

State Route 18
from State Route 100 to State Route 5 (U.S. 45),
Madison and Hardeman Counties, Tennessee

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to the National Environmental Policy Act of 1969 42 U.S.C. 4332(2)(c)

U.S. Department of Transportation, Federal Highway Administration and
Tennessee Department of Transportation, Environmental Division

Cooperating Agency

U.S. Army Corps of Engineers

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Date


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SUMMARY OF ENVIRONMENTAL ASSESSMENT

General Project Description

The Tennessee Department of Transportation (TDOT) proposes to improve State Route (SR) 18 from SR-100 in Hardeman County to SR-5 (U.S. 45) in Madison County. The total length of the proposed improvement is approximately 14.5 miles.

The purpose of the SR-18 improvement project would be to provide an efficient and safe transportation facility that would yield maximum benefits to road users and be compatible with local and regional goals and objectives. Completion of the SR-18 improvement project would relieve some of the existing and future traffic congestion at the SR-18 and SR-5 (U.S. 45) intersection, correct sight distance and vertical design deficiencies, allow adequate shoulders and turn lanes, and provide a safer and more efficient transportation link between Bolivar and Jackson for the motoring and commuting public.

Summary of Alternatives

A No-Build Alternative and six Build Alternatives are being considered for this project.

The No-Build Alternative:

The No-Build Alternative involves making no new improvements to the existing roadway that would increase the overall traffic capacity or operational efficiency of the facility. Normal roadway maintenance activities would continue under the No-Build Alternative to maintain the current operation of the existing roadway.

The Build Alternatives:

The Build Alternatives include various options such as widening the existing SR-18 from two lanes to four lanes or a combination of widening the existing alignment and relocating at least some portion of the roadway on new alignment to the southeast of the existing roadway.

Summary of Environmental Consequences

The No-Build Alternative: Existing baseline social and cultural land use patterns and ecological conditions within the project area would be preserved under the No-Build Alternative. However, adverse impacts to socioeconomic resources would occur. The No-Build Alternative would not meet future traffic demands projected for the project area. As the regional traffic volumes and demands increase the existing facility would no longer provide adequate capacity or safety. The No-Build Alternative would result in declining traffic service for those who currently depend on existing SR-18 as a transportation corridor. Traffic congestion would increase, which would adversely affect traffic circulation within the vicinity of the project area. As traffic volumes increase, crash rates would become worse resulting in increasing safety issues along the existing roadway.

The Build Alternatives: The primary benefits of the proposed action include:

- improved safety and traffic conditions;
- enhanced economic development opportunities within the project area;
- improved circulation among the cities and communities in the project area;
- improved regional accessibility to the project area;
- reduced travel times; and
- increased property values with new opportunities for economic development, especially for strategically located properties.

The primary direct adverse impacts of the proposed action under any of the various Build Alternatives would include:

- the displacement of single family residential units, multi-family units, and small businesses;
- an increase in noise levels in some portions of the project area;
- temporary construction impacts (fugitive dust, siltation, construction noise, traffic detours, etc.);
- impacts to surface waters and wetlands; and
- conversion of undeveloped areas to highways and associated right-of-way (ROW) resulting in loss of agricultural land, wildlife habitat, and open space.

In addition, the improved capacity and efficiency anticipated with implementation of any of the Build Alternatives may make some of the land within the project area more desirable for development, including residential, retail/commercial, and industrial uses. This would result in indirect adverse impacts associated with future development of currently undeveloped areas along the proposed highway. The ROW requirements would be refined during the design phase of the project, and these refinements should reduce the adverse impacts presented in this document.

Table S.1 provides summary information for each of the proposed SR-18 Build Alternatives that can be used for general comparison purposes. Chapter 3 of this document contains more details regarding the project's affected environment and environmental consequences.

Table S.1. Summary of project data and resources present within the SR-18 study area in Hardeman and Madison Counties, Tennessee.

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Roadway Length (miles)	14.6	14.1	14.6	14.6	14.8	14.8
New Alignment Length (miles)	0.0	10.1	5.4	5.9	3.2	8.6
Total Size of Study Area (acres)*	885	865	883	887	895	894
Land Uses/Wildlife Habitat Present						
Forest (acres)*	315	436	406	375	344	436
Old Field (acres)	34	184	59	86	45	70
Grassland/Agriculture (acres)	141	144	176	139	156	191
Developed/Disturbed (acres)	394	100	241	285	348	196
Open Water (acres)	1	1	1	2	2	1
Residential Displacements	72	16	48	53	63	39
Business Displacements	8	1	5	5	7	4
Non-Profit Organization/Church Displacements	0	0	1	0	0	1
Farmland Conversion Impact Rating Score (out of 260 points possible)	141	159	153	151	144	158
Noise Receptors Impacted	135	23	56	108	135	56
Aquatic Resources Present						
Streams Present in 500-foot Corridor	23	26	19	28	26	22
Stream Channel in 500-foot Corridor (feet)	13,659	14,247	11,474	17,574	15,899	13,689
Streams Crossed in 500-foot Corridor	15	15	12	19	18	14
Streams Channelized within 250-foot ROW***	10	12	10	16	13	13
Length of Stream Channelization within 250-foot ROW (feet)***	2, 889	5,311	3,639	6,678	4,741	5,491
WWCs Present***	45	36	44	38	41	40
Springs Present	8	7	6	7	7	5
Seeps Present	2	4	3	5	5	6
Ponds Present	9	10	10	10	9	11
Lakes Present	0	0	0	0	0	0

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Wetlands Present						
Number of Wetlands Present in 500-foot Corridor	14	11	15	12	12	13
Wetlands in 500-foot Corridor (acres)	19	10	21	7	7	9
Wetlands in 250-foot ROW (acres) ^{***}	6	5	9	2	2	5
Mapped Hydric Soils (acres)	36	91	82	52	32	78
100-year Floodplains Present						
Floodplains Crossed (linear feet)	312	1,582	312	993	407	407
Floodplains (acres)	6	18	5	11	6	5
Archaeological Sites Impacted (number)	0	0	0	1	0	0
Historic Sites Impacted (number)	0	0	0	0	0	0
Hazardous Materials Sites Impacted (number of "High" impact potential sites)	10	1	5	6	9	4

* The study area for the land use and natural resources reported in this table was 500-foot-wide corridor (250-feet on either side of the centerline of each Build Alternative alignment). All resources present within the 500-foot corridor were documented and reported on this table for general comparison unless otherwise noted. Because the actual ROW would be narrower than 500 feet, the actual impacts to many of the resources in this table would be less. This data characterizes the general corridors used by each of the Build Alternatives that can be extrapolated to the narrower ROW boundary in most cases. Exact impacts to the various resources in this table will be refined following development of more detailed design plans.

** For stream channelization and wetland impacts, data were reported based on a 250-foot ROW. This represents the worst-case scenario for these features because a portion of the ROW will be narrower than 250-feet and the entire stream-channel within the ROW may not require rechannelization. Exact impacts to streams and wetlands will be determined following development of more detailed design plans. The data in this table provides a good representative of the potential impacts for comparison purposes.

***WWC = Wet Weather Conveyance, which are small man-made or natural watercourses, including natural watercourses that have been modified by channelization, that flow only in direct response to precipitation runoff in their immediate locality and whose channels are above the groundwater table, do not support fish or aquatic life, and are not suitable for drinking water supplies. Wet weather conveyances are not streams. (Rules of Tennessee Department of Environment and Conservation (1200-4-3-.04)

Permits

The acquisition of permits would occur prior to initiating construction activities, pursuant to Section 69-3-108(a) of the Tennessee Water Quality Control Act of 1977 and other state and Federal laws and regulations. The following permits are likely to be required:

- Clean Water Act (CWA) Section 404 Permit – required for construction that involves the placement of dredge and fill material in waters of the U.S.. Typical Waters of the U.S. include rivers, blueline streams, headwaters streams, and special aquatic sites, such as wetlands. Section 404 Permits would be required by the U.S. Army Corps of Engineers (USACE) prior to construction.
- Aquatic Resource Alteration Permit (ARAP) – required for any alterations of state waters, including wetlands, that do not require a federal (Section 404) permit. ARAP permits are required for construction at locations where the proposed project involves placement of fill in the following: a pond that is spring fed or impacts springs; reservoirs; wetlands; blueline streams; intermittent blueline streams on the U.S. Geological Survey (USGS) quadrangle map; and any stream that supports any form of aquatic life or is in the vicinity of a State-listed endangered species. ARAP permits are issued by the Tennessee Department of Environment and Conservation (TDEC), Division of Water Pollution Control.
- National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit – required for grubbing, clearing, grading or excavation of one or more acres of land. NPDES permits are issued by TDEC's Division of Water Pollution Control.
- Tennessee Construction General Permit for Storm Water Discharges from Construction Activities (TNCGP) – required by operators of construction sites in Tennessee.

In addition, the State of Tennessee may require water quality certification under Section 401 of the CWA. Section 401 certification ensures that activities requiring a Federal permit or license will not cause pollution in violation of state water quality standards.

SAFETEA-LU Statute of Limitations on Filing Claims

FHWA may publish a notice in the Federal Register, pursuant to 23 USC §139(l), indicating that one or more Federal agencies have taken final action on permits, licenses, or approvals for the subject transportation project. If such notice is published, claims seeking judicial review of those Federal agency actions will be barred unless such claims are filed within 180 days after the date of publication of the notice, or within such shorter time period as is specified in the Federal laws pursuant to which judicial review of the Federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the Federal laws governing such claims will apply.

Environmental Commitments

Social Commitments

Provision of bicycle or pedestrian accommodations will be determined during the remainder of the planning and final design phase of the project. TDOT will continue to work with local officials and citizens to determine what features can be included within the ROW of the new roadway. Pedestrians and bicycles will be able to use the paved shoulders of the new roadway.

Natural Resources Commitments

TDOT will attempt to avoid or minimize wetland and stream impacts to the extent possible. However, no matter which Build Alternative were selected, there will be at least some unavoidable wetland and stream impacts. TDOT will coordinate with regulatory agencies to obtain the appropriate permits to fill or drain the wetlands, as necessary. TDOT's stream and wetland mitigation efforts for this project will be in compliance with all rules and regulations as set by USACE, EPA, and/or TDEC. Where possible, TDOT will replace unavoidable stream and wetland impacts through compensatory mitigation.

The following measures will be used to the extent possible to help prevent the introduction and spread of invasive species:

- Native grasses, shrubs, and trees will be planted for beautification purposes or to prevent erosion, wherever needed. Native species will be consistent with local community types.
- Whenever possible, all disturbed soil will be seeded with temporary annual species to reduce the ability of exotics to become established. This will also act to reduce erosion potential during stormwater events; and
- Consideration will be given to the types and quality of plants and soils at borrow sites. Soil from borrow sites used as project area fill could contain viable plant parts or seeds and could increase the spread of invasive species to new locations.

All reasonable precautions will be taken to minimize short-term and long-term impacts to plants and wildlife and their habitat. Several mitigation measures that will avoid or minimize short-term and long term adverse impacts to species will be required conditions of any build alternative that may be selected. These will include:

- Streamside and in-stream construction work will occur during dry periods.
- Removal of vegetation near the streams will occur only as necessary to accomplish the proposed action. Where removal of vegetation is necessary, bank stabilization measures will be used. Streambank restoration measures will include seeding with native species and the placing of rip-rap or other bank stabilization techniques, as outlined in TDEC's Riparian Restoration and Streamside Erosion Control Handbook (TDEC, 1998a).
- Proper sediment control measures, such as silt fences, will be used as outlined in the Tennessee Erosion and Sediment Control Handbook (TDEC, 2001b) and

Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites (Smoot et al., 1992).

Noise Commitments

Based on preliminary evaluation, noise barriers, such as noise walls, are not considered reasonable for this project due to the cost per protected receptor exceeding the allowable costs. However, the final decision on implementation of abatement measures will be made during the project design phase and after consideration of input from the public involvement process.

Cultural Resources Commitments

TDOT in coordination with the SHPO commits to making the requisite investigations and mitigation necessary to avoid, minimize, or mitigate potential impacts to any cultural resources sites that may be discovered in the project area during construction. If remains, artifacts, or other archaeological material is uncovered during construction, all construction in the area of the find will cease. The Tennessee Division of Archaeology and the recognized Native American tribes will be contacted immediately so representatives may have the opportunity to examine and evaluate the material.

It is not anticipated that the project will result in adverse effects to the historic Swink House, contingent upon a landscaping plan that will be prepared in coordination with TDOT historians and the Tennessee SHPO. Therefore, TDOT is committed to developing a landscaping plan that will mitigate any potential impacts the project could otherwise have on the historic property.

Farmland Commitments

TDOT will work with affected property owners on a case-by-case basis during the ROW and design phases of the project to determine what the appropriate action may be in instances where potential farm severances occur. Options for including features such as cattle underpasses will be discussed during those phases of the project.

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CHAPTER 1 - PURPOSE AND NEED

1.1 Project Status

1.1.1 Project Description and Setting

The Tennessee Department of Transportation (TDOT) proposes to improve State Route (S.R.) 18 from SR-100 in Hardeman County to SR-5 (U.S. 45) in Madison County. The total length of the proposed improvement is approximately 14.5 miles.

The SR-18 project area is located just south of Jackson, Tennessee in Madison and Hardeman Counties. The topography consists of gently rolling to steep hills dissected by several creeks and small streams. A mixture of forested areas and open agricultural land, such as pastures and cotton fields, is present throughout most of the study area. Low-density rural residential areas occur along most of the study area with somewhat higher density residential use in the northern one-third of the project area. Commercial developments occur mainly at the northern terminus of the project area along SR-5 (U.S. 45). The Cities of Jackson, Medon, and Malesus occur within or near the study area. Figure 1-1 shows the vicinity of the SR-18 project area.

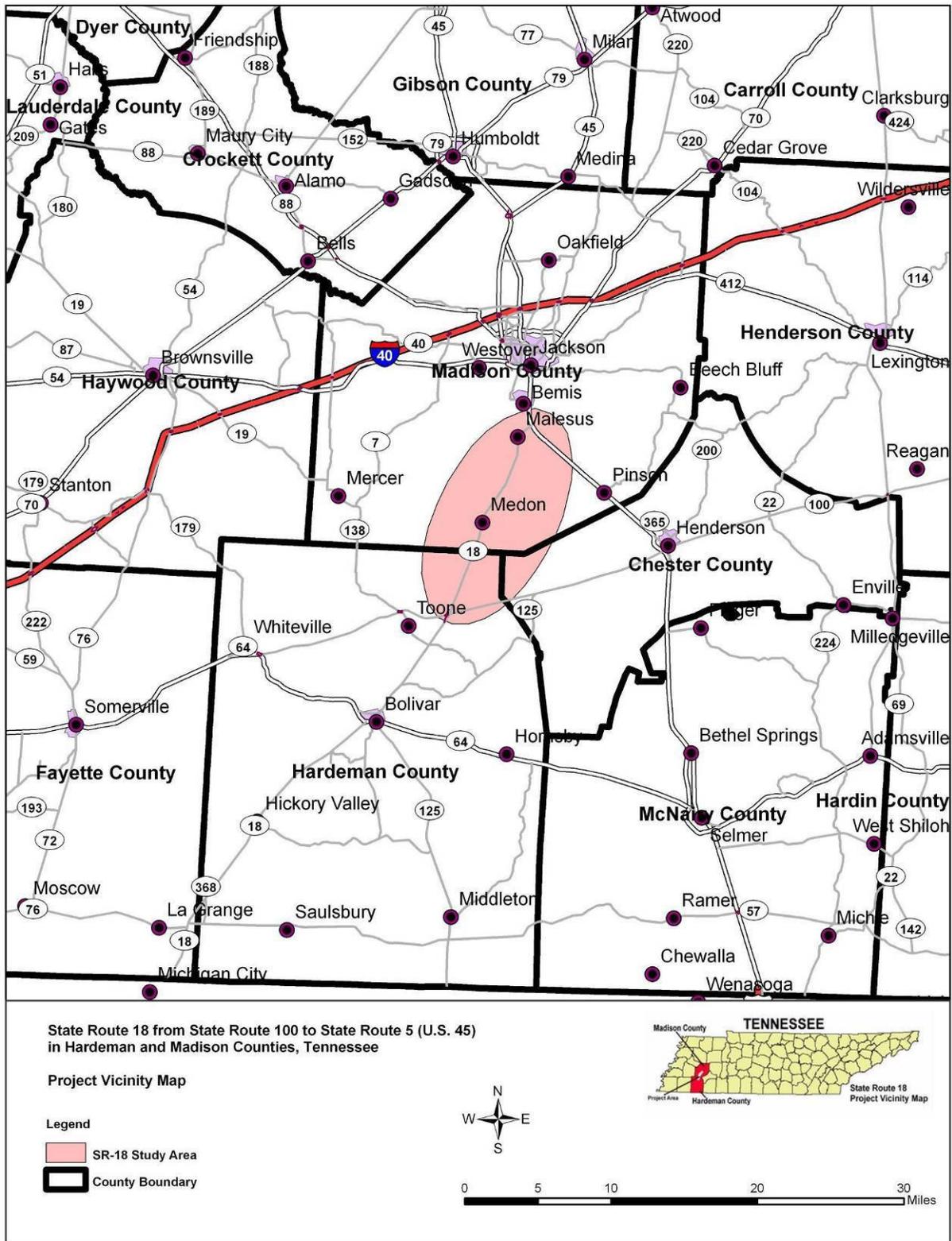
1.1.2 Project History/Legislation

On March 25, 1993, the 98th General Assembly of the State of Tennessee approved House Joint Resolution No. 16 urging a study to determine the feasibility and need for expanding a portion of SR-18 in Hardeman County to four lanes. The Resolution stated that, at the time, Hardeman County was inadequately served by the State transportation system as evidenced by the fact that there were no four-lane highways in the county. It also stated that this lack of an adequate and functional transportation system adversely affected the quality of life of the citizens of Hardeman County, resulting in a severely depressed economy and one of the lowest per capita incomes of any county in the western portion of the State.

Based on the findings of studies conducted as a result of House Joint Resolution 16, TDOT proposed to improve existing SR-18, from Bolivar in Hardeman County to Jackson in Madison County. This project, however, was separated in 2004 into two projects, with the subject project, SR-100 to SR-5 (U.S. 45) in Jackson representing the northern sector of the original. A Public Meeting was held in November 2004 to provide the public with mapping of potential alternative routes for the project and allow them to provide comments to help TDOT determine which options to consider.

The total length of this existing stretch of SR-18 between SR-100 to SR-5 (U.S. 45) is approximately 14 miles. As an important element of the local and regional transportation system, it serves a major portion of Madison County, northern Hardeman County, and other surrounding areas. SR-18 is classified as a Minor Arterial in the TDOT Roadway Classification System and is a two-lane facility within the project limits. It provides a connection for through-traffic from SR-100 and surrounding communities to SR-5 (U.S. 45) in south Jackson. SR-18 is a primary commuting route to and from the City of Jackson for areas southwest of the City.

Figure 1-1. Project Vicinity Map for the SR-18 from SR-100 to SR-5 (U.S. 45) Project in Hardeman and Madison Counties, Tennessee.



1.2 Purpose of Project

The purpose of the SR-18 improvement project is to provide an efficient and safe transportation facility that would yield maximum benefits to road users and be compatible with local and regional transportation plans including the State Transportation Improvement Program (STIP) and the Jackson Area Metropolitan Planning Organization's (MPO) 2035 Long Range Transportation Plan (JALRTP). Completion of the SR-18 improvement project would provide some relief of existing and future traffic congestion at the SR-18 and SR-5 (U.S. 45) intersection, correct sight distance and vertical design deficiencies, provide for adequate shoulders and turn lanes, improve roadway safety, and provide an improved and more efficient transportation link between Bolivar and Jackson for the motoring and commuting public.

An objective of the SR-18 improvement project is to provide a transportation facility that will serve the public well in the near term as well as account for any growth-induced cumulative impacts in the long term. TDOT will develop access control strategies to ensure this objective is met, and proposes limiting the number of access points along the new route in order to maintain traffic flow and reduce the total number of turning points. Comments from local communities and affected citizens will be taken into consideration to ensure the new facility is concurrent with both local and regional needs and that the overall objectives of improving the facility are met.

1.3 Need for the Project

1.3.1 Transportation Demand/Traffic

The SR-18 project is mentioned in Attachment 3 of the current 2008-2011 STIP as a project that was originally included in a previous STIP. This project was authorized in April 1998. A portion of SR-18, from north of Medon-Malesus Road to SR-5 (U.S.-45) is included in the 2035 JALRTP as a roadway widening project to widen the road to five lanes. The project was also mentioned in Appendix C of the MPO's 2008-2011 Transportation Improvement Program. Both of the MPO documents were approved in January 2008. Inclusion in these plans recognizes suburban growth in this corridor and subsequent need for improvements to existing transportation facilities.

1.3.2 Existing and Future Conditions

The existing SR-18 consists of a two lanes that are a minimum of 11 feet and a maximum of 12 feet with variable shoulder widths. The shoulders along most of the existing roadway are less than two feet wide and are gravel. Some areas contain a small amount of paved shoulder extending out to approximately two feet beyond the edge of the traffic lane.

Traffic volume projections were conducted for SR-18 using a base year of 2011 and a design year of 2031 for the existing and alternative alignments. The projected increases in traffic volumes along the existing SR-18 would result in traffic congestion and increased travel times, particularly during peak hour traffic flow near SR-5 in Jackson. Table 1.1 contains a summary of traffic volume projections for the SR-18 project area in Hardeman and Madison Counties, Tennessee. For a map of the proposed system or proposed build alternatives, see Figure 2-1 in Section 2.2 below.

Table 1.1. Traffic volume projections for the SR-18 project area in Hardeman and Madison Counties, Tennessee.

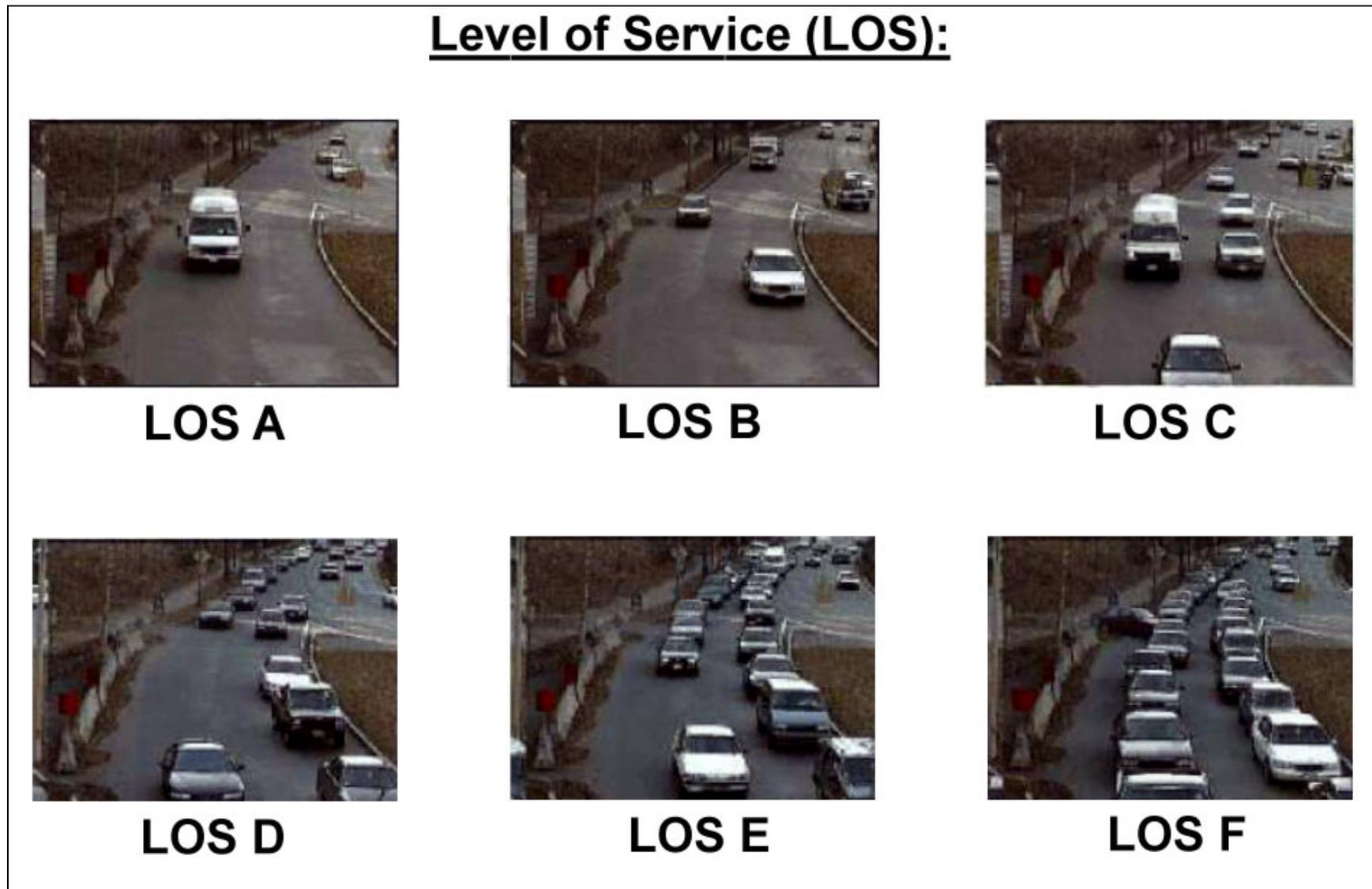
Roadway	Base Year (2011)	Design Year (2031)			
	AADT	AADT	Percent Trucks in AADT	DHV	Percent Trucks in DHV
Existing System (No Build Alternative and Build Alternatives ending with Segment A-4; Build Alternatives 1, 4, and 5)	9,260	13,890	10%	1,250	7%
Proposed System (Build Alternatives ending with Segment B-4; Build Alternatives 2, 3, and 6)	8,170	12,250	10%	1,103	7%
AADT = Annual Average Daily Traffic (number of vehicles) DHV = Design Hour Volume (i.e., number of vehicles projected during peak traffic times) <i>Source: TDOT Project Planning Division, 2007</i>					

As shown in Table 1.1, if one of the proposed build alternatives (see Section 2.0 below) were built to shift traffic to a new SR-18/U.S. 45 intersection located south of the existing intersection, a large amount of the traffic would utilize the new alignment. Of the 9,260 vehicles projected to use the existing system in 2011, 8,170 of the vehicles would switch to the new alignment if it were constructed. This would reduce some of the existing and anticipated congestion issues on SR-18 at or near the existing SR-18/SR-5 (US 45) intersection. It would also reduce the number of vehicles, including trucks, moving past the numerous residences and the school located along the northernmost sections of SR-18.

1.3.2.1 Levels of Service/Capacity/Traffic Congestion Mitigation

Traffic forecasts were prepared by TDOT for the No-Build and Build Alternatives. The anticipated character of future traffic flow was investigated using a process called "capacity analyses," which provides operational characteristics of a highway facility in terms of "Levels of Service (LOS) ranging from A through F. LOS are much like school grades given to the roadway, where LOS A is free-flowing and LOS F is congested. The LOS analysis takes into consideration three variables: travel speed, traffic density (number of cars per mile per lane) and vehicle flow rate (number of cars per hour per lane). Figure 1-2 contains a graphical representation of the different LOS to show what each may look like in an everyday situation.

Figure 1-2. Graphical Depiction of the Levels of Service (LOS) used to describe Roadway Capacity.



The methodologies used for capacity analyses are taken from the Highway Capacity Manual, which is published by the Transportation Research Board, a division of the National Academy of Science.

For the No-build Alternative, existing SR-18 was analyzed for anticipated operation with the forecast volumes for the year 2031. The findings are:

- Segment A-1, from SR-100 north to Segment A-2, LOS D;
- Segment A-2, from Segment A-1 to Segment A-3, LOS D;
- Segment A-3, from Segment A-2 to Segment A-4, LOS E;
- Segment A-4, from Segment A-3 to Medon-Malesus Road, LOS E; and
- Segment A-4, from Medon-Malesus Road to SR-5 (U.S. 45), LOS F.

The existing intersection of SR-18 with SR-5 (U.S. 45) was investigated for intersection operating character, and is anticipated to operate at LOS F.

The proposed bypass alternatives (build alternatives ending with Segment B-4) were also reviewed. All of the segments of the proposed bypass are proposed as four-lane divided highway with partial access control. All of the proposed bypass segments are anticipated to operate at LOS A.

If a bypass alternative (with the associated widening of remaining sections of existing SR-18 under those alternatives) were constructed, then the anticipated operational character of the existing roadway would improve due to reduced traffic volumes (see Table 1.1 above). Forecast levels of service would be as follows:

- Segment A-1, from SR-100 north to Segment A-2, LOS A;
- Segment A-2, from Segment A-1 to Segment A-3, LOS A;
- Segment A-3, from Segment A-2 to Segment A-4, LOS A;
- Segment A-4, from Segment A-3 to Medon-Malesus Road, LOS B; and
- Segment A-4, from Medon-Malesus Road to SR- 5 (U.S. 45), LOS F.

It should be noted that the reasons for the northern portion of Segment A-4 to be expected to operate at LOS F, even if much of the traffic is diverted onto a bypass, are the lack of passing zones, narrow shoulders, and the high number of driveways on this segment. However, without a bypass, the severity in declines of LOS would be much worse. In other words, the degree of LOS F without the bypass would be more of a problem than the LOS F with the bypass. This is because without the bypass all SR-18 traffic would be forced to use that section of roadway. With a bypass, most users would have the option to avoid the Segment A-4 portion of SR-18 thereby providing most drivers an alternative route with better LOS.

The existing and proposed SR-18/SR-5 (U.S. 45) intersections were examined for LOS. A diamond interchange was previously constructed at the SR-100 and SR-18 intersection located just south of the southern terminus of this SR-18 improvement project. SR-100 was placed on a bridge over SR-18. There are ramps with merging and diverging on SR-100, and ramp terminal intersections on SR-18. There are no traffic signals on the main alignment of SR-18. The two intersections of SR-18 with the interchange ramps were evaluated and found to have acceptable LOS in both the base year 2011 and design year 2031. Though traffic operations on SR-18 are anticipated to have very good characteristics, the stop signs at the end of the ramp approaches will result in some delays for traffic turning onto SR-18. At the intersection for the westbound ramps, the left turn is expected to decline to LOS E by the year 2031. This is an acceptable condition for an unsignalized intersection, though it indicates that an auxiliary lane for the right-turning traffic on this ramp may need to be considered at some point in the future.

The proposed SR-18/SR-5 (U.S. 45) intersection at the end of the bypass (end of Segment B-4) was considered as a T-intersection, similar to the existing intersection, for the LOS analysis. The analyses indicated that both the existing and proposed intersections would operate at LOS F. The existing intersection would operate at LOS F either with or without the proposed bypass and new intersection at the end of Segment B-4. The analyses indicated that both intersections would have high potential for intersection delays, especially during peak traffic conditions no matter which type of intersection were constructed. Even if grade-separated intersections were constructed, a LOS F was predicted.

The primary reason for the anticipated low LOS of the SR-18/SR-5 (U.S. 45) intersections is due to the high traffic volumes forecasted on SR-5 (U.S. 45) and the resulting poor LOS on that roadway. According to a Transportation Planning Report prepared by the City of Jackson for the possible Southern Extension of the U.S. 45 Bypass (U.S. 45 Bypass Extension) south of downtown Jackson, LOS on SR-5 (U.S. 45) between SR-18 and the U.S. 45 Bypass/SR-5 (U.S. 45) interchange area would be LOS D in the year 2015 (ADT = 44,464 vehicles), and LOS F in 2030 (ADT = 69,273 vehicles) under baseline or no build conditions for that project. Therefore, there would continue to be traffic bottlenecks for people traveling from the south near the SR-18 project area northward toward downtown Jackson.

Although the proposed improvements associated with this SR-18 project would substantially improve traffic and safety issues along the majority of the SR-18 main route through the design year of 2031, the ultimate benefits of the project would likely not be fully realized at the extreme northern end of the route until LOS on SR-5 (U.S. 45) are resolved. Improvements to the LOS along SR-5 (U.S. 45) would potentially improve the LOS of the SR-18/SR-5 (U.S. 45) intersections, because the majority of northbound traffic on SR-18 is expected to turn left onto northbound SR-5 (U.S. 45). Therefore, by eliminating or reducing the potential for heavy traffic congestion on SR-5 (U.S. 45), the SR-18 traffic would be able to move more freely through the intersections and beyond.

During past public involvement meetings, a large number of people stated that they would prefer a new grade-separated interchange be constructed at the SR-18/SR-5 (U.S. 45) intersection. The anticipated traffic volumes at the SR-18/SR-5 (U.S. 45) intersections are high enough that a grade-separated interchange would be warranted. However, development of a grade-separated interchange, at either the existing location or the proposed location to the south, would have limited utility unless there were substantial improvements to SR-5 (U.S. 45) north of SR-18. In the morning, the northbound SR-5 (U.S.

45) traffic would be backed up from traffic signals further north, so that the SR-18 intersection area would be stop-and-go traffic metered by downstream bottlenecks. Even if a more free-flowing grade-separated interchange were constructed at SR-18, the benefits would be offset by downstream bottlenecks along SR-5 (U.S. 45). Because a grade-separated interchange would be substantially higher in cost to construct, and there would be no return in terms of providing improvements to LOS at the northern terminus of SR-18, TDOT is proposing to construct an at-grade or T-intersection as part of this SR-18 improvement project.

