zoning districts which might be found in these areas would include RR-l, AR-l and possibly R-1 R-2, 3, 4 and MH-1 where municipal services are available.

Conservation / Government - In general, these areas have been set aside for conservation uses such as parks or forest area and are owned by some governmental entity.

Agriculture / Rural Residential - These areas will tend to be either vacant agricultural lands or larger parcels with single family residences. Proposals for more intense uses may be considered in these areas as well as conditional uses. Zoning districts which might be found in these areas would include A-1, A-R and possibly some RR-l

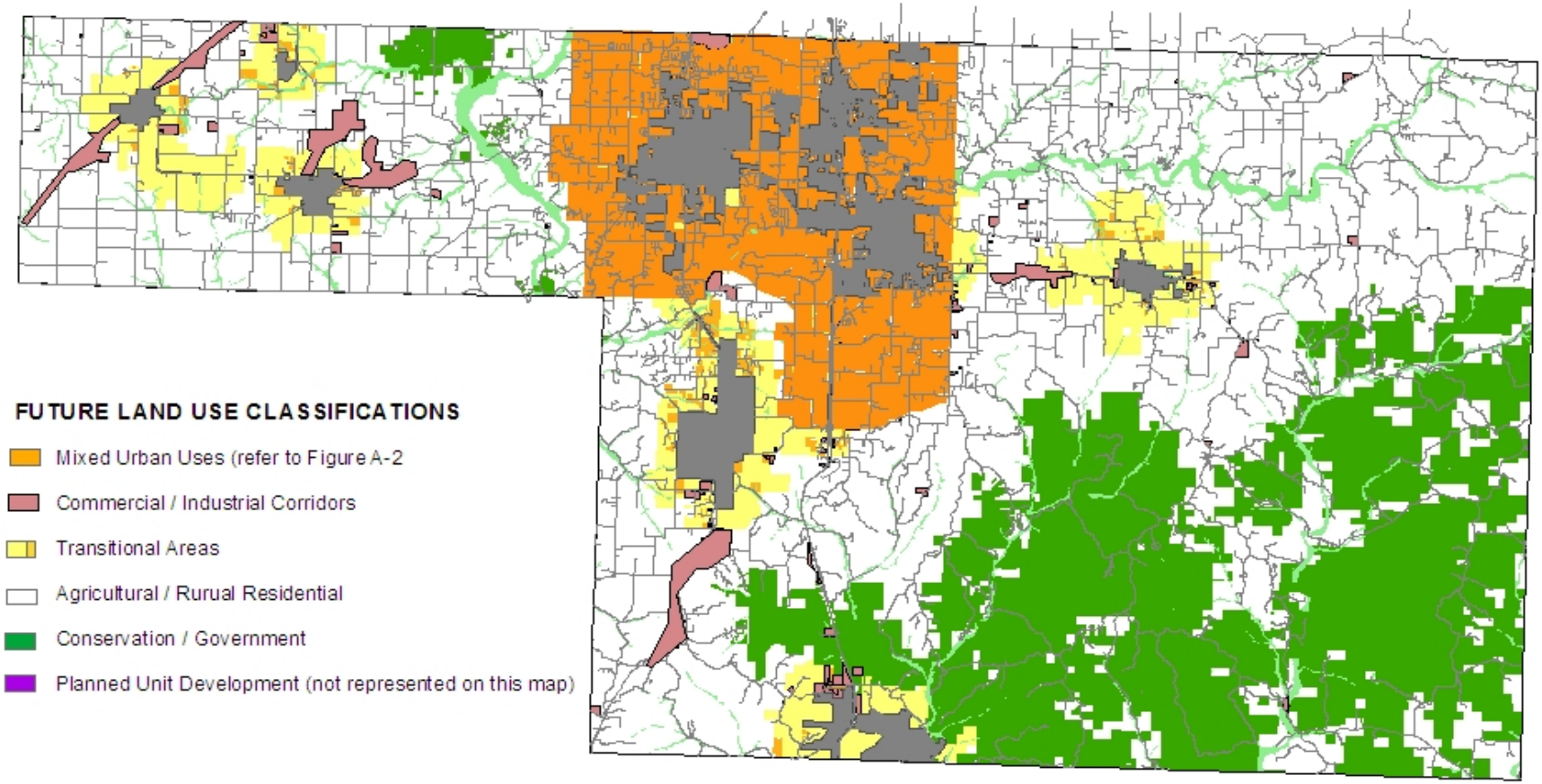
Planned Unit Development (PUD) - This type of development is not shown in a specific location on the future land use map but could potentially be appropriate in many places.

Overlay Districts - While not shown on the Christian County Future Land Use Map, an overlay district is an additional zoning requirement that could be placed on a geographic area but does not change the underlying zoning. Overlay districts can been used to impose development restrictions in specific locations in addition to standard zoning requirements. These districts are created to protect natural resources, promote safety, and protect health. Some examples of overlay districts are:

--- Conservation Overlay District
--- Wireless Communication Facilities Overlay District
--- Historic Preservation Overlay District
--- Floodplain Overlay District
--- Agricultural Overlay District
--- Aquifer Protection Overlay District

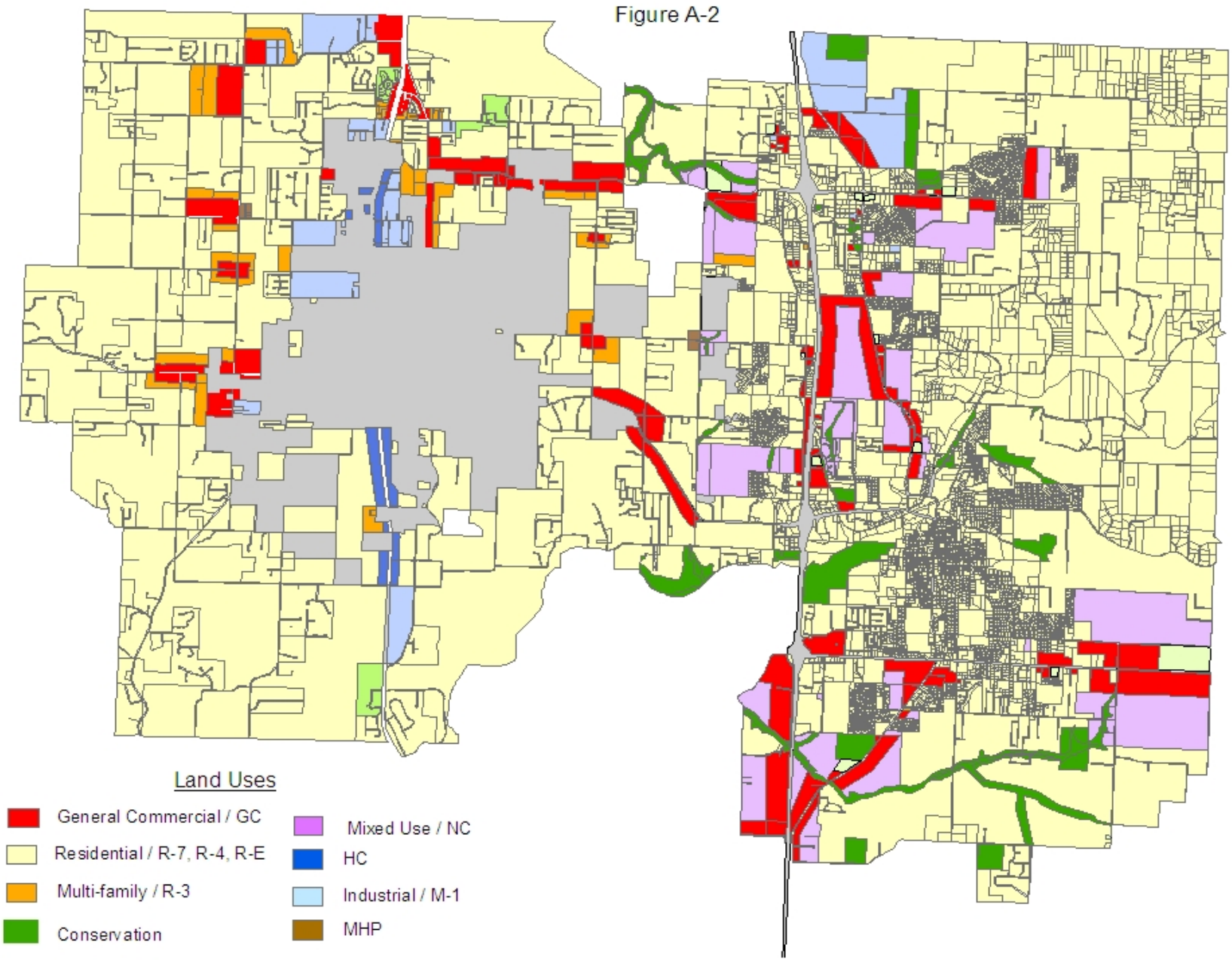
Generalized Future Land Use Map For Christian County

Figure A-1

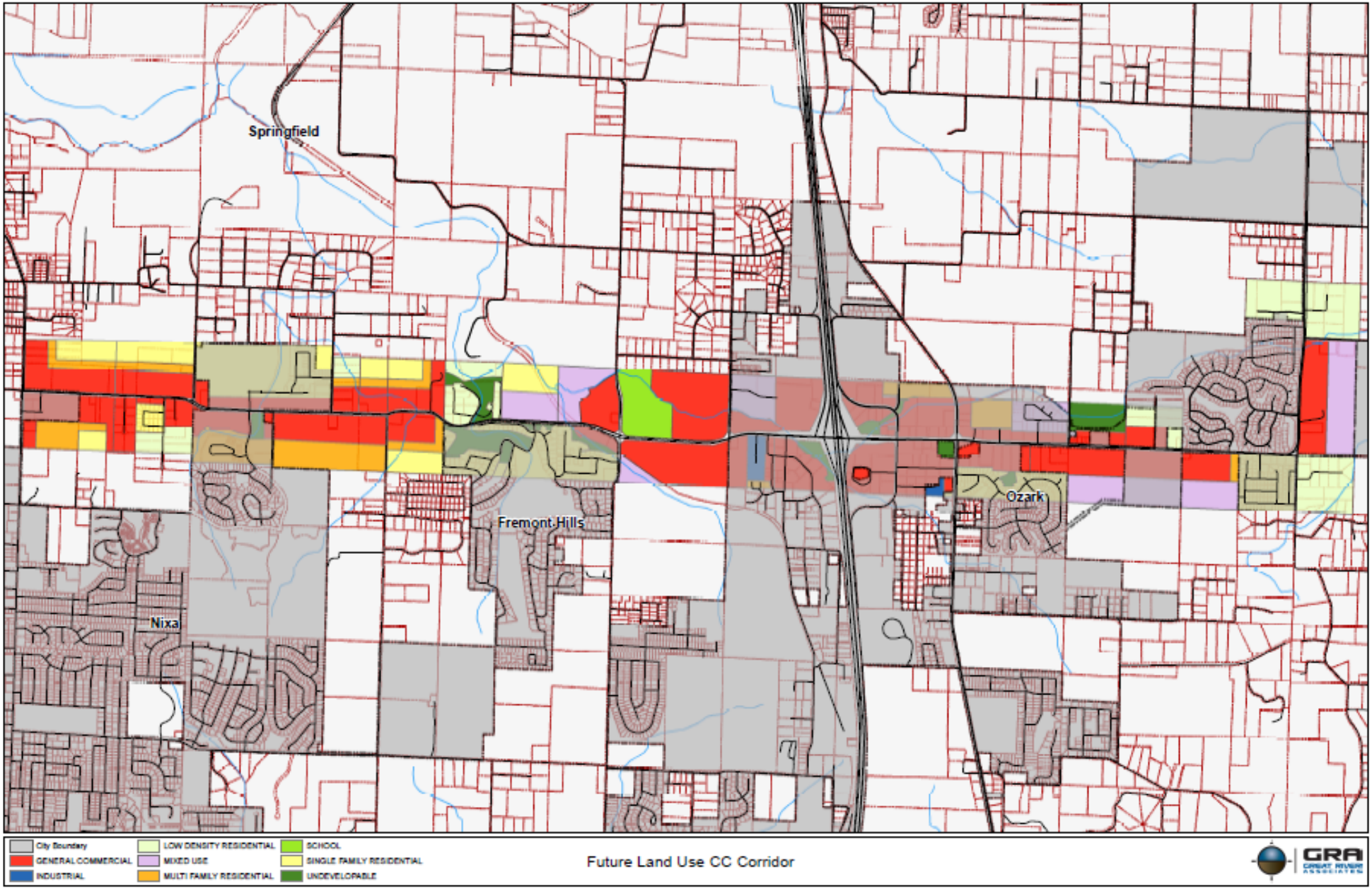


Urban Services Areas Future Land Use

Figure A-2



Appendix A , Figure A-3



Smarter Land-Use Analysis:

