

B. Environmental and Related Resources

The EC-EIS study area falls within the irregular east-west boundary between two major physiographic provinces, defined by the extent of the most recent (Pleistocene) glaciation: the Dissected Till Plain Province (glaciated) to the north and east and the Ozark Highlands Province (unglaciated) to the south and west. The topography along the corridor can generally be characterized as rolling, with medium and narrow ridges and moderate to steep valley side slopes. **Exhibit III-2** depicts the location of many of the resources discussed in this text.

1. Mineral Resources

Rocks of Mississippian and Pennsylvanian age form the bedrock of the study site. Mississippian age rocks vary in formation but are predominately limestone with thin beds of shale. Pennsylvanian age rocks vary from shale, limestone, sandstone, clay and coal. Glacial till and loess of varying thickness are deposited on top of the bedrock.

Rock formations from the Mississippian and Pennsylvanian age were mined in Boone County for coal, ceramic materials (including fireclay), limestone, and shale for cement manufacturing and as raw material for the production of Tripoli, lead, zinc and iron. A total of 11 mines were previously active within the study area. Acreage of the mines varied from 0.5 to 21 acres. Coal was extracted from ten mines; six mines using surface mining operations and four using a combination of surface and underground mining operations. One mine was quarried for limestone using surface mining operations. None of the mines are currently active.

Limestone and dolomite bedrock is prone to the development of sinkholes and caves, known as karst topography. Groundwater is particularly susceptible to contamination from the surface in karst areas because the sinkholes provide direct connections to the groundwater. The Missouri Department of Natural Resources (MDNR) has identified no sinkholes in the project area.

2. Farmland Resources

Based on soil characteristics, the Natural Resource Conservation Service has classified about 41 percent of the land in Boone County as prime farmland. Prime farmland is land best suited to grow food, feed, forage, fiber and oilseed crops and is available for these uses. Prime farmland produces the highest yield with minimal expenditure of energy or economic resources, and farming it results in the least damage to the environment.

Active agriculture is an important land use in Boone County, occupying about 53 percent of the total area of the county. Roughly 30 percent of the county land area is used for row crops and hay, and 23 percent is used for livestock pasture. The average farm size in the county is 204 acres. Boone County ranks in the 50th to 70th percentile of Missouri counties for most agricultural commodities. The annual income from active row cropland ranges from about \$140 per acre for hay to about \$300 per acre for corn. According to the Missouri Department of Agriculture, total cash receipts in Boone County for agricultural products were \$40 million in 1997 and \$31 million in 2001.

The project's aerial mapping depicts the general distribution of agricultural lands within the EC-EIS study area. For the reasonable alternatives, a survey was conducted to more precisely identify terrestrial habitat types. This data is shown on **Exhibit III-2**. The following habitat types were used for this survey:

- Agricultural – Any active crop production
- Forest – Mature deciduous forest
- Grassland/Pasture – Fallow, abandoned or hay fields. Also includes larger mown areas and livestock areas
- Scrub-Shrub Habitat – Immature woody areas or shrub dominated habitats
- Urban – Predominantly developed areas
- Wooded Estate – Low density and heavily forested residential areas

The exhibits in **Chapter IV** show the distribution of habitat types affected by the Preferred Alternative.

3. Groundwater and Water Supply

Groundwater within the study area comes from Cambrian and Ordovician formations, mostly dolomite and limestone. Water is mostly fresh but the aquifer contains areas that are slight to moderately saline. Recharge of water levels in the aquifer occurs via precipitation but small amounts of water enter by downward leakage from the overlying Mississippian aquifer. Water from the aquifer primarily discharges to streams in outcrop areas.

Two active wells, Harg Well and Airpark Well pull water from the aquifer for public consumption within the study area. Drilled in 1971, Harg Well pumps 500 gallons per minute (gpm) of water from a depth of 400 feet. Drilled in 1981, the Airpark Well pumps 180 gpm of water from a depth of 650 feet.

Water from the wells is of a calcium bicarbonate type. Dissolved-solid concentrations are around 500 milligrams per liter. In most places, chloride and sulfate concentrations are less than 10 milligrams per liter. Water from the aquifer is considered hard to moderately hard. Threats to water quality are mainly runoff that percolates into the system. Contaminating sources are residential lagoons, above-ground fuel storage tanks and commercial industries.

4. Surface Water Resources

The study area is in the Lower Missouri-Moreau Watershed System (Hydrologic Unit # 10300102). The Lower Missouri-Moreau Basin covers 3,400 square miles and includes 273 stream miles, 3,176 stream acres and 3,175 lake acres within Boone County.

All crossings of regulated waters, including all streams and connected ponds and wetlands, require permission from the USACE under Section 404 and the MDNR under Section 401 of the CWA. The impacts to all regulated waters for the project would likely be considered as a whole under a single Individual Section 404 permit and Section 401 water quality certification. Section 404 permits and Section 401 certifications typically require analysis of alternatives to avoid impacts to streams and wetlands, measures to minimize impacts and then mitigation for unavoidable wetland and stream impacts.

