Sinkhole Plain

Several studies have been conducted to assess the groundwater quality in the Sinkhole Plain (Panno et al., 1996). Elevated levels of fecal coliform and other bacteria, nitrate, and pesticides (Alachlor and Atrazine) were reported for numerous springs and wells. The bacterial species found in wells and springs indicate private septic systems are a significant source of contamination of the karst aquifer (Panno et al., 1996). Livestock and runoff from farm fields are also sources of contamination. The pervasiveness of groundwater contamination is attributed to the karst terrain (i.e., sinkholes, losing streams) forming a direct pathway for stormwater runoff, septic discharge, and other contaminants to enter the karst aquifer. Karst systems provide little opportunity for adsorption, degradation, or other natural processes to cleanse the water of contaminants before the water reaches the aquifer (OUL, 2000).

It has been noted that the water quality at the southern end of the Stemler Cave system is better than that at the northern end. Therefore, the groundwater at the southern end of the system may be more sensitive to degradation.

The Illinois Nature Preserves Commission may request the Illinois Pollution Control Board to designate the Stemler Cave recharge area as Class III: Special Resource Groundwater. This designation will establish this groundwater as irreplaceable and is therefore suitable for more stringent application of the groundwater standards. Class III: Special Resource Groundwater has been codified to be "vital" for a "particularly sensitive" and "irreplaceable ecological system"

Potential mechanisms of impact to groundwater include the alteration of groundwater quality due to increased pollutant loading or the change in water quantity. Potential impacts may result from improper sealing or closure of wells during construction as well as pollutant loading during the operational phase in areas that are important groundwater recharge areas (i.e., alluvial sediments, karst areas). The karst terrain of the Sinkhole Plain is particularly sensitive to degradation of the groundwater quality due to the rapid entry of surface water into the subsurface groundwater system. In such areas, storm water runoff from farm fields or urban development quickly becomes groundwater. Roadway construction within the Stemler Cave recharge area has the potential for roadway contaminants (salt, oil, etc.) to enter the cave system, and the potential for increasing runoff/erosion due to the increased impervious surface area. Development within the cave recharge area would also require extensive engineering controls (sedimentation basins, peat filters, etc.) in order to prevent water quality degradation. The watersheds of surface streams in karst areas are also difficult to define because the groundwater watershed may not match the surface water watershed. Streams may get more water during storm events than predicted by surface water models, due to groundwater entering the stream (via springs) from outside the surface watershed. This is referred to as "inter-basin flow," and has been well documented in the area as the source for abnormally high flood levels in some streams.

Potential effects to groundwater quality will be minimized through the proper sealing of wells and a more thorough investigation of recharge zones within the Columbia karst area. The Preferred Corridor, however, notably avoids the known limits of the Stemler Cave recharge area and, therefore, minimizes potential effects to this resource. Other mitigative measures may include the design of vegetated buffer zones, detention basins, and other measures to interrupt and detain surface water flow prior to its release to subsurface systems.

Potential impacts to groundwater quantity may result from the creation of greater acreages of impervious surfaces (resulting in increased discharge to groundwater resources in karst terrain), "capping" of groundwater recharge zones, or use of groundwater via pumping. Among these mechanisms of impact, only the first represents a major consideration for the Preferred Corridor.

In particular, this potential impact may be expected to occur in the Columbia karst area of the Sinkhole Plain. Avoidance of the Stemler Cave recharge area coupled with other measures as stated previously will effectively minimize and mitigate such potential effects.

4.7.3 Geotechnical (mines, shafts, stability)

Previously Mined Areas

Many areas of the Metro East have been used historically for the extraction of coal reserves. In some areas, like the lands north of Freeburg, south of Belleville and near Millstadt, coal reserves were shallow and were removed via surface mining techniques. In contrast, deeper resources such as those near Troy, Collinsville, and Shiloh were mined using subsurface mining techniques. Areas characterized by strip mining are generally considered to be more geotechnically stable as they lack the subsurface voids and shafts associated with underground mines. In contrast, subsidence problems may occur in those areas located above an underground mine. In terms of geotechnical stability, however, open mine shafts within such areas represent a greater source of potential concern to the development of a transportation facility.

The extent and location of both surface and underground mines as well as recorded locations of mine shafts were compiled as part of the constraint mapping process. Alternative development was also undertaken by avoiding mine shafts and other geotechnically unstable features. Accordingly, while the Preferred Corridor does cross several previously mined areas, it avoids all locations of recorded mine shafts. More detailed geotechnical investigation of any previously mined areas crossed by the Preferred Corridor will be necessary to analyze geotechnical stability more completely.

Karst Terrain

The karst terrain of the Sinkhole Plain also presents geotechnical and stability issues for development. Karst terrain presents special construction issues because the bedrock may not provide a stable foundation and is susceptible to collapse due to solution of the rock. Therefore, extra subsurface investigations (i.e. drilling, geophysical surveys, etc.) are needed in karst prior to road construction. If sinkholes are crossed, they need to be sealed and filled to prevent subsequent roadway collapse.

4.8 Aquatic and Terrestrial Ecosystems

4.8.1 Terrestrial Ecology

Illinois is divided into 14 natural divisions based upon topography, soils, bedrock, glacial history, and the distribution of plants and animals (Schwegman, 1973). The 14 natural divisions are further divided into sections based on smaller differences in the above criteria. The study area is located in the following divisions/sections (Figure 4-3):

- Middle Mississippi Border Division, Glaciated Section;
- Southern Till Division, Effingham Plain Section;
- Ozark Division, Northern Section; and
- Lower Mississippi River Bottomlands Division, Northern Section.