The Land-Use Conflict Identification Strategy Model™

Of Christian County, Missouri

Research Synopsis
Prepared by:
David Faucett

Abstract

Land-use suitability analysis is one of the most useful applications of GIS for planners and land managers. The goal of this type of analysis is to identify the most suitable land use pattern based on specific criteria or preferences. Contemporary GIS has developed along a similar trajectory with a planning approach towards collective design. GIS has become a potent component of Planning Support Systems (PSS) that seek to integrate empirical "geodata" with normative social values. The Land Use Conflict Identification Strategy (LUCIS™) model integrates these concepts and can be of high value in certain jurisdictions that seek to incorporate traditional zoning schemes on the heels of rapid growth. Christian County, Missouri has been the fastest growing county in the state over the past two decades. Growth in some parts of the county has outpaced the capacity of the transportation network and has led to transportation issues becoming one of the highest priorities in terms of new development. Multi-criteria accessibility measures, based on an ad hoc residential location preference survey, were incorporated as part of the LUCIS™ model to aid in decision support for a major thoroughfare plan that accommodates future growth in conjunction with a future land use map.

Introduction

Land-use planning remains one of the most powerful tools of planners. Zoning schemes are the result of a spatial logic that manifests itself into a functional mosaic of prescribed intensities of various human activities across the landscape that promotes the health, safety and general welfare of the public at large. Growing environmental awareness and a Malthusian-like epiphany in terms of the exhaustion of non-renewable resources in the latter half of the twentieth century have culminated in the emergence of sustainable development as the controlling paradigm of community and regional planning. Today land-use planning has become entrenched in a complex and dynamic struggle to discern the most efficient spatial organization of human endeavor that balances environmental quality and resource constraints against economic development in an equitable manner for all members of the community and future generations. This "triple bottom line" of sustainable development is a difficult construct to allow fomenting completely in one's mind and an even trickier ideal to implement in reality. A reality that is dominated by socio-political fragmentation and conflicting values between special interests seeking to advance one component over another. Yet sustainable development can be a unifying concept that brings together many different concerns under one overarching goal that reflects a set of social priorities and articulates how society values the economy, the environment and equity (Campbell, 1996).

Approaching sustainable development in terms of land-use management presents the paradox concerning two seemingly contradictory objectives of nature conservation and economic growth. The need to reconcile these conflicting objectives has fostered a planning arena that provides a seat at the table for representatives of dissonant perspectives in order to reach a moral consensus regarding a set of proposed alternatives to an optimal pattern of land-use. Land-use suitability assessment has become an invaluable process for decision makers involved in urban and regional land-use planning. Land-use suitability assessment is a map overlay technique or the process of combining geo-

graphically varying attributes describing the optimal suitability or capacity land to support a specified land-use type. This technique emanates from the field of landscape architecture and an ecological perspective advanced by the work of Ian McHarg.

Ian McHarg, considered the father of an ecological planning perspective, developed a comparative map overlay methodology that has "popularized and advanced the application of multiple 'cake layers' for incorporating the environment and social constraints into the myopic developers dreams of paving the planet" (Foresman, 1998). McHarg (1969) presented this method in his quintessential work *Design with Nature*, "let us map physiographic factors so that the darker the tone the greater the cost. Let us similarly map social values so that the darker the tone, the higher the value…make the maps transparent, superimpose them over a light table and scrutinize them for their conclusion." It was McHarg's intent to counter the pervasive and, in his view, environmentally degrading hard data of cost-benefit analysis and economic determinism with value driven soft data of an ecological perspective in the spatial decision making process. This innovative methodology was the precursor to the advancement of land-use suitability assessment techniques that have become synonymous with McHarg's name and have influenced the computer language and methodology developed as part of all current GIS programs (Palmer, 2001; Malcweski, 2004; Davis et al, 2002). In this context, reducing the role of the techno-positivist and increasing the value of collective goals, "GIS is seen as a tool for plan-making *with* the public rather than *for* the public" (Malczewski, 2004).

GIS and Multi-Criteria Decision Analysis (MCDA)

MCDA provides a rich set of techniques and procedures for structuring and prioritizing decision problems (Malczewski, 2006). MCDA is a Decision Support technique by which criteria pertaining to choosing the best alternative are defined by experts in conjunction with stakeholders and policy makers through a structured hierarchy of goals and

objectives (Hill et al., 2005). These methods convert subjective qualitative ordinal preference ranks into a quantitative interval/ratio weight that can be used as mathematical operators in multiplication procedures. The attributes associated with each criterion are classified according to their level of measurement to a common scale or ranking of suitability. Subsequently, decision makers rank these criteria as to their relative importance in terms of optimal suitability pertaining to a specified objective. The criteria are then weighted according to rank, and then the attributes associated with each candidate are combined most commonly in an additive weighted linear combination to reveal the best-suited alternative relative to all other candidates.

Statement of Purpose

The purpose of this study is to integrate a multi-criteria analysis of accessibility developed by Zhu et al. (2006) for housing in Singapore into the LUCIS™ model as an explanatory variable describing the demand for growth in residential land-use types based on location-based accessibility to a variety of activities. This methodology will demonstrate an avenue for incorporating community values into the modeling process by utilizing findings from an ad hoc residential location preference questionnaire and explore public participation in GIS (PPGIS). The introduction of GIS-based network analysis into the LUCIS™ model will better describe how accessibility shapes land-use by simulating the market demand for new development based on the recognized relationship between land value and the cost of travel along the transportation network. The ultimate aim of this study is to aid land-use planners and decision makers in formulating future land-use patterns that accommodate both nature conservation and economic growth through the cartographic visualization of the relationship between transportation and land-use that has historically been a contributing factor to low-density suburban development. The methods described above were employed in a case study for Christian County, Missouri.

Methodology

Margaret Carr and Paul Zwick (2007) developed The Land-Use Conflict Identification Strategy (LUCIS™) model over a ten-year period instructing students in a joint studio called the Ecological Design Practicum in the Department of Urban and Regional Planning at the University of Florida. LUCIS™ is a goal driven model that attempts to derive probable future land-use patterns based on the three broad land-use categories of agriculture, conservation and urban. The power of LUCIS™ is touted to "come from the application of its results to develop alternative land-use futures based on community preference and conflict" (Carr and Zwick, 2007). The model is a five-step process of employing traditional land-use suitability analysis to divide regions into subcategories where the three land-use types already exist, where they are preferred and ultimately, where they come into conflict.

Table 7.1 The Five Steps of the LUCIS™ Modeling Process

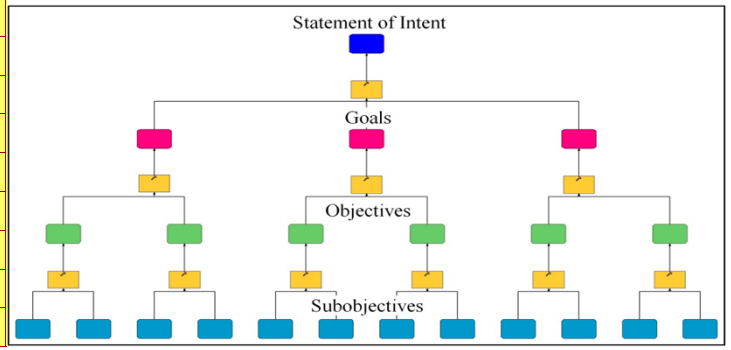
Step	Description
Goals and Objectives	Define goals and objectives that become criteria for suitability
Data Inventory	Identify sources potentially relevant to each goal and objective
Suitability	Analyze data to determine relative suitability of each goal
Preference	Combine relative suitability's of each goal for the three major land-use categories
Conflict	Compare the three land-use preferences to determine likely areas of future land-use conflict

Defining Goals and Objectives

Table 7.2 Structured Hierarchy of Goals and Objectives for Christian County, Missouri Urban Land-Use

Overall statement of intent:	Determine the lands preferred for agriculture, conservation and urban use in Christian County, Missouri. Compare the resulting preferences to derive the most likely locations for future conflict and provide decision support for preferred future land-use pattern.
Urban Land Use	
Statement of intent:	Identify lands most suitable for urban development
Goal 1	Identify land most suitable for residential use
Objective 1.1	Determine land suitably located for residential use
Subobjective 1.1.1	Identify land with high accessibility to employment opportunities
Subobjective 1.1.2	Identify land with high accessibility to healthcare facilities
Subobjective 1.1.3	Identify land with high accessibility to parks and recreation
Subobjective 1.1.4	Identify land with high accessibility to schools and daycare
Subobjective 1.1.5	Identify land with high accessibility to shopping
Subobjective 1.1.6	Identify land proximal to emergency services
Subobjective 1.1.7	Identify land proximal to existing public water and sewer services
Objective 1.2	Determine land physically suitable for residential use
Subobjective 1.2.1	Identify soils suitable for septic systems
Subobjective 1.2.2	Identify soils suitable for roads and streets
Subobjective 1.2.3	Identify soils suitable for structures with basements
Objective 1.3	Determine land with property values suitable for residential development
Goal 2	Determine land most suitable for commercial use
Objective 2.1	Identify land suitably located for commercial use
Objective 2.2	Identify land with soils suitable for small commercial buildings
Goal 3	Determine land physically suitable for urban use
Objective 3.1	Identify land with slopes suitable for development

The development of goals and objectives is a critical first step in the modeling process. This structured hierarchy is designed to provide valuable direction in identifying relevant data for model development. The more time spent in this first step of the process will lead to a more focused design of the model. This structured hierarchy is then used as the base criteria in the next step of identifying relevant data sets to be used as input map layers in subsequent steps. The goals and objectives are not meant to be fixed throughout the process and can be altered during the step of data inventory and preparation. If no direct data exists relevant to the realization of stated goals and objectives indirect contributors or proxy variables must be identified.