A new grade-separated interchange could be developed at the SR-18/SR-5 (U.S. 45) intersection as part of a future improvement project, once the traffic issues on SR-5 (U.S. 45) to the north have been resolved. Some of the options presently being considered for the U.S. 45 Bypass Extension project would end near SR-18. If the U.S. 45 Bypass were to extend all the way to SR-18, it is possible that a grade-separated interchange would be proposed to connect the three roadways (U.S. 45 Bypass, SR-18, and SR-5 (U.S. 45)). It is likely that the design of such an interchange would be developed once an alternative has been selected for the SR-18 project and it is known whether the two projects would connect to each other and at what location they would connect.

Regardless of whether other future projects are constructed to alleviate traffic on SR-5 (U.S. 45) heading into Jackson from the south (including the U.S. 45 Bypass Extension), the stated purpose and need of this SR-18 improvement project will still be met if the proposed improvements to SR-18 identified in this document are completed. This project would remedy most of the known design deficiencies along the length of the existing SR-18 between SR-100 and SR-5 (U.S. 45) and would result in improved LOS, travel efficiency, and safety in most areas. This SR-18 improvement project would combine with a separate SR-18 improvement project south of SR-100 to provide an overall improved roadway connection between Bolivar and Jackson.

1.3.3 Roadway Deficiencies

The existing SR-18 between SR-100 and SR-5 contains various design deficiencies that result in traffic flow issues and potential safety problems. The SR-18 deficiencies include poor vertical geometric alignment, substandard shoulder widths, insufficient sight distances, and lack of left turn lanes. The configuration of the existing SR-18/SR-5 (U.S. 45) intersection also poses potential traffic flow problems.

Vertical alignment deficiencies that occur along the length of the existing route are a detriment to safe travel due to areas of low visibility and unsafe passing zones. The existing facility has narrow shoulder widths making it impossible to pull off onto the shoulder for emergency purposes or to avoid objects in the traffic lanes. Turning lanes are not provided in most areas where left turns are frequently made, resulting in efficiency and safety issues at these intersections along the route.

The design deficiencies of the existing roadway are anticipated to continue to become more of an issue as traffic continues to increase in the project area. The following section provides more details related to safety issues along the existing SR-18.

1.3.4 Safety/Crash Analysis

The goals of the new facility include providing improved traffic flow, correcting existing geometric deficiencies, and installing turn lanes and wider shoulders in areas where access

is necessary. These improvements are anticipated to decrease the risk of crashes and reduce the potential for injuries and fatalities along the route.

Utilizing the average daily traffic acquired from TDOT's Tennessee Roadway Information Management System (TRIMS) database for years 2003 through 2005 and the calculated vehicle miles traveled (VMT), a crash rate (crashes per one million VMT) was calculated for the existing route. The calculated crash rate for SR-18 from SR-100 to SR-5 (U.S. 45) was 1.31 crashes per one-million VMT. This rate can be compared to the statewide average rate for the same three years of 1.70 for a typical two-lane rural highway in Tennessee. Although the existing crash rate does not exceed the statewide rate, the incidence of fatalities, the number of injuries, and the anticipation of increased traffic volume over time, improving overall safety of the facility must be taken into consideration.

A critical crash rate was calculated for the existing SR-18 within the project limits. The critical rate is a quality control measure that defines statistically how the actual rate differs significantly from the statewide average accident rate. The critical rate was calculated to be 2.20 crashes per million VMT for SR-18 from SR-100 to SR-5 (U.S. 45). The ratio of the actual crash rate to the critical crash rate indicates the severity of the problem. A ratio of over 1.0 suggests an existing safety deficiency problem. In this case the calculated ratio is 0.60. Although the ratio was well below 1.0, it is anticipated that as the amount of traffic increases, this ratio will grow to better reflect the current design deficiencies of the roadway. In other words, if no major improvements are made to the existing roadway, the crash rates would eventually become more severe. Improving a roadway such as SR-18 that has known design deficiencies before crash rates become substantially worse can help to avoid several injuries and/or fatalities in the foreseeable future.

A total of 137 crashes occurred during 2003-2005 on the existing SR-18 from SR-100 to SR-5 (U.S. 45). The majority of the crashes occurred along the more densely populated area between the Hardeman-Madison County line and SR-5 (U.S. 45). Many of these accidents occurred at intersections with local roadways, although it appeared that crashes were distributed throughout the length of the SR-18 alignment, many of which involved one-vehicle accidents. A total of 82 people were injured and 6 people were killed during the three-year period. Table 1.2 contains summary data for crashes that occurred on SR-18 between SR-100 and SR-5 (U.S. 45) from 2003-2005.

Table 1.2. Crash data for SR-18 in Hardeman and Madison Counties, Tennessee during the 2003-2005 period.

Roadway	Statistics				
	Number of Crashes	Number of Injury Crashes	Number of Persons Injured	Number of Fatal Crashes	Number of Persons Killed
SR-18 from SR-100 to SR-5 (U.S. 45)	137	56	82	3	6
<i>Source: TDOT Project Planning Division, Safety Planning Section, 2007</i>					

The types of crashes that occur on a facility can also indicate the types of deficiencies on a roadway. Table 1.3 contains summary data for the types of crashes that occurred on SR-18 between SR-100 and SR-5 (U.S. 45) between 2003 and 2005.

Table 1.3. Crash data for SR-18 in Hardeman and Madison Counties, Tennessee during the 2003-2005 period.

Roadway	Manner of Crash				
	Rear-End	Angle	Side-Swipe	Head-On	Other/No Collision with Other Vehicle
SR-18 from SR-100 to SR-5 (U.S. 45)	49	23	8	6	51
<i>Source: TDOT Project Planning Division, Safety Planning Section, 2007</i>					

The primary types of crashes involving two or more vehicles were rear end and angle collisions. Several of those crashes may have been partially attributed to the existing horizontal and vertical deficiencies along the roadway including inadequate turn lanes and shoulders as well as sight deficiencies. A large number of one-vehicle crashes occurred along the existing roadway. All of the fatal accidents were one-vehicle accidents, one involving collision with a tree, one with a culvert, and one was a vehicle that left the roadway and overturned. Of the remaining one-vehicle crashes, eleven involved deer strikes.

Other crashes involving vehicles running off of the road may have been due to the lack of shoulders not allowing room for error or room to avoid other objects in the driving lane such as animals, other vehicles, or other objects in the roadway. In addition, the vertical sight deficiencies in some areas result in unsafe passing areas. Occasionally, people attempt to pass in non-passing zones resulting in either head-on collisions with oncoming vehicles, or one or both of the vehicles being forced off of the road to avoid the oncoming vehicles. Sometimes the vehicles that are forced off of the road are recorded as one-vehicle crashes even though the true cause of the accident was to avoid another vehicle.

Based on the crash trends for the area, it is anticipated that improvements to SR-18 would decrease the number of crashes and the resulting injuries and fatalities. Providing a four-lane highway with turn lanes at appropriate areas, adequate shoulders, and better visibility would eliminate many of the above types of crashes. Crashes involving deer may still be an issue due to the rural nature of the roadway. However, providing wider shoulders would give drivers more time to see deer and be able to react to avoid hitting them. The wider shoulders would also provide extra space to maneuver around deer or other objects in the driving lanes without having to leave a paved surface.

Based on the above traffic data and crash history data, a SR-18 improvement project would enhance traffic operations and safety, and provide an improved link to the local, regional, and statewide transportation system. Improving SR-18, along with other major routes in the region, would be necessary as traffic volumes continue to increase resulting in declines in LOS and safety.

1.3.5 Logical Termini/Independent Utility

The southern terminus for this proposed improvement project is located at SR-100 and the northern terminus is located in South Jackson at SR-5 (U.S. 45). These proposed termini are considered logical and would allow this segment of SR-18 to have independent utility. Although local traffic generates the vast majority of activity along this segment of SR-18, there is a substantial amount of through traffic, including truck traffic, which utilizes the roadway to reach destinations beyond the project termini via SR-5, SR-100, or SR-18 south of SR-100 toward Bolivar. Therefore, the proposed improvements to SR-18 would provide increased capacity and benefits for both local commuters and travelers using the route to reach other destinations outside of the project limits.

1.3.6 System Linkage

The SR-18 project between SR-100 and SR-5 (U.S. 45) can be considered independent of any future projects. TDOT is currently conducting environmental studies on a separate SR-18 project from SR-100 south to Bolivar. The two projects will likely be constructed at different times. Together, the two projects would connect the main urban areas in this region with an improved roadway facility that provides good system continuity throughout its entire length.

Future improvements to other links in the system, such as SR-5 (U.S. 45) or additional new alignments may become necessary to allow the proposed improvements to SR-18 to achieve the maximum benefits the project has to offer in terms of improved regional travel efficiency. Although improvements to one facility can provide substantial improvements to local transportation efficiency, it often requires a combination of projects to improve regional transportation efficiency. Each individual piece of the local, regional, and national transportation system is important. Maintaining or improving the existing transportation infrastructure to keep up with increased demands and growth in a given region is a continuous process.

CHAPTER 2 - ALTERNATIVES

Six Build Alternatives and a No-Build Alternative are considered in this EA. Other alternatives that were previously considered but eliminated from further study for this project are described below in Section 2.3.

2.1 The No-Build Alternative

The No-Build Alternative involves making no new major improvements to the existing SR-18 between SR-100 and SR-5 that would increase the overall traffic capacity or operational efficiency of the facility or provide any safety benefits. Routine roadway maintenance activities would continue under the No-Build Alternative to maintain the current operation and capacity of the existing roadway. However, as traffic volumes continue to increase with time, the LOS of the roadway will continue to decline, especially in northern sections of the roadway. The No Build Alternative will not satisfy the Purpose and Need for this project.

2.2 The Build Alternatives

The Build Alternatives include various options such as widening the existing SR-18 from two lanes to four lanes or a combination of widening the existing alignment and relocating at least some portion of the roadway on new alignment to the east of the existing roadway. The proposed project consists of 11 individual segments that were combined in various ways to form a total of six separate Build Alternatives. Table 2.1 lists the Build Alternatives and identifies the individual alignment segments that comprise each alternative. The six Build Alternatives that have been carried forward for study in this EA are depicted on Figure 2-1.

Table 2.1. State Route 18 Build Alternatives and alignment segments.

Alternative	Alignment Segments	Total Length (Miles)	Total New Alignment (Miles)
1 (Widen Existing SR-18)	A-1, A-2, A-3, A-4	14.6	0.0
2	A-1, B-1, B-2, B-3, B-4	14.1	10.8
3	A-1, A-2, A-3, C-3, B-4	14.6	5.4
4	A-1, B-1, B-2, C-2, A-4	14.6	5.9
5	A-1, B-1, C-1, A-3, A-4	14.8	3.2
6	A-1, B-1, C-1, A-3, C-3, B-4	14.8	8.6

The typical section proposed for all rural segments consists of a four-lane divided roadway, with four 12-foot lanes separated by a 52-foot depressed median (includes two 6-foot inside shoulders) and two 12-foot outside shoulders within a 250-foot ROW. The typical section proposed for urban areas consists of a 92-foot ROW containing four 12-foot lanes with a 12-foot center left turn lane, two 4-foot outside shoulders, and curb and gutter. Five-foot sidewalks would be included on both sides of the roadway in the urban areas. Figure 2-2 contains illustrations of the proposed cross section layouts for the build alternative alignment.

Figure 2-1. Map of the SR-18 Build Alternatives in Hardeman and Madison Counties, Tennessee.

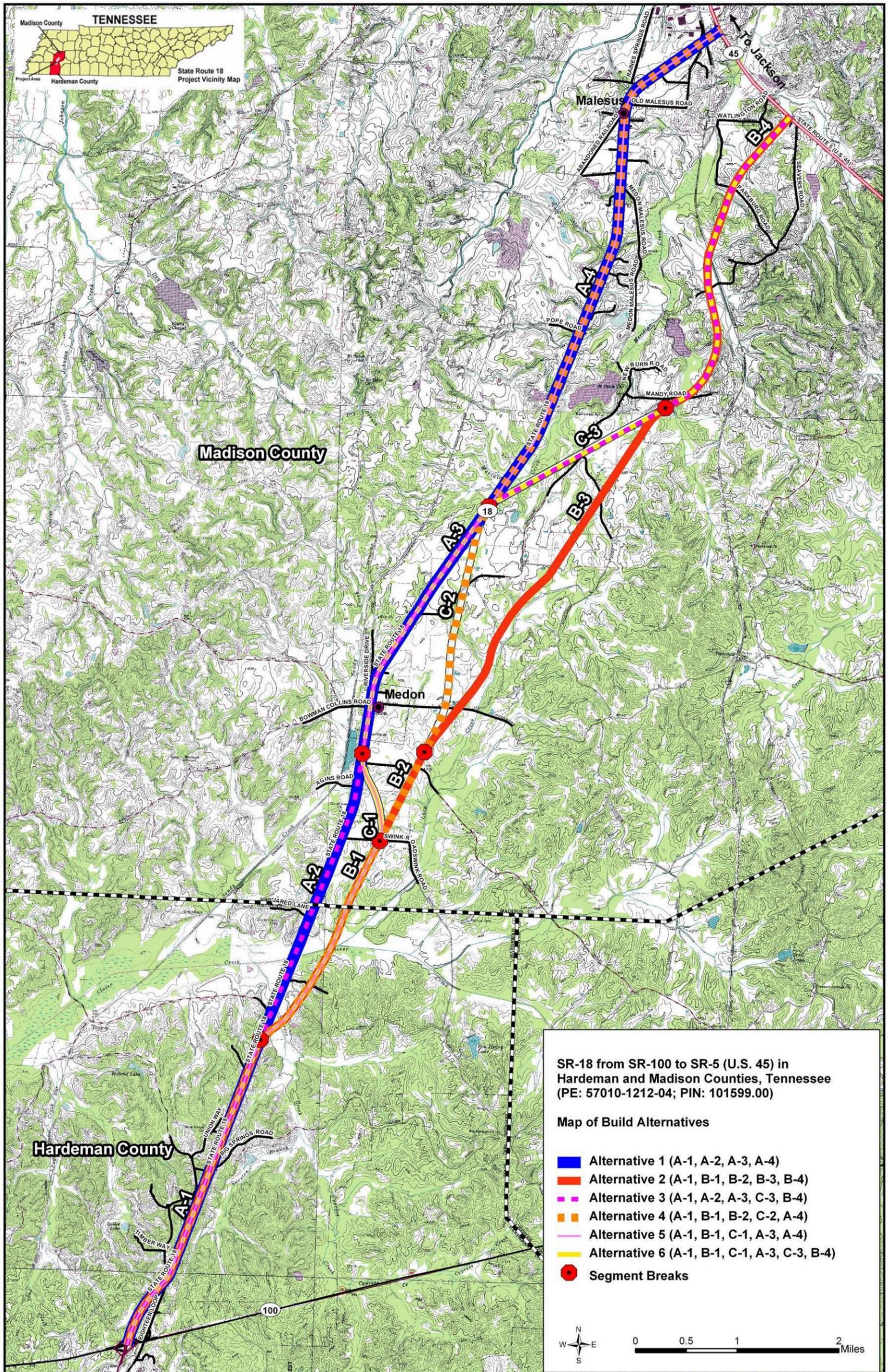
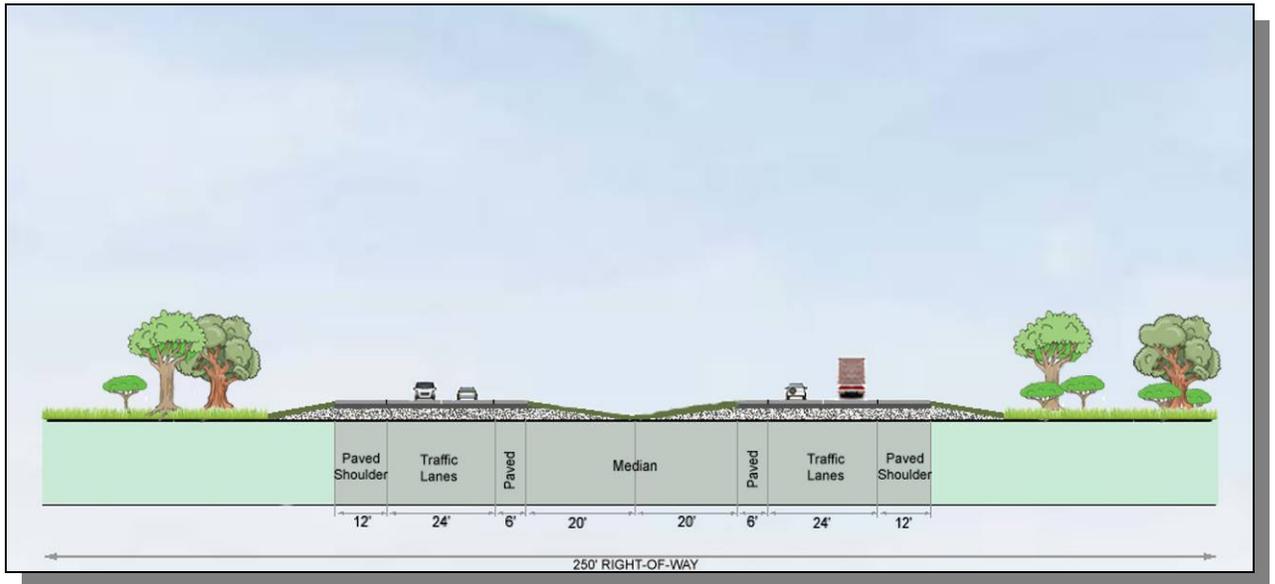
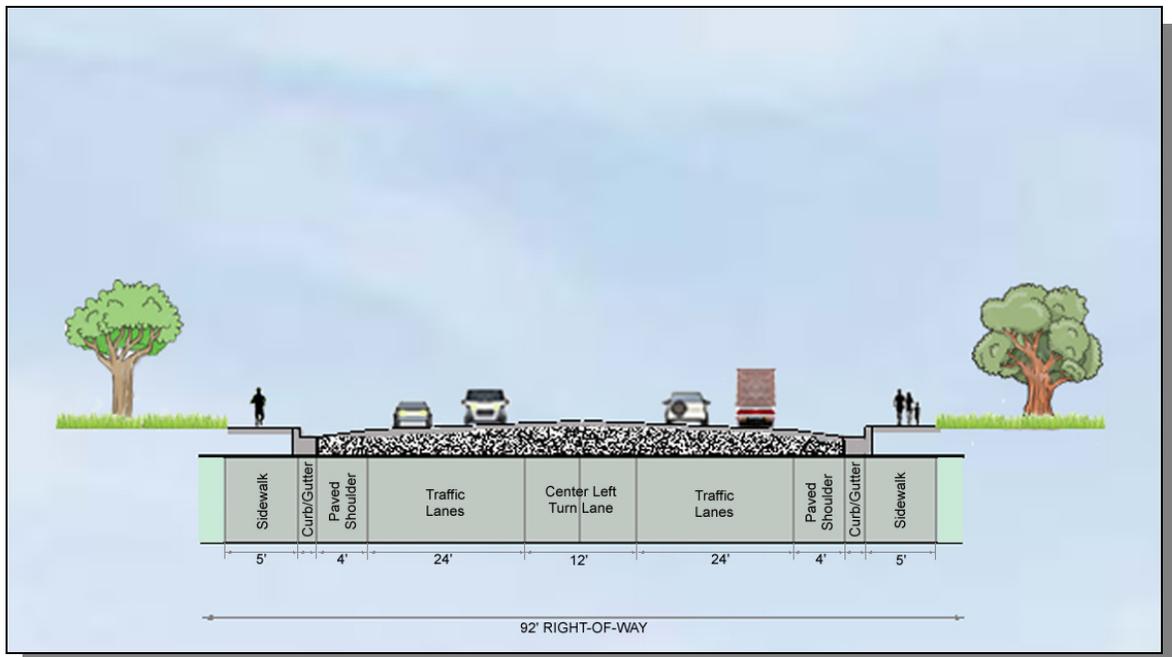


Figure 2-2. Proposed Typical Sections for the SR-18 Build Alternatives in Hardeman and Madison Counties, Tennessee.



Typical Section for Rural Segments A-1, A-2, A-3, and A-4 (from SR-100 to Jennalee Lane) and Segments B-1, B-2, B-3, B-4, C-1, C-2, and C-3.



Typical Section for Urban Segment A-4 [Jennalee Lane to SR-5 (U.S. 45)] and A-3 through Medon.

2.2.1 Alternative 1 (Widen Existing SR-18)

This alternative involves widening the existing SR-18 from SR-100 to SR-5 (U.S. 45) from two lanes to four lanes. This alternative would utilize segments A-1, A-2, A-3, and A-4. The total length of this Alternative is 14.6 miles. This alternative would utilize portions of the existing SR-18 ROW and additional ROW would be purchased where necessary. Alternative 1 would go through the City of Medon and community of Malesus.

The northern terminus of Alternative 1 would occur at the existing intersection of SR-18 and SR-5 (U.S. 45). An improved at-grade intersection would be developed at that location. The intersection would be signalized.

2.2.2 Alternative 2

Alternative 2 involves widening the portion of the existing SR-18 from SR-100 to just south of Teague Road (Segment A-1) from two lanes to four lanes. From Teague Road to the northeast, Alternative 2 would consist of a four-lane highway on new alignment running somewhat parallel and east of the existing SR-18. Alternative 2 would bypass the Cities of Medon and community of Malesus. This alternative was developed to avoid many of the residences, businesses, and other existing structures that would be impacted by other alternatives that utilize more of the existing SR-18 route. This alternative would result in the fewest residential and business displacements. The total length of this Alternative is 14.1 miles. This alternative would utilize portions of the existing SR-18 ROW in Segment A-1 but would require the purchase of new ROW throughout the remainder of the alignment along Segments B-1, B-2, B-3, and B-4.

The northern terminus of Alternative 2 would occur at SR-5 (U.S. 45) approximately one mile southeast of the existing SR-18/SR-5 (U.S. 45) intersection. A new at-grade T-intersection is proposed at this location. Although the projected traffic volumes on SR-18 indicate a grade-separated interchange could be warranted, it has been determined that an at-grade intersection will be constructed as part of this proposed project. This is because a grade-separated interchange would not provide improved traffic flow in the area until additional improvements are made to relieve traffic issues along SR-5 (U.S. 45). Regardless of the type of connection to SR-5 (U.S. 45), placement of a new intersection at this more southern location would remove much of the traffic from the more congested northernmost section of existing SR-18 south of the existing SR-18/SR-5 (U.S. 45) intersection. This would help to improve LOS and safety in this more urbanized area and would meet the overall purpose and need of this SR-18 improvement project.

2.2.3 Alternative 3

Alternative 3 is similar to Alternative 1 throughout the southern two-thirds of the alignment in that it utilizes the existing SR-18 alignment through Segments A-1, A-2, and A-3. Alternative 3 differs from Alternative 1 in the northern one-third of the study area where it utilizes Segments C-3 and B-4. The total length of this Alternative is 14.6 miles. This Alternative would utilize portions of the existing SR-18 ROW in Segment A-1, A-2, and A-3 but would require the purchase of new ROW throughout the remainder of the alignment along Segments C-3 and B-4. Alternative 3 would go through the City of Medon but would pass around the eastern edge of Malesus. This alternative was developed as an option to continue to allow SR-18 to go through Medon and utilize much of the existing route, while avoiding many of the residential and business displacements that would occur in Segment A-4. This option also provides a reduction in traffic congestion that is currently experienced in the northern section of the roadway.

The northern terminus of Alternative 3 would be the same as Alternative 2 and occur at SR-5 (U.S. 45) approximately one mile southeast of the existing SR-18/SR-5 (U.S. 45) intersection. A new at-grade intersection is proposed at this location. This location would remove much of the through traffic from the more highly congested areas of SR-18 south of the existing SR-18/SR-5 (U.S. 45) intersection.

2.2.4 Alternative 4

Alternative 4 is similar to Alternative 1 except instead of going through the City of Medon, the alignment utilizes Segments B-1, B-2, and C-2 to bypass it. The northern one-third of the alignment is similar to Alternative 1 and utilizes Segment A-4. The total length of Alternative 4 is 14.6 miles. This alternative would utilize portions of the existing SR-18 ROW in Segments A-1 and A-4 but would require the purchase of new ROW along Segments B-1, B-2, and C-2. Alternative 4 would go through the community of Malesus located at the northern portion of the study area. This alternative was developed to reduce impacts in the City of Medon.

The northern terminus of Alternative 4 would occur at the existing intersection of SR-18 and SR 5 (U.S. 45). An improved at-grade intersection would be developed at that location. The intersection would be signalized.

2.2.5 Alternative 5

Alternative 5 is similar to Alternative 1 throughout much of the alignment in that it utilizes the existing SR-18 alignment through Segments A-1, A-3, and A-4. Alternative 3 differs from Alternative 1 in the area just south of Medon where it utilizes Segments B-1 and C-1. This alternative was developed in an effort to avoid impacts to several wetlands located between Cypress Creek and Clover Creek. The total length of this Alternative is 14.8 miles. This Alternative would utilize portions of the existing SR-18 ROW in Segment A-1, A-3, and A-4 but would require the purchase of new ROW throughout the remainder of the alignment along Segments B-1 and C-1. Alternative 5 would go through the City of Medon and the community of Malesus.

The northern terminus of Alternative 5 would occur at the existing intersection of SR-18 and SR 5 (U.S. 45). An improved at-grade intersection would be developed at that location. The intersection would be signalized.

2.2.6 Alternative 6

Alternative 6 utilizes multiple alignment segments consisting of both existing SR-18 alignment new alignment. Similar to Alternative 5, Alternative 6 would utilize Segments A-1, B-1, and C-1 in the southern portion of the project area. This alternative was developed to avoid many of the wetland areas associated with the Cypress Creek and Clover Creek and to avoid many of the residential and business displacements in Segment A-4. Utilizing Segments C-1 and A-3 would allow traffic flow to continue through the City of Medon. North of Medon, Alternative 6 would utilize Segment C-3 allowing the roadway to eventually end at SR-5 at the southern terminus utilized by Alternative 2 and Alternative 3. The total length of this Alternative is 14.8 miles. This Alternative would utilize portions of the existing SR-18 ROW in Segment A-1 and A-3 but would require the purchase of new ROW throughout the remainder of the alignment along Segments B-1, C-1, C-3, and B-4. Alternative 6 would go through the City of Medon and bypass the eastern edge of the community of Malesus.

The northern terminus of Alternative 6 would be the same as Alternative 2 and occur at SR-5 (U.S. 45) approximately one mile southeast of the existing SR-18/SR-5 (U.S. 45) intersection. A new at-grade intersection is proposed at this location. This location would remove much of the through traffic from the more highly congested areas of SR-18 south of the existing SR-18/SR-5 (U.S. 45) intersection.

2.3 Alternatives Considered But Eliminated

Other alternatives were previously considered for this project prior to the development of the current Build Alternatives being studied in this EA. The alternatives that were considered but later eliminated involved additional alignment segments that were located both west and east of the existing SR-18. Figure 2-3 displays the alternatives previously considered but eliminated from further study.

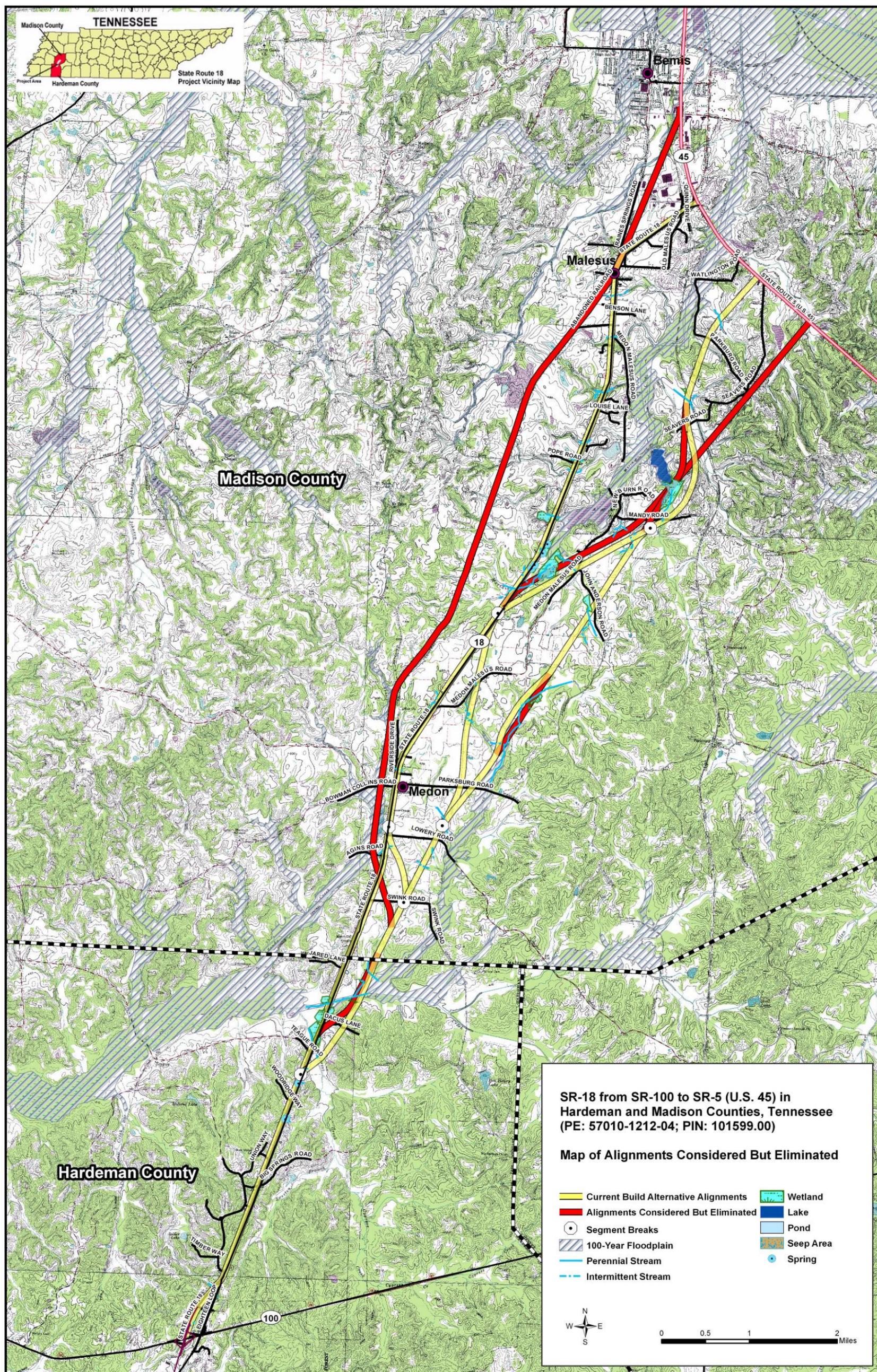
The primary alternative that had been developed, but is no longer being considered, was an alternative located west of the existing SR-18 following an abandoned railroad footprint. That alternative followed the abandoned railroad west of SR-18 from just south of Medon to SR-5 (U.S. 45) in South Jackson. This alternative was dropped from consideration following an environmental constraints analysis conducted for the project that identified potential substantial impacts to wetlands and potential National Register of Historic Places (NRHP)-eligible properties, including two historic farms. Because similar reasonable alternatives with fewer potential impacts to those resources could be developed east of the existing SR-18, it was decided not to carry the western alternative forward in the EA.

The current Build Alternatives located east of existing SR-18 were derived from other similar alternatives that had been developed in those areas early in the project planning phases. Some of the original Build Alternative alignments were realigned based on information discovered during the initial environmental constraints analysis and subsequent field investigations associated with studies conducted for the project. The current Build Alternative alignments have been altered where possible to avoid certain known resources including some of the larger, higher quality wetlands and higher quality streams in the area.

If one of the Build Alternatives being studied as part of the environmental studies is selected as the Preferred Alternative, it is likely that the alignment of that alternative would be further adjusted prior to construction. Any further changes to the layout of the selected Build Alternative would occur during the final design and ROW acquisition phases of the project. These changes would be considered in an effort to avoid or minimize impacts to various resources, including social, cultural, and ecological resources, if the integrity of the overall roadway design can be maintained. Not all impacts to such resources would be avoidable. The ultimate goal is to provide necessary improvements to the function, safety, and capacity of SR-18 while minimizing potential environmental impacts.

The final selection of an alternative for this project will be made only after consideration of impacts discussed in this document and after all public comments have been received and considered following completion of the EA public review period. The public review period includes a Public Hearing for the EA where the public will be presented summary information regarding the impacts of each alternative and an opportunity to submit their comments in person.

Figure 2-3. SR-18 Alignments Considered but Eliminated in Hardeman and Madison Counties, Tennessee.



CHAPTER 3 - ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter of the EA will describe the social/community, economic, cultural, and natural resources in the project vicinity (affected environment), followed by a discussion of the potential impacts (environmental consequences) this project may have on those resources. Following the discussion of environmental consequences, mitigation measures are discussed to explain what efforts have been or would be taken to avoid, minimize, and/or mitigate for environmental consequences resulting from this project. In Section 3.11, a summary table (Table 3.28) is provided that shows the data for resources expected to be impacted by this project for each alternative studied.