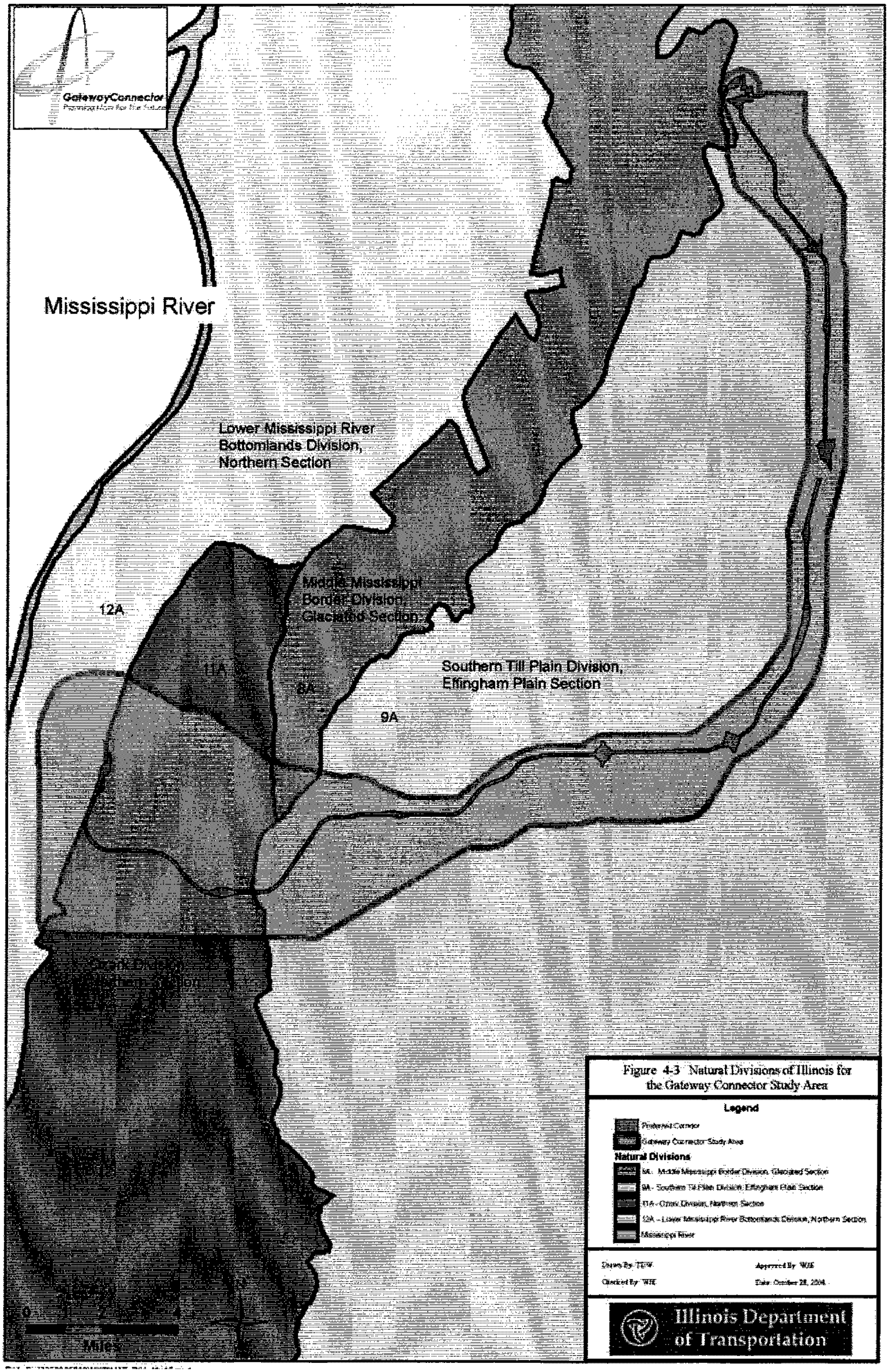

Figure 4-3 Natural Divisions of Illinois for the Gateway Connector Study Area

Most of the study area (Sections A, B, C, and D) are located in the Effingham Plain Section of the Southern Till Division. This section is characterized by a nearly level plain formed by glacial till (mostly clay) and typically capped by several feet of loess. The topography is flat except where the plain has been dissected by tributary streams. The major streams including Silver Creek (east of the study area) and Richland Creek (south of Belleville) have broad floodplains. Originally, the area was mostly prairie that was interspersed with selected forests in the uplands along the major stream valleys and steep tributary streams. Typical forest species include white oak, northern red oak, shingle oak, various hickory species, white ash, sugar maple, basswood, and slippery elm. Forests in the stream floodplains include silver maple, willow species, sycamore, cottonwood, hackberry, and American elm. There are no known prairie remnants located within the study area. The remaining tracts of forest within Sections A and D are typically associated with stream riparian corridors with a few isolated upland (second growth) forest remnants.

Most of the study area in the vicinity of Columbia is located within the northern section of the Ozark Division. This division consists of the Illinois part of the Salem Plateau of the Ozark uplift. The topography consists of a maturely dissected plateau with steep bluffs with steep forested ravines along the Mississippi River. The study area within Section E is characterized by limestone bedrock and karst (numerous caves, sinkholes, and springs). Prior to settlement, the Ozark Division was almost completely forested but now has largely been converted to agriculture and urban development. Typical forest species include white oak, northern red oak, sugar maple, basswood, black oak, and hickory species. Loess hill prairies were once common along the river bluffs but none are located in proximity to the Preferred Corridor. The remaining tracts of forest within the section are associated with sinkholes, streams, and the Mississippi River bluffs (see Appendix B). The forests of these areas and its associated flora/fauna are likely to be greater quality relative to other more disturbed communities within the study area.

The western terminus of the project area is located in the northern section of the Lower Mississippi River Bottomlands Division. This section of floodplain is known locally as the "American Bottoms." Originally most of the floodplain was forested. Swamps, oxbow lakes, and sloughs were once common but most of the floodplain has been converted to agriculture. Typical bottomland species include cottonwood, box elder, silver maple, green ash, American elm, and honey locust.

Typical terrestrial wildlife expected to occur within the study area are presented in Tables 4-7, 4-8, and 4-9 for mammals, amphibians and reptiles, and birds, respectively.

The overall structure of the landscape was considered when determining the study corridor and developing study alternates. The study corridor and alternates were based, in part, on the avoidance and minimization of direct impacts and disruption to ecological resources. One such factor entailed the consideration of habitat fragmentation, and an attempt was made to minimize disruption of large tracts of woodland during the alternative development process.

Potential impacts of the Preferred Corridor to terrestrial communities may be associated with: (1) direct impact resulting from the conversion of habitats to developed land; and (2) indirect impact that arises as a consequence of habitat modification/conversion. Potential direct impacts correspond to acreages of each habitat type converted by the Preferred Corridor. While a precise quantification of each habitat type was not performed for this analysis, direct habitat loss and its resultant impact on wildlife is expected to be greater at each forested stream crossing valley.

Table 4-7. Mammal Species Potentially Occurring within the Gateway Connector Study Area

Common Name	Scientific Name	Habitat*	Abundance†
Marsupials	Didelphimorphia		
Virginia opossum	*Didelphis virginiana*	F, W, G	C
Insectivores	Insectivora		
Southeastern shrew	*Sorex longirostris*	F, G (mostly)	C
Northern short-tailed shrew	*Blarina brevicauda*	F, G, W	C
Least shrew	*Cryptotis parva*	G	*
Eastern mole	*Scalopus aquaticus*	F, G	C
Bats	Chiroptera		
Little brown bat	*Myotis lucifugus*	F, caves, buildings	C
Indiana bat	*Myotis sodalis*	F, caves	R
Eastern pipistrelle	*Pipistrellus subflavus*	F, caves	C
Big brown bat	*Eptesicus fuscus*	F, caves, buildings	C
Red bat	*Lasiurus borealis*	F	C
Rabbits	Lagomorpha		
Eastern cottontail	*Syvilagus floridanus*	G, F (edges)	C
Rodents	Rodentia		
Eastern chipmunk	*Tamias striatus*	F	C
Woodchuck	*Marmota monax*	G, F (edges)	C
Gray squirrel	*Sciurus carolinensis*	F, urban	U,C (urban)
Fox squirrel	*Sciurus niger*	F	C
Southern flying squirrel	*Glaucomys volans*	F	C
Beaver	*Castor canadensis*	W	C
Deer mouse	*Peromyscus maniculatus*	G	C
White-footed mouse	*Peromyscus leucopus*	F, G, W (mostly F)	C
Meadow vole	*Microtus pennsylvanicus*	G	C
Prairie vole	*Microtus ochrogaster*	G	C
Muskrat	*Ondatra zibethicus*	W	C
House mouse	*Mus musculus*	Mostly buildings	C
Carnivores	Carnivora		
Coyote	*Canis latrans*	F, G, W	C
Red fox	*Vulpes vulpes*	G, F, W	C
Raccoon	*Procyon lotor*	F, W, G	C
Long-tailed weasel	*Mustela frenata*	F, W, G	C
Mink	*Mustela vison*	W, G, F	C
Striped skunk	*Mephitis mephitis*	F, G, W	C
River otter	*Lontra canadensis*	W	*
Bobcat	*Lynx rufus*	F	*
Even-toed ungulates	Artiodactyla		
White-tailed deer	*Odocoileus virginianus*	F, W, G	C

**Habitats: W = wetland, G = grassland, F = forest*
*† Abundance: C = common, U = uncommon, R = rare, * = status uncertain* *Prepared/Date: SEG/9-10-04*
Source: Modified from IDNR, 2000, Volume 3, Living Resources. *Checked/Date: WJE/9-17-04*

Table 4-8. Common Amphibians and Reptiles Likely to Occur within the Gateway Connector Study Area