LUCIS™ Model Data Inventory (Sources and Layers)

USDA Soil Database and Soil Data Viewer:

Soils Suitability Data:

Prime Farmland [PrmFrm]

Non-Irrigated Crop Yield Index [Yield]

Seedling Mortality Rate [SdlgMort]

Camp Areas [CmpArea]

Picnic Areas [PncArea]

Playground Areas [PlayArea]

Paths and Trails [PthTr]

Small Commercial Buildings [ComBldg]

Local Roads and Streets [RdsStrs]

Dwellings with Basements [DWB]

On-Site Waste Water Absorption Fields [Septic]

Missouri Spatial Data Information Service:

USGS Land Use/Land Cover 2005:

Cropland Class [Crplulc]

Grassland Class [Grsslulc]

Wetland Classes [Wetlnds]

Urban Classes

USGS Digital Elevation Model:

Slope [slope]

Missouri Department of Conservation: [MoDepCon]

Busiek

Delaware Town Access

Shelvin Rock Access

National Forest [NF]

Sinkhole Area Polygons [Snkhle]

Public Schools [PS]

Private Schools [PRS]

Christian County Database:

Golf Course [PrkRec]

Country Club [PrkRec]

Parcel Value Per Acre [PrcVal]

Large Parcels (> or = to 50 Acres) [AgPrc]

City Parks [PrkRec]

Fire Station [FD]

Ambulance District Facilities [AMB]

Wilson's Creek National Battlefield [WCNB]

Floodplain [FP]

City Boundaries

Township and Range Sections [TR_Point]

Greene County Parcel Database [PrkRec]

Parks

Golf Courses

Country Clubs

Nature Center

Southwest Missouri Council of Governments

Christian County Hazard Mitigation Plan: [Hlth]

Hospitals

Medical Clinics

Daycare Facilities [DayCare]

Regional Transportation Plan: [MajEmp]

Major Employers

MoDOT Planning Data 2007 [CmSt]

Environmental Science Research Institute (ESRI)

Streetmap USA Network Dataset

Google Maps/Google Earth, Yellow Pages [Shop]

Groceries

Supermarkets

Wal-Mart Supercenters

Malls and Shopping Centers

Target

Lowe's

Home Depot

Office Depot

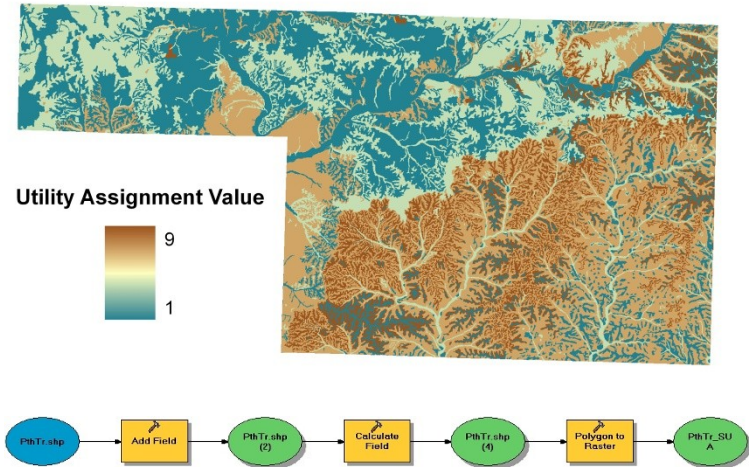
Best Buy

Analyzing Data to Determine the Relative Suitability of Goals

Vector to Raster Conversion. The LUCIS model is designed to take advantage methods and procedures within the Spatial Analyst extension of ArcGIS Desktop and the unique characteristics of the raster data format. The strength of the raster data format as opposed to the vector data format is the ability to perform the simultaneous evaluation of cells from multiple data sets representing coincident locations, rapidly accomplishing complex spatial analysis and overlay. Whereas, performing these tasks with vector data requires the user to continually manage, combine, aggregate and disaggregate multiple layers to form complex polygons or networks (Carr and Zwick, 2007).

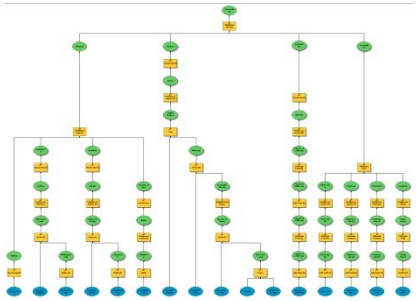
Transforming Nominal Soil Suitability Data to Rescaled Ordinal Utility Value

Original Value	Rank	Reciprocal Rank	Proportion of Utility	Utility Value
Not Limited	1	1/1	1.00*9	9
Somewhat Limited	2	1/2	.5*9	4.5
Very Limited	3	1/3	.333*9	3
Not Rated	4	1/4	.250*9	2.25



Single Utility Assignments. In order for suitability analysis to be meaningful, all of the layers must be reclassified into similar standard intervals to satisfy Chrisman's interaction rule for combining spatial data. Carr and Zwick used intervals from one to nine to assign a "range of utility" to each layer, where one is the lowest suitability and nine is the highest. The method proposed in the LUCIS™ model requires the translation of criterion maps to this common scale whereupon they become single utility assignments (SUA). The level of complexity in determining the range of utility for SUAs varies depending on the level of measurement of the attribute used to define suitability. It is much easier to assign utility values to interval and ratio data that already have known intervals. With this type of data, it is quite common for the modeler to assign the values (Carr and Zwick, 2007).

Combining Relative Suitability's for the Three Major Land-Use Categories

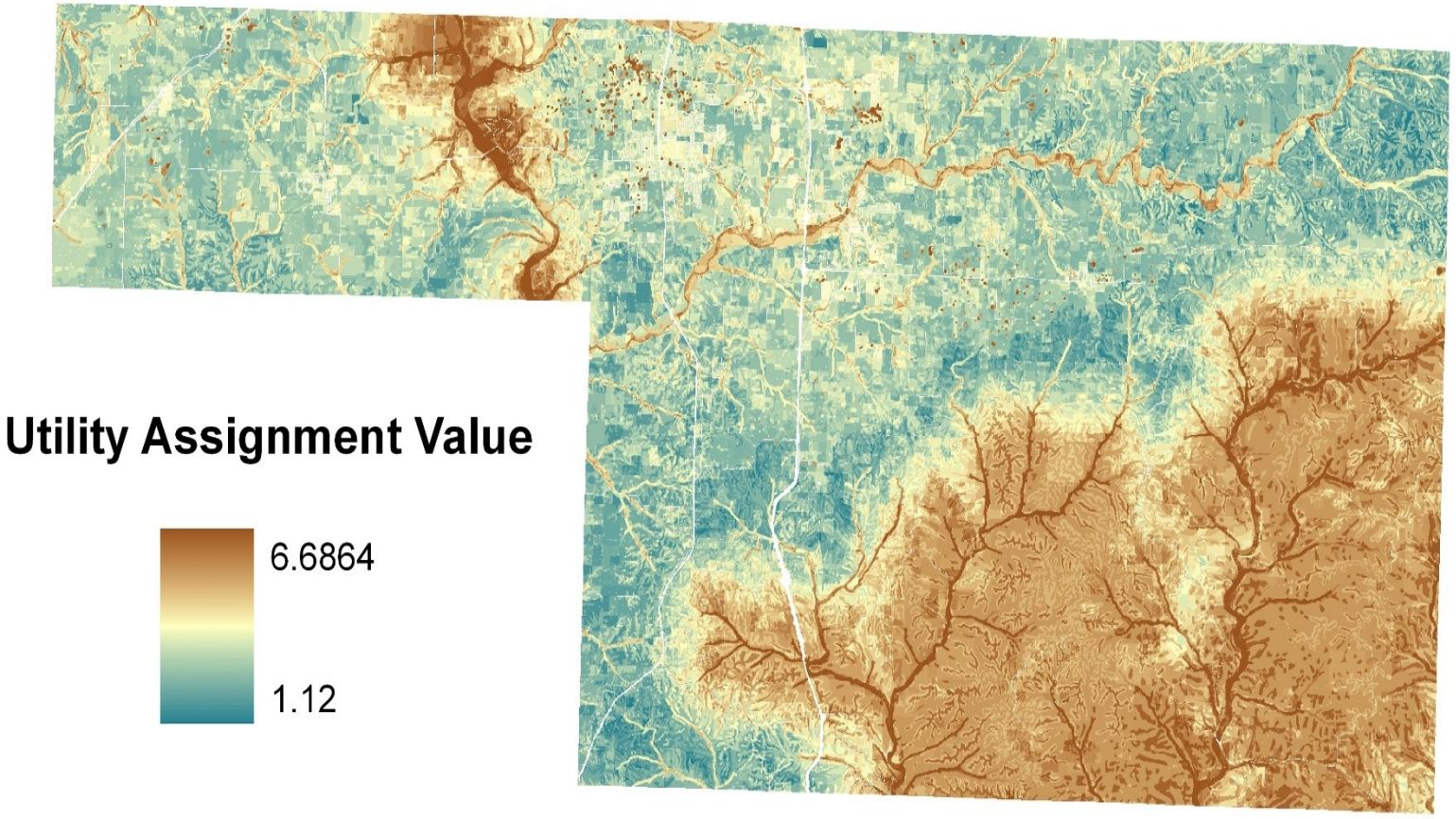


Conservation Multi-Utility Assignment (ConservMUA)

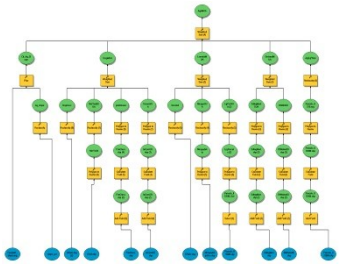
ConservAreasMUA = ([FP]*.25) + ([MoDepCon]*.25) + ([NF]*.25) + ([WCNB]*.25)

RecSoilsMUA = ([CmpArea]*.12) + ([PncArea]*.24) + ([PlayArea]*.16]) + ([PthTr]*.48)

ConservMUA = (ConservAreasMUA*.325) + ([Snkhle]*.325) + ([Wtlnds]*.081) + (PrcVal]*.107)



Agricultural Suitability

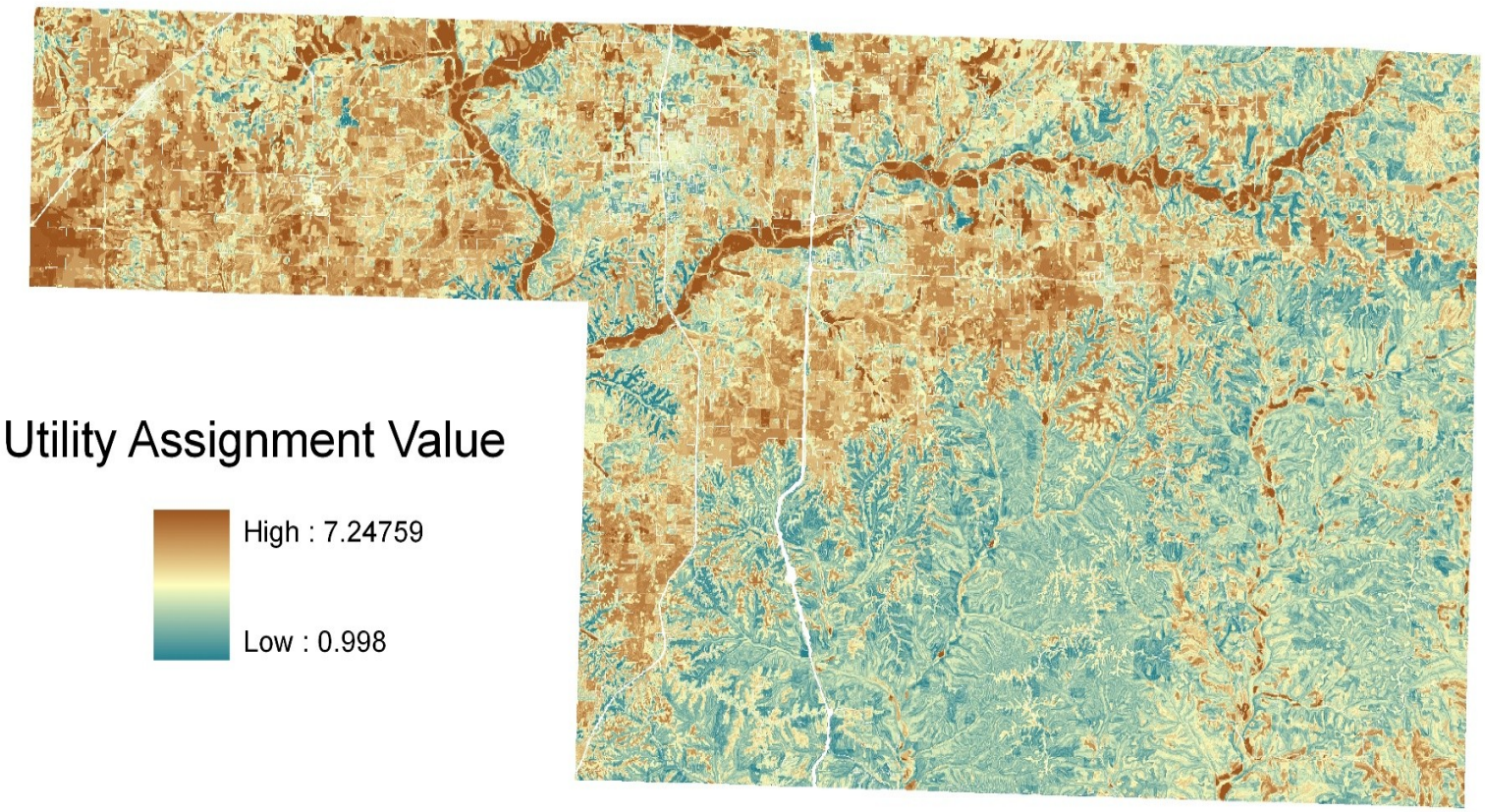


Agricultural Multi-Utility Assignment (AgMUA)

