

CHAPTER III

Affected Environment

A. Geographic Setting

The Route 65 corridor is located in the Springfield Plateau Section of the Ozark Natural Division (Missouri Department of Natural Resources Geological Survey). The project lies on the western edge of the East Osage River Basin. The East Osage River Basin encompasses 2,475 square miles of Osage, Maries, Cole, Pulaski, Miller, Camden, Morgan, Benton, Laclede and Hickory counties. The majority of the project area drains east to Osage River tributaries, although a small portion of the project area drains west to the Truman Reservoir.

The topography along most of the corridor can generally be described as flat to rolling, with medium to broad ridges and moderate slopes. However, steeper hills characterize the southern end of the corridor, as evidenced by the rock cuts along the existing highway. Elevations in the corridor range from approximately 709 feet National Geodetic Vertical Datum (NGVD) in the flats near the Lost Valley Fish Hatchery, to about 960 feet near Lincoln. **Figure III-1** depicts the general location of the project, Route 65 and Benton County.

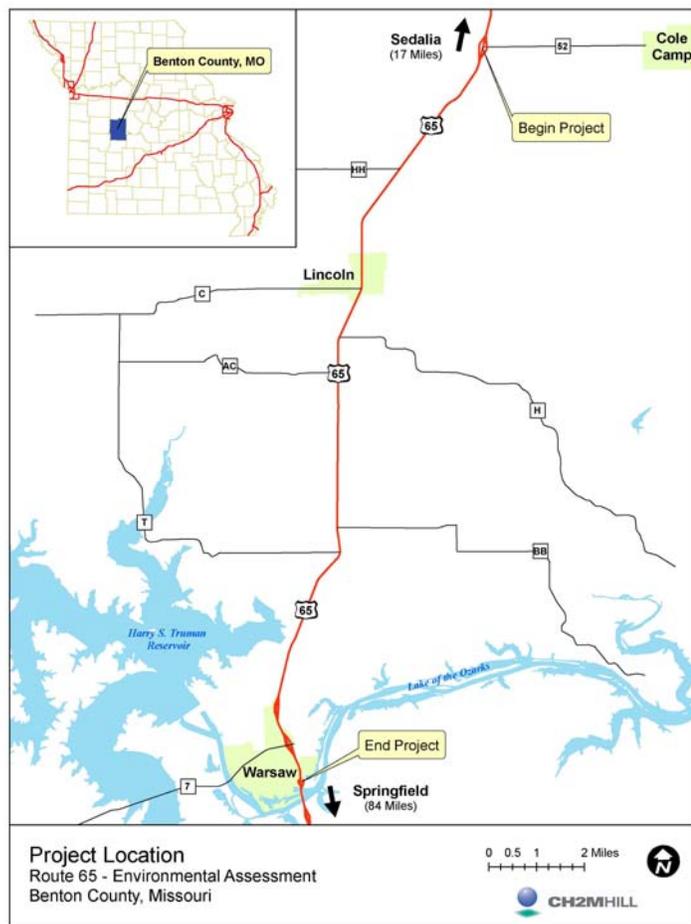


Figure III-1: Route 65 Project Location Map

Historically, the native Osage tribe occupied the basin. European settlers cleared timber and began large-scale cultivation. In 1931, construction of Bagnell Dam was completed, forming Lake of the Ozarks, a prime recreational and tourist destination. Harry S. Truman Dam and Reservoir was completed in 1979. Bagnell Dam and Truman Dam both currently provide hydroelectric power generation. Agriculture in the basin has experienced a shift from a crop-based system to a livestock-based system. Precipitation in the basin is typical of a mid-Missouri basin with an average of 40 inches per year. There are more than

85,000 residents of the basin served by public-supplied surface water, public-supplied groundwater or private wells. Water quality is normally good.

B. Social and Economic Characteristics

This section presents the social and economic characteristics of the Route 65 study area. These characteristics include demographic and economic data, community resources, the transportation planning environment and land use information. Information on each topic is provided for the jurisdictions within the project area as appropriate, including the state of Missouri, Benton County and the cities of Lincoln and Warsaw. **Exhibits III-1A–D** is a depiction of the community-related resources discussed throughout this portion of the text.

1. Demographic and Economic Profile

This section provides an overview of the demographic and social characteristics within the study area including population, age, race, housing, employment and income.

a. Population

Population was examined at several levels including the state, county, city and project area. The census block groups that encompass the reasonable range of alternatives defined the project area.

Population increases occurred at each jurisdictional level between 1990 and 2000. During this period, the state of Missouri's population increased by 9.3 percent (an additional 478,138 residents), and Benton County's population increased by 24 percent (an additional 3,321 residents). Population in the project area increased by 31.1 percent (an additional 1,490 residents), while growth in the communities of Lincoln and Warsaw was 23.4 and 18.4 percent, respectively. **Table III-1** shows populations trends in the project area as taken from the U.S. Census.

Table III-1: State, County, City and Project Area Population Trends

Location	1990	2000	Change 1990-2000	Percent Change 1990-2000
State of Missouri	5,117,073	5,595,211	478,138	9.3
Benton County	13,859	17,180	3,321	24.0
City of Lincoln	832	1,027	195	23.4
City of Warsaw	1,696	2,008	312	18.4
Project Area*	4,798	6,288	1,490	31.1

*Project Area: Block groups in Census Tracts 9602 and 9603 that encompass the reasonable range of alternatives.
Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

The University of Missouri Extension, Office of Social and Economic Data Analysis (OSED), estimates that the population of Benton County will increase by 16 percent to 19,905 in the year 2010, while the state of Missouri will increase by approximately four percent to 5,808,393 in the year 2010. It is anticipated that the jurisdictions in the project area would experience a population increase similar to Benton County in the year 2010. This would represent a more modest increase than was experienced between 1990 and 2000 (**Table III-2**).

Table III-2: Forecast Population Growth in State and County

Location	2000 Population	2010 Population	Change 2000-2010	Percent Change 2000-2010
State of Missouri	5,595,211	5,808,393	213,182	3.8
Benton County	17,180	19,905	2,725	15.9

Source: University of Missouri Extension, Office of Social and Economic Data Analysis (OSED)

b. Age

The age characteristics for the project area are consistent with Benton County, Lincoln and Warsaw (see **Table III-3**). In 2000, the median age in the project area was 43.5, the percentage of persons 17 and under was just over 20 percent and the percentage of persons 65 and older was nearly 25 percent. This represents a modest increase in the percentage of people 17 and under from 1990 and a modest decrease in the percentage of people 65 and older.

Table III-3: State, County, City and Project Area Age Characteristics

Location	Year	Median Age	Percent 17 and Under	Percent 65 and Older
State of Missouri	1990	33.5	25.7	14.0
	2000	36.1	25.5	13.5
Benton County	1990	*	21.4	22.7
	2000	46.3	20.5	22.4
City of Lincoln	1990	*	18.0	34.4
	2000	40.2	25.9	28.1
City of Warsaw	1990	*	19.9	30.4
	2000	44.1	20.2	26.8
Project Area	1990	*	19.8	26.3
	2000	43.5	21.3	23.9

** Census data for median age not available.*

Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

c. Race and Ethnicity Characteristics

Table III-4 identifies race and ethnicity characteristics for the State of Missouri, Benton County, Lincoln, Warsaw and the project area.¹ The percentage of people who identified themselves as members of a minority race was 15.2 percent in the State of Missouri, compared to 2.4 percent in Benton County and 2.2 percent in the project area. The percentage of people who identified themselves as being of Hispanic or Latino origin was 2.1 percent for the state, which is slightly higher than Benton County (0.8 percent) and the project area (1.3 percent). The cities of Lincoln and Warsaw had a slightly higher percent of persons that identified themselves as minority and of Hispanic or Latino origin than the project area as a whole.

Table III-4: Race and Ethnicity Characteristics, 2000

Location	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Races	Percent Minority	Percent Hispanic or Latino (of any race)
State of Missouri	4,746,952	622,087	26,200	60,429	3,071	136,472	15.2	2.1
Benton County	16,768	46	99	9	0	258	2.4	0.8
City of Lincoln	986	8	1	0	0	32	4.0	3.2
City of Warsaw	1,951	4	0	4	0	49	2.8	2.3
Project Area	6,151	12	31	4	0	90	2.2	1.3

Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

Table III-5 identifies the race and ethnicity by the individual block groups that encompass the reasonable range of alternatives. The percentage of people who identified themselves as being from a minority race ranged from 1.0 to 4.7 percent. The percentage of people who identified themselves as being of a Hispanic or Latino origin ranged from 0 to 3.4 percent.

Table III-5: Race and Ethnicity Characteristics of Project Area Block Groups, 2000

	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Races	Percent Minority	Percent Hispanic or Latino (of any race)
Block Group 1, Census Tract 9602	1,172	0	5	0	0	18	1.2	0.0
Block Group 2, Census Tract 9602	1,007	8	10	0	0	64	4.7	3.1
Block Group 1, Census Tract 9603	1,642	0	16	0	0	0	1.0	0.0
Block Group 2, Census Tract 9603	1,164	0	0	0	0	54	2.3	3.4
Block Group 3, Census Tract 9603	1,166	4	0	4	0	44	2.5	0.6

Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

¹ The block groups that encompass the reasonable range of alternatives defined the project area.

d. Housing Characteristics

Housing characteristics, shown in **Table III-6**, reflect a moderate rate of occupied dwellings and home ownership in Lincoln, Warsaw and the project area. Occupancy rates in the project area are over 75 percent. The percentage of owner-occupied housing units in the project area exceeds the state average but is lower than the value for Benton County. Median home values are generally moderate in the project area. Median home values of owner-occupied units were lower than the state value and were higher than the median value in Benton County.

Table III-6: Housing Characteristics, 2000

Location	Total Housing Units	Percent Occupied	Percent Owner Occupied	Median Value*
State of Missouri	2,442,017	89.9	70.3	\$86,900
Benton County	12,691	58.5	82.2	\$66,800
City of Lincoln	467	90.4	76.8	\$64,400
City of Warsaw	1,015	89.8	62.0	\$65,600
Project Area	3,331	78.7	75.1	\$76,117

*Median Value of Owner-Occupied Housing Units
Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

e. Employment Characteristics

As shown in **Table III-7**, within Benton County the retail trade and farm employment sectors employ the greatest number of people.

Table III-7: Total Full-time and Part-time Employment, 2003

Sector	State of Missouri		Benton County	
	Number	Percent	Number	Percent
Retail Trade	393,219	11.3	1,179	15.8
Farm Employment	118,314	3.4	936	12.6
Local Government	267,946	7.7	758	10.2
Construction	205,309	5.9	717	9.6
Accommodation and Food Services	233,148	6.7	577	7.7
Other Services, Except Public Administration	205,309	5.9	532	7.1
Health Care and Social Assistance	347,982	10	445	6
Manufacturing	323,623	9.3	435	5.8
Real Estate and Rental and Leasing	114,834	3.3	325	4.4
Transportation and Warehousing	125,273	3.6	292	3.9
Finance and Insurance	160,072	4.6	267	3.6
Professional and Technical Services	173,991	5	215	2.9
Administrative and Waste Services	167,031	4.8	181	2.4
Total Employment	3,479,817		7,455	

Source: University of Missouri Extension, OSEDA

As shown in **Table III-8**, approximately 60 percent of Benton County residents work in the county and eight percent work from home. The unemployment rate in Benton County is consistent with the unemployment rate in the state.

Table III-8: Travel to Work/Commuting Patterns, 2000

	State of Missouri		Benton County	
	Number	Percent	Number	Percent
Total Workers Aged 16 and Over	2,629,296		6,492	
Work Outside the County	878,185	33.4	2,531	39
Did Not Work at Home (commuters)	2,537,271	96.5	5,959	91.8
Commute Time: Less than 30 Minutes	1,735,335	66	3,637	56
30 to 60 Minutes	662,583	25.2	1,745	26.9
60 Minutes or More	141,982	5.4	577	8.9
Worked at Home	92,025	3.5	533	8.2
Unemployment Rate, May 2005		5.4		5.7

Source: University of Missouri Extension, OSEDA

f. Personal Income

Personal income is an indicator of the economic condition of the area. Income characteristics shown in **Table III-9** indicate that per capita income, median household income and the percentage of persons below the poverty line in the project area are comparable to Benton County as a whole. The per capita income and median household income in the project area were lower than the state values, and the percent of persons below the poverty line in the project area was slightly higher than the state value.

Table III-9: Income Characteristics

Location	Per Capita Income	Median Household Income in 1999	Percent of Persons Below Poverty Line
State of Missouri	\$19,936	\$37,934	11.7
Benton County	\$15,457	\$26,646	15.7
City of Lincoln	\$13,803	\$25,595	10.2
City of Warsaw	\$15,262	\$23,583	18.5
Project Area	\$15,547	\$26,586	13.7

Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

Table III-10 identifies the income characteristics by the individual block groups that encompass the reasonable range of alternatives. The per capita income ranged from \$13,152 to \$17,878, and the median household income ranged from \$20,833 to \$29,044.

The percent of persons below the poverty line ranged from 8.7 percent to 19.6 percent.

Table III-10: Income Characteristics of Project Area Block Groups, 2000

Location	Per Capita Income	Median Household Income in 1999	Percent of Persons Below Poverty Line
Block Group 1, Census Tract 9602	\$13,152	\$26,324	14.7
Block Group 2, Census Tract 9602	\$14,974	\$28,214	8.7
Block Group 1, Census Tract 9603	\$17,878	\$28,879	10.6
Block Group 2, Census Tract 9603	\$15,611	\$29,044	15.3
Block Group 3, Census Tract 9603	\$15,133	\$20,833	19.6

Source: U.S. Department of Commerce, Bureau of the Census, Census 2000

2. Community Resources – Facilities, Institutions and Services

Community resources are both government and non-government sponsored resources that are available to the public in the project area. These resources include schools, emergency services, churches and church-sponsored services and cemeteries.

a. Churches

There are 11 churches in the general project vicinity; most are located around Lincoln and Warsaw. Seven church properties are located within the study area for the initial range of alternatives study area:

- Lincoln Church of Christ – Located along the west side of Route 65 just south of Fordney Road in Lincoln;
- River Church – West of Route 65 just north of the Truman Dam Access Road;
- Poplar Baptist Church – East of Route 65 on Poplar Church Road near Route T;
- First Baptist Church of Lincoln – Lamine Street;
- Zion Church – Zion Church Road in Lincoln;
- United Methodist Church of Lincoln – Located at Locust and Center Street and
- Christian Outreach – Located along the east side of Route 65, north of Oak Street, in Lincoln.