Common Name	Scientific Name	Habitat*	Abundance†
Amphibians			
American toad	*Bufo americanus*	U	C
Fowler's toad	*Bufo fowleri*	F, W, P	C
Cricket frog	*Acris crepitans*	W, L, R	C
Gray treefrog complex	*Hyla verisicolor-chrysoscelis*	F, W	C
Spring peeper	*Pseudacris crucifer*	F, W	C
Western chorus frog	*Pseudacris triseriata*	U	C
Bullfrog	*Rana catesbeiana*	W, L, R	C
Southern leopard frog	*Rana sphenocephala*	F, W, L, R	C
Reptiles			
Snapping turtle	*Chelydra serpentina*	W, L, R	C
Painted turtle	*Chrysemys picta*	W, L, R	C
False map turtle	*Graptemys pseudpgeographica*	L, R	C
Eastern box turtle	*Terrapene carolina*	F	C
Ornate box turtle	*Terrapene ornata*	P	U/R
Red-eared slider	*Trachemys scripta*	W, L, R	C
Spiny softshell turtle	*Apalone spinifera*	W, L, R	C
Fence lizard	*Sceloporus undulatus*	F	C
Five-lined skink	*Eumeces fasciatus*	F	C
Broadhead skink	*Eumeces laticeps*	F	C
Black rat snake	*Elaphe obsoleta*	F, W, P	C
Prairie kingsnake	*Lampropeltis calligaster*	F, P	C
Northern water snake	*Nerodia sipedon*	W, R, L	C
Eastern garter snake	*Thamnophis sirtalis*	U	C

* *F=forest, W=wetland, P=prairie and savanna, L=lakes, ponds, impoundments, R=rivers & creeks, C=cultural, U=ubiquitous (all habitats)*

† *C=common, U=uncommon, R=rare, ?=status uncertain*

Source: Modified from IDNR, 2000, Volume 3, Living Resources.

Prepared/Date: SEG/9-10-04
Checked/Date: WJE/9-17-04

Table 4-9. Representative Bird Species Likely Occur in the Gateway Connector Study Area

Common Name	Scientific Name	Probable Habitat†
Great blue heron	*Ardea herodias*	L, W, Fs, F
Great egret	*Ardea albus*	W
Cattle egret	*Bubulcus ibis*	W, Fs
Green heron	*Butorides virescens*	L, W, Fs
Canada goose	*Branta canadensis*	L, W, C
Wood duck	*Aix sponsa*	Fs, W
Mallard	*Anas platyrhynchos*	W, C, L, Fs, G
Cooper's hawk	*Accipiter cooperii*	F, S, Sav
Red-tailed hawk	*Buteo jamaicensis*	F, C, G, R, S
American kestrel	*Falco sparverius*	R, C, G, Sav
Wild turkey	*Meleagris gallopavo*	F, S, Sav, Fs
Northern bobwhite	*Colinus virginianus*	S, G, C, Sav
Killdeer	*Charadrius vociferous*	W, R, G, C
American woodcock	*Scolopax minor*	F, Fs, S
Rock dove	*Columba livia*	R, C
Mourning dove	*Zenaida macroura*	R, C, S
Yellow-billed cuckoo	*Coccyzus americanus*	F, S, Fs, Sav
Eastern screech-owl	*Otus asio*	R, S, Sav
Great horned owl	*Bubo virginianus*	F, C, R, Fs, Sav
Barred owl	*Strix varia*	F, Fs
Common nighthawk	*Chordeiles minor*	R, Sav
Chimney swift	*Chaetura pelagica*	R, F, S, Fs, Sav

Table 4-9. Representative Bird Species Likely Occur in the Gateway Connector Study Area

Common Name	Scientific Name	Probable Habitat†
Ruby-throated hummingbird	*Archilochus colubris*	F, S, R, Fs, Sav
Belted kingfisher	*Ceryle alcyon*	L, W
Red-headed woodpecker	*Melanerpes erythrocephalus*	Fs, R, C
Red-bellied woodpecker	*Melanerpes carolinus*	F, Fs, S, R, Sav
Downy woodpecker	*Picoides pubescens*	F, Fs, R, S, Sav
Hairy woodpecker	*Picoides villosus*	F, Fs, Sav, R
Northern flicker	*Colaptes auratus*	S, F, R, Sav, Fs
Pileated woodpecker	*Dryocopus pileatus*	F, Fs, Sav
Eastern wood-pewee	*Contopus virens*	F, Fs, R, Sav
Eastern phoebe	*Sayornis phoebe*	R, Fs
Eastern kingbird	*Tyrannus tyrannus*	S, G, C, Sav
Horned lark	*Eremophila alpestris*	C, G
Tree swallow	*Tachycineta bicolor*	L, W, Fs, G
Barn swallow	*Hirundo rustica*	C, R, W, L, G, S
Blue jay	*Cyanocitta cristata*	R, F, Fs, S, C, Sav
American crow	*Corvus brachyrhynchos*	All
Carolina chickadee	*Poecile carolinensis*	F, Fs, S, R, Sav
Black-capped chickadee	*Poecile atricapillus*	F, Fs, S, R, Sav
Tufted titmouse	*Baeolophus bicolor*	F, R, Fs, Sav
White-breasted nuthatch	*Sitta carolinensis*	F, R, Fs, Sav
Carolina wren	*Thryothorus ludovicianus*	R, F, Fs, S, Sav
House wren	*Troglodytes aedon*	R, F, S, Sav
Eastern bluebird	*Sialia sialis*	C, G, R, S, Sav
Wood thrush	*Hylocichla mustelina*	F, Fs
American robin	*Turdus migratorius*	R, S, F, Fs, Sav
Gray catbird	*Dumetella carolinensis*	S, Fs, R, Sav
Northern mockingbird	*Mimus polyglottos*	R, S
European starling	*Sturnus vulgaris*	R, C, F, Fs, Sav
Yellow-throated vireo	*Vireo flavifrons*	F, Fs
Red-eyed vireo	*Vireo olivaceus*	F, Fs, Sav
Common yellowthroat	*Geothlypis trichas*	G, C, W, S, R, Sav
Northern cardinal	*Cardinalis cardinalis*	R, F, Fs, S, C, Sav
Indigo bunting	*Passerina cyanea*	F, Fs, S, Sav
Dickcissel	*Spiza americana*	G, C
Eastern towhee	*Pipilo erythrophthalmus*	S, F
Chipping sparrow	*Spizella passerina*	R, F, Sav
Field sparrow	*Spizella pusilla*	S, G, C, Sav
Song sparrow	*Melospiza melodia*	R, S, W, C, G
Red-winged blackbird	*Agelaius phoeniceus*	W, C, R, G, S, Sav
Eastern meadowlark	*Sturnella magna*	G, C
Common grackle	*Quiscalus quiscula*	R, W, Fs, F
Brown-headed cowbird	*Molothrus ater*	All
Baltimore oriole	*Icterus galbula*	R, F, Fs, S, Sav
American goldfinch	*Carduelis tristis*	S, R, G
House sparrow	*Passer domesticus*	R, C

**Note: List does not include species that may occur exclusively in winter or as migrants*
† The following habitat codes are used:
L = lakes
C = crops
G = grassland (including pasture and hayfield)
W = wetland (seasonally flooded, open habitats such as marshes and sedge meadows)
Fs = forested swamp (forested wetland, including wet floodplain forest)
Sav = savannah
F = upland and mesic forest
R = residential areas (including urban centers and the "urban forest")
S = shrublands (open habitats dominated by shrubs, including old fields)

Prepared/Date: SEG/9-10-04
Checked/Date: WJE/9-17-04

Source: Modified from IDNR, 2000, Volume 3, Living Resources.

Potential indirect or consequential impacts that are likely common to each of the natural communities include, but are not limited to:

- reduction in local floral and faunal species diversity due to the effects of habitat fragmentation;
- alteration of wildlife movement patterns;
- increased incidence of roadkills;
- construction-phase displacement of wildlife (e.g., avoidance);
- reduction of annual plant productivity; and
- greater potential for local erosion and increased sediment loads due to the increase in impervious surfaces.