Both direct and indirect impacts anticipated to occur with implementation of this project are discussed under each resource category. In addition, a separate section of this chapter (Section 3.12) is devoted to describing potential cumulative impacts associated with this project. The cumulative impacts analysis looks at potential impacts to various resources as a whole resulting from implementation of the SR-18 project in combination with all other past, present, and reasonably foreseeable projects or actions that have affected or could potentially affect the same resources.

3.1.1 Affected Environment

The affected environment portion of this chapter describes the existing natural, cultural, social, and economic environments occurring within the proposed project area. The affected environment results from all past and present actions in the project area. The affected environment descriptions serve to establish baseline conditions of each resource against which to evaluate anticipated environmental consequences that could result from the proposed project. The affected environment is described by resource category either in general or by subcategory where appropriate.

The following resource categories for study are listed below:

Social/Community and Economic Resources (Human Resources) including:

- Land Use;
- Infrastructure;
- Social Environment and Community Resources;
- Environmental Justice and Non-discrimination;
- Displacements and Relocations;
- Neighborhood and Community Cohesion;
- Travel Efficiency;
- Public Services;
- Considerations Related to Pedestrians and Bicyclists;
- Visual Quality;
- Economic Environment; and
- Farmland.

Ecological Resources including:

- Aquatic Resources (Streams, Waterbodies, and Water Quality);
- Wetlands;

- Floodplains;
- Threatened and Endangered Species; and
- Fish and Wildlife/Habitats;

Cultural Resources impacts including:

- Archaeological Resources; and
- Historical/Architectural Resources.

Air Quality;

Noise;

Hazardous Materials;

Energy;

Section 4(f) Properties; and

Construction.

3.1.2 Environmental Consequences

An environmental consequence (hereafter referred to in this document as an impact) is defined as a noticeable change in a resource from the existing environmental baseline conditions caused by the proposed action. The discussion concentrates on aspects of the environment that could potentially be affected by implementation of new activities and facilities associated with the proposed action.

The analysis of impacts associated with each project alternative has been further divided into direct, indirect, and cumulative impacts.

3.1.2.1 Direct vs. Indirect Impacts

Direct Impacts

A direct impact is caused by the proposed action and occurs at the same time and place.

Indirect Impacts

An indirect impact is caused by the proposed action and occurs later in time or is farther removed in distance but is still reasonably foreseeable.

Cumulative Impacts

Section 3.12 contains a complete discussion and analysis of potential Cumulative impacts associated with this project.

Application of Direct versus Indirect Impacts

A resource must be present in a particular area for a direct impact to occur. For example, if a stream channel is physically altered during construction of a roadway, there would be a direct impact to the portion of the stream being altered. The direct impacts to the stream at the construction site may eventually lead to indirect impacts to the stream channel at some distance downstream of the construction site as changes to the stream channel at the construction site may result in changes in hydrology or other characteristics of the stream. Those changes could indirectly impact the streams function, integrity, or water quality over time. Such indirect impacts are often reasonably foreseeable and can therefore be minimized through proper construction techniques and mitigation efforts.

3.1.3 Avoidance, Minimization, and Mitigation of Project Impacts

After the potential impacts of the proposed project have been identified, a determination would be made whether mitigation is appropriate or required. Mitigation measures would be planned and developed to protect or maintain the baseline conditions of the resources that are identified in the affected environment portion of this chapter.

Because planning for SR-18 is being developed through the NEPA process, which involves interagency coordination and input provided by private citizens and local, state, and federal stakeholders, it is anticipated that all potential impacts to the social, cultural, and natural environment would be identified thoroughly and fully disclosed to the public and regulatory agencies. This NEPA study has been and would continue to be conducted in a manner that allows for all potential adverse impacts to be addressed in the planning process so that proactive efforts can be made to avoid, minimize, or mitigate impacts during final design phases of the project.

The resources in the SR-18 project area have been identified through intensive survey efforts along with input from regulatory agencies, landowners, and the general public. Unavoidable adverse impacts to the environment associated with construction of SR-18 would be mitigated to the extent practical. Mitigation for all resources would be determined through continued coordination with appropriate regulatory agencies. Several potential environmental concerns identified during initial environmental constraints analyses conducted for this project have already been avoided during development of the current Build Alternatives discussed in this EA. This process of identifying and then minimizing or avoiding potential impacts of this project would be used through the duration of this project's development.

Anticipated mitigation efforts are identified, where appropriate, under each of the individual resource categories discussed in this chapter of the EA. The mitigation discussion for each resource occurs after the discussion of all environmental impacts of the project alternatives. Final detailed mitigation plans and actions would be developed during the regulatory permit acquisition phase of the project that would occur after final design plans are approved, but prior to initiation of any construction activities.

3.2 Social/Community and Economic Resources (Human Resources) Affected Environment

3.2.1 Land Use and Infrastructure

3.2.1.1 Land Use Plans and Policies

There are no officially adopted land use plans for Madison County, Hardeman County, City of Jackson, and the City of Medon. Rather, the respective existing zoning ordinances serve as a guide for land use development and planning in these jurisdictions. The Jackson Municipal Regional Planning Commission makes recommendations to the Jackson City Council and the Madison County Commission on zoning and planning issues in the city and county, respectively.

The City of Jackson also utilizes a Metropolitan Planning Organization (MPO) for local and regional transportation planning purposes. The Jackson Area MPO encompasses all of Madison County. The MPO coordinates land use decisions with transportation activities to ensure functional efficiencies and compatible relationships. The MPO maintains a continually updated land use and socioeconomic database necessary for transportation

planning for the Jackson area. MPO documents include the Jackson Urban Area 2035 Long-Range Transportation Plan; Transportation Improvement Program FY 2008 through 2011; and the Unified Planning Work Program FY 2009.

In addition to county and municipal planning authorities, the Tennessee General Assembly passed Public Chapter 1101, Growth Management Law (1998). This state growth policy law mandates all city and county governments to designate an Urban Growth Boundary (UGB) to anticipate and plan for 20 years of growth and change within and around a municipality. Included among the purposes of this legislation are the encouragement of compact and contiguous development, and the establishment of acceptable and consistent levels of public services and community facilities in newly annexed or growth areas. Each growth policy plan identifies the following three distinct types of areas:

“Urban Growth Boundaries” (UGB), or those areas that are contained within a municipality’s corporate limits, and adjoining unincorporated land where growth is expected to occur, and which can be provided infrastructure and other urban services by an adjacent municipality, and where annexation or new incorporations may occur;

“Planned Growth Areas” (PGA), or reasonably compact areas outside incorporated municipalities where growth is expected to occur, and which are well suited for urban and suburban development; and

“Rural Areas” (RA), or those areas which are to be preserved for agriculture, recreation, forest, wildlife, and uses other than high-density commercial or residential development.

Each of the two counties in the project area have developed an “Urban Growth Boundary” for their respective jurisdiction with designated “growth areas” specified. Madison County’s growth plan was approved in January 2000, by the Local Government Planning Advisory Committee (LGPAC), which consists of local government officials. The Urban Growth Boundary in Madison County generally encircles the City of Jackson five miles outward from the city’s municipal boundaries. The City of Medon is one of three designated “growth areas” in Madison County. Hardeman County’s Urban Growth Boundary encircles the City of Bolivar. There is no designated “growth area” within the Route 18 project area in Hardeman County. The remainder of the SR-18 area in Madison and Hardeman counties is designated as rural areas.

3.2.1.2 Existing Land Use

Land use within the SR-18 project area consists primarily of rural and semi-rural areas, with intervening residential development. Development within the project area transitions from primarily rural and dispersed residential development in the southern portion in Hardeman County to more dense and compact development in the northern portion approaching the City of Jackson. Residential development is most dense in the community of Malesus in the southernmost portion of Jackson.

Existing development within the project area and surrounding environs consists primarily of low-density residential, with some commercial development and public uses. Residential development consists primarily of linear single lot dispersed development along SR-18. The City of Medon, however, represents an older established more compact residential community. Subdivisions become more predominant along the northern portion of SR-18 approaching the City of Jackson. Several subdivisions were developed in the 1990’s.

These subdivisions include Southwood Village, Chipwood Estates, and Country Lake Estates. Undeveloped areas consist primarily of a patchwork of forests and pastures.

Commercial development within the project area is concentrated along SR-18 in the City of Jackson, and around the intersection of SR-18 and SR-5 (U.S. 45). The Wal-Mart Supercenter and Lowe's represent big-box retail development at the intersection of SR-18 and SR-5 (U.S. 45) in Jackson. A number of small businesses are also located along the west side of SR-18 south of SR-5 (U.S. 45). In addition, there are approximately seven small businesses within the City of Medon, and a couple of businesses along the remainder of SR-18. All of the latter businesses are of a small-scale nature and are not major employers. There are also three wood-related industries (i.e. pallets, mulching) adjacent to SR-18 north of Medon.

Development is more limited within the SR-18 project area in Hardeman County. The majority of the area consists of woodlands and open areas, with some dispersed single-family residences. The only area of any concentrated development is at the intersection of SR-18 and SR-100. However, development is limited consisting only of a service station, a small mobile home park, and a few residences.

Recreational facilities within the project area include the Malesus Civic Park and South Jackson Community Center and associated outdoor recreational facilities. These facilities are located along SR-18 in the community of Malesus near the southern city limits of Jackson. The City of Medon recreational center and associated outdoor athletic facilities are located at College Street east of SR-18.

Public and non-profit facilities within the project area include the following:

- Malesus Elementary School, located near the southern city limits of Jackson;
- Medon City Hall, located at College Street east of SR-18; and
- Madison County Fire Station #9, located adjacent to the Medon City Hall.

There are a number of additional public/non-profit sensitive uses within the project area located adjacent to or near SR-18. These include the following:

- New Union Church, New Union Loop Road (Hardeman County);
- Clover Creek Missionary Baptist Church, Pruitte Drive (Medon);
- Clover Creek Baptist Church (Medon);
- Faith Tabernacle Church (Medon);
- Church of God (north of Medon City Limits);
- South Jackson Church of God, Gobblett Road (under construction);
- Landmark Church, Benson Lane (under construction);
- Malesus Baptist Church, Old Malesus Road; and
- Clover Creek Baptist Church Cemetery (Medon).

3.2.1.3 Current and Proposed Developments

There are two developments currently under construction in the northern portion of the SR-18 project area. These include the Landmark Church at SR-18 and Benson Lane, and

the New Baptist Church at SR-18 and Gobblett Road. Currently, there are no other known on-going or proposed developments in the SR-18 project area.

3.2.1.4 Land Use Controls

Each of the two counties within the project area have zoning and subdivision ordinances as mechanisms for land use control. Under Tennessee law, an incorporated community with planning and zoning controls can petition the county and be granted by county resolution, planning and zoning jurisdiction within an adjacent unincorporated area. This municipal planning region boundary can extend to a maximum distance of five miles beyond the city's boundaries. The City of Jackson, under State of Tennessee Statutory authority, has extra-territorial planning, zoning, and subdivision powers in unincorporated Madison County. Zoning in unincorporated Hardeman County is derived in a similar manner with the City of Bolivar also having extra-territorial land use and zoning powers.

The City of Jackson has a City Zoning Ordinance; an Inner Region Zoning Resolution for Madison County; and an Outer-Region Zoning Resolution for Madison County. The Inner Region Zoning Resolution encompasses that area of Madison County within five-miles of the corporate limits of Jackson. The Outer Region Zoning Resolution is for the remainder of Madison County beyond a five-mile radius of Jackson. This five-mile line coincides with the City of Jackson's Urban Growth Boundary. The City of Jackson also has subdivision regulations in effect for the city and unincorporated Madison County.

The City of Medon does not have its own zoning regulations and building codes. Rather, the city entered into an agreement with Madison County in 1985 to adopt the county's zoning and building code regulations. Under this resolution Madison County was granted the jurisdiction and authority to administer and enforce such regulations within the City of Medon

Existing Zoning

There is a myriad of zoning districts in the SR-18 project area. The Forestry-Agriculture-Residential (FAR) District predominates throughout the project area in both Madison County and Hardeman County. The FAR District generally encompasses the rural areas along SR-18 and larger parcels more distant from SR-18. Residential zoning districts permitting higher density development and commercial districts encompass certain areas adjacent to SR-18.

Zoning districts within the SR-18 project area in Madison County, permitted uses and location, include the following:

- Forestry-Agriculture-Residential District (FAR); permits forestry, agriculture, and low-density single-family residential with one-acre minimum lot size; predominates from southern limits of Jackson to north of Medon, and from south of Medon to Hardeman County line;
- Fringe Residential District (F-R); allows medium density residential with one-half acre minimum lot size with access to public water; located in southern Jackson in community of Melesus and in Medon;
- Single-Family Residential District (RS-1); permits medium density residential with minimum lot size of 9,000sf; residential area located adjacent to SR-18 in Malesus;

- Multi-Family Residential District (M-R); permits higher density residential with minimum lot size of 7,000sf with access to public water; residential area located adjacent to SR-18 in Medon;
- General Business District (B-4); permits general retail and service uses; located at SR-18 and Hudson Drive north of Malesus Elementary School;
- General Commercial Center District (C-2); allows commercial establishments in rural communities and/or at major highway intersections; located along length of SR-18 in Medon;
- Planned Unit Commercial Development District (SC-1); permits shopping and commercial centers; encompasses Wal-Mart Supercenter and Lowe's at SR-18 and SR-5 (U.S. 45);
- Office Center District (O-C); permits offices and related services; located on west side of SR-18 at SR-5 (U.S. 45); and
- Wholesale and Warehouse District (I-O); permits warehousing, wholesaling, and distribution; located on west side of SR-18 at intersection with SR-5 (U.S. 45).

Zoning districts within the SR-18 project area in Hardeman County, permitted uses and location, include the following:

1. Forestry-Agricultural-Residential District (FAR); permits forestry, agriculture, and low-density residential with one-acre minimum lot size; encompasses majority of SR-18 project area;
2. Residential-Mobile Home District (R-MH); intended for low to moderate density development; permits a mixture of single-family residential development with individual mobile homes, mobile home parks, and multi-family dwellings; to be served by public water; encompasses a portion of southeast quadrant of SR-18 and SR-100;
3. Local Commercial District (C-1); permits the development of smaller scale commercial (e.g. retail trade, personal services) to serve neighborhoods in rural areas; to be served by public water; encompasses the entire area between SR-18 and the SR-18 Loop-by-Pass north of SR-100; and
4. General Commercial District (C-2); permits a wider range of commercial uses; to be served by public water; consists of two small lots along SR-18 near intersection with SR-100.

3.2.1.5 Highway and Roadway Network

The existing transportation facilities within the project vicinity include a network of federal, state, and county highways. This system of roadways provides a well-developed interconnection between the rural residential areas and surrounding urban areas, including Jackson.

The major highways currently serving the project area include SR-5 (U.S. 45), SR-100, and SR-18. Some of the secondary roadways crossed by or adjacent to the SR-18 Build Alternatives include Teague Road, Dacus Road, Big Springs Road, Lowery Road, Swink Road, Parkburg Road, Bowman Road, Collins Road, Riverside Drive, Medon-Malesus Road, John Anderson Road, Pope Road, Gobelett Road, Mandy Road, Caldwell Road, and Old Malesus Road.

Traffic demand has increased throughout the project area with population growth in the region. The existing roadway system that serves the area consists primarily of non-access controlled highways. Most of these facilities have geometric deficiencies such as narrow lane widths, narrow shoulder widths, and poor horizontal and vertical alignments.

3.2.1.6 Railroads

No operating railroads would be crossed by the proposed SR-18 Build Alternatives. An abandoned railroad footprint would be crossed, but this area no longer contains railroad tracks.

3.2.1.7 Electricity

The Jackson Energy Authority (JEA) purchases electricity from the Tennessee Valley Authority (TVA) and provides electric services to the City of Jackson and adjacent parts of Madison County. The portion of SR-18 within the City of Jackson and adjacent subdivisions in unincorporated Madison County are served by JEA. The City of Medon is provided electric services by Southwest Tennessee Electric (SWTE) which also purchases electricity from (TVA). Northern Hardeman County and the rural portions of Madison County within the SR-18 area are also provided electric services by SWTE. Some of the powerlines with the existing SR-18 right-of-way may require relocation to allow the roadway to be constructed.

3.2.1.8 Water and Wastewater

Water and wastewater services are also provided by the JEA in the City of Jackson and some adjacent areas in Madison County. The water and sanitary sewer lines in the SR-18 area generally terminate at the city's southern limits. The City of Medon has no public water or sanitary sewers. Rather, residences and businesses are on individual water wells and septic systems. Previously submitted Community Development Grant (CDBG) applications by the City of Medon for the extension of public water from Jackson have never been approved.

3.2.1.9 Natural Gas

The JEA is the provider of natural gas for the City of Jackson and some adjacent areas in Madison County. The JEA also provides access to natural gas service in the City of Medon to those residences and businesses who wish to sign on for such service. Other residences in Medon, in addition to the remainder of the SR-18 area in Madison and Hardeman counties utilize propane typically stored in tanks on their property.

3.2.1.10 Land Use and Infrastructure Impacts

Potential Land Use and Infrastructure Impacts Associated with the No-Build Alternative

Direct Impacts to Land Use and Infrastructure (No-Build Alternative)

Under the No-Build Alternative not improving SR-18 would have several adverse long-term direct impacts. Additional new residential and commercial development along the SR-18 corridor would be expected to continue to be limited. Not providing this improved transportation link in the local and regional transportation system would inhibit growth and development in south Jackson, and in south Madison County and Hardeman County. Commercial development potential of several areas, including the City of Medon and the intersection of SR-18 and SR-100, would continue to be limited and not be fully realized under this alternative. The current traffic congestion conditions at SR-18 and SR-5 (U.S. 45)

would increase over time as traffic demand continues to grow and LOS continues to decrease.

Indirect Impacts to Land Use and Infrastructure (No-Build Alternative)

As a result of the lack of improving SR-18, and subsequently limiting potential development opportunities in south Jackson and adjacent unincorporated Madison County, development in the Jackson area would continue to be concentrated in the northern portion of the city and adjacent areas along I-40. Additional development pressures in the latter areas could result in additional traffic congestion and decrease in the LOS on primary roadways, and overtax required infrastructure improvements.

Potential Land Use and Infrastructure Impacts Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Land Use and Infrastructure (Alternative 1-Widen Existing)

Implementation of the proposed SR-18 improvement under Alternative 1 would have several potential beneficial long-term direct impacts. A more efficient and safer transportation facility would be completed, yielding greater user benefits in respect to vehicle operating costs and travel time. An improved transportation link would be provided between Jackson and Hardeman County for the commuting public. As a result of this transportation improvement and recurring benefits, development would be expected to increase along or near the SR-18 corridor. Enhanced development opportunities would occur in strategic areas, such as near the SR-18/SR-5 (U.S. 45) intersection; the SR-18/SR-100 intersection; and at other easily accessible areas along the route.

In addition, transportation circulation in south Jackson would be improved, and some of the traffic issues at the SR-18/SR-5 (U.S. 45) intersection would be relieved with the construction of an improved intersection at that location.

There would also be several potential adverse long-term direct impacts from the implementation of Alternative 1. The primary initial direct adverse land use impacts would be the displacement of residences and businesses within the proposed ROW. The greatest number of displacements (72 residences, 8 businesses) occur under Alternative 1. Alternative 1 would also have the greatest adverse impacts on community cohesion as a result of extensive residential displacements in Medon and the community of Malesus in south Jackson.

Short-term adverse impacts to traffic flow would occur on SR-18 and at the intersections with crossroads during the construction period. Additional traffic delays would be associated with the construction of the improvements to the intersection of SR-18 and SR-5 (U.S. 45). Some utility relocations would be required under Alternative 1. This would involve relocating powerlines, natural gas, water and sewer lines in areas where they currently run parallel to and within the proposed construction limits of the project.

Indirect Impacts to Land Use and Infrastructure (Alternative 1-Widen Existing)

Construction of SR-18 under Alternative 1 would have several beneficial long-term indirect impacts. Property values and land use intensities would be expected to increase at strategic locations, particularly on property suitable for highway-oriented commercial and higher density residential uses.

Land development in the project area would be expected to increase through induced conversion of low density residential zoned rural land to more intensive uses, such as higher density residential and commercial uses. Employment opportunities, earnings, and tax collection would increase with these changes in land use to more intensive uses. Increased housing starts and residential population would be accompanied by increases in demand for supportive commercial/retail and public services.

Implementation of Alternative 1 would have some adverse short- and long-term indirect impacts. Real property tax revenues would decrease as a result of displacements and public acquisition of private property for additional rights-of-way. Some business-related employment, earnings, and tax receipts may be lost or would decline from displaced businesses, at least in terms of the specific area impacted. However, it would be anticipated that new businesses established within the SR-18 area would increase jobs, income, and tax receipts in the long-term. In addition, property values in certain areas immediately adjacent to SR-18 may decline owing to adverse noise/visual effects of the proposed improvement under Alternative.

Potential Land Use and Infrastructure Impacts Associated with Alternative 2

Direct Impacts to Land Use and Infrastructure (Alternative 2)

Implementation of Alternative 2 would have the same potential beneficial long-term direct impacts as Alternative 1 in respect to user benefits resulting from a more efficient and safer transportation facility. Development of a new intersection east of the existing SR-18/SR-5 (U.S. 45) intersection would result in decreased traffic congestion and increased traffic flow in this area of south Jackson.

There would be some long-term adverse impacts which would be similar in nature to those under Alternative 1, but generally of lesser magnitude. Only 17 (16 residential, 1 business) displacements would occur under this alternative - the least number of displacements under the six build alternatives. The larger size of some of the impacted occupied parcels may permit relocation of displacees elsewhere on their property. In addition, there would be no adverse impacts on community cohesion as no residential neighborhood will become physically disrupted, fragmented, or isolated under this alternative.

Some adverse impacts will result from the fragmentation of larger parcels as a result of ROW acquisition. As a result of fragmentation, some parcels may no longer support existing land uses.

Indirect Impacts to Land Use and Infrastructure (Alternative 2)

Implementation of Alternative 2 would have potential adverse long-term indirect impacts similar to Alternative 1. However, greater adverse impacts would occur in respect to currently open and undeveloped areas within the SR-18 project area. The greatest amount of new alignment occurs under Alternative 2. Under this alternative, 10.8 of the 14.1 miles of improved SR-18 consist of new alignment through an open, undeveloped rural area. Undeveloped land that is presently forest, pasture, and farmland would be converted to transportation uses and to other potentially more intensive uses, such as residential and commercial. Agricultural-related earnings and tax receipts may be lost or would decline.

Potential Land Use and Infrastructure Impacts Associated with Alternative 3

Direct Impacts to Land Use and Infrastructure (Alternative 3)

Implementation of Alternative 3 would have the same potential beneficial long-term direct impacts as Alternative 1 in respect to user benefits resulting from a more efficient and safer transportation facility. Development of a new intersection east of the existing SR-18/SR-5 (U.S. 45) intersection would result in decreased traffic congestion and increased traffic flow in this area of south Jackson.

There would be some long-term adverse impacts which would be similar in nature to those under Alternative 1, but generally of lesser magnitude. A total of 53 (48 residences, 5 business) displacements would occur under this alternative. The larger size of some of the impacted occupied parcels may permit relocation of displacees elsewhere on their property. In addition, there would be no adverse impacts on community cohesion as no residential neighborhood will become physically disrupted, fragmented, or isolated under this alternative.

Similar to Alternative 2, some adverse impacts will result from the fragmentation of larger parcels as a result of ROW acquisition.

Indirect Impacts to Land Use and Infrastructure (Alternative 3)

Implementation of Alternative 3 would have potential adverse long-term indirect impacts similar to Alternative 1. However, greater adverse impacts would occur in respect to currently open and undeveloped areas within the SR-18 project area. Under this alternative, 5.4 of the 14.6 miles of improved SR-18 consist of new alignment through an open, undeveloped rural area. Undeveloped land that is presently forest, pasture, and farmland would be converted to transportation uses and to other potentially more intensive uses, such as residential and commercial. Agricultural-related earnings and tax receipts may be lost or would decline.

Potential Land Use and Infrastructure Impacts Associated with Alternative 4

Direct Impacts to Land Use and Infrastructure (Alternative 4)

Implementation of Alternative 4 would have the same potential beneficial long-term direct impacts as Alternative 1 in respect to user benefits resulting from a more efficient and safer transportation facility.

There would be some long-term adverse impacts which would be similar in nature to those under Alternative 1, but slightly of lesser magnitude. A total of 58 (53 residences, 5 businesses) displacements would occur under this alternative. Similar to Alternative 2, some adverse impacts will result from the fragmentation of larger parcels as a result of ROW acquisition.

Indirect Impacts to Land Use and Infrastructure (Alternative 4)

Implementation of Alternative 4 would have potential adverse long-term indirect impacts similar to Alternative 1. However, greater adverse impacts would occur in respect to currently open and undeveloped areas within the SR-18 project area. Under this alternative, 5.9 of the 14.6 miles of improved SR-18 consist of new alignment through an open, undeveloped rural area. Undeveloped land that is presently forest, pasture, and farmland would be converted to transportation uses and to other potentially more intensive uses, such

as residential and commercial. Agricultural-related earnings and tax receipts may be lost or would decline.

Potential Land Use and Infrastructure Impacts Associated with Alternative 5

Direct Impacts to Land Use and Infrastructure (Alternative 5)

Implementation of Alternative 5 would have the same potential beneficial long-term direct impacts as Alternative 1 in respect to user benefits resulting from a more efficient and safer transportation facility.

There would be some long-term adverse impacts which would be similar in nature to those under Alternative 1, but slightly of lesser magnitude. A total of 70 (63 residences, 7 businesses) displacements would occur under this alternative. Similar to Alternative 2, some adverse impacts will result from the fragmentation of larger parcels as a result of ROW acquisition.

Indirect Impacts to Land Use and Infrastructure (Alternative 5)

Implementation of Alternative 5 would have potential adverse long-term indirect impacts similar to Alternative 1. However, greater adverse impacts would occur in respect to currently open and undeveloped areas within the SR-18 project area. Under this alternative, 3.2 of the 14.8 miles of improved SR-18 consist of new alignment through an open, undeveloped rural area. Undeveloped land that is presently forest, pasture, and farmland would be converted to transportation uses and to other potentially more intensive uses, such as residential and commercial. Agricultural-related earnings and tax receipts may be lost or would decline.

Potential Land Use and Infrastructure Impacts Associated with Alternative 6

Direct Impacts to Land Use and Infrastructure (Alternative 6)

Implementation of Alternative 6 would have the same potential beneficial long-term direct impacts as Alternative 1 in respect to user benefits resulting from a more efficient and safer transportation facility. Development of a new intersection east of the existing SR-18/SR-5 (U.S. 45) intersection would result in decreased traffic congestion and increased traffic flow in this area of south Jackson.

There would be some long-term adverse impacts that would be similar in nature to those under Alternative 1, but generally of lesser magnitude. A total of 43 (39 residences, 4 businesses) displacements would occur under this alternative. Similar to Alternative 2, some parcels may be fragmented due to ROW acquisition. However, the larger size of some of the impacted occupied parcels under this alternative may permit relocation of displacees elsewhere on their property. In addition, there would be no adverse impacts on community cohesion as no residential neighborhood will become physically disrupted, fragmented, or isolated under this alternative.

Indirect Impacts to Land Use and Infrastructure (Alternative 6)

Implementation of Alternative 6 would have potential adverse long-term indirect impacts similar to Alternative 1. However, greater adverse impacts would occur in respect to currently open and undeveloped areas within the SR-18 project area. Under this alternative, 8.6 of the 14.6 miles of improved SR-18 consist of new alignment through an open, undeveloped rural area. Undeveloped land that is presently forest, pasture, and farmland

would be converted to transportation uses and to other potentially more intensive uses, such as residential and commercial. Agricultural-related earnings and tax receipts may be lost or would decline.

3.2.1.11 Mitigation of Land Use and Infrastructure Impacts

Mitigation measures, as defined by the Council on Environmental Quality (40 CFR 1508.20), include avoiding impacts, minimizing impacts, rectifying impacts, reducing or eliminating the impact over time, and compensating for the impact. Each of the two counties traversed by the build alternatives has mechanisms in effect to minimize, mitigate, or avoid adverse impacts of project implementation. Such issues as land use, buffering, noise mitigation, etc. can be addressed through implementation and application of the respective county growth policy plan, zoning and subdivision ordinances, design guidelines, and other special ordinances and/or policies. In some cases, there is potential that the ROW boundaries could be shifted slightly to avoid a small portion of a parcel. However, changes in the ROW boundary would be on a case-by-case basis and would not be considered if the change would diminish the overall integrity of the design.

All land acquisitions and relocation of displaced households, businesses, and any other affected party would be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646).

3.2.2 Social Environment and Community Resources

The geographic area considered for analysis of existing social conditions and environmental consequences consists of Madison and Hardeman Counties, including the Cities of Jackson and Medon. Environmental Justice is analyzed in further detail on the census tract, block group, and block level.

3.2.2.1 Population and Housing

Population and Population Trends

The Jackson, Tennessee Metropolitan Statistical Area (MSA) includes the City of Jackson, Madison County, and Chester County. In 2000, the Jackson MSA ranked number 318 in size among the 361 MSAs in the United States based on a population of 107,377.

According to the 2000 U.S. Census the population density within the two-county project area ranged from 42.1 persons per square mile in Hardeman County to 165 per square mile in Madison County. The urbanized population is concentrated in the City of Jackson (Madison County) accounting for 49.7 percent of the total population within the project area. In 2000 Hardeman County's population was primarily rural with 63 percent of its population classified as non-urban. In contrast, Madison County's population was the most urbanized with 71 percent of its inhabitants classified as urban. "Urban" consists of territory, people, and housing units in places of 2,500 or more persons being incorporated as cities, towns or villages, excluding rural portions of extended cities; census designated places of 2,500 or more persons; and other territory, incorporated or unincorporated included in urbanized areas. The U.S. Census defines rural areas as any population or area not classified as urban.

A comparative summary of population trends and projections within the project area and the State of Tennessee is shown on Table 3.1. The total population of the two-county project

area in 2000 was 119,942, which represents an 18 percent increase from 1990. This rate of population growth was slightly greater than the respective rate for the State of Tennessee (17 percent) during the 1990-2000 period. Hardeman County had the greatest relative (percentage) population increase (20 percent), while Madison County had the greatest absolute increase during the 1990-2000 period. Madison County's population increase of 13,855 accounted for approximately 47 percent of the population growth in the two-county project area during the 1990-2000 period. Over 75 percent of the county's population growth occurred in the City of Jackson. The majority of the population growth within Madison County has occurred in the northern portion of Jackson, along the I-40 corridor, and between Jackson and the City of Three Way. There was only an eight percent increase in population in the census block groups within the SR-18 project area during the 1990-2000 period. The majority of this limited growth has occurred in the form of residential development in the northern segment of Route 18 near the southern limits of the City of Jackson.

Past and current trends and future projections indicate continuing steady population growth within the project area. Current population estimates for July 1, 2005 indicate a population of 123,087 for the two-county project area, or a 3 percent increase since 2000. Population projections indicate an increase of approximately 7,800, or a 6 percent increase in the project area's population between the years 2005 and 2010. Past population trends and projected populations are shown on Table 3.1. This growth represents a relative increase of 9 percent between 2000 and 2010 for the project area, similar to the projected growth rate of 9 percent for the State of Tennessee during the same period. This represents an annual growth rate approximating one percent. Population projections for the project area indicate that Hardeman County would have the greatest relative increase (11 percent) during the current decade, with Madison County having the greatest absolute increase (7,769 persons).

Table 3.1. Population Trends and Projections for the SR-18 Project Area.

County/City	2010 Projected Population	2005 Population Estimates	Percent Change (1990- 2000)	2000 Population⁴	1990 Population⁴
Hardeman County	31,299 ¹	28,170 ²	20.2	28,105	23,377
Madison County	99,606 ¹	94,917 ²	17.7	91,837	77,982
City of Jackson	68,055 ³	62,914 ³	21.9	59,643	48,949
City of Medon	210 ³	203 ³	78.5	191	107
Tennessee	6,225,051	5,900,962	16.7	5,689,283	4,877,185
¹ Source: Tennessee Department of Health, Office of Health Statistics. ² Source: U.S. Department of Commerce, U.S. Census Bureau, 2006. ³ Source: University of Tennessee, Center for Business and Economic Research, College of Business Administration. ⁴ Source: U.S. Department of Commerce, U.S. Census Bureau, Census of Population, 1990 and 2000					

A summary of the population distribution by age cohort within the project area is shown on Table 3.2. For comparison purposes, also shown is the age distribution for the State of Tennessee. The age distribution of the population reflects the typical population age pyramid with a greater share of the population being at the young (under 18) and young/middle-age categories (25-54). There are no substantial differences in age distribution of the population on the county-wide level within the project area.

Table 3.2. Population Distribution by Age Cohort within the SR-18 Project Area, 2000 (percent).

Age Cohort (Years)	State of Tennessee	Hardeman County	Madison County	City of Jackson	City of Medon
Under 18	25	24	26	26	24
18-24	10	10	11	13	6
25-34	14	15	14	14	11
35-44	16	17	16	14	13
45-54	14	14	14	12	15
55-64	9	9	8	8	16
65-74	7	7	6	6	9
75 & Over	6	6	6	7	7

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

The dynamics of population change responsible for population growth or decline are natural increase (births minus deaths) and net migration. Net migration is the difference between immigration (moving in) and emigration (moving out) of the population. Table 3.3 portrays the relative importance of these two components in the population growth for the project area during the 2000-2005 period.