All of the churches located in the project vicinity are shown on **Exhibits III-1A–D**.

b. Schools

There are two school districts that serve residents of the study area: Lincoln R-II and Warsaw R-IX. The Lincoln school district serves the northern approximately two thirds of the

project area and the Warsaw district the southern third. Lincoln Elementary and Lincoln High School are located near the center of Lincoln on Lamine Street. Warsaw schools are located in the city of Warsaw and south of the Osage River.

c. Cemeteries

There are six cemeteries within the general project vicinity, but none of them are within or adjacent to any of the alternatives. These include:

- Lincoln Cemetery – 0.7 mile west of Route 65, one mile north of Lincoln;
- Zion Cemetery – 0.3 mile west of Route 65 on Redmunde Avenue south of Lincoln;
- Vincent Cemetery – 0.5 mile west of Route 65 on Route AC;
- Drake Cemetery – 0.7 mile west of Route 65 off Sterett Creek Road and
- Riverside Cemetery – 1.0 mile west of Route 65 on the northwest side of Warsaw.

d. Emergency Services

Each city's police department provides police protection for the cities of Lincoln (122 East Main Street, 660-547-2718) and Warsaw (181 West Harrison Street, 660-438-5522). The Benton County Sheriff's Department (174 West Washington Street, Warsaw 660-438-5252) provides police protection for portions of the project area outside of the municipal boundaries.

Fire protection for the project area is provided by three volunteer fire departments. In the northern portion of the study area, the Cole Camp City Fire Department provides service. Near the city of Lincoln, the Lincoln Fire Department provides fire service. The Warsaw Fire Department serves the southern portion of the project area.

Residents in the project area are provided health care at Bothwell Regional Health Center in Sedalia. Emergency medical services for the northern end of the study area are provided by the Cole Camp fire department. For the rest of the project area, the Warsaw Lincoln Ambulance District provides service. There are two stations: one along Route 65 in Lincoln, and the other on the frontage road east of Route 65 at the southern project terminus.

3. Transportation Planning Environment

The Missouri Department of Transportation recognizes the need for coordinated planning efforts outside the metropolitan areas. To achieve this goal, MoDOT works with the regional planning organizations (RPOs) throughout the state. The RPOs were established as a result of the State and Regional Planning Community Development Act of 1965. The study area is located within the jurisdiction of the Kaysinger Basin Regional Planning Commission.

The Kaysinger Basin Regional Planning Commission coordinates local issues related to regional planning and development. They maintain an active working relationship with MoDOT. Federal law requires that states consult local officials in the transportation planning process. Regional planning organizations are consortiums of local governments. As such, they develop regional consensus, address transportation issues and are the most logical entities to help MoDOT fulfill federal requirements and capture local perspectives.

The Missouri Department of Transportation prepares a State Transportation Improvement Program (STIP) annually in consultation with the Kaysinger Basin Regional Planning Commission. The STIP sets forth the specific construction projects that MoDOT will undertake in the next five years. It covers highways and bridges, transit, aviation, rail, waterways, enhancements and other projects. The Route 65 project is included in the 2006–2010 STIP.

Relative to the Route 65 project, the Kaysinger Basin Regional Planning Commission provided technical support by making their GIS database available. They were also members of the Benton County Coalition. The Benton County Coalition is comprised of business owners and important political figures interested in the transportation issues affecting Benton County. In that role, they were an important liaison between the project team and the larger community. The work of the Benton County Coalition is discussed further in **Chapter V.A.4**.

There are no pedestrian or bicycle facilities in the vicinity of the portion of Route 65 under consideration. There are no sidewalks on Route 65 in Lincoln. Discussions with community leaders in Lincoln indicate that bicycle/pedestrian use of Route 65 is very limited. There is some crossing traffic, but bicycles and pedestrians intending to access resources along Route 65 do so by using the local roads that are behind the buildings that front on Route 65. There was no expressed desire for sidewalks among community leaders. At both of the public involvement meetings, typical cross-sections were presented. This was done to facilitate a discussion of how the roadway could be best configured within Lincoln. Turn lane and raised median configurations were shown; none depicted a sidewalk. Both of these meetings were well-attended, and discussions of bicycle/pedestrian issues were limited to medians and their affect on crossing Route 65. No interest in sidewalks was raised.

While there are no existing sidewalks along Route 65, in May 2006, the City of Warsaw applied for a Transportation Enhancement Funds Program grant. The intent was to do master planning for a trail system. The system would be concentrated along the Lake of the Ozarks and the Osage River. This main part of the trail system will have no impact to the Route 65 project. However, the application mentions a desire for connections to the Lost Valley Fish Hatchery. This has led to on-going informal coordination with Warsaw regarding bicycle/pedestrian facilities. Currently, the planning for the connections to the Lost Valley Fish Hatchery is very preliminary and seems to be limited to crossings of Route 65.

4. Land Use Planning Environment

a. Existing Land Use

Agricultural land use represents the majority of the land use in the project area, with urban and other land cover representing the balance. Urban land uses in the study area are largely confined to the cities of Lincoln and Warsaw. A field inventory of existing land uses was conducted in 2005 and 2006. The city of Lincoln is a rural small town that is predominantly residential, although most properties along Route 65 are commercial, including restaurants, convenience stores, fuel stations, auto repair and various other small businesses. On the north side of town is the Lincoln Municipal Airport, which has one turf runway with a north-south alignment. Between Lincoln and the Truman Dam Access Road interchange, the project area is again predominantly rural agriculture, with scattered commercial properties and residences.

The city of Warsaw's primary business core is in its Downtown/Main Street area, south and west of the project area. The majority of established residential neighborhoods ring the downtown area outside of the project area. Within the project area, established and developing commercial

land uses are located east and west of Route 65 from the Truman Dam Access Road interchange to the Route 7 interchange. The commercial area west of Route 65 is known as the North Town Retail District. This developing area includes restaurants, lodging, automobile dealers, Wal-Mart, the Osage Shopping Center, Truman Medical Village, fuel/convenience stores and a number of other small businesses. A number of restaurants and small businesses are also located along the east side of Route 65 between these interchanges. The Warsaw Municipal Airport is located about five miles north, along the west side of Route 65 at McDaniel Road. The airport includes one 3,300-foot concrete runway, a terminal building, and a 10-unit hangar facility.

b. Land Use Planning

Warsaw is the only community that has a formal comprehensive plan to guide future growth; other jurisdictions have informal or unwritten policies about future development in the community. The Warsaw comprehensive plan is rather old (1984) but does represent the community's current planning posture. It covers some lands in the vicinity of the project's southern terminus. The comprehensive plan identifies commercial and residential use along Route 7. The land at Route 65 and Truman Dam Access Road is identified as commercial.

Although the City of Lincoln has no formal land use plan, City officials have indicated that increasing the capacity of Route 65 is critical to Lincoln's growth. City officials have indicated that expanding Route 65 on its current alignment would have a very positive impact on the economic future of Lincoln. In 2003, the City formed the Lincoln Civic Redevelopment Corporation along Route 65 between Main Street and the north city limits at Frisch Ave. The City is currently in the process of establishing Lincoln as an Enhanced Enterprise Zone with the Department of Economic Development, which would provide tax credits as incentives to those non-retail businesses that provide jobs and manufacturing investment.

c. Public/Quasi-Public Land Uses

There are numerous public or quasi-public land uses within the project area. These land uses include traditional recreation and community service areas as well as other government owned facilities that might not typically be open to public use. Among the public/quasi-public facilities located within the project area are:

- Lincoln Municipal Airport – Located on the west side of Route 65, north side of Lincoln, the Lincoln Municipal Airport has a 2,940-foot long grass runway (see **Exhibit III-1B**). On-site amenities are limited to small hangers.
- Warsaw Municipal Airport – Located at the Route 65/McDaniel intersection, the Warsaw Municipal Airport is owned by the City of Warsaw (see **Exhibit III-1C**). The airport consists of a 3,300-foot concrete runway, terminal buildings, tarmac tie-down areas, an automated weather observation system and a 10-unit hangar facility.
- Lost Valley Fish Hatchery – Located on the east side of Route 65 just north of Truman Dam Access Road, the Missouri Department of Conservation has the responsibility for the Lost Valley Fish Hatchery (see **Exhibit III-1D**). Amenities include fishing ponds, a nature center, walking/interpretive trails and even limited hunting areas. The total area of the hatchery is 971 acres with approximately 5,000 feet of frontage along Route 65.

- Missouri Department of Transportation Maintenance Facilities – There are two MoDOT maintenance facilities in the project area. One MoDOT facility is located on the east side of Route 65, in Lincoln, just north of Fordney Road (see **Exhibit III-1B**). Another MoDOT Facility is located in the southeastern quadrant of the Route 7 interchange, in Warsaw (see **Exhibit III-1D**).
- Lincoln Municipal Offices – These are located in Lincoln on East Main Street (see **Exhibit III-1B**). The mayor’s office and the city’s community building are located here.
- Benton County Soil and Water Conservation District Field Office – Located on Route 65 in Lincoln, this field office provides soil, water and agricultural assistance to Benton County (see **Exhibit III-1B**).
- Warsaw Lincoln Ambulance District – There are two ambulance stations in the vicinity of the project. Lincoln Station #2 is located at 219 Route 65 in Lincoln (see **Exhibit III-1B**). Warsaw Station #1 is located at 1206 Medic Drive in Warsaw (see **Exhibit III-1D**). This ambulance district covers approximately 700 square miles in Benton County.
- The Lincoln School Playground – This playground is located adjacent to the Lincoln School on Lamine Street in Lincoln (see **Exhibit III-1B**).
- The Mike Hare Memorial Ball Field – This facility is located on both sides of Fordney Road in Lincoln (see **Exhibit III-1B**). Facilities include ball fields, recreation equipment and other passive amenities.
- The Truman Reservoir – The U.S. Army Corps of Engineers has the responsibility for managing 259 square miles of land and water at Truman Reservoir. Truman Reservoir is the largest flood control lake in Missouri. The reservoir has a surface area of about 56,000 acres; additionally 110,000 acres of public land surround the reservoir. Part of the reservoir property abuts Route 65; see **Exhibit III-1D**. There is approximately 9,200 feet of frontage along Route 65. The area adjacent to Route 65 is dominated by the embankment for the reservoir. While nominally open to the public, this adjacent area’s primary purpose is clearly not recreation.

C. Environmental and Related Resources

This section provides an overview of the natural resources and environmental characteristics present within the study area. **Exhibits III-2A–D** are depictions of the natural resources discussed throughout this portion of the text.

1. Soil and Mineral Resources

Limestone and dolomite are the primary bedrock types across Benton County. The corridor crosses an irregular north-south border between the two bedrock types, where a narrow layer of shale interbedded with dolomite separates the primary bedrock types.

The limestone and dolomite bedrock is prone to the development of sinkholes and caves, known as karst topography. Groundwater in this area is particularly susceptible to contamination from the surface in those areas because the sinkholes provide direct connections to the groundwater. The Missouri Department of Natural Resources has identified a number of karst features around the Truman Reservoir and the Lake of the Ozarks, but none within five miles of the project corridor. No sinkholes have been identified in the project area from field investigations. Karst features are further discussed below under Chapter III.C.3, “Groundwater and Water Supply.”

The parent material for most soils along the corridor is thin cherty clay or silty to sandy clay residuum, formed in place from the weathering of the bedrock. Well-drained and moderately well-drained soils comprise about two-thirds of the project corridor (see **Table III-11**). Somewhat poorly drained soils comprise another 11 percent, and poorly drained soils comprise about 16 percent. Poorly drained soils are generally located along streams, but also occupy a large portion of the flats at the Lost Valley Fish Hatchery and around the Truman Access Road interchange. About 90 percent of the soils in the corridor are considered highly erodible or potentially highly erodible. Only the soils located in flat areas are not considered erodible.

Table III-11: Summary of Soil Types in the Project Corridor

Soil Unit Name	Percent of Project Area	Drainage Class	Importance**	Erosion Potential	Hydric
Aquents	0.4	PD	—	Not highly erodible land	Hydric
Barden silt loam, 1 to 5 percent slopes	12.2	MWD	PF	Potentially highly erodible land	—
Barden silt loam, 1 to 5 percent slopes, eroded	4.3	MWD	PF	Potentially highly erodible land	—
Bardley cherty silt loam, 3 to 9 percent slopes	4.6	WD	SW	Highly erodible land	—
Bardley very cherty silt loam, 9 to 35 percent slopes	5.8	WD	—	Highly erodible land	—
Claiborne silt loam, 5 to 9 percent slopes	1.9	WD	SW	Highly erodible land	—
Creldon silt loam, 2 to 5 percent slopes	2.9	MWD	PF	Potentially highly erodible land	—
Creldon silt loam, 5 to 9 percent slopes	1.7	MWD	SW	Highly erodible land	—
Doniphan cherty silt loam, 3 to 9 percent slopes	0.3	WD	SW	Potentially highly erodible land	—
Eldon cherty silt loam, 3 to 9 percent slopes	20.9	WD	SW	Potentially highly erodible land	—
Eldon cherty silt loam, 9 to 14 percent slopes	6.0	WD	—	Highly erodible land	—
Goss cherty silt loam, 14 to 45 percent slopes	1.7	WD	—	Highly erodible land	—
Hartwell silt loam, 0 to 2 percent slopes	9.6	SPD	PF	Potentially highly erodible land	—
Hartwell silt loam, 1 to 3 percent slopes, eroded	1.8	SPD	PF	Potentially highly erodible land	—
McGirk silt loam, 2 to 5 percent slopes	1.0	PD	PFd	Potentially highly erodible land	Hydric
Osage silty clay loam, occasionally flooded	1.5	PD	PFd	Not highly erodible land	Hydric
Quarles silt loam, occasionally flooded	0.4	PD	PFd	Not highly erodible land	Hydric
Racket silt loam, occasionally flooded	2.2	WD	PF	Not highly erodible land	—
Sampsel silty clay loam, 2 to 5 percent slopes	12.8	PD	PFd	Potentially highly erodible land	Hydric
Sampsel silty clay loam, 5 to 9 percent slopes	0.9	PD	SW	Highly erodible land	Hydric
Udorthents, clayey	4.5	PD	—	Not highly erodible land	Hydric
Verdigris silt loam, occasionally flooded	1.7	MWD	PF	Not highly erodible land	—
Disturbed soils (Truman Reservoir dike)	0.9	WD	—	Potentially highly erodible land	—

* Drainage of the soil type under natural conditions: WD = well drained; MWD = moderately well drained; SPD = somewhat poorly drained; PD = poorly drained.