Mitigative measures to offset such potential impacts include avoidance of sensitive terrestrial habitats and natural areas, tree replacement, and replanting of disturbed areas with native species.

4.8.2 Aquatic Ecology

The project corridor falls within the Lower Kaskaskia watershed and contains a number of creeks, small lakes, and ponds. There are no major rivers within the project corridor and most of the creeks that run through the study area are tributaries to Silver Creek and Richland Creek. The proposed route crosses several of the tributaries to Silver Creek, the main stem of Richland Creek and three of its tributaries, Douglas Creek, Palmer Creek, and Hill Lake Creek (Illinois Route 15 to I-255) (Table 4-10).

Table 4-10. Primary Creeks Crossed (from North to South) by the Preferred Corridor

Madison County	St. Clair County	Monroe County
Mill Creek	Ogles Creek	Palmer Creek
	Hagemann Creek	Hill Lake Creek
	Engles Creek	Carr Creek
	Rock Spring Branch	
	Ash Creek	
	Loop Creek	
	Sugar Creek	
	Richland Creek	
	Douglas Creek	

Source: MACTEC, 2004. *Prepared/Date: SPS/9-15-04* *Checked/Date: WJE/9-17-04*

Aquatic biota within the surface water resources of the project area may be expected to be somewhat variable depending on the size, habitat characteristics, water quality, and permanence of the water body. Typical fish species likely to occur in ponds and lakes include largemouth bass, bluegill, channel catfish, green sunfish, and yellow bullhead. In contrast, streams of the project area may support such species as central stoneroller, bluegill, orangespotted sunfish, pirate perch, bowfin, darters, channel catfish, and largemouth bass in addition to a variety of other species.

Aquatic environments will also support a variety of benthic invertebrate species depending on factors relating to water quality, in-stream habitat, and flow.

Potential impacts to fish and other aquatic biota may be expected to occur at each surface water crossing. In some areas, ponds may be impacted by filling or draining and will therefore result in encroachments on or total losses of habitat and their associated biota. In contrast, crossings of streams will also result in localized impacts due to channel realignment, culvert extensions, and bridge placement. In addition, some temporary water quality and sedimentation impacts are also likely to occur at stream crossings during the construction phase.

Mitigative measures that can be used to offset potential impacts to aquatic biota include avoidance and minimization during planning and design, replacement of affected habitats, and use of best management practices to minimize erosion and pollutant loading in receiving waters.

4.8.3 Water Quality

Potential impacts to water quality resulting from roadway construction activities may be short-term or long-term in nature. Short-term impacts are primarily related to the construction phase, whereas long-term impacts could be associated with both the construction and operational and maintenance phases. Impacts to water quality during construction typically result from elevated turbidity levels and the deposition of sediment into neighboring surface waters. Increased sedimentation and turbidity can adversely affect aquatic primary production as well as feeding rates and reproductive success of aquatic organisms. However, fish and benthic macroinvertebrate communities may recover quickly after the cessation of construction activities. Water column turbidity and sedimentation rates associated with construction activities generally return to baseline levels upon the completion of project construction and the establishment of good vegetative cover.

The Preferred Corridor would cross (impact) a total of 25 jurisdictional streams.

The control of water pollution is to be accomplished by the use of Best Management Practices including the use of berms, slope drains, ditch checks, sediment basins, silt fences, rapid seeding and mulching, and other erosion control devices or methods as needed. These temporary measures employed during construction are to be coordinated with planned erosion control features to ensure effective and continuous erosion control.

Roadway operation and maintenance activities are associated with long-term effects of increased motor vehicle traffic resulting in higher pollutant levels reaching surface water resources. Some anticipated pollutants associated with motor vehicle operations are toxic heavy metals, oil and grease, herbicides, deicing salt, rubber, asbestos, etc. These pollutants can move through the environment as runoff, splash, and spray.

Issues of water quality are of particular importance in the Sinkhole Plain region of the study area due to its karst topography. Surface water runoff from development in such areas (new homes, widened roads, cleared wood lots, and farm fields) has caused a number of pollutants to enter the groundwater as a result. This development has also increased turbidity and sediment deposition during spring floods. The most common pollutants in the study area include discharge from septic systems, highway runoff, and pesticide and fertilizer runoff from agricultural fields (IDNR, 1999). Without sufficient soil filtration, contaminants that enter groundwater may be extremely persistent in spite of the high flow rates of groundwater through these systems. Contaminants such as suspended and dissolved solids, heavy metals, nutrients, bacteria, road salt, herbicides, and hydrocarbons from highways are transported to groundwater systems through stormwater runoff. Hydrocarbons from the incomplete combustion of gasoline or from oil that has dripped onto roadways, or that has been improperly disposed of, may likewise enter storm drains.

Three streams within the project study area are listed as impaired according to Section 303(d) of the federal CWA.

The 303(d) streams are prioritized as follows:

- High Priority – Watersheds containing one or more water bodies in which potential causes of impairments pose a threat to a drinking water use.
- Medium Priority – Watersheds containing one or more water bodies in which potential causes of impairments pose a threat to aquatic life use, fishing use, or primary contact (swimming) use.
- Low Priority – Watersheds containing one or more water bodies in which potential causes of impairment pose a threat to secondary contact (recreation).

The following Section 303(d) listed streams are located within the project study area, as listed in the Illinois 2002 list:

- **Loop Creek** – One tributary and the mainstem of Loop Creek are within the project corridor in Section C. The mainstem of Loop Creek, a tributary to Silver Creek, is listed as a medium priority stream. Causes of impairment include organic enrichment resulting in low dissolved oxygen, moderate siltation, nutrient loading, and suspended solids. Potential impairment sources include municipal point sources, non-irrigated crop production, urban runoff/storm sewers, hydrologic/habitat modification, and channelization.
- **Richland Creek South** – Two impaired segments of Richland Creek fall within the project corridor in Section D. Both are listed as medium priority segments. Causes of impairment consist of habitat alteration (other than flow) and nutrient loading including nitrate and phosphorous. Potential impairment sources include municipal point sources, combined sewer overflows, agriculture, urban runoff/storm sewers, and resource extraction in the form of surface mining.
- **Douglas Creek** – Douglas Creek, a tributary to Richland Creek South, is within the project corridor in Section D and is listed as impaired under Illinois' 2002 Section 303(d) List. Similar to Richland Creek South, potential causes of impairment consist of habitat alteration (other than flow) and nutrient loading including nitrate and phosphorous. Potential impairment sources include municipal point sources, non-irrigated crop production, and resource extraction in the form of surface mining.

Highway runoff on receiving streams can be minimized through design, construction, and operational features such as the use of vegetated drainage ditches, preservation of riparian areas, wet detention basins, erosion control features, and deicing control management. Special care should be taken in areas such as the Sinkhole Plain or in watersheds of riparian streams to avoid and minimize water quality degradation.

4.9 Floodplains

FEMA and FHWA guidelines 23 Code of Federal Regulations 650 have identified the base (100-year) flood as the flood having a 1 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. FEMA has mandated that projects can cause no rise in the regulatory floodway, and a 1-foot cumulative rise for all projects in the base (100-year) floodplain. In the case of projects proposed within regulatory floodways, a "no-rise" certificate, if applicable, should be obtained prior to issuance of a permit.

All available Flood Insurance Rate Maps from FEMA for the project area were obtained and reviewed. These maps indicate that Zone A (100-year) floodplains occur in the study corridor and are primarily associated with the Mississippi River, Palmer Creek, Carr Creek, Richland Creek, Douglas Creek, West Fork of Richland Creek, Engle Creek, Rock Spring Branch, Loop Creek, Ogles Creek, and Mill Creek. This information from Flood Insurance Rate Maps was incorporated into a geographical information system database and used to quantify floodplain occurrence. Floodways in the study area are associated with the Mississippi River, Ogles Creek, Loop Creek, Richland Creek, Carr Creek, and Palmer Creek.