Net immigration was responsible for 21 percent of the population growth within the two-county project area from 2000 to 2005. This relative importance of net migration was similar for the State of Tennessee. Approximately 24 percent of the population increase in Madison County was due to immigration, while Hardeman County had a net emigration.

Table 3.3. Components of Population Change within the SR-18 Project Area, 2000-2005.

County	Population Change ¹ (Increase)	Natural Increase	Net Migration ²	Percent Due to Immigration
Hardeman County	65	283	-185	0
Madison County	3,079	2,058	670	24

¹ The estimated components of population change will not equal the total population change because of a small residual after controlling for the differences between sub-national and national population estimates.

² Includes both domestic and international migration.

Source: Population Estimates Program, Population Division, U.S. Bureau of the Census, Washington, D.C., July, 2005.

As shown on Table 3.4, the median household incomes within the project area ranged from \$29,911 in Hardeman County to \$36,982 in Madison County according to the 2000 U.S. Census. As indicated on Table 3.4 the greatest increase (65 percent) in median household income between 1990 and 2000 occurred in the City of Medon, with the smallest increase (52 percent) occurring in Hardeman County. The median household income for the two-county project area in 2000 approximated that of the State of Tennessee, with Hardeman County's median household income considerably less.

Table 3.4. Median Household Income within the Route 18 Project Area.

County	2000	1990
Hardeman County	\$29,111	\$19,128
Madison County	\$36,982	\$23,716
City of Jackson	\$33,194	\$21,063
City of Medon	\$26,750	\$16,250
Jackson, MSA	\$36,649	\$23,716
Tennessee	\$36,360	\$24,807

Source: U.S. Department of Commerce, U.S. Census Bureau, 1990 and 2000 Census of Population.

3.2.2.2 Housing and Household Characteristics

In 1999 there were a total of 48,899 housing units within the two-county project area according to the 2000 U.S. Census. Table 3.5 shows housing distributions by type of structure. The number of housing units increased by approximately 20 percent during the 1990-2000 period. Approximately 78 percent of the total housing units within the project area are in Madison County.

According to the 2000 U.S. Census, single family residential is the dominant housing type, comprising approximately 72 percent of the total housing units within the project area. Manufactured housing (mobile homes) comprises a greater share of the housing units in Hardeman County. The rural nature of these two counties partially explains the greater predominance of single family dwellings and manufactured housing. Multi-family housing is of greatest frequency and importance in the City of Jackson.

Table 3.5. Housing Distribution by Type of Structure within the SR-18 Project Area, 2000.

Type of Housing Structure	Hardeman County	Madison County	City of Jackson	City of Medon
Total Units	10,694	38,205	25,501	83
Percent Single Family	71.6	71.6	65.6	81.0
Percent Manufactured Housing	21.8	6.7	2.5	19.0
Percent 2-4 Family	4.2	11.8	17.4	—
Percent 5+Units Per Structure	2.3	9.8	14.4	—

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

Selected housing characteristics related to occupancy status, median value, vacancy rate, and size of household are shown on Table 3.6. As indicated, the owner-occupancy rate ranges from 67 percent in Madison County to 74 percent in Hardeman County. The cities of Jackson and Medon have high owner-occupancy rates with over 90 percent of the housing units owner-occupied. The median value of owner-occupied housing in 2000 ranged from \$59,900 in Hardeman County to \$85,100 in Madison County. The overall housing vacancy rate in 2000 for the two-county area was 10 percent.

Table 3.6. Housing Characteristics within the SR-18 Project Area, 2000.

County	Total Housing Units, 2000	Percent Vacant, 2000	Percent Owner Occupied, 2000	Median Value (Owner Occupied), 2000	Median Rent (Renter Occupied), 2000	Average Household Size, 2000
Hardeman County	10,694	12	74.	\$59,900	\$387	2.56
Madison County	38,205	7	67	\$85,100	\$510	2.49
City of Jackson	25,501	8	92	\$81,800	\$514	2.40
City of Medon	83	6	94	\$78,000	\$725	2.45
Total/ Average (County)	24,450	10	71	\$72,500	\$449	2.48

Source: U.S. Department of Commerce, Bureau of the Census, Population and Housing Characteristics, 2000

In 2000 there were a total of 44,964 households in the two-county project area compared to 37,885 households in 1990, representing almost a 20 percent increase. Over 79 percent of the households are in Madison, County. The average size of households is 2.48 persons.

3.2.2.3 Environmental Justice and Non-discrimination

On February 11, 1994, President Clinton issued Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. This Order was issued to provide that "each federal agency shall make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." A minority community is classified by the U.S. Census as African American, Hispanic American, Asian and Pacific American, American Indian, Eskimo, or Aluet, and other non-white persons. A low-income community or population was classified as having an aggregated mean annual income level for a family of four correlating to \$17,463 in 2000, adjusted for inflation. The threshold of poverty for a family of four in 2005 as defined by the U.S. Census Bureau was \$19,806.

According to the Final US DOT Order, a minority population means any readily identifiable groups of minority persons that live in geographic proximity. CEQ guidelines state that minority population should be identified where either (a) the minority population of the affected area exceeds 50%, (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. Information on race and ethnicity could be analyzed down to the Census Block level utilizing the U.S. Census data. Census Block level data are the most detailed level of population data made available by the US Bureau of Census.

The initial step in this process is the identification of minority and low-income populations that might be affected by implementation of the proposed action. For environmental justice considerations, those populations are defined as individuals or groups of individuals that are subject to an actual or potential health, economic, or environmental threat arising from existing or proposed federal actions and policies.

Table 3.7 compares minority and low-income populations for the project area, and the census tracts, block groups, and blocks traversed by the build alternatives. Figure 3-1 (2-pages) displays the boundaries of the census tracts and blocks studied. The block group boundaries can be determined by looking at the first number in the labels of the individual blocks shown within each tract on Figure 3-1 (i.e., Block 1003 would be part of Block Group 1 within the respective tract containing that block shown on the map).

Table 3.7. Minority and Low-Income Populations within the State Route 18 Project Area.

County/Census Tract/Block Group ¹	Total Population 2000	Percent Minority Population 2000 (%)	Median Household Income	Percent Below Poverty Level, 2000^{2,3}
Madison County	91,837	35	\$36,982	14
CT 13	6,009	9	\$33,940	10
BG 1	898	7	\$42,250	12
BL 1000	151	3	--	--
BL 1003	84	2	--	--
BL 1004	98	1	--	--
BL 1005	0	0	--	--
BL 1006	18	6	--	--
BL 1007	5	0	--	--
BL 1008	113	0	--	--
BL 1014	19	0	--	--
BL 1015	0	0	--	--
BL 1016	0	0	--	--
BL 1017	9	33	--	--
BL 1018	61	0	--	--
BL 1019	24	8	--	--
BL 1020	51	75	--	--
BG 2	710	13	\$34,861	8
BL 2014	6	0	--	--
BL 2015	24	0	--	--
BL 2016	0	0	--	--
BL 2017	104	6	--	--
BL 2020	133	1	--	--
BG 3	914	4	\$40,676	6
BL 3000	220	3	--	--
BL 3005	31	0	--	--
BL 3008	148	7	--	--
CT 18	3317	39	\$32,346	17
BG 1	1,750	33	\$38,250	13
BL 1000	66	0	--	--
BL 1001	3	0	--	--
BL 1002	53	4	--	--
BL 1003	135	4	--	--
BL 1004	24	0	--	--
BL 1015	100	58	--	--

County/Census Tract/Block Group ¹	Total Population 2000	Percent Minority Population 2000 (%)	Median Household Income	Percent Below Poverty Level, 2000^{2,3}
BL 1016	25	0	--	--
BL 1017	18	61	--	--
BL 1018	2	0	--	--
BL 1019	88	24	--	--
BL 1020	24	17	--	--
BL 1021	2	100	--	--
BL 1022	98	35	--	--
BL 1023	5	0	--	--
BL 1028	0	0	--	--
BL 1029	10	0	--	--
BL 1031	36	0	--	--
BL 1032	2	0	--	--
BL 1033	0	0	--	--
BL 1034	0	0	--	--
BL 1035	0	0	--	--
BL 1036	15	27	--	--
BL 1037	7	0	--	--
BL 1043	5	0	--	--
BL 1044	12	0	--	--
BL 1045	58	2	--	--
BL 1046	19	11	--	--
BL 1047	22	36	--	--
BL 1048	0	0	--	--
BL 1060	25	8	--	--
BL 1061	51	20	--	--
BL 1062	5	20	--	--
BL 1063	0	0	--	--
CT 19	4,624	8	\$38,820	11
BG 4	1,426	13	\$38,750	16
BL 4005	13	0	--	--
BL 4015	121	2	--	--
BL 4017	88	2	--	--
Hardeman County	28,105	43	\$29,111	20
CT 9501	4,014	16	\$30,047	20
BG 1	992	22	\$32,292	24
BL 1000	2	0	--	--

County/Census Tract/Block Group ¹	Total Population 2000	Percent Minority Population 2000 (%)	Median Household Income	Percent Below Poverty Level, 2000^{2,3}
BL 1002	15	0	--	--
BL 1034	5	0	--	--
BL 1035	0	0	--	--
BL 1036	102	6	--	--
BL 1041	48	2	--	--
BL 1042	19	0	--	--
BL 1076	16	0	--	--
BL 1077	1	0	--	--
BL 1078	9	0	--	--
BL 1079	0	0	--	--
BL 1080	0	0	--	--
BL 1081	7	0	--	--
BL 1082	9	0	--	--
BL 1083	8	0	--	--
BG 2	1,633	20	\$28,459	17
BL 2003	0	0	--	--
BL 2004	7	14	--	--
BL 2005	2	0	--	--
BL 2006	25	0	--	--
BL 2011	9	0	--	--
BL 2012	24	4	--	--
BL 2014	52	2	--	--
BL 2024	24	13	--	--
BL 2028	27	7	--	--
BL 2091	2	0	--	--
Total of all Census Tracts Traversed by SR-18 Alternatives	4,491	18	\$33,788	15
Tennessee	5,689,283	20	\$36,360	13
CT = Census Tract BG = Census Block Group BL = Block Level -- = Data Not Available at Block Level ¹ Includes those census tracts/block groups traversed by the build alternative alignments. ² The poverty level for a family of four was \$17,463 in 2000. ³ The poverty level for a family of four was \$19,806 in 2005. <i>Source: U.S. Census Bureau, U.S. Census, 2000; U.S. Census Bureau, Small Area Income & Poverty Estimates, 2005.</i>				

Figure 3-1 (Map 1 of 2). Map of the Census Tracts and Blocks within the State Route 18 Project Area in Hardeman and Madison Counties, Tennessee with Minority Population Data.

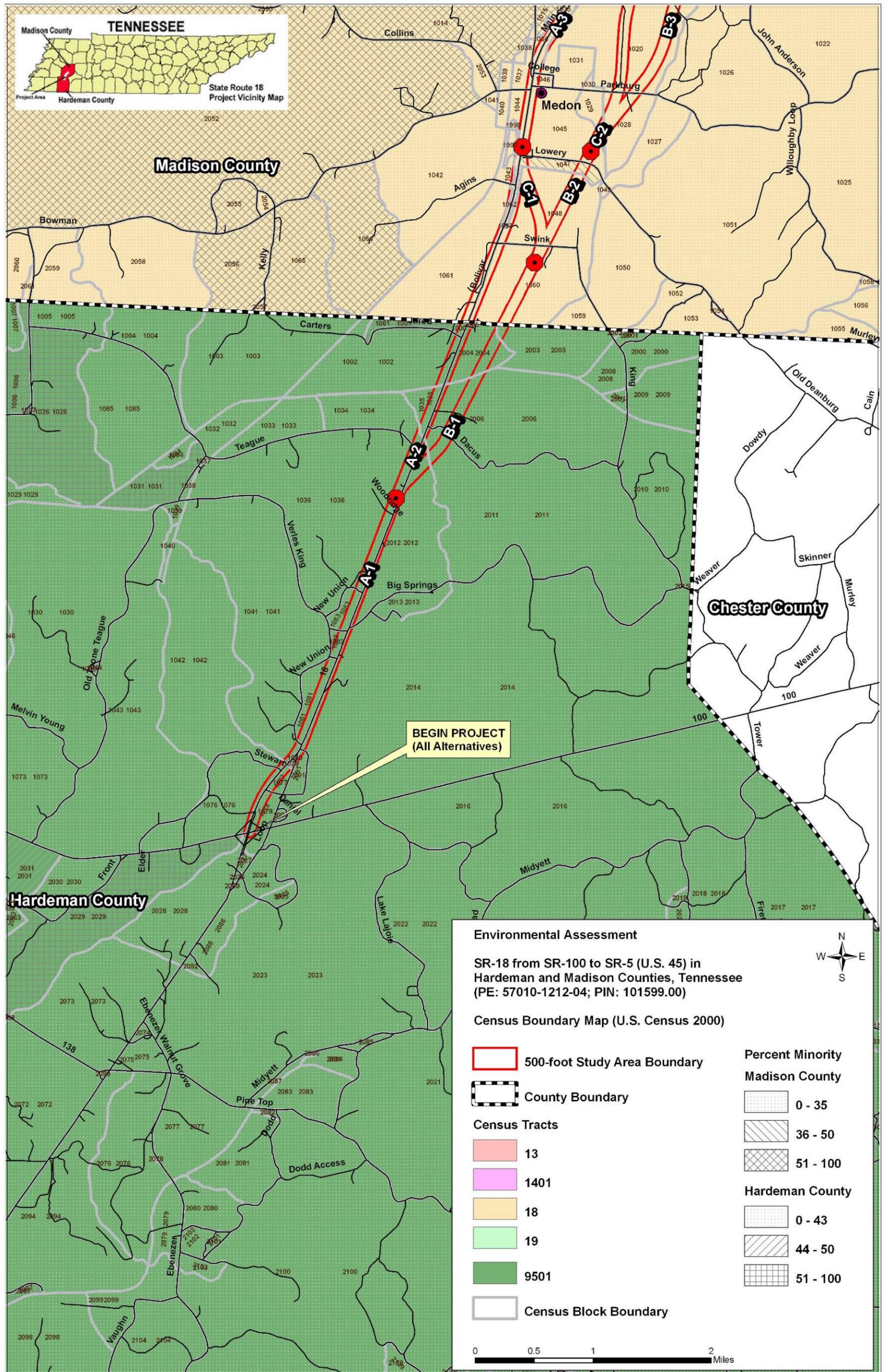
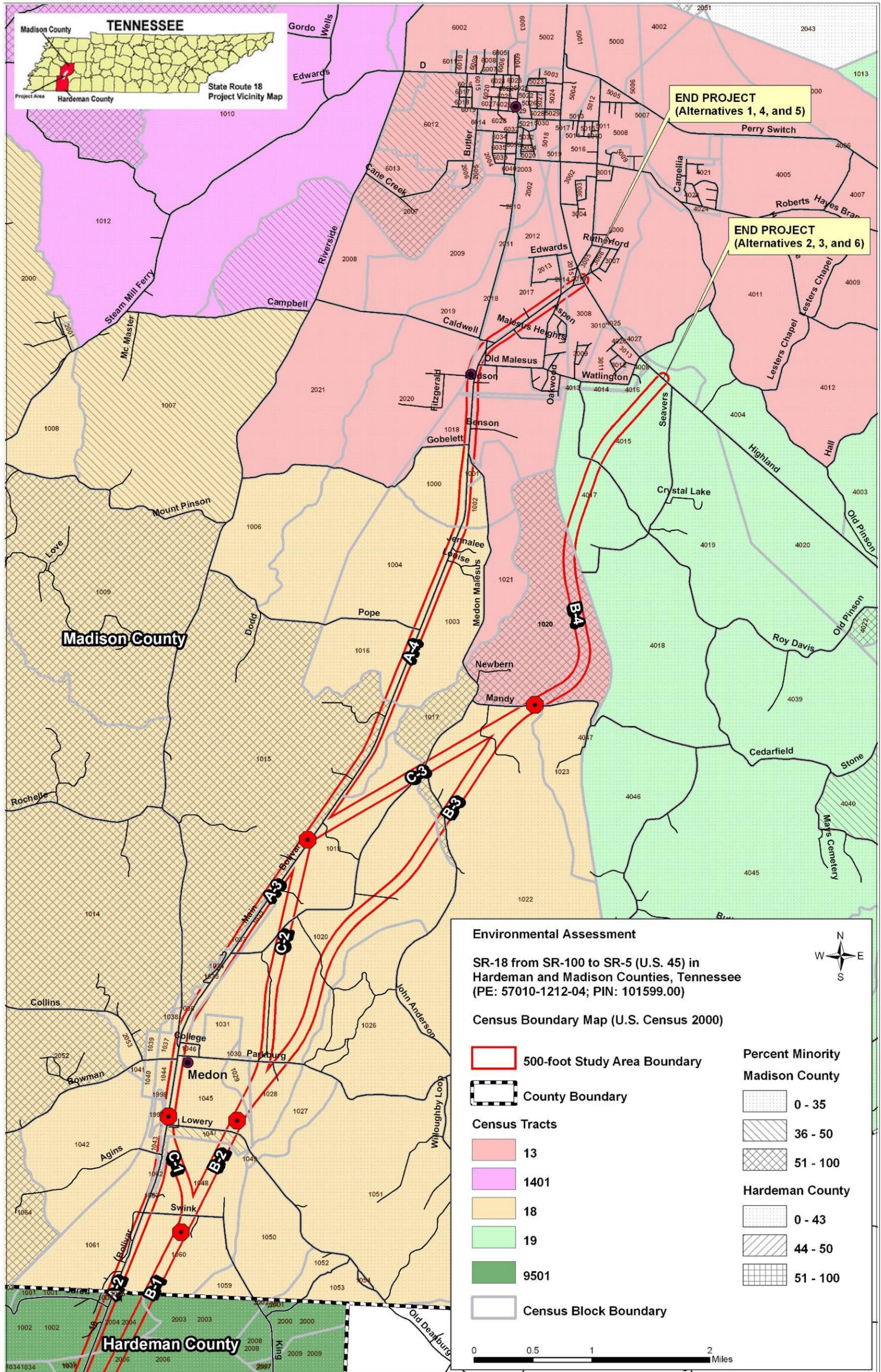


Figure 3-1 (Map 2 of 2). Map of the Census Tracts and Blocks within the State Route 18 Project Area in Hardeman and Madison Counties, Tennessee with Minority Population Data.



In 2000, the relative share of minority population in the two-county project area was approximately 37 percent, considerably higher than the relative share of minority population for the State of Tennessee (20 percent). The relative share of minority population ranged from 35 percent in Madison County to 43 percent in Hardeman County. The relative share of minority population within the combined census tracts affected by SR-18 is 18 percent.

Adverse impacts to minority and/or low-income persons are considered "high and disproportionate" if: (a) the adverse impact is predominantly borne by a minority population and/or a low-income population is more severe or greater in magnitude than the adverse impact that will be imposed by the non-minority population and/or non-low-income persons. The Final US DOT Order directs government agencies to determine disproportionate impact, taking into account mitigation, enhancement measures and all off-setting benefits to the affected populations, as well as the design, comparative impacts and the relevant number of similar existing system element in non-minority and non-low income areas.

In order to determine if a disproportionate impact would occur on minority populations the individual blocks within the impact area were studied. All blocks that contained greater than 50% minority population are highlighted on Figure 3-1. In addition, to determine if blocks containing a higher percentage of minority populations would be impacted by the Build Alternatives, all blocks that contain a higher percentage of minorities than the respective county in which they are contained were highlighted on Figure 3-1. For Hardeman County all blocks that contained greater than 43% minority populations were highlighted; whereas in Madison County, blocks that contained greater than 35% were highlighted. Table 3.7 above showed the actual percentage of minority populations within each individual block shown on Figure 3-1.

For comparison purposes, the average percent minority for all of the blocks impacted by each individual Build Alternative was calculated. The average percent minority for the individual blocks impacted by each Build Alternative is shown on Table 3.8. Based on this data, Alternative 6 would have the potential to affect the blocks with the highest percentage of minority populations compared to the other Build Alternatives, followed by Alternative 3 and Alternative 2 respectively. The primary areas containing high percentages of minority populations that would be impacted by those alternatives include Segments A-3 and A-4 along the existing SR-18 and Segment B-4 all in Madison County. The alignments that utilize Segment A-3 and Segment A-4 would result in the highest number of potential displacements (15 and 35 respectively for the two segments), some of which may include minorities. Those alignments that follow Segment B-4 would only result in approximately 5 total displacements in that segment and therefore would not be expected to result in substantial impacts.

Table 3.8. Average Percentage of Minority Populations within the Census Blocks Affected by each of the State Route 18 Build Alternatives in Hardeman and Madison Counties, Tennessee.

Build Alternative	Alignment Segment	Total Population within Blocks Affected 2000¹	Percent Minority Populations within Blocks Affected 2000 (%)
Alternative 1 (Widen Existing SR-18)	A-1, A-2, A-3, A-4	2,438	6
Alternative 2	A-1, B-1, B-2, B-3, B-4	906	11
Alternative 3	A-1, A-2, A-3, C-3, B-4	1,278	12
Alternative 4	A-1, B-1, B-2, C-2, A-4	2,272	6
Alternative 5	A-1, B-1, C-1, A-3, A-4	2,358	6
Alternative 6	A-1, B-1, C-1, A-3, C-3, B-4	1,198	13
¹ Includes the total population within those census blocks traversed by the build alternative alignments. This does not represent the number of people that would be displaced. <i>Source: U.S. Census Bureau, U.S. Census, 2000.</i>			

In addition, when compared to the average of 37% minority population present in the two-county study area, and 18% minority population for the affected census tracts, none of the alternatives would affect a high percentage of minority populations based on the block level detail. The highest percent minority affected (13%) would occur under Alternative 6, but that percentage is lower than both the county and tract averages.

According to the 2000 U.S. Census approximately 17 percent of the population within the two-county project area was considered to be below the poverty level in 2000, slightly higher than for the Jackson MSA (14.0 percent) and the State of Tennessee (13.5 percent). More recent estimates from the U.S. Census Bureau for 2004 indicate a small increase in the relative magnitude of population below the poverty level at the county level. The census tracts traversed by the build alternatives have a population below the poverty level ranging from 10 percent to 20 percent. Block group 4 in Census Tract 19 in Madison County and Block Group 1 in Census Tract 9501 in Hardeman County are the only block groups within the build alternative alignments in which the percent of population below the poverty level (16 and 24 percent respectively) exceeds the respective census tract and county poverty rates. These two block groups are located adjacent to the City of Jackson and in Hardeman County, respectively. Very few displacements would occur within those particular block groups and therefore the potential for adverse impacts to low-income families due to this project is considered to be low. Displacements per build alternative segment is discussed in the following section, Section 3.2.2.4.

Based on the above data, it is not anticipated that disproportionate impacts would occur to any minority or low-income populations. The burden of the new roadway would not be more severe or greater in magnitude than the adverse impact that will be imposed by the non-minority population and/or non-low-income persons along the proposed routes. All demographics would share in the benefits associated with the improved transportation facilities provided by this project.

Although some of the blocks within the impact area of each of the Build Alternatives do contain a higher percentage of minorities than the respective county averages, there does not appear to be reasonable alternatives to avoid impacting those blocks due to the relatively high percentage of minority populations within the counties as a whole. In other words, moving the alignments would likely result in impacts to other blocks containing minority populations. Also, the proposed alignments do not result in a substantial number of residential displacements in the individual blocks that do contain the high percentages of minority populations, with the exception of those alternatives that would require widening of the existing SR-18 within the A-3 and A-4 Segments identified on Figure 3-1. One of the primary blocks impacted in that area is Block 1015 within census tract 18. This is a large block and it is not known exactly how much of the minority population in that block lives in the areas that would be directly impact by the SR-18 widening. It is not expected that shifting the widening of SR-18 to the opposite side of the highway would result in noticeable differences in the demographics affected. It is anticipated that comparable replacement housing would be available in the project vicinity to allow all displaced individuals to relocate in the same vicinity. An equal burden will be put on all demographics affected. Therefore this project is in compliance with EO 12898.

3.2.2.4 Displacements and Relocations

A field survey was conducted along the proposed ROW for each Build Alternative of SR-18 to determine residential, business, and public/non-profit displacements that could potentially occur because of the proposed construction. County tax maps and aerial photographs were used in field surveys to identify specific parcels potentially impacted. County assessor records were subsequently used to determine real property appraised values and property taxes.

The 2000 U.S. Census data supplemented with field surveys were analyzed to determine general characteristics of the households to be displaced and relocated. The potential displacees are assumed to be representative of a cross-section of households within the project area, and include family, one-person, and elderly households. However, it is estimated that the majority of the residential displacements are family households, with minimal displacement of elderly households and handicapped individuals. The average size household is estimated at 2.5 persons. U.S. Census data for 2000 indicate that over 80 percent of the potentially displaced households are owner-occupied. Based on the respective county assessor records, the appraised valuations of the potentially displaced residences range from under \$100,000 to over \$250,000 (improvement value only). The types of residential structures potentially displaced consist primarily of single-story/two-story residences, with mobile homes being the second most common type of residence. Based upon 2000 U.S. Census data and supplemented with field observations, it is estimated that the majority of the potential displaced households are Caucasian. There is no identified concentration of any minority or ethnic groups associated with any of the build alternatives.

A Conceptual Stage Relocation Plan was prepared for this project. Field surveys indicated that there are the following number of potential displacements and relocations associated with the individual Build Alternatives:

Alternative 1 - 72 residences and 8 businesses;

Alternative 2 - 16 residences and 1 businesses;

Alternative 3 - 48 residences and 5 businesses, and 1 non-profit (church);

Alternative 4 - 55 residences and 5 businesses;

Alternative 5 - 63 residences; and 7 businesses; and

Alternative 6 - 39 residences, 4 businesses, and 1 non-profit (church).

To get a better idea of exactly where the majority of the displacements would occur within each build alternative alignment, the displacement data was summarized by each individual alignment segment being studied for this project. The displacement data is summarized by segment on Table 3.9.

Table 3.9. Number of Displacements by Alignment Segment followed by the State Route 18 Build Alternatives in Hardeman and Madison Counties, Tennessee.

Segment	Residential Displacements	Business Displacements	Non-Profit Displacements
A-1	8	1	
A-2	14	1	
A-3	15	2	
A-4	35	4	
B-1	2		
B-2	0		
B-3	1		
B-4	5		
C-1	3		
C-2	8		
C-3	6	1	1

The SR-18 Build Alternatives consist of the following segments:
 Alternative 1 (Widen Existing SR-18) - A-1, A-2, A-3, A-4;
 Alternative 2 - A-1, B-1, B-2, B-3, B-4;
 Alternative 3 - A-1, A-2, A-3, C-3, B-4;
 Alternative 4 - A-1, B-1, B-2, C-2, A-4;
 Alternative 5 - A-1, B-1, C-1, A-3, A-4; and
 Alternative 6 - A-1, B-1, C-1, A-3, C-3, B-4.

Source: TDOT, State Route 18 Conceptual Stage Relocation Plan, December 2008

These numbers are subject to change slightly during the final design and acquisition phases of the project as minor shifts in the ROW boundary could occur.

Although there is the potential for a large number of displacements, a study of the real estate market in the project area indicates an active market with sufficient housing both for sale and for rent to accommodate those displaced by this project. According to the Madison County/Jackson Multiple Listing Service (MLS), there were 566 single-family dwellings for sale in the \$50,000-\$300,000 price range in Madison County and the City of Jackson in March 2007.

The distribution of the for-sale properties in the City of Jackson and Madison County by listed price range is shown in Table 3.10. The median price range for the listed properties is \$125,000-\$150,000. There were 148 properties listed for \$50,000-\$100,000, while there were 213 single-family homes listed for \$100,000-\$150,000. These price ranges most likely represent the primary housing market for the majority of the potential residential displacees.

Table 3.10 Single Family Homes List for Sale, Madison County/City of Jackson.

Listed Price Range	Number of Listed Single Family Properties
\$50,000 - \$ 75,000	76
\$75,000 - \$100,000	72
\$100,000 - \$125,000	87
\$125,000 - \$150,000	126
\$150,000 - \$175,000	64
\$175,000 - \$200,000	52
\$200,000 - \$300,000	89
TOTAL	566
<i>Source: Madison County/Jackson Multiple Listing Service, March 9, 2007.</i>	

Procedures and Assurance for Assistance to Displaced Persons

The relocation of displaced households, businesses, and any other affected party will be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646). Comparable replacement housing will be provided to all residential relocatees under the provisions of the above laws.

Comparable replacement housing is defined as follows: a decent, safe, and sanitary dwelling; functionally equivalent to the existing displaced dwelling; in a location not less desirable than the existing displaced dwelling; on a site that is typical in size for residential development; currently available on the private market; and within the financial means of the displaced person. It is anticipated that most displaced will be relocated successfully. However, if any situation should exist where comparable decent, safe, and sanitary housing within the financial means of the displaced person is not available, such housing will be made available under the replacement housing of "last resort" provisions of the above laws.

Relocation services will be provided without regard to race, color, religion, or national origin. Relocation payments and financial assistance will be in accordance with the above laws.

3.2.2.5 Neighborhood and Community Cohesion

The primary communities that would be impacted by this project include Medon, Malesus, and South Jackson. Most of the residences that would potentially be impacted within the immediate project area are located along the existing SR-18, primarily within the Madison County portion of the roadway. There are multiple residences in the Medon area that are located along the existing route and could potentially be impacted by the project. However, the majority of residences that would be impacted by this project are located along SR-18 in the Malesus/South Jackson area located at the extreme northern portions of the project area, primarily within the Segment A-4 area. There are smaller groups of houses or small neighborhoods located in other areas along the existing route that may also be impacted. Due to the relatively small size of the communities and/or neighborhoods in the area, displacement of only a small portion of the residences may be meaningful in terms of neighborhood and community cohesion.

3.2.2.6 Travel Efficiency

The primary route used for travel between the various communities in the immediate project area are SR-18, SR-100, and SR-5 (U.S. 45), with secondary roads such as Medon-Malesus Road, Parkburg Road, and Riverside Drive also providing important connections within the region.

As discussed in Chapter 1 of this EA, traffic volumes are projected to increase along the existing SR-18 and result in reduced travel efficiency in the long-term. Some signs of travel efficiency problems have already begun to develop along portions of the existing route. Most of the problems occur along the northern segment of the existing SR-18 in the Malesus/South Jackson vicinity. Such problems would only be expected to worsen as traffic volumes in the area continue to increase.

Reduced travel efficiencies can result in both social and economic consequences including increased commuting times, increased response time for emergency vehicles, lower fuel efficiency, and potential impacts on property values as the area could become less desirable to new residents due to traffic issues.

3.2.2.7 Considerations Relating to Pedestrians and Bicyclists

No bicycle lanes are planned to be included within the ROW of the proposed roadway, because the design speed through much of the area would prohibit the safe provision of bicycle traffic. However, if one of the build alternatives that utilize the urban sections of SR-18 within the Jackson and/or Medon city limits is constructed, sidewalks would be provided within the proposed ROW. Provision of sidewalks in the urban part of the project area would be consistent with the Jackson Urban Area MPO's 2005 Bicycle and Pedestrian Plan, which indicated sidewalk improvements would be provided with future SR-18 road widening efforts in that area.

Although no bicycle lanes are currently proposed, bicyclists and pedestrians could utilize the proposed paved shoulders along the length of the roadway.

3.2.2.8 Visual Quality

Visually desirable open space, agricultural land, and forests have been increasing in relative importance because development has diminished their abundance. Any primary or secondary effects during and after highway construction should be examined with these trends in mind.

Roadway projects can have a negative effect on the visual quality due to loss of undeveloped habitats, modification of naturally flowing streams, and alteration of natural topography from cut-and-fill activities. Improper preparation of sites for construction activities can also have aesthetic consequences. Examples of improper preparation include inappropriately located disposal sites, damage to trees, and poorly located access and haul roads.

Roadway projects can also result in improvements to visual quality if the new roadway is constructed in areas otherwise perceived as rundown or poorly maintained. Also, replacing older roadways with newer, better designed features, may also be perceived by some individuals as an improvement over the existing, older more run-down facility.

3.2.2.9 Social Environment and Community Impacts

Potential Social/Community Impacts Associated with the No-Build Alternative

Direct Impacts to Social/Community Resources (No-Build Alternative)

Because the SR-18 improvement would not be constructed under the No-Build Alternative, there would be no additional direct impacts to the social environment. Existing social conditions and trends would be anticipated to continue in the project area. Future population growth, housing, and supportive development would be expected to be limited, reflecting recent and current trends.

Indirect Impacts to Social/Community Resources (No-Build Alternative)

The anticipated decreases in traffic congestion, reduction of accident rates, and travel cost savings would not occur as the SR-18 improvement would not be constructed. Local roads would continue become more crowded if population levels increased. This would result in decreased LOS on some local roadways.

Reduction in travel efficiency along primary routes, such as SR-18, can result in potential social and economic impacts, especially for local communities. Some of the potential social impacts would be due to increased travel times required for commuters to go to and from work, school, or other primary travel destinations. In addition, response times for emergency vehicles can be adversely impacted resulting in potential negative consequences for residents in the area.

