Section 4: ENVIRONMENTAL CONSEQUENCES AND MITIGATION

This section presents an analysis of the potential consequences, both beneficial and adverse, of the No-Action and Build Alternatives for the I-69 project with respect to transportation, social and economic, physical and biological, and atmospheric conditions. This section discusses primary, direct impacts (the loss of a resource) and, where feasible, indirect impacts (changes in the function or quality of a resource). Secondary and cumulative impacts are discussed, as well as measures that would be implemented to mitigate unavoidable impacts.

4.1 SOCIAL IMPACTS

The Project passes through a predominantly rural landscape about fifteen miles south and east of the Shreveport metropolitan area. Development is limited to towns associated with area highways. The alignments were specifically developed and located within the Preferred Corridor through sparely populated areas currently in use for agricultural, oil and gas, and timber purposes to minimize community, residential, and business impacts while attempting to maximize public access to this transportation facility.

Social impacts in rural areas may not necessarily be dictated by the physical location of the proposed highway in a particular community, but rather by the presence of the proposed highway through the local area, regardless of the particular alignment location. For this reason, all alignments are expected to have similar social impacts unless otherwise noted. Social impacts associated with the No-Action alternative would be minimal and are described where appropriate.

4.1.1 Land Use and Land Cover Changes

The Project will have both direct and secondary impacts to existing land uses and land cover. The construction of the highway will result in the direct conversion of land currently in forest or agricultural production, to a transportation use. The proximity to highway access could spur indirect or secondary land use impacts resulting from new or increased residential, commercial, or industrial development in the Study Area.

Land Cover Conversion

Land directly used by the proposed highway would be converted from its present use to transportation use as shown in Table 4-1. For the majority of the route, land would be converted from forested lands. Impacts to these land covers and vegetative communities are discussed in Section 4.9. Line 2 would convert the least amount of land to highway use while Line 3 would convert the greatest.

Table 4-1
SUMMARY OF LAND COVER IMPACTS

Alignment	Forested (ac)	Pasture/ Cropland (ac)	Wetlands (ac)	Developed (ac)	Totals (ac)
No-Action	0	0	0	0	0
Line 1	1,153.2	547.4	51.2	22.7	1,774.5
Line 2	1,102.5	503.2	47.9	20.5	1,674.1
Line 3	1,144.3	569.3	55.2	26.1	1,794.9
Line 4	1,130.7	483.4	58.2	15.5	1,687.8
Line 5	1,138.1	497.6	46.7	17.5	1,699.9
Line 6 (Preferred)	1,189.5	532.1	42.9	23.6	1,788.1

Source: Michael Baker Jr., Inc.

The No-Action alternative would not result in any development beyond what the current development trends would indicate. Scattered residential development will continue to occur as land becomes available.

Secondary Development

The Project could facilitate secondary development in the Study Area to some extent regardless of the alignment selected. This development could take several forms:

- ❑ commercial development at interchanges
- ❑ industrial development in new industrial parks
- ❑ recreational development that may result due to improved access
- ❑ single site industrial developments by manufacturing enterprises that locate in the area due to improved access
- ❑ residential development that may result due to community growth and improved access to nearby job markets.

Hartgen and Kim (1998) found that the extent and type of rural interchange development is influenced by the size of the nearby community, the services offered, and the distance to that community. The development would generally be proportional to the size of the community and inversely proportional to the distance from that community. That is, more development would be expected at larger communities with an interchange close by than for smaller communities with an interchange farther away. The size and distance variables are not

absolute and exceptions to these general trends can and often do occur. Precise predictions of type and extent of development are not possible.

Interchanges are located to provide access to the local highway network, facilitating Interstate travel opportunities for Study Area residents. All Lines have proposed interchanges at U.S. 171 near Stonewall, I-49, LA 1, U.S. 71, LA 157 south of Haughton, and at I-20. Little development would be expected at these interchanges because a variety of services exist in the Shreveport-Bossier metropolitan area, which is in close proximity (5-11 miles) to all of these interchanges. For example, an existing interchange was provided at LA 3276 for access to I-49, which is location about 1.4 miles north of the proposed Project interchange with I-49. The interchange was open to traffic about 16 years ago and, to date, no development has occurred.

Lines 1, 3, and 6 (Preferred Alignment) would have proposed interchanges at LA 1 at the Port of Shreveport-Bossier and at U.S. 71. The proposed interchange at U.S. 71 is close enough to a sizeable population that some secondary development is likely to occur. Light commercial development would be expected at the Port.

Additionally, Lines 2, 4, and 5 have proposed interchanges at LA 1 and U.S. 71 about 3 miles to the south of Lines 1, 3, and 6 (Preferred Alignment). Both locations are close enough to a sizeable population and far enough away from existing services that light commercial development is likely to occur. Currently, both locations are surrounded by pastureland that could accommodate some form of limited development.

Single site industrial development could occur near the proposed highway where land is available. This development would be limited by the services and infrastructure local communities could provide. This type of development would most likely be confined to areas where supporting infrastructure would be available closest to the Shreveport-Bossier metropolitan area along LA 1 and U.S. 71. Furthermore, additional residential development may occur in the communities Stonewall, Elm Grove, and Haughton due to improved access by the proposed highway.

The No-Action alternative would not result in any development beyond what the current development trends would indicate. Scattered residential development will continue to occur as land becomes available. Limited commercial growth may continue at the Port of Shreveport-Bossier.

Consistency of Highway and Secondary Development with Land Use Plans

The Northwest Louisiana Council of Governments' (Shreveport-Bossier City area Metropolitan Planning Organization (MPO) transportation planning committee, have participated in several meetings at various stages of the project to discuss both land use and transportation issues as they relate to the development of the Project. As

discussed in Section 2.3.17, the MPO expressed their preference for an alignment following the northern route of the Preferred Corridor.

Elected officials from Stonewall and Haughton have actively participated in the project development process and have been an active voice in the decision-making process.

4.1.2 Community Changes

The Project would result in changes to neighborhoods, travel patterns, local traffic, community services, and property values. These changes would be most evident in communities in or adjacent to the highway. All alignments are expected to have similar community impacts.

Neighborhoods and Community Cohesion

The alignment development process was designed to fully consider potential community impacts at both the corridor and alignment level of study. Corridor location involved an attempt to avoid all area communities and neighborhoods to the greatest extent practicable, and subsequent alignment development focused on avoidance of individual residences and businesses. Lines 1, 3, and 6 (Preferred Alignment) would cross a residential area along Pine Hill Road in order to avoid other clusters of residential development along LA 527 to the south, and Goat Hill Road, Caplis Sligo Road, and LA 157 to the north.

Attempts were made to avoid small clusters of residences in outlying areas. Community cohesion for the more scattered residences in the Study Area would be maintained via highway overpasses/underpasses of the local roadways.

The No-Action alternative would not directly impact neighborhoods. Widening projects may disrupt individual residents, but would not likely divide any existing neighborhoods.

Community Access and Travel Patterns

Grade separations are proposed for all alignments at all existing U.S. highways, state highways, and parish road crossings via overpass or underpass structures depending on roadway alignment and terrain. Access within and between communities would not appreciably change as a result of this project. Maintenance of access to individual property parcels would be considered and addressed during the final design of the highway.

Most communities within the Study Area will have access to the proposed highway via six interchange locations. In the western portion of the Study Area, access to the community of Stonewall would be provided by interchanges at U.S. 171 and I-49. An interchange at LA 1 would provide access to the community of Frierson via LA 175. Access to the community of Elm Grove would be provided by an interchange along U.S. 71. In the eastern portion of the Study Area, an interchange at LA 157 would provide access to the communities of Oakland and Koran via LA 527. Access to Haughton would be provided by an interchange at I-20. Shreveport

area residents could access the highway with proposed interchanges at I-49 and LA 1. Bossier City residents could access the highway at proposed interchanges at U.S. 71 and I-20.

The No-Action alternative limits the accessibility to an Interstate highway for many area residents. Study Area residents that need to travel between Stonewall and Haughton, without heading northward through Shreveport, would have to use the existing roadway network that provides an indirect travel path between the two communities with a limited number of bridge crossings several miles north of the Preferred Corridor. While these roads are acceptable for community travel, they do not provide the convenience and safety of an Interstate highway.

Travel patterns in the Study Area may change as a result of the proposed highway. Residents would have a choice to travel on the existing roadway network or I-69 depending on their final destination. Travel time between Stonewall and Haughton would be reduced especially during peak traffic hours or periods of construction and safety would be increased through the use of the new facility.

The No-Action alternative fails to complete the regional Interstate highway system and does not provide direct Interstate access for area residents. Residents that are located in the central portion of the Study Area would need to travel to LA 1 or U.S. 71 to access Interstate travel to the east or west. While these roads are acceptable for community travel, they do not provide the convenience and safety of an Interstate highway.

Changes in Local Traffic

Changes in local traffic would result from all highway alignments. Residents living or traveling along roads such as U.S. 171, LA 175, LA 1, U.S. 71, LA 527, LA 157, LA 164, and U.S. 80 may experience a decrease in the traffic volumes, particularly truck traffic, as through trips are diverted to the new highway facility. Most truck traffic currently traveling these routes within the Study Area would benefit from the increased transportation efficiency provided by an Interstate highway.

Community Services and Facilities

Most residents within the Study Area would need to travel 15-20 miles to the Shreveport metropolitan area for major medical and other professional services. Residents would travel northward on U.S. 171 from Stonewall, U.S. 71 from Elm Grove, and LA 1 near the community of Caspiana to assess these services. Moderate to heavy traffic would likely be encountered as the Shreveport-Bossier area is approached. Travel on I-69 for northward travel on I-49 would improve access to services especially in times of medical emergencies. Accessibility to community services would be improved by all alignments.

Adequate fire and police services are important for the protection of citizens and property in all communities. Construction of I-69 would benefit the Study Area by reducing emergency response times between communities by removing through traffic from the local roadway network.

The proposed highway would not affect access to churches, schools, and public facilities. Grade separations proposed at all existing U.S. highways, state highways, and local road crossings via overpasses or underpasses would maintain facility access. Lines 1, 3, and 6 (Preferred Alignment) would impact the Elm Grove Baptist Church. No other community facilities would be directly impacted.

The No-Action alternative would not result in improved community service accessibility or improve emergency response times. Increased traffic congestion along U.S. 71, U.S. 171, and LA 1 and adjacent roadways could make community facility access more difficult and time consuming.

Property Values

Property values could increase along highways for which an interchange has been proposed as land becomes more desirable for commercial and industrial development. Commercial development and associated increased property values are more likely to occur at interchange locations near existing communities.

The value of residential units adjacent to the proposed highway is difficult to predict. Individual home values are based on each owner's and the potential buyer's perception of the benefits of an adjacent highway and would vary on a case-by-case basis.

Secondary Community Impacts

Secondary development that could occur as a result of the proposed highway would affect the daily lives of residents in nearby communities. All alignments would produce similar secondary development. The degree to which secondary development may occur is dependent on many variables and is difficult to precisely predict. Residential areas may become more densely populated, demands on utilities and social services may increase, and farmlands, forests, and pasture may be converted to residential areas and other forms of land use. This growth is likely to occur over an extended period of time and is likely to follow current residential growth patterns observed in the Study Area where local community officials, planners, developers, and service providers have provided the basic infrastructure conducive to residential development. Secondary development and potential community change such as this can be perceived as positive or negative. New development often means new jobs, increased economic vitality and a higher population. To some this change is unwanted while to others it is desirable and vital.

Development that may occur at interchanges could indirectly affect the residents living along these highways. The land adjacent to the proposed interchange could change from solely residential and farm use to light commercial use such as restaurants and service stations. While nearby residents may enjoy the convenience of these services, the previous rural character of their residence would have changed.

The No-Action alternative would not likely result in secondary development or associated change in communities beyond the current development trends.