The Preferred Corridor will potentially impact approximately 188.1 acres of floodplains associated with 11 creeks and the Mississippi River. Table 4-11 identifies each creek, presence of associated floodway, and the nature of the encroachment.

Although exact floodway impacts were not evaluated, the Preferred Corridor crosses floodways associated with Ogles Creek, Loop Creek, Richland Creek, Carr Creek, Palmer Creek, and the Mississippi River. Floodways will be quantified and bridged during the Phase I study (Table 4-11).

Table 4-11. Floodplain and Floodway Impacts Associated with the Preferred Alternative

Creek	Floodway	Encroachment
Mill Creek		Transverse
Ogles Creek	X	Transverse
Engle Creek		Transverse
Rock Spring Branch		Transverse
Tributary of Loop Creek		Longitudinal
Loop Creek	X	Longitudinal
Richland Creek	X	Transverse
Douglas Creek		Transverse
West Fork of Richland Creek		Transverse
Carr Creek	X	Longitudinal
Palmer Creek	X	Longitudinal
Mississippi River	X	Longitudinal

Source: MACTEC, 2004. *Prepared/Date: SPS/9-15-04* *Checked/Date: WJE/9-17-04*

4.10 Wetlands and Waters of the United States

Recent studies indicate that the nation has lost more than half of the wetlands that existed in the contiguous United States since European settlement began. Illinois has lost more than 90 percent of its wetlands since 1818. Similar losses in wetlands have been experienced within the study area where most of the lost wetlands were drained for conversion to agriculture. In Monroe County, 24 percent of the land (or 56,000 acres) consisted of wetlands of all types in 1820. Today, only 30 percent (approximately 17,000 acres) of Monroe County's original wetlands remain in existence. In St. Clair County, 33,000 acres of the original 78,000 acres of wetlands (or approximately 42 percent) remain.

Wetland types within the study area include forested wetlands, scrub-shrub wetlands, herbaceous emergent wetlands, shallow ponds, and wetlands associated with seeps and springs. Typical wetland vegetation includes silver maple (*Acer saccharinum*), box elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pensylvanica*), black willow (*Salix nigra*), buttonbush (*Cephalanthus occidentalis*), sedges (*Carex* spp.), cattail (*Typha* spp.), knotweed (*Polygonum* spp.), swamp milkweed (*Asclepias incarnata*), and barnyard grass (*Echinochloa cursgalli*).

Extensive forested wetland areas exist along Silver Creek to the east of the study area and some of these wetlands are of reasonably high quality. Silver Creek Marsh is a 54-acre high-quality wetland site located southeast of SAFB and includes several exceptional features including a pond, swamp, and a perennial stream.

Many of the wetland communities within the study area are located along the banks of the larger streams such as Ogles Creek, Hageman Creek, Engle Creek, Richland Creek, Loop Creek, and Douglas Creek. Although the wetland types may vary, many of the wetlands located along these streams and within their floodplains are forested wetlands.

Included within Section E are several non-jurisdictional (Section 404) wetlands associated with the sinkholes of the Sinkhole Plain region. Sinkholes are closed depressions formed by the dissolution of limestone bedrock (see Section 4.7). In some cases, the surface water drainage or swallow hole of the sinkhole becomes plugged with soil, forming ponds or wetlands. These wetlands may be forested, emergent, or consist of mostly open water. Small spring- or seep-fed wetlands are present at the base of bluffs and deeper stream valleys within the Sinkhole Plain.

The Preferred Corridor will potentially impact 5.66 acres of wetlands with most of the impacts being incurred in Sections D and E. Because the impact assessment is based on National Wetland Inventory mapping, additional surveys will be required during the Phase I study to delineate and quantify jurisdictional wetland impacts within the Preferred Corridor.

Some wetlands within the Preferred Corridor, although not directly impacted, may receive secondary or indirect impacts such as sediment loads from increased stormwater runoff, salt spray, and automobile contaminants including engine oil and coolant.

Consideration should be given in regard to the avoidance and minimization of impacts to wetlands throughout the design phase. Design features that could be utilized to avoid or minimize wetland impacts include the use of bridges, retaining walls, and/or steeper roadway side slopes. Mitigation for unavoidable impacts to wetlands will be accomplished by providing appropriate wetland compensation through wetland restoration and creation.

4.11 Sensitive Species and Natural Areas

4.11.1 Threatened and Endangered Species

Several state and/or federally listed threatened or endangered species have been reported from the study area, or have been the subject of agency correspondence regarding the Gateway Connector project. Each of these are discussed below.

Illinois Cave Amphipod (*Gammarus acherondytes*)

This small, cave-dwelling crustacean is federally listed as endangered by the USFWS. It inhabits the "dark zone" of cave streams and is endemic to the Illinois Sinkhole Plain. It is currently found in only three of six original cave sites, and all three caves are in Monroe County. The cave amphipod does not tolerate a wide range of water temperatures, and it is very sensitive to contamination, making it an excellent indicator of water quality in cave systems. This species feeds on various dead animals and plants as well as the thin bacterial film covering submerged surfaces. Threats to this species include groundwater pollution from pesticides and fertilizers, along with contamination from human and animal wastes.

The Illinois cave amphipod was historically collected in Stemler Cave but has not been observed since 1965. The reintroduction of the Illinois cave amphipod to Stemler Cave is part of the species recovery plan (USFWS, 2002). Suitable habitat for the cave amphipod may be present in sinkholes that have not been inventoried within the recharge area (Addison, personal communication, 2004).

The delineated Stemler Cave recharge area will not be impacted by the Preferred Corridor, therefore, direct impacts of this resource are not anticipated. It is possible that the Preferred Corridor will impact groundwater quality in the karst regions of the study area via increased pollutant loading to surface water that subsequently flows to sinkholes and enters the groundwater aquifer. Therefore, the Preferred Corridor may directly or indirectly impact previously unknown suitable Illinois cave amphipod habitat. Potential mitigation measures to prevent or minimize impacts to karst aquifer(s)' water quality include detention basins, biofilters, and other roadway pre-treatment technologies.

Indiana Bat (*Myotis sodalis*)

This medium-sized bat is a federal and state listed endangered species. During the first part of October, mating takes place at night on the ceilings of large rooms near cave entrances. Limited mating may also occur in the spring before the hibernating colonies disperse. During the winter, Indiana bats hibernate in caves or mines with a relatively specific winter temperature range of 37 to 43 degrees Fahrenheit. Relative humidity is usually above 74 percent but below saturation (USFWS, 1999). Summer habitat includes mature riparian and adjacent upland forests, preferably with a full canopy and open understory, where roost and maternity colonies are established beneath the loose exfoliating bark of hickory (*Carya* spp.), oak (*Quercus* spp.), elm (*Ulmus* spp.), and ash (*Fraxinus* spp.) trees. The cavities of living or dead/dying trees may be used. Little is known of this bat's diet beyond the fact that it consists of insects.

Due to the avoidance of known caves and mine shafts by the Preferred Corridor, direct impacts to Indiana bat winter habitat are not anticipated. The removal of potential roost and maternity trees should be conducted during the winter months when Indiana bats are not present to minimize direct impacts to this species. Construction activities subject to coordination with IDNR and USFWS may also include the removal of trees from riparian areas adjacent to creeks and rivers. The removal of riparian vegetation may reduce Indiana bat foraging habitat if these areas are utilized for summer foraging activities.