CrplndMUA = ([PrmFrm]*.4) + ([Crplulc]*.4) + ([Yield]*.2)

LvstckMUA = ([Grsslulc]*.5) + ([AgPrc]*.3) + ([Yield]*.2)

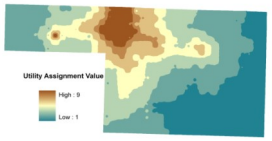
AgMUA = (CrplndMUA*.25) + (LvstckMUA*.35) + ([SdlgMort]*.15) + ([PrcVal]*.25) +



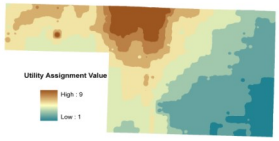
Defining Urban Land-Use Suitability

The Core of the Urban MUA is the use of network based accessibility to various activities; i.e. employment, shopping, etc, weighted according to values from the Citizen Survey. Accessibility to these activities was calculated from an origin/destination matrix generated in ArcGIS Network Analyst using ESRI's Streetmap USA Network Dataset. Township and Range section polygons were converted to points to represent uniformly spaced origins throughout the county. The various destination classes were then weighted in terms of relative attractiveness. Travel time from each origin to each destination was divided into 1 to invert the travel cost value, converting short travel times into higher values. These inverted values were then multiplied by the weight of the particular destination. The summation to each destination was then divided by the total weight of all destinations to produce an accessibility index for each point. A raster surface for each activity was calculated using the inverse distance interpolation method. A measure of proximity to emergency services was calculated in Network Analyst based on service area polygons from fire stations and ambulance facilities. Poximity to water and sewer was calculated using as the crow flys distance from city limits.

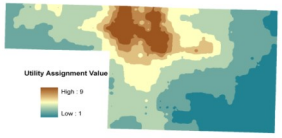
Accessibility to Daycare



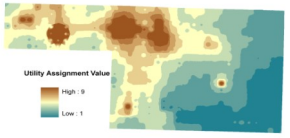
Accessibility to Employment



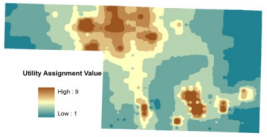
Accessibility to Healthcare



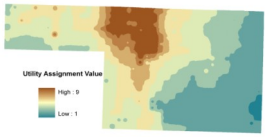
Accessibility to Schools



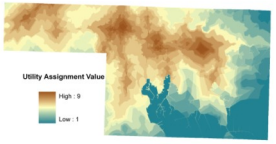
Accessibility to Recreation



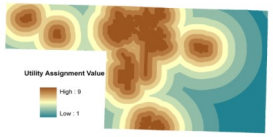
Accessibility to Shopping



Proximity to Emergency Services



Proximity to Utilities



Urban Suitability Model

Urban Multi-Utility Assignment (UrbMUA)

EmergencyMUA = ([FD]* .8) + ([AMB*.2])

SchlDaycareMUA = ([PS]*.7) + ([PRS]*.15) + ([DayCare]*.15)

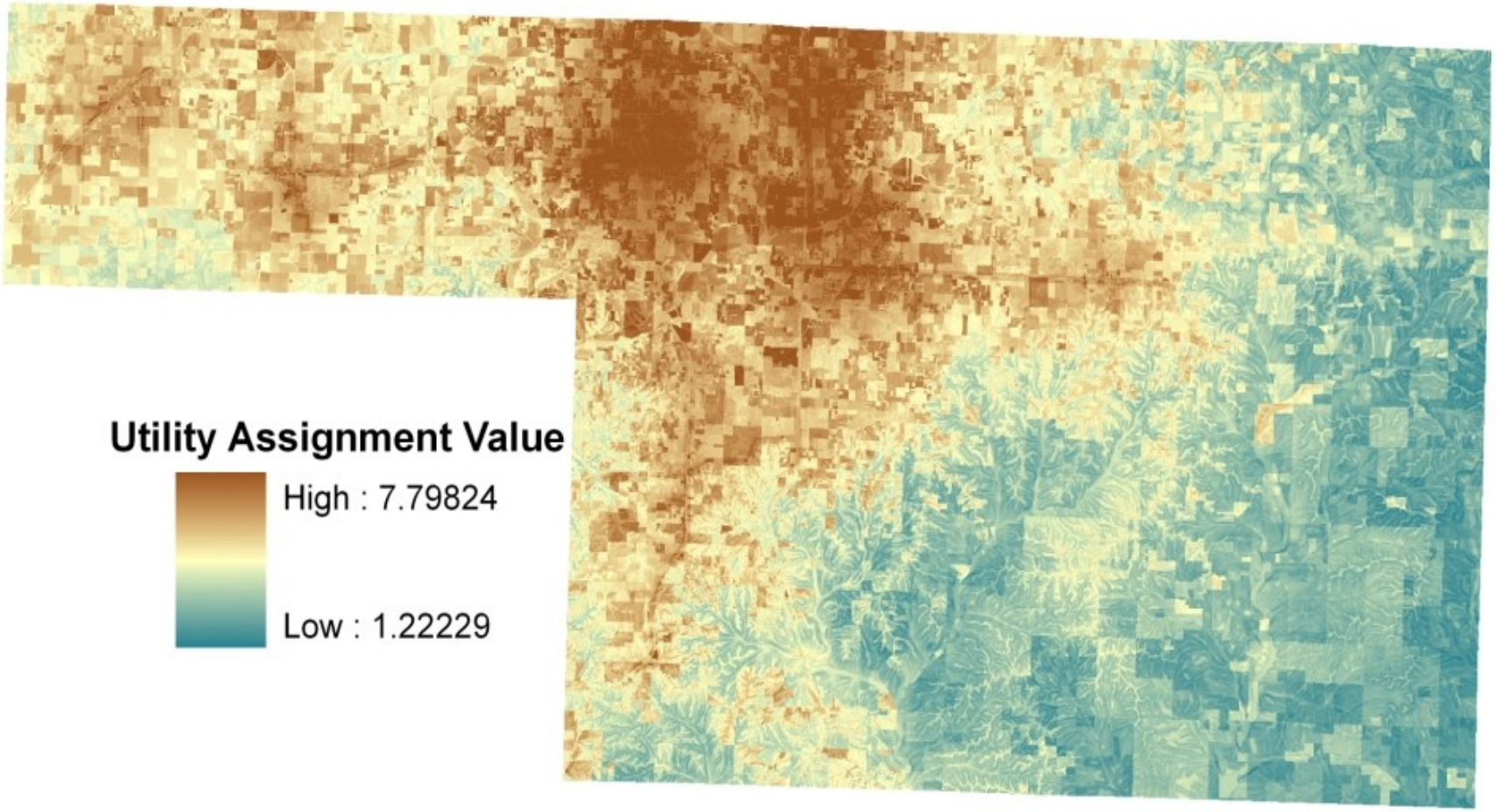
AccessMUA = ([EmergencyMUA]*.158576) + ([Hlth]*.14788) + ([MajEmp]*.139009) + (SchlDaycare*.122091) + ([PrkRec]*.110122) + (ProxUtilities*.107848) + ([Shop]*.090369)

ResSoilsMUA = ([Septic]*.333) + ([RdsStrs]*.333) + ([DWB]*.334)

ResMUA = (AccessMUA*.75) + ([PrcVal]*.15) + (ResSoilsMUA*.1)

ComMUA = ([ComBldg]*.5) + ([CmSt]*.5)

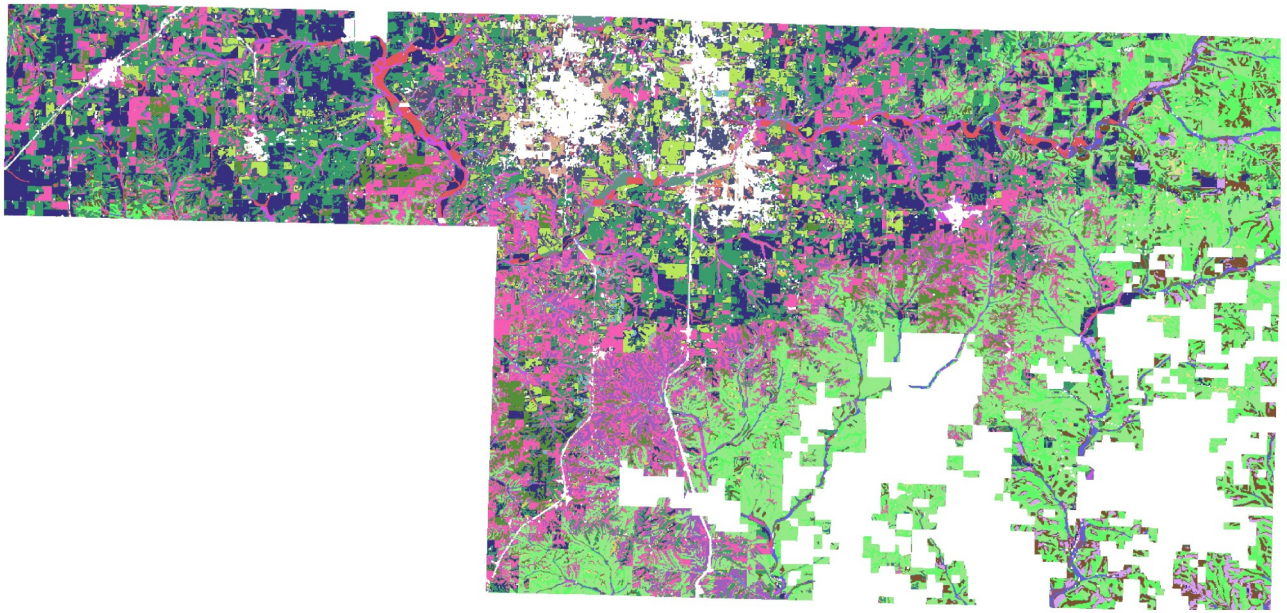
UrbanMUA = (ResMUA*.7) + (ComMUA*.1) + ([PrcVal]*.1) + ([slope]*.1)



Determining Likely Areas of Future Land-Use Conflict

Land-Use Suitability Identification Layer

The AgMUA, ConservMUA, and UrbMUA were all normalized and collapsed from utility values into 3 new classes representing low, medium and high. The AgMUA was reclassified to values in the hundreds place; 100, 200, and 300. The value for the ConservMUA was reclassified to the tens place; 10, 20, and 30. The UrbMUA was similarly reclassified to the ones place. These layers were all added together using the map algebra function in ArcMap. This created 27 unique values representing where agriculture suitability was the greatest; 311, 312, 321, and 322. These values were then reclassified into land most suitable or "preferred" for agricultural endeavors. Similarly, values of 113, 123, 213, and 223 are the cells where Urban suitability wins out. This leaves 15 values, after conservation wins, that represent some form of conflict between land uses. These values are classed together and represented in the land-use conflict map presented on the following page.