4.1.3 Safety

The construction of I-69 would have a positive impact on both highway and overall public safety, including bicycle and pedestrian safety, within the project area. All alignments would have a similar affect on safety.

Highway Safety

Safety improvements would primarily be related to the diversion of truck traffic from local roads to the new highway. Diversion of truck traffic to the proposed highway could reduce the need to pass, thereby reducing the potential number of head-on collisions. In addition, all traffic on the proposed highway would encounter fewer access points than on the existing route, a factor that correlates to accident rates. Traffic traveling on U.S. and state highways within the Study Area frequently encounters vehicles turning onto or out of side roads or driveways, which can lead to collisions.

Pedestrians and Bicyclists

Limited pedestrian and bicycle activity exists where the proposed highway would cross U.S. and state highways within the Study Area near the communities of Stonewall, Frierson, and Haughton. Safety concerns result due to the lack of sufficient designation pathways especially along U.S. 171, LA 3276, LA 1, U.S. 71, LA 175, LA 527, Camp Zion Road, LA 164 and U.S. 80. However, pedestrian and bicycle safety could improve as through traffic and truck traffic is diverted to the proposed highway.

The No-Action alternative could result in additional traffic accidents, fatalities, and property damage along the Study Area roadways due to the future increase in traffic volumes and increased congestion.

4.1.4 Relocations

All alignments will displace residents. Line 3 would displace the Boomtown Grocery in Haughton. Lines 1, 3, 5, and 6 (Preferred Alignment) would impact Carson's Auto Repair in Haughton. Lines 1, 3, and 6 (Preferred Alignment) would also displace the newly constructed Elm Grove Baptist Church. Lines 2 and 4 would also impact properties owned by Yogie and Friends Exotic Cat Sanctuary in Frierson. Structures were initially identified on 1998 and 1999 aerial photographic

mapping, field verified, and entered into the Project GIS for impact assessment. Revisions and updates were made to this information during the Alignment Study and again prior to distributing the Draft EIS to include all currently existing residences and businesses. An effort to minimize residential, business, and community facility impacts was made during both the corridor and alignment study. Further steps to minimize displacements will be considered during the final design of the highway.

Table 4-2 compares the relocations for all alignments. Line 2 would have the least number of relocations while Line 1 would have the most.

Table 4-2
RELOCATION SUMMARY

Alignment	Structure/Facility Type					
	House	Mobile Home	Business	Community Facilities		Total
				Church	Park	
No-Action	0	0	0	0	0	0
Line 1	5	15	1	1	0	22
Line 2	4	3	0	0	0	7
Line 3	4	12	2	1	0	19
Line 4	7	8	0	0	0	15
Line 5	2	7	1	0	0	10
Line 6 (Preferred)	4	10	1	1	0	16

Source: Michael Baker Jr., Inc.

The No-Action alternative could result in future relocations as minor safety improvements and additional widening or passing lane projects are implemented within the Study Area. All future projects will include measures to minimize relocations to the extent practicable. Due to the existence of numerous residences along area highways, it is reasonable to assume that some impacts to residences would occur as improvement projects are implemented in the future.

Relocation Mitigation

An assessment was made of the available housing to determine its comparability with the relocatees' needs. An Internet search was conducted to determine available house within the Study Area (Lending Tree 2004). The results are summarized in Table 4-3.

The DOTD conducts the acquisition and relocation process in accordance with the Uniform Relocation Assistance and Real Property Policies Act of 1970.

Table 4-3
CURRENT AVAILABLE HOUSING[1]

Area	Price Range	Number
Stonewall	52,900 – 499,000	19
Frierson	67,000 – 299,000	6
Elm Grove	91,000 – 160,000	4
Haughton	19,500 – 375,000	61

Source: Michael Baker Jr., Inc., Lending Tree
[1] Housing units generally fall within Study Area from U.S. 171 to I-20.

Relocation assistance will be made available to all residential and business relocatees without discrimination as to race, color, national origin, age, sex or religion. In all cases, decent, safe and sanitary housing will be made available for all relocatees. The DOTD is committed to locating replacement housing within the occupant's financial means and within the general area of the project and when necessary providing housing of last resort. Real estate availability will be reassessed once final design of the highway has been completed.

4.2 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, directs all Federal agencies to determine whether a proposed action would have an adverse and disproportionately high impact on minority and/or low-income populations. In addition, elderly populations (>65 years old) were also assessed. The objective of the Environmental Justice policy is not to develop alternatives that simply move the impacts from one affected group to another, but to fully and equitably consider potential project impacts to minority and low-income populations during the project development process.

4.2.1 Methodology

Fifteen U.S. Census Bureau Census Block Groups were identified within the Study Area and initially examined to determine the presence of minority, low-income, or elderly populations within the Study Area (see Table 3-8 and Exhibit 3-1). Eleven of these fifteen block groups would be crossed by the proposed alignments. Further analysis of this information was conducted to establish Parish reference populations for comparative purposes in determining disproportionate project impacts. When possible, Parish reference populations consisted of only those Census Block Groups within the Study Area.

Table 4-4 presents the minority, low-income, and elderly populations potentially affected by all developed highway alignments compared to the appropriate reference population. The majority of Census Block Groups traversed by all alignments showed no indication of disproportionate impacts. The shaded cell in the table represents a value considered substantially different than the reference population values and identified Census Block Groups where disproportionate impacts may occur. This area was examined in greater detail to determine the extent of any project impacts, positive or negative.

Table 4-4
CENSUS BLOCK GROUPS POTENTIALLY AFFECTED BY THE ALIGNMENTS

Parish	Census Tract	Census Block Group	Population	% Minority	% 65 and Older	Median Household Income	% Below Poverty
Bossier	110	1	1,715	24	15	35,560	14
		2	851	22	10	48,802	20
		3	1,928	35	7	32,548	24
		4	2,121	6	6	55,781	4
	111.06	1	1,124	10	8	38,611	15
		4	3,317	24	9	33,542	16
		5	14	71	0	61,250	0
Bossier Parish Reference Population			11,070	27	8	43,728	13
Caddo	240	1	1,238	9	35	72,222	19
Caddo Parish Reference Population			1,238	9	35	72,222	19
DeSoto	9501	1	2,423	37	10	39,028	13
		2	1,646	19	12	37,679	15
		3	2,875	27	10	36,650	19
DeSoto Parish Reference Population			6,944	28	11	37,786	16

Source: U.S. Department of Commerce – Bureau of the Census – 2000 Census of Housing and Population
* Shading indicates values substantially different from the reference population.

Bossier Parish Census Block Group 5 in Census Tract 111.06 was the only tract traversed by the proposed alignments with a substantially higher percentage of minorities (71%) when compared to the reference population (27%). A small cluster of homes and one business is located along Shootout Lane in the northeastern portion of Block Group 5 between the western border of the Louisiana Army Ammunition Plant, U.S. 80, and Clarke Bayou. These were identified and avoided during the alignment development process in order to preserve community cohesion.

4.2.2 Summary of Environmental Justice Considerations

No disproportionate impacts to minority, low-income, or elderly population groups would be expected by any of the alignments. During final design of the highway, further consideration will be given to reducing all residential and business displacements. All displaced residents will be provided with relocation assistance by DOTD and every reasonable effort will be made to relocate affected residents within their immediate community.

4.3 ECONOMIC IMPACTS

Economic impacts related to the development of the Project include a temporary increase in construction employment, an increase in other employment areas, reduction in travel costs, and additional local and regional income generated from sources such as transportation related taxes. Economic impacts would be similar for all alignments, including the Preferred Alignment.

4.3.1 Employment Opportunities

Construction of the proposed highway would positively impact the local economies of the Study Area communities. New employment opportunities would be generated by the construction activities, in addition to the services required to support the operation. A recent national FHWA study on employment impacts of highway investment (*Highway Infrastructure Investment and Job Generation: A Look at the Positive Employment Impacts of Highway Investment*, USDOT, FHWA, 1997) found that every $1 billion in Federal-aid highway investment supported approximately 42,100 total full-time equivalent jobs. Jobs were further classified as:

- direct or on-site highway construction jobs specifically involved with the highway improvement project such as construction laborers, engineers, and construction managers
- indirect or supply industry jobs at firms that supply equipment, materials, and administrative support
- induced jobs created when construction-based employees spend their wages on various goods and services throughout the area.

An estimate of the number of jobs potentially created by the proposed highway is shown in Table 4-5.

Table 4-5
ESTIMATED EMPLOYMENT IMPACTS OF HIGHWAY CONSTRUCTION

Job Category (person-years)	Jobs Per $1 Billion of Construction Costs[1]	No-Action	Build Alternatives
Average Construction Costs (Billions)		$0.00	$0.50
Direct/On-site Jobs	7,900	0	3,950
Indirect Jobs	19,700	0	9,850
Induced Jobs	14,500	0	7,250
Total Jobs	42,100	0	21,050

Source: Michael Baker Jr., Inc., FHWA, 1997
[1] Does not include Right-of-Way costs

Due to the similarity in estimated construction costs of all alignments, individual employment projections were not made for each alignment. Overall, over 21,000 indirect and induced jobs could be

generated by construction of the proposed highway. Given the length of the proposed highway, these economic impacts would continue for several years.

Many Study Area residents would benefit from the proposed highway. Increased accessibility to the Interstate system would allow commuting times to be reduced from these rural communities allowing persons to increase their employment search area in a safer and more time efficient manner.

It is possible that some highway-related businesses along U.S. 171, LA 1, U.S. 71, and LA 157 could suffer due to a reduction in traffic on this route. This would depend on the type of business, the traffic changes that occur, and the proximity to other traffic generators. Highway related businesses that depend in large part on through traffic might be negatively impacted. Impacts to these businesses would also be dependent on their proximity to proposed interchanges. Marketing initiatives by affected businesses, such as signs on the highway, may offset the loss of through traffic impacts.

The No-Action alternative could have a negative economic impact on the Study Area. The No-Action alternative would not result in new construction employment, could limit rural resident employment opportunities, and increase travel and vehicle operating costs through a decreasing level of service on area roadways.

4.3.2 Secondary Economic Impacts

Secondary economic impacts would be tied to potential secondary development throughout the Study Area. Growth in residential development in the communities of Stonewall, Elm Grove, and Haughton would increase the demand for consumer services, including retail, banking, healthcare and recreation.

Commercial development at interchanges at U.S. 171, LA 1, U.S. 71, and LA 157 would have varying economic effects on the local economy, depending on the extent of this development.

4.4 VISUAL

Visual changes that are attributable to the proposed highway would take two forms: views of the proposed highway from various points within the Preferred Corridor and views from the proposed highway of the surrounding landscape. All alignments would have similar visual impacts.

4.4.1 Views of the Proposed Highway

The proposed highway would alter both the urban and rural setting as it moves from Stonewall to Haughton. The landscape between these two communities is comprised by a mixture of forestland interspersed with limited residential development in upland areas, and agricultural land adjacent to the Red River floodplain. Residents not displaced by the highway facility, but in close proximity to it, would have the greatest visual impacts. However, the number of these incidences

is low due to the forested nature of the surrounding environment. Other residents living in the flat terrain across the agricultural landscape of the Red River floodplain would be less affected by most views of the highway except in areas where elevated grade separations occur at area roadway crossings.

4.4.2 Views from the Proposed Highway

The views of the surrounding landscape from the proposed highway could be considered a beneficial impact as travelers pass through a predominantly rural vista marked by agricultural and adjacent forested lands. Numerous viewshed opportunities would exist, primarily at elevated grade separations, for motorist views across expansive agricultural lands, forested areas, and views of distant rural communities. Views of scenic wetlands would occur at the bridge crossing of the Red River.

4.5 OIL AND GAS RESOURCES

Producing oil and gas well locations were obtained from Tobin International, Ltd. in San Antonio, Texas and entered into the Geographic Information System (GIS) to determine impacts for each alignment. Producing wells are defined as wells that are currently providing enough product to offset the cost of maintenance and extraction.