Decurrent False Aster (*Boltonia decurrens*)

This flowering plant is federally listed as threatened by the USFWS. It is a perennial plant inhabiting low areas subject to flooding along rivers such as the Mississippi and Illinois rivers. It is found in ditches, mudflats, sloughs and agricultural fields, and it requires periodic disturbance such as prolonged standing water. Decurrent false aster succumbs to shading from competing plants if not periodically disturbed. Roadside populations are subject to mowing during the growing season, which prevents seed production. The reasons for the decline in this species seem to be related to habitat destruction and modification. Currently they are most common in disturbed lowland areas where it appears to be dependent on human disturbance. No populations of the decurrent false aster have been reported within the study area.

Because the decurrent false aster is predominantly associated with the disturbed alluvial areas on the Mississippi River floodplain, the Preferred Corridor is not expected to have an effect on this species.

Common Moorehen (*Gallinula chloropus*)

This fairly large, duck-like waterbird is state listed as threatened in Illinois. It inhabits freshwater marshes, canals, quiet rivers, and lakes and ponds with emergent aquatic vegetation. Its breeding habitat consists of wetland-open water habitats. The diet of the common moorhen consists mostly of plant matter, along with lesser quantities of aquatic invertebrates. This species has been reported from one locality, an old strip mine in close proximity to the corridor, south of Belleville. However, its precise location and status in the study area are not known.

The Preferred Corridor does not impact any of the ponds associated with the strip mines north of Freeburg; therefore the potential impact to the habitat of the common moorehen is considered minimal.

Gray Bat (*Myotis grisescens*)

This small bat is a federally endangered species with a limited geographic range. The species' habitat requirements are very specific, primarily cave or mine shafts. The gray bat is particularly vulnerable to habitat disturbance during their winter hibernation periods in caves. Many of the caves where these bats are known to occur have had access limited by the construction of gates which allow for free movement of the bats but minimize human intrusion. The hibernation period, during winter months, is when the bats are most susceptible to human disturbances. Other caves are used in summer months for the rearing of their young. These summer caves are located near rivers or lakes, almost always within one-half mile. The gray bat feeds mostly upon flying insects, including mayflies and beetles, and foraging generally occurs parallel to streams. No records of gray bat roosts are known from the study area.

Due to the avoidance of known caves and mine shafts by the Preferred Corridor, direct impacts to gray bat habitat are not anticipated.

Interior Least Tern (*Sterna antillarum*)

The interior least tern is a small bird listed by the USFWS as endangered. Formerly well distributed in the Mississippi River basin, the interior least tern has been eliminated from most stretches of the Mississippi River and its tributaries. It nests on barren or sparsely vegetated alluvial islands or sandbars maintained by periodic inundation from large rivers. Although most nesting is in rivers, the interior least tern also nests on the barren flats of saline lakes and ponds. Little is known about the interior least tern's specific food preferences, but small fish such as minnows constitute its prey.

Because no major river habitat that is suitable to the interior least tern occur within the study area, impacts to the interior least tern are not anticipated.

Bald Eagle (*Haliaeetus leucocephalus*)
The federally threatened bald eagle is a common migrant and winter resident throughout the state and an uncommon breeder along some of the major rivers and larger reservoirs in the state. During winter, they congregate near rivers and reservoirs with open water and often near large concentrations of waterfowl. Wintering eagles usually occupy river habitats between November 15 and March 1 and use large-diameter riparian tree species as daytime perches and night roosts. During the daytime, they usually perch within a riparian corridor or along lakeshores and prefer areas with limited human activity. At night, wintering bald eagles may congregate at communal roosts and will travel as much as 12 miles from feeding areas to a roost site. The period from January 1 to March 1 is important for initiating nesting activity. March 1 to May 15 is the most critical time for incubation and rearing of young. Bald eagles feed opportunistically on fishes, injured waterfowl and seabirds, various mammals, and carrion. They hunt live prey, scavenge, and pirate food from other birds.

Since no major rivers or their associated riparian corridors occur within the study area, impacts to the bald eagle are not anticipated.

Pallid Sturgeon (*Scaphirhynchus albus*)
The pallid sturgeon, a federally endangered species, is a benthic (bottom-dwelling) fish that prefers turbid, swift-flowing water of various depths. Earlier studies indicated that the pallid sturgeon does not have a restricted home range and may move long distances. Side channels, wing dams and other channel training structures provide important foraging, over-wintering, and nursery habitat for riverine fish species including the pallid sturgeon. Dike systems contribute to habitat diversity because they are comprised of a mosaic of steep banks, sandbars, deep channel habitat types, and a variety of microhabitats.

Since no major rivers occur within the study area, impacts to the pallid sturgeon are not anticipated.

4.11.2 Natural Areas

No designated natural areas are located within or in proximity to the Preferred Corridor. The following natural areas are, however, found within the study area:

- **Stemler Cave Nature Preserve** -- This privately owned nature preserve covers a 1-acre tract surrounding the cave entrance and encompasses the entire subterranean extent of Stemler Cave (approximately 1 mile of mapped passage to date).
- **Stemler Cave Woods Nature Preserve** – This nature preserve covers approximately 200 acres in two parcels in proximity to Stemler Cave. The cover type consists of dry and dry-mesic upland forest and old field prairie restoration. Numerous sinkholes that provide internal drainage to Stemler Cave are protected in this area. This "buffers" the cave stream system from potential water quality impacts.
- **Pruitt Sinkholes Nature Preserve** – The Pruitt sinkholes cover approximately 3.6 acres in two parcels. These sinkholes provide water to Stemler Cave; therefore, this preserve's primary purpose is buffering impacts to water quality within the Stemler Cave system.
- **Sinking Creek Nature Preserve** – This nature preserve is located adjacent to Illinois Route 158 and encompasses 3.7 acres with several sinkholes and a losing stream that discharges to Stemler Cave. Again, the primary purpose is to buffer Stemler Cave from water quality impacts.

Sinking Creek Nature Preserve

The Sinking Creek Nature Preserve is a 4.5-acre mostly forested tract of land located in western St. Clair County. This site is located approximately 2 miles east of Columbia and 0.75 mile south of Stemler Cave Woods Nature Preserve and the Pruitt Sinkholes Nature Preserve. This area is located upstream of the main cave stream and helps to protect the cave system from various surficial contaminants. The preserve features numerous sinkholes and an intermittent, "sinking" stream that is part of the Stemler Cave karst system. The preserve is not used for recreational purposes and is privately owned.

Sinking Creek Nature Preserve is located completely within the Stemler Cave Recharge Area immediately north of Illinois Route 158. Because the Preferred Corridor completely bypasses the Stemler Cave Recharge Area, approximately 2 miles to the south of Sinking Creek Nature Preserve, impacts to this resource are not anticipated.

Stemler Cave Nature Preserve

The Stemler Cave Nature Preserve consists of a privately owned, 1-acre surface parcel and the entire subsurface extent of the cave. Stemler Cave is classified as a very high quality natural cave community (Grade A) with an outstanding invertebrate cave fauna and an outstanding example of karst topography (Illinois Natural Area Committee, 1986). A stream (Sparrow Creek) flows through the cave and subsequently discharges to Sparrow Spring. Approximately 1 mile of cave passage has been mapped.

The only Illinois location of a rare snail (*Fontigens antroecetes*) is in Stemler Cave. This species has been proposed for state listing. Additional macroinvertebrates have been reported for Stemler Cave, along with salamanders.

The Stemler Cave biota are considered important as an indicator of groundwater quality. These species are sensitive to water quality changes, and will not survive if the water becomes too degraded. Therefore, these species are monitored as "indicators" of the overall ecosystem health (canary in a coal mine). Given that many people in St. Clair and Monroe counties obtain their drinking water from groundwater wells, protecting these species is considered the same as protecting drinking water supplies.