Potential Social/Community Impacts Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Social/Community Resources (Alternative 1-Widen Existing)

Direct long-term adverse impacts under Alternative 1 include the potential displacement and relocation of 72 residences and 8 businesses. The potential displacement of 72 households would result in an additional demand on the existing housing market. Although there is a high number of displacements possible, a study of the real estate market in the project area

indicates an active market with sufficient housing both for sale and rent to accommodate those displaced by this project.

Direct short-term adverse impacts associated with displacement/relocation include temporary disruption of household quality of life and routine, temporary disruption of business activity and employment for those businesses directly impacted, and temporary disruption of church-related services and functions.

Direct short-term adverse social impacts would occur as a result of population loss from the displacement and relocation of 72 households. The potential estimated population loss is approximately 180 people based on an average of 2.5 persons per household. There would be direct long-term adverse impacts on community cohesion as two residential neighborhoods would be disrupted and adversely impacted by Alternative 1. These include the City of Medon, and the community of Malesus in south Jackson.

It is anticipated that many of the displaced families would prefer and attempt to relocate in the same general area, some on remaining portions of their affected properties, if feasible. However, subsequent on-site relocation does not appear to be feasible with the majority of displaced households. In addition, there is currently a lack of available replacement housing on the market in the south Jackson area and within the SR-18 project area in Madison and Hardeman Counties.

Other direct short-term adverse impacts include a temporary increase in traffic congestion, and disruption of traffic patterns and accessibility during the construction period. In addition, there would be direct short-term adverse impacts in respect to the visual, noise, and air quality environment associated with project construction activities. Other direct short-term adverse impacts would be anticipated during the construction phase relative to posing potential temporary inconveniences for the parishioners of the various churches within the project area.

Direct long-term adverse impacts would result from increased traffic and related noise, night-time glare, and other visual effects associated with the SR-18 improvement. Those properties immediately adjacent or in proximity to the SR-18 would be most adversely impacted. It is expected that the majority of traffic-related adverse impacts would be associated with heavy truck traffic.

Alternative 1 would not adversely impact, split, disrupt or isolate any low-income, minority, social or ethnic group, as there is no concentration of any of these groups within, adjacent or in the near vicinity of the proposed SR-18 ROW. The individual census blocks traversed by Alternative 1 have a lower proportion of the population below the poverty level than the respective census block group, census tract, and county. Those census block groups having a higher than average poverty rate and minority population reflect census blocks within that block group that are more distant from the SR-18 project area. The percent minority population within the immediate area of SR-18 is less than the respective county-wide relative share of minority population. Less than 10 percent of the population is minority within those census blocks in which the majority of residential displacements occur (e.g. Medon and the community of Malesus in south Jackson). Thus, there would be no disproportionate adverse impact on minority or low-income populations under this alternative.

This document has been reviewed by the TDOT's Civil Rights Staff (Department) in accordance with Title VI of the Civil Rights Act of 1964. The Department will comply with Title VI to ensure that "No person shall be, on the grounds of race, color or national origin, excluded from participation in, denied the benefits of, or subject to discrimination under any program or activity receiving federal assistance." The Department notifies the public of proposed highway projects and the availability of environmental documents for public inspection is published in local newspapers.

This project is not expected to sever any existing or proposed pedestrian or bicycle routes in the project area. Any existing routes designated for pedestrians and bicycles that are crossed by SR-18 would be provided access across the roadway. Details regarding any existing pedestrian or bicycle trails would be developed during the final design phase of the project.

The improvements to SR-18 under Alternative 1 would have a minor effect on visual quality due to additional loss of undeveloped habitats, modification of naturally flowing streams, and alteration of natural topography from cut-and-fill activities. However, because Alternative 1 would involve widening of an existing roadway, the additional adverse visual impacts would not be substantially different from the existing conditions. The roadway would result in the roadway moving closer to some of the existing residences along SR-18 potentially degrading their viewshed.

In other instances, people may see the wider, newly designed roadway to be more visually appealing than the existing, older highway. In addition, some of the more run-down buildings or properties within the proposed ROW would likely be removed or cleaned-up during construction. These changes could result in a better view for adjacent landowners, local citizens, and commuters using the new roadway.

Indirect Impacts to Social/Community Resources (Alternative 1-Widen Existing)

Indirect long-term beneficial impacts are anticipated as related to traffic safety, public services, and facilities. Highway and traffic safety would be beneficially impacted in the long-term by project implementation. Current traffic and future traffic demands would be served in a more efficient and safe manner by construction of the proposed SR-18 improvement. Reduced travel time and less congestion would indirectly benefit safety in the long term.

It is anticipated that some new residential and commercial developments would occur in certain strategic areas within the vicinity of SR-18 which would have improved accessibility and mobility under Alternative 1. The associated population increases resulting from the new developments would eventually demand additional public services and facilities, which would result in increased public expenditures. However, the additional tax revenues produced from new residential and commercial developments in the area would help provide funding for many of these projects.

The provision of public services, such as police, fire and emergency medical, would be beneficially impacted in the long-term under Alternative 1. Improved accessibility and increased efficiency in the circulation system would result in lower response time in many instances for delivery of these services. Overall, accessibility to public services and facilities would not be adversely impacted under this build alternative. Disruptions to utility services would be minimized under Alternative 1 as it is standard policy for the TDOT to coordinate all utility relocations with the affected utility companies.

Indirect beneficial long-term impacts would occur in respect to the provision of suitable and comparable replacement or “last resort” housing for displaced households, and provision of replacement properties for displaced businesses. The provisions of suitable and acceptable replacement housing, combined with adequate relocation payments, can be expected to minimize relocation impacts resulting from project implementation.

Some displaced families or businesses may choose to construct new residences or businesses within the area during their relocation efforts which may result in additional loss of open space and impacts to natural resources. It is expected that these impacts would be minor and relatively isolated.

Improvements to SR-18 may induce adjacent land use changes, generating visual impacts away from the proposed highway. Secondary developments would likely result in additional clearing of vegetation and replacing it with man-made structures. These changes may be perceived as negative by some and positive by others, depending on the types of land use changes that occur. Construction of the new highway and associated secondary developments that could include more modern buildings with professionally landscaped areas may improve the visual environment in some locations.

Potential Social/Community Impacts Associated with Alternative 2

Direct Impacts to Social/Community Resources (Alternative 2)

Direct adverse impacts under Alternative 2 would be considerably less than those associated with Alternative 1 as there would be only 16 residences and 1 business potentially displaced. Other direct impacts would be expected to be similar, but of much lesser magnitude, than those associated with Alternative 1.

Indirect Impacts to Social/Community Resources (Alternative 2)

Indirect impacts to social/community resources would be similar to those under Alternative 1.

Potential Social/Community Impacts Associated with Alternative 3

Direct Impacts to Social/Community Resources (Alternative 3)

Direct short-term adverse impacts under Alternative 3 include the potential displacement and relocation of 48 residences, 5 business, and 1 church. Other direct impacts would be expected to be similar to those associated with Alternative 1.

Indirect Impacts to Social/Community Resources (Alternative 3)

Indirect impacts to social/community resources under Alternative 3 would be similar to those under Alternative 1.

Potential Social/Community Impacts Associated with Alternative 4

Direct Impacts to Social/Community Resources (Alternative 4)

Direct short-term adverse impacts under Alternative 4 include the potential displacement and relocation of 53 residences and 5 businesses. Other direct impacts would be expected to be similar to those associated with Alternative 1.

Indirect Impacts to Social/Community Resources (Alternative 4)

Indirect impacts to social/community resources under Alternative 4 would be similar to those under Alternative 1.

Potential Social/Community Impacts Associated with Alternative 5

Direct Impacts to Social/Community Resources (Alternative 5)

Direct short-term adverse impacts under Alternative 5 include the potential displacement and relocation of 63 residences and 6 businesses. Other direct impacts would be expected to be similar to those associated with Alternative 1.

Indirect Impacts to Social/Community Resources (Alternative 5)

Indirect impacts to social/community resources under Alternative 5 would be similar to those under Alternative 1.

Potential Social/Community Impacts Associated with Alternative 6

Direct Impacts to Social/Community Resources (Alternative 6)

Direct short-term adverse impacts under Alternative 6 include the potential displacement and relocation of 39 residences, 4 businesses, and 1 church. Other direct impacts would be expected to be similar to those associated with Alternative 1.

Indirect Impacts to Social/Community Resources (Alternative 6)

Indirect impacts to social/community resources under Alternative 6 would be similar to those under Alternative 1.

3.2.2.10 Mitigation of Social Environment Community Resources Impacts

All reasonable efforts would be made to minimize the adverse impacts to residential, business, and other displacements resulting from implementation of the build alternatives. The relocation of displaced households, businesses, and any other affected party would be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972 and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646). TDOT would comply with Title VI to ensure that no person shall, on the grounds of race, color, religion, or national origin, be excluded from participation in, denied the benefits of, or subject to discrimination under any program or activity receiving federal assistance.

Parcels that would become fragmented and consequently lose their previous access would need to be addressed through modification of existing or provision of alternative access. Measures would be taken to avoid disruption in accessibility and subsequent delivery of public services, such as police, fire, EMS, and school bus routing during project construction.

The relocation of displaced households, businesses, and any other affected parties would be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646) as amended by the Surface Transportation and Uniform Relocation Act of 1987. These relocation assistance programs are offered to all individuals, families, businesses, farm operators, and non profit

organizations that are partially or totally displaced by a federal or state highway project. Relocation assistance under these programs would be available to all relocatees without regard to race, color, religion, or national origin. Relocation payments and financial assistance would be in accordance with the above laws. A relocation office would be established within the general project area at the initiation of negotiations for property acquisition.

Comparable replacement housing would be provided for all displaced households under the provisions of the above laws. Comparable replacement housing means a decent, safe, and sanitary dwelling; functionally equivalent to the existing displaced dwelling; adequate in size to accommodate the displaced person(s); in a location not less desirable than the existing displaced dwelling; located on a typical residential site; accessible to the displaced person's place of employment; currently available on the private market; and within the financial means of the displaced person. If any situation should exist where suitable housing is not available, such housing would be made available under the provisions of "Last Resort" housing when replacement housing is not available.

Relocation services would be provided without regard to race, color, religion, or national origin. Relocation payments and financial assistance would be in accordance with the above laws. All persons and businesses to be displaced are given assurances that they would not have to move from their dwelling or place of business without at least a 90-day written notice given after the subject property has been purchased by TDOT and at least one comparable replacement dwelling has been made available to the displaced occupant.

Impacts of the proposed relocations are discussed in detail in the Relocation Technical Memorandum. The provisions of suitable and acceptable replacement housing, combined with adequate relocation payments, can be expected to minimize relocation impacts resulting from project implementation. As stated previously in this document, TDOT foresees no difficulty in satisfactorily relocating all persons likely to be displaced under any of the build alternatives.

Potential mitigation measures for visual impacts should include, but not be limited to:

- Consideration of post-project aesthetic appeal during the highway's functional design, surveying, and clearing.
- Preparation of areas within the ROW to permit successful revegetation programs that accommodate, preserve, and capitalize on mature and semi-mature stands of vegetation. Care should be taken to establish desirable native vegetation. This may be accomplished either naturally or through planned seeding.

3.2.3 Economic Environment

3.2.3.1 Economic Conditions and Trends

Various key indicators of economic conditions and growth within an area include changes in labor force, employment, capital investment, retail sales, and property values. These economic variables are discussed in the context of the two-county project area.

Labor Force

The annual labor force in Madison and Hardeman Counties approximated 57,500 in 2005 with total employment of the labor force estimated at 53,960 (BLS, 2005). Approximately 80

percent of the labor force is located in Madison County. The 2005 labor force represented a one percent decrease from 2000, while the statewide labor force increased by one percent during this five-year period. The annual unemployment in the two-county project area in 2005 was 6.1 percent compared to a statewide unemployment rate of 5.6 percent.

Employment

Total employment within the two-county project area exceeds the resident labor force as a result of workers commuting into Madison County from adjacent counties for employment. Total employment in the two-county project area approximated 77,750 in 2004, with over 85 percent of the employment in Madison County. This represented an increase of 1,167 employees, or less than a two percent increase during the 2001-2004 period. Almost all of the employment increase occurred in Madison County, primarily within the City of Jackson and adjacent area. During the same period statewide employment increased by 2.5 percent. Local and regional employment trends reflect national trends as services and retail trade experienced the most notable gains, with manufacturing reflecting a decrease in employment during this period. Employment by the major industry sectors, including the government sector, for 2004 is shown on Table 3.11.

Table 3.11. Full and Part-Time Employment by Major Industry Sector by Place of Work in the Two-County State Route 18 Project Area, 2004 (North American Industrial Classification System).

Industry Sector	Madison County		Hardeman County	
	Total Employment	Percent	Total Employment	Percent
Total Employment	66,992	100	10,756	100
Farm Employment	759	1	760	9
Agriculture, Forestry, Fisheries	(D)	-	100	1
Mining	(D)	-	11	Neg.
Construction	4,197	7	521	6
Manufacturing	10,309	16	2,134	24
Transportation, Communications, Utilities	(D)	-	310	4
Wholesale Trade	2,362	4	(D)	-
Retail Trade	8,943	14	1,074	12
Finance, Insurance, Real Estate	3,491	5	507	6
Services	22,849	35	1,201 ¹	14
Government	11,488	18	2,141	24

¹ A number of the service subsectors (e.g. health care, social assistance, education) did not disclose employment and, thus, the services sector employment is under reported.
(D) Not shown to avoid disclosure of confidential information, but estimates for these items are included in the total non-farm employment.
Note: Sum of sector employment does not equal total employment because of non-disclosure of information for some industry sectors and service sub-sectors.
Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts.

The services, government, and manufacturing sectors comprise almost 70 percent of the total employment within the project area. This employment sector distribution is similar to the State of Tennessee, although manufacturing comprises a greater relative share of total employment within the project area. Manufacturing and government comprise the largest sectors of employment in Hardeman County, while services and government are the predominant employment sectors in Madison County. Overall, the project area has a balanced and diversified employment base. The major employers, all of which are located in Madison County, are listed on Table 3.12.

Table 3.12. Major Employers within the State Route 18 Project Area.

<u>Employer</u>	Number Employees
West Tennessee Healthcare	5,200
Jackson-Madison County School System	1,987
Proctor and Gamble	1,280
Proctor-Cable/Delta (Black and Decker).	1,200
Jackson State Community College	788
City of Jackson	767
Delta Faucet	700
DeVilbiss	650
Whirlpool-Jackson	610
Madison County	574
<i>Source: Jackson Area Chamber of Commerce, 2007.</i>	

Based on employment-population growth relationships, employment within the two-county project area is projected to increase by 10-12 percent during the 2000-2010 period. Current employment trends would continue with services and retail trade comprising a larger proportion of the employment base, while manufacturing would maintain its relative current share of employment and new job growth.

Development Trends

Housing

Recent development trends indicate a consistent annual rate of residential development throughout the project area, with a noticeable decrease in 2007 in Madison County. This decrease in 2007 likely reflects national trends due to declines in the national housing market during that time. The majority of more recent new residential development has occurred in the northern portion of Jackson and environs, primarily along I-40 and in the Three-Way area. The number of housing units gradually increased in Hardeman County during the period between 2003-2007. Table 3.13 provides a summary of residential building activity during the 2002-2007 period within the two-county project area.

Building permits were issued for 4,389 housing units during this six-year period, or an average of 732 permits annually. Single-family detached dwellings account for the majority of the permits issued, with mobile homes comprising the next largest category of issued permits. Over 88 percent of the residential units authorized by building permit in the two-county project area were in Madison County, with the City of Jackson accounting for 73% of the total permits issued in Madison County.

Table 3.13. Estimated Number of Construction Permits Issued for New Privately-Owned Housing Units within the SR-18 Project Area, 2002-2007.

County/ City	Total	2007	2006	2005	2004	2003	2002
Hardeman County	517	101	95	85	77	72	87
Madison County	3,872	501	695	622	688	722	644
City of Jackson	2,818	357	499	412	447	591	512
Total*	4,389	602	790	707	765	794	731
* Total number of permits includes Madison and Hardeman Counties only, because the City of Jackson permits are included in the Madison County totals. Source: U.S. Bureau of the Census, 2008 http://censtats.census.gov/bldg/bldgprmt.shtml							

Industrial

Industrial growth and associated employment has occurred primarily along major transportation corridors, primarily I-40 and associated interchanges. Trends in industrial growth investment (i.e. manufacturing, distribution, and selected service projects) during the 1996-2005 period within the two-county project area are shown on Table 3.14. During this ten-year period, approximately \$1.74 billion were invested in the form of location of 19 new industries and expansion of 238 existing industries in the two-county project area. Over 95 percent of this growth occurred in Madison County, primarily in the City of Jackson and adjacent areas.

Table 3.14. Ten-Year Manufacturing Growth, 1996-2005: State Route 18 Project Area¹ (\$Million).

	Madison County	Hardeman County
New Plants	13	6
Total Investments	\$263.5	\$10.3
Plant Expansions	204	34
Total Investments	\$1,398.1	\$69.5
Source: Tennessee Department of Economic and Community Development, Community Profiles.		

Retail Sales

Retail sales trends within the project area for the 2000-2005 period are shown on Table 3.15. Approximately 90 percent of the retail sales within the project area occur in Madison County, with the City of Jackson serving as the retail and service center for the surrounding thirteen-county trade area. Retail sales increased 17 percent during this five-year period.

Table 3.15. Retail Sales Trends within the Two-County State Route 18 Project Area, 2000-2005 (\$million).

County	2005	2004	2003	2002	2001	2000
Madison	1,728.8	1,684.0	1,599.0	1,472.3	1,457.4	1,463.8
Hardeman	160.6	154.8	144.5	129.4	140.2	145.7
Total	1,889.4	1,838.8	1,743.5	1,601.7	1,597.6	1,609.5
<i>Source: Tennessee Department of Revenue, 2007.</i>						

Property Valuation

Property value increases reflect primarily real property and improvements through new construction and expansion of buildings and facilities that are added to the tax rolls. Therefore, property valuation trends are a good indicator of economic growth and construction activity within a jurisdiction.

Real property value trends for the 2001-2005 period for the two counties comprising the project area are shown on Table 3.16. The two-county area registered a 20 percent increase in total real property value during this period, with Madison County accounting for over 90 percent of this increase. However, note that some of the increases in property valuations during this time period were due to reassessments.

Table 3.16. Real Property Appraised Values Within the Two-County State Route 18 Project Area, 2001-2005 (\$Million)¹

County	% Change 2001-2005	2005 ²	2004	2003	2002	2001 ³
Madison	23	4,633.7	4,147.7	3,976.8	3,906.4	3,781.9
Hardeman	8	877.5	863.8	854.2	833.5	815.4
Total	20	5,511.2	5,011.5	4,831.0	4,739.9	4,597.3
¹ Appraised values include land and improvement appraised values.						
² Reflects property reappraisal in Madison County in 2005.						
³ Reflects property reappraisal in Hardeman County in 2001.						
<i>Source: Tennessee Comptroller of the Treasury, Division of Property Assessments.</i>						

3.2.3.2 Potential Economic Impacts Associated with the No-Build Alternative**Potential Economic Impacts Associated with the No-Build Alternative****Direct Impacts to Economic Resources (No-Build Alternative)**

Improvements in regional/local accessibility and traffic movement would not occur under the No-Action Alternative, thereby not realizing a potential reduction in traffic congestion and associated travel cost savings in the Jackson area. This could slow the rate of economic growth in south Jackson and Madison County.

Movement of goods and people as well as accessibility to the regional transportation network would not be enhanced.

Indirect Impacts to Economic Resources (No-Build Alternative)

Potential economic development and growth at strategic locations traversed by SR-18 would not likely occur, or would be of a smaller scale and occurring over a longer period of time. The potential for an increased tax base and tax revenues would be minimized as a result of the lack of improved accessibility and enhanced movement of goods and people.

Reduction in travel efficiency along primary routes such as SR-18 can result in potential economic impacts, especially for local communities. Economic impacts can result from increased travel expenses due to longer commute times and lower fuel efficiency due to congestion. Property values can also depreciate, or fail to appreciate at expected levels, if travel efficiency to an area makes it less desirable for new residents or businesses to locate there.

Potential Economic Impacts Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Economic Resources (Alternative 1-Widen Existing)

There are two basic categories of economic impacts of major highway investments or improvements, such as SR-18. These categories are transportation user or operational impacts and economic impacts. Transportation user or operational impacts include effects on travel time, vehicle operating costs, and accident reduction. Economic impacts include the direct, indirect, and induced impacts of the investment expenditures on the local and regional economy. Economic impacts can be both short- and long-term. Those impacts resulting from construction are short-term and temporary, while long-term and permanent impacts result from the operation and maintenance aspects of highway investment and associated development.

Alternative 1 would result in operational impacts by providing a more efficient roadway system that reduces operating costs, improves travel times, and enhances safety.

Long-term economic benefits may be realized by implementation of Alternative 1. Improved accessibility and travel efficiency would enhance the potential for new highway-oriented and community-based development. This implies expanded opportunities for commercial and industrial growth, and an associated expanded employment base. Business growth can occur in the manufacturing, service, wholesale and retail sectors of the economy through the expansion of existing businesses; attraction of new businesses to the area; reduction in the cost of moving goods and raw materials; and the servicing of inter-regional traffic flows, which can encourage development of travel-related businesses. The impacts on business are reflected in increases in sales, income, employment, and other economic indicators. An overall growth in employment could attract additional workers and families to an area, thereby creating an increased demand for housing. Any substantial new potential development would create a demand for an expansion of existing and new public infrastructure and services (e.g., utilities, police, and fire).

Property values within the vicinity of the SR-18 improvement project area may be appreciated due to better access and improved transportation efficiency making the area more attractive for residential, retail, and industrial uses. The specific impacts on property values would depend on the proximity of a property in relation to the proposed SR-18 improvements. Some properties may be subjected to slight decrease in value due to increased noise or visual impacts as the widened roadway may encroach closer to the existing residence. In general, the further away from the proposed SR-18 improvements a property is, the lower the chance of experiencing changes to property values, either positive or negative.

Increased development would result in enhanced tax revenues. Thus, any short-term tax revenue losses from project implementation (e.g., displacement, ROW acquisition) would be offset by the potential long-term tax revenue increases directly and indirectly resulting from project implementation as a result of increased property valuations and growth.

Highway investments represent a means to increase the size of the economic “pie” or region of economic activity rather than just redistribute existing pieces of economic activities (Clay et al., 1993). In most instances, both an increase and redistribution of economic activity occurs when a major highway investment is made. Thus, it can logically be expected that the improvements to SR-18 could cause some relocation of existing business activity in addition to the generation of new business activity within the immediate area of the highway alignment, especially near key intersections or connector roads.

Short-term direct and indirect economic benefits would result during the construction phase of the SR-18 project. Employment generated by project construction activities would in turn result in direct and indirect employment in other sectors. Direct employment represents jobs initially created in the retail, service, wholesale, and other industry sectors in response to the additional demands from the construction project and construction workers. Indirect employment represents additional jobs created as a result of the new direct employment. The additional direct and indirect employment created by project implementation would in turn generate an increase in direct, indirect, and induced personal income as a result of the additional wages paid; an increase in local and regional business volume resulting from purchases with the additional income; and additional expenditures for local and regional services and supplies related to project construction.

Short-term adverse economic impacts would consist primarily in the reduction of the real property tax base and tax revenues as a result of ROW acquisition and displacement of residences and businesses. The greatest economic impacts of this nature would occur under Alternative 1 impacted by displacements and/or rights-of-way acquisition. Based upon property tax records of the respective County Assessor offices, there would be a decrease of approximately \$23.2 million in real property appraised value and an estimated associated annual loss of \$215,000 in real property tax revenues (2007). However, the above numbers reflect appraised values and property taxes applicable only to improvements. Additional property tax revenue loss resulting from public acquisition of the associated parcel and other parcels for necessary ROW is not included. The current ratio of assessed valuation to appraised valuation is 25 percent for residential properties and 40 percent for commercial and industrial properties in Tennessee. These respective ratios and the current county real property tax rates were applied to calculate property taxes for each impacted parcel. The current county/city tax rates are as follows:

Madison County	= \$2.31/\$100 Assessed Valuation;
City of Jackson	= \$2.10/\$100 Assessed Valuation (in addition to the Madison County tax rate);
City of Medon	= Madison County tax rate;
Hardeman County	= \$2.65/\$100 Assessed Valuation.

There would be some loss of sales and other special business-related taxes as a result of the potential displacement of 8 businesses. In addition, there would be some loss in sales revenues by local businesses resulting from the displacement and subsequent relocation of households. However, these losses would be minimized and short-term in duration if, as anticipated, most of the displacees relocate within the immediate area.

Indirect Impacts to Economic Resources (Alternative 1-Widen Existing)

There could be several indirect long-term beneficial economic impacts resulting from project implementation. It is expected that there could be a potential increase in property values for those properties with increased accessibility and development potential at key areas along the improved SR-18. The resultant induced development could result in an increased real property tax base and tax revenues. The potential induced development could result in a local increase in employment and personal income, and an increase in sales and other business-related taxes. Long-term travel cost savings in respect to vehicle operating costs and travel time would occur under Alternative 1.

There could be some indirect long-term adverse economic impacts resulting from implementation of Alternative 1. It is anticipated that some property values could decrease or at least increase more slowly than unaffected properties as a result of potential adverse noise, visual, and other aesthetic impacts on some properties immediately adjacent or in proximity to the SR-18 ROW. In addition, some parcels that could become fragmented and disconnected as a result of project implementation could also potentially lose some economic value and function.

There would be a short-term temporary loss of real property tax base and revenues as a result of project implementation. In addition, there may be a short-term temporary loss of employment, income, business sales, and sales tax revenues resulting from business displacement and relocation. However, these short-term economic losses could be more than offset by subsequent new development occurring within the impacted area.

Potential Economic Impacts Associated with Alternative 2

Direct Impacts to Economic Resources (Alternative 2)

The least number of displacements [17 (16 residential, 1 business)] and consequential least adverse economic impacts occur under Alternative 2. Thus, the magnitude of direct short-term adverse impacts under Alternative 2 would be substantially less under Alternative 1. There would be a decrease of only \$3.7 million in the appraised property tax base valuation of real improvements and \$22,500 in associated annual real property tax revenues.

Indirect Impacts to Economic Resources (Alternative 2)

Indirect economic impacts associated with Alternative 2 would be similar to those listed under Alternative 1.

Potential Economic Impacts Associated with Alternative 3

Direct Impacts to Economic Resources (Alternative 3)

The number of potential displacements [53 (48 residential, 5 businesses)] and consequential economic impacts would be less than under Alternative 1, but greater than under Alternative 2. Direct short-term adverse economic impacts would result in a decrease of approximately \$7.9 million in the appraised property tax base valuation of real improvements and \$47,000 in associated annual real property tax revenues.

Indirect Impacts to Economic Resources (Alternative 3)

Indirect economic impacts associated with Alternative 3 would be similar to those listed under Alternative 1.

Potential Economic Impacts Associated with Alternative 4

Direct Impacts to Economic Resources (Alternative 4)

Direct short-term adverse economic impacts are expected to be less than under Alternative 1, but greater than under Alternatives 2 and 3. This is the result of a greater number of displacements [58 (53 residential, 5 business)] under Alternative 4 than under Alternatives 2 and 3. The number of displacements and subsequent economic impacts under Alternative 4 are exceeded only under Alternative 1. Direct short-term adverse impacts include a decrease of approximately \$20.8 million in the appraised property tax base valuation of real improvements, and a loss of \$199,000 in associated annual real property tax revenues.

Indirect Impacts to Economic Resources (Alternative 4)

Indirect economic impacts associated with Alternative 4 would be similar to those listed under Alternative 1.

Potential Economic Impacts Associated with Alternative 5

Direct Impacts to Economic Resources (Alternative 5)

Direct short-term adverse economic impacts are expected to be less than under Alternative 1, but greater than under Alternatives 2, 3, and 4. This is the result of a greater number of displacements [70 (63 residential, 7 business)] under Alternative 5 than under Alternatives 2, 3, and 4. Direct short-term adverse impacts include a decrease in the appraised property tax base valuation of real improvements, and a loss of money associated annual real property tax.

Indirect Impacts to Economic Resources (Alternative 5)

Indirect economic impacts associated with Alternative 5 would be similar to those listed under Alternative 1.

Potential Economic Impacts Associated with Alternative 6

Direct Impacts to Economic Resources (Alternative 6)

Direct short-term adverse economic impacts are expected to be less than the other Build Alternatives, except Alternative 2. This is the result of a fewer number of displacements [43 (39 residential, 4 business)] under Alternative 6 than under Alternatives 1, 3, 4, and 5. The number of displacements and subsequent economic impacts under Alternative 6 are exceeded by all other build alternatives except Alternative 2. Direct short-term adverse impacts include a decrease in the appraised property tax base valuation of real improvements, and a loss of money associated annual real property tax.

Indirect Impacts to Economic Resources (Alternative 6)

Indirect economic impacts associated with Alternative 6 would be similar to those listed under Alternative 1.

3.2.3.3 Mitigation of Economic Impacts

Reasonable mitigation measures where necessary and feasible would be utilized to avoid, minimize, reduce, or compensate for local and individual adverse economic impacts. TDOT would provide just compensation, or a monetary payment equivalent to the fair market value of the property, for each property acquired for the new ROW. Mitigation of relocation

impacts for displaced households and businesses would be in the form of financial remuneration or compensation for property loss and relocation expenses as outlined in the Uniform Relocation and Real Property Acquisition Act, as amended. TDOT would work with business owners to find a suitable relocation site, with affected business owners reimbursed for actual reasonable moving costs, reestablishment costs, and costs incurred in identifying a replacement site. The relocation of impacted businesses within proximity to their existing business site and business clientele would be a high priority during the relocation process.

Additional measures would be taken to mitigate potential adverse economic impacts on property values. Such measures include the potential application of noise abatement and other measures to mitigate impacts on properties adjacent to the new ROW which may experience a decrease in property values. These measures could include noise barriers, landscape buffers, property acquisition, and land use controls. Every attempt would be made to minimize the creation of uneconomical parcel remnants and landlocked parcels. Temporary access roads would be constructed to maintain access to farm fields and parcels that serve an economic function.

3.2.4 Farmland

The Farmland Protection Policy Act of 1981 (FPPA) seeks to "minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses, and to insure that federal programs are administered in a manner that, to the extent practicable, would be compatible with state and local government, and private programs and policies to protect farmland."

In accordance with the FPPA, a Farmland Conversion Impact Rating Form was submitted to the USDA, Natural Resources Conservation Service (NRCS) for each County affected, and an assessment score was determined for each alternative. This score is determined by numerous factors including the agricultural value of the land. The score is used to determine which areas should receive the highest level of protection from conversion to non-agricultural uses. The higher the numerical score given to a proposed alternative, the more protection the farmland affected by it would receive. The highest rating possible is 260. Sites receiving a total score of 160 points or less typically do not require further evaluation. If the site receives a score higher than 160 points, alternatives should be developed that would avoid or minimize impacts to farmland.

All of the Build Alternative ROWs were evaluated in accordance with the FPPA. Some soils classified as prime or unique farmland are found within the project area. The approximate amount of prime and unique farmland as identified by the NRCS for each of the proposed Build Alternatives is shown on Table 3.17. The NRCS correspondence and Farmland Conversion Rating Forms are included in Appendix A.

Table 3.17. Prime and unique farmland taken by each SR-18 Build Alternative located in Hardeman and Madison Counties, Tennessee.

Alternative	Acres of Prime and Unique Farmland Taken		Overall Farmland Conversion Impact Rating Assessment Score ¹
	Hardeman County	Madison County	
Alternative 1	3	37	141
Alternative 2	8	99	159
Alternative 3	8	113	153
Alternative 4	11	82	151
Alternative 5	8	60	144
Alternative 6	8	115	158

¹ The highest possible overall score is 260. Scores over 160 points may require further evaluation and additional efforts to avoid or reduce impacts.
Source: USDA, 2006 and Parsons, 2007.

3.2.4.1 Potential Farmland Impacts

Potential Farmland Impacts Associated with the No-Build Alternative

Direct Impacts to Farmland (No-Build Alternative)

The No-Build Alternative would not result in any substantial changes to farmland impacts. Current land uses and development trends would continue in the project area. However, the residential and commercial development trends could slow as LOS on SR-18 continued to decline, especially near the SR-5 (U.S. 45) intersection. Any new developments that do occur would possibly result in conversion of farmland into non-farm related uses.

Indirect Impacts to Farmland (No-Build Alternative)

No substantial indirect impacts to farmland would be anticipated under the No-Build Alternative. Without improvements to SR-18, the area may become less attractive for continued residential and commercial developments and therefore the potential for additional impacts to farmland may be somewhat reduced in the long term.

Potential Farmland Impacts Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Farmland (Alternative 1-Widen Existing)

The farmland impact rating score for Alternative 1 (141 points) was well below the 160 point threshold discussed above. Although impacts to farmland are lowest under Alternative 1 due to utilization of existing alignment for the length of the project, there would be some unavoidable farmland impacts. Most farmland impacts associated with Alternative 1 would involve direct loss of farmland located adjacent to the existing SR-18 ROW. In general, the impacts to individual farms would be relatively minor due to taking of farmland along the edges of the properties rather than cutting through the middle of properties and further dividing or severing existing farms as would occur for alternatives utilizing new alignment.