Oil and gas well impacts are summarized in Table 4-6. Well impacts are scattered throughout the Study Area from Stonewall to LA 157 in Bossier Parish, with most being located within the Elm Grove Field. Line 4 would impact the greatest number of producing oil wells, while Line 5 would impact the greatest number of producing gas wells and the greatest number of producing oil and gas wells. Line 3 would impact the least number producing wells.

The No-Action alternative would not impact any wells.

Table 4-6
PRODUCING OIL AND GAS WELL IMPACTS

Alignment	Oil	Gas
No-Action	0	0
Line 1	1	8
Line 2	0	9
Line 3	0	5
Line 4	2	6
Line 5	0	10
Line 6 (Preferred)	1	6

Source: Michael Baker Jr., Inc., Tobin International, Ltd.

As a result of highway construction, economic impacts may occur to landowners due to the loss of active oil or gas wells. In conjunction with the property acquisition process, a qualified petroleum engineer would conduct a feasibility study for each impacted well to determine the estimated reserves. Results of the study would determine whether a well would be replaced by directional drilling or compensation would be provided to landowners based on estimated reserves. All wells impacted by the proposed highway would be properly abandoned according to procedures established by

the Louisiana Department of Environmental Quality.

During final design of the highway, individual gas and oil collector lines would be identified. When possible, these lines would be avoided or relocated to continue service to these well sites.

4.6 WATER QUALITY

Potential water quality impacts were assessed for surface water, groundwater, and public water supplies. DOTD will comply with all requirements of the Clean Water Act, as amended, for the construction of this proposed highway, and will obtain the following permits: a Section 401 Water Quality Certification, a Section 402 National Pollutant Discharge Elimination System (NPDES) Permit, and a Louisiana Water Discharge Permit System (LWDPS) permit issued by the Louisiana Department of Environmental Quality (LADEQ); and a Section 404 permit issued by the U.S. Army Corps of Engineers for the placement of dredged and fill material in waters of the United States. A Stormwater Pollution Prevention Plan will be prepared in conjunction with the NPDES permitting process prior to construction. This plan will include all specifications and best management practices (BMPs) necessary for control of erosion and sedimentation due to construction related activities.

The No-Action alternative would have limited impacts to all water resources. Normal roadway maintenance, and minor safety improvements may result in the temporary influx of sediment-laden runoff to area waters.

4.6.1 Surface Water Resources

Surface water resources crossed by all alignments include perennial and intermittent streams or bayous, and man-made ponds primarily associated with agricultural activities. Perennial streams crossed by the alignments from west to east include Brushy Bayou, Wallace Bayou, Chico Bayou, Bayou Pierre, Red Chute Bayou, Foxskin Bayou, and Clarke Bayou. Intermittent streams crossed by all alignments include Frierson Branch and Gandy Bayou. Additionally, all alignments would cross the Red River and the Flat River. Stream resources are shown in Exhibit 4-1.

Water quality impacts would be similar for all alignments and likely be restricted to the temporary influx of sediment laden surface runoff associated culvert and bridge placements. No long-term adverse impacts would be expected.

Proposed Bridge and Culvert Locations

Bridges or culverts are proposed at the various surface water crossings depending on the roadway alignment and the upstream watershed area. Table 4-7 lists the major watercourses crossed and crossing type for each alignment. Culverts will most likely be used to cross other minor watercourses. Detailed hydraulic studies will be performed during the final design of the Project (see Section 4.7.4).

Caddo Parish
DeSoto Parish
Stonewall
I-69 SIU 16
(Interstate 69/Trans-Texas Corridor)
I-69 SIU 15
Preferred Corridor
Line 6 (Preferred) & Line 5
Line 1
Line 2 & 4
Line 3
Conceptual Interchange (All Lines)
Relocated Road (All Lines)
Bayou Pierre Subbasin
Brushy Bayou
Sand Bayou
Match Line
See Sheet 2 of 6
Wendy Ln
Joanne Ln
Hilaire Rd
Cherri Ln
Ramblin Rd
Old Jefferson Rd
Julie Ln
Hall Rd
Dalton Rd
Woodsmoke Rd
Kathryn Loop
Kaylin Dr
Pine Grove Rd
Baker Rd
3276
Hill Rd
Sunday Rd
Lesa Ln
Middleton Rd
Library Rd
Curtis Cir
Nancy Ln
Twin Oaks Rd
Stacy Ln
Williamson Rd
Memory Ln
Rylin
Douglas Rd
Rosemary Ln
Maze Ln
Cottonwood Rd
Thornton Rd
Jackie Ln
Hall Rd
Scarlett Rd
171
Dixie Swim Club Rd
Red Bluff Rd
Buena Vista
Long Rd
Mabry Ln
Nora Ln
Glenn Rd
Antha Rd
Fields Rd
Hines Rd
Jessie Lattin Rd
Unwood Ave

Legend

- LINE 1: Proposed Interchange
- LINE 2: Proposed Interchange
- LINE 3: Proposed Interchange
- LINE 4: Proposed Interchange
- LINE 5: Proposed Interchange
- LINE 6 (Preferred): Proposed Interchange
- PFO
- PSS
- PEM
- POW
- FLOODPLAIN
- FLOODWAY
- SUBBASIN

I-69 SIU 15
US 171 to I-20

Exhibit 4-1

WETLANDS AND FLOODPLAINS

Sheet 1 of 6

0 Feet 2,500

1 inch equals 2,500 feet

DOTD

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Match Line See Sheet 1 of 6

Wallace Bayou

DeSoto Parish

Caddo Parish

Wallace Lake

Bayou Pierre Subbasin

Preferred Corridor

Conceptual Interchange (Line 2, 4, 5, 6)

Line 6 (Preferred)

Conceptual Interchange (Line 1)

Conceptual Interchange (Line 3)

Line 1

Line 2

Line 3

Line 4

Line 5

Frierson Branch

Sylvest Creek

Gandy Bayou

Frierson

Rowe Rd

Red Strong Rd

Kelly Ln

Chappatel Rd

Timberline Cir

Stonewall Frierson Rd

Linwood Ave

Bethel Rd

Dave Ln

Rodeo Dr

Garnco Cir

Church Ln

Wallace Lake Rd

Bloxom Rd

Fob Ln

Page Rd

Atkins Ln

Mason Rd

Williams

Thomas Rd

Los Adais Rd

Old Oaks Riding Club

White Springs Rd

Wilson Ln

Old Church Rd

Miles Ln

Red Bluff Rd

Old Mansfield Case Ln

Thames Ln

Bethel Rd

Kansas City Southern Railway

Legend

- LINE 1: Proposed Interchange
- LINE 2: Proposed Interchange
- LINE 3: Proposed Interchange
- LINE 4: Proposed Interchange
- LINE 5: Proposed Interchange
- LINE 6 (Preferred): Proposed Interchange
- PFO
- PSS
- PEM
- POW
- FLOODPLAIN
- FLOODWAY
- SUBBASIN

I-69, SIU 15
US 171 to I-20

Exhibit 4-1

WETLANDS AND FLOODPLAINS

Sheet 2 of 6

0 2,500 Feet

1 inch equals 2,500 feet

DOTD

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Wallace Lake
Caddo Parish
DeSoto Parish
Circle Six Rd
Wallace Lake Dam Rd
Kelly Bayou
Line 6 (Preferred) & Line 3
Naylor
Robson Rd
Relocated Road (Line 1, 3, 6)
Conceptual Interchange (Line 1, 3, 6)
Port of Shreveport - Bossier
Union Pacific Railroad
Francis Bickham Blvd
Red River
Middle Red-Coushatta Subbasin
Line 1
Bayou Pierre
Preferred Corridor
Chris Rd
Gayles Levee Rd
Gayles
Wallace Bayou
Frierson Rd
Red Bluff Dr
Chico Bayou
Bayou Pierre Subbasin
Bossier Parish
Caddo Parish
175
Match Line See Sheet 2 of 6
Match Line See Sheet 4 of 6
White Springs Rd
Line 5
White Rd
Nadia Ct
Warren Pl
Wilson Ln
Ellerbe Rd
Line 4
Line 2
Pascagoula Bayou
Conceptual Interchange (Line 4)
Conceptual Interchange (Line 2, 5)
Eli Rd
Bunker Rd
1

Legend

- LINE 1: Proposed Interchange
- LINE 2: Proposed Interchange
- LINE 3: Proposed Interchange
- LINE 4: Proposed Interchange
- LINE 5: Proposed Interchange
- LINE 6 (Preferred): Proposed Interchange
- PFO
- PSS
- PEM
- POW
- FLOODPLAIN
- FLOODWAY
- SUBBASIN

I-69, SIU 15
US 171 to I-20

Exhibit 4-1

WETLANDS AND FLOODPLAINS

Sheet 3 of 6

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1 inch equals 2,500 feet

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Match Line See Sheet 3 of 6

Match Line See Sheet 5 of 6

Conceptual Interchange (Line 3)

Conceptual Interchange (Line 1, 6)

Conceptual Interchange (Line 2, 5)

Conceptual Interchange (Line 4)

Relocated Road (Line 1,6)

Relocated Road (Line 3)

Line 1

Line 2 & Line 5

Line 3

Line 4

Line 6 (Preferred)

Preferred Corridor

Walson Lake

Middle Red-Coushatta Subbasin

Old River Lake

Half Moon Lake

Red Chute Subbasin

Red Chute Bayou

Honey Lake

Flat River

Stumpy Lake

Raft Bayou

Red River

71

527

Ash Point Rd

Gamble Rd

Ranchtown Rd

Wills Rd

Fern Rd

Cedar St

Dumphy Ln

Goat Hill Rd

Pine Hill Rd

Ebenezer Rd

Joyner

Joyner Ln

Jamerson Rd

Chilman Rd

Longhorn Rd

Red Chute Ln

Capks Sligo Rd

Jack Cade Rd

Leger St

Old Hwy 71

Oil Field Rd

Hopewell Rd

Highway 157

Smith Rd

Island Rd

Elson Rd

Mulberry Ln

Trueheart

Hogan Rd

Tilsley Estate Dr

Kansas City Southern Railway

Legend

- LINE 1 — Proposed Interchange
- LINE 2 — Proposed Interchange
- LINE 3 — Proposed Interchange
- LINE 4 — Proposed Interchange
- LINE 5 — Proposed Interchange
- LINE 6 (Preferred) — Proposed Interchange
- PFO
- PSS
- PEM
- POW
- FLOODPLAIN
- FLOODWAY
- SUBBASIN