Four major waterways transverse the study area: Hominy Branch, the North and South Fork of Grindstone Creek and Gans Creek. Hominy Branch and the North and South Fork of Grindstone Creeks drain into Hinkson Creek which empties into Perche Creek. Gans Creek merges with the Little Bonne Femme which connects directly to the Missouri River.

a. Hominy Branch

Located in the northwest corner of the study area, Hominy branch originates about 5 miles north of the study area, meandering through farmland, planned residential communities and commercial districts. The branch enters the study area just east of Crump Drive and exists just south of Broadway Street. **Figure III-6** shows the Hominy Branch, south of Broadway

FIGURE III-6
Hominy Branch



b. North Fork of Grindstone Creek

The North Fork of Grindstone Creek originates about 2.5 miles north of the study area just south of Mexico Gravel Road. A couple of unnamed intermittent streams merge with the North Fork before entering the study area near Eastern Lane. The creek is primarily surrounded by farmland (**Figure III-7**), but enters a commercial district near I-70. The North Fork passes along the border of both Highfield Acres and Eastport Village neighborhoods as well as passing through pastures and woodland as it passes through the center of the study area. The North Fork of Grindstone Creek merges with the South Fork of Grindstone Creek just south of the intersection of Stadium Boulevard and US-63 before exiting the study area.

FIGURE III-7
North Fork of Grindstone Creek

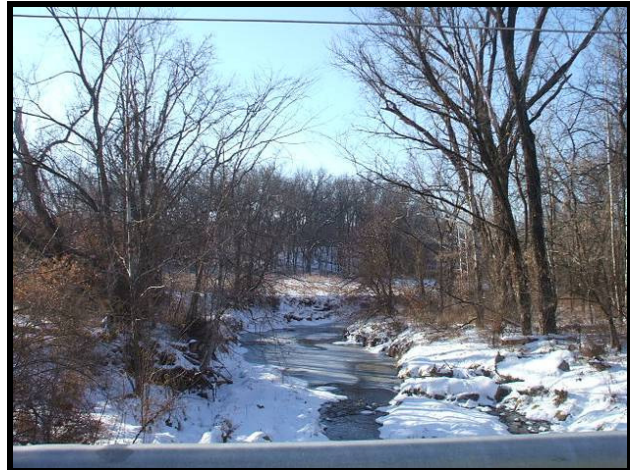


Figure III-7 shows the North Fork Grindstone Creek south of Richland Road.

c. South Fork of Grindstone Creek

The South Fork of Grindstone Creek is entirely within the study area. The South Fork originates near the intersection of Rangeline Road and I-70, in a light industrial area. Land use adjacent to the South Fork consists of industrial parks, farmland and planned communities. The South Fork of Grindstone Creek passes through the center of the planned

Old Hawthorne and the Vineyards neighborhoods. The South Fork merges with the North Fork of Grindstone Creek near the Stadium Boulevard and US-63 interchange. **Figure III-8** shows the South Fork Grindstone Creek, north of Richland Road.

d. Gans Creek

Gans Creek also originates in the study area just south of the Richland Road and Rangeline Road intersection. Gans Creek travels south merging with an unnamed intermittent stream before turning southwest, existing the study area just east of Rolling Hills Road. Land use adjacent to the creek consists of pastures, rural housing, and light industrial. **Figure III-9** shows the Gans Creek, north of New Haven Road.

In addition to these major streams, there are numerous small, intermittent and ephemeral tributaries within the project area. Those streams generally flow only during wet seasons and during intense rainstorms in drier seasons. Nevertheless, they are considered waters of the US, and are regulated under the CWA. The locations of these smaller streams have been established by literature reviews and field studies. **Exhibits III-2** depicts all the streams in the study area.

FIGURE III-8
South Fork of Grindstone Creek



FIGURE III-9
Gans Creek



5. Water Quality

The quality of waters that drain Boone 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 Pennsylvanian-aged limestone bedrock, which is generally beneficial to stream water quality. 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.

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

operations. As a result, surface waters tend to be somewhat turbid and are affected by sediment deposition from soil erosion. Within the urban areas, waters are affected by additional factors. Urban land development is known to have had a deleterious effect on waterways because of changes in stormwater flow patterns as well as from entrained pollutants from buildings, parking lots, lawns and roadways. Columbia's wastewater is processed at the treatment plant southwest of the city, but numerous localized discharges of wastewater effluent exist. Subsurface systems are common.

Waters that are not meeting Missouri's water quality standards are identified and listed as impaired in accordance with the Federal Water Pollution Control Act, section 303(d). These waters, because of degraded water quality, do not sustain all of the beneficial uses required under state regulation. Beneficial uses include whole body contact for swimming, maintaining fish and other aquatic life and providing drinking water. Projects affecting these impaired waters may, therefore, require attention to state regulation. Depending on the nature of the impairment, a project may also find it prudent to consider how the impairment might impact the implementation of the project. The Revised EPA Consolidated 2002 Missouri 303(d) List and MDNR list of 303(d) impaired waters were reviewed. None of the creeks within the study area are listed as impaired under Section 303d of the Clean Water Act. A segment of Grindstone Creek outside of the study area is being proposed as impaired because of bacteria from an unknown source.