Soils in the project area would be disturbed during construction of the project as earth moving equipment would be used to grade the area. Grading of the project area would require a combination of cutting or leveling hills and filling of valleys or low areas along the length of the project. Some erosion of soils is expected to occur during the construction phase of the project as exposed soils are unavoidable. Best management techniques would be utilized to control erosion and subsequent sedimentation in and adjacent to the project area. The mitigation section below provides more detail regarding the general actions that would be taken to control soil erosion during and following construction.

Indirect Impacts to Farmland (Alternative 1-Widen Existing)

Farmland and soils adjacent to the Alternative 1 ROW could be indirectly impacted through secondary development. The project is expected to encourage some new development, especially near the proposed intersections with other local roadways, and it is likely, given the rural nature of the area, that some of this new development would occur on farmland.

Fewer impacts to farmland in terms of farm severances would occur with the secondary developments as farmland would be sold on a tract by tract basis by willing owners rather than tracts being split apart by the linear type project associated with SR-18. Therefore, impacts to individual farming operations would be considered less severe with the secondary developments.

Potential Farmland Impacts Associated with Alternative 2

Direct Impacts to Farmland (Alternative 2)

Direct Impacts to farmland associated with Alternative 2 would be similar to those discussed under Alternative 1, except the impacts would be somewhat higher (159 points) due to the additional amount of new alignment that would be utilized under Alternative 2. This alternative would have the highest farmland impact rating out of the six alternatives, but just slightly more than Alternative 6. Portions of the new alignment would cross existing farmland and result in direct conversion of that land to non-farm uses. Additional severance of existing farms would occur under Alternative 2 compared to Alternative 1, because Alternative 1 would utilize more of the existing SR-18 alignment and would require taking of land on the edges of existing properties rather than splitting those properties. Placement of portions of Alternative 2 on new alignment would require unavoidable splitting of multiple properties containing farms and farmland.

Because the farmland in the project vicinity is relatively evenly dispersed, shifting the alignment would not effectively reduce impacts to prime and unique farmland. Shifting the alignment may reduce impacts to certain individual farms but would likely only lead to additional impacts to neighboring farms and/or other resources. Therefore, additional changes in the alignment based on farmland impacts are not warranted. The taking of farmland would have a long-term impact on crop and/or timber production depending on the current use of the land. Some of the farmland in the project area is not in production at this time.

Indirect Impacts to Farmland (Alternative 2)

Indirect impacts to farmland associated with Alternative 2 would be similar to those listed under Alternative 1. However, since much of Alternative 2 would be on new alignment, the potential indirect impacts to farmland would be greater.

Potential Farmland Impacts Associated with Alternative 3**Direct Impacts to Farmland (Alternative 3)**

Direct Impacts to farmland associated with Alternative 3 would be similar to those discussed under Alternative 2, except the impacts would be slightly lower (153 points) due to the utilization of more of the existing SR-18 alignment than Alternative 2.

Indirect Impacts to Farmland (Alternative 3)

Indirect impacts to farmland associated with Alternative 3 would be similar to those listed under Alternative 2.

Potential Farmland Impacts Associated with Alternative 4**Direct Impacts to Farmland (Alternative 4)**

Direct Impacts to farmland associated with Alternative 4 would be similar to those discussed under Alternative 2, except the impacts would be lower (151 points) due to the utilization of more of the existing SR-18 alignment than Alternative 2.

Indirect Impacts to Farmland (Alternative 4)

Indirect impacts to farmland associated with Alternative 4 would be similar to those listed under Alternative 2.

Potential Farmland Impacts Associated with Alternative 5**Direct Impacts to Farmland (Alternative 5)**

Direct Impacts to farmland associated with Alternative 5 would be similar to those discussed under Alternative 1, except the impacts would be slightly higher (144 points) due to the utilization of a segment of new alignment south of Medon aimed at reducing wetland impacts. Some of the land that would be needed to bypass the wetlands contains active farmland.

Indirect Impacts to Farmland (Alternative 5)

Indirect impacts to farmland associated with Alternative 5 would be similar to those listed under Alternative 2.

Potential Farmland Impacts Associated with Alternative 6**Direct Impacts to Farmland (Alternative 6)**

Direct Impacts to farmland associated with Alternative 6 would be very similar to those discussed under Alternative 2, except the impacts would be just slightly lower (158 points) due to the utilization of more of the existing SR-18 alignment (through the Medon area) than Alternative 2. This Alternative would impact the second highest farmland impact rating out of the six Build Alternatives.

Indirect Impacts to Farmland (Alternative 6)

Indirect impacts to farmland associated with Alternative 6 would be similar to those listed under Alternative 2.

3.2.4.2 Mitigation of Farmland Impacts

Impacts to farmland would be minimized where practical under any of the Build Alternatives. Minimization efforts may include locating the final alignment along and parallel to fences or property lines to reduce the number of farm severances. In addition, where farm severances are unavoidable, cattle and equipment underpasses would be considered on an individual basis as the project proceeds into the design phase.

Impacts to soils can be minimized by using best management practices to reduce soil erosion including implementing proper construction techniques and erosion controls and by avoiding the unnecessary removal of existing vegetation where possible. Employing streambank stabilization measures such as seeding or placement of rip-rap and/or silt fence would also minimize adverse impacts to soils and farmland during stream-side and in-stream construction. Silt fencing and sediment control ponds may also be used to help control the movement of soils during construction.

Impacts to soils and farmland can be mitigated using the mitigation measures described in documents such as the following: FHWA Best Management Practices for Erosion and Sediment Control (FHWA, June 1995), TDOT Standard Specifications for Road and Bridge Construction (TDOT), Erosion & Sediment Control Handbook (Wang and Grubbs, 1992), Riparian Restoration and Streamside Erosion Control Handbook (Thompson and Green, 1994); and Reducing Non-point Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites manual (Smoot et al., 1992).

3.3 Ecological Resources

3.3.1 Aquatic Resources

3.3.1.1 Water Quality

The primary law to protect water quality in the United States is the Clean Water Act (CWA). Section 303(d) of the CWA requires states to develop a list of streams and lakes that are "water quality limited." "Water quality limited" waterbodies do not meet one or more water quality standards and are not supporting designated uses.

The Code of Federal Regulations 40 Part 130.7(b) (4) states that 303(d)-listed waters are to be prioritized for total maximum daily load (TMDL) development. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards and an allocation of that amount to the pollutant's sources.

The following designated uses are listed along with the pollutants or factors that impair or limit the capability:

- Aquatic Life Use – dissolved oxygen, pH, temperature, turbidity, toxics, or any non-toxic compound that alters the aquatic life community structure beyond that expected;
- Drinking Water – compounds that are not easily removed by drinking water treatment facilities; compounds with established secondary maximum contaminant levels (MCL), e.g., Chlorines, Sulfates, Nitrates, and total dissolved solids (TDS);
- Primary and Secondary Contact – fecal coliform; and

- Agricultural or Industrial Uses – Compounds that would interfere with industrial uses such as cooling water or the water used in certain manufacturing processes; or waters unsuitable for livestock watering or crop irrigation; most often includes Chlorine, Sulfates, and TDS.

Water quality standards have been established by TDEC to protect the use classifications assigned to each waterbody (TDEC, 1995). Water quality standards published by TDEC, Division of Water Pollution Control classifies most streams in the project area as having the capability to support fish and aquatic life; recreation; irrigation; and livestock and wildlife watering.

All permanent flowing or perennial streams that would be crossed or impacted by the Build Alternatives were evaluated during field investigations. These field investigations were conducted in October and November 2006 and in May of 2007. The dynamics and structure of aquatic communities found in streams in the project area are influenced mainly by the physical attributes of the individual streams and not water quality, which generally appeared to be good with a few exceptions. The primary stream characteristics affecting the types of aquatic communities were shade, substrate, flow, water temperature, presence of livestock in streams, and water depth. The diversity of aquatic life was generally consistent at the various sampling points. Field studies were completed during and following a relatively dry period in the region resulting in many of the intermittent streams being dry during the study period. Only the perennial streams that appeared to have a good groundwater connection were exhibiting some flow during the study period.

3.3.1.2 Stream and Sediment Contamination

Pursuant to Section 303(d) of the Clean Water Act, TDEC has compiled a list of streams in the state that are “water quality limited” (TDEC, 1998). Streams within or near the project area that are included on the Section 303(d) list include Bond Creek (TDEC, 2006), which is located west of existing SR-18 (Segment A-4) outside of the 500-foot study area. Bond Creek has been placed on the 303(d) list due to habitat loss due to alteration in stream-side or littoral vegetative cover associated with stormwater discharges and streambank modifications.

3.3.1.3 Streams, Waterbodies, Springs, and Seeps

Streams and Other Watercourses

The natural drainage system in the project area is well developed, and much of the area is characterized by a trellis drainage system. The slope of the northern portion of the project area tends to be to the north while the slope in the southern portion of the project area tends to be to the southwest.

The dominant surface water feature in the northern portion of the project area is Meridian Creek while Clover Creek is the dominant feature in the southern portion of the area. The primary watersheds that drain the project area are the South Fork Forked Deer River Watershed (Hydrologic Unit Code (HUC) 08010205) located in the northern portion of the project area and the Lower Hatchie River Watershed (HUC-08010208) located in the southern portion of the project area.

Based on field investigations conducted in October and November 2006 and in May of 2007, there are several streams located within the 500-foot study area, including 21 perennial streams, 27 intermittent streams, and 69 wet weather conveyances that could be crossed or

could potentially receive runoff from at least one of six Build Alternatives. Some of the larger named streams potentially affected by the various Build Alternative alignments include Cypress Creek, Clover Creek, Lacy Creek, and Meridian Creek. A map showing the watercourses potentially impacted by the SR-18 project is contained on Figure 3-2. Table 3.18 shows a comparison of stream information for each of the proposed Build Alternatives. The Ecology Study Technical Appendix prepared for this project contains more detailed descriptions of each of the watercourses potentially impacted by this project and is available upon request from TDOT.

Stream Channelization

Stream crossing points were assessed to determine if any channelization would be required. It was assumed that channelization would be necessary if the angle of the stream crossing to the highway was less than 45 degrees. Stream crossings at angles greater than 45 degrees would be accommodated by culverts or bridges and would require only minimal channelization. At locations where the stream would be spanned by a bridge, it was assumed that any minimal channelization would be corrected as part of the bridge construction. In addition, stream segments not crossed by the road could still be impacted, if the build alternative were to be constructed adjacent to the stream, depending on the limits of fill. In these cases, channelization could be necessary, as well. Stormwater drainage ditches were not considered channelizations when culverts could be used to carry future stormwater flow. A summary of the number of streams likely requiring substantial channel modification or stream channelization is provided on Table 3.18 below.

Springs, Seeps, and Other Waterbodies

Several springs, seeps, and man-made ponds would also be potentially affected by the various Build Alternative alignments. A total of 12 springs, 8 seeps, and 20 ponds were located within the 500-foot study area surrounding all of the Build Alternatives. The locations of these features are shown on Figure 3-2. More details for each of these features are contained in the Ecology Study Technical Appendix available upon request from TDOT.

Figure 3-2 (Map 1 of 5). Map of Ecological Resources Present within the State Route 18 Study Area in Hardeman and Madison Counties, Tennessee.

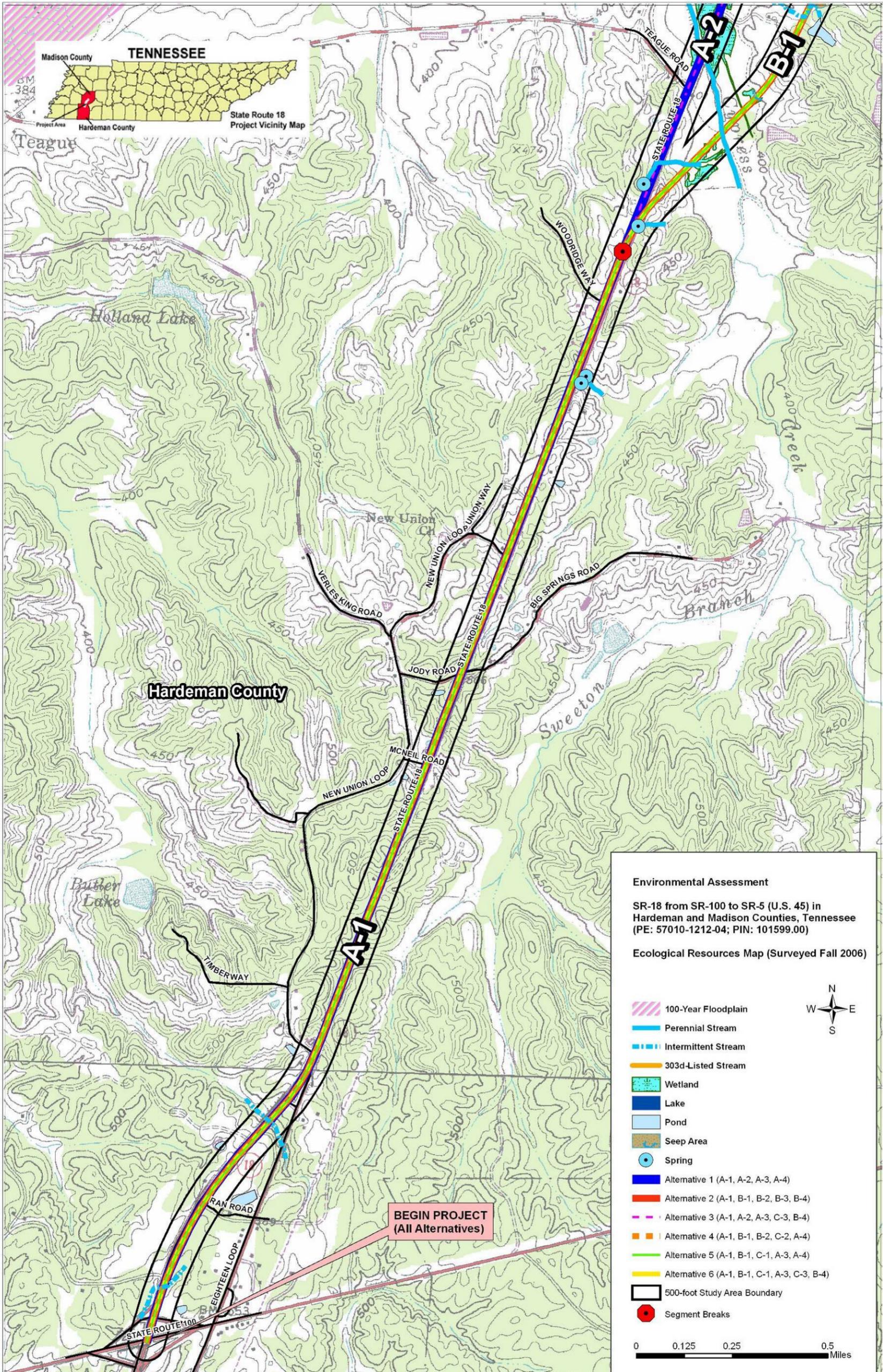


Figure 3-2 (Map 2 of 5). Map of Ecological Resources Present within the State Route 18 Study Area in Hardeman and Madison Counties, Tennessee.

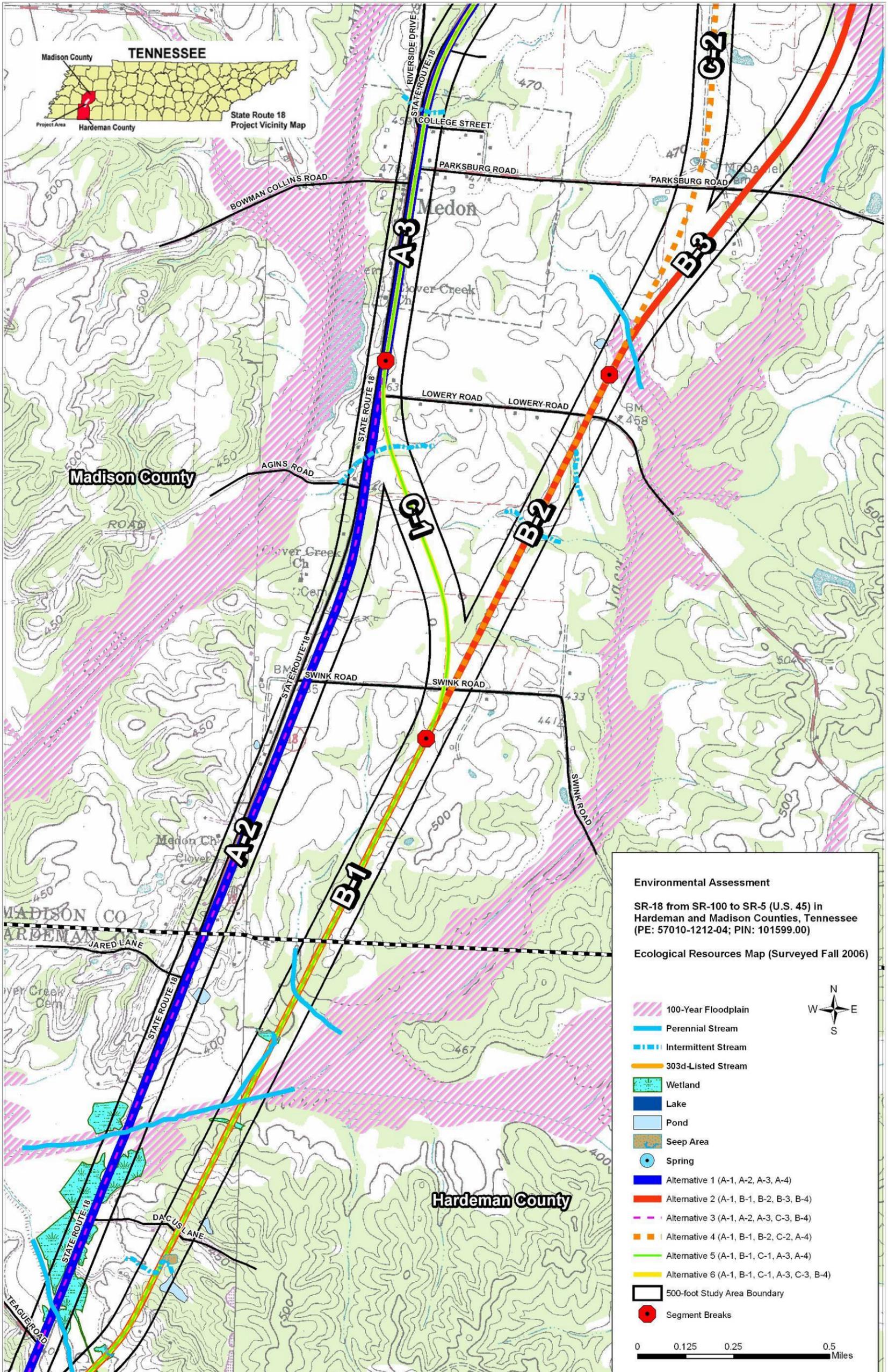


Figure 3-2 (Map 3 of 5). Map of Ecological Resources Present within the State Route 18 Study Area in Hardeman and Madison Counties, Tennessee.

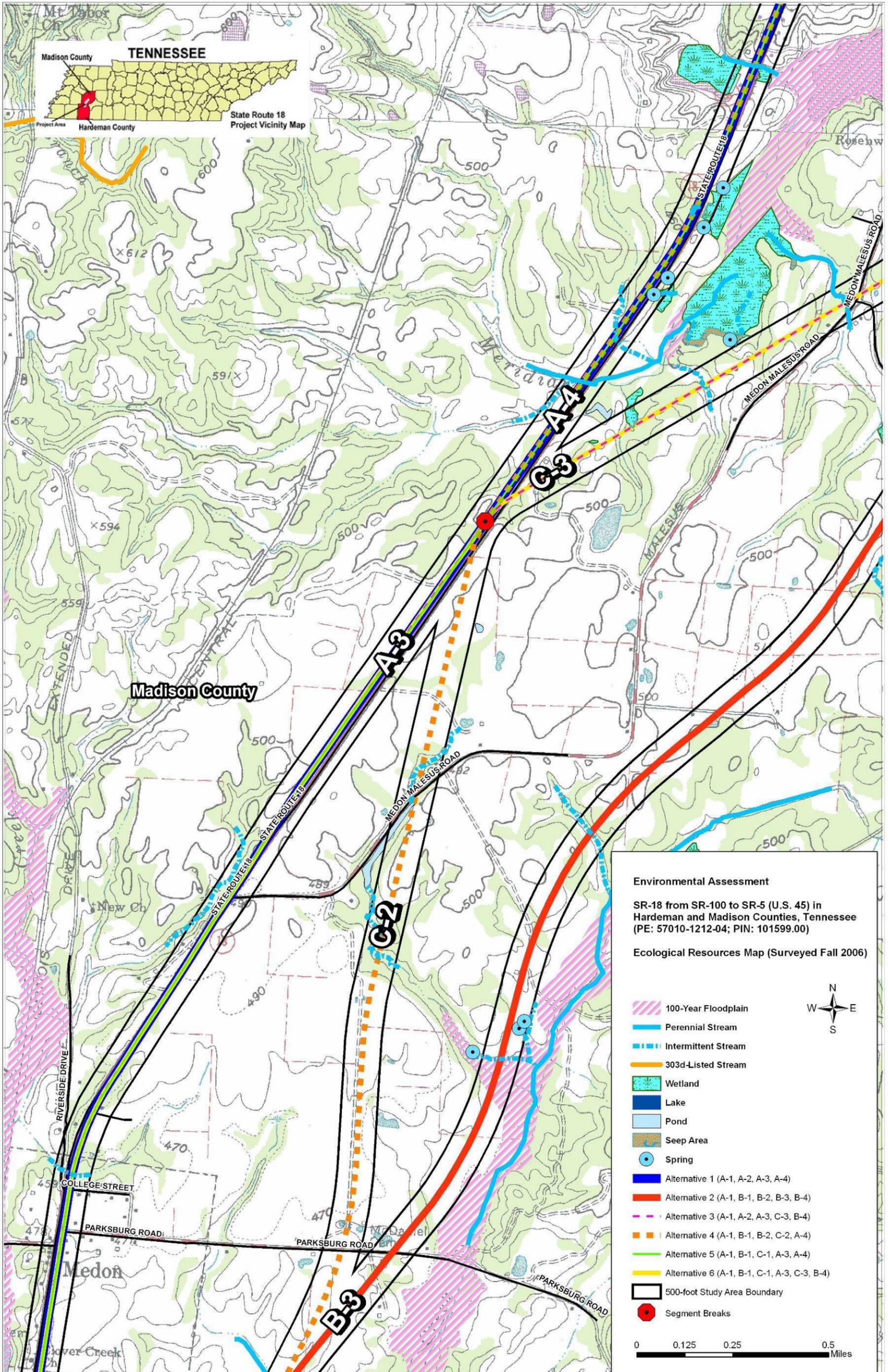


Figure 3-2 (Map 4 of 5). Map of Ecological Resources Present within the State Route 18 Study Area in Hardeman and Madison Counties, Tennessee.

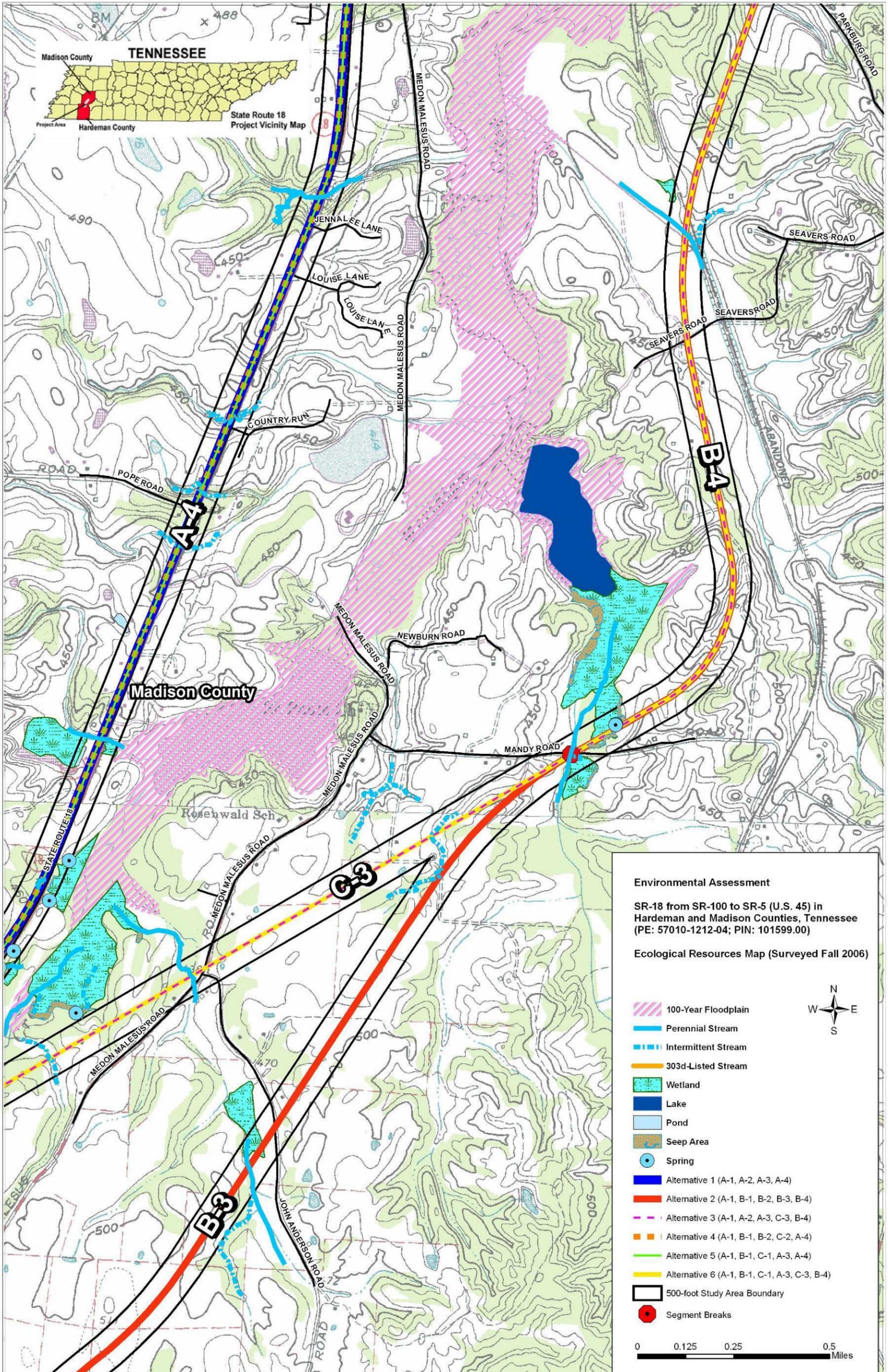


Figure 3-2 (Map 5 of 5). Map of Ecological Resources Present within the State Route 18 Study Area in Hardeman and Madison Counties, Tennessee.

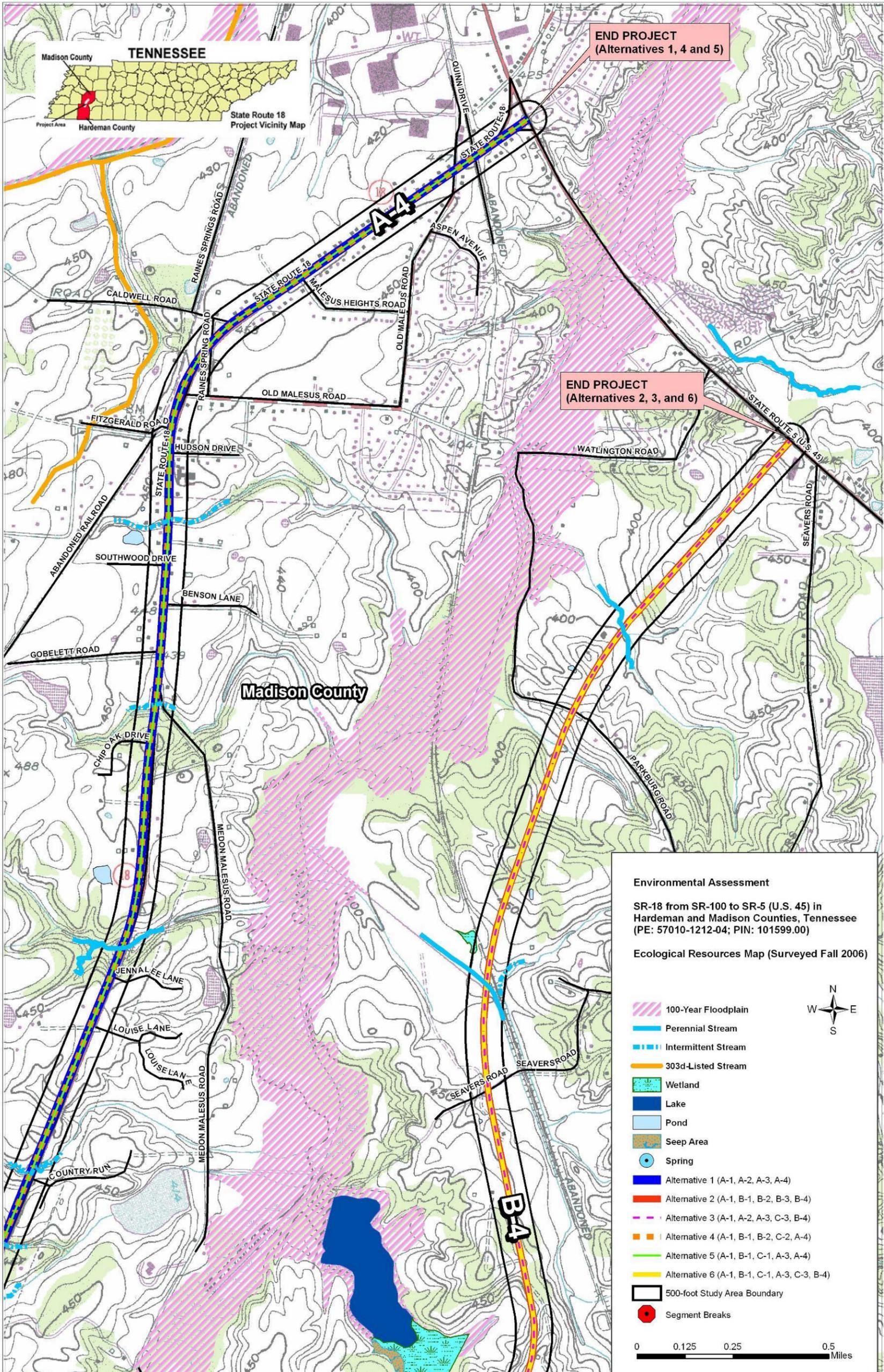


Table 3.18. Streams located within the 500-foot Study Corridor for each Build Alternative for the State Route 18 project.

Alternative	Number of Streams in 500-foot Corridor	Length of Stream Channel in 500-foot Corridor	Number of Streams Directly Crossed	*Number of Streams Requiring Substantial Channel Modifications/ Rechannelization (feet of Channelization in 250-foot ROW)
Alternative 1	23	13,659	15	10 (2,889 feet)
Alternative 2	26	14,247	15	12 (5,311 feet)
Alternative 3	19	11,474	12	10 (3,639 feet)
Alternative 4	28	17,574	19	16 (6,678 feet)
Alternative 5	26	15,899	18	13 (4,741 feet)
Alternative 6	22	13,689	14	13 (5,491 feet)

The information listed in this table is subject to change once final design of the roadway is complete as many of the features may be avoided or impacts may be minimized by slight shifts in the centerline of the chosen alternative.

*The length of stream channelization estimated in this table is based on a 250-foot ROW. The ROW for a portion of the alignments will be narrower than 250 feet. Therefore, this data represents the worst-case scenario, but provides good comparative data for the individual alternatives.

Source: Parsons, 2007

3.3.1.4 Potential Impacts to Aquatic Resources

Potential Impacts to Aquatic Resources Associated with the No-Build Alternative

Direct Impacts to Aquatic Resources (No-Build Alternative)

Because no new construction activities would occur under the No-Build Alternative, no changes from the baseline conditions of aquatic resources would occur.

Indirect Impacts to Aquatic Resources (No-Build Alternative)

Because no new construction activities would occur under the No-Build Alternative, no changes from the baseline conditions of aquatic resources would occur.

Potential Impacts to Aquatic Resources Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Aquatic Resources (Alternative 1-Widen Existing)

Alternative 1 would directly cross a total of 15 streams and would require substantial channel modification and/or rechannelization of 10 streams. Long-term adverse impacts to streams would occur due to changes in stream flow caused by necessary channel modifications at crossings. Additional minor long-term adverse impacts would occur due to highway runoff containing oils and other roadway contaminants entering the streams.

Long-term impacts to water quality would be anticipated for streams along Alternative 1 corridor. Widening the existing SR-18 would increase the amount of paved or impervious surfaces resulting in increased runoff. Pollutants usually contained in highway runoff include de-icing salts, pesticides, and herbicides used for the control of roadside vegetation. De-icing salts are used relatively sparingly in this area and would not likely impact water quality, and pesticides and herbicides can be applied in a manner designed to minimize introduction of these chemicals into the surrounding water bodies. Runoff from bridge surfaces could impact water quality in the immediate area. Also, aquatic benthic habitats may be altered near the piers of bridges due to changes in bathymetry associated with the piers.