I-69, SIU 15
US 171 to I-20

Exhibit 4-1

WETLANDS AND FLOODPLAINS

Sheet 4 of 6

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1 inch equals 2,500 feet

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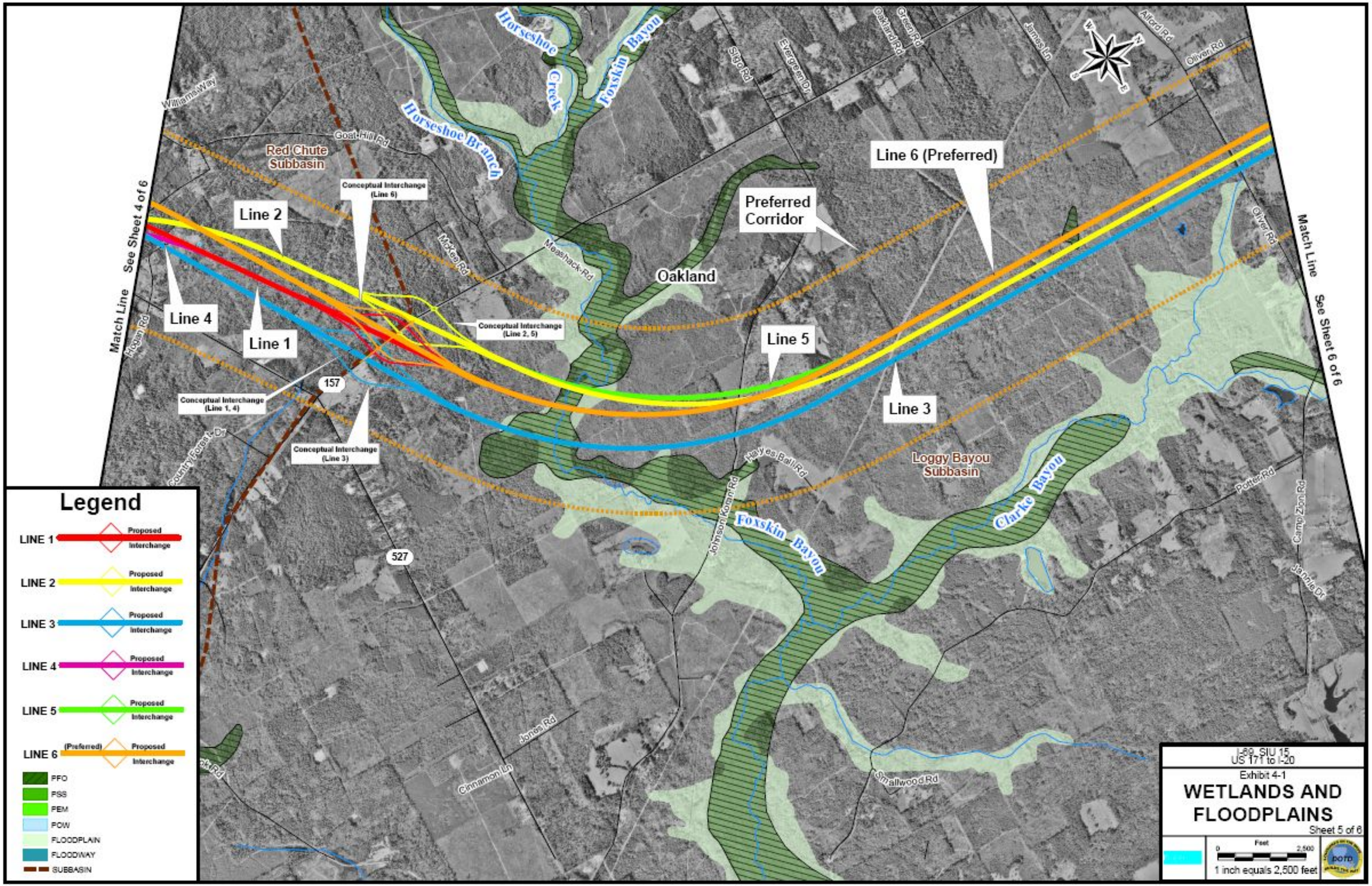
Horseshoe Creek
Foxskin Bayou
Horseshoe Branch
Red Chute Subbasin
Oakland
Loggy Bayou Subbasin
Clarke Bayou
Foxskin Bayou
Line 1
Line 2
Line 3
Line 4
Line 5
Line 6 (Preferred)
Preferred Corridor
Conceptual Interchange (Line 6)
Conceptual Interchange (Line 2, 5)
Conceptual Interchange (Line 1, 4)
Conceptual Interchange (Line 3)
Match Line See Sheet 4 of 6
Match Line See Sheet 6 of 6
157
527
Goat Hill Rd
Meashack Rd
Hayes Bath Rd
Johnson Korman Rd
Jones Rd
Cinnamon Ln
Smallwood Rd
Oliver Rd
Alford Rd
Porter Rd
Camp Zion Rd
Jamie Dr
Legend
LINE 1 Proposed Interchange
LINE 2 Proposed Interchange
LINE 3 Proposed Interchange
LINE 4 Proposed Interchange
LINE 5 Proposed Interchange
LINE 6 (Preferred) Proposed Interchange
PFO
PSS
PEM
POW
FLOODPLAIN
FLOODWAY
SUBBASIN
I-69, SIU 15
US 171 to I-20
Exhibit 4-1
WETLANDS AND FLOODPLAINS
Sheet 5 of 6
Feet
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1 inch equals 2,500 feet
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Match Line See Sheet 5 of 6

Red Chute Subbasin

Haughton

Loggy Bayou Subbasin

Louisiana Army Ammunition Plant

Clarke Bayou

Caney Branch

I-69 SIU 15

I-69 SIU 14

Line 1

Line 2

Line 3

Line 4

Line 5

Line 6 (Preferred) & Line 5

Preferred Corridor

Conceptual Interchange (Line 2, 3, 5, 6)

Conceptual Interchange (Line 1, 4)

Kansas City Southern Railway

Cherry St

Myrtle St

Trail End

Evangeline Ln

Timberline Ln

Robbin Ln

McSwain Dr

Oliver Rd

Camp Zion Rd

Debbie St

Cedar St

Poplar St

Freedom St

Allentown Rd

McMillan Rd

Hickory Nut Ln

Chestnut Ln

Jones Rd

Shootout Lane

Bois D'

Owl Ln

Pearl Ln

Maryland Dr

Academy Ln

Burton Ln

Fox Creek

Jackson Ave

Lincoln Ave

Haynes Rd

Brelsford Rd

Hazel St

Loyd Ln

Covington Rd

Princeton Rd

Bodcau Rd

McCoy Ln

Gilly Rd

Gilbert Ln

157

614

3227

20

164

79

80

Legend

- LINE 1: Proposed Interchange
- LINE 2: Proposed Interchange
- LINE 3: Proposed Interchange
- LINE 4: Proposed Interchange
- LINE 5: Proposed Interchange
- LINE 6 (Preferred): Proposed Interchange
- PFO
- PSS
- PEM
- POW
- FLOODPLAIN
- FLOODWAY
- SUBBASIN

I-69 SIU 15
US 171 to I-20

Exhibit 4-1

WETLANDS AND FLOODPLAINS

Sheet 6 of 6

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Table 4-7
PROPOSED BRIDGE AND CULVERT LOCATIONS

Watercourse	Alignment					
	Line 1	Line 2	Line 3	Line 4	Line 5	Line 6 / Preferred
Brushy Bayou	Culvert	Culvert	Culvert	Culvert	Culvert	Culvert
Frierson Branch	Culvert	Culvert	Culvert	Culvert	Culvert	Culvert
Gandy Bayou	Culvert	Culvert	Culvert	Culvert	Culvert	Culvert
Wallace Bayou	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge
Chico Bayou	Bridge	-	Bridge	-	-	Bridge
Bayou Pierre	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge
Red River	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge
Flat River	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge
Red Chute Bayou	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge
Foxskin Bayou	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge
Clarke Bayou	Bridge	Bridge	Bridge	Bridge	Bridge	Bridge

Source: Michael Baker Jr., Inc.

Construction Impacts

In general, construction activities would include removal of existing vegetation during clearing and grubbing that would expose soils adjacent to bayou crossings and within the right-of-way limits. As a result, a temporary increase in stream sedimentation could occur due to stormwater runoff and would be greatest in the immediate vicinity of the crossings.

Suspended solids could adversely impact both aquatic invertebrates (aquatic insects, mussels, zooplankton) and fishes by altering the existing substrate, reducing light penetration and in-stream photosynthesis, reducing dissolved oxygen, and increasing biological oxygen demand within the water column. Elevated suspended sediment concentrations could cause mortality in adult fish by clogging the gill filaments and preventing normal water circulation and aeration of blood. In addition, excess sedimentation could disrupt species productivity by smothering spawning areas, reducing egg viability, and preventing the emergence of fry.

Potential construction impacts to surface water quality would be non-alignment specific and could occur regardless of the alternative selected. All alignments would cross the same soils types and associated slopes adjacent to impacted streams. The substrate within stream segments crossed is nearly identical from location to location. Impacts from any of the alignments would be temporary in nature and would be minimized through site specific erosion and sedimentation control measures at all stream or bayou crossings.

Secondary or Operational Impacts

The operation and maintenance of a highway would produce additional sources of surface water pollutants. During highway operation, sources of potential pollutants include vehicles (heavy metals such as copper, lead, and zinc from tire and brake wear, motor oil additives, and vehicle rust) and roadway maintenance practices such as sanding, deicing, and application of herbicides on right-of-way. However, the mild winter climate throughout the Study Area would limit the use of deicing materials and herbicides have not been found to be significant pollutants in highway runoff (Maestri et. al., 1988).

The rate of deposition and the subsequent magnitude of these pollutants in highway runoff are site-specific and are affected by traffic volumes, highway design, maintenance activities, surrounding land use, climate, and accidental spills.

The primary mechanism for removal of highway pollutants from the road surface is through stormwater runoff. Highway construction would increase the impervious surface in the watershed and would generate additional runoff to receiving streams. The affects of highway runoff on streams are variable and dependent on the length of time since the last storm event, the quantity of stormwater runoff delivered to the stream, volume of flow in the stream, the duration of the storm event, and traffic volume (Barrett et al. 1993). Highway runoff may adversely affect the water quality through short-term loadings associated with storm events and through chronic effects as a result of long-term accumulation and exposure.

Research indicates that runoff from rural highways would generate few substantial impacts with average daily traffic (ADT) of less than 30,000 vehicles and that toxic effects are limited to urban facilities with ADT's exceeding 50,000 vehicles per day (Maestri et al. 1988). Based on the predicted ADT of approximately 11,000 for the proposed highway, no substantial impacts to water quality would be expected due to highway runoff.

Hazardous or Toxic Spills

The potential for a single event pollution discharge into the receiving waters during construction or operation of the proposed highway could impact area streams. In the event of a spill, all releases must be reported to the Emergency Response Commission through the Transportation and Environmental Safety section of the State Police using the Hazardous Materials Hotline. Depending on the nature of the material and location of the spill, other agencies such as the LADEQ may need to be notified.

Stormwater Runoff

Avoidance of crossing surface water resources is not possible within the Study Area. The developed highway alignments run roughly west to east while the existing drainage patterns run mainly north to south. The following mitigation measures would be

implemented as part of the design and construction of this project to reduce impacts resulting from stormwater runoff. These measures would include:

- ❑ Implementation of a LADEQ approved Erosion and Sedimentation Control Plan
- ❑ Use of properly sized and engineered culverts for stream crossings to minimize impacts attributed to flood height and flood duration
- ❑ Construction of detention treatment facilities where necessary
- ❑ Perpendicular stream crossings where practicable
- ❑ Scheduling construction activities to minimize exposed areas and duration of exposure
- ❑ Prompt re-vegetation of all disturbed areas
- ❑ Minimize duration of in-stream work by heavy equipment
- ❑ Control of runoff within the right-of-way limits using temporary stormwater management ponds before discharging into receiving streams
- ❑ Use of gentle slopes and wide shallow channels for grassed swales to remove pollutants through filtration, settling, and infiltration
- ❑ Designation of impervious areas for construction equipment, vehicle storage, and fuel to minimize accidental spills.

4.6.2 Groundwater Resources

The construction of the proposed highway and subsequent stormwater runoff would have minimal impacts on groundwater quality. Construction would increase the amount of impervious cover within the local watersheds, which would reduce the amount of infiltration to recharge underlying aquifers. However, because of the remaining amount of undeveloped land available for groundwater recharge, the change in land use associated with the proposed project would have a negligible effect on recharge.

Highway stormwater runoff could provide a potential source of pollutants to the groundwater system. However, through the implementation of a properly designed erosion and sedimentation control plan, minimal impact to groundwater resources would be anticipated.

The No-Action alternative would not impact groundwater resources.

4.6.3 Public Water Supply

All Lines cross two Wellhead Protection Areas (WHPA) designated for the Town of Haughton water supply system while Line 1 crosses three. Additionally, all Lines would cross a WHPA designated for the Village Water System at the interchange at I-20. The Village Water System provides a water supply for residents that live along U.S. 80. Avoidance of these WHPA's is not possible at this location due to the narrow corridor

between the community of Haughton to the west and the Louisiana Army Ammunition Plant to the east. Potential impacts would be minimized during construction activities by storing fuels, other similar materials, and construction vehicles and equipment away from the WHPA.