6. Floodplains

Both the City of Columbia and Boone County participate in the National Flood Insurance Program (NFIP) and have adopted flood insurance studies to identify flood hazards for floodplain management and flood insurance purposes. The NFIP flood insurance rate maps (FIRM) were reviewed to determine the extent of the 100-year floodplain and regulatory floodway within the study area. A 100-year flood is defined as a flood which has a 1 percent chance of being equaled or exceeded in magnitude in any given year and is any area that would be covered by water during a 100-year flood event. A regulatory floodway is defined as the channel of a stream plus the adjacent area that will be inundated with water during a 100-year flood event and must remain free of encroachment to avoid increasing the base flood elevation during a 100-year flood event.

Floodplains are located adjacent to the four major streams found within the EC-EIS study area: Hominy Creek, North and South fork of Grindstone Creek, and Gans Creek. The 100-year floodplains are depicted on **Exhibit III-2**.

FEMA requires that all projects located within a 100-year floodplain not raise the base flood elevation more than 1 foot and result in no rise in the regulatory floodway. The State of Missouri Emergency Management Agency (SEMA) is the agency that issues floodplain development permits and issues no-rise certificates for development within regulatory floodways and is also the agency which operates the flood-buyout program in the State of Missouri. The purpose of this program is to purchase property that has been developed in the floodplain and remove all structures located on the property. This aids in restoring the floodplain and reducing the amount of money paid out as a result of flood insurance claims. Since federal money is used to fund the flood buyout program other federally funded projects may not be located on property that was purchased as part of a FEMA/SEMA flood

insurance buyout program. Correspondence with SEMA revealed that there were no SEMA-buyout properties located within the study area.

7. Wetlands and Ponds

Wetlands are a transitional type of habitat between terrestrial and aquatic systems (Cowardin et. al. 1979). The water table is usually at or near the surface, or the land is covered by shallow water in areas designated as wetlands. The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency 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 under normal circumstances do support, a prevalence of vegetation typically adopted for life in saturated soil conditions. Wetlands generally include swamps, 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 nonforested 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.

Wetlands within the EC-EIS study area are primarily palustrine emergent (PEM), palustrine scrub-shrub (PSS) and palustrine forested (PFO) systems. Many of these systems are also associated with openwater features, such as ponds and small lakes.

Palustrine emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes that are present for most of the growing season (Cowardin et. al. 1979). These ponds, marshes and associated ponds are located predominately at the mouth or base of ephemeral streams as a result of manmade and natural activities. Water levels are dependent on flooding which is temporary, seasonal or semipermanent.

Palustrine forested wetlands are characterized as broad-leaved deciduous forests that are temporarily flooded due to natural processes or manmade activities. Forested wetlands are characterized by woody vegetation 6 meters tall or taller (Cowardin et. al. 1979). Within the study area, forested wetland systems are rare and generally confined to the wooded stream corridors.

Palustrine scrub-shrub wetlands are saturated or temporarily flooded, naturally occurring wetlands dominated by vegetation less than 6 meters tall. Palustrine scrub-shrub wetlands may be successional growth leading to forested wetlands or stable communities (Cowardin et. al. 1979). The PSS wetlands are predominantly located along the banks of Gans Creek, the North and South Forks of Grindstone Creek and Hominy Branch.

Within the study area, ponds are interspersed with wetlands. 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. Many of the ponds support a band of shoreline vegetation.

The National Wetland Inventory depiction of wetlands within the EC-EIS study area was used to develop and evaluate conceptual alternatives. For the reasonable alternatives, a determination-level wetland survey was conducted to more precisely identify the location and size of wetland resources. This refinement is shown on **Exhibit III-2**.

8. Terrestrial Habitats and Wildlife

The EC-EIS study area is located in a predominately rural, agricultural environment with wide-open spaces for cultivating row crops and pastures for grazing livestock. Secondary growth of shrubs and saplings along fence rows act as a division or wind break between fields. Wildlife likely to be found within the study area include many species of birds, such as the red-winged blackbird (*Agelaius phoeniceus*), indigo bunting (*Passerina cyanea*), northern cardinal (*Cardinalis cardinalis*), American crow (*Corvus brachyrhynchos*), morning dove (*Zenaida macroura*), red-tailed hawk (*Buteo jamaicensis borealis*), blue jay (*Cyanocitta cristata*) and the American tree sparrow (*Spizella arborea*).

Some of the mammalian species likely to occur within the study area include the white-tailed deer (*Odocoileus virginianus*), Virginia opossum (*Didelphis virginiana virginiana*), striped skunk (*Mephitis mephitis avia*), gray squirrel (*Sciurus carolinensis carolinensis*), raccoon (*Procyon lotor hirtus*) and the eastern cottontail rabbit (*Sylvilagus floridanus alager*).

Hominy Creek, the North and South Forks of Grindstone Creek and Gans Creek contain a sufficient amount of water providing habitat to some common fish species such as largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), suckermouth minnow (*Phaenacobius mirabilis*) and the green sunfish (*Lepomis cyanellus*). The ponds and damper environments in the study area can provide habitat for amphibians such as the eastern American toad (*Bufo americanus*), the southern leopard frog (*Rana sphenoccephala*), western chorus frog (*Pseudacris triseriata*) and the eastern tiger salamander (*Ambystoma tigrinum*). Some of the reptiles include the western painted turtle (*Chrysemys picta*), the five-line skink (*Eumeces fasciatus*), the northern fence lizard (*Sceloporus undulatus*) and the eastern garter snake (*Thamnophis sirtalis sirtalis*).