** PF = Prime farmland, SW = Farmland of statewide importance, PFd = Prime farmland if drained.

2. Farmland Resources

Based on soil characteristics, the Natural Resources Conservation Service has classified about 18 percent of the land in Benton County as prime farmland. Prime farmland is land best suited to food, feed, forage, fiber and oilseed crop and is available for these uses. It could be cultivated land, pastureland, forestland or other land, but it is not urban or built-up land or water areas. Prime farmland produces the highest yield with minimal expenditure of energy or economic resources. Further, prime farmland is suitable to cultivation, exhibiting few of the deleterious ecological impacts associated with other soil types. About one-third of the project corridor is considered prime farmland. About 15 percent more of the corridor is considered prime farmland if it is adequately drained. About 30 percent is considered farmland of statewide importance (see **Table III-11**), which includes lands not considered prime due to slope, drainage or flooding, but that produce high yields of crops when treated and managed according to modern farming methods. Some statewide important farmland may produce as high a yield as prime farmland if conditions are favorable. Combined, these soils comprise more than 80 percent of the project area.

Suitable soils and landform have made active agriculture the main land use in Benton County, occupying about 54 percent of the total area of the county. Roughly 25 percent of the county land area is used for row crops and hay, and 13 percent is used for livestock pasture. The average farm size in the county is 309 acres. Soybean is the most extensively grown row crop in the county, followed by corn, wheat and sorghum. Benton County ranks in the 68th percentile of Missouri counties for most agricultural commodities. According to the Missouri Department of Agriculture, total cash receipts in Benton County for agricultural products were \$30.8 million in 1997 and \$31.2 million in 2002, the majority coming from livestock. Crops accounted for only about one-sixth of the total agricultural production in 2002.

The Conservation Reserve Program offered by the U.S. Department of Agriculture encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as native grasses, wildlife plantings, trees, filter strips or riparian buffers, in exchange for a stipend. This action stabilizes the soil against erosion, and thereby reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat and enhances forest and wetland resources. Similar programs are the Wetland Reserve Program and the Grassland Reserve Program. There are no lands in the project area that are currently enrolled in any of these programs (Ricke, personal communication, 2006).

3. Groundwater and Water Supply

Groundwater is the primary drinking water source in the project area. The Ozark Plateaus Aquifer system south of the Missouri River consists of three aquifers that are separated by confining rock layers. Two of these aquifers underlie the project area: the Springfield Aquifer and the Ozark Aquifer.

The Springfield Aquifer is contained in the Mississippian-age limestone that is largely located to the west, but underlies a middle portion of the project area just south of Lincoln. The yield from wells in the Springfield Aquifer is generally less than 20 gallons per minute and is mostly used for domestic and stock-watering supplies. Recharge to the aquifer occurs as precipitation on the outcrop areas of the aquifer. While most rainwater that percolates to the water table actually moves laterally to discharge into streams, some portion of the percolating water penetrates into the deeper parts of the aquifer. This limestone rock formation is prone to the formation of

sinkholes, which makes this aquifer somewhat susceptible to contamination from the surface. According to recent monitoring by the Missouri Department of Natural Resources (MDNR), urbanization and livestock production have led to elevated nitrates and bacterial contamination problems in the Springfield Aquifer (MDNR, 2005). A review of mapping by the MDNR, topographic mapping, and field investigations has identified no sinkholes in the project area.

The deeper, more widespread Ozark Aquifer is the more important aquifer because it is a public water source. The Ozark Aquifer is contained in the Ordovician dolomite that underlies the majority of the project area. Groundwater yields from this aquifer are usually large and of excellent quality, such that some municipalities can pump and use groundwater without treatment. Depending on well depth and location, private domestic wells a few hundred feet deep can produce water ample for domestic purposes, while larger-diameter wells 1,200 to 1,500 feet deep typically can produce from 300 to more than 1,000 gallons of water per minute. Generally, the deeper wells in this aquifer yield high-quality water (United States Geological Survey [USGS], 2006; MDNR, 2006).

The Ozark Aquifer is somewhat protected from potential contamination through sinkholes, where it is confined beneath the limestone (Springfield Aquifer) and the mixed dolomite/shale layers. However, portions of the aquifer that are unconfined can also be susceptible to contamination from percolating surface waters.

There are 16 existing and one proposed public drinking water supply wells within one mile of the project corridor, excluding those south of the Osage River/Lake of the Ozarks (University of Missouri, Columbia, 2006). **Table III-12** describes the public water supply wells. Notably, one on the Lost Valley Hatchery (Well #2) is located about 150 feet east of Route 65 in the northwest corner of the hatchery property. There are also 134 private wells certified by the MDNR within one mile of the corridor (excluding those south of the Osage River/Lake of the Ozarks). Eight of these are considered abandoned, three are monitoring wells, and two others are in need of pump work. The remaining 121 wells are individual water wells and range in depth from 90 feet to 1,150 feet, with yields from 15 to 20 gallons per minute to as high as 1,600 gallons per minute. Seven are for irrigation, one is for a heat pump and the rest are considered drinking water wells.

Wellhead protection is accomplished under the Missouri Code of State Regulations, Title 10, Chapter 23, which establishes regulations for the construction of all wells, including water, oil, gas, injection and any other wells. There are no state regulations that limit land use within any of the watershed areas in the project area. There are no wellhead protection laws that would preclude construction of additional lanes on the existing alignment. The U.S. Environmental Protection Agency has designated no Sole Source Aquifers in Missouri.

Table III-12: Public Water Source Wells within One Mile of the Project Corridor

MDNR Well ID	Public Water Supply System Name	Local Well Name	System Type	Status
11033	The Benton House	Well #1	Restaurant	Active
12108	Bradley's Ribs, Steaks & Whatnots		Restaurant	Active
16709	Country Acres MHP		Mobile Home Park	Active
12216	Hot Spot #1	Well #1	C-Store/Svc. Station	Active
14667	Lincoln	City Park	City	Active
14666	Lincoln	At Tower	City	Active
12409	Lost Valley Hatchery	Well #2	Department of Conservation Area	Active
12410	Lost Valley Hatchery	Well #3	Department of Conservation Area	Active
12106	Motor Technologies Group		Industrial and Large Business	Active
12107	Quarter House		Restaurant	Inactive
12892	Rigby Bunkhouse Suites	Well #1	Motel/Hotel/Resort	Active
12859	Sterett Creek PUA	Well #1	Federal Facility	Active
13205	Sterett Creek Village	Proposed Stand-by Well	Subdivision	Proposed
11023	Sterett Creek Village	Well #1	Subdivision	Active
11034	The Dam Restaurant & Lounge	Private Well	Restaurant	Active
10280	Warsaw	Well #4	City	Active
12484	Warsaw	Well #4	City	Active

Source: Missouri Center for Agricultural, Resource and Environmental Systems (CARES), <http://maproom.missouri.edu/>

4. Surface Water Resources

The project corridor is largely located in the Lake of the Ozarks Basin (the USGS eight-digit hydrologic unit 10290109). About two miles of the project area drain to the Harry S. Truman Reservoir (the USGS eight-digit hydrologic unit 10290105). The Lake of the Ozarks Basin covers 1,385 square miles, and the Truman Reservoir Basin covers about 1,203 square miles.

The project corridor is crossed by a number of streams. **Table III-13** summarizes and characterizes the major (perennial and intermittent) streams and creeks crossing the Route 65 corridor, as identified on the USGS topographic quadrangle maps. All jurisdictional waters, which include these waters as well as others identified during field studies, are depicted on **Exhibits III-2A–D**.

Table III-13: USGS Mapped Streams in the Project Corridor

Stream Name	Classification per USGS	Stream Order	Crossing Location
Cole Camp Creek (11 digit HUC 10290109-020)			
Tributaries to Carman Creek	Intermittent	1, 2	North end of corridor
Tributaries to Cole Camp Creek (3)	Intermittent	1, 2	Between Lincoln and Route HH
Duran Creek	Intermittent	1	Near Route AC
Bird Branch	Intermittent	1	Near Meyer Road
Tributary to Bird Branch	Intermittent	1	Near McDaniel Road
Harry S. Truman Reservoir (11 digit HUC 10290105-080)			
Tributaries to Sterett Creek (6)	Intermittent	1, 2	Between Route T and Marina Road
Osage River East /Lake of the Ozarks (11 digit HUC 10290109-040)			
Tributaries to Osage River (6)	Intermittent	1, 2	South of Marina Road

The largest streams that cross the corridor are an unnamed tributary to Cole Camp Creek north of Lincoln, Duran Creek, Bird Branch, two tributaries to Sterett Creek and a tributary to the Osage River. While all of these streams are designated by the USGS as intermittent, and all of these streams are first or second order, many actually appeared to be small perennial streams in field studies. While some of the lower sections of named streams are classified in the Code of State Regulations (CSR) Water Quality Regulation (10 CSR 20-7), none of the stream reaches in the project corridor have been classified. There are no known losing streams in the project area.

In addition to streams identified by the USGS, there are numerous small, intermittent and ephemeral tributaries within the project area. Those streams generally flow only during wet seasons and during intense rain storms in drier seasons. Nevertheless, they are considered waters of the United States, and are regulated under the Clean Water Act. The locations of these smaller streams have been established by field studies. **Exhibits III-2A–D** depict all the streams in the project corridor.

Fisheries in the streams along the corridor generally depend on the amount of flow available at any time during the year. Intermittent and ephemeral streams would have limited, if any, value as fisheries. Perennial streams within the project area may provide habitat for fish and aquatic macroinvertebrates, such as crayfish, stoneflies, damselflies and mayflies. The value of the perennial streams as fisheries is mostly as headwaters suitable for spawning and nursery areas.

The MDC has not conducted any biological inventories in the streams within the project corridor. The Missouri Fish and Wildlife Information System lists non-game fish known from Benton County streams to include shiners, minnows, darters, madtom, shad, stonerollers and chubs. Game fish include largemouth, smallmouth and spotted bass; sunfish; black and white crappie; bullheads; carp and suckers. Cole Camp Creek is being evaluated for special smallmouth bass management by the MDC.

The project corridor is not within the watershed of any surface public water supply intakes. There are two water supply intakes in the Truman Reservoir, but these are both located upstream along the Cooper Creek section of the reservoir in Henry County, some 14 miles west of Route 65.

The portion of the project corridor that drains to the Truman Reservoir by way of Sterett Creek enters near the dam and far below the drainage to these public water supplies.

5. Water Quality

The quality of waters that drain central Benton County is a function of the underlying geology and the land uses in their watersheds. Most of the land in the area is underlain by moderately permeable limestone bedrock, which is generally beneficial to stream water quality. None of the streams within the project area have been assigned beneficial uses in the state Water Quality Regulations (10 CSR-20-7.031). However, based on their natural water quality conditions, segments of Cole Creek, Duran Creek, Bird Branch and Sterett Creek downstream of the project area have been assigned beneficial uses, namely livestock and wildlife watering and protection of warm water aquatic life and human health fish consumption. There are no outstanding national resource waters (designated under the National Wild and Scenic Rivers Act) in the project area. None of the streams in the project area have been designated by the Clean Water Commission as coldwater sport fisheries or outstanding state resource waters (<http://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7b.pdf>).

Point and non-point sources of pollution affect the natural water quality in project area streams. The watersheds of most streams in the project area are influenced by agricultural land uses. Potential non-point pollution from agriculture includes fertilizer and pesticides, sedimentation from erosion in tilled lands and high nutrient runoff from livestock operations.

The MDNR's 303(d) list names waters that are degraded and for which current pollution discharge limitations are not stringent enough to meet the water quality standards and to assure protection and propagation of the resident aquatic life. The list establishes total maximum daily loads (TMDLs) or the primary pollutants (which may vary for each stream) and a priority ranking for restoring the waters, taking into account the severity of pollution and uses to be made of the streams. No waters within the project corridor are designated Section 303 (d) waters. However, portions of the Lake of the Ozarks have been identified as 303(d) waters because of fish trauma, low dissolved oxygen or supersaturation (dam outfall), and portions of the Truman Reservoir have been identified as 303(d) waters for manganese levels.

6. Floodplains

Floodplains provide flood and stormwater attenuation by decreasing water velocities and providing temporary water storage. By temporarily storing water, floodplains help to remove sediments and provide erosion control. Floodplains also provide important ecosystem functions, such as nutrient export, increased primary productivity and wildlife habitat and movement corridors. These functions can vary from one location to another depending on vegetative structure, stream hydrology and distance from the stream.

Floodplain information for the project corridor is available from the Missouri Spatial Data Information Service, as derived from the Flood Insurance Rate Maps published by the Federal Emergency Management Agency (FEMA) for Benton County. The Federal Highway Administration and FEMA guidelines 23 Code of Federal Regulations (CFR) 650 have identified the base (100-year) flood as the flood having a one percent probability of being equaled or exceeded in any given year. The base floodplain is the area of 100-year flood hazard within a county or community. The regulatory floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood discharge

can be conveyed without increasing the base flood elevation more than a specified amount. The U.S. Army Corps of Engineers regulates floodways.