The No-Action alternative would not impact public water supplies.

4.7 FLOODPLAINS

A floodplain evaluation was conducted in accordance with EO 11988, "Floodplain Management", 23 CFR 650, Subpart A, "Location and Hydraulic Design of Encroachments on Floodplains", and US DOT 5650.2, "Floodplain Management and Protection". The location of 100-year floodplains for creeks and bayous throughout the Study Area, as identified on Flood Insurance Rate Maps, are shown on Exhibit 4-1.

4.7.1 Floodplain Impacts

Table 4-8 presents a comparison of impacts by alignment. Line 5 would have the greatest impact on floodplains, while the Line 6 (Preferred Alignment) would have the least. The greatest floodplain impacts would be associated with Red River and would be similar for all alignments. All alignments would have similar smaller floodplain impacts associated with perennial and intermittent stream crossings.

Table 4-8
FLOODPLAIN IMPACTS

Alignment	Acres
No-Action	0
Line 1	280.7
Line 2	290.4
Line 3	271.6
Line 4	298.0
Line 5	292.2
Line 6 (Preferred)	268.7

Source: Michael Baker Jr., Inc.

The No-Action alternative could result in future floodplain impacts as minor safety improvements and additional widening or passing lane projects are implemented within the Study Area. All future projects will include measures to minimize floodplain impacts to the extent possible.

4.7.2 Floodway Impacts

Line 2, Line 4, and Line 5 would cross floodways associated with the Red Chute Bayou. Avoidance is not practicable at this location due to the expansive nature of the floodway to the north and south. Line 1, Line 3, and Line 6 (Preferred Alignment) would not impact any regulated floodways.

4.7.3 Secondary Floodplain Impacts

Interchanges within floodplains were analyzed for potential secondary development that could promote incompatible floodplain development. Floodplains involved were associated with Brushy Bayou and Red River. Interchange locations are shown on Exhibit 4-1.

All alignments have an interchange proposed at U.S. 171 that would encroach upon the floodplain of Brushy Bayou. Sufficient undeveloped land exists to the west of U.S. 171 outside the floodplain area that could support secondary development.

Lines 1, 3, and 6 (Preferred Alignment) would have an interchange proposed at U.S. 71 that would encroach upon the floodplain of Red River. Secondary floodplain impacts due to interchange development could occur at this location.

Lines 2, 4, and 5 would have an interchange proposed at U.S. 71 slightly north of Old Field Road. Secondary floodplain impacts due to interchange development could occur at this location.

4.7.4 Floodplain and Floodway Mitigation

Detailed hydraulic studies will be performed during the final design of the Project to determine any changes in flood elevations due to construction. DOTD and FHWA will review these studies to confirm that adequate measures have been taken to insure that floodplain encroachment does not increase the risk of flooding to adjacent properties.

4.8 WETLANDS

4.8.1 Methodology

Potential wetland systems were initially identified using color infrared aerial photography and U.S. Department of Agriculture Soils Survey mapping. Identified wetlands were entered into the Project GIS as part of the environmental inventory conducted during the Corridor Study phase of the project. This information was overlaid on USDA soils mapping and project aerial photography to aide in field verification of potential wetland impacts.

All wetlands identified within the Preferred Corridor were evaluated in accordance with Executive Order 11990 entitled "Protection of Wetlands". Due to the relative number and spatial distribution patterns of wetland communities, as well as a thorough consideration of other environmental concerns including existing topography, residential structures and communities, a practicable alignment that avoids all wetlands is not possible within the Preferred Corridor. However, throughout the development of all alignments, wetland impacts were minimized to the greatest extent possible.

Prior to the wetland field investigation, Vicksburg District COE regulatory and enforcement personnel were contacted to discuss important considerations regarding hydric soils within the Red River floodplain. Any areas exhibiting hydric vegetation and positive hydrological indicators but having red parent material soils would be reviewed with appropriate COE personnel prior to confirming wetland status.

The NRCS offices in Caddo, Bossier and DeSoto parishes were contacted to obtain information on farmed and prior converted wetlands. Information on farmed wetlands was not available as recent

enforcement of existing privacy laws prevents this information from being distributed to the public. However, based on the wetlands field study, the only areas of concern would be between U.S. 71 and the Red River and LA 1 and Wallace Bayou. A review of historic aerial photography indicates that these farm tracts were in agricultural use prior to 1980 and would be considered prior converted if positive wetland conditions were once present.

Using the information as described above, wetlands within the Preferred Corridor were field verified (where reasonably accessible and where property owner permission was granted) using methods outlined in the COE Wetlands Delineation Manual (COE Manual, January 1987). Where access was limited, verification of wetlands was based on aerial photography and soil survey information. The COE has been involved at all stages of the project development. Wetland delineation methodology and boundary determinations were reviewed and approved by the COE during a July 19, 2003 field review. Principle functions and values such as floodflow alteration, wildlife habitat, and recreational value were identified and assessed for each wetland system.

A draft Section 404 permit application for the Selected Alignment will be included in the Final Environmental Impact Statement.

Continuing coordination between the COE and the DOTD will assure that all regulatory concerns are addressed. During the final design process continued efforts will be made to further avoid and/or minimize wetland impacts through consideration of design alternatives.

4.8.2 Wetland Impacts and Alternatives Analysis

Wetland impacts are presented in Table 4-9 and are shown on Exhibit 4-1 for impacts occurring within each alignment's construction limits. Because of the spatial distribution and linear nature of many wetland systems as well as consideration of other environmental concerns such as topography, residential structures, and communities a practical alignment that avoids all wetlands is not possible for any alignment.

Table 4-9
TOTAL WETLAND IMPACTS BY HABITAT TYPE

Alignment	Forested (ac)	Scrub/ Shrub (ac)	Emergent (ac)	Total (ac)
No-Action	0	0	0	0
Line 1	49.1	1.9	0.2	51.2
Line 2	42.9	3.3	1.7	47.9
Line 3	53.5	1.5	0.2	55.2
Line 4	53.9	3.2	1.1	58.2
Line 5	42.0	2.9	1.8	46.7
Line 6 (Preferred)	41.2	1.5	0.2	42.9

Source: Michael Baker Jr., Inc.

All alignments would impact similar wetland resources except within the Red River floodplain generally located between Wallace Bayou and Red Chute Bayou. Line 4 would have the greatest wetland impacts (58.2 ac) while Line 6 (Preferred Alignment) would have the least impact (42.9 ac). The majority of wetland impacts would be to

palustrine forested wetlands (PFO) adjacent to area streams and bayous while some impacts occur to palustrine scrub-shrub (PSS) and palustrine emergent (PEM) systems. Early wetland identification allowed for avoidance and minimization of impacts of major wetland sites very early in the alignment development process. This approach limited impacts primarily to linear wetland systems that could not be avoided by any alternative.

Wetland Impacts by Subbasin

All alignments are located within four subbasins as defined by the U.S. Geologic Survey, Bayou Pierre, Middle Red-Coushatta, Red Chute and Loggy Bayou. Table 4-10 presents the wetland impacts within each subbasin. The Bayou Pierre subbasin includes Brushy Bayou, Wallace Bayou, Chico Bayou, Bayou Pierre, Frierson Branch, and Gandy Bayou. The Red Chute subbasin includes the Flat River and Red Chute Bayou. The Loggy Bayou subbasin includes Foxskin Bayou and Clarke Bayou. The Middle Red-Coushatta subbasin includes the Red River. There are no wetland impacts associated with the Middle Red-Coushatta subbasin because the bridge over the Red River will span from levee to levee to reduce impacts from fill material to the wetlands and floodplains associated with the river system.

Table 4-10
WETLAND IMPACTS BY SUBBASIN

Alignment	Bayou Pierre (ac)	Middle Red - Coushatta (ac)	Red Chute (ac)	Loggy Bayou (ac)	Total (ac)
No-Action	0	0	0	0	0
Line 1	18.5	0	1.7	31.0	51.2
Line 2	15.46.8	0	11.6	20.9	47.9
Line 3	24.2	0	0.9	30.1	55.2
Line 4	16.9	0	14.6	26.7	58.2
Line 5	12.7	0	11.6	22.4	46.7
Line 6 (Preferred)	18.9	0	1.7	22.3	42.9

Source: Michael Baker Jr., Inc.

Construction related impacts could include erosion and sediment deposition, and altering water regimes and water quality. The majority of these impacts are temporary in nature and their severity would be mitigated during construction through implementation of the following:

- ❑ Wetlands outside the construction limits will not be used for construction support activities (borrow sites, waste sites, storage, parking access, etc.) unless the contractor obtains 404 permits from the Corps of Engineers

- ❑ Clearing of wetland vegetation will be limited to the minimum required for job completion
- ❑ Coordination with the contractor to ensure that all appropriate measures will be taken to protect the water quality of adjacent wetlands through the use of straw bales, silt fencing, and seeding and mulching.

Wetland impacts could also result from the relocation of utilities (electric, gas, water and sewage transmission lines) and oil and gas wells. These issues were considered during the alignment development process. The proposed highway has been developed on new location and as such, involvement with major utilities has been minimized.

The No-Action alternative would not impact area wetlands.

4.8.3 Secondary Wetland Impacts

Secondary development at interchange locations could result in additional wetland impacts. A review of wetlands adjacent to these interchanges and the connecting roadway indicates that there is potential for additional wetland impacts created by secondary development near the I-49 interchange. At this location there are forested wetland systems associated with Sylvest Creek with dominant trees being water oak, black gum and green ash. Sylvest Creek and the associated wetlands are located generally more than 400 feet from existing I-49 but could be impacted by future development. However, it should be noted that there are significant areas of uplands adjacent to this wetland system that are closer to I-49 and would be better building sites and require less permitting and are therefore more desirable locations for development.

Studies have found that the majority of interchange development occurs within 0.5 miles of the interchange (Hartgen and Kim 1998). With the exception of the I-49 interchange, no wetlands occur along existing roadway within 0.5 miles of the proposed interchanges, and sufficient upland areas exist to accommodate potential secondary development. Development and subsequent impacts of any wetlands would be under the jurisdiction of the COE and other permitting agencies and as such, would require an Alternatives Analysis documenting avoidance and minimization efforts and a mitigation plan if appropriate.

4.8.4 Wetland Mitigation

Wetland area lost due to construction of the proposed highway would be replaced through mitigation activities. Coordination with the COE is ongoing. Jurisdictional wetlands would be replaced at a ratio to be determined by application of an appropriate assessment methodology for compensatory mitigation. Final mitigation ratios and requirements will be determined during an evaluation of the project pursuant to Section 404 of the Clean Water Act. This evaluation process will take place after issuance of the Record of Decision.

4.9 NATURAL COMMUNITIES

Impacts to terrestrial and aquatic communities would primarily result from the conversion of existing land to highway right-of-way (see Table 4-11). Land conversion impacts for each alignment were assessed using color infrared aerial photography and GIS to determine the extent of impact to five broad natural communities. These communities are described in Section 3.

Table 4-11
NATURAL COMMUNITIES

Alignment	Pine Forest (ac)	Pine/Oak Forest (ac)	Bottomland Hardwoods (ac)	Pasture/Cropland (ac)	Wetlands (ac)
No-Action	0	0	0	0	0
Line 1	729.6	364.6	59.0	547.4	51.2
Line 2	726.9	302.6	73.0	503.2	47.9
Line 3	704.2	381.3	58.8	569.3	55.2
Line 4	780.0	300.0	50.7	483.4	58.2
Line 5	838.0	266.8	33.3	497.6	46.7
Line 6 (Preferred)	784.2	343.3	62.0	532.1	42.9

Source: Michael Baker Jr., Inc.

Impacts are based on the area within each alignment's construction limits. Wetland community impacts are described in detail in Section 4.8.