The project's aerial mapping depicts the general distribution of terrestrial habitats within the EC-EIS study area. For the reasonable alternatives, a survey was conducted to more precisely identify habitat types. The following habitat types were used for this survey:

- Agricultural – Any active crop production
- Forest – Mature deciduous forest
- Grassland/Pasture – Fallow, abandoned or hay fields. Also includes larger mown areas and livestock areas
- Scrub-Shrub Habitat – Immature woody areas or shrub dominated habitats
- Urban – Predominantly developed areas
- Wooded Estate – Low density and heavily forested residential areas

This distribution of habitat types is shown on **Exhibit III-2**. Pertinent agency coordination letters are in **Appendix G**.

9. Threatened and Endangered Species

Under the U.S. Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) has primary responsibility in the protection of federally endangered and threatened species and designation of critical habitat areas for these species. All federally endangered and threatened plants and animals are protected by the Endangered Species Act of 1973 (ESA). The Missouri Department of Conservation (MDC) determines species' state status in Missouri under constitutional authority (3CSR10-4.111 Endangered Species). Species that are listed in the Wildlife Code under 3CSR10-4.111 are protected by State Endangered Species Law 252.240.

Correspondence was conducted with the USFWS concerning species listed as federally endangered or threatened that could occur in or near the study area. Correspondence was also conducted with the MDC and information was obtained from the MDC's Natural Heritage Database to see if there are any rare species or rare natural communities that have been known to occur in or near the study area. Endangered or threatened species known to occur in Boone County (and their typical habitat) are outlined in **Table III-8**.

TABLE III-8

Federal Endangered or Threatened Species Known to Occur within Boone County

Common Name	Scientific name	Typical Habitat
Gray bat (E)	<i>Myotis grisescens</i>	Caves
Indiana bat (E)	<i>Myotis sodalis</i>	Small stream corridors with well developed riparian woods; upland forests
Pallid sturgeon (E)	<i>Scaphirhynchus albus</i>	Mississippi and Missouri Rivers
Running buffalo clover (E)	<i>Trifolium stoloniferum</i>	Disturbed bottomland meadows
Topeka shiner (E)	<i>Notropis topeka</i>	Small prairie (or former prairie) streams

Source: County Distribution of Missouri's Federally-listed Threatened, Endangered, Proposed, and Candidate Species.

Initial coordination with the USFWS concluded that, "The USFWS has reviewed the project proposal and determined that no federally listed species of designated critical habitat occurs within the project area." Subsequent coordination concluded that alternatives SC-2C and SC-2A (in that order) would minimize the potential for impacts to the foraging habitats (the area's stream corridors) of the gray bat and the Indiana bat. The USFWS recommended that approved best management practices be implemented. Pertinent agency coordination letters are contained in **Appendix G**.

Coordination was also conducted with the MDC and information was obtained from the MDC's Natural Heritage Database to see if there are any listed rare species or rare natural communities that have been known to occur in or near the study area. No state or federal-listed rare species or rare natural communities were found to occur within or near the EC-EIS study area.

The MDC also maintains records of unlisted species and habitats of conservation concern. MoDOT considers these species and natural communities during the project planning process. A brief explanation of each ranking is as follows:

- S1—Critically imperiled (typically 5 or fewer occurrences or very few remaining individuals)
- S2—Imperiled (6 to 20 occurrences or few remaining individuals or acres)
- S3—Rare or uncommon (21 to 100 occurrences)

Three species of conservation concern occur within the study area: the Harvey's beak-rush (*Rhynchospora harveyi*) ranked S1, A Brome (*Bromus latiglumis*) ranked S3, and the northern crawfish frog (*Rana areolata circulosa*) ranked S3. Harvey's beak-rush is a perennial herb of the sedge family, Cyperaceae found in moist, sandy or clay soils and shallow water (Great Plains Flora Association, 1986). The occurrence of Harvey's beak-rush within the study area is near the intersection of Rollings Hill Road and State Highway WW. A Brome is a perennial grass of the grass family, Poaceae found in moist woods (Great Plains Flora Association, 1986). A Brome occurs near the mouth of the South Fork of Grindstone Creek within the study area. Additional individuals are found outside the study area west of US-63 along Grindstone Creek. The northern crawfish frog is a carnivorous amphibian found south of Gans Creek near New Haven Road. Preferred habitat of the frog is native prairies or low meadows and pastures. The northern crawfish frog can also be found or associated with terrestrial/aquatic habitats.

10. Hazardous Substances

To inform the process used to develop and evaluate the conceptual alternatives, an initial literature search for hazardous substances was conducted. This data search found less than 10 potential hazardous waste generators within the EC-EIS study area. Based on the MDNR data there were only eight small quantity hazardous waste generators located within or immediately adjacent to the study area. These include Lowes, Boyce & Bynum Pathology Labs, Columbia Regional Hospital, Gates Corporation, Perry Legend Collision repair, MU Printing Services, Casey's General Store, and the U.S. Geological Services' Columbia Environmental Research Center. The MDNR brownfield/voluntary cleanup program lists one site located within the study area, UMC's South Farm. This site is listed for the presence of pesticides and volatile organic compounds and is currently listed as an active cleanup site.