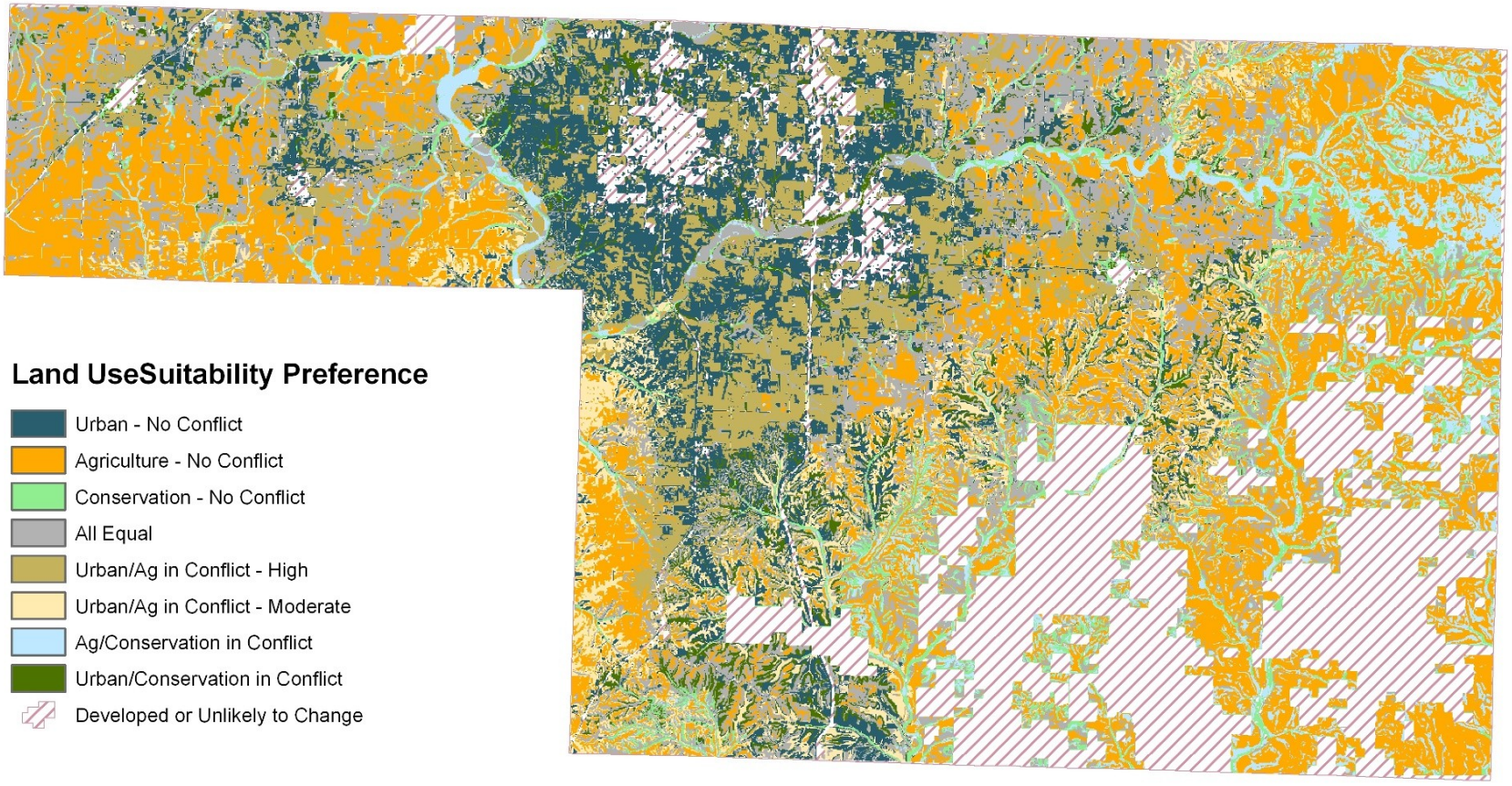
Combined Suitability Values

111	123	212	231	313	332
112	131	213	232	321	333
113	132	221	233	322	
121	133	222	311	323	
122	211	223	312	331	

Results

Land Use Conflict Identification Strategy Model (LUCIS)

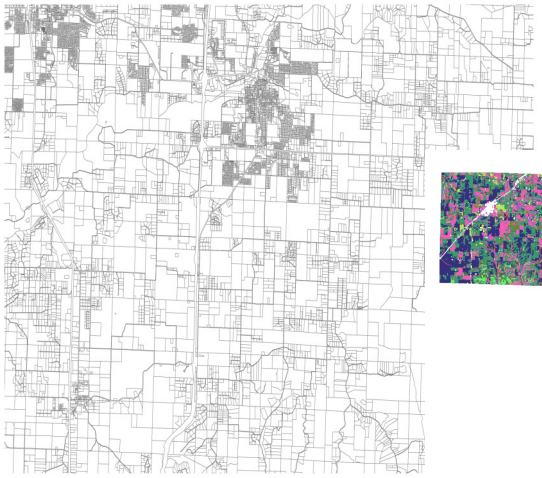
Christian County, Missouri



Prepared by: David Faucett
Prepared for: Christian County Planning and Zoning Dept.
Date: 4/16/2009
Sources: Missouri Spatial Data Information Service; USGS 2005 Land Use/Land Cover Map; Christian County Planning Data; The Southwest Missouri Council of Govts; USDA

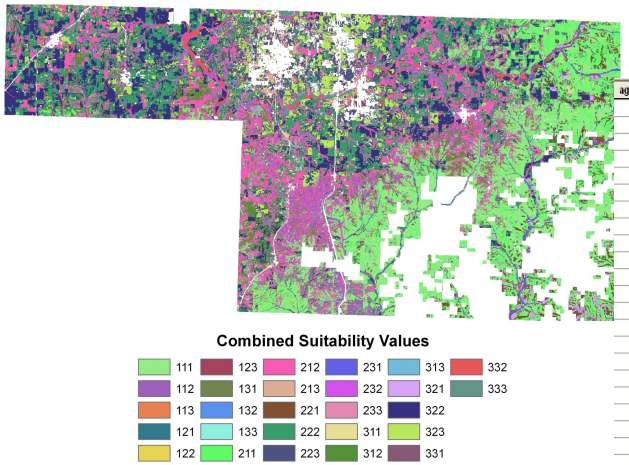
Allocating Future Land-Use

The raster of coded land-use suitability values was used as the base to calculate zonal statistics providing a guide to developing a future land-use map. The Christian County Parcel shapefile was overlaid atop the conflict raster and represents the zones by which to calculate the majority cell value within each parcel. An attribute for each parcel was created for the majority cell value within that respective parcel. This attribute was used along with existing parcel attributes in database queries to determine an appropriate future land-use. In this manner, a future land-use map that attempts to describe a pattern of land-use that balances the value of agricultural productivity, the conservation of land suitable for life sustaining ecological processes and the need for economic growth and development can be used as a guide to more sustainable outcomes for future generations.



Parcel Data

LUCIS™ Value

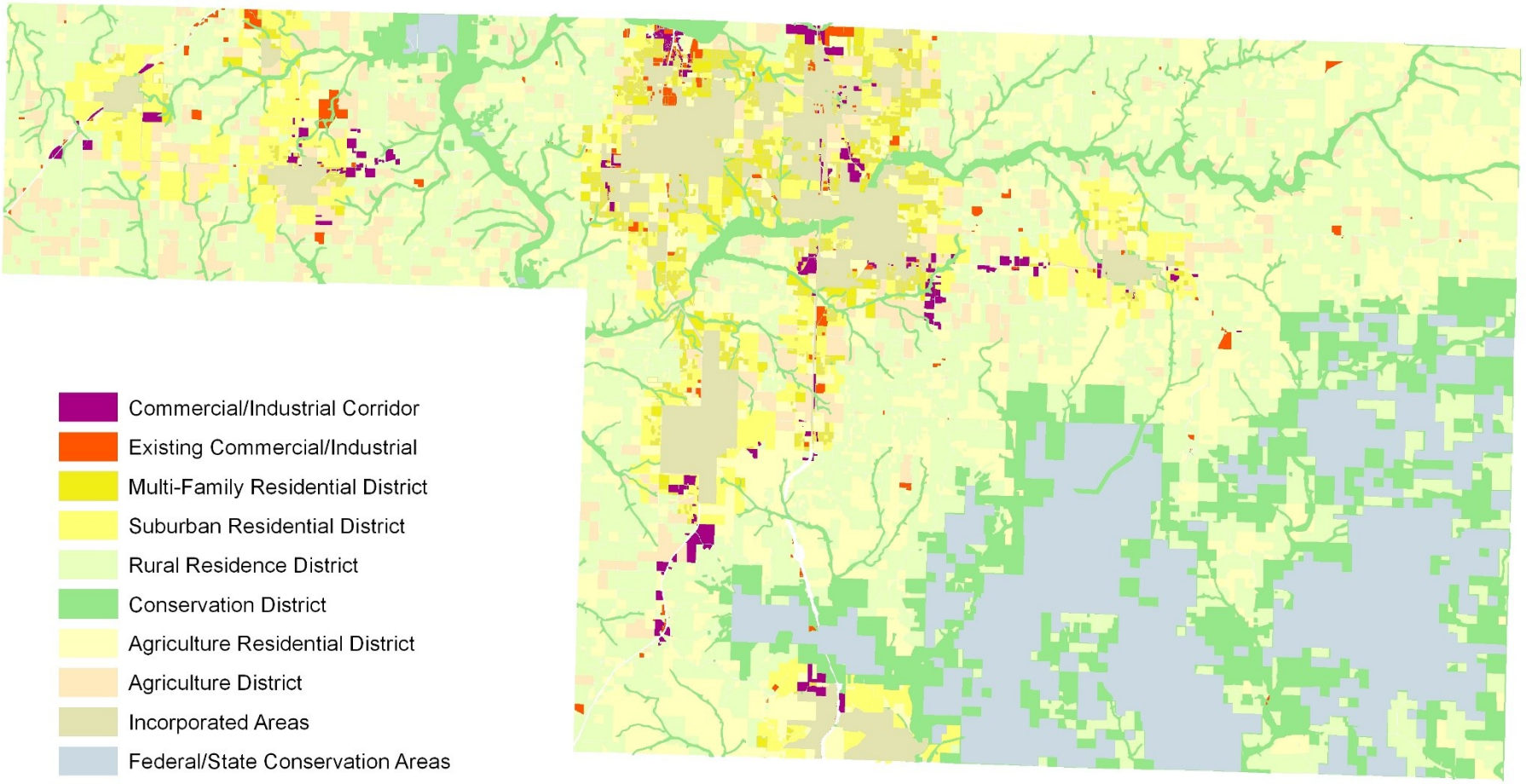


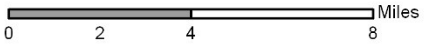
New Parcel Attribute

ag7_acre	ag8_acre	ag90_acre	land_type	appr_res	appr_ag	appr_comm	Appr_Val	AV_Val	LUCIS_VAL
0	0	0	RL	10000	0	0	10000	2382.513705	213
27	0	0	RL	122100	7100	0	129200	3114.519946	212
8.02	0	0	RL	0	600	171400	172000	19106.920815	212
0	6.1	0	RL	0	1700	0	1700	114.66544	223
0	0	0	RL	67600	0	0	67600	12681.765603	222
6.2	1	0	RL	0	2700	0	2700	148.018308	212
0	0	0	RL	230500	0	0	230500	61573.568068	222
0	0	0	RL	44900	0	0	44900	14119.641027	222
0	0	0	RL	103900	800	0	104700	20299.161244	222
0	0	0	RL	30700	900	0	31600	6255.904158	122
0	4	0	RL	0	1100	0	1100	124.425072	222
15	14	0	EX	0	3200	0	3200	76.951066	122
35	5	0	EX	0	2800	0	2800	68.531761	222
15	15	0	EX	0	3000	0	3000	80.316521	222
26.21	27.6	0	RL	0	6100	0	6100	75.300966	222
0	0	0	RL	5200	0	0	5200	4384.158629	222
0	3	0	RL	16700	700	0	17400	2024.70057	232
0	0	0	EX	0	23400	0	23400	146.634378	221
6	16	0	RL	0	3500	0	3500	86.742702	121
0	0	0	RL	127300	33800	0	161100	4597.005001	223
0	0	0	RL	0	400	0	400	117.743483	113
11.5	0	0	RL	14500	1200	0	15700	1143.30735	213
0	0	0	RL	127900	0	0	127900	38352.935322	213

Record: 0 Show: All Selected Records (0 out of 34101 Selected) Options

Christian County, Missouri Future Land-Use Map





Prepared By:
David Faucett
Prepared for:
Christian County, Missouri Planning and Zoning Department

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APPENDIX A

(Generalized Future Land Use Map Will Be Inserted Here)

APPENDIX B

SOIL SERIES GENERAL CHARACTERISTICS

Bardley series (member of mapping unit 25D, Ocie-Bardley-Gatewood complex) uplands.