Impacts are generally similar for all Lines. The pasture/cropland and pine forest would be the community types most affected by all alignments. This is consistent with the dominant vegetation found throughout the Study Area.

Line 3 would impact the greatest amount of pasture and cropland while Line 5 would impact the greatest amount of pine forest.

Aquatic community impacts would be limited to the conversion and filling of several isolated ponds, primarily used for cattle production, and increased levels of sedimentation at stream crossing areas during construction. As previously described, increased sedimentation could adversely impact both aquatic invertebrates and fishes and cause temporary habitat degradation for a number of species.

No terrestrial or aquatic species populations would be eliminated due to construction of any of the alignments. Some individual species mortality would occur to less mobile species, such as reptiles and amphibians, during initial construction

activities. Construction of the alignments would convert existing habitat communities to early successional grassy or shrubby vegetation commonly associated with highway right-of-way. Potential wildlife impacts would likely follow those observed on other similar existing highways. Researchers have found that construction and operation of highways does not adversely affect the distribution and abundance of the majority of bird and mammal species, including game species (Michael 1975; Burke and Sherburne 1982; Adams and Geis 1982).

Many wildlife species would be able to utilize the new habitat created by the right-of-way and its associated edge and could be used by a variety of wildlife species including cottontail rabbits, white-tailed deer, red fox, coyotes, a variety of small mammals, and a number of bird species. The above researchers found that while species composition changed along the newly formed edge habitat, species adapted to more remote forested environments continued to use the adjacent forest community.

No community types would be extensively impacted based on their overall availability within the Study Area. Wildlife species that are unable to adapt to the limited right-of-way environment, could relocate to suitable surrounding habitats. However, most species found within the Study Area display a broad habitat distribution and are not restricted to any particular habitat types.

The No-Action alternative would have minimal impacts on terrestrial and aquatic communities.

Secondary Impacts

The most visible effect of roads on wildlife is animal mortality resulting from collisions with motor vehicles. For most wildlife species, the death of a few individuals does not directly impact the overall survival of the species throughout its range. In general, most wildlife species found within the Study Area are broadly distributed across Northwest Louisiana. It is unlikely that highway mortality would pose a serious threat to the continued existence of any of these species. Several highway related wildlife mortality studies have concluded that roads appeared to act in a density-dependent manner. Species killed in greatest numbers were those with high population densities attracted to right-of-way habitat, such as edge-associated birds and small/medium sized mammals (Adams and Geis 1982; Michael 1975).

4.10 THREATENED AND ENDANGERED SPECIES

Coordination with the FWS and the LNHP has occurred throughout project development process with respect to the location of and potential habitat for the endangered Interior least tern and Red-cockaded woodpecker. The Preferred Corridor avoided involvement with previously recorded locations of these known species.

The presence or absence of federally listed, threatened and endangered species along Line 6 (Preferred Alignment) will be confirmed after additional surveys have been conducted (see Section 4.10.1). At a January 25, 2005 meeting, the DOTD, the FHWA, and the FWS agreed that potential habitat surveys for these endangered species would be conducted along the Preferred Alignment prior to the issuance of the Final Environmental Impact Statement.

The FWS Guidelines for Surveys to Assess Potential Project Impacts to Red-cockaded Woodpecker Nesting and/or Foraging Habitat (FWS 1993) specify that surveys should be conducted within ½-mile of the Project to identify potential nesting and suitable foraging habitat. The FWS defines suitable foraging habitat as pine or pine/hardwood stands of forest, woodland, or savannah in which 50 percent or more of the dominant trees are pines and the dominant pine trees are generally 30 years in age or older.

Pine, pine/oak, and oak forest stands were identified using color infrared aerial photography. Forest stands within ½-mile of each of the alignments are shown in Table 4-12. Line 5 has the greatest amount of pine and pine/oak forest, while Line 3 has the least.

LNHP identified 11 site locations of special concern within the Study Area (see Section 3). No locations of species of special concern or habitat would be impacted by any of the alignments.

Table 4-12
FOREST STANDS WITHIN ½-MILE OF THE ALIGNMENTS

Alignment	Oak Forest (ac)	Pine/Oak Forest (ac)	Pine Forest (ac)	Pine + Pine/Oak Forest (ac)
No-Action	0	0	0	0
Line 1	1,678.3	2,782.8	10,807.0	13,589.8
Line 2	1,695.5	2,555.4	11,198.9	13,754.3
Line 3	1,669.1	2,929.4	10,861.2	13,790.6
Line 4	1,664.9	2,625.9	10,979.2	13,605.1
Line 5	1,825.2	2,508.1	11,424.8	13,932.9
Line 6 (Preferred)	1,684.5	2,778.6	11,017.5	13,796.1

Source: Michael Baker Jr., Inc.

No secondary impacts to state species of special concern would be anticipated from construction or continued use of the proposed highway.

The No-Action alternative could impact several identified locations of state species of special concern within the Study Area that are adjacent to area roadways by routine state or parish maintenance of shoulders and right-of-ways.

4.10.1 Environmental Commitments

The DOTD and the FHWA will conduct biological assessments for the Interior least tern (*Sterna antillarum*) and Red-cockaded woodpecker

(*Picoides borealis)* and will complete the Endangered Species Act (ESA) Section 7 consultations with the U.S. Fish and Wildlife Service prior to the issuance of the Final Environmental Impact Statement. The Record of Decision will address the status of the ESA Section 7 consultation.

4.11 FARMLAND SOILS

All alignments would impact soils identified as prime and statewide or locally important farmland (see Table 4-13). A Farmland Conversion Impact Rating Form (Form AD-1006) was completed and forwarded to the NRCS State office in Alexandria for their review and completion. Completed forms are included in the Appendix.

Table 4-13
FARMLAND IMPACTS

Alignment	Prime (ac)	Statewide Important (ac)
No-Action	0	0
Line 1	1,143	202
Line 2	1,086	218
Line 3	1,135	203
Line 4	1,111	221
Line 5	1,090	217
Line 6 (Preferred)	1,130	205

Source: Michael Baker Jr., Inc.

The NRCS office has reviewed the alignments to determine whether any are candidates for protection measures. The Farmland Protection Policy Act (FPPA) states that if the site assessment for any project alternative received a score of 160 points or higher, then the site should receive consideration for farmland protection. The NRCS has determined that none of the alternative exceed 160 points or higher in Desoto and Bossier Parish. In Caddo Parish, Line 1 exceeds 160 points by 15 points, Line 2, Line 4, and Line 5 by 11 points, and Line 3 and Line 6 (Preferred Alignment) by 16 points.

Line 1 would impact the greatest amount of prime farmland soils. Line 4 would impact the greatest amount of statewide important soils. Impacts to farmland soils in active agricultural production were minimized to the extent practicable.

Due to the extensive agricultural activity in the Study Area, there is no practicable highway alternative that would avoid impacts to this resource. The Preferred Corridor and the subsequent Preferred Alignment were developed to minimize impacts to productive farmland soils.

Secondary development at interchanges may result in additional impacts to farmland soils. These impacts cannot be quantified at this time.

The No-Action alternative would not impact farmlands.

4.12 CULTURAL RESOURCES

The identification and assessment of potential cultural resource impacts within the Study Area were based a records search conducted at the

Louisiana Division of Archaeology and the Louisiana Division of Historic Preservation. One hundred seventy-two previously recorded cultural resources were recorded within the Study Area (see Section 3). Nineteen of these previously recorded cultural resources are located within the Preferred Corridor.

An architectural survey conducted within the Preferred Corridor identified 136 structures that were at least 50 years old. Photographs were taken of each structure and Louisiana Historic Resource Inventory forms were completed for each structure. Four of the structures (Louisiana Historic Resource Inventory ID numbers 08-03275, 08-03277, 08-03278, and 08-03279) comprise a potentially eligible historic district of the Palmetto Plantation. The remaining 132 structures are recommended ineligible for listing in the NRHP and are therefore not considered historic properties. The Louisiana Division of Historic Preservation has not yet had the opportunity to comment on these recommendations. The architectural survey will be included with the Phase I Cultural Resources Survey that will be conducted on the Selected Alignment.

All alignments, except Line 1, would impact previously recorded archaeological sites (see Table 4-14).

Lines 2 and 5 would impact Site 16BO86, a possible Caddoan Farmstead identified by a surface scatter of prehistoric lithics and sherds. Artifacts recorded at 16BO86 include three chert flakes and 4 plain sherds of pottery. The site has an unknown NRHP eligibility status and would require additional testing in order to determine its final NRHP eligibility status.

Lines 3, 5, and 6 (Preferred Alignment) would impact Site 16BO196. Site 16BO196 is a possible late nineteenth- to early twentieth-century farmstead that was identified by shovel testing. Artifacts recovered from 16BO196 include window glass, barrel hoops, and stoneware. The site is considered potentially eligible for listing in the NRHP, and additional testing would be required to determine its final NRHP eligibility status.

Line 4 would impact Site 16DS353, a possible late Paleoindian to early Archaic upland camp that was identified by a scatter of lithic material uncovered during construction of an oil well pad. Artifacts recovered from 16DS353 include three San Patrice projectile points, flake scrapers, and other chipping debris. The site has an unknown NRHP eligibility status and would require additional testing in order to determine its final NRHP eligibility status.

In addition, prehistoric archaeological probability areas were developed to determine, in a broad sense, the likelihood of encountering buried resources. Areas of high, medium and low probability within the Red River Alluvial Valley and upland areas were developed using data such as

terrain characteristics, proximity to water, soil types, locations of previously recorded sites, historic mapping and other documentation as appropriate.

All alignments would potentially impact unrecorded archaeological sites. Lines 1 and 3 would have the greatest involvement with areas of high/medium probability for prehistoric archaeological resources, both within the Red River Alluvial Valley and overall. Lines 2 and 5 would have the least (see Table 4-14).

Table 4-14
SUMMARY OF CULTURAL RESOURCES WITHIN EACH ALIGNMENT

Alignment	Archaeological Resources			Prehistoric Archaeology Probability Areas			Historic Architecture		
	NRHP Listed Sites	Recorded Potentially Eligible Sites	Recorded Ineligible Sites	High	Medium	Low	Eligible	Recommended Potentially Eligible	Recommended Not Eligible
				ac	ac	ac			
	#	#	#	RRAV	RRAV	RRAV			
	Caddoan	Caddoan	Caddoan	Upland	Upland	Upland			
	0 0	0 0	0 0	0 0	0 0	0 0	0	0	0
Line 1	0 0	0 0	0 0	26.6 26.7	242.9 45.6	124.6 1,180.5	0	0	8
Line 2	0 0	1 1	0 0	27.1 23.5	188.1 62.1	157.2 1,158.0	0	0	3
Line 3	0 0	1 0	0 0	30.5 31.1	230.5 52.0	123.9 1,207.0	0	0	6
Line 4	0 0	1 0	0 0	24.5 24.0	206.8 55.8	150.6 1,165.2	0	0	4
Line 5	0 0	2 1	0 0	27.1 25.7	188.0 63.1	157.3 1,176.1	0	0	2
Line 6 (Preferred)	0 0	1 0	0 0	25.3 27.8	231.5 47.3	122.0 1,209.3	0	0	7

Source: Louisiana Division of Archaeology, Michael Baker Jr., Inc., Gulf South Research Corporation
RRAV – Red River Alluvial Valley Upland – Upland Areas Caddoan – Sites with Caddoan Components

An intensive Phase I Cultural Resources Survey will be conducted on the Selected Alignment. Terraces, floodplains, and bayou and stream crossings typically are high probability areas for cultural material. All sites located within the Selected Alignment will be recorded and evaluated for their eligibility for nomination to the National Register of Historic Places. Significant sites and properties that would be adversely affected by the Project may require data recovery or other

mitigative techniques. A commitment letter identifying continuing efforts for completion of the National Historic Preservation Act of 1966, Section 106 process with respect to the Project's effect on cultural resources will be prepared by the DOTD and the FHWA, and accepted by the Louisiana State Historic Preservation Officer prior to issuance of the Record of Decision.