To inform the process of developing and evaluating the reasonable alternatives, a commercial data base search of readily available regulatory files and a limited field study to identify potential hazardous waste generators was conducted in late November of 2007. The survey identified 29 areas of potential concern that warrant further consideration by the project team. The sites are typical commercial and industrial sites. None of the sites seemed to present clean-up costs that could be considered extraordinary. The Environmental Site Assessment is available in the project records.

11. Air Quality

The Federal Clean Air Act of 1970 and subsequent amendments adopted air quality standards to protect and enhance the public's health and welfare from hazardous air borne particles. Particles of primary interest are sulfur dioxide (SO₂), particulates (PM₁₀, 10 microns and smaller; PM_{2.5}, 2.5 microns and smaller), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃) and lead (Pb). In addition to these pollutants, the State of Missouri has established additional criteria for



hydrogen sulfide (H₂S) and sulfuric acid (H₂SO₄). The Missouri and National Ambient Air Quality Standards for these pollutants are listed in **Table III-9**.

TABLE III-9
National and Missouri Ambient Air Quality Standards

Pollutant	Averaging Time	Standard Value	Standard Type
Ozone (O ₃)	1 hour ⁽¹⁾	0.12 ppm (235 µg/m ³)	Primary & Secondary
	8 hour ⁽²⁾	0.08 ppm (157 µg/m ³)	Primary & Secondary
Carbon Monoxide (CO)	1 hour ⁽³⁾	35 ppm (10 mg/m ³)	Primary & Secondary
	8 hour ⁽³⁾	9 ppm (40 mg/m ³)	Primary
Nitrogen Dioxide (NO ₂)	Annual Arithmetic Mean	0.053 ppm (100 µg/m ³)	Primary & Secondary
Particulate (PM ₁₀)	Annual Arithmetic Mean	50 (µg/m ³)	Primary & Secondary
	24-hour average	150 (µg/m ³)	Primary & Secondary
Particulate (PM _{2.5})	Annual Arithmetic Mean	15 µg/m ³	Primary & Secondary
	24-hour average ⁽⁴⁾	35 µg/m ³	Primary & Secondary
Lead (Pb)	Quarterly average	1.5 µg/m ³	Primary & Secondary
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean	0.03 ppm (80 µg/m ³)	Primary
	24-hour average ⁽¹⁾	0.14 ppm (365 µg/m ³)	Primary
	3-hour average ⁽¹⁾	0.50 ppm (1300 µg/m ³)	Secondary
Hydrogen Sulfide (H ₂ S) ⁽⁵⁾	One-half hour ⁽⁶⁾	70 µg/m ³ (0.05 ppm)	
	One-half hour ⁽⁷⁾	42 µg/m ³ (0.03 ppm)	
Sulfuric Acid (H ₂ SO ₄) ⁽⁵⁾	24-hour ⁽⁸⁾	10 µg/m ³	
	1 hour ⁽⁹⁾	30 µg/m ³	

Notes:

- (1) The U.S. EPA will be phasing out the old 1-hour ozone standard.
- (2) The 8-hour primary and secondary standards are met when the 3-year average of the 4th highest average concentration is less than or equal to 0.085 ppm.
- (3) Not to be exceeded more than once per year.
- (4) Statistically estimated number of days do not exceed more than 1 per year.
- (5) Missouri Air Quality Standards
- (6) Not to be exceeded more than twice per year.
- (7) Not to be exceeded more than twice in any five consecutive days.
- (8) Not to be exceeded more than once in any ninety consecutive days.
- (9) Not to be exceeded more than once in any two consecutive days.

ppm parts per million parts of air (by volume) at 25°C

µg/m³ micrograms of pollutant per cubic meter of air

mg/m³ milligrams of pollutant per cubic meter of air

* No longer applies to any area in Missouri.

Source: Code of Federal Regulations; Title 40 Part 50: Revised July 2004 and Missouri 10 CSR 10-6.010 Ambient Air Quality Standards

The Clean Air Act Amendment (CAAA) of 1977 required all states to submit to the U.S. Environmental Protection Agency (EPA) a list identifying those air quality control regions, or portions thereof, which 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 with the requirements of the federal regulations. These procedures are published in 40 CFR parts 51 and 93.

The EC-EIS project study area is located within the Northern Missouri Intrastate Air Quality Control Region. This area is in a non-classified area. Therefore, the requirements of 40 CFR part 93 do not apply to this project.

12. Traffic-Noise Environment

Missouri Department of Transportation's Traffic-Noise Policy, developed in accordance with FHWA procedures for highway noise analysis and abatement contained in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, was used to identify and evaluate potential noise impacts associated with the proposed EC-EIS improvements. Evaluation of the traffic-noise impacts expected from construction of a highway involves the following:

- Identification of existing activities and developed lands that may be affected by traffic noise from the highway
- Prediction of traffic-noise levels
- Determination of existing noise levels
- Determination of traffic-noise impacts
- Examination and evaluation of alternative noise abatement measures for reducing or eliminating noise impacts

Traffic-noise levels are typically calculated in A-weighted decibels (dBA). A-weighting de-emphasizes lower frequency sounds below 1,000 hertz (1 kHz) and higher frequency sounds above 4 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, contains 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 1-hour period, in decibels (i.e., a 1-hour L_{eq}).