Slopes range from 2 to 14 percent. Permeability is moderate. Surface runoff is medium to rapid, and available water capacity is low. The surface texture is cherty silt loam. Most areas are in woodland, with some areas used for hay and pasture.

Bolivar series (mapping unit 23B, Bolivar fine sandy loam)

The Bolivar series consists of moderately deep, well-drained soils on ridgetops on uplands. Slopes range from 2 to 14 percent. Permeability is moderate. Surface runoff is medium, and available water capacity is low. Most areas have been cleared and are used for hay and pasture. A few areas are used for row crops or are in woodland. This series is considered prime farmland.

Captina series (member of mapping unit 8B, Captina-Needleye silt loams)

The Captina soils are deep, very gently sloping and well-drained soils on uplands and ridges. Captina soils are found on the top and sides of ridges. These soils have a fragipan with slow to moderate permeability. Surface runoff is medium. The soils are suited for row and small grain crops and for trees.

Cedargap series (mapping unit 93A, Cedargap cherty silt loam; member of mapping unit 92A, Cedargap-Secesh silt loams)

The Cedargap series consists of deep, well-drained soils in flood plains of small streams. Slopes range from 0 to 3 percent. Permeability is moderately rapid. Surface runoff is low, and available water capacity is moderate. Most areas are in hay and pasture, with a few areas in row crops or woodland. This series is considered prime farmland.

Clarksville series (mapping unit 45D, 45E, 45F, and 45G, Clarksville very silt loam; member of mapping unit 35D, Doniphan-Clarksville complex)

The Clarksville series consists of deep, somewhat excessively-drained soils on ridgetops and side slopes of ridges on uplands. Slopes range from 2 to 60 percent. Permeability is moderately rapid. Surface runoff is rapid, and available water capacity is low. Most areas are in woodland, with a few areas in pasture and hay in regions of less slope.

Creldon series (mapping unit 6B, Creldon silt loam)

The Creldon series consists of deep, moderately well-drained soils that have a fragipan. These soils are on broad ridgetops on uplands. Slope ranges from 1 to 4 percent. Permeability is moderate above the fragipan and low in the fragipan. Surface runoff is medium, and available water capacity is moderate. Most areas are used for hay and pasture, with some areas used for row crops. This series is considered prime farmland.

Doniphan series (member of mapping unit 35D, Doniphan-Clarksville cherty silt loams)

The Doniphan series consists of deep, well-drained soils on ridgetops on uplands. Slopes range from 2 to 14 percent. Permeability is moderate. Surface runoff is medium to rapid, and available water capacity is low. Most areas are in pasture and woodland, with a few areas in row crops.

Gasconade series (mapping unit 83G, Gasconade Rock Outcrop complex)

These soils are shallow, strongly sloping to very steep and are excessively drained. Located on broken side slopes and upland areas, these soils exhibit moderately slow permeability and rapid surface runoff. The soils are poorly suited for trees or building development.

Gatewood series (member of mapping units 24F, Gatewood-Ocie-Rock complex; and 25D, Ocie-Bardley-Gatewood complex)

The Gatewood series consists of moderately deep, moderately well-drained soils on uplands. Slopes range from 9 to 65 percent. Permeability is moderately slow. Surface runoff is rapid, and available water capacity is low. The surface texture is cherty silt loam. Most areas are in woodland, with some areas used for hay and pasture.

Goss series (mapping units 43C and 43D, Goss cherty silt loam)

The Goss series consists of deep, well-drained soils on ridgetops and side slopes on uplands. Slopes range from 2 to 20 percent. Permeability is moderate. Surface runoff is medium to rapid, and available water capacity is low. Most areas have been cleared and are used for hay and pasture. A few areas are in woodland, and a few areas on the lesser slopes are in row crops.

Huntington series (mapping unit 55A, Huntington silt loam)

The Huntington series consists of deep, well-drained soils on flood plains. Slopes range from 0 to 3 percent. These soils are subject to occasional flooding. Permeability is moderate.

Surface runoff is medium and available water capacity is very high. Most areas are used for hay and pasture, with some areas used for row crops. This series is considered prime farmland.

Needleye series (member of mapping unit 8B, Captina-Needleye silt loam)

The Needleye series consists of deep, moderately well-drained soils that have a fragipan. Needleye series soils are found in depressed areas on the top of broad ridges on uplands. Slopes range form 1 to 3 percent. Permeability is slow in the fragipan. Surface runoff is medium, and available water capacity is medium. Most areas are cleared and used for hay and pasture, with a few areas in row crops and a few areas in woodlands. This series is considered prime farmland.

Ocie series (mapping unit 22C, Ocie cherty silt loam; and member of mapping units 24F, Gatewood-Ocie-Rock outcrop and 25D, Ocie-Bardley-Gatewood complex)

The Ocie series consists of deep, moderately well-drained soils on uplands. Slopes range from 2 to 35 percent. Permeability is moderate in the upper part of the profile and slow in the lower part. Surface runoff is medium and available water capacity is low. Most areas are in woodland, with some areas in hay and pasture.

Peridge series (mapping unit 21B, Peridge silt loam)

The Peridge series consists of deep, well-drained soils on high stream terrace and on uplands around the heads and sides of drainage ways. Slopes range from 2 to 5 percent. Permeability is moderate. Surface runoff is medium to high, and available water capacity is high. Most areas are used for hay and pasture, with a few areas in woodland or used for row crops. This series is considered prime farmland.

Secesh series (member of mapping unit 92A, Cedargap-Secesh silt loams)

The Secesh series consists of deep, well-drained soils on flood plains. Slopes range form 1 to 3 percent. Permeability is moderate. Surface runoff is slow, and available water capacity is moderate. Most areas are used for hay and pasture, with a few areas in woodlands or used for row crops. This series is considered prime farmland.

Tonti series (mapping unit 81B, Tonti silt loam)

The Tonti series consists of deep, moderately well-drained soils that have a fragipan. These soils are on ridgetops and high terraces. Slopes range form 2 to 5 percent. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is medium, and available water capacity is low. Most areas have been cleared and are used for hay and pasture, with a few areas in woodland or used for row crops.

Wilderness series (mapping unit 5C, Wilderness cherty silt loam)

The Wilderness series consists of deep, moderately well-drained soils that have a fragipan. These soils are on ridges on uplands. Slopes range from 2 to 9 percent. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is medium, and available water capacity is low. A perched water table is at a depth of 1 to 2 feet from December to March in most years. Most areas have been cleared and are used for hay and pasture. Some areas are in woodland, with a few areas used for row crops.

Soils Features

Tables B-1 through B-3 summarizes general suitability of the soil series in Christian County for building development, on-site sewage disposal and general soils characteristics. The following terminology is used to describe the various soil limitations summarized in these tables:

Slight	Soil properties and site features are generally favorable for the indicated use. Limitations are minor and easily overcome.
Moderate	Soil properties or site features are not favorable for the indicated use. Special planning, design or maintenance is needed to overcome or minimize the limitation.
Severe	Soil properties or site features are so unfavorable or so difficult to overcome that special design; significant increases in construction costs and possible increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

TABLE B-1

SOIL AND WATER FEATURES

The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.

	Flooding			High Water Table			Bedrock		Risk of Corrosion	
Soil Name and Map Symbol	**Frequency**	**Duration**	**Months**	**Depth**	**Kind**	**Months**	**Depth**	**Potential**	**Uncoated**	**Concrete**
6B Creldon		None		1.5-3.0	Perched	Dec-Apr	>60	Moderate	High	High
22C Ocie		None		3.0-5.0	Perched	Dec-Mar	40-60	Moderate	High	Moderate
23B Bolivar		None		>6.0			20-40	Moderate	Low	Moderate
24F Gatewood		None		>6.0			20-40	Moderate	High	Moderate
Ocie		None		3.0-5.0	Perched	Dec-Mar	40-60	Moderate	High	Moderate
Rock outcrop.										
25D Ocie		None		3.0-5.0	Perched	Dec-Mar	40-60	Moderate	High	Moderate
Bardley		None		>6.0			20-40	Moderate	Moderate	Moderate
Gatewood		None		>6.0			20-40	Moderate	Moderate	High
27D Bolivar		None		>6.0			20-40	Moderate	Moderate	High
35D Doniphan		None		>6.0			>60	Moderate	Moderate	High
Clarksville		None		>6.0			4-20	Moderate	High	Low
45D, 45F, 45G Clarksville		None		>6.0			>60	Moderate	Low	High
83G Gasconade		None		>6.0			4-20	Moderate	High	Low
Rock outcrop.										
94 Pits.										
Dumps.										

Flooding-Frequency: Occasional means flooding occurs no more than once every two years.
Flooding-Duration: Frequent Means flooding occurs more than once every two years.
Brief means two to seven days. Very Brief occurs less than two days.
High Water Table: Apparent means a thick zone of freewater in the soil.
Perched means water standing in a saturated zone of the soil above a dry zone.

TABLE B-2

BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined below.)

Soil name and Map Symbol	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets	Lawns and Landscaping
6B Creldon	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Severe: low strength	Moderate: wetness
22C Ocie	Moderate: too clayey, depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength, shrink-swell	Moderate: large stones
23B Bolivar	Moderate: depth to rock	Moderate: shrink-swell	Moderate:shrink-swell depth to rock	Moderate: shrink-swell	Moderate: low strength, shrink-swell	Moderate: thin layer
24F Gatewood	Severe: slope, depth to rock	Severe: shrink-swell, slope	Severe: shrink-swell depth to rock, slope	Severe: shrink-swell, slope	Severe: low strength, slope, shrink-swell	Severe: small stones, slope
Ocie	Severe: slope	Severe: shrink-swell, slope	Severe: shrink-swell slope	Severe: shrink-swell, slope	Severe: low strength, slope, shrink-swell	Severe: slope
Rock outcrop.						
25D Ocie	Moderate: too clayey, depth to rock, slope	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: large stones, slope
Bardley	Severe: depth to rock	Moderate: shrink-swell,	Severe: depth to rock	Severe: slope	Severe: low strength	Severe: small stones
Gatewood	Severe: depth to rock	Severe: shrink-swell	Severe: depth to rock, shrink-swell	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: large stones, slopes
27D Bolivar	Moderate: large stones, depth to rock, slope	Moderate: shrink-swell, large stones, slope	Moderate:depth to rock, slope, shrink-swell	Severe: slope	Moderate: low strength, slope, frost action	Severe: large stones
35D Doniphan	Moderate: too clayey, slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Severe: low strength	Severe: small stones
35D Clarksville	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Severe: small stones
45D Clarksville	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Severe: small stones
45F, 45G Clarksville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, small stones
83G Gasconade	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, thin layer
Rock outcrop.						
94 Pits. Dumps.						

Large stones - Rock fragments 3 inches (7.5 cm) or greater.

Shrink-swell - Expansion and contraction of clays from wetting and drying.

TABLE B-3

SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined below.)