Mapped floodplains are depicted on **Exhibits III-2A–D**. Within the project area, FEMA floodplains exist along the tributaries to Carman Creek and Cole Camp Creek north of Lincoln, the tributary to Sterett Creek at Route T (only west of Route 65) and along the tributary to Sterett Creek at Marina Road (only west of Route 65). The mapping of the floodplain in the latter area appears to be inaccurate, overlapping the dike designed to retain floodwaters. Floodplains along each of the other streams are generally less than 300 feet wide at the project corridor. Most are forested, although some segments near the existing roadway have been cleared.

The State Emergency Management Agency can purchase flood-prone properties using FEMA funding through the Hazard Mitigation Grant Program and Section 404 of the Stafford Act and Flood Mitigation Assistance Program, provided there are state and local governmental agency matching funds. There are no flood buyout properties in the project area.

7. Wetlands and Ponds

The United States Army Corps of Engineers and the USEPA regulate wetlands. They jointly define wetlands as:

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands contribute to sediment retention and removal, water quality protection, wildlife habitat and biodiversity. Wetlands may also provide shoreline protection, flood/storm water attenuation, groundwater recharge and discharge. For example, the water quality protection functions, such as sediment retention and nutrient removal, are important in agricultural areas where nutrient levels and sediment in runoffs may be high. Forested and non-forested wetlands along drainageways also provide important wildlife habitat in areas where agricultural land use is predominant. A wetland may serve one or more than one function depending on such factors as landscape position, plant community composition and hydrologic regime.

The presence of hydric soils is indicative of potential wetland soil conditions and jurisdictional wetlands. Hydric soils generally are subject to flooding or ponding of water for more than one to two weeks per year, or have a water table less than 18 inches (46 centimeters) from the ground surface during the growing season. According to the NRCS, the Quarles, Sampsel, McGirk, Osage and Udorthents soils in the project area are considered hydric soils (see **Table III-11**). These soils account for about 20 percent of the project corridor area. These soils are generally located along streams in the project corridor, except at the southern end where there is a large area of hydric soil in the flats on the Lost Fish Hatchery property and around the Truman Access Road interchange. Large portions of these soil types have been drained for agricultural use or land development.

Potential wetlands in the project corridor were identified in the DEA using three sources: the NWI mapping; the NRCS mapping of hydric soil units; and a very limited field reconnaissance. This preliminary information (often called a wetland determination) was used in the DEA to determine impacts. **Exhibits III-2A–D** depict the potential jurisdictional wetlands identified within the reasonable range study area by the field reconnaissance.

For the FEA, a wetland delineation was conducted for the selected alternative. The wetland delineation was conducted in accordance with the Routine On-Site Procedures in the *1987 Army Corps of Engineers Wetland Delineation Manual and Associated Regulatory Guidance Letters*. The wetland/upland boundary was established at the point where all three wetland parameters were not present. The wetland boundaries were recorded with a handheld global positioning system (GPS) unit. Wetland functionality was assessed for all delineated wetlands within or near the selected alternative. While under current regulations, isolated wetlands are not regulated under the Clean Water Act. These wetlands were identified and reported in this study.

The results of the wetland delineation closely parallel the wetland determination. Wetlands are not abundant within the footprint of the selected alternative. **Exhibits IV-1A–J** depict the jurisdictional wetlands with the footprint of the selected alternative. Most of the jurisdictional wetland features consist of palustrine emergent wetlands (PEM – wet meadows, wet prairies, marshes and sloughs dominated by herbaceous vegetation). Other wetland types identified during the delineation included palustrine scrub-shrub (PSS) and palustrine forested (PF01) wetlands. These two wetland types are dominated by woody species.

A total of 27 ponds also occur in the project area. Most of these ponds are excavated or impounded agricultural stock ponds and recreational ponds that are designated as palustrine unconsolidated bottom (PUB) wetlands. The PUBs generally are constructed in undulating uplands. Field investigation confirmed many of the ponds as shown on the National Wetlands Inventory (NWI) map, as well as a number of additional ponds that were more recently created. The ponds range from less than 1.0 to about 4.5 acres in size and occasionally support a band of shoreline vegetation. The location and extent of these open waters (within the reasonable range study area) are depicted on **Exhibits III-2A–D**.

8. Upland Habitats and Wildlife

According to the MDC, the Springfield Plateau is a transitional area between the Osage Plains and the Ozark highlands. The Springfield Plateau Section was historically comprised of a mosaic of prairie and forest. Prairie once occupied about 29 percent of the Springfield Plateau, but the Springfield Plateau Section is now less than one percent prairie. Currently, the section is characterized by fragmented forests, pasture and early successional shrub-scrub habitats. The project area is typical of this general description.

Much of the undeveloped portion of the project area is used for active agriculture, primarily pasture land or hay, but also some areas are devoted to row crops. Non-agricultural upland habitats within the Route 65 project area include scattered remnants of mesic forest, dry-mesic forest, chert dolomite dry prairie and dry-mesic prairie.

Table III-14 summarizes upland habitats within the reasonable range project area – beyond the existing right of way. Data in **Table III-14** are based on a combination of field observations and published aerial habitat mapping.

Table III-14: Summary of Upland Habitat Types in the Route 65 Project Area

Upland Habitat Type	Acreage (Beyond Existing Right of Way)	Percent of Project Area (Beyond Existing Right of Way)
Ungrazed Grass Land	328	30.3
Grazed Land	266	24.6
Forested Land *	134	12.4
Mowed Land	109	10.1
Row Crop Agricultural Land	71	6.6
Developed Land	68	6.3
Old Field	54	5.0
Shrub Lands	45	4.1
Native Prairie	6	0.6
Total	1,081	100%

* A small percentage of forested land along drainageways may be wet-mesic floodplain forest.

More than half of the reasonable range project area is grassland dominated by pasture grasses. About half of these grasslands are currently actively grazed by livestock. The other half are grasslands that may be grazed at times, cut for hay or are periodically mowed, including portions of the Lost Valley Fish Hatchery, Truman Reservoir and Warsaw Airport near Route 65. Another 10 percent of the project area includes open fields or lawns that are frequently mowed.

Approximately 12 percent of the study area is upland forest. Forested areas are generally located in ravines too steep for row-cropping. The upland forests are generally sub-mature, second growth and are disturbed as a result of cattle grazing. Dominant tree species in the area include bur oak (*Quercus macrocarpa*), white oak (*Q. alba*), blackjack oak (*Q. marilandica*), shingle oak (*Q. imbricaria*), post oak (*Q. stellata*), green ash (*Fraxinus pennsylvanica*), honey locust (*Gleditsia triacanthos*), hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), black locust (*Robinia pseudoacacia*), red elm (*Ulmus rubra*) and box elder (*Acer negundo*). The species composition of shrub and herbaceous layers within upland forests is indicative of a long history of cattle grazing; dominant species include Tartarian honeysuckle (*Lonicera tatarica*), buckbrush (*Symphoricarpos orbiculatus*), multiflora rose (*Rosa multiflora*), prickly ash (*Xanthoxylum americanum*) and bedstraw (*Galium aparine*). Four relatively large upland forest parcels within the project area are described in detail as follows:

Upland Forest Parcel #1: Located between 2,900 and 4,100 feet south of the northern terminus along the east side of Route 65 is a disturbed, sub-mature, second growth mesic forest. Disturbances include historical cattle grazing and logging. The total size of this forested parcel is approximately 88 acres, with 10 acres occurring in the reasonable range project area.

Upland Forest Parcel #2: Located in the northern portion of the Near East Bypass of the city of Lincoln (NE-1) is a disturbed, young to sub-mature second growth mesic forest that is associated with a railroad embankment that has been abandoned for more than 50 years. Disturbances include historical railroad construction and active cattle grazing. The total size of this forested parcel is approximately 59 acres, with about seven acres occurring in the project area.

Upland Forest Parcel #3: Located in the easternmost portion of the Near East Bypass (NE-1) of the city of Lincoln is a disturbed sub-mature to mature second growth mesic forest. Disturbances include fragmentation and clearing for residential buildings. The total size of this forested parcel is approximately 103 acres, with 16 acres occurring in the project area.

Upland Forest Parcel #4: Located approximately 1,900 feet northeast of Sterett Creek Drive on both sides of Route 65 is a disturbed sub-mature to mature second growth mesic forest. Disturbances include road construction and maintenance and bisection by utility line easements, particularly west of Route 65. The total size of this forested parcel is approximately 295 acres (east and west of Route 65), with 37 acres occurring in the project area.

Prairie remnants are scattered throughout this part of Benton County. The most notable of these prairie remnants is Rock Hill Prairie, The Nature Conservancy acquisition. Rock Hill Prairie is located south of the city of Lincoln, in the southeast quadrant of the intersection of Route 65 and County Road BB. The Rock Hill Prairie, acquired in 1988, is 68 acres of which 40 acres are chert dolomite dry prairie and dry-mesic prairie. This is notable because of the diverse assemblage of prairie species it harbors including the federally threatened Mead's milkweed (*Asclepias meadii*). Prairie remnants within the reasonable range of alternatives study area, other than Rock Hill Prairie, are all small and disturbed as a result of road construction and maintenance.

Mammal species common in the project area that have strong affinities for forested habitat include the eastern gray squirrel, eastern fox squirrel, and gray fox. The Virginia opossum, red fox, white-footed mouse, raccoon, and white-tailed deer are associated primarily with forests but also use other habitat types. Little brown bats, big brown bats, northern long-eared bats, and eastern pipistrelles forage in or along forest edges, but roost in buildings or other artificial structures as well as in trees (Barbour and Davis 1969). Eastern cottontails occupy forest edges rather than forest interiors.

Bird species potentially present in the project area and with strong affinities for forest habitat include the sharp-shinned hawk, downy woodpecker, eastern wood pewee, great crested flycatcher, white-eyed vireo, red-eyed vireo, black-capped chickadee, tufted titmouse, white-breasted nuthatch, hermit thrush, wood thrush, numerous warbler species, the scarlet tanager and the blue-gray gnatcatcher.

Mammals restricted to grassland habitat and potentially present in the project area include the thirteen-lined ground squirrel and the deer mouse. Bird species potentially present in grassland (upland prairie, old field, hayed land or pastured land) within the project area include the horned lark, bobwhite quail, vesper sparrow, savannah sparrow, Henslow's sparrow and the eastern or western meadowlark.

9. Threatened and Endangered Species

The USFWS website (www.fws.gov/midwest/Endangered/lists/missouri-cty.html) identifies six federally listed species whose ranges include Benton County, Missouri: the gray bat (*Myotis grisescens*), the bald eagle (*Haliaeetus leucocephalus*), a cave crayfish (*Cambarus aculabrum*), Niangua darter (*Etheostoma nianguae*), Mead's milkweed (*Asclepias meadii*) and running buffalo clover (*Trifolium stolonifereum*). The MDC – Natural Heritage Database also documents the presence of several state-listed species in Benton County (see **Appendix V-F**). **Table III-15** summarizes status and habitat preferences of listed species.

Table III-15: Federally and State-Listed Species Known From Benton County, MO

Species	Status	Habitat Preferences
Gray bat (<i>Myotis grisescens</i>)	Federally Endangered, State Endangered	Caves
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Federally Threatened, State Endangered	Large lakes, reservoirs and rivers
Cave crayfish, no common name (<i>Cambarus aculabrum</i>)	Federally Endangered, State Endangered	Caves
Niangua darter (<i>Etheostoma nianguae</i>)	Federally Threatened, State Endangered	Rivers
Mead's milkweed (<i>Asclepias meadii</i>)	Federally Threatened, State Endangered	Virgin prairies
Running buffalo clover (<i>Trifolium stoloniferum</i>)	Federally Endangered, State Endangered	Disturbed bottomland meadows
Black-tailed jackrabbit (<i>Lepus californicus</i>)	State Endangered	Large grasslands near row-cropped areas
Barn owl (<i>Tyto alba</i>)	State Endangered	Agricultural outbuildings
Northern harriers (<i>Circus cyaneus</i>)	State Endangered	Grassland, marshland
Henslow's sparrow (<i>Ammodramus henslowii</i>)	Imperiled in the State	Grassland
Greater prairie chicken (<i>Tympanuchus cupido</i>)	State Endangered	Grassland

Gray bat – The gray bat occupies caves in summer and winter. The Missouri Speleological Survey has identified 42 caves in Benton County, three of which are known to contain colonies of the gray bat. These three caves are all east of Warsaw; the cave nearest to the project area (Cole Camp Cave) is approximately five miles east of Route 65, the other two caves are approximately 12 miles east of Route 65 (Personal communication with Bill Elliott with the MDC, August 2006).

The gray bat forages over water along rivers and lakeshores feeding primarily on mayflies and other insects. Summer caves are usually within two miles of permanent water. Summer foraging areas may extend up to 50 miles. Cole Camp Cave is located near Cole Camp Creek, a tributary of the Osage River. Thus, suitable riparian foraging habitat for the gray bat near Cole Camp Cave may occur along Cole Camp Creek and the Osage River. Cole Camp Cave is also near the confluence of Duran Creek and Cole Camp Creek. The headwaters of Duran Creek and its tributary (Bird Branch) are within the Route 65 project area; Duran Creek is culverted under Route 65 at County Road AC (south of Lincoln) and Bird Branch is culverted under Route 65 just north of Meyer Road.