The No-Action alternative would not impact cultural resources within the Study Area.

4.13 AIR QUALITY

The Project is located within the Northwest Louisiana Council of Government's (the regional metropolitan Planning Organization) (MPO) planning boundaries and is in an area designated as in attainment by the Environmental Protection Agency. Attainment areas are areas that meet the National Ambient Air Quality Standards (NAAQS).

The Project is included in the MPO's Transportation Improvement Plan (TIP) and in turn the State Transportation Improvement Plan (STIP), which was found to conform to the State Implementation Plan (SIP) for air quality. Therefore, a micro-scale analysis of air quality is not warranted.

4.13.1 Air Quality Construction Impacts

Construction activities can have a short-term impact on local air quality during periods of site preparation with particulate matter, also known as fugitive dust, having the greatest impact. This impact would occur in association with excavation and earth moving, asphalt aggregate handling, heavy equipment operation, use of haul roads and wind erosion of exposed areas and material storage piles. The effect of fugitive dust would be temporary and would vary in scale depending on local weather conditions, the degree of construction activity and the nature of the construction activity.

Where fugitive dust is likely to be a problem, effective dust control measures would be required following standard roadway construction procedures. This would include minimizing exposed erodible earth areas to the extent possible, stabilizing exposed earth, periodic application of stabilizing agents (e.g. water), covering or stabilizing of stockpiled material as necessary, and the use of covered haul trucks. All abatement measures shall be in strict accordance with the Louisiana Standard Specifications of Roads and Bridges.

4.14 NOISE

A noise analysis was prepared in accordance with 23 CFR 772 and DOTD's Highway Traffic Noise Policy, which establish requirements for any proposed federal or federal-aid project. DOTD requires that highway traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials in this directive, comply with the noise standards mandated by 23 U.S.C. 109(i).

The traffic noise analysis included the following:

- ❑ Identification of existing activities, developed land, and undeveloped land which is planned, designed, and programmed;
- ❑ Determination of existing noise levels;
- ❑ Prediction of traffic noise levels;
- ❑ Determination of traffic noise impacts; and
- ❑ Examination and evaluation of alternative noise abatement measures for reducing or eliminating the noise impacts.

Sound intensity is typically presented as a sound level using the unit "decibel" (dB). The decibel is used to measure either sound power or sound pressure levels. These sound pressure levels are shown as dBA L_{eq}(h). The term dBA refers to decibels on the A-weighted scale that represents the way the human ear perceives sound. The term L_{eq} (h) refers to an equivalent of an average sound level over an hour's time period.

Table 4-15 shows the DOTD Noise Abatement Criteria (NAC) for various land use activity categories. These criteria are consistent with the FHWA NAC allowing for consideration of traffic noise impacts 1 dBA below the FHWA criteria. Noise impacts occur when the predicted traffic noise levels equal or exceed the DOTD NAC, or when the predicted traffic noise levels exceed the existing levels by 10 dBA. Noise abatement measures would be considered for these sites.

Table 4-15
DOTD NOISE ABATEMENT CRITERIA (NAC)*
HOURLY A-WEIGHTED SOUND LEVEL - DECIBELS (dBA)

Activity Category	L_{eq} (h)	Description of Activity Category
A	56 (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 area is to continue to serve its intended purpose.
B	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	71 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

*These criteria are consistent with the FHWA Noise Abatement Criteria (23 CFR 772) allowing for consideration of traffic noise impacts 1-dBA below the FHWA criteria.

Activity Category B, representative of residences, schools, churches and parks, was used as the criteria for sensitive receptors identified in this analysis. Additionally, Activity Category C receptors were also noted when businesses were part of a mixed land-use area.

4.14.1 Prediction of Traffic Noise Levels

Traffic noise calculations were performed for the design year 2030 using the FHWA Traffic Noise Model (TNM) 2.5 model. Posted speed limits were used for the vehicular speeds on the modeled roadways. Traffic data from AHTD (1995) was used to develop the predictive noise model. Additionally, the model accounted for tree shielding where dense vegetation existed based on aerial photography. Over 200 receptor sites were modeled to account for areas most likely affected by the proposed project (see Appendix).

4.14.2 Traffic Noise Impacts

Noise impacts are determined based on the degree to which the projected noise levels exceed the established noise level activity category criteria, and by how much the levels increase over the existing condition as a result of the proposed highway. Results of the noise analysis for each receptor area under all conditions modeled are included in the Appendix. The approximate receptor locations and the areas considered for further noise abatement consideration are included in the Appendix.

DOTD NAC Criteria Impacts

The number of sensitive receptors that equal or exceed the DOTD NAC for all alignments is presented in Table 4-14. No schools, parks, or business establishments were impacted under any condition. For these criteria, Line 2 and Line 4 would have the greatest number of impacts, while Line 3 would have the least. Under the No-Action alternative, noise at 4 receptors would exceed the DOTD NAC in 2030.

Substantial Increase Criteria Impacts

Table 4-16 presents the number of sensitive receptors where a substantial increase in noise would occur due to the proposed highway. For these criteria, Line 3 would have the greatest noise impact while Line 5 would have the least. No schools, parks, or businesses were impacted under any condition for these criteria. The Substantial Increase Criteria does not apply for the existing condition and was predicted to be zero for the No-Action alternative.

Exceedance of Both Criteria

In 2030, the predicted number of exceedances for both criteria would be zero for the No-Action alternative. Line 1 would have the greatest number of exceedances while Line 4 would have the least.

Total Number of Impacts

The total number and type of noise impacts is shown in Table 4-16.

Table 4-16
TRAFFIC NOISE IMPACT COMPARISON

	Existing Year	2030 Design Year No-Action	2030 Design Year Line 1	2030 Design Year Line 2	2030 Design Year Line 3	2030 Design Year Line 4	2030 Design Year Line 5	2030 Design Year Line 6 (Preferred)
Total Number of Sensitive Receptors	255	255	236	243	239	238	247	241
Sensitive Receptors Equaling or Exceeding the DOTD Noise Abatement Criteria*	3	4	4	5	2	5	4	4
Sensitive Receptors with Substantial Noise Increase Criteria **	N/A	0	39	32	47	32	31	38
Sensitive Receptors Meeting Both Criteria	N/A	0	10	6	6	5	8	9
Total Receptors Impacted	3	4	53	43	55	42	43	51

Source: Michael Baker Jr., Inc.
* DOTD NAC - 66 dBA for Category B receptors
** An increase of 10 or more dBA over the existing condition

Line 3 would have the greatest number of total noise impacts, while Line 4 would have the least.

4.14.3 Noise Abatement

Noise abatement must be considered when predicted traffic noise levels either equal or exceed the DOTD NAC, or when the predicted traffic noise levels exceed the existing levels at any sensitive receptor by 10 dBA. Noise abatement measures and procedures are fully described in the DOTD Highway Traffic Noise Policy. When noise abatement measures are considered, every effort is made to obtain noise reductions of at least 8 dBA.

Mitigation measures are not required for the existing conditions or the Design Year No-Action alternative because these measures are only analyzed for Type I highway noise impacts. The study included efforts to avoid or minimize noise impacts to sensitive receptors through alignment shifts and overall avoidance of residential areas.

General Noise Reduction Measures

Several types of noise reduction measures were considered to mitigate noise impacts of the proposed highway, including:

- ❑ Traffic management measures
- ❑ Alteration of horizontal and vertical alignments
- ❑ Acquisition of property rights for construction of noise barriers
- ❑ Noise insulation of public use or nonprofit institutional structures.
- ❑ Construction of Noise Barriers

Traffic management measures include control devices and signing for prohibiting certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits and exclusive land designations. They would be difficult to enforce.

Comparably, speed reduction was not considered an effective mitigation measure. A substantial decrease in speed would be needed to provide a noticeable sound level reduction. A 10 mph speed reduction would result in only a two-dBA decrease in sound levels.

Reasonable horizontal and vertical alignments for the proposed alignments were developed to minimize and/or avoid impacts to potentially sensitive areas to the fullest extent possible. Any significant sound level reductions at impacted locations as a result of horizontal modifications would require substantial shifts in the proposed alignment, whereby entailing additional property acquisition, require additional environmental studies, and would expose other areas to potential noise impacts from the proposed project. Vertical alignment alteration was also not considered to be a feasible noise abatement measure.

Property rights acquisition would be investigated during final design of the highway.

There are no impacted receptors qualifying for sound insulation, and abatement does not need to be investigated for interior receptors.

Noise reduction measures such as earth berms and barrier walls would provide the greatest degree of noise attenuation. A graded, vegetated earth berm that blends with the surrounding topography is one of the more aesthetically pleasing noise barriers. An earth berm may also provide slightly more attenuation (up to 3 dBA more) than a vertical barrier wall of the same height because of the better absorptive quality of the earth and ground vegetation.

A solid, acoustically opaque barrier (barrier wall) can theoretically reduce noise exposure to a property by as much as 15 to 20 dBA, although a typical reduction is approximately 5-10 dBA. The design can range from relatively simple, straight-line walls to complex designs that blend in with

local features such as terrain and neighborhood characteristics.

Both the on-site cost and the degree of noise attenuation must be considered when selecting barrier wall materials. In addition, it is unlikely that any one barrier wall type or material would be applicable in every situation; however, preliminary costs of $25/ft^2 were based on ground mounted concrete barriers.

For maximum effectiveness, barriers should be as close as possible to either the source or the receiver and should be high and long enough to adequately mitigate the site.

4.14.4 Determination of Feasibility and Reasonableness

Noise abatement considerations evaluate both feasibility and reasonableness. The feasibility of mitigating noise impacts deals primarily with quantitative elements such as topography, access points, drainage, safety, maintenance requirements, other noise sources, and whether the proposed insertion of a barrier provides minimum sound level reductions. In determining the feasibility of providing noise abatement measures, at least one receptor must receive a minimum of an 8-dBA reduction. If no receptors receive this minimum noise reduction, the abatement measure is deemed not to provide substantial noise reductions and is not feasible.

In determining reasonableness, DOTD balances the interests of the overall public good with the social, economic and environmental impacts and the costs of the noise abatement measures. On projects where noise impacts occur, DOTD considers the following:

- a sensitive receptor, whether or not impacted, must receive a 5-dBA reduction in noise levels to be counted as benefited, and
- the cost of the noise abatement measure (including the cost of real estate acquisition, construction servitude or utility relocation) must be equal to or less than $25,000 per benefited receptor.

Additional reasonableness considerations are detailed in the DOTD Highway Traffic Noise Policy.

Preliminary Noise Abatement Analysis

The regional traffic model maintained by the North Northwest Louisiana Council of Governments (Shreveport-Bossier City area Metropolitan Planning Organization (MPO)) is being expanded to include the entire Study Area. When completed, the predictive noise model will be revised, the traffic noise analysis verified, and a preliminary noise abatement analysis will be performed. The results will be included in the Final Environmental Impact Statement.

4.14.5 Analysis of Construction Noise

Construction noise is expected to have temporary impacts upon all of the receptor areas. Noise caused by construction may include ground clearing, demolition of and removal of existing structures, excavation, foundation placement, and finishing, including filling, paving, grading, and clean up. Noise at any given site would depend on the construction activity and the type of equipment being used.

Construction of the proposed highway would occur in close proximity to most of the identified receptors presented in the noise analysis. If not direct noise impacts from adjacent construction activities, indirect impacts could occur as a result of travel to and from the construction sites. Therefore, all of the analyzed areas would experience varying degrees of temporary impacts resulting from construction noise.

Abatement measures would be employed whenever possible. All noise abatement measures shall be in accordance with Section 107.15 of the Louisiana Standard Specifications of Roads and Bridges. These measures include muffling all motorized equipment, establishing haul routes away from sensitive areas, limiting the hours of operation at the sites and locating noisy stationary equipment away from sensitive areas.