The Stemler Cave recharge area has been extensively studied by the Ozark Underground Laboratory (OUL, 2000). The purpose of these studies was to determine areas that contribute water to the cave stream. Dyes were introduced into select sinkholes or losing streams and subsequently recovered at springs or gaining streams. The Stemler Cave recharge area and the approximately 20 dye traces used to define the recharge area are presented in Figure 4-4. The total recharge area is approximately 7.1 square miles.

The dye tracer studies determine the groundwater flow paths from specific introduction points to specific recovery points. In addition, topographic maps, surface watersheds, and other information are used to infer the recharge area boundaries. These boundaries, however, should be considered estimates and have some uncertainty associated with them. Site-specific issues, especially near recharge boundaries, will often require site-specific dye tracing to refine recharge boundaries.

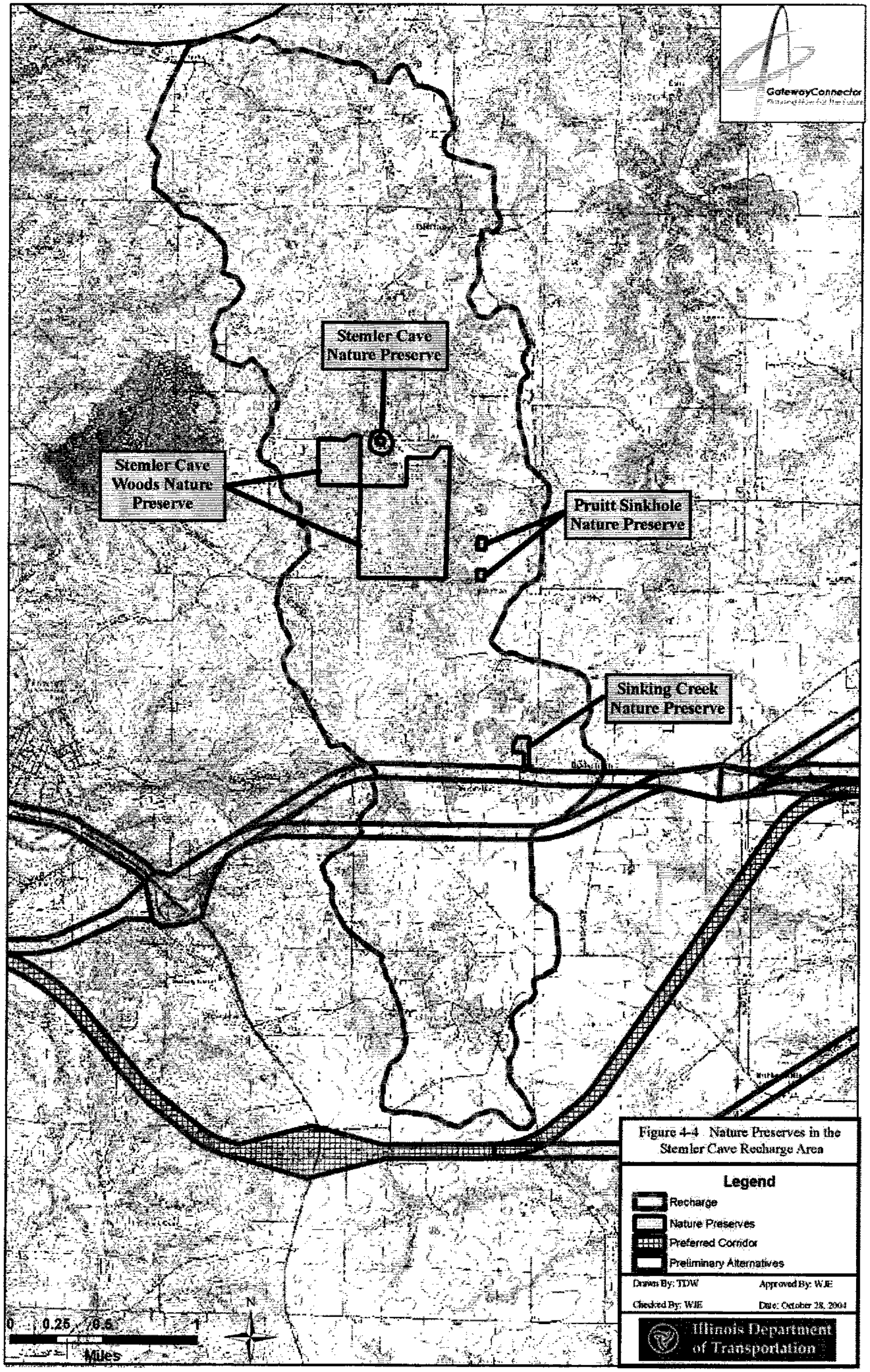

Figure 4-4 Nature Preserves in the Stemler Cave Recharge Area

Because the Preferred Corridor completely bypasses the Stemler Cave Recharge Area to the south, impacts to Stemler Cave Nature Preserve are not anticipated. During the design phase, however, surface water controls should be given high priority in areas adjacent to the recharge area. Surface water controls may include design features such as detention basins and/or roadway biofilters.

Stemler Cave Woods Nature Preserve

The Stemler Cave Woods Nature Preserve is an old growth remnant that is located in the sinkhole plain near Stemler Cave in St. Clair County. This 120-acre preserve is owned by the IDNR and was dedicated in April 1986. Recreational usage consists of strictly passive uses such as hiking and photography. There are no additional recreational facilities and the primary purpose of this nature preserve is to protect the Stemler Cave recharge area.

Stemler Cave Woods Nature Preserve is located completely within the Stemler Cave Recharge Area north of Illinois Route 158. Because the Preferred Corridor completely bypasses the Stemler Cave Recharge Area approximately 3 miles to the south of Stemler Cave Woods Nature Preserve, impacts to this resource are not anticipated.

Pruitt Sinkholes Nature Preserve Sites

Pruitt Sinkhole Nature Preserve is a privately-owned 2.5-acre preserve on two separate sinkholes located west of Millstadt in St. Clair County. This area was dedicated as a nature preserve in order to protect several sinkholes that drain into Stemler Cave.

The Pruitt Sinkholes Nature Preserve sites are located completely within the Stemler Cave Recharge Area. Because the Preferred Corridor bypasses the Stemler Cave Recharge Area approximately 3 miles to the south of Pruitt Sinkholes Nature Preserve, impacts to this resource are not anticipated.

4.12 Hazardous Materials/Solid Waste

A hazardous material reconnaissance and assessment was conducted for the Gateway Connector corridor project area. The purpose of the reconnaissance was to (1) identify and assess significant sites within the study area that were identified within the Gateway Connector Protection Report and (2) identify sites that potentially represent health and safety concerns to workers or that would result in high remediation and clean-up costs.

For the purpose of this report, hazardous wastes and materials are defined as products or wastes regulated by the USEPA or Illinois Environmental Protection Agency. These include substances and sites regulated under the Comprehensive Emergency Response, Compensation and Liability Act.

The hazardous waste assessment for the Gateway Connector protection corridor involved data collection efforts, including review of numerous government agency lists and files, as well as a limited field reconnaissance of the study area and the final alternative corridors. A review of regulatory databases was conducted by VISTA Information Solutions, Inc. (now Environmental Data Resources of Southport, Connecticut) in conjunction with the previously conducted Feasibility Study. The database findings were provided in a report titled "Site Assessment – Special Report" dated January 9, 2001, Report Number 380409001. The VISTA report is not included as a part of this document.

The databases searched included the following with additional supplemental federal, state and/or local databases:

Federal Databases

- National Priority List;
- Comprehensive Environmental Response, Compensation and Liability Information System;
- Comprehensive Environmental Response, Compensation and Liability Information System – No Further Remedial Action Planned;
- Corrective Action Report;
- Emergency Response Notification System; and
- Resource Conservation and Recovery Information System Databases (Treatment, Storage and Disposal, Large Quantity Generator, Small Quantity Generator):
  - Registered Hazardous Waste Treatment, Storage and Disposal Facilities
  - Registered Hazardous Waste Generators.