Indiana bat – Indiana bats hibernate during winter in caves and abandoned mines, often with many other species of bats. Areas in caves that are suitable for hibernation are draft free and have a constant winter temperature. After hibernation, Indiana bats migrate to their summer

habitats. The summer range of the Indiana bat includes Benton County. Summer habitat for the Indiana bat may be wet-mesic floodplain forest or upland mesic forest. Suitable roosting and brood-rearing (summer) habitats for the Indiana bat are living or standing dead trees or snags with exfoliating, peeling or loose bark, split trunks and/or branches, or cavities. Many species of trees have been documented as providing refuge to the Indiana bat. The bats will often forage along corridors with a clear understory beneath a forested canopy, such as a stream or logging road, and along the edges of woodlands. Four relatively large forested parcels (between 59 and 295 acres) have been identified in the project area that may provide summer habitat for the Indiana bat; see the description of these upland forest parcels in **Chapter III.C.8**.

Bald eagle – The bald eagle is currently listed as federally threatened and state endangered in Missouri. Nesting success of the bald eagle has steadily increased in Missouri, a trend mirrored nationally. The bald eagle will likely be de-listed in the near future as a result of the dramatic population increase; however, protected status of this raptor will remain in effect under The Migratory Bird Treaty Act and several other state and federal laws. For example, the Bald and Golden Eagle Protection Act prohibits any form of possession or taking of both bald and golden eagles. The statute imposes criminal and civil sanctions as well as an enhanced penalty provision for subsequent offenses. The construction of the Truman Reservoir, near the southern terminus of the project area, has provided the bald eagle with abundant nesting and wintering habitat. The nearest known bald eagle nest in the vicinity of Route 65 is 12 miles west of Route 65 on the Truman Reservoir. Another possible nest is located approximately 5.6 miles east of Route 65 on Cole Camp Creek (Personal Communication with Andy Forbes, Audubon Society, August 2006). The Truman Reservoir and the Osage River below the Truman Dam also provide notable wintering habitat for the bald eagle. Wintering habitat is generally located along water that remains open during the winter with abundant fish and with large trees near the open water.

The Draft National Bald Eagle Management Plan recommends that a 660-foot (one-eighth mile) buffer be maintained around active bald eagle nests during the nesting season. Known bald eagle nests in the vicinity of the Route 65 project area are well outside of the recommended nest buffer zones; therefore, it is not anticipated that the bald eagle will be impacted by the proposed improvements to Route 65. Further, potential wintering habitat along the Osage River is south of the southern terminus of this project and will not be impacted by the proposed improvements. The bald eagle will not be discussed further in the Environmental Consequences section of this document.

Cave crayfish – Four listed cave crayfish species are known from Missouri; *Cambarus hubrichti*, *C. setosus*, *C. aculabrum* and a species of *Oronectes*. *C. hubrichti* and *C. setosus* are not known from Benton County despite several surveys for these species (Personal communication with Bill Elliott with the MDC, August 2006). The biogeographic range of *C. aculabrum* is primarily in the state of Arkansas though it is also known from several caves in the southern tier of counties in Missouri. The species of *Oronectes* cave crayfish is known only from Ozark County.

The proposed improvement to Route 65 will not impact cave crayfish; therefore, the cave crayfish will not be discussed further in the Environmental Consequences section.

Niangua darter – The Niangua darter, a Missouri endemic species, is known from medium to small north-flowing tributaries of the Osage River. There is federally designated critical habitat for the Niangua darter in Missouri, though not in Benton County (Personal communication with Chris Vitello, MDC, August 2006). The Niangua darter was historically known from the Osage

River in reaches near where the Truman Dam is now; however, this species has not been observed there since the early 1970s. It is not anticipated that the proposed road improvements will adversely impact the Osage River or its tributaries where the species is known to occur. Therefore, no impacts to the Niangua darter are anticipated. The Niangua darter will not be discussed further in the Environmental Consequences section of this document.

Mead's milkweed – Mead's milkweed is known to exist in the vicinity of Route 65. Specifically, it is known from Rock Hill Prairie, a Nature Conservancy acquisition. Rock Hill Prairie is approximately six miles north of the southern terminus of the project area, in the southeast quadrant of the intersection Route 65 and Route BB. Sub-populations of Mead's milkweed have been monitored on Rock Hill Prairie for several decades. Because of the potential for Mead's milkweed along Route 65, a field survey was conducted in June 2005. The study area for this survey was 250 feet on either side of Route 65, from the Route 65/Route 52 interchange to the Route 65/Route 7 interchange. No new populations were located during that survey. Except for the Rock Hill Prairie, habitat along Route 65 is degraded and Mead's milkweed presence is unlikely. In May 2006, 14 MDC botanists conducted a survey for Mead's milkweed on Rock Hill Prairie. This survey located 25 individuals of Mead's milkweed within the Nature Conservancy tract; four flowering and 21 sterile. Of these located plants, 11 were within 100 feet of the east side of Route 65; three flowering and eight sterile. Several individual plants identified in the May 2006 survey are within 100 feet of County Road BB. Based on communication with Blane Heumann with The Nature Conservancy (May and July 2006), locations of these individual plants are consistent with previous surveys.

Mead's milkweed may appear at one location and be absent there in subsequent years. The MDC Natural Heritage Review Report (August 2006) identified several locations of the Mead's milkweed in sections that abut Route 65, outside of Rock Hill Prairie (Township 41, Range 22, Section 22); the section immediately south of Rock Hill Prairie (Township 41, Range 22, Section 27) and a section just north of the City of Lincoln (Township 42, Range 22, Section 14). Three plants were identified in Section 27 in 1984 and one plant in 1986. The location of the Section 27 population is several hundred yards east of Route 65. The Section 14 population, located near the west shoulder of Route 65, was not located during a systematic re-survey of the area by MDC in 2005 (Personal communication with MDC, August 2006). The Section 14 population is frequently hayed and is not likely still present there.

Running buffalo clover – This low herb species occurs on old trails and roads, grazed bottomlands, stream banks, lawns, cemeteries with native vegetation and prairies. It typically occurs on well-drained soils and usually with filtered to partial sunlight, such as at a woodland edge or in a woodland with partially open canopy and little or no shrub layer. The species is associated with sites that have a pattern of periodic disturbance such as mowing, trampling or grazing, possibly controlling the invasion of competitive species. While forested areas are not widespread in the project area, many are subject to grazing and could provide suitable habitat. While the USFWS website lists this species for the county, the MDC's Missouri Fish and Wildlife Information System website and project correspondence with the MDC indicate that no populations have been identified in the project area. Initial field studies of the reasonable range study area have not identified any populations of the running buffalo clover.

Black-tailed jackrabbit – The black-tailed jack rabbit inhabits large contiguous native grasslands with adjacent legume and crop fields, as well as grazed areas with scattered clumps of taller vegetation. The black-tailed jackrabbit is known from southwest and central Missouri. The Route 65 project area is located within the biogeographic range of the black-tailed jackrabbit, though this species has not been documented to occur within the project area.

Several areas of hayed land within the project area and Rock Hill Prairie could provide suitable habitat for this species.

Barn owl – The barn owl is quite rare in Missouri, though it is widely distributed, except in the Ozarks. Within Missouri, the barn owl is most abundant in the Osage Plains of southwestern Missouri and the boot heel (MDC website, 2006). The barn owl typically nests in agricultural outbuildings that have been abandoned or are seldom used. The barn owl can also occupy forested habitat. Occurrences of the barn owl have been recorded in the general vicinity of the project.

Northern harrier – The northern harrier, a raptor, occupies habitat with a mosaic of agricultural land, grassland and marshland. Occurrences of the northern harrier have been recorded in the general vicinity of the project. The northern harrier is fairly common in Missouri, during the winter months. They are uncommon during the breeding season and nests are rare.

Henslow's sparrow – The Henslow's sparrow occupies large tracts of grassland such as abandoned fields and hayfields; specifically those tracts with cover that is dense and knee-to-waist high. Occurrences of the Henslow's sparrow have been recorded in the Cole Camp/Hi Lonesome Conservation Opportunity Area, north of Route 52, about one mile north of the project area. Several parcels of hayed land are present within the project area which may provide habitat for Henslow's sparrow. While the Rock Hill Prairie provides ideal habitat for this grassland bird species; it has not been documented to occur at Rock Hill Prairie.

Greater prairie chickens – The greater prairie chicken, a state endangered species, occupies large tracts of grassland with a mosaic of shortgrass and tallgrass prairie. The greater prairie chicken uses booming grounds²present on the Cole Camp/Hi Lonesome Conservation Opportunity Area, just north of Route 52, approximately one mile north of the project area. Hayed land and remnants of native prairie such as Rock Hill Prairie may provide nesting and foraging habitat and temporary cover for the greater prairie chicken. However, remnants of native grassland within the project are generally too small for use as booming grounds for the greater prairie chicken. The Missouri Department of Transportation will continue to coordinate with the MDC for updates to occurrences of this species in and near the project area.

The MDC Natural Heritage Review Report (see **Appendix V-F**) also identified known generalized locations of several species of special concern (no federal or state-listed status) and several rare natural communities of special concern in or near the project area. These Natural Heritage occurrences are summarized in **Table III-16**.

² Booming grounds are the area in which males perform their displays in hopes of attracting a female. These displays consist of inflating air sacs located on the side of their neck and also snapping their tails.

Table III-16: Summary of Missouri Department of Conservation, Natural Heritage Element Occurrences in and Near the Project Area

Feature	Federal/ State Status	State Ranking *	Generalized Location
Least darter (<i>Etheostoma microperca</i>)	None/ None	S2	In creek 1.5 miles north of the northern terminus of the project area.
Regal Fritillary (<i>Speyeria idalia</i>)	None/ None	S3	2 locations; 2 miles north of northern terminus of project area, 1 mile east of project area.
Plains topminnow (<i>Fundulus sciadicus</i>)	None/ None	S3	In creek 1.5 miles north of the northern terminus of the project area.
Wild Hyacinth (<i>Camassia angusta</i>)	None/ None	S3	In section that abuts the project area north of the City of Lincoln.
Prairie mole cricket (<i>Gryllotalpa major</i>)	None/ None	S3	1.5 miles north of the northern terminus of the project area.
Dry limestone/ dolomite prairie	None/ None	S3	Located within Rock Hill Prairie, a Nature Conservancy acquisition. See “Upland Habitat and Wildlife” for description.
Dry-mesic chert prairie	None/ None	S3	Located within Rock Hill Prairie, a Nature Conservancy acquisition.
Dolomite glade	None/ None	S3	Located 1 mile east of the project area.

*S2 = Very rare. Typically between 5 and 20 estimated occurrences or with many individuals in fewer occurrences, often susceptible to becoming extirpated.
S3 = Rare to uncommon. Typically between 20 and 100 estimated occurrences, may have fewer occurrences but with large number of individuals in some populations, may be susceptible to large-scale disturbances.

Known occurrences of the least darter, regal fritillary, plains topminnow, and prairie mole cricket are all north of the project area. The occurrence of the wild hyacinth is approximately one-eighth mile west of Route 65, where two individuals were identified during a 1988 survey. It is unlikely that these species of special concern will be impacted as a result of the proposed road improvements given their distance from Route 65.

10. Hazardous Materials

An investigation was conducted to identify sources of hazardous materials and to assess the potential for encountering sites that may contain environmental contaminants. The investigation began with a search of federal and state regulatory databases of known contamination sites or hazardous materials storage or waste generators. The database search was conducted in April 2006 by Environmental Data Resources, Inc. (EDR). The database search encompassed a study area one-half mile wide, consisting of one-quarter mile on either side of Route 65. The records search included the following federal databases:

- *Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)* contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies or individuals.
- *National Priority List (NPL)* is a subset of CERCLIS that identifies sites for priority cleanup under the Superfund Program.
- *Corrective Action Reports (CORRACTS)* identifies hazardous waste handlers with Resource Conservation and Recovery Act (RCRA) corrective action activity.
- *Resource Conservation and Recovery Information System (RCRIS)* includes selective information on sites that generate, transport, store, treat and/or dispose of hazardous waste as defined by RCRA. Resource Conservation and Recovery Information System sites can be further categorized as a transfer, storage and disposal (TSD) site, a large quantity generator (LQG) or a small quantity generator (SQG).
- *Emergency Response Notification System (ERNS)* records and stores information on reported releases of oil and hazardous substances.
- *Facility Index System (FINDS)/Facility Identification Initiative Program Summary Report* contains both facility information and sources for more detailed information.
- *Material Licensing Tracking System (MLTS)*, maintained by the Nuclear Regulatory Commission (NRC), contains a list of sites that possess or use radioactive materials and are subject to NRC requirements.

State-maintained databases included in the search were the following:

- *State Hazardous Waste Sites (SHWS)* is equivalent to CERCLIS.
- *Solid Waste Facilities (SWF)/Landfill Sites (LF)* contains an inventory of solid waste disposal facilities or landfills in a particular state. Although it varies by state, these sites may be active or inactive facilities or open dumps failing to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal facilities.
- *Leaking Underground Storage Tanks (LUST)* contains an inventory of reported LUST incidents.
- *Underground Storage Tanks (UST)* is regulated under Subtitle I of RCRA and must be registered with the MDNR's UST section.
- *Voluntary Cleanup Program (VCP)* is a program in which property owners, business operators or prospective buyers can enroll a site not contaminated by sources addressed by any of MDNR's regulatory programs such as Emergency Response, Superfund, RCRA or Petroleum Storage Tanks. The site must be remediated to standards acceptable to the state to receive some type of certification from MDNR regarding site cleanup.
- *Above-ground Storage Tanks (AST)* contains a list of registered AST sites.
- *SPILLS Environmental Response Tracking Database* is a list of reportable spills from a variety of sources.

Based on the EDR database and field investigations, a total of 18 sites were identified within one-quarter mile of Route 65 (**Table III-17**). None were NPL Sites, CERCLIS Sites, RCRIS TSD Facilities, State Hazardous Waste Sites or State Landfill Sites. The complete Environmental Site Assessment conducted for the Route 65 project is contained in the project's technical file.