Soil Name and Map Symbol	Septic Tank Absorption Fields	Sewage Lagoon Areas	Trench Sanitary Landfill	Area Sanitary Landfill	Daily Cover for Landfill
6B Creldon	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness, too clayey	Moderate: wetness	Poor: too clayey, small stones, hard to pack
22C Ocie	Severe: percs slowly, wetness	Severe: wetness	Severe: too clayey, depth to rock	Moderate: depth to rock	Poor: too clayey, hard to pack
23B Bolivar	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: area reclaim
24F Gatewood	Severe: percs slowly, slope, depth to rock	Severe: depth to rock, slope	Severe: too clayey, slope, depth to rock	Severe: slope, depth to rock	Poor: too clayey, area reclaim, hard to pack
Rock outcrop.					
25D Ocie	Moderate: percs slowly, large stones	Severe: seepage	Severe: too clayey, large stones	Severe: seepage	Poor: too clayey, small stones
43D Goss	Moderate: percs slowly, slope, large stones	Severe: seepage, slope	Severe: too clayey, large stones	Severe: seepage	Poor: too clayey, small stones
44G Goss	Severe: slope	Severe: seepage, slope	Severe: slope, too clayey, large stones	Severe: seepage, slope	Poor: too clayey, small stones, slope
Gasconade	Severe: depth to rock, slope, large stones	Severe: depth of rock, large stones	Severe: depth to rock, slope, too clayey	Severe: depth to rock, slope	Poor: area reclaim, too clayey, large stones
45E Clarksville	Severe: slope	Severe: seepage, slope	Severe: seepage, slope, too clayey	Severe: seepage, slope	Poor: too clayey, small stones, slope
55A Huntington	Severe: flooding	Severe: flooding	Severe: flooding, wetness	Severe: flooding	Good
81B Tonti	Severe: percs slowly, wetness	Moderate: slope	Severe: too clayey, wetness	Moderate: wetness	Poor: hard to pack, too clayey
92A Cedargap	Severe: flooding	Severe: seepage, flooding	Severe: flooding, seepage	Severe: flooding, seepage	Poor: small stones
Secesh	Severe: flooding	Severe: seepage, flooding	Severe: flooding, seepage	Severe: flooding, seepage	Poor: small stones
93A Cedargap	Severe: flooding	Severe: seepage, flooding	Severe: flooding, seepage	Severe: flooding, seepage	Poor: small stones

Perc slowly: slow movement of water through the soil.
Seepage: movement of water through the soil.

APPENDIX C

EXISTING LAND USE CLASSIFICATION SYSTEM

Grouping	Sub-grouping and Examples
Residential	**Single Family** - Detached single family homes.
	Duplexes - Two-family homes.
	Multi-Family - Triplexes, apartments.
	Group Quarters - Boarding houses; retirement homes; juvenile care homes.
	Mobile Homes - Mobile homes on individual lots.
	Mobile Home Parks - Mobile homes in a group park.
Commercial	**General Commercial** - Retail and wholesale establishments selling: dairy products, bakeries, auto parts, clothing, shoes, furniture, food, appliances, drugs, liquor, hardware,, sporting goods, books, jewelry, etc.; photographic studios; beauty and barber shops; shoe repair, funeral homes; health clubs; repair services for appliances; theaters; bowling alleys; hotels and motels; restaurants; photo copy and blueprint services; other similar uses. Banks and banking services; credit agencies; real estate sales; insurance agents; title and abstract; investment offices; medical and dental labs; services such as: legal, architectural, engineering, accounting, advertising, data processing, management and other similar uses.
	Heavy Commercial - Motor vehicle sales and service; service stations; motorcycle sales and service; laundries and dry cleaners; carpet and upholstery cleaners; motor vehicle renting; car washes; building materials; lawn and garden shops; mobile home dealers; equipment rentals; agricultural products; kennels; other similar uses.

Industrial	**Light Industrial** - Warehouses; wholesale trade establishments; automobile auctions; truck warehouses. Production such as: clothing, lumber and paper products; professional instruments; and other similar uses. **Heavy Industrial** - Production of new products such as: stone, glass, concrete and clay products; metal products; machinery and equipment; petroleum products; rubber and leather products; chemicals; ordinance; and extractive industries.
Transportation, Communication & Utilities	Transit services such as taxi, school buses; transit maintenance services; telephone; radio and television broadcasting; electric, gas, water and sanitary sewer services and facilities.
Public/Semi-Public	All public and private schools and educational services; museums; art galleries; historic sites; libraries. Government offices; public health services; post offices; job services; social service agencies. Nursing homes; convalescent homes. Churches; cemeteries; business associations; labor unions; civic organizations; political organizations.
Parks & Recreation	Parks; special activity facilities; playgrounds; gymnasiums; fairgrounds; campgrounds.
Streets & Right-of-Way	Public and private streets and rights-of-way.
Agriculture/Rural Residential	Fallow land; farming; cattle grazing and related activities; hogs and poultry production with associated single family residences.
Forest	Public and privately owned forested land with no obvious activity.
Vacant	Vacant lots in urbanized areas.

APPENDIX D

TABLE D-1
---2002 - 2007---- AVERAGE ANNUAL DAILY TRAFFIC COUNTS
Christian County, Missouri

ROUTE	SEGMENT MILEAGE	BEGINNING SEGMENT DESCRIPTION	AADT		PERCENT CHANGE 2002 - 2007
			2002	2007	
B-65	1.341	RTE 65			
AA	2.2	BEGIN STATE CON	528	496	-6.1
AA	0.536	RTE 160	4,140	3886	-6.1
BB	2.05	RTE 176	220	222	0.9
CC	0.5	RTE 160	7,010	10386	48.2
CC	4.072	E RD SEC 36			
DD	3.454	RTE 14	158	166	5.1
EE	3.567	RTE 160	4,182	3908	-6.6
HH	2.64	RTE 160	538	664	23.4
JJ	3.5	RTE 125	1,246	1182	-5.1
JJ	0.8	MCCRACKEN			
JJ	0.224	W RD SEC 30			
KK	1.476	RTE U	340	352	3.5

MM	1.517	BEGIN STATE CONS	190	210	10.5
NN	3.01	Route 60	2,040	x	
NN	3.205	RTE J	5,300	8390	58.3
OO	2.55	RTE 14	222	298	34.2
PP	0.5	RTE 14	1,004	902	-10.2
PP	1.5	E RD SEC 36			
UU	0.54	DOUGLAS CO LINE	174	x	
UU	2.16	RTE T S JCT	168	98	-41.7
UU	1.2	W RD SEC 29			
UU	4.5	E RD SEC 32			
UU	2.553	E RD SEC 20			
VV	1.006	GREENE CO LINE	996	1278	28.3
ZZ	1	GREENE CO LINE	1,162	1364	17.4
ZZ	1.9	W RD SEC 2-35			
ZZ	0.9	W RD SEC 3-10			
ZZ	0.7	E RD SEC 10			
ZZ	0.987	W RD SEC 9-16			
A	0.677	RTE 65	362	x	
F	3.025	BEGIN STATE CON	1,256	1014	-19.3
H	2.6	RTE 125	500	398	-20.4
H	7.294	W RD SEC 2			
J	0.567	RTE 65	7,876	14772	87.6
K	0.6	RTE 14	4,042	5660	40.0
K	0.4	SW RD IN CLEVER			
K	2.454	S RD SEC 29			
M	0.8	STONE CO LINE			
M	3.071	NW RD SEC 33			
N	4.045	RTE 14	1,128	1440	27.7

O	3.375	STONE CO LINE			
P	3	GREENE CO LINE		4376	
P	1.307	E RD SEC 28			
T	3.1	RTE 125	480	526	9.6
T	2.7	N RD SEC 11			
T	3.71	RTE DD	502	552	10.0
T	0.64	RTE UU N JCT	454	x	
T	0.107	RTE UU S JCT	538	506	-5.9
U	3.141	RTE 125	454	522	15.0
U	1.859	RTE VV	426	742	74.2
U	1	S RD SEC 5			
U	2.99	S RD SEC 4			
U	0.284	RTE KK	1,110	1168	5.2
V	2.283	STONE CO LINE	582	546	-6.2
W	0.25	BEGIN STATE CON	2,448	x	
W	3.25	RTE 14	2,682	2868	6.9
W	1.4	W RD SEC 13			
W	0.7	CHRISTIAN CENTER			
W	2.686	E RD SEC 19			
Z	3.372	BEGIN STATE CON	208	174	-16.3
13	3.914	RTE 60	2,404	2836	18.0
14	1.51	LAWRENCE CO LINE			
14	0.99	RTE MM	886	882	-0.5
14	0.222	W C-L BILLINGS			
14	6.098	RTE 60 N JCT	1,718	1919	11.7
14	1.51	RTE K-P	2,562	2863	11.7
14	2.58	RTE ZZ	3,000	3348	11.6
14	4.33	RTE N	3,960	4423	11.7

14	1.32	RTE M	7,114	x	
14	4.76	RTE 160	11,574	11909	2.9
14	1.01	RTE 65	16,544	19010	14.9
14	1.64	RTE NN	19,028	18678	-1.8
14	1.72	BUS 65	15,868	16594	4.6
14	0.88	RTE W	8,150	12326	51.2
14	2.02	RTE JJ	5,804	8776	51.2
14	2.01	RTE OO	5,190	7846	51.2
14	0.26	RTE 125 W JCT	6,108	9234	51.2
14	0.44	RTE PP	4,380	6626	51.3
14	7.36	RTE 125 E JCT	3,718	3104	-16.5
14	0.54	RTE DD	1,828	x	
14	2.598	RTE Z	1,564	1528	-2.3
60	3.13	LAWRENCE C/L	10,088	10826	7.3
60	0.96	RTE 13	12,426	12676	2.0
60	0.61	RTE 14 S JCT	15,261	15514	1.7
60	0.3	RTE 14 N JCT	15,094	14508	-3.9
60	2.811	N C-L BILLINGS			
65 SB	1.5	GREENE CO LINE	21,985	25454	15.8
65 NB	1.5	GREENE CO LINE	20,180	23903	18.4
65 SB	3.28	RTE CC-J	15,309	18936	23.7
65 NB	3.28	RTE CC-J	15,074	19796	31.3
65 SB	1.42	RTE 14	14,727	18512	25.7
65 NB	1.42	RTE 14	14,070	17741	26.1
65 SB	3.726	RTE F	10,598	12469	17.7
65 NB	3.726	RTE F	10,997	11576	5.3
65	7.27	RTE EE	17,724	22298	25.8
65		END DIV PAV	17,714	x	

65	2.11	RTE BB-A	17,451	21966	25.9
125	0.5	GREENE CO LINE			
125	1	SW RD SEC 33			
125	2.1	RTE U	1,790	3733	108.5
125	2.3	RTE JJ	786	2376	202.3
125	1.7	W RD SEC 23			
125	0.413	N C-L SPARTA			
125	2.687	RTE 14 E JCT	3,022	3130	3.6
125	3.4	RTE T	2,066	2142	3.7
125	1.56	CHADWICK			
125	8.34	RTE H	686	472	-31.2
125	2.89	SE RD SEC 34			
125	1.911	RTE UU	664	456	-31.3
160 EB	0.25	GREENE CO LINE			
160 WB	0.25	GREENE CO LINE			
160 EB	0.49	RTE AA	10,953	14267	30.3
160 WB	0.49	RTE AA	10,953	14443	31.9
160 EB	2.799	RTE CC	9,636	12554	30.3
160 WB	2.799	RTE CC	9,636	12709	31.9
160 EB	0.259	RTE 14	6,853	7386	7.8
160 WB	0.259	RTE 14	6,853	7236	5.6
160	0.302	END DIV PAV	10,776	11489	6.6
160	3.3	S C-L NIXA			
160	0.654	RTE EE	9,838	7574	-23.0
160	1.192	RTE O	7,722	5946	-23.0
160	1.299	RTE HH	7,116	5478	-23.0
160	2.042	RTE V	8,232	6340	-23.0
160	2.614	RTE 176 N JCT	8,482	x	

160	0.975	RTE 176 S JCT	6,766	6528	-3.5
176	0.368	STONE CO LINE			
176	3.417	RTE 160 N JCT	758	580	-23.5
176	2.4	RTE BB	658	690	4.9

Source: Missouri Department of Transportation.