Long-term, adverse impacts would be expected as a result of stream channelization. Straightening of the watercourse and modification of natural streambank would likely lead to permanent loss or degradation of habitat for aquatic and riparian species. For example, streams that have been channelized often exhibit less aquatic habitat complexity as compared to non-channelized streams.

Short-term adverse impacts would include interruption or modification of stream flow during construction and water quality impacts associated with site preparation, grading, and construction activities. Other short-term adverse impacts would include increased sediment loading, disruption of bottom substrates and associated macroinvertebrate communities, and removal of tree cover and riparian vegetation resulting in increased erosion and habitat loss. Removal of canopy cover increases sun exposure to the water surface, which can raise stream water temperature. Increased water temperature can alter species composition in the stream. Contaminant runoff from construction equipment and materials may also adversely affect water quality. Construction-related impacts would be temporary and any affected aquatic communities would be expected to recover after construction had ceased. The degree of impact would vary depending on the width and depth of the stream, the distance of the stream to the final alignment, the steepness of the newly established streambanks, and the typical level of flow within the stream.

Alternative 1 would impact 8 springs and 2 seeps. Impacts to springs and seeps would directly impact associated streams and wetlands to which they supply hydrology. Efforts would be made during the design phase to avoid or minimize impacts to these features or design the roadway in a manner which would allow them to continue to provide hydrological connection to streams and wetlands.

Alternative 1 would impact nine man-made ponds. Some of the ponds impacted would need to be completely drained and filled. Impacts to ponds and lakes would be avoided or minimized to the extent practical during the final design phase of the project. Draining of ponds may have short-term impacts to downstream watercourses.

Indirect Impacts to Aquatic Resources (Alternative 1-Widen Existing)

Channelization of streams within the project area could result in long-term adverse impacts to aquatic habitats and species living in downstream habitats. These long-term adverse impacts would mainly result from potential changes in aquatic habitat conditions associated with changes in hydrology and water quality over time. Changes in hydrology may impact microhabitat conditions, such as substrate type, stream channel depth and width, and vegetation in portions of these streams. These changes could result in changes in species composition in certain areas. These adverse impacts have potential to affect spawning and larval fish due primarily to the decreased water quality and subsequent decrease in benthic invertebrates.

Potential short-term indirect adverse impacts on benthic invertebrates, larval fish, and other aquatic species could occur from stormwater runoff, which would increase turbidity and total suspended solids. Erosion would be the primary agent of adverse impacts, potentially resulting in an increased silt load (suspended solids and total solids), turbidity, change in color, and introduction of contaminants, such as petroleum products from heavy equipment. Siltation can cause mortality or impair the growth of the benthic fauna and fish, while increased turbidity and color can impact primary production by plants.

Bond Creek located west of the SR-18 study area, could receive short-term impacts during construction due to surface runoff and subsequent sedimentation. It is not anticipated that this stream would be substantially impacted due to the BMPs and other mitigation measures that will be used during construction to help reduce runoff and stream sedimentation downstream of the project area. TDOT will continue to work with regulatory agencies throughout the design, permit acquisition, and construction phases to ensure that appropriate measures are taken to prevent further degradation to this stream, and other non-303(d) listed streams in the vicinity.

Impacts to springs and seeps may indirectly impact streams and wetlands that rely on the hydrology provided by those features. Loss or alteration of the hydrology of adjacent streams and wetlands would likely result in eventual loss of function of those features. Efforts would be made during the design phase to maintain hydrology to all streams and wetlands located downstream of the project area to reduce the potential for long-term impacts extending beyond the project limits. Permeable material such as rock fill may be used in some areas to allow movement of water underneath the roadway.

Construction of SR-18 could indirectly impact springs located outside of the immediate ROW due to disruption of hydrology in the vicinity of the project area. This disruption of hydrology would change the existing groundwater flow rates in some areas.

Potential Impacts to Aquatic Resources Associated with Alternative 2

Direct Impacts to Aquatic Resources (Alternative 2)

Alternative 2 would directly cross a total of 15 streams and would require substantial channel modification and/or rechannelization of 12 streams. Alternative 2 would impact 7 springs, 4 seeps, and 10 ponds. All other general aquatic resources impacts associated with Alternative 2 would be similar to those discussed under Alternative 1.

Indirect Impacts to Aquatic Resources (Alternative 2)

Indirect impacts to aquatic resources associated with Alternative 2 would be similar to those discussed for Alternative 1.

Potential Impacts to Aquatic Resources Associated with Alternative 3

Direct Impacts to Aquatic Resources (Alternative 3)

Alternative 3 would directly cross a total of 12 streams and would require substantial channel modification and/or rechannelization of 10 streams. Alternative 3 would impact 6 springs, 3 seeps, and 10 ponds. All other impacts associated with Alternative 2 would be similar to those discussed under Alternative 1.

Indirect Impacts to Aquatic Resources (Alternative 3)

Indirect impacts to aquatic resources associated with Alternative 3 would be similar to those discussed for Alternative 1.

Potential Impacts to Aquatic Resources Associated with Alternative 4

Direct Impacts to Aquatic Resources (Alternative 4)

Alternative 4 would impact a total of 19 streams and would require substantial channel modification and/or rechannelization of 16 streams. Alternative 4 would impact 7 springs, 5 seeps, and 10 ponds. All other impacts associated with Alternative 4 would be similar to those discussed under Alternative 1.

Indirect Impacts to Aquatic Resources (Alternative 4)

Indirect impacts to aquatic resources associated with Alternative 4 would be similar to those discussed for Alternative 1.

Potential Impacts to Aquatic Resources Associated with Alternative 5

Direct Impacts to Aquatic Resources (Alternative 5)

Alternative 5 would impact a total of 18 streams and would require substantial channel modification and/or rechannelization of 13 streams. Alternative 5 would impact 7 springs, 5 seeps, and 9 ponds. All other impacts associated with Alternative 5 would be similar to those discussed under Alternative 1.

Indirect Impacts to Aquatic Resources (Alternative 5)

Indirect impacts to aquatic resources associated with Alternative 5 would be similar to those discussed for Alternative 1.

Potential Impacts to Aquatic Resources Associated with Alternative 6

Direct Impacts to Aquatic Resources (Alternative 6)

Alternative 6 would impact a total of 14 streams and would require substantial channel modification and/or rechannelization of 13 streams. Alternative 6 would impact 5 springs, 6 seeps, and 11 ponds. All other impacts associated with Alternative 6 would be similar to those discussed under Alternative 1.

Indirect Impacts to Aquatic Resources (Alternative 6)

Indirect impacts to aquatic resources associated with Alternative 5 would be similar to those discussed for Alternative 1.

3.3.1.5 Mitigation of Aquatic Resources Impacts

Impacts to aquatic resources and water quality can be minimized by using best management practices, including limiting the construction and/or placement of metal pipes, concrete culverts, and bridges to dry periods, by implementing proper construction techniques and erosion controls, and by avoiding the removal of existing vegetation to reduce soil erosion. Employing bank stabilization measures such as seeding, placing of rip-rap, and/or installing a silt fence would also minimize short-term adverse impacts to water quality during stream-side and in-stream construction.

Stream channels requiring relocation or channelization would be replaced on-site to the extent possible, using techniques that would replace existing stream characteristics, such as length, width, gradient, and tree canopy. Stream or water body impacts that cannot be mitigated on site, such as impacts of culverts over 200 feet, or impacts to springs or seeps that require rock fill to allow for movement of water underneath the roadway, would either be mitigated off-site by improving a degraded system or by making a comparable payment to an in-lieu-fee program which would perform such off-site mitigation under the direction of state and federal regulatory and resource agencies.

Although short-term and long-term adverse impacts would be anticipated, BMPs would be followed to reduce or mitigate for the overall impact to water quality. Water quality protection measures that would be followed are described in the following documents:

- Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites (Smoot et al., 1992);
- Tennessee Erosion and Sediment Control Handbook (TDEC, 2001b);
- Riparian Restoration and Streamside Erosion Control Handbook (TDEC, 1998a); and
- Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction (TDOT, 2006).

Examples of stream protection measures that may be used include the following:

- When possible, streamside and in-stream construction activities would be performed during dry periods, when stream flow is at a minimum.
- The unnecessary removal of existing vegetation would be avoided as much as possible. Canopy removal along all working or staging areas would be limited to the extent practicable.
- Where removal of vegetation is necessary, bank stabilization and sediment control measures would be employed immediately at the start of construction. Bank stabilization measures would include seeding with native species and placing of silt fences or rip-rap.
- Control structures would be inspected and properly maintained throughout the life of the project.

Specific mitigation measures for this project would be developed during the permit acquisition process once final design plans have been developed, but prior to any construction activities. All construction activities and associated mitigation requirements would need to be approved by the appropriate agencies responsible for protecting water resources in the project area. Continued coordination with appropriate regulatory agencies would occur during final planning and construction of the project and extend through required monitoring periods that may be established during the initial permit acquisition process.

A spill prevention, control, and counter measures (SPCC) plan would be developed for both the construction process and for operations of SR-18 after construction. This plan would define the emergency response plan in cases where accidental releases of hazardous substances occurred, including potential spills or releases adjacent to streams or other environmentally sensitive areas.

3.3.2 Wetlands

Section 404 of the Clean Water Act extends authorization to the U.S. Army Corps of Engineers (USACE) to regulate activities that affect waters of the United States, including wetlands. The USACE issues Section 404 permits for the discharge of dredged or fill material into wetlands and other waters of the U.S.

Jurisdictional wetlands are defined by the USACE as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (USACE, 1987). Wetlands have hydrophytic vegetation, hydric soils, and occur in areas that are permanently or periodically inundated or saturated with water.

Potential wetlands were preliminarily identified within the project area by reviewing existing United States Geological Survey (USGS) topographic maps, Natural Resources Conservation Service (NRCS) soil survey maps, U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps, and aerial photographs. Field surveys were conducted to confirm the presence or absence of jurisdictional wetlands within or adjacent to the Build Alternative ROWs.

Following the preliminary review of potential wetlands, on-site field investigations were conducted to identify potential jurisdictional wetlands occurring within and immediately adjacent to the Build Alternative ROWs; to characterize the wetland resources in terms of wetland type, size, and functional value; and to determine the environmental impacts of each alternative on these wetland resources.

Wetland delineations were made utilizing the technique as described in the USACE Wetlands Delineation Manual (USACE, 1987). The USACE three-parameter approach (hydrology, soils, and vegetation) was applied to make routine wetlands determinations in the field. This approach requires an on-site inspection of the vegetative composition, soils, and hydrology of an area to make wetland determinations. At least one positive wetland indicator for each parameter must be evident for a positive wetland determination. General diagnostic characteristics for each parameter distinguish wetlands from non-wetland or upland areas. These characteristics are described below for each parameter (USACE, 1987).

Wetland vegetation generally consists of macrophytes that are typically adapted to areas that are at least periodically inundated or saturated by surface or groundwater. These hydrophytic species, due to morphological, physiological, and/or reproductive adaptations, have the ability to grow, compete, reproduce, and/or persist in anaerobic soil conditions, which develop in wetland soils due to inundation or prolonged saturation. Indicators of hydrophytic vegetation include more than 50 percent of the dominant plant species having a regional indicator status of obligate wetland (OBL), facultative wetland (FACW), or facultative (FAC). In addition, morphological plant adaptations such as buttressed trunks,

adventitious roots, and floating leaves were also considered indications of hydrophytic vegetation.

Wetland soils are classified as hydric or possess characteristics that are associated with reducing soil conditions. Indicators of hydric soils include presence of organic soils (peats or mucks), histic epipedons, sulfidic materials, gleyed soils, soils with bright mottles and/or low chroma matrix, and presence of iron and manganese concretions, among others.

Wetland hydrology is defined by an area that is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet, or the soil is saturated to the surface at some time during the growing season creating reducing soil conditions. Indicators of wetland hydrology include, but are not limited to, the presence of drainage patterns, sediment deposition, water marks, and visual observations of inundation or saturation.

During the field inventory, all potential wetland areas identified in the first phase were characterized for vegetation, soils, and hydrology, documented on wetland data forms, and photographed. Each potential wetland was located on the appropriate topographical quad and aerial photograph.

Vegetation and hydrology determinations were based on field observations. Dominant plant species were identified for each vegetative stratum (i.e., tree, shrub/sapling, herb, vine), and their wetland indicator status documented on the data sheets. Soil determinations were based on soil core samples. Soil core samples were taken and observations of hue, value, and chroma using a Munsell Soil Color Chart were made. For the poorly-drained mineral soils generally encountered during the inventory activities, matrix soils with chroma of 2 or less for mottled soils, and matrix chroma of 1 or less for unmottled soils, were considered hydric. Observations of wetland type, physical characteristics, approximate dimensions, water regime, and primary functional values were recorded on supplemental data sheets.

Approximately 29 acres of potential wetlands have been identified at 28 sites within the 500-foot study area of all of the Build Alternatives combined. All the wetlands encountered during the field survey are considered palustrine emergent, forested, and/or scrub-shrub wetlands, as defined by the Cowardin wetlands classification system (Cowardin et al., 1979). The wetlands vary in size and functional value. Several of the wetlands extended beyond the 500-foot study boundary so the actual size of the entire wetlands affected could not be determined. A map showing the wetlands potentially impacted by the SR-18 project is contained on Figure 3-2 in Section 3.3.1 above.

The number of acres of wetlands located within the 250-foot ROW of each of the individual Build Alternatives is reported in the impacts sections (Section 3.3.2.1 through 3.3.2.7) below. Table 3.28 in Section 3.11 shows a comparison of wetland impacts in acres for each of the proposed Build Alternatives. More detailed descriptions and information regarding the individual wetlands documented in the study area are contained in the Ecology Study Technical Appendix available from TDOT upon request.

3.3.2.1 Potential Impacts to Wetlands

Potential Impacts to Wetlands Associated with the No-Build Alternative

Direct Impacts to Wetlands (No-Build Alternative)

Because no new construction activities would occur under the No-Build Alternative, no changes from the baseline conditions of wetlands would occur.

Indirect Impacts to Wetlands (No-Build Alternative)

Because no new construction activities would occur under the No-Build Alternative, no changes from the baseline conditions of wetlands would occur.

Potential Impacts to Wetlands Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Wetlands (Alternative 1-Widen Existing)

There were 6 acres of wetlands at within the 250-foot ROW study area of Alternative 1. Potential impacts to the wetlands include partial to full removal (fill or draining) of the wetlands or temporary impacts to the existing wetlands, such as temporary fill or temporary alteration of hydrology. Removal of all or a portion of any of these wetlands would result in a direct loss of associated wetland wildlife and vegetation. Efforts would be made during project design to avoid or minimize impacts to wetlands, including impacts to hydrology sources for the wetlands, including springs and seeps that flow into them.

Indirect Impacts to Wetlands (Alternative 1-Widen Existing)

Removal of all or a portion of any wetlands in the project area may result in an adverse impact to nearby or adjacent streams, because many of these wetlands help to filter sediments from those watercourses during periods of high flow, and help to slow or store floodwaters to help attenuate the effects of floods in the associated watersheds. Wildlife and/or vegetation that are associated with these wetlands would be adversely impacted from construction due to the loss of habitat. Alteration of hydrology due to cut and fill activities could indirectly impact wetlands located downstream of the project area, especially wetlands that receive hydrology from springs and seeps located within the project limits. Additional wetlands outside the project area could be affected by the proposed alignments, if proper construction and sediment retention are not implemented. Use of best management practices and mitigation techniques should be employed during and following construction of SR-18 to help control sedimentation in wetlands and to maintain hydrological connection to these areas.

Potential Impacts to Wetlands Associated with Alternative 2

Direct Impacts to Wetlands (Alternative 2)

Impacts to wetlands under Alternative 2 would generally be similar to those listed under Alternative 1. However, there were only 5 acres of wetlands within the Alternative 2 250-foot ROW study area.

Indirect Impacts to Wetlands (Alternative 2)

General indirect impacts to wetlands under Alternative 2 would be similar to those discussed under Alternative 1. However impacts to wetlands under Alternative 2 would be slightly reduced due to fewer wetlands within the Alternative 2 study area.

Potential Impacts to Wetlands Associated with Alternative 3

Direct Impacts to Wetlands (Alternative 3)

General impacts to wetlands under Alternative 3 would be similar to those listed under Alternative 1. However, there were 9 acres of wetlands within the 250-foot ROW study area of Alternative 3, the most of any of the alternatives. Therefore, impacts to wetlands would be slightly increased under this alternative.

Indirect Impacts to Wetlands (Alternative 3)

General indirect impacts to wetlands under Alternative 3 would be similar to those discussed under Alternative 1. However impacts to wetlands under Alternative 3 would be slightly increased due to more wetlands within the Alternative 3 study area.

Potential Impacts to Wetlands Associated with Alternative 4

Direct Impacts to Wetlands (Alternative 4)

General impacts to wetlands under Alternative 4 would be similar to those listed under Alternative 1. However, there were only 2 acres of wetlands within the 250-foot ROW study area for Alternative 4, the least of all of the alternatives except for Alternative 5, which also has 2 acres. Therefore, Alternative 4 and Alternative 5 would have the least impacts to wetlands.

Indirect Impacts to Wetlands (Alternative 4)

General indirect impacts to wetlands under Alternative 4 would be similar to those discussed under Alternative 1. However impacts to wetlands would be reduced due to fewer wetlands within the Alternative 4 study area.

Potential Impacts to Wetlands Associated with Alternative 5

Direct Impacts to Wetlands (Alternative 5)

General impacts to wetlands under Alternative 5 would be similar to those listed under Alternative 1. However, there were only 2 acres of wetlands within the 250-foot ROW study area of Alternative 5. Therefore, this alternative would have reduced impacts to wetlands.

Indirect Impacts to Wetlands (Alternative 5)

General indirect impacts to wetlands under Alternative 5 would be similar to those discussed under Alternative 1. However impacts to wetlands would be reduced due to fewer wetlands within the Alternative 5 study area.

Potential Impacts to Wetlands Associated with Alternative 6

Direct Impacts to Wetlands (Alternative 6)

General impacts to wetlands under Alternative 6 would be similar to those listed under Alternative 1. However, there were only 5 acres of wetlands within the 250-foot ROW study area of Alternative 6. Therefore, this alternative would have reduced impacts to wetlands.

Indirect Impacts to Wetlands (Alternative 6)

General indirect impacts to wetlands under Alternative 6 would be similar to those discussed under Alternative 1. However impacts to wetlands would be reduced due to fewer wetlands within the Alternative 6 study area.

3.3.2.2 Mitigation of Wetland Impacts

A detailed summary of the wetland resources affected by each build alternative of SR-18 is shown in the Ecology Study Technical Appendix prepared for this project. Actual impacts to individual wetlands can not be fully determined until a final alternative is chosen and the functional design of the roadway is fully developed. The following information is to be used as general guidance to minimize and/or mitigate impacts to wetlands should it be necessary.

Avoidance, Minimization, and/or Mitigation of Wetland Impacts

Mitigation measures, as defined by the Council of Environmental Quality (CEQ) (40 CFR 1508.20), include avoiding impacts, minimizing impacts, rectifying impacts, reducing or eliminating the impact over time, and compensating for the impact. Executive Order 11990, Protection of Wetlands, provides guidelines to avoid wetlands where possible and minimize contact with them where total avoidance is not feasible. Federal resources management agencies (e.g., the NRCS and USFWS) also recommend impact minimization measures as the best management practices.

The mitigation measures and best management practices (BMPs), as listed below, are proposed during highway construction to avoid, minimize, or mitigate impacts to jurisdictional wetlands. A combination of measures to mitigate for wetland losses and changes in functions and values would be employed. Selection of BMPs and mitigation measures are influenced primarily by functional values, wetland type, or objectives of the mitigation.

Impacts to wetlands would be regulated under Section 401 and Section 404 of the Clean Water Act. A Section 401 permit would be issued according to the state's water quality standards. A Section 404 permit would be issued by the USACE under the guidelines established for regulating impacts to wetlands. As part of the Section 404 permitting process, attempts would be made to avoid or minimize impacts to wetlands. If necessary, proper mitigation would be developed in accordance with USACE permit requirements.

Avoidance of Wetland Impacts

Several potential wetland impacts were avoided by changes to the original build alternative alignments in May 2007. After initial field surveys were completed, some of the alignments affecting the largest and/or highest quality wetlands were shifted in order to avoid or minimize impacts to those resources. If a Build Alternative is chosen for this project, the final alignment would be designed in a manner that would avoid additional wetland impacts where feasible.

Proposed measures for avoiding impacts to wetlands include the following elements:

- Avoidance of riparian and wetland zones would be used to the fullest possible extent to prevent impacts to these resources by reconfiguring the facilities or selective routing around jurisdictional wetland areas;
- Scheduling of construction activities and grading, to the extent practicable, would coincide with dry periods or low-flow conditions;
- Efforts would be made to avoid disturbance of wetland/riparian soils and vegetation outside of the Build Alternative ROWs. Wetlands located outside of the ROWs would not be crossed by vehicles or other equipment. Construction areas and activities (including operation of equipment and trucks, storage of material, and other construction activities) through any wetland or riparian area within the ROW boundaries would be temporarily fenced to prevent disturbances outside of the project area;
- Sediment traps (e.g., straw bales, filter fabric fences, and siltation berms) located down-gradient from construction areas can be used to intercept eroded soils and

sediments transported toward adjacent streams, wetlands, and floodplains during storm events; and

- Material stockpiles (sand, gravel, and other construction materials) would not be in unprotected floodplains and wetlands and, if necessary, would be contained or enclosed by berms to prevent transport of materials into streams and wetlands.

Minimization of Wetland Impacts

Where wetland impacts are unavoidable, impact minimization measures would be enacted to reduce the potential effects as much as possible. Some potential measures to minimize wetland impacts include:

- Employing construction practices that reduce soil erosion (such as sediment traps and scheduling constraints) and minimize vegetation losses;
- Existing drainage patterns within the project area would be maintained uninterrupted, to the extent practicable;
- The width of roads through wetland areas would be minimized as much as possible to reduce the overall extent of wetland damages;
- The amount of vegetation removal would be minimized in wetlands and riparian areas; and
- Disturbed areas in wetlands and riparian areas would be revegetated with native species or species similar to those that were present on the wetland before site alterations occurred.

Mitigation of Wetland Impacts

TDOT's stream and wetland mitigation efforts for this project will be in compliance with all rules and regulations as set by USACE, EPA, and/or TDEC. Where possible, TDOT replaces unavoidable stream and wetland impacts through a process referred to as compensatory mitigation. Compensatory mitigation involves actions taken to offset unavoidable adverse impacts to wetlands, streams, and other aquatic resources authorized by Clean Water Act Section 404 permits and other USACE permits. As such, compensatory mitigation is a critical tool in helping the federal government to meet the longstanding national goal of "no net loss" of wetland acreage and function. For impacts authorized under Section 404, compensatory mitigation is not considered until after all appropriate and practicable steps have been taken to first avoid and then minimize adverse impacts to the aquatic ecosystem pursuant to 40 CFR part 230 (i.e., the CWA Section 404(b)(1) Guidelines). Compensatory mitigation can be carried out through four methods: the restoration of a previously-existing wetland or other aquatic site, the enhancement of an existing aquatic site's functions, the establishment (i.e., creation) of a new aquatic site, or the preservation of an existing aquatic site.

There are three mechanisms for providing compensatory mitigation: permittee-responsible compensatory mitigation, mitigation banks, and in-lieu fee mitigation. Permittee-responsible mitigation is the most traditional form of compensation and continues to represent the majority of compensation acreage provided each year. As its name implies, the permittee retains responsibility for ensuring that required compensation activities are completed and

successful. Permittee-responsible mitigation can be located at or adjacent to the impact site (i.e., on-site compensatory mitigation) or at another location generally within the same watershed as the impact site (i.e., offsite compensatory mitigation). Mitigation banks and in-lieu fee mitigation both involve off-site compensation activities generally conducted by a third party, a mitigation bank sponsor or in-lieu fee program sponsor. When a permittee's compensatory mitigation requirements are satisfied by a mitigation bank or in-lieu-fee program, responsibility for ensuring that required compensation is completed and successful shifts from the permittee to the bank or in-lieu fee sponsor. TDOT's compensatory mitigation typically occurs in advance of or concurrent with the impact.

On April 10, 2008 the U.S. Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) issued revised regulations governing compensatory mitigation for activities authorized by permits issued by the USACE (USACE 33 CFR Parts 325 and 332 and EPA 40 CFR Part 230; EPA-HQ-OW-2006-0020; FRL-8545-4] RIN 0710-AA55). The regulations establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects for activities authorized by USACE permits. This rule improves the planning, implementation and management of compensatory mitigation projects by emphasizing a watershed approach in selecting compensatory mitigation project locations, requiring measurable, enforceable ecological performance standards, regular monitoring for all types of compensation, and specifying the components of a complete compensatory mitigation plan. This includes assurances of long-term protection of compensation sites, financial assurances, and identification of the parties responsible for specific project tasks. This rule applies equivalent standards to permittee-responsible compensatory mitigation, mitigation banks, and in-lieu fee mitigation to the maximum extent practicable.

Since a mitigation bank must have an approved mitigation plan and other assurances in place before any of its credits can be used to offset permitted impacts, this rule establishes a preference for the use of mitigation bank credits, which reduces some of the risks and uncertainties associated with compensatory mitigation. This rule also significantly revises the requirements for in-lieu fee programs to address concerns regarding their past performance and equivalency with the standards for mitigation banks and permittee-responsible compensatory mitigation. This new became effective on June 9, 2008. Additional information can also be found at the Corps Headquarters Regulatory Program webpage at <http://www.usace.army.mil/CECW/Pages/techbio.aspx> or the EPA compensatory mitigation webpage at: <http://www.epa.gov/wetlandsmitigation>.

3.3.3 Floodplains

Floodplains perform a variety of important natural functions including storage of floodwater, moderation of peak flows, maintenance of water quality, and groundwater recharge. Floodplains often support wetland ecosystems due to collection and storage of floodwaters and filtration and deposition of beneficial nutrients from those waters that enter into the soil and help support lush wetland vegetation. Many floodplains, especially those that flood less frequently during the growing season, also provide areas that are suitable for growing crops. Floodplains also provide habitat for wildlife (especially migratory birds, such as waterfowl and shorebirds), recreational opportunities, timber supplies, and aesthetic benefits.

Significant encroachment according to 23CFR650.105(q) refers to a highway encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction-or flood-related impacts: (1) a significant potential for

interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route; (2) a significant risk; or (3) a significant adverse impact on natural and beneficial floodplain values.

Encroachment may diminish or impair the natural functions of the floodplain by decreasing the capacity for the area to convey floodwaters, which increases the potential for flood hazards. Flooding can cause serious damage to homes, businesses, and public works and can pose a threat to the safety of individuals.

The Build Alternatives would traverse the 100-year floodplain of several streams within the project area. The floodplains of Clover Creek, Lacy Creek, and Meridian Creek, along with those of some of the smaller tributary streams, would be crossed by the various Build Alternative alignments. Figure 3-2 shows the designated 100-year floodplains within the project area. Table 3.28 located in Section 3.11 contains summary data for each of the Build Alternatives, including number of acres of floodplain impacted. Section 3.3.3.1 below discuss the floodplain impacts in more detail.

Most of the floodplains being crossed are currently relatively undeveloped lands containing a mixture of old fields, forests, and pastures. Ecological values associated with the affected floodplains include overflow flood storage, water filtration, and wildlife habitat.

Any Build Alternative would be designed to minimize impacts to current drainage patterns and would not increase the base flood elevations upstream from the floodplain crossing. Where feasible, precautions would be taken during construction to minimize in-stream work and other stream disturbances that could alter flood flow. All stream work and mitigation measures would be in compliance with EO 11988, *Floodplain Management*. Regulatory floodway encroachments would be coordinated with FEMA.

3.3.3.1 Potential Impacts to Floodplains

Potential Impacts to Floodplains Associated with the No-Build Alternative

Direct Impacts to Floodplains (No-Build Alternative)

The No-Build Alternative would not result in any changes to the baseline conditions relative to floodplains. Therefore, the No-Build Alternative would not result in impacts to floodplains.

Indirect Impacts to Floodplains (No-Build Alternative)

The No-Build Alternative would not result in any changes to the baseline conditions relative to floodplains. Therefore, the No-Build Alternative would not result in any indirect impacts to floodplains.

Potential Impacts to Floodplains Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Floodplains (Alternative 1-Widen Existing)

Within the 500-foot study area of Alternative 1, there are 6 acres in the 100-year floodplain. Encroachment of floodplains can diminish or impair the natural functions of the floodplain by decreasing the capacity for the area to convey floodwaters, which increases the potential for flood hazards. Portions of the floodplains being crossed may be bridged allowing those portions to continue to provide their natural functions. Impacts to floodplains would be avoided or minimized to the extent practical during the design phase by slightly shifting the

proposed alignment and by adding design features that would minimize effects to the function of the floodplain.

Indirect Impacts to Floodplains (Alternative 1-Widen Existing)

Loss of floodplain as a result of construction could result in minor increases in flood levels elsewhere within the same floodplain. Loss of floodplain vegetation could result in minor adverse impacts to water quality, because less opportunity would exist for water filtration provided by vegetation.

Potential Impacts to Floodplains Associated with Alternative 2

Direct Impacts to Floodplains (Alternative 2)

General impacts to floodplains under Alternative 2 would be similar to those discussed under Alternative 1. However, within the 500-foot study area of Alternative 2, there are 18 acres in the 100-year floodplain. Therefore, there would be more acres of floodplains impacted under Alternative 2. Alternative 2 would potentially impact the largest amount of floodplain out of all the Build Alternatives, primarily because the proposed alignment runs parallel to Lacy Creek for a relatively long stretch portion of the alignment. It is likely that floodplain impacts could be reduced during final design of this alternative by slightly shifting the alignment away from the floodplain area.

Indirect Impacts to Floodplains (Alternative 2)

In general, indirect impacts to floodplains under Alternative 2 would be similar to those discussed under Alternative 1. However, because additional floodplain areas may be impacted under this alternative, the level of impacts would be increased.

Potential Impacts to Floodplains Associated with Alternative 3

Direct Impacts to Floodplains (Alternative 3)

General impacts to floodplains under Alternative 3 would be similar to those discussed under Alternative 1. However, within the 500-foot study area of Alternative 3, there are only 5 acres in the 100-year floodplain. Therefore, there would be less acres of floodplains impacted under Alternative 3. Alternative 3 and Alternative 6 would potentially impact the least amount of floodplain out of all the Build Alternatives.

Indirect Impacts to Floodplains (Alternative 3)

In general, indirect impacts to floodplains under Alternative 3 would be similar to those discussed under Alternative 1. However, because fewer floodplain areas may be impacted under this alternative the level of impacts would be reduced.

Potential Impacts to Floodplains Associated with Alternative 4

Direct Impacts to Floodplains (Alternative 4)

General impacts to floodplains under Alternative 4 would be similar to those discussed under Alternative 1. However, within the 500-foot study area of Alternative 4, there would be 11 acres in the 100-year floodplain. Therefore, there would be more acres of floodplains impacted under Alternative 4.

Indirect Impacts to Floodplains (Alternative 4)

In general, indirect impacts to floodplains under Alternative 4 would be similar to those discussed under Alternative 1. However, because more floodplain areas may be impacted under this alternative the level of impacts would be slightly increased.

Potential Impacts to Floodplains Associated with Alternative 5

Direct Impacts to Floodplains (Alternative 5)

General impacts to floodplains under Alternative 5 would be similar to those discussed under Alternative 1. Similar to Alternative 1, within the 500-foot study area of Alternative 5, there would be 6 acres in the 100-year floodplain.

Indirect Impacts to Floodplains (Alternative 5)

Indirect impacts to floodplains under Alternative 5 would be similar to those discussed under Alternative 1.

Potential Impacts to Floodplains Associated with Alternative 6

Direct Impacts to Floodplains (Alternative 6)

General impacts to floodplains under Alternative 6 would be similar to those discussed under Alternative 1. However, within the 500-foot study area of Alternative 6, there would only be 5 acres in the 100-year floodplain. Therefore, there would be slightly less floodplain impacted under Alternative 6. Alternative 6 and Alternative 3 would impact the least amount of floodplains out of all of the Build Alternatives.

Indirect Impacts to Floodplains (Alternative 6)

In general, indirect impacts to floodplains under Alternative 6 would be similar to those discussed under Alternative 1. However, because fewer floodplain areas may be impacted under this alternative the level of impacts would be reduced.

3.3.3.2 Mitigation of Floodplain Impacts

All regulatory floodplain encroachments would be coordinated with FEMA, and no revisions to the regulatory floodplain limits are anticipated. There would be no significant encroachment [as defined in 23CFR650.105(q)] on floodplains with any of the alternatives.

Because the overall region and project area contains a large number of streams with their associated floodplains, there is no practicable alternative that would successfully accomplish the objectives of this project without some encroachment on existing floodplains. Impacts to floodplains have been avoided or minimized to the extent practical by either crossing floodplains at a near-perpendicular angle with appropriately sized bridges or by placing parallel stretches of highway alignment out of the floodplain in adjacent upland areas. Additional minimization efforts, such as the incorporation of proper design to minimize drainage pattern impacts, would be employed. In-stream work would be limited to the extent practical and measures to minimize stream bank impacts would be employed. All stream work and mitigation measures would be in compliance with Executive Order 11988, Floodplain Management.