Table III-17: Summary of Hazardous Materials Sites Recorded along the Project Corridor

Site Type	Number of Sites Identified
Resource Conservation and Recovery Information System Small Quantity Generator	1
Leaking Underground Storage Tanks	4
Underground Storage Tanks	7
Above-ground Storage Tanks	3
SPILLS Environmental Response Tracking Database	1
Facility Index System/Facility Identification Initiative Program Summary Database	1
Other Sites of Concern	1

Generally, UST, AST and RCRIS hazardous waste generator sites are not considered to have an impact on the location of the transportation corridor. Although some cost would be incurred to remove and close any tanks or dispose of hazardous materials properly at acquired properties, these costs are reasonably predictable with low risk of groundwater contamination and offsite migration of contaminants. All of the recorded LUST sites have been closed or received No Further Action determinations from the MDNR³. One of these is the former Whiteman Air Force Base (AFB) Foxtrot 6 minuteman missile silo, located just northeast of the intersection of Route 65 and Route H. There are a number of locations with underground or above-ground storage tanks in the area, including gasoline stations and the Warsaw Municipal Airport. Some of these sites have records of UST removal and closure, and others are relatively new. Current records show no known contamination at these sites.

One SPILLS site (Map ID #8) was identified in the EDR search. This was a sewage spill from a private residence at 2003 Commercial Street in Warsaw. No remediation is expected to be necessary at this site.

Based on a review of these records and a limited onsite investigation, two sites were determined to warrant further site assessment, if they are within the potential area of effect of the project. **Exhibits III-2A–D** show the locations of these sites.

Kreisler's Auto Sales – This used auto sales/used parts yard is located approximately 0.2 mile south of Route H on the east side of Route 65. A large number of vehicles are stored on the property. The potential for soil contamination and possible groundwater contamination is high, from leaking fluids such as gasoline, oil and engine coolant from the vehicles. A site investigation will be necessary to determine the amount and extent of contamination at the site, and necessary remediation. Cleanup costs could be high at this site.

³ A No Further Action Determination does not eliminate the possibility of encountering soil contamination during excavation.

Bobby's Towing Tire Auto – This property is located on the east side of Route 65 in Lincoln about 600 feet north of Fordney Road. It is a former gas station with the pumps removed and is now used as a body shop and auto sales lot. This site was not listed in the records search, meaning there are no records of UST removal or closure. A site inspection/investigation will be needed to determine whether there are remnant USTs and the potential for contamination at the site.

11. Air Quality

The federal Clean Air Act Amendments (CAAA) of 1970 required the adoption of air quality standards. These were established in order to protect public health, safety and welfare from known or anticipated effects of air pollutants. National Ambient Air Quality Standards (NAAQS) were established for sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide, ozone and lead. In addition to these pollutants, the State of Missouri has established additional criteria for hydrogen sulfide and sulfuric acid.

The Clean Air Act (CAA) established two types of national air quality standards. Primary standards set limits to protect public health, including the health of sensitive populations, such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation and buildings.

The Missouri and NAAQS standards are listed in **Table III-18**.

The CAAA of 1977 required all states to submit to the USEPA a list identifying those air quality control regions, or portions thereof that meet or exceed the NAAQS or cannot be classified because of insufficient data. Portions of air quality control regions that are shown by monitored data or air quality modeling to exceed the NAAQS for any criteria pollutant are designated nonattainment areas for that pollutant.

The 1990 CAAA established procedures for determining the conformity of State Implementation Plans (SIP) with the requirements of the federal regulations. These procedures are published in 40 CFR Parts 51 and 93. The Missouri SIP does not contain any transportation control measures for this area.

Benton County is a designated attainment area for the NAAQS. The nearest monitoring stations are in Springfield (Greene County) and Eldorado Springs (Cedar County), which are 50 to 75 miles from the project area. For 2004 to 2005, all of the pollutants measured at these stations were below the NAAQS.

Table III-18: Missouri and National Ambient Air Quality Standards

Pollutant	Averaging Time	Concentration	Average Readings of Nearest Stations, 2004 to 2005
Sulfur Dioxide	Annual Arithmetic Mean: Primary 24-hour ^a : Primary 3-hour ^a : Secondary	80 $\mu\text{g}/\text{m}^3$ (0.03 ppm) 365 $\mu\text{g}/\text{m}^3$ (0.14 ppm) 1,300 $\mu\text{g}/\text{m}^3$ (0.50 ppm)	0.003 ppm 0.028 ppm N/A
Particulates (PM ₁₀)	Annual Arithmetic Mean: Primary and Secondary 24-hour ^b : Primary and Secondary	50 $\mu\text{g}/\text{m}^3$ 150 $\mu\text{g}/\text{m}^3$	18 $\mu\text{g}/\text{m}^3$ 37 $\mu\text{g}/\text{m}^3$
Fine Particulates (PM _{2.5})	Annual Arithmetic Mean: Primary and Secondary 24-hour ^b : Primary and Secondary	15 $\mu\text{g}/\text{m}^3$ 65 $\mu\text{g}/\text{m}^3$	11.5 $\mu\text{g}/\text{m}^3$ N/A
Carbon Monoxide	1-hour ^a : Primary 8-hour ^a : Primary	40 mg/m^3 (35 ppm) 10 mg/m^3 (9 ppm)	4 ppm 2.6 ppm
Ozone	1-hour ^c 8-hour ^d	0.12 ppm 0.08 ppm	0.085 ppm 0.073 ppm
Nitrogen Dioxide	Annual Arithmetic Mean	100 $\mu\text{g}/\text{m}^3$ (0.053 ppm)	0.012 ppm
Lead	Calendar Quarter Arithmetic Mean: Primary and Secondary	1.5 $\mu\text{g}/\text{m}^3$	N/A
Hydrogen Sulfide ^f	½-hour ^e ½-hour ^g	70 $\mu\text{g}/\text{m}^3$ (0.05 ppm) 42 $\mu\text{g}/\text{m}^3$ (0.03 ppm)	N/A
Sulfuric Acid ^f	24-hour ^h 1-hour ⁱ	10 $\mu\text{g}/\text{m}^3$ 30 $\mu\text{g}/\text{m}^3$	N/A

^a Not to be exceeded more than once per year.
^b Statistically estimated number of days with exceedances is not to be more than one per year.
^c One-hour average not to be exceeded more than one day per year.
^d The three-year average of the fourth-highest daily maximum eight-hour average ozone concentration each year must not exceed 0.08 ppm.
^e Not to be exceeded more than twice per year.
^f Missouri Air Quality Standards.
^g Not to be exceeded more than twice in any five consecutive days.
^h Not to be exceeded more than once in any 90 consecutive days.
ⁱ Not to be exceeded more than once in any two consecutive days.

ppm = Parts per million parts of air (by volume) at 25°C
 $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter of air

Source: Code of Federal Regulations; Title 40 Part 50: Amended July 1998; Missouri Code of State Regulations; Title 10, Division 10, Chapter 6: last amended 9/30/03

12. Traffic Noise Environment

The Missouri Department of Transportation's Traffic Noise Policy was developed in accordance with the FHWA procedures for highway noise analysis and abatement contained in 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. These procedures were used to identify and evaluate potential traffic noise impacts associated with the Route 65 project. Evaluation of the traffic noise impacts involves the following:

- Identification of sensitive receptors,
- Determination of existing noise levels,
- Prediction of future traffic noise levels,
- Determination of traffic noise impacts and
- Examination and evaluation of noise abatement measures.

Traffic noise levels are typically calculated in A-weighted decibels (dBA). A-weighting de-emphasizes lower frequency sounds below 1,000 hertz (one kHz) and higher frequency sounds above four kHz. A weighting is the measure most used for traffic and environmental noise throughout the world, as it provides a high degree of correlation with human annoyance and health effects.

The actual impact of noise is not a function of loudness alone. The time of day during which noise occurs and the duration of the noise are also important. In addition, most noise that lasts for more than a few seconds is variable in its intensity. The noise descriptor used for this study is the L_{eq} . The L_{eq} is the equivalent steady-state sound level which, in a stated period, would contain the same acoustical energy as the time-varying sound level during the same period. The $L_{eq}(h)$ is the energy-average of the A-weighted sound levels occurring during a one-hour period, in decibels (i.e., a one-hour L_{eq}). The traffic noise predictions used for the Route 65 project were for the peak traffic hour.

The effects of noise on people can be listed in three general categories: 1) subjective effects of annoyance, nuisance, dissatisfaction; 2) interference with activities such as speech, sleep and learning and 3) physiological effects such as startling and hearing loss.

With regard to increases in dBA, knowledge of the following relationships will be helpful in understanding this report:

- Except in carefully controlled laboratory experiments, a change of one dBA cannot be perceived by humans.
- Outside the laboratory, a three dBA change is considered a just-perceivable difference.
- An increase in 10 dBA is subjectively heard as approximately a doubling in loudness.

Noise abatement criteria (NAC) are traffic noise impact thresholds established by FHWA for considering abatement. A traffic noise impact occurs when traffic noise levels predicted to result from the proposed project approach or exceed the NAC, or when predicted traffic noise levels substantially exceed (by 15 dBA or more) the existing noise level, even though the predicted levels may not exceed the NAC. **Table III-19** identifies the established NAC.

Table III-19: Noise Abatement Criteria, Hourly A-Weighted Sound Level – decibels (dBA)

Activity Category	L _{eq} (1 Hour)	Description of Activity Category
A	57 dBA (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
B	67 dBA (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 dBA (exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	52 dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: Code of Federal Regulations, Title 23 Part 772, Revised October 1997

Activity category B was determined to be applicable to the noise-sensitive receptors located within the Route 65 study area, meaning that they are in locations with land uses that would benefit from a lower noise level. These typically include residences, churches, schools, libraries, hospitals, nursing homes, apartment buildings and condominiums. The noise-sensitive receptors that are included in this analysis were determined prior to the initiation of modeling activities. These receptors are described below and depicted on **Exhibits III-1A–D**.

Sensitive Receptor 1: Residential Subdivision near Truman Lake

On the west side of Route 65, this single-family subdivision contains 10 units on a circular roadway. The subdivision is substantially higher in elevation than the adjoining portion of Route 65.

Sensitive Receptor 2: Residential Subdivision at Cedar Gate Road

On the east side of Route 65, this single-family subdivision contains less than eight units in the immediate proximity of Route 65.

Sensitive Receptor 3: Farmstead between Sterett Creek and Poplar Church Roads

On the west side of Route 65, this receptor is a single farmstead that was closely evaluated for its historic architectural significance (see Karr farmstead in III.C.13).

Sensitive Receptor 4: Residential Cluster at Carpet Barn Drive

On the east side of Route 65, this is a cluster of single-family homes on modestly sized lots.

Sensitive Receptor 5: Church of Christ, Lincoln

On the west side of Route 65, just outside the current city boundary is the Church of Christ.

Sensitive Receptor 6: Residential at Near Eastern Bypass/Route C

Just east of the near-eastern bypass of Lincoln (LE-1) at Route C, is a single-family homestead. This homestead is approximately 3,100 feet from existing Route 65.

Sensitive Receptor 7: Residential Subdivision in Lincoln

This is a single-family subdivision in Lincoln. The near-eastern bypass (LE-1) is immediately adjacent to approximately eight units.

Sensitive Receptor 8: Residential Subdivision in Lincoln

On the west side of Route 65 in Lincoln, there are a few residential units.

Sensitive Receptor 9: Residential Subdivision near Eichler Drive

On the west side of Route 65, this single-family subdivision contains two or three units. It is also the site of a proposed subdivision.

The Traffic Noise Model[®] (TNM[®] version 2.5) was used to determine existing noise levels in the Route 65 corridor. **Table III-20** summarizes the existing traffic noise conditions at the sensitive receptor locations.

Table III-20: Design Hour Noise Levels, Route 65 Corridor

Sensitive Receptor ID#	Land Use*	No. of Dwellings Represented	NAC Category and Level	Noise Level (L _{eq}) (Design Hour)	
				Existing (dBA)	Summary
1	SF	10	B (67 dBA)	63.0	Subdivision on bluff above Route 65
2	SF	8	B (67 dBA)	63.4	Typical Roadside Levels
3	SF	1	B (67 dBA)	65.9	Typical Roadside Levels
4	SF	6	B (67 dBA)	62.1	Typical Roadside Levels
5	CH	1	B (67 dBA)	66.5	Typical Roadside Levels
6	SF	1	B (67 dBA)	35.7	Not adjacent to Route 65 (LE-1)
7	SF	8	B (67 dBA)	45.7	Not adjacent to Route 65 (LE-1)
8	SF	2	B (67 dBA)	65.2	Typical Roadside Levels
9	SF	3	B (67 dBA)	56.4	Typical Roadside Levels

*SF = single-family residence, CH = church.

The TNM[®] analysis indicates existing traffic noise levels are fairly low within the Route 65 corridor. Existing conditions do not exceed the NAC. **Chapter IV** will examine how the reasonable alternatives will affect these receptors.

13. Cultural Resources

Cultural resources consist of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering and culture. According to the applicable standards, significant sites or properties are those that possess integrity of location, design, setting, materials, workmanship, feeling and association and are shown to be significant for one or more of the following four criteria for evaluation:

- **Criterion A – Events:** Properties associated with events that have made a significant contribution to the broad patterns of our history;
- **Criterion B – Persons:** Properties associated with the lives of persons significant in our past;
- **Criterion C – Design:** Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or

that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction and

- **Criterion D – Information:** Properties that have yielded or may be likely to yield information important in prehistory or history.

Properties considered significant according to these criteria are eligible for listing on the NRHP. Planning for federally funded, licensed or permitted projects must consider impacts to properties listed on or determined eligible for listing on the NRHP to be in compliance with the National Historic Preservation Act and National Environmental Policy Act.

As part of the environmental study process, MoDOT Historic Preservation staff performed a screening-level investigation for all reasonable alternatives for the presence of historic resources. During an interagency consultation meeting on May 23, 2006, the State Historic Preservation Office (SHPO) concurred with MoDOT's preliminary findings that the project was not likely to affect any historic buildings.

For the preferred alternative described in the DEA, additional investigations were conducted to verify compliance with the National Historic Preservation Act and National Environmental Policy Act. On October 3, 2006, SHPO concurred with MoDOT that no NRHP-eligible resources (architectural or archaeological) are present within the footprint of the selected alternative or situated in its immediate vicinity.