The effects of noise on people can be listed in three general categories: 1) subjective effects of annoyance, nuisance and 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 topic:

- Except in carefully controlled laboratory experiments, a 1-dBA change cannot be perceived by humans.
- Outside the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A 10-dBA increase is subjectively heard as approximately a doubling in loudness.

Noise abatement is considered when a traffic-noise impact is predicted. A traffic-noise impact occurs when peak-hour noise levels are predicted to approach or exceed the noise abatement criteria (NAC) or when predicted traffic-noise levels substantially exceed (by 15 dBA or more) the existing noise levels. Approach is defined as within 1 dBA. **Table III-10** identifies the NAC for most activity categories.

Activity Category B applies to all uses in the EC-EIS study area. Consequently, traffic-noise impacts will occur whenever peak-hour noise levels exceed 66 dBA or when they are 15 dBA higher than existing conditions.

TABLE III-10
Noise Abatement Criteria, Hourly A-weighted Sound Level-Decibels (dBA)

Activity Category	Leq (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

Within the EC-EIS study area, the major noise-sensitive receptors are neighborhoods that will be affected by increased traffic noise from any roadway improvement. These receptors are described below and depicted on **Exhibits III-1**. The location and configuration of these receptors were considered during the development and evaluation conceptual alternatives. **Table III-11** summarizes how the conceptual alternatives relate to the sensitive receptors.

a. Sun Rise Estates

Located between I-70 and Richland Road, this single-family subdivision contains several hundred units along circular roadways on half-acre lots. The dominant source of traffic noise is from I-70. Mitigation of I-70 traffic noise is outside the scope of this project. However, traffic noise from alternatives that propose to reconfigure the Richland Road corridor can be expected to increase noise levels to adjacent dwellings.



b. New Haven / Olivet

Located in the northeastern quadrant of the New Haven Road/Olivet Road this single-family subdivision contains less than 20 units. Only alternatives that propose to reconfigure New Haven Road would affect these dwellings.

c. Cedar Grove / Old Hawthorne

Located off Route WW, near the South Fork of Grindstone Creek crossing, the Cedar Grove single-family subdivision consists of approximately 30 units along a single roadway on lots varying between 3 and 6 acres. Cedar Grove is adjacent to a large (805 acre) development, often referred to as Old Hawthorne. Plans call for the construction of more than 1,500 single-family homes and apartment units, many surrounding a golf course. The site may also be rezoned to include some commercial development, mostly along the northern edge of Route WW. Alternatives that propose to reconfigure Route WW may result in traffic-noise impacts.

d. The Woodlands

Located in the northwestern quadrant of the New Haven Road/Rolling Hills Road this single-family subdivision contains approximately 100 units. Only alternatives that propose to reconfigure New Haven Road would affect these dwellings.

e. El Chaparral / New Haven Meadows

On the south side of Route WW, this single-family subdivision contains several hundred units along circular roadways on quarter-acre lots. Alternatives that propose to reconfigure Route WW may result in traffic-noise impacts. Additionally, the extension of Stadium Boulevard (Route 740) may also affect the noise environment.

f. Concord Estates / The Vineyards

On Route WW, several single-family subdivisions are under development. Alternatives that propose to reconfigure Route WW may result in traffic-noise impacts.

g. Wellington Manor

Located on both sides of St Charles Road, at the Richland Road intersection, these single-family subdivisions contain approximately 100 units. Alternatives that propose to reconfigure St Charles Road may result in traffic-noise impacts. Additionally, the extension of Ballenger Lane may also affect the noise environment.

h. Carmel Creek

This is a small single-family subdivision on St. Charles Road. Alternatives that propose to reconfigure/utilize the St Charles Corridor may affect the noise environment.

i. Woodridge

Woodridge is located in the northwestern corner of the project study area; access is from I-70 Drive (southeast). This small single-family subdivision has a Columbia Neighborhood Association. The dominant source of traffic-noise is from I-70. Mitigation of I-70 traffic-noise is outside the scope of this project. Additionally, it is unlikely that any of the alternatives to

improve the transportation network in eastern Columbia would affect the noise environment of the Woodridge neighborhood. The nearest improvement, the Ballenger Lane extension, is roughly 2,000 feet away.

j. Eastland Hills

This single-family subdivision is located between I-70 and St Charles Road and has nearly 100 units. The dominant source of traffic-noise is from I-70. Mitigation of I-70 traffic-noise is outside the scope of this project. The reuse of St. Charles Road may affect the noise environment of the Eastland Hills neighborhood. The Ballenger Lane extension is roughly 800 feet away.

k. Eastport/Bay Hills/Lake of the Woods

Located between I-70 and Richland Road, and composed of several single-family subdivisions, they represent several hundred units along circular roadways on quarter-acre lots. The dominant source of traffic-noise is from I-70. Mitigation of I-70 traffic-noise is outside the scope of this project. However, traffic noise from alternatives that propose to reconfigure the Richland Road or St. Charles corridors may rise to the level of a traffic-noise impact.