4.15 HAZARDOUS MATERIALS

All alignments would impact known potential hazardous waste sites. Line 5 would impact two sites, while Lines 1, 2, 3, 4, and 6 (Preferred Alignment) would impact one. Line 6 (Preferred Alignment) would impact the far western portion of the Louisiana Army Ammunition Plant. Remedial investigations are still in progress at the plant. However, the portion of the plant property crossed by Line 6 (Preferred Alignment) adjacent to Clarke Bayou was not involved with any plant operations.

A Phase 1 Environmental Site Assessment will be conducted for the Preferred Alignment. If areas of contamination are present, appropriate measures would be taken to remediate the area prior to construction.

4.16 ENERGY

With the exception of the No-Action alternative, construction of any of the alignments would require short-term energy consumption. Construction related energy consumption would be generally based on the construction cost of the alternative. The amount of energy required for the production and placement of materials (asphalt, structures, cut, fill, etc.) during construction would be a fixed cost. Construction related energy consumption would be offset over the life of the project by the energy efficiencies gained with the use of an improved transportation facility over many decades. The Project would improve fuel efficiencies due to

higher levels of service resulting from uniform speeds, less congestion, and free flow of traffic. The operating efficiency would likely improve on most of these roads, improving levels of service, reducing travel times between destinations, and in turn reducing overall fuel consumption.

4.17 CONSTRUCTION IMPACTS

Construction activities for the proposed highway would impact the environment with most being classified as "short-term". The most common impacts associated with the construction of the proposed highway include the temporary degradation of air, noise, and water quality; temporary disruption of traffic including maintenance, control, and safety concerns; the stockpiling and disposal of construction materials; the use of borrow areas; and the construction and use of haul roads.

The temporary impacts associated with construction activities on air, noise, and water quality concerns are discussed in detail in earlier portions of Section 4. Traffic disruption should be limited to interchange construction as the entire route would be on new location. This should minimize involvement with residential and commercial areas.

Construction of the proposed highway would occur in close proximity to several single-family residences, mobile homes, and businesses. Construction impacts in these areas would be closely monitored by the DOTD.

4.18 CUMULATIVE IMPACTS

4.18.1 Methodology

Definition of Cumulative Impacts

Three types of impacts are routinely assessed for proposed federal actions and are defined by the Council on Environmental Quality (CEQ) regulations (40 CFR § 1500-1508). Direct impacts are defined as effects that are caused by the action and occur at the same place and time. Indirect impacts, also known as secondary impacts, are defined as effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth induced effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems (40 CFR § 1508.8). An example of a direct impact is the taking of a wetland within the right-of-way. An indirect impact could be the conversion of forestland or farmland adjacent to an interchange location for commercial development due to new access provided by this proposed action. Direct and indirect impacts have been previously addressed throughout this section.

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of the action when added to other past,

present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action (CFR 40 § 1508.7). Cumulative impacts include the direct and indirect impacts of a project together with the reasonable foreseeable future actions of others. The cumulative impacts that result from an action may be undetectable but can add to other disturbances and eventually lead to a measurable environmental change.

The assessment of cumulative impacts is required by the CEQ regulations and although secondary and cumulative impacts are not specifically defined or referenced in FHWA regulations for preparation of environmental impact statements (23 CFR Part 771), they have been addressed in a FHWA 1992 position paper titled "Secondary and Cumulative Impact Assessment in the Highway Impact Development Process". This paper encourages incorporation of cumulative impact issues into the highway development process in order to fulfill the NEPA mandate of environmentally sensitive decision-making.

Description of Reasonably and Foreseeable Future Actions and Time Line

One major Federal reasonably and foreseeable future action, the National I-69 Corridor, has been identified in the vicinity of the Project that could induce potential cumulative effects on the social, natural, and cultural environments. This project is subject to separate environmental analysis; their quantifiable impacts are not included in this discussion.

The National I-69 Corridor was divided into 32 viable sections of independent utility (SIU) so that each can be constructed in a reasonable time frame by the states involved. A given SIU may be in place for several years before an adjacent section is completed and open to traffic (AHTD 1999). Therefore, adjacent segments of the National I-69 Corridor are considered as reasonable and foreseeable future actions.

A NOI was issued by the FHWA in January 2004 to prepare a Tier One EIS to determine the location of an I-69/Trans-Texas Corridor. The Corridor Study includes SIU 16 of the National I-69 Corridor from U.S. Highway 171 near Stonewall in DeSoto Parish, Louisiana to U.S. Highway 59/U.S. Highway 259 near Nacogdoches in Nacogdoches County, Texas. SIU 16 lies to the south of, and connects with, the I-69 Project. After the Tier One decision has been made, the FHWA will proceed with the I-69 highway component by performing project-level studies in a Tier Two decision process. Other federal, state, and/or local agencies would pursue project decisions for the non-highway modes after the Tier One decision. This project is just beginning the environmental process.

In March 2003, a NOI was issued by FWHA to prepare an Environmental Impact Statement on a

proposal to construct Section of Independent Utility SIU 14 of the National I-69 Corridor from I-20 near the town of Haughton in Bossier Parish, Louisiana to U.S. Highway 82 near El Dorado in Union County, Arkansas. SIU 14 lies to the north of the Project. SIU 14 is currently in the alignment selection phase of study.

Geographic Limits of the Analysis

The limits of the Project are contained within the boundary of the National I-69 Corridor. Therefore, consideration of potential cumulative impacts as the result of the National I-69 Corridor and adjacent SIU's is limited to the geographic areas potentially affected by the Project when it becomes connected with, and becomes a part of the fully completed National I-69 Corridor.

4.18.2 Potential Cumulative Impacts

For any given resource within the Study Area, a cumulative impact would only potentially exist if the resource were also directly impacted by a highway alignment. Potential cumulative impacts to specific human and environmental resources within the Study Area are as discussed below.

Economics

It has been previously demonstrated (AHTD 1995, 1997) that construction of the National I-69 Corridor would provide positive economic benefits primarily derived from an increase in transportation efficiency via the movement of freight and people. An increase in efficiency would result in time savings, reduced vehicle operating costs, improved safety (lower insurance costs, reduced crashes), and improved access to other regions of the state and country. Moreover, it is estimated that such a facility would result in thousands of additional jobs and billions of dollars in wages. The completion of the National I-69 Corridor would provide markets outside the Shreveport-Bossier Metropolitan area direct access to the local economic base in addition to responding to economic concerns by providing better access to the Port of Shreveport-Bossier. The construction of the Project would additionally help to stimulate the economic growth of the region.

Land Use

The Project would likely have cumulative impacts in terms of land development. In general, more development would be expected at interchanges near larger communities and would likely decrease as the interchange location moves further from the population centers. The construction of the National I-69 Corridor, SIU 14, and the Trans-Texas Corridor will provide greater opportunity for development, which could induce cumulative impacts in these areas. This development may occur in stages as more sections of I-69 are completed. However, the potential for development would depend on the availability of undeveloped land in the area and is not necessarily due to access to the area by an interchange.

Displacements

One of the most important functions of the corridor location study is the identification of homes, churches, schools, businesses, and community centers. This process was undertaken to minimize to the greatest extent possible, impacts to the human environment. The majority of land traversed by the Project is rural consisting of pine, bottomland and hardwood forests, pastures and cropland. Denser residential areas are predominantly located near the larger population centers such as Stonewall and Haughton. Scattered residences can be found in rural areas along state and U.S. highways.

Future construction of the National I-69 Corridor, and adjacent SIU's could induce additional displacements as the synergy of these large transportation facilities in close proximity to one another serve to draw additional business and industry to the region. However, the location and quantity of such displacements cannot be determined at this time.

Noise

Cumulative impacts due to noise could occur from the construction and operation of the National I-69 Corridor and the adjacent SIU's. As these projects are completed, traffic volumes could increase in the Study Area and additional traffic related noise could be generated. However, the noise analysis found very few receptors that would experience a noise impact due to the rural setting of the Study Area. This trend would be similar for any future cumulative noise.

Environmental Justice

An environmental justice analysis (see Section 4.2) was conducted to demonstrate that the proposed action would not disproportionately impact elderly, low income or minority populations. Therefore, no cumulative negative impact is anticipated by the identified foreseeable future actions. Future benefits by all socioeconomic classes could be further realized with the completion of the National I-69 Corridor as employment opportunities expand.

Farmland, Hazardous Materials, and Cultural Resources

No cumulative impacts to farmland or hazardous materials are anticipated in the Study Area by the National I-69 Corridor or adjacent SIU's. No additional right of-way or direct farmland conversion between the project's termini (U.S 171 near Stonewall and I-20 near Haughton) would result from the future construction of these projects. Currently, a cultural resource investigation is underway for the Project and a complete assessment cannot be made at this time.

Wetlands and Floodplains

Cumulative wetland and floodplain impacts could occur near interchanges from additional development due to the construction of the National I-69 Corridor and adjacent SIU's. The availability of

these large transportation facilities in close proximity to one another could serve to draw additional business and industry to the region.

Threatened and Endangered Species

One federally listed species, the Interior least tern, has been documented within the Study Area. The Study Area also contains potential habitat for the Red-cockaded woodpecker, a federally listed species. As discussed in Section 4.10, potential habitat surveys will be conducted along the Preferred Alignment for the Interior least tern and Red-cockaded woodpecker. No assessment can be made with respect to the cumulative impact on these species at this time.

Wild and Scenic Rivers

No wild and scenic rivers are located within the Study Area. Therefore, no cumulative impacts are anticipated.

Surface Water Bodies/Water Quality

The Study Area includes portions of the Red River drainage basin. Within this basin exists intermittent and perennial streams. The operational use of additional traffic from the future construction of the National I-69 Corridor, and adjacent SIU's projects would not induce additional physical alterations to these surface water bodies. However, future additional traffic could result in cumulative impacts to surface water resources due to additional roadway related pollutants and accidental spills of hazardous materials. Roadway related pollutants are best mitigated through the use of stormwater management practices.

Natural Communities and Wildlife

Future construction of the National I-69 Corridor, and adjacent SIU's could induce additional impacts to the natural community as the synergy of these large transportation facilities in close proximity to one another serve to draw additional business and industry to the region. Cumulative impacts to aquatic species and wildlife could occur due to construction of the National I-69 Corridor and adjacent SIU's. Additional vehicles could generate more sediment for deposition in area streams. The mortality rate of wildlife could also increase, however, as outlined in Section 4.10, wildlife in the Study Area display a broad habitat distribution and are not restricted to a particular habitat type.

4.19 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Short-term impacts to the human and natural environment are anticipated by the construction of the proposed highway. Impacts to the human environment would include the relocation of families and businesses. The DOTD relocation program would minimize this inconvenience to the extent possible. Improved access within the Study Area could stimulate long-term residential and commercial growth as well as create short and long term employment opportunities.

Short-term impacts to the natural environment would include erosion and siltation of local creeks and bayous. Implementation of an approved erosion and sedimentation control plan would minimize these impacts. Long-term impacts to wetlands involve fill required for construction of the proposed highway. Successful creation or restoration of wetland habitat would mitigate for these long-term impacts. Short-term wildlife impacts would involve the disruption and displacement of species during construction. Long-term impacts would include the conversion of vegetative cover to a transportation use.

4.20 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction of the proposed highway would require a commitment of land, labor, natural resources, and financial resources. Land used for the proposed highway would be considered an irreversible commitment during the life of the facility. If a greater need arises for the use of this land in the future, the highway could be converted to another use. However, presently, there is no need to consider that this would occur.

Labor, construction materials, and fossil fuels for construction vehicles and equipment would be used during construction. Labor and natural resources would be used to fabricate construction materials. Generally, these materials are not retrievable. The use of these materials would not have an adverse effect on the continued availability of these resources.

Construction of the proposed highway would require funding from Federal and State sources. These funds would be committed to the construction and maintenance of the facility and not available for other uses.