*A Actual Count
*B Revised Count (based on growth factor formula).
All other counts are estimated projections for 1991.

APPENDIX E

LAND USE SPACE ALLOCATION FORMULAS

This appendix provides space allocation formulas used in determining future acreage requirements in the Land Use element of the Comprehensive Plan. The specific formulas and assumptions applied to arrive at acreage needs for residential, industrial and commercial developments in the unincorporated portions of the County are noted below.

Residential Development Requirements

1. Past editions of the Christian County Comprehensive Plan operated on the assumption that 60% of future population growth would occur in the unincorporated (rural) portions of the County. Recent census data shows that from the years 2000 - 2007, 76.5% of the County's growth has occurred in what are now incorporated areas. This statistic and the concept it represents is a number that is difficult to define due to the fact that much of this development originated in the unincorporated County but was then later annexed into the jurisdiction of one of the various municipalities. For this reason we will now look at future land use needs on an aggregate basis for the County as a whole and no longer from a rural / urban perspective.

2.	*Projected Year 2020 Population*	*107,318*
	- 2007 Population	*- 73,066*
	Additional Year 2020 Population	*34,252*
	Projected Year 2030 Population	*131,066*
	- 2007 Population	*- 73,066*
	Additional Year 2030 Population	*58,000*

4. Assume 90% of new population to reside in single family dwellings, 10% in multiple family dwellings.

   .90(34,252) = 30,827 Additional Population in Single Family Dwellings in Year 2020

   .10(34,252) = 3,425 Additional Population in Multiple Family Dwellings in Year 2020

   .90(58,000) = 52,200 Additional Population in Single Family

Dwellings in Year 2030

.10(58,000) = 5,800 Additional Population in Multiple Family Dwellings in Year 2030

5. Assume average household size of 2.62 persons for single-family dwellings and 1.8 persons for multiple family dwellings.

$$\frac{\text{Additional Population}}{\text{Average H.H. Size}} = \text{Additional Single Family Dwellings}$$

$$\frac{30{,}827}{2.62} = 11{,}766 \text{ Additional Single Family Dwellings-Year 2020}$$

$$\frac{52{,}200}{2.62} = 19{,}924 \text{ Additional Single Family Dwellings-Year 2030}$$

$$\frac{3{,}425}{1.8} = 1{,}903 \text{ Additional Multiple Family Dwellings-Year 2020}$$

$$\frac{5{,}800}{1.8} = 3{,}222 \text{ Additional Multiple Family Dwellings-Year 2030}$$

6. *Total Additional Dwellings Year 2020 = 13,669*

Total Additional Dwellings Year 2030 = 23,146

7. Project 85% of dwelling units at density of 1 d.u./5 acres and 15% of dwelling units at density of 1 d.u./acre.

.85(13,669) x 5 = 58,093 acres

.15(13,669) = 2,050 acres

Total Additional Residential Acres Year 2020 = 60,143 acres

.85(23,146) x 5 = 98,370 acres

.15(23,146) = 3,472 acres

Total Additional Residential Acres Year 2030 = 101,842 acres

Commercial Development Requirements

1. Future commercial acreage requirements are projected on the basis of 1,000 square feet of commercial space for every person added to the population. This formula is based on acreage requirements to serve the local population. Commercial activity designed to draw and serve customers from outside the local area, such as tourists, would require additional space allocation.

2. Projected Year 2020 Additional Population = *34,252*

   34,252(1,000) = 34,252,000 sq. ft. =786 Acres

   786 Acres Additional Commercial Land by Year 2020

3. Projected Year 2030 Additional Population = *58,000*

   58,000(1,000) = 58,000,000 sq. ft. = 1331 Acres

   1331 Acres Additional Commercial Land by Year 2030

Industrial Development Requirements

1. Future industrial space requirements are projected on the basis of 12 acres per 1,000 additional residents. The following requirement is projected 20 years into the future (2020-2030) as industrial activity has specific site location requirements that necessitate reserving appropriate space for a longer time period.

2. Projected Year 2020 Additional Rural Population = 34,252

   (58,000/1000) x 12 (20 year requirement) = 696 Acres

   696 Additional Acres Industrial Land by Year 2030

APPENDIX F

Citizen Survey

Please rate the **importance** of the following criteria based on residential location preferences. The question you are being asked to address is how important it is to you personally to live in an area with these things nearby and not whether they are at this time. *Accessibility* in this case means the ease with which the following attractions or opportunities can be reached from your home. Please circle the level importance for each question based on the following scale:

5) Highly Important
4) Very important
3) Important
2) Somewhat Important
1) Not Important

1. Accessibility to employment

5 4 3 2 1

2. Accessibility to schools and or daycare

5 4 3 2 1

3. Accessibility to shopping centers

5 4 3 2 1

4. Accessibility to parks and recreation

5 4 3 2 1

5. Accessibility to health care services

5 4 3 2 1

6. Accessibility to public transport or multi-use trails

5 4 3 2 1

7. Proximity to emergency services; fire stations, police, emergency rooms, etc.

5 4 3 2 1

8. Proximity to public utilities; sanitary sewer, water, etc.

5 4 3 2 1

9. Land values, home price and age of structure

5 4 3 2 1

Please take a moment to answer a few more short questions

Number of persons in your household?_____

Number of school age children or otherwise dependent persons in your household?_____

Number of vehicles available?_____

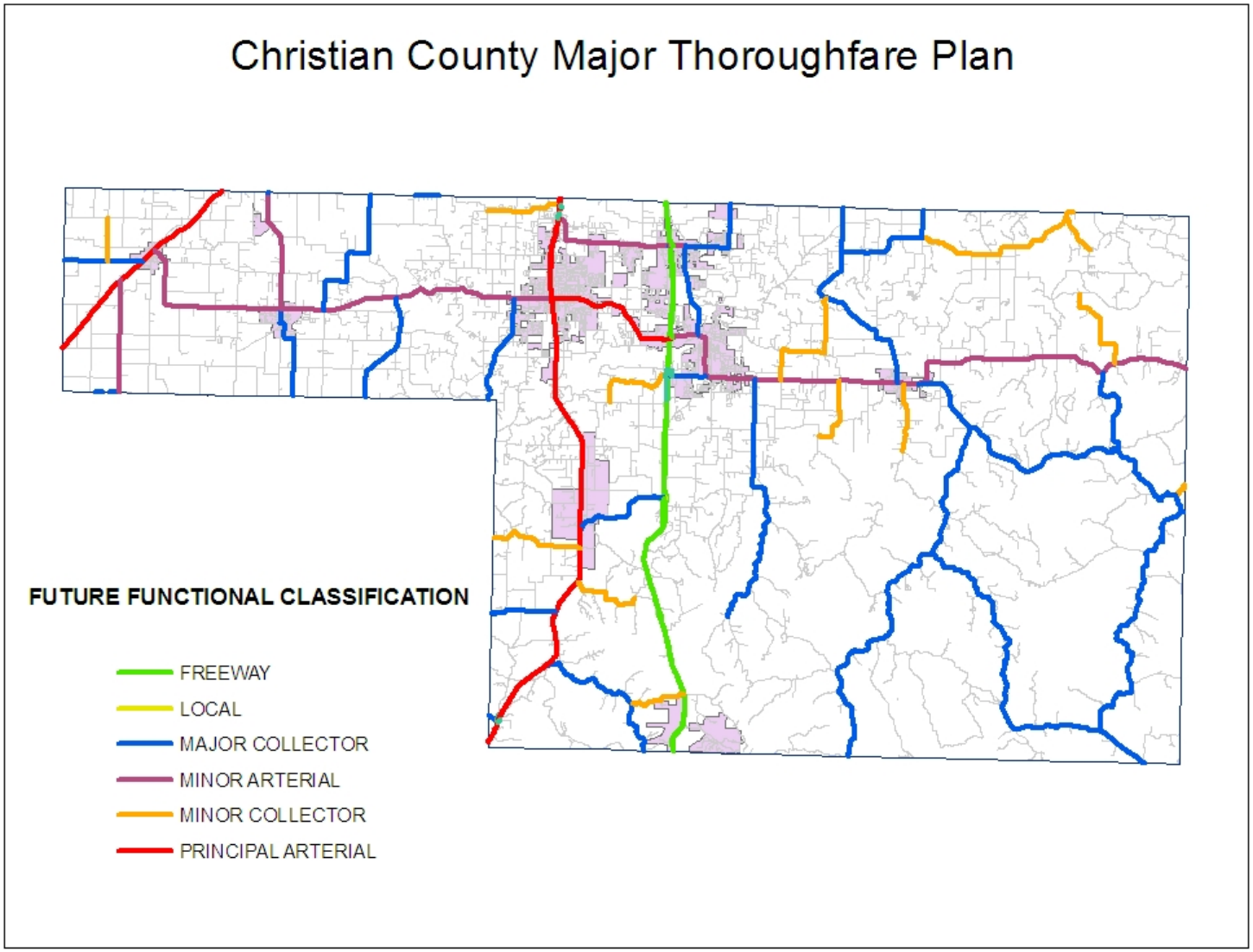
Do you work or have been most recently employed in Christian County?

Yes / No

If no, in which county do you currently work or have been most recently employed?

That's it, you're finished. Thank you very much for taking the time to help us. It is greatly appreciated.

APPENDIX G


Christian County Major Thoroughfare Plan
FUTURE FUNCTIONAL CLASSIFICATION
FREEWAY
LOCAL
MAJOR COLLECTOR
MINOR ARTERIAL
MINOR COLLECTOR
PRINCIPAL ARTERIAL

GLOSSARY

Aquifer - A rock formation or group of formations that contains sufficient saturated, permeable material to yield quantities of water to wells and springs.

Average Daily Traffic (ADT) - The total traffic volume during a given time period, in whole days greater than a day and less than a year, divided by the number of days in the time period.

Flood (100-Year) - A base flood having one percent chance of annual occurrence.

Floodplain - Low-lying region along rivers and streams, periodically subject to natural flooding.

Floodway - The channel of a river or other watercourse and the adjacent portion of the floodplain required to discharge the 100-year flood without cumulatively increasing the water surface elevation more than one foot.

Fragipan - An often hard and impervious layer beneath the surface soil. A fragipan appears cemented and restricts root penetration and the downward percolation of surface waters. When moist, it tends to rupture suddenly under pressure.

Karst Topography - The relief of an area underlain by calcium-rich limestones and dolomite bedrock. Surface waters, entering the bedrock through fractures and joints, dissolve the calcium in the bedrock, resulting in the formation of sinkholes, caves and other underground features which connect the surface water with the groundwater.

Loess - Fine grained silt materials deposited by wind.

Losing Stream - A stream which loses its water to the underlying groundwater system in areas of karst topography.

Metropolitan Statistical Area - A city of 50,000 or more people, including the suburbs of the city and the surrounding economic area. The Springfield MSA includes Greene and Christian Counties.

Percolation - The downward flow or infiltration of water through the pores of rock or soil.

Pollutant - Any gas, liquid or solid introduced into an environment that makes a resource unfit for a specific purpose.

Porosity - A measure of the space between the grains or cracks in soil and rock that can fill with water.

Runoff - The precipitation discharged into stream channels from an area. Water that flows off the land without sinking into the soil is called surface runoff.
Septic System - An underground system using a septic tank for the decomposition of domestic wastes.

Sinkhole - A steep depression in the landscape, normally associated with karst topography, where the underlying limestone bedrock has been dissolved.

Slope - The inclination of the land surface from horizontal.

Soil Permeability - The ability of the soil to transmit groundwater or other fluids through pores and cracks.

Soil Series - A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils have horizons that are similar in composition, thickness and arrangement.

Transportation System Management Improvements (TSM) - Non-structural improvements to a transportation system to ease congestion and improve upon the movement of traffic. Examples: ride-share programs, one-way streets, traffic signal improvements, bicycle paths, pedestrian separation, etc.

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