Table III-11 summarizes the nature of the sensitive receptor and identifies those design elements that were expected to affect the locations. **Chapter IV** will examine how the reasonable alternatives will affect these receptors.

13. Cultural Resources

Cultural resources consist of archaeological sites, architectural buildings and structures, bridges, National Register places and districts and cultural landscapes that are significant to American history, architecture, archaeology, engineering and culture. According to the criteria in the NHPA, significant sites or properties are those that possess integrity of location, design, setting, materials, workmanship, feeling and association. Further, a property can be significant for one or more of the following four criteria:

- **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
- **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 as eligible for listing on the NRHP to be in compliance with Section 106 of the NHPA, as well as Section 4(f) of the Transportation Act.

TABLE III-11
Sensitive Receptors and Design Elements that may affect the Traffic-noise Environment

Sensitive Receptor	Approximate Number of Dwellings	NAC Category and Level	Design Elements that May Affect Noise Environment (Conceptual Alternatives with these Elements)
Sunrise Estates*	>100	B (67 dBA)	Reconfiguration of Richland Road to a Limited Access Freeway (RR-1/RR-2/RR-3)
New Haven/Olivet	<20	B (67 dBA)	Conversion of New Haven Road, especially alternatives that convert it to a Limited Access Freeway (NH-1/NH-2)
Cedar Grove/Old Hawthorne	30/1,500	B (67 dBA)	Conversion of Route WW, especially alternatives that convert it to a Limited Access Freeway (WW-1/WW-2)
The Woodlands	100	B (67 dBA)	Conversion of New Haven Road, especially alternatives that convert it to a Limited Access Freeway (NH-1/NH-2)
El Chaparral/ New Haven Meadows	>100	B (67 dBA)	Conversion of Route WW, especially alternatives that convert it to a Limited Access Freeway (WW-1/WW-2)
Concord Estates/ The Vineyards	>100	B (67 dBA)	Conversion of Route WW, especially alternatives that convert it to a Limited Access Freeway (WW-1/WW-2)
Wellington Manor	100	B (67 dBA)	Stadium Boulevard extension using St. Charles/ Ballenger Lane extension (SC-1/SC-2)
Carmel Creek	40	B (67 dBA)	Stadium Boulevard extension using St. Charles/ Ballenger Lane extension (SC-1/SC-2)
Woodridge*	>100	B (67 dBA)	Within EC-EIS study area, but very far from any conceptual alternative
Eastland Hills*	100	B (67 dBA)	Stadium Boulevard extension using St. Charles/ Ballenger Lane extension (SC-1/SC-2)
Eastport/ Bay Hills/ Lake of the Woods*	>100	B (67 dBA)	Stadium Boulevard extension using St. Charles/ Ballenger Lane extension (SC-1/SC-2) and reconfiguration of Richland Road to a Limited Access Freeway (RR-1/RR-2/RR-3)

*The dominant source of traffic noise is from I-70. Mitigation of I-70 traffic noise is outside the scope of this project.

To inform the process used to develop and evaluate the conceptual alternatives, an initial literature search for cultural resources was conducted. This data search found little data indicating the presence of resources eligible for the NHRP. To inform the process of developing and evaluating the reasonable alternatives, a cultural resource review and architectural survey was conducted. In accordance with MoDOT protocols, when a Preferred Alternative is selected, an archaeological survey will be conducted for that area. The results of the archaeological survey will be included in the project's FEIS.

The Archaeological Research Center completed the cultural resource review and architectural survey in January 2008. The report concluded:

"The cultural resource study identified no significant cultural resources impacted by the proposed roadway construction including cemeteries, National Register properties, and potentially significant architectural properties, structures, cultural landscapes and bridges..."

The complete cultural resource study is stored in the project's administrative record.

14. Visual Resources

This section describes the existing visual resources and impacts that result from the construction, operation and maintenance of the study area. This section also describes the type and quality of sensitive viewers located near the study area. Visual resource impacts were identified as they relate to potentially sensitive viewpoints.

a. Introduction and Important Term

The criteria used to determine visual quality rating are vividness, intactness and unity. None of these criteria are individually equal to the visual quality, all three criteria must rate high to indicate high visual quality. Vividness is the visual power of the landscape components as they combine to form distinctive visual patterns. Intactness is the visual integrity of the landscape, natural or manmade, and its freedom from encroaching elements. Unity is the ability of the landscape's individual visual elements to combine in a coherent manner.

Visual impact is a function of the viewers response to change in the visual environment. For highway projects there are two primary groups of viewers: viewers who use the project facility (views from the road), and people who have a view of the project facility from an adjacent viewpoint (views of the road).

b. Visual Resources in the Project Area

The most notable natural scenic areas occur along the four creeks found within the study area. These creeks and the riparian buffers associated with them offer a sharp contrast with the urban environment that flanks the creeks throughout much of the study area.

The visual landscape is a combination of various factors including, landform, land cover, vegetation and manmade developments. For this project the landform is generally flat within the exception of the area surrounding the four creeks found within the study area. The land cover varies depending on the location within the study area. The vegetation in the study area consists of grasses and agricultural crops with some forested land surrounding the four creeks. The manmade developments vary greatly throughout the study area.