Illinois State Databases

- Hazardous Waste Sites;
- Landfill and/or Solid Waste Disposal Sites;
- Leaking Underground Storage Tank (LUST) Sites;
- Registered Underground Storage Tank (UST) and Aboveground Storage Tank (AST) Sites; and
- State Spills lists.

Potential Sites

No critical flaws such as landfills or Comprehensive Emergency Response, Compensation and Liability Act type (Superfund) sites were identified in the review process of the final alternative corridors.

Sites such as service stations (active and abandoned) with AST, UST and LUST tanks and generators of designated regulated material were included in the reconnaissance and assessment. These sites were reviewed for the potential to contain or generate special waste.

Several sites were identified in the review process that were within corridors not chosen to be the Preferred Corridor. For example, two sites were identified along Douglas Road within Section D and three sites were identified in Columbia along Final Alternatives within Section E. The sites at Douglas Road included Equipment Service Company and Carrons Truck Repair, and could be generators of special waste. The sites in Columbia, an active Shell Station, an Ameren Substation, and Centerpoint Energy, could have active and abandoned USTs/ASTs and special waste onsite.

Seven sites were identified within the Preferred Corridor. These sites that were identified have the potential to contain or generate special waste as indicated in Table 4-12. However, it is important to note that these sites may warrant additional consideration in subsequent studies based on the limited data that were available during the Final Alternative Corridor review process.

Table 4-12. Potential Sites for Special Waste within Proximity of the Preferred Corridor

Site Name	Location	Comments
Potential abandoned gas station	Illinois Route 3 at Route EE, southeast of Columbia	Possible abandoned USTs
Ameren Substation	Triangle parcel at intersection of Douglas Road, Roenicke Road and Illinois Route 158 southwest of Millstadt	May contain special waste
Handy Fertilizer, Inc.	Floraville Road at Rudy Lane southeast of Millstadt	May have special waste onsite
Former Amoco Oil Station	Illinois Route 158 west of SAFB, now identified as Filipino American Association	May contain historic USTs/special waste
Moto Mart	Illinois Route 158 north of I-64/Route 158 interchange	May contain special waste and/or active USTs
Ameren Substation	I-55/70 and Illinois Route 40 interchange at the northern terminus	May contain special waste
IDOT Maintenance facility	I-55/70 and Illinois Route 40 interchange at the northern terminus	May contain special waste and/or active/abandoned USTs/ASTs

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Potential mitigative measures at each of these locations may include further investigation and avoidance during the design phase, as well as site remediation including such measures as excavation and disposal in an approved facility.

4.13 Air Quality

Pollutants of common concern in highway planning studies are carbon monoxide, ozone, and nitrous oxides. The primary air pollutant standards are shown in Table 4-13.

Table 4-13. National Ambient Air Quality Standards

Criteria Air Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon Monoxide	1-Hour Maximum[a]	40 mg/m³ [b] (35 ppm[c])	
	8-Hour Maximum[a]	10 mg/m³ (9 ppm)	
Lead	3-Month Arithmetic Mean	1.5 µg/m³ [d]	Same as primary
Nitrogen Dioxide	Annual Arithmetic Mean	100 µg/m³ (0.05 ppm)	Same as primary
Ozone	1-Hour Average[a]	0.12 ppm (235 µg/m³)	Same as primary
	8-Hour Average[e]	0.08 ppm (157 µg/m³)	Same as primary
Particulate Matter 10	Annual Arithmetic Mean 24-Hour Average[f]	50 µg/m³ 150 µg/m³	Same as primary
Particulate Matter 2.5	Annual Arithmetic Mean[g] 24-Hour Average[h]	15 µg/m³ 65 µg/m³	Same as primary
Sulfur Dioxide	24-Hour Maximum[a]	365 µg/m³ (0.14 ppm)	
	Annual Arithmetic Mean	80 µg/m³ (0.03 ppm)	
	3-Hour Maximum[a]		1,300 µg/m³ (0.5 ppm)

a Not to be exceeded more than once a year for primary and secondary standards
b mg/m³ = milligrams per cubic meter
c ppm = part per million
d µg/m³ = micrograms per cubic meter
e Established for a 3-year average of the 4th highest daily maximum concentration.
f Established for a 3-year average of the 99th percentile of data
g Established for a 3-year average
h Established for a 3-year average of the 98th percentile of data

Source: USEPA, 2004 (www.epa.gov/air/criteria.html).

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In May 2003, the USEPA designated the entire eight-county St. Louis metropolitan area a maintenance area for ozone. Like many metropolitan areas, the St. Louis region has a history of air pollution levels that exceeded health-based atmospheric air quality standards and thus was previously classified as a nonattainment area for ozone. (The USEPA uses the term nonattainment area to describe metropolitan areas where air quality fails to meet health standards for particular pollutants. An ozone nonattainment area that has met the ozone level monitoring requirements over a 3-year period may request reclassification to a maintenance area based on compliance with the ozone level monitoring requirements.)

The Preferred Corridor will have the potential to ease future congestion on the existing roadway network. As a result, the proposed project is expected to have a positive effect on improving local air quality at congested intersections. This project supports continued efforts to improve regional air quality. Specific air quality impacts will be evaluated and a conformity determination will be made during the Phase I study.

4.14 Noise

A noise study was not conducted at this level of analysis. However, a new transportation facility in a rural area will increase noise levels at sensitive noise receptors as identified in Table 4-14.

During the Phase I study, an analysis will be conducted according to the guidelines as presented in 23 Code of Federal Regulations, Part 772, which provide procedures whereby the acoustic impact of the proposed action can be assessed and the needs for abatement measures can be determined when the noise levels approach or exceed the FHWA Noise Abatement Criteria for various land uses as presented in Table 4-14.

Table 4-14. Noise Abatement Criteria Hourly A-Weighted Sound Level (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	66 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.
		Prepared/Date: RCH/9-01-04 *Checked/Date: WJE/9-10-04*

The future development of the Gateway Connector will have an effect on noise levels. In areas where the project will be on new alignment, it will result in a notable increase in noise levels as compared to that which currently is associated with agricultural land uses. By comparison, in areas where the future facility is closely aligned with an existing roadway (e.g., Scott-Troy Road, Illinois Route 158), the change in noise levels will be less apparent as receptors in these areas are currently subject to roadway noise.

When the 66 dBA L_{eq} criterion is exceeded, noise abatement procedures are to be reviewed for effectiveness and feasibility according to the following criteria:

- Potential noise reduction benefit;
- Number of receptors benefited;
- Noise wall characteristics including height, access and cost; and
- Desirability of noise walls by benefited receptors.

4.15 Visual Environment

Any existing landscape is considered to have visual quality when its landscape components (landform, water, vegetation, manmade development) have striking characteristics that convey visual excellence.

The majority of the project corridor is composed of agricultural lands that are dissected by wooded stream valleys with some small, noncontiguous developed areas such as residences and farmsteads. Developed residential and commercial areas are located primarily in the northern section of the study area along Illinois Route 158, and near Columbia. These areas are characterized by a variety of developed uses such as truck stops, gas stations, churches, residences, retail facilities, and light industrial facilities.

The project corridor crosses the Sinkhole Plain region near the southwestern terminus. The Sinkhole Plain region is characterized by limestone bedrock, caves, and sinkholes.

The Preferred Corridor will potentially impact the predominantly agricultural visual resources by introduction of a transportation facility in a rural (but developing) area. Views from the future transportation facility will be of a gently rolling terrain dissected by stream valleys. By comparison, the Gateway Connector would alter the current viewshed of the undeveloped landscapes within the Preferred Corridor for those who may be in its vicinity.