Methods for the investigations were determined through consultation with the SHPO. Interagency consultation materials are included in **Appendix V-F**.

a. Architectural Resources

Study Methods

The architectural investigations included literature reviews and field surveys focused on identifying architectural resources at least 40 years old (pre-1966). The literature review failed to identify historic buildings in the study area. An internet search for historic properties in Benton County yielded no NRHP-listed buildings in the study area. The architectural field survey covered the entire study area for the reasonable range of alternatives. All buildings in the study area were surveyed; those that appeared on the 1966 aerial maps that were still extant also were photographed. Interagency consultation occurred on May 23, 2006, when MoDOT and SHPO architectural historians met to review architectural field survey results and consult on NRHP eligibility evaluations. In addition to these interagency meetings, public involvement meetings were held in Lincoln, Missouri, on February 22 and May 24, 2006. These meetings provided an opportunity for the agencies, consultants and public to discuss the proposed highway improvements as they relate to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended). Historic preservation exhibits and brochures were available at the public meetings to explain Section 106 procedures and solicit information about historic resources in the study area.

Upon identification of the preferred alternative described in the DEA, the project's area of potential effects (APE) was established in consultation with the SHPO. Information regarding the preferred alternative described in the DEA, the APE and architectural survey area, study methods and architectural resources associated with the project was forwarded to the SHPO for review on September 7, 2006. The survey results were presented in a Section 106 memo

addressing all cultural resources. SHPO formally concurred with MoDOT's eligibility assessments in correspondence dated October 3, 2006.

Survey Results – Summary of Draft Environmental Assessment Results

There are 229 parcels in the project area associated with the reasonable range of alternatives. Architectural resources built before 1966 are present at 36 of the 229 surveyed parcels. Of these 36 properties, nine are estimated to have buildings that were constructed prior to 1935. During the reconnaissance survey, the study team readily recognized two properties that would require archival research to help determine their historical significance: 1) a highway maintenance facility in Lincoln (AR 62) and 2) a late nineteenth-century farm north of Warsaw and presently owned by Karr Farming Enterprises (AR 140).

AR 62, MoDOT Maintenance Facility

The Lincoln MoDOT shed complex (AR 62) is located on the east side of Route 65 north of the Route 65 and Main Street intersection. It includes the original garage and two recent outbuildings: a metal-clad, one-bay building immediately south of the shed and a two-bay salt shed northwest of the main shed. The garage is a 1930 Art Deco influenced maintenance building with concrete foundation, brick walls, and bow-arched roof with parapets. The garage is one story and rectangular in form. The main (west) façade is comprised of four bays with replacement overhead garage doors. Molded concrete facing between the garage bays creates pilaster effects at regular intervals. The south and north façades have decorative brick panels below the parapets and two double hung windows. The south façade also features a single-leaf metal door. The rear (east) façade has four bays with a double-hung window centrally positioned in each bay; corbelled brick pilasters separate the bays. The small outbuilding south of the shed is used to store employee uniforms that are maintained by a uniform service company. The salt shed northwest of the garage was added to the complex in 1978 (Luten, 2006).

Previous cultural resources investigations in Missouri have found MoDOT maintenance sheds to be historic under NRHP Criteria A and C (for local significance in transportation and architecture). While the Lincoln shed may represent the same themes and period as other early maintenance sheds, it has suffered recent alterations that affect its historic integrity. The main façade of the Lincoln shed is largely the four overhead garage doors. The replacement garage doors may account for more than 90 percent of the façade giving the building a much different appearance and a change that compromises its original design, materials, workmanship, feeling and association. Furthermore, all nine of the garage windows are replacement windows. At least nine other highway maintenance sheds are known to have greater historic integrity. For these reasons, MoDOT does not believe the Lincoln maintenance shed fulfills NRHP eligibility criteria, and SHPO concurred with this assessment.

AR 140, Karr Farming Enterprises, LLC

Karr Farming Enterprises (AR 140) includes a late nineteenth-century farmstead of roughly 94 acres, situated on the west side of Route 65, immediately south of Route T. It includes a residence, barn (enclosing a log building), smokehouse, garage and machine shed. The one-and-one-half story frame house is rectangular in plan with a symmetrical three-bay front. The side-gabled house has a concrete-covered foundation, white original clapboard siding, gable and wall dormer windows, black asphalt roof and northern gable-end brick chimney. The barn is situated south of the house, beyond the circle drive between the two buildings. The one-and-one-half story barn has a stone and concrete foundation, vertical siding and side gable roof clad in corrugated metal. In plan, the barn has a central aisle perpendicular to the roof ridge in

the tradition of English barns; however, it also features an end (southern) aisle and a side (eastern) aisle parallel to the ridge. Enclosed within the northern half of the barn are the remains of a single pen log building, roughly 16 foot by 16 foot. Large sandstone blocks that double as a foundation and partial basement support the four log walls. The original roof no longer survives; the metal barn roof shelters the log core. A single-bay frame garage west of the house, a contemporary metal machine shed southwest of the house, and a frame smokehouse north of the house complete the complex.

The Missouri Department of Transportation traced the history of the property to 1863, when H. H. Ham owned the 397-acre parcel and its assessed value was \$1,310. Ham continued to own the property until his death in 1890 and the farm remained with his family until after 1905. By 1910, Henry Kreisler had acquired it. Construction dates for the house and barn have not been determined, but the building sequence is likely as follows: 1) single-pen log building, 2) house and 3) barn enclosing single pen. While significant elements of the log pen enclosed within the barn are missing, the parts that survive exhibit skilled construction techniques with both wood and masonry materials. It is the oldest surviving building at the farm and may represent the first house at the farm. An estimated construction date for the present house is circa 1916 based on the stylistic details incorporated in the house and the increased valuation of the property. In 1915, the assessed value of the 168-parcel was \$850; by 1920 the value of the same 168-acre parcel was \$3,500. This spike in value suggests improvements to the parcel, although other properties in the area also had substantial increases that could indicate a general inflation in local real estate values. The house does not represent a particular architectural style or vernacular form and therefore is not considered architecturally significant. The façade features minimal ornament such as the sunburst motifs in the front gable dormer and square porch posts. These elements are sometimes linked to Queen Anne Style houses popular from 1880 to 1910, but AR 140 lacks other characteristic features of the high style (McAlester and McAlester, 1984; Gottfried and Jennings, 1985). The symmetry of the building's principal façade is not unusual, but the massing of the building's form and the asymmetrical floor plan appear uncommon for this period and region. The architecture may be the result of a local builder assisted by a pattern book, although other houses like it in Warsaw and Lincoln are unknown (Karr, 23 May 2006).

The barn and house at the Karr Farm are interesting for their age and atypical design qualities; however, neither was considered to fulfill Criterion C for its architectural significance. Criteria A (historic events or broad patterns) and B (historic individuals) have been applied to the property, especially as the farm might demonstrate agricultural significance, but it has had an ordinary past and no significant persons are known to be associated with the property. It is possible that Criterion D may warrant further consideration for information the property may yield, especially if archaeological investigations support the recommendation. MoDOT and SHPO concurred that the property is not likely to fulfill any of the NRHP eligibility criteria.

Survey Results – Summary of Selected Alternative Survey

Because the selected alternative is situated within the reasonable alternatives study area, it represents only a portion of that broader study area and therefore shares only a fraction of the same architectural resources. The selected alternative involves 128 parcels, yet only one dozen of these parcels have architecture that is situated within the footprint of the selected alternative, the project's APE: AR 18, 27, 106, 108, 116, 117, 120, 122, 136, 139, 141 and 153. Of the 12 properties with architectural resources located within the selected alternative's boundaries, nine are contemporary in nature, meaning all the buildings at the property were constructed after 1966. Architectural resources built before 1966 are present at three parcels where buildings are

located directly in the footprint of the selected alternative, AR 108 (Wischmeier Farm), 136 (Dawson Property/"Rockhill") and 153 (Fisher Trust). Before the selection of a selected alternative (when all the reasonable alternatives were considered at the draft stage of the study), older buildings at two additional properties, AR 62 (MoDOT Lincoln maintenance shed) and AR 140 (Ham/Karr Farm), were of interest for their potential as historic properties. While associated with the overall study area, they are not situated within the project's selected alternative, thus the project will avoid impacting them. Because of their proximity to the project and possible historic significance, MoDOT supplied additional background information about these properties in its Section 106 memo to the SHPO.

A file search and field survey of the selected alternative yielded five culverts and two bridges in the APE. Several unnumbered, diminutive concrete box and metal pipe culverts are located along the selected alternative but were not recorded. All of the structures are excluded from the Missouri Historic Bridge List, and none are significant in terms of NRHP eligibility.

Conclusions

Following application of National Register Bulletin 15, MoDOT concluded that none of the architectural resources associated with the selected alternative possess architectural or historical significance and retain sufficient historical integrity necessary to be eligible for listing in the NRHP. On October 3, 2006, SHPO concurred with MoDOT that none of the 12 properties with architectural resources in the APE, none of the five culverts and neither of the two bridges constituted historic properties; therefore, no historic buildings or structures will be affected by the project. Furthermore, in its correspondence, SHPO also commented that AR 62, the MoDOT maintenance shed at Lincoln, and AR 140, the Ham/Karr Farm did not fulfill NRHP eligibility criteria; therefore, no historic buildings are present in the project's APE or situated in its immediate vicinity.

b. Archaeological Resources

Study Methods

In accordance with Section 106 of the National Historic Preservation Act (as amended), the MoDOT conducted a background literature search to identify known and potential archaeological sites within the study area for the reasonable range of alternatives.

Upon the identification of the preferred alternative described in the DEA, a systematic archaeological survey was conducted for over approximately 75 percent of the project area. The remainder of the project area could not be surveyed due to the lack of landowner permission. A supplemental survey will be conducted when right of access is received, and any additional archaeological sites that might be affected by the project will be addressed in accordance with the regulations (36 CFR 800) implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470). Identified cultural resources will be evaluated according to the Department of the Interior's "Standards and Guidelines for Archaeology and Historic Preservation," in consultation with the Missouri State Historic Preservation Officer.

Survey Results – Previously Recorded Archaeological Sites and Predictive Models

A background check was conducted at the cultural resources library of the SHPO, Missouri Department of Natural Resources, to determine the extent of previous cultural resources surveys in the general vicinity of the project area. A file search was also conducted at the SHPO to document locations of known sites. These sources indicated that there have been 15 Phase I

cultural resource surveys within the project area (Ayres, 2005; Dasovich, 2004; Ensor, 2002; Harcourt, 1995; Harris, 1977; LeeDecker, 1983; McNerney, 1979; Purrington, 1988; Sturdevant, 1981, 1989, 1993; Synhorst, 1983; Taylor et al., 1986; Walters, 1989, 1996). In addition, there have been various specialized studies and Phase II reports on selected sites near the project area. There are 24 previously reported archaeological sites in the vicinity of the proposed improvements; these resources will not be impacted by the project with the limits currently proposed. The following sites are located near but outside the project corridor: 23BE1, 23BE681-23BE696, 23BE1008, 23BE1088-23BE1090 and 23BE1093-23BE1095.

In order to assess the potential for unrecorded sites within the range of alternates, predictive models were used to look separately at prehistoric and historical sites.

For prehistoric sites, a model based largely upon the work done for the Harry S. Truman Dam and Reservoir was used (Roper, 1993). The majority of sites within the Harry S. Truman Reservoir study area are small; however, sites along the major stream valleys (i.e., the Osage River) tend to be larger in comparison with sites found within the prairie regions. Sites in the Ozark and transitional areas are likely to occur on bottomlands, while sites in the prairies will likely occur on slopes along major streams. Temporally, sites are well distributed across all physiographic zones, the exception being that Early and Middle Archaic sites are overrepresented in the uplands.

The potential for historical sites was developed through an evaluation of the region's history coupled with an examination of historical maps and highway plans. Early twentieth century maps were examined with the expectation that buildings identified on these maps may have existed during the mid to late nineteenth century. The history of Benton County indicates that this region was settled relatively early during the 1830s, with Warsaw being founded as the county seat in 1838. In addition to becoming a regional center of commerce on the Osage River, Warsaw became an important point on the Springfield Road⁴ and served as a stopping point for the Butterfield Overland Express Mail Service. Based on this history, there is a relatively high potential for historical sites to be located along the existing Route 65 corridor.

Archaeological Survey Results

An archaeological survey for the preferred alternative described in the DEA was conducted in June 2006. Because the project area consisted largely of pasture and wooded land and had limited surface visibility, field methods primarily involved shovel testing at 15-m intervals. The survey identified two previously unreported historical sites: 23BE2155 and 23BE2156. Neither site appears to have the potential to answer significant research questions; they are therefore not considered eligible for listing on the NRHP. In addition to the archaeological sites, the survey identified two isolated finds: a modern building foundation and a trash dump; these resources likewise do not represent significant deposits or properties eligible for listing on the NRHP. The SHPO concurred with these recommendations in a letter dated October 3, 2006.

Although the isolated finds do not represent significant archaeological deposits, one of them might be related to the Ham/Karr Farm (AR 140). If additional artifacts or features are identified before or during construction, the resource will be re-evaluated.

⁴ The St. Francois Mountains run east to west across southern Missouri. When the first Europeans came to the area in 1798, drawn largely by mining possibilities, there were many Native Americans. The Osage Indians had historically occupied southern Missouri and many of the early settler roads followed more ancient trails. This is the case with the Springfield Road; which ran from near Springfield to St. Louis. The settlement of southern Missouri was facilitated by the Springfield Road. Consequently, the possibility for historic resources is higher along the path of the road, than in other locations. The Springfield Road is believed to have been located in the vicinity of existing Route 65 in Benton County. The Springfield Road is not listed on the NRHP.