The visual impacts of a project can be varied because the areas are visually distinct. The study area can be divided into several landscape units or "outdoor rooms" containing similar visual characteristics. The boundaries of these landscape units occur where there is a change in the visual character of the area. There are two main determinations of the visual boundaries of these landscape units, topography and landscape components. Topography is the relief or the terrain of an area. Landscape components are anything that is located above the surface of an area such as vegetation, streams, buildings and roads.

The following landscape units were determined through the review of Digital Elevation Models, recent aerial photography, and windshield surveys.

- **Keene Street Area**—The Keene Street area, located in the northwest corner of the study area, is bounded by I-70 to the north, US-63 to the west and Hominy Branch to the south and east. This area is characterized by a mix of commercial, light industrial and residential land uses.
- **Lemone Industrial Park**—The Lemone Industrial Park area, located in the southwest corner of the study area, is bounded on the west by US-63, on the south by New Haven Rd., and to the north by the South Fork of Grindstone Creek. This area is characterized by primarily light industrial and warehouse facilities.
- **I-70 Industrial Park**—The I-70 Industrial Park area is located in the northeast corner of the study area. This area is characterized by the light industrial facilities that are located in this area.
- **Hominy Branch Area**—The area located between the Hominy Branch and the North Fork of Grindstone Creek is visual bound by the riparian woodland located along these creeks. The residential subdivisions and the woodlands that surround these developments characterize this area. The northern portion of this area is bound by I-70 and a small commercial area located along the highway. The residential areas are a mix of newer subdivisions and mobile-home parks.
- **Grindstone Creek Area**—The Grindstone Creek Area, bounded primarily by the North and South Forks of Grindstone Creek, also includes the areas of Old Hawthorne Subdivision south of the South Branch and the area south of the South Branch between the Lemone Industrial Park and Rolling Hills Road. This area is characterized by single-family residential areas and some areas of riparian woodland.
- **Rural Area**—The rural area consists of the remaining part of the study area south of the South Fork of Grindstone Creek. This area is characterized by primarily agricultural land use with interspersed rural residences. This area is flat in comparison to the other areas that have a more rolling topography. The structures there are generally smaller, older and more spread out than in any other area found within the study area.

15. Section 4(f)/Section 6(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 sites. The Secretary of Transportation may only approve projects requiring the use of these lands if there is no feasible and prudent alternative and the project includes all planning to minimize harm. Early in the planning process of this project Section 4(f) resources were located and mapped. Avoidance of these resources was a primary factor in the development of alternatives. Early coordination with the City of Columbia Parks and Recreation Department helped to identify resources within the study area that are potentially Section 4(f) resources.

State and local governments often obtain grants through the Land and Water Conservation Fund (LWCF) Act to acquire or make improvements to parks and recreation areas. Section 6(f) of this act prohibits the conversion of property acquired or developed with these grants



to a non-recreational purpose without the approval of the U.S. Department of the Interior's (DOI) National Park Service. Section 6(f) directs the DOI to assure that replacement lands of equal value, location, and usefulness, are provided as a condition of such conversions. Coordination with the Missouri Department of Natural Resources, the National Parks Service and the City of Columbia were used to identify Section 6(f) resources.

Table III-12 Summarizes the Section 4(f) and/or 6(f) properties within the EC-EIS study area. **Exhibit III-1** shows the location of these resources. Currently, there are three parks owned by the City of Columbia and one park owned by Boone County that are classified as Section 4(f) properties; two of these parks have received LWCF funds and, consequently, qualify as Section 6(f) properties.

TABLE III-12
Section 4(f)/Section 6(f) Resources

Name	Location	Section 4(f) or 6(f)
Lake of the Woods South Park	Richland Road	4(f)
American Legion Park	Route WW	4(f)
Woodridge Park	Berrywood Drive	4(f) and 6(f)
El Chaparral Park	El Chaparral Subdivision	4(f) and 6(f)

Woodridge Park is a 6.5-acre park located in the northwest corner of the study area between Berrywood Drive and Lansing Avenue. Facilities at Woodridge Park include a baseball/softball practice field that also serves as a soccer practice field, a basketball court, and a playground.

American Legion Park is a 20 acre park located along Route WW. Facilities at the American Legion Park include seven picnic tables, a barbeque grill, a concession stand, restrooms, a baseball field, a baseball practice field, a soccer practice field, a playground, a fishing pond, and an archery practice range

Lake of the Woods South Park is under development. It is located in the north-central portion of the study area along Richland Road. The Park is currently undeveloped and has no facilities. This area became a part of the Columbia Parks and Recreation Department from a developer donation for the purpose of providing a future neighborhood park.

The only county-owned park currently located within the study area is in the El Chaparral residential subdivision. El Chaparral Park is a 4.4 acre county-owned park that was originally developed in 1978 using a LWCF grant. Original facilities included a softball field, playground equipment, picnic shelters, grills, tables and multi-use courts. Some of the equipment may have been removed or replaced.

These public parks and recreational facilities are discussed in more detail in **Chapter III.A.2.d**.

Section 4(f) also limits FHWA participation in projects that adversely impact historic sites. (sites listed on or eligible for the National Register of Historic Places, regardless of ownership). As discussed in **Chapter III.B.13**, no NHRP resources exist with the study area.

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