The survey found several historical resources along the old highway corridor, as was expected. Although there was a possibility that sites dating to the early nineteenth century could exist, none were identified. Based upon these results, it is unlikely that significant historical sites exist within the remainder of the selected alternative. Because no prehistoric sites were identified, including in the highest probability area along the Osage River, it is unlikely that the remaining portions of the selected alternative will contain any significant prehistoric resources.

14. Visual Resources

a. Introduction and Important Terms

An analysis of visual resources within the Route 65 study area was conducted following FHWA (DOT-FH-11-9694) and American Society of Landscape Architects (ASLA) visual assessment guidelines. Guidance from FHWA-HI-88-054 was also used. Field investigations and photographic analysis were the primary techniques used to assess the *visual environment* of the project corridor. Visual analysis focuses on *viewers* and the *visual resources* that appear within their viewshed or angle of view. For *viewers*, the response to the *visual environment* is defined by *viewer exposure* and *viewer sensitivity*. The nature of *visual resources* is defined by their *visual character* and *visual quality*. Using this framework, existing conditions can be compared with build alternatives. The nature of the *resource change* and the *viewer response* to that change defines the *visual impact*. This assessment methodology is depicted graphically in **Figure III-2**. The critical elements of this assessment are defined in the balance of this section.

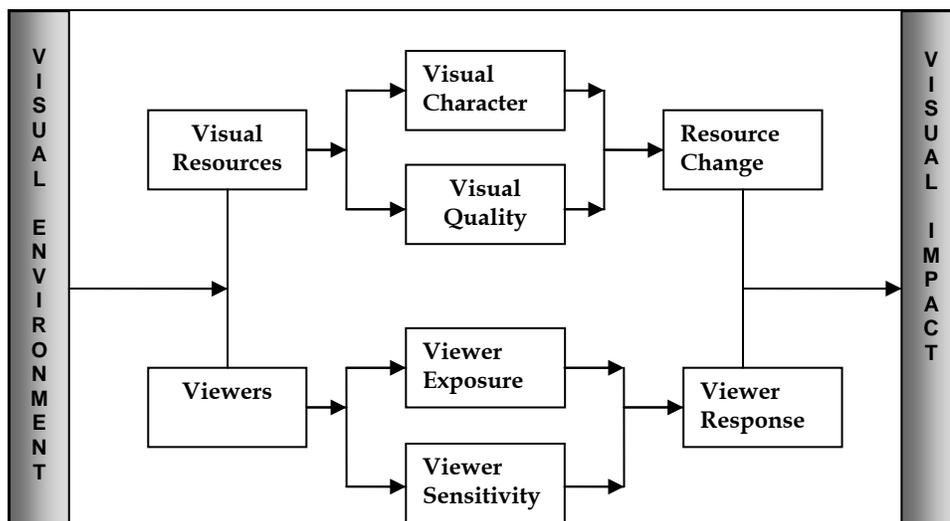


Figure III-2: Schematic Depiction of Visual Assessment Methodology

Visual resources consist of land forms and land cover including water, vegetation and the human-made development. *Visual resources* help define a landscape's *visual character*.

Visual character of a landscape is formed by viewed elements, such as form, line, color and texture. The interrelationships of these forms can be described in terms of the prominence, scale, diversity and continuity of land form and land cover. Four key features are used to identify relationships among elements of the visual environment: dominance, scale, diversity and continuity. Dominance refers to the position of an individual element or its extent or contrast among all the other elements of a view. Scale refers to apparent size relationships between an element and the other components of its surroundings. Diversity is a function of the number,

variety and intermixing of elements in a view. Continuity refers to the maintenance of visual relationships between connected or related landscape features. The integration of these elements results in a complete description of the *visual character* of a view.

Visual quality measures how pleasing a visual perception of a given view or environment is to the viewer. In general, there are wide areas of agreement regarding what viewers find pleasing. Certain landscapes are generally agreed to have high value, such as national parks, scenic rivers, scenic highway viewpoints and designations such as the city's designation of significant natural and human-made features. However, the quality of a view also depends on the viewer's ability to observe it. For example, viewers driving on a city street in heavy traffic likely would concentrate on driving conditions and foreground views of vehicles, street signs and traffic signals and have low awareness or perception of adjacent historic buildings or other similar amenities. Drivers' views of foreground visual resources would be brief. Residents of adjacent houses, who have stationary viewpoints, would be exposed to views of long duration and have a greater awareness of views beyond the immediate roadway than drivers.

Visual quality is further defined by evaluating vividness, intactness and unity. These characteristics are consistently prominent in landscapes perceived by the general public as having high visual quality. *Vividness* describes the way landscape components may combine in distinctive and memorable visual patterns. For different landscapes, various elements may contribute to vividness. *Intactness* describes the integrity of natural and human-built visual patterns and the extent to which the landscape is free from encroaching elements. Encroaching elements may include a single eyesore or multiple elements. *Unity* measures the visual coherence and compositional harmony of the landscape considered as a whole. It refers to the fit between elements of the landscape but does not connote uniformity in design or character.

Viewer response is analyzed in terms of *viewer exposure* and *viewer sensitivity*. *Viewer exposure* and *viewer sensitivity* work together for persons viewing the road from the context of other activities. *Viewer exposure* refers to the physical location of viewer groups, the number of people exposed to the view and the duration of their view. This includes both highway users and persons in the surrounding area. *Viewer sensitivity* refers to factors that affect the degree to which a viewer perceives elements of the environment and the extent to which those elements are important to the viewer. Viewer sensitivity is affected by factors such as the activities a viewer is engaged in, the visual context and the values, expectations and interests of the groups involved.

Generally, persons engaged in elective activities are most sensitive to the visual environment. People who have chosen an activity for enjoyment, such as a tourist or someone engaged in a recreational activity, are often attracted to an area because of its visual features. They have ample time to stop and look at a scene in a leisurely fashion. Other elective activities, such as shopping, dining or attending a cultural or sporting event, involve varying degrees of sensitivity to visual elements, depending on location, elements visible, time available and mode of traveling to the site.

Residents in their homes exhibit a similar attraction to the visual amenities of an area. Residents are often among the most sensitive groups because of their high personal investment in the environment as well as regular exposure to it. They may, however, become habituated to elements of a view that might be intrusive or objectionable to those not exposed on a regular basis.

Employees at work tend to be less sensitive to the visual environment outside the work place when they are focused on work tasks. However, the surrounding environment is likely to be a factor if they have time to take a visual break and they have window access to the outside environment. The visual environment may be important in their trip to and from work and during times they leave the work environment, such as for breaks or lunch. In general, office workers are more likely to be able to include access to the visual environment in their work activities than industrial workers.

Persons involved in travel are likely to be less sensitive to the surrounding visual environment because of the demands of driving and the short duration they are exposed to visual elements. In the case of regular commuters using a familiar route, the daily repetition of a relative short-duration event may lead to a great deal of familiarity, and they may place high value on a scene that is experienced only in a “snapshot” moment. They also may become habituated to negative elements and focus more on positive elements.

b. Visual Resources in the Project Area

The most striking visual characteristics of the Route 65 project corridor are the visual contrasts between urban and rural elements. This contrast is strongly affected by the rolling nature of the terrain, which tends to limit some views and focus attention on others. Urban views are most concentrated within Lincoln, and to some extent near Warsaw, but are also intermittently visible throughout the corridor as commercial signage or buildings. Interspersed with the urban views are typical rural/pastoral views.

Overall, the visual environment in the Lincoln area and along the arterials is disharmonious and disorderly. There is little variation among the urban views. The views generally consist of various types of residential and roadside commercial real estate development. One and two story structures dominate the landscape. The Lincoln commercial area is not fully developed, so that the existing structures are generally widely spaced, detached buildings with parking in front. There is little visual cohesion in terms of design integrity with relation to signage, setbacks, layout of parking lots and access to commercial establishments. As a standout feature, the MoDOT maintenance garage is an older building with some interesting elements. Along the cross-roads of Route 65, the views quickly convert to residential, mostly modest single-family structures. Visually speaking, the intersections do not provide cohesive examples of the built environment within the project area. Views of the open spaces adjacent to the city border are somewhat notable. These views include Timberline Lake, the rolling woodlands (primarily along the east side of the city) and the views to the city’s parks (Lincoln School and Mike Hare Memorial Ball Park). Views of existing Route 65 from most neighborhoods are effectively obstructed by vegetation, frontage roads and other buildings.

Overall, the visual environment in the rural areas also contains few important or sensitive elements (such as water resources or plant communities). The rural visual environment is largely shaped by the rolling terrain. Because of the topography, there are few substantial distant views of natural elements. The most common views are of agricultural open spaces and woodlands. Water views are limited. The Truman Reservoir is not visible from Route 65 because of the prominent reservoir dike. Among the notable views of the rural environment are those to the Lincoln Airport and the Warsaw Airport. Both are readily visible from Route 65 and vice versa. The Lost Valley Fish Hatchery and the Rock Hill Prairie are visible, but these views cannot be considered outstanding or unique. The residential communities within the rural areas are sporadic and range from trailers to single-family homes to farm-type homesteads.

15. Section 4(f)

Section 4(f) of the USDOT Act of 1966 limits FHWA participation in projects that adversely impact publicly owned park and recreation lands, wildlife and waterfowl refuges and historic sites⁵. The Secretary of Transportation may only approve projects requiring the use of these lands if there is no feasible and prudent alternative to the use and the project includes all planning to minimize harm. There are no historic resources known within the vicinity of the reasonable range of alternatives for which Section 4(f) applies.

The remainder of this section will discuss two groups of properties. First are those that qualify as potential Section 4(f) resources, but have been avoided in the establishment of the reasonable range of alternatives for the Route 65 project. These include the Lincoln School Playground and the Mike Hare Memorial Ball Field Park. The second group of properties contains characteristics similar to those of a Section 4(f) resource but to which Section 4(f) does not apply. These resources include the Rock Hill Prairie, the Truman Reservoir and the Lost Valley Fish Hatchery.

a. The Lincoln School Playground

Public school playgrounds are Section 4(f) resources when they are open to the public and non-school activities form a substantial part of the parks' users. The officials with jurisdiction over the playgrounds have a critical responsibility in determining the characteristics associated with the playgrounds' uses. The reasonable range of alternatives was developed, in part, to avoid encroachments to this resource.

b. The Mike Hare Memorial Ball Field

This facility is located on both sides of Fordney Road in Lincoln. The reasonable range of alternatives was developed, in part, to avoid encroachments to this resource.



c. The Rock Hill Prairie

This facility is a 68-acre tract located in the southeastern quadrant of the Route 65/Route BB intersection. This facility is owned by a private organization—The Nature Conservancy. Among



Typical view of the Truman Reservoir Embankment from Route 65

the goals of this facility is the preservation of important habitat for the Mead's milkweed. The project team has conducted extensive outreach with The Nature Conservancy so that impacts to this important facility can be minimized. This outreach is more fully discussed in **Chapter V.B.4**. Because the prairie is not owned by the public, Section 4(f) does not apply to the Rock Hill Prairie.

d. The Truman Reservoir

The ACOE has the responsibility for managing 259 square miles of land and

⁵ Sites listed on or eligible for the National Register of Historic Places, regardless of ownership.

water at Truman Reservoir. Truman Reservoir is the largest flood control lake in Missouri. The reservoir has a surface area of about 56,000 acres; additionally 110,000 acres of public land surround the reservoir. At the top of the flood control pool (739.6) the reservoir grows to over 200,000 acres. The reservoir is located in portions of four Missouri counties: Benton, Henry, St. Clair and Hickory. The Kaysinger Bluff Dam and Reservoir was authorized in 1954 as one unit in a comprehensive flood control plan for the Missouri River basin. In 1970, the project was renamed by Congress as the Harry S. Truman Dam and Reservoir, in honor of the former president.

Part of the reservoir property abuts Route 65; see **Exhibit III-2C**. Section 4(f) does not apply to the Truman Reservoir because the primary purpose of the facility is not recreation (but rather flood control). Additionally, the area adjacent to Route 65 is dominated by the embankment for the reservoir. While nominally open to the public, this adjacent area's primary purpose is clearly not recreation. Section 4(f) applies to those areas of multiple-use land holdings that are used primarily for park/recreation/refuge purposes and are determined to be significant for those purposes.



View of use limitation within Lost Valley Fish Hatchery

The officials with jurisdiction over the Truman Reservoir are supportive of the project. The Route 65 project team has coordinated extensively with the ACOE. In **Appendix V-F** is a coordination letter documenting ACOE support for the project and establishing that the reservoir areas adjacent to Route 65 are not primarily for park/recreation/wildlife refuge use and are not significant for those purposes. Consequently, it has been determined that Section 4(f) is not applicable to this property.

e. Lost Valley Fish Hatchery

The MDC has the responsibility for the Lost Valley Fish Hatchery. This is the largest warm water fish hatchery in Missouri and is located adjacent to Route 65, near Warsaw (see **Exhibit III-2C**). The hatchery areas adjacent to Route 65 are not covered by Section 4(f) because of the primary purpose criteria. The areas adjacent to Route 65 are not open to recreation. Access to a proposed MDC maintenance shop, which is not in the project's footprint, will be assured as project development continues.

The officials with jurisdiction over the Lost Valley Fish Hatchery are supportive of the project. The Route 65 project team has coordinated extensively with the MDC. **Appendix V-F** contains a coordination letter documenting MDC support⁶ for the project and establishing that the areas adjacent to Route 65 are not primarily for park/recreation/wildlife refuge use and are not significant for those purposes. Consequently, it has been determined that Section 4(f) is not applicable to this property.

Additionally, the Lost Valley Fish Hatchery does not have any investment from the Land and Water Conservation Fund. It does, however, contain investment from the Dingell-Johnson Sport Fish Restoration Act (F-48D), administered by the USFWS. This is restricted to the hatchery area, which is located east of the proposed project. Because the project will not affect the hatchery or its function, mitigation is not an issue.

⁶ Among the MDC's primary concerns was the avoidance of a proposed Forestry Building. The location of this building is proposed well outside the Route 65 project area. Nevertheless, its avoidance was made an environmental commitment for the project.