3.3.4 Threatened and Endangered Species

3.3.4.1 Federally-Listed Species

Certain species are given protection under the Endangered Species Act of 1973 (ESA), as amended. The ESA, administered by the USFWS and National Marine Fisheries Service, provides Federal protection for all species designated as *threatened* or *endangered*. An *endangered* species is “in danger of extinction throughout all or a significant portion of its range,” and a *threatened* species “is likely to become an endangered species within the foreseeable future.” The “take” of species listed as *threatened* or *endangered* under the ESA is prohibited, unless the take is incidental to otherwise lawful activities. To “take” a listed species includes to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct.

Information from several sources, as well as prior experience with habitats in the area, was used to prepare for field surveys to locate protected species and/or habitats. These sources included database information provided by the U.S. Fish and Wildlife Service (USFWS) and the Tennessee Department of Environment and Conservation (TDEC). A letter dated April 12, 2006 from the USFWS reported that their records did not indicate that federally-listed or proposed endangered or threatened species occur within the impact area of the project. A copy of the USFWS letter is contained in Appendix A of this document. Table 3.19 lists the federally-listed species for Hardeman and Madison Counties.

Table 3.19. Federally-listed threatened and endangered species known to occur in Hardeman and/or Madison Counties, Tennessee.

Common Name	Scientific Name	Federal Status	County
Gray Bat	<i>Myotis grisescens</i>	LE	Hardeman (h)
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	No Status	Hardeman (h)
Whorled Sunflower	<i>Helianthus verticillatus</i>	C	Madison (h)
Federal Status: LE = Listed Endangered, LT = Listed Threatened, C = Candidate Species			
Sources: TDEC-ESD Natural Heritage Division, List of Rare and Endangered Species by Tennessee County.			
Notes: (h) = historical record			

3.3.4.2 State-Listed Species

The TDEC database was searched for state-listed species that are known to occur in Madison and Hardeman Counties, Tennessee. State-listed species known to occur within the project counties are shown on Table 3.20. None of the known records of state-listed species occur within the ROW of any of the Build Alternatives. A letter from the Tennessee Wildlife Resources Agency (TWRA) dated August 31, 2006 concerns were raised regarding potential impacts to the firebelly darter (*Etheostoma pyrrhogaster*), listed as “Deemed in Need of Management” in Madison County by the State of Tennessee. A copy of the TWRA letter is contained in Appendix A of this document.

Table 3.20. State-listed threatened and endangered species known to occur in Hardeman and/or Madison Counties, Tennessee.

Common Name	Scientific Name	State Status	County
Fish			
Naked Sand Darter	<i>Ammocrypta beani</i>	D	Hardeman
Scaly Sand Darter	<i>Ammocrypta viviax</i>	D	Hardeman
Firebelly Darter	<i>Etheostoma pyrrhogaster</i>	D	Madison
Northern Madtom	<i>Noturus stigmosus</i>	D	Hardeman, Madison
Birds			
Lark Sparrow	<i>Chondestes grammacus</i>	T	Hardeman
Cerulean Warbler	<i>Dendroica cerulean</i>	D	Hardeman
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	D	Hardeman
Red-Cockaded Woodpecker	<i>Picoides borealis</i>	?	Hardeman
Reptiles/Amphibians			
Barking Treefrog	<i>Hyla gratiosa</i>	D	Hardeman
Alligator Snapping Turtle	<i>Macroclemys temminckii</i>	D	Hardeman
Eastern Slender Glass Lizard	<i>Ophisaurus attenuatus longicaudus</i>	D	Hardeman
Western Pigmy Rattlesnake	<i>Sistrurus miliarius streckeri</i>	T	Hardeman
Mammals			
Eastern Big-eared Bat	<i>Corynorhinus rafinesquii</i>	D	Madison
Gray Bat	<i>Myotis grisescens</i>	E	Hardeman
Southeastern Shrew	<i>Sorex longirostris</i>	D	Hardeman, Madison
Southern Bog Lemming	<i>Synaptomys cooperi</i>	D	Hardeman
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	D	Hardeman
Plants			
Lake-bank Sedge	<i>Carex lacustris</i>	T	Madison
Woolly Sedge	<i>Carex lanuginose</i>	E-P	Madison
Prickly Hornwort	<i>Ceratophyllum echinatum</i>	S	Hardeman
Red Turtlehead	<i>Chelone obliqua</i>	S	Madison
Whorled Sunflower	<i>Helianthus verticillatus</i>	E	Madison
Goldenseal	<i>Hydrastis canadensis</i>	S-CE	Madison
Lamance Iris	<i>Iris brevicaulis</i>	E	Madison
Sweetbay Magnolia	<i>Magnolia virginiana</i>	T	Hardeman
American Ginseng	<i>Panax quinquefolius</i>	S-CE	Madison
Red Starvine	<i>Schisandra glabra</i>	T	Madison
Horse-sugar	<i>Symplocos tinctoria</i>	S	Hardeman

Common Name	Scientific Name	State Status	County
Buffalo Clover	<i>Trifolium reflexum</i>	E	Madison
Inflated Bladderwort	<i>Utricularia inflata</i>	S	Madison
State Status: E = Endangered, T = Threatened, P = Proposed for Listing, D = Deemed in Need of Management, S = Special Concern, CE = Commercially Exploited			
Sources: TDEC-ESD Natural Heritage Division, List of Rare and Endangered Species by Tennessee County.			

3.3.4.3 Threatened and Endangered Species Assessment

Following the compilation of the list of threatened and endangered species potentially occurring in the project area, a detailed literature search was completed for the species. Published recovery plans and species accounts from the USFWS were collected and analyzed. The potential for species to occur in the project area was estimated using available life history information coupled with recorded observations of known threatened and endangered species occurrences provided by TDEC.

It is not anticipated that any of the federally-listed species occur within the proposed ROW of any of the Build Alternatives. However, one state-listed species is known to occur within the project vicinity based on recorded observations. While none of the species are known to occur within the 500-foot study area of any of the Build Alternatives, their current or historical existence within the two-county project area necessitates the consideration of potential impacts.

The firebelly darter (*Etheostomo pyrrhogaster*) listed as “Deemed in Need of Management” was observed in the Meridian Creek watershed in 1994 based on records provided by TDEC. Additional efforts were made during the alternative development process to provide alignments that minimized impacts to Meridian Creek, in part to protect the stream from substantial impacts in case populations of the darter occur in the stream. Tributary streams located in proximity to the 1994 firebelly darter observation were documented. This includes primarily streams located along segment B-4. No darters were observed in those streams within the 500-foot study areas of the alignments in those areas. Proposed stream crossings in those areas tend to be perpendicular, which would limit the amount of channel modifications required in those streams.

Of the federally-listed species identified, one species is listed as endangered and one species is listed as a candidate for listing. The federally-listed species include one mammal and one plant.

Plants

The whorled sunflower (*Helianthus verticillatus*), a candidate to become federally-listed, was documented to occur in the two-county project area according to the USFWS. The USFWS listed the whorled sunflower as a candidate species historically occurring in Madison County. The whorled sunflower is a perennial flower in the sunflower family and is typically associated with moist, prairie-like openings in wooded areas that are adjacent to creeks. This plant prefers sandy, alkaline soils that are high in organic content. No populations of this plant are known to exist within the project area. The closest known population is near Pinson in Madison County and was rediscovered by Nordman in 1998. Surveys of the adjoining counties found no other individuals. A historical population was documented in

1892 near the intersection of SR-5 (U.S. 45) and SR-100. The species was not found during field surveys.

Mammals

The federally-endangered gray bat (*Myotis grisescens*) was listed in the USFWS and TDEC ESD databases as potentially occurring in Hardeman County. On April 28, 1976, the gray bat was listed as endangered under the Endangered Species Act (ESA) of 1973. Due to protection in the late 1970's and throughout the 1980's, populations have stabilized and are increasing at some of the major gray bat sites. Cave protection, including restricting access through proper gate construction, is important to the protection of the species. A recovery plan for the species was completed in July 1982. Critical habitat has not been designated in the project area.

A field survey was conducted to look for evidence of possible gray bat habitat. The Build Alternative study areas were examined for the presence of caves or evidence of karst topography such as sinkholes, depressions, springs, and/or limestone terrain. No evidence of karst topography or caves were located within the SR-18 project vicinity.

3.3.4.4 Potential Impacts to Threatened and Endangered Species

Potential Impacts to Threatened and Endangered Species Associated with the No-Build Alternative

Direct Impacts to Threatened and Endangered Species (No-Build Alternative)

The No-Build Alternative would not result in any changes to the baseline conditions in regards to threatened and endangered species.

Indirect Impacts to Threatened and Endangered Species (No-Build Alternative)

The No-Build Alternative would not result in any changes to the baseline conditions in regards to threatened and endangered species.

Potential Impacts to Threatened and Endangered Species Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Threatened and Endangered Species (Alternative 1-Widen Existing)

No records of listed species occurred within the 500-foot study area of Alternative 1. In addition, no listed species or suitable habitats were identified during field the 2006-2007 field surveys. With the exception of a few isolated areas, most of the terrestrial and aquatic habitats within the proposed project area have become relatively degraded due to past and/or present disturbances, such as agriculture, residential development, roadways, utilities, timber harvesting, and other human disturbances. Therefore, the potential for the remaining habitats to support threatened and endangered species is considered low at this time. Avoidance of direct impacts to some of the higher quality streams and wetlands in the project vicinity helped to reduce the potential for affecting listed species as most of those species require high quality or unique habitat conditions to prosper.

Indirect Impacts to Threatened and Endangered Species (Alternative 1-Widen Existing)

Because no known populations of threatened or endangered species are known to exist in the immediate project area, no indirect impacts to such species are anticipated. There is a low potential for state-listed aquatic species to be present in higher quality streams or

wetlands located downstream of the immediate project area. Any impacts to water quality or other characteristics of those aquatic habitats could result in indirect impacts to such species. However, impacts to areas outside of the immediate project vicinity would primarily be short-term, occurring during construction. Potential impacts to areas downstream of the construction areas would be reduced through use of BMPs to help control runoff, erosion, and subsequent sedimentation.

Potential Impacts to Threatened and Endangered Species Associated with Alternative 2

Direct Impacts to Threatened and Endangered Species (Alternative 2)

Direct impacts to threatened and endangered species associated with Alternative 2 would be similar to those discussed for Alternative 1. There would be a slightly higher potential for impacts to listed species or their habitats due to a large portion of this alternative being constructed on new alignment. However, as with Alternative 1, much of the habitat located within the Alternative 2 study area is considered of low likelihood to support listed species due to past and present land uses and human disturbances. Impacts to any firebelly darter populations that may exist in the Meridian Creek Watershed have been minimized to the extent possible by shifting the original alternative alignments away from the the primary streams and wetlands associated with it. Where stream crossings could not be avoided, attempts were made to ensure that the crossings were at perpendicular angles so channel modifications could be kept to a minimum. Additional efforts could be made during the final design and permitting phases of the project to minimize impacts to streams, especially in Segment B-4, which is proximal to the 1994 observation point for the firebelly darter.

Indirect Impacts to Threatened and Endangered Species (Alternative 2)

Indirect impacts to threatened and endangered species would be similar to those discussed under Alternative 1. However, there would be a slightly higher potential for impacts to species downstream of the project area since Alternative 2 would be constructed primarily on new alignment. Construction on this new alignment may result in impacts to small tributaries and/or groundwater features such as seeps and springs that eventually flow into higher quality streams and wetlands located downstream. Although no listed species have been recorded in those areas to date, the potential may exist for some of the listed species to occur in those higher quality habitats. However, as stated under Alternative 1, it is not expected that substantial impacts outside of the immediate project area would occur as use of BMPs during construction would help reduce potential impacts. Implementation of erosion control structures during construction would protect downstream habitats from substantial impacts.

Potential Impacts to Threatened and Endangered Species Associated with Alternative 3

Direct Impacts to Threatened and Endangered Species (Alternative 3)

Direct impacts to threatened and endangered species under Alternative 3 would be similar to those discussed under Alternative 2. However, a smaller portion of this alternative would be constructed on new alignment. Therefore, any potential impacts to listed species would be reduced relative to Alternative 2.

Indirect Impacts to Threatened and Endangered Species (Alternative 3)

Indirect impacts to threatened and endangered species under Alternative 3 would be similar to those discussed under Alternative 2. However, a smaller portion of this alternative would be constructed on new alignment. Therefore, any potential indirect impacts to listed species would be reduced relative to Alternative 2.

Potential Impacts to Threatened and Endangered Species Associated with Alternative 4

Direct Impacts to Threatened and Endangered Species (Alternative 4)

Direct impacts to threatened and endangered species under Alternative 4 would be similar to those discussed under Alternative 2. However, a smaller portion of this alternative would be constructed on new alignment. Therefore, any potential impacts to listed species would be reduced relative to Alternative 2.

Indirect Impacts to Threatened and Endangered Species (Alternative 4)

Indirect impacts to threatened and endangered species under Alternative 4 would be similar to those discussed under Alternative 2. However, a smaller portion of this alternative would be constructed on new alignment. Therefore, any potential indirect impacts to listed species would be reduced relative to Alternative 2.

Potential Impacts to Threatened and Endangered Species Associated with Alternative 5

Direct Impacts to Threatened and Endangered Species (Alternative 5)

Direct impacts to threatened and endangered species under Alternative 5 would be similar to those discussed under Alternative 2. However, a smaller portion of this alternative would be constructed on new alignment. Therefore, any potential impacts to listed species would be reduced relative to Alternative 2.

Indirect Impacts to Threatened and Endangered Species (Alternative 5)

Indirect impacts to threatened and endangered species under Alternative 5 would be similar to those discussed under Alternative 2. However, a smaller portion of this alternative would be constructed on new alignment. Therefore, any potential indirect impacts to listed species would be reduced relative to Alternative 2.

Potential Impacts to Threatened and Endangered Species Associated with Alternative 6

Direct Impacts to Threatened and Endangered Species (Alternative 6)

Direct impacts to threatened and endangered species under Alternative 6 would be similar to those discussed under Alternative 2. However, a slightly smaller portion of this alternative would be constructed on new alignment. Therefore, any potential impacts to listed species would be reduced relative to Alternative 2.

Indirect Impacts to Threatened and Endangered Species (Alternative 6)

Indirect impacts to threatened and endangered species under Alternative 6 would be similar to those discussed under Alternative 2. However, a slightly smaller portion of this alternative

would be constructed on new alignment. Therefore, any potential indirect impacts to listed species would be reduced relative to Alternative 2.

3.3.5 Fish and Wildlife Resources

3.3.5.1 Aquatic Wildlife

Aquatic Habitats

Aquatic habitats within the project area consist of a mixture of intermittent streams, perennial streams, wetlands, and man-made ponds. Most of the streams in the project area contain relatively limited amounts of aquatic habitats due to their small sizes. However, some of the larger streams, such as Cypress Creek, Clover Creek, and Lacy Creek, provide habitats for a variety of species. Characteristics of these habitats are described in more detail in the Ecology Study Technical Appendix prepared for this project.

Several small fish species, reptiles, amphibians, mammals, and various invertebrates rely on the aquatic habitats within the project area. Several otherwise terrestrial species also utilize the aquatic habitats for drinking and foraging. Most of the aquatic habitats are of somewhat reduced quality due to past and present human disturbances including residential developments and associated infrastructure, such as roadways, driveways, and utilities; agricultural practices such as row crop production, hay production, and cattle grazing; and other land uses such as timber harvesting. These disturbances have resulted in a combination of impacts to local aquatic habitats and water quality resulting from removal of riparian vegetation, substantial channel modifications, increased erosion, and changes in hydrology. Loss of wetlands in the project area has also resulted in loss of unique and important aquatic habitats. It is likely that much more wetland habitat formerly occurred in the project vicinity prior to development and land use changes. Evidence of recent wetland impacts were observed in various areas within the proposed project area.

3.3.5.2 Terrestrial Wildlife

Terrestrial Wildlife Habitats

The State Route 18 project area provides a variety of habitats for resident and migratory species. Typical resident species include mammals, such as white-tailed deer, raccoon, gray squirrel, coyote, opossum, and several small rodent species. Resident birds include wild turkey and Northern bobwhite. Some of the migratory species that frequent the project area include waterfowl, such as wood ducks and mallards, and raptors, such as red tailed hawks, turkey vultures, sharp-shinned hawks, and American kestrels. Neotropical migrants including warblers, vireos, thrushes, and other songbirds that utilize the diverse habitats within the project area. Reptiles including snakes, lizards, and turtles, are also common within the project area.

Some of the species and signs of the species listed above were observed during field surveys conducted for this project. The areas with mixtures of agricultural crops, pasture, old fields, and forests provide quality habitat for game species such as white-tailed deer and turkeys. Areas containing mostly forest, scattered old fields, and small fields provide quality habitat for game species, such as turkey, white-tailed deer, and squirrels, and non-game species such as neotropical migrant birds. The developed/disturbed areas provide low quality habitat for most species occupying the project area.

Most of the vegetative communities and habitats within the project area have been altered by human activity. The various habitat types within the project area have been fragmented

and modified by roads, railroads, fences, utility lines, residences, small businesses, timber cutting, agriculture, and other man-induced disturbances.

Characteristics of these habitat types are described in detail in the Ecology Technical Report prepared for this project. The acreage of each habitat type within each of the build alternative ROWs is summarized on Table 3.21.

Table 3.21. Total habitat acreages potentially affected by the SR-18 build alternatives in Hardeman and Madison Counties, Tennessee.

Alternative	Grassland/Agriculture	Old Field	Forest	Open Water	Developed/Disturbed	Total
Alternative 1	141	34	315	1	394	885
Alternative 2	144	184	436	1	100	865
Alternative 3	176	59	406	1	241	883
Alternative 4	139	86	375	2	285	887
Alternative 5	156	45	344	2	348	895
Alternative 6	191	70	436	1	196	894

Note: Habitat areas shown as acres.

Note: These acreage amounts were calculated based on lands within the 500-foot study corridor for each alternative and are given for comparison purposes. They include all areas, including existing right-of-way (ROW). For example, existing ROW along the existing SR-18 is included in the habitat calculations, but would not be included in the ROW acquisition amounts shown elsewhere in environmental documents. Not all of the acreages shown in this table would actually be impacted by construction of this project. This data provides a general summary of what the basic land uses/habitat types are within each alternative study corridor. Only lands needed for actual construction or work zones would be cleared or disturbed. It is anticipated that the actual ROW for most of the project would be 250 feet wide or less.

Source: Parsons, 2007.

The following is a summary of the primary habitat types in the project area:

- Grassland/Agriculture Grassland/Agriculture habitats make up approximately 15.9% of Alternative 1; 16.6% of Alternative 2; 20.0% of Alternative 3; 15.7% of Alternative 4; 17.4% of Alternative 5; and 21.4% of Alternative 6;

- Old Field Old field make up approximately 3.8% of Alternative 1; 21.3% of Alternative 2; 6.7% of Alternative 3; 9.7% of Alternative 4; 5.0% of Alternative 5; and 7.8% of Alternative 6;
- Forest Forests make up approximately 35.6% of Alternative 1; 50.4% of Alternative 2; 46.0% of Alternative 3; 42.4% of Alternative 4; 38.5% of Alternative 5; and 48.8% of Alternative 6;
- Open Water Open water habitats make up <1% of each of the Build Alternatives; and
- Developed/Disturbed Developed and disturbed areas make up approximately 44.6% of Alternative 1; 11.6% of Alternative 2; 27.3% of Alternative 3; 32.2% of Alternative 4; 38.9% of Alternative 5; and 21.9% of Alternative 6.

3.3.5.3 Potential Impacts to Fish and Wildlife Resources

Potential Impacts to Fish and Wildlife Resources Associated with the No-Build Alternative

Direct Impacts to Fish and Wildlife Resources (No-Build Alternative)

The No-Build Alternative would not change the baseline conditions in the project area. Therefore, no substantial changes to existing levels of impacts to fish and wildlife resources would be expected.

Indirect Impacts to Fish and Wildlife Resources (No-Build Alternative)

The No-Build Alternative would not change the baseline conditions in the project area. Therefore, no substantial changes to existing levels of impacts to fish and wildlife resources would be expected.

Potential Impacts to Fish and Wildlife Resources Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Fish and Wildlife Resources (Alternative 1-Widen Existing)

There would be direct long-term adverse impacts to terrestrial habitats due to the clearing of productive forests, old fields, and grassland areas for conversion to roadway. Loss of potential wildlife habitats, especially forests and old fields is one of the more substantial potential impacts of the project, especially for alternatives utilizing new alignment. Although a substantial amount of potential wildlife habitat was recorded within the entire 500-foot study area, only a portion of those habitats would actually need to be cleared for this project. Some of the remaining habitats within the ROW of the project could still be utilized by several of the species common to the project area. However, the quality of the habitats immediately adjacent to the roadway would be reduced for most species due to highway noise and other factors. Areas that are completely cleared and covered with pavement would no longer provide usable habitat.

Among the build alternatives, Alternative 1 would result in the least amount of new impacts to existing wildlife habitats, because construction would occur mainly in previously developed areas along the existing SR-18 corridor. Many of the habitats along the existing SR-18 consist of small fragmented blocks of habitat compared to larger blocks of habitats that would be encountered within the other alternatives on new alignment.

Highway noise can affect the utilization of habitats by wildlife in both the short and long term. Construction noise would likely disturb wildlife in the short term. Vehicle noise from operation along the constructed SR-18 would be a sustained long-term impact. Since much of the project area already contains the existing SR-18, other roadways, and other development, traffic, construction noise, and other human induced noises, the additional impacts should be minimal. The increase in noise could adversely affect breeding of some sensitive species in the project area. It may be difficult for land animals to traverse the land occupied by SR-18. Mortality of individual animals may occur during construction and afterward during highway operation. Although roadway mortality is generally not believed to affect most animal populations under normal conditions, if the population is experiencing other sources of stress, then traffic-related mortality can contribute to the reduction of the population. Because most species present in the SR-18 project area are habitat generalists and have overall healthy populations, impacts associated with this alternative would be minimal.

Short-term adverse impacts would include interruption or modification of stream flow during construction and water quality impacts associated with site preparation, grading, and construction activities. Other short-term adverse impacts would include increased sediment loading, disruption of bottom substrates and associated macroinvertebrate communities, and removal of tree cover and riparian vegetation resulting in increased erosion and habitat loss. Contaminant runoff from construction equipment and materials may also adversely affect water quality. Construction-related impacts would be temporary and any affected aquatic communities would be expected to recover after construction had ceased. The degree of impact would vary depending on the width and depth of the stream, the distance of the stream to the final alignment, the steepness of the newly established streambanks, and the typical level of flow within the stream.

Indirect Impacts to Fish and Wildlife Resources (Alternative 1-Widen Existing)

The plant communities found within the proposed project ROW serve as shelter, nesting, and foraging habitat for numerous species of wildlife. Loss of habitat initially displaces animals from the area and can force them to concentrate into a smaller area. This can cause over utilization of the remaining habitats. Construction of a large roadway in a relatively rural area would cause habitats to become permanently segmented and segregated. Spring systems can be permanently altered by damaging groundwater flows or connections to surface drainages upstream.

Channelization of streams within the project area could result in long-term adverse impacts to aquatic habitats and species living in downstream habitats. These long-term adverse impacts would mainly result from potential changes in aquatic habitat conditions associated with changes in hydrology and water quality over time. Changes in hydrology may impact microhabitat conditions, such as substrate type, stream channel depth and width, and vegetation in portions of these streams. Removal of canopy cover increases sun exposure to the water surface, which can raise stream water temperature. Increased water temperature and other microhabitat changes can alter species composition in the stream. These adverse impacts have the potential to affect spawning and/or affect larval fish survival due primarily to the decreased water quality and subsequent decrease in benthic invertebrates.

Potential short-term indirect adverse impacts on benthic invertebrates, larval fish, and other aquatic species could occur from stormwater runoff, which would increase turbidity and total suspended solids. Uncontrolled erosion would be the primary adverse impact to water

quality, potentially resulting in an increased silt load (suspended solids and total solids), turbidity, change in color, and introduction of contaminants, such as petroleum products from heavy equipment. Siltation can cause mortality or impair the growth of the benthic fauna and fish, while increased turbidity and color can impact primary production by plants.

Although much of the habitats along the existing SR-18 corridor have been altered and are already somewhat developed, improvements to the roadway may encourage additional secondary developments within and adjacent to the corridor. Such developments would occur at strategic locations along the route where new or improved access may be established. Any secondary developments that occur as a direct result of the SR-18 improvements could result in additional loss and/or fragmentation of fish and wildlife habitats. Those impacts could result in additional changes in species composition as species less adapted to human disturbances or habitat fragmentation may not persist in the area. In addition, increase development could result in decreased water quality for aquatic habitats resulting in a change in species composition from water quality sensitive species to more tolerant species.

It is not possible to determine the exact extent of secondary growth, or the severity of impacts that may occur, at this time. However, because much of the habitat in the area has already been degraded by past and present land uses, it is not anticipated that major new impacts in terms of species composition would occur. More likely, localized populations of existing species would be affected, but no major changes in overall species would occur. Most species existing in the project area can tolerate moderate levels of human disturbance that would be anticipated. Species requiring large home ranges, or large intact blocks of high quality habitats have likely already been lost from the area due to the past changes in the landscape.

Potential Impacts to Fish and Wildlife Resources Associated with Alternative 2

Direct Impacts to Fish and Wildlife Resources (Alternative 2)

Direct impacts to fish and wildlife resources associated with Alternative 2 would be similar to those discussed under Alternative 1. However, impacts would be higher under Alternative 2 because a large portion of this Alternative would be constructed on new alignment resulting in a higher percentage of forest and old field habitats being removed. Construction on new alignment would result in a more substantial loss of fish and wildlife habitats and would result in additional fragmentation of existing habitats.

The new roadway would also result in increased impacts in terms of placement of an additional barrier or obstacle within the existing fish and wildlife habitats. Placement of the new roadway segments may disrupt travel lanes for various species and/or result in increased direct mortality. Increased mortality would occur during construction as less mobile species may be killed. Also, during a period immediately following opening of the roadway to traffic, local mortality rates for some species may increase due to encounters with the new roadway that may have been placed in former travel lanes.

Indirect Impacts to Fish and Wildlife Resources (Alternative 2)

Indirect impacts to fish and wildlife resources associated with Alternative 2 would be similar to those discussed under Alternative 1. However, because a large portion of Alternative 2 would be constructed on new alignment, the potential for indirect impacts to fish and wildlife resources would be somewhat higher. Although most species inhabiting the general project area can tolerate moderate levels of human disturbances, there may be some species

present that require habitats further removed from human activities. New roadway that bisects previously unfragmented habitats may result in changes in species composition. Some of these changes may not occur immediately following construction of the roadway, but may occur in the long term as secondary developments occur along the new roadway. Such developments would be anticipated in some areas along the new roadway segments due to the improved access provided by the new roadway. Secondary developments, such as residential or industrial developments, would result in further loss and/or fragmentation of habitats, increased human activity in the area, and increased potential for impacts to water quality in aquatic habitats.

The degree of impacts resulting from potential secondary developments can not be quantified at this time, because it is not evident where such developments would occur. If secondary developments occur in areas containing already highly disturbed habitats or adjacent to existing developments, the impacts would be less noticeable. Whereas, if secondary developments occur adjacent to larger, more secluded blocks of habitats, such as near some of the larger wetlands adjacent to the corridor, then the potential impacts to fish and wildlife would be more severe. Local planning and zoning aimed at preserving some of the higher quality habitats, such as wetlands within the Meridian Creek watershed, would help reduce impacts. Environmental regulations already in place would protect many of these resources.

Potential Impacts to Fish and Wildlife Resources Associated with Alternative 3

Direct Impacts to Fish and Wildlife Resources (Alternative 3)

Direct impacts to fish and wildlife resources resulting from implementation of Alternative 3 would be similar to those of Alternative 2 discussed above. However, because more of the Alternative 3 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Indirect Impacts to Fish and Wildlife Resources (Alternative 3)

Indirect impacts to fish and wildlife resources resulting from implementation of Alternative 3 would be similar to those of Alternative 2 discussed above. However, because more of the Alternative 3 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Potential Impacts to Fish and Wildlife Resources Associated with Alternative 4

Direct Impacts to Fish and Wildlife Resources (Alternative 4)

Direct impacts to fish and wildlife resources resulting from implementation of Alternative 4 would be similar to those of Alternative 2 discussed above. However, because more of the Alternative 4 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Indirect Impacts to Fish and Wildlife Resources (Alternative 4)

Indirect impacts to fish and wildlife resources resulting from implementation of Alternative 4 would be similar to those of Alternative 2 discussed above. However, because more of the Alternative 4 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Potential Impacts to Fish and Wildlife Resources Associated with Alternative 5

Direct Impacts to Fish and Wildlife Resources (Alternative 5)

Direct impacts to fish and wildlife resources resulting from implementation of Alternative 5 would be similar to those of Alternative 2 discussed above. However, because more of the Alternative 5 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Indirect Impacts to Fish and Wildlife Resources (Alternative 5)

Indirect impacts to fish and wildlife resources resulting from implementation of Alternative 5 would be similar to those of Alternative 2 discussed above. However, because more of the Alternative 5 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Potential Impacts to Fish and Wildlife Resources Associated with Alternative 6

Direct Impacts to Fish and Wildlife Resources (Alternative 6)

Direct impacts to fish and wildlife resources resulting from implementation of Alternative 6 would be similar to those of Alternative 2 discussed above. However, because slightly more of the Alternative 6 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

Indirect Impacts to Fish and Wildlife Resources (Alternative 6)

Indirect impacts to fish and wildlife resources resulting from implementation of Alternative 6 would be similar to those of Alternative 2 discussed above. However, because slightly more of the Alternative 6 alignment would utilize the existing SR-18 corridor, the overall impacts would be reduced.

3.3.5.4 Mitigation of Fish and Wildlife Resources Impacts

Whenever possible, impacts to fish and wildlife resources would be avoided and minimized. In some cases stream relocations can be avoided by slightly shifting the alignment away from the stream channel or away from the immediate riparian corridor. These decisions would be made during the final design phase of the project as more details regarding cut and fill limits and volumes have been developed.

It is expected that the combined use of water quality protection measures during construction and appropriate mitigation measures would result in a reduction in potential impacts to water bodies and wildlife. Although short-term and long-term adverse impacts would be anticipated, BMPs would be followed to minimize or mitigate for the overall impact to fish and wildlife. When possible, streamside and in-stream construction activities would be performed during dry periods, when stream flow is at a minimum. The unnecessary removal of existing vegetation would be avoided as much as possible. Canopy removal along all working or staging areas would be limited to the extent practicable. Where removal of vegetation is necessary, bank stabilization and sediment control measures would be employed immediately before the start of construction. Bank stabilization measures would include seeding with native species and placing of silt fences or rip-rap. Control structures would be inspected and properly maintained throughout the life of the project. A spill prevention control and countermeasures (SPCC) plan would be developed for both the construction process and for operations of SR-18 after construction.

All reasonable precautions would be taken to minimize short-term and long-term impacts to both terrestrial and aquatic habitats. While terrestrial resource losses are not given the high priority usually assigned to other habitats, such as wetlands, measures can be employed to minimize impacts of the selected build alternative on these resources. Mitigation techniques include strict adherence to state erosion and sedimentation controls, selective clearing and grubbing, selective seeding of native herb, shrub and tree species typical of the habitats impacted, restrictions in the time of use and application of herbicides, and use of selected mowing to maintain ecotone and habitat diversity.

Some precautions may also be taken to minimize impacts to aquatic resources. These precautions include performing streamside and in-stream construction during dry periods, implementing proper sediment control measures, and avoiding unnecessary removal of existing vegetation. Where removal of vegetation is necessary, bank stabilization measures, such as seeding and placing of rip-rap and/or silt fences would be employed. Steps would be taken to implement reasonable erosion control measures and to repair any riparian areas disturbed during construction. Timing of construction would dictate the level of adverse impacts on spawning fish and their offspring. Generally, most fish species within the project area spawn between mid-April through mid-July, and larval fish may be present through August.

The chosen build alternative would be designed to avoid major impacts to waters of the state to the extent practicable. Efforts to further minimize impacts would continue throughout the design, permitting, and construction processes. Unavoidable impacts would be mitigated as required by applicable laws and regulations. In an effort to minimize sedimentation impacts, erosion and sediment control plans would be included in the project construction plans. TDOT would also implement its Standard Specifications for Road and Bridge Construction, which include erosion and sediment control standards for use during construction. The State of Tennessee sets water quality criteria for waters of the state; these standards must be met during the construction of the proposed SR-18.

Stream channels requiring relocation or channelization would be replaced on-site to the extent possible, using techniques that would replace existing stream characteristics such as length, width, gradient, and tree canopy. Stream or water body impacts that cannot be mitigated on site, such as impacts of culverts over 200 feet, or impacts to springs or seeps which require rock fill to allow for movement of water underneath the roadway, would either be mitigated off-site by improving a degraded system or by making a comparable payment to an in-lieu-fee program, which would perform such off-site mitigation under the direction of state and federal regulatory and resource agencies.

TDOT will work closely with TDEC and the USACE during the permit stage of the project to determine exact impacts to existing watercourses and what mitigation is required for impacts to those resources. TDOT will continue to work closely with regulatory agencies and other stakeholders to ensure that impacts to important resources are kept to the minimum practical.

3.3.6 Invasive Species

In accordance with EO 13112 *Invasive Species*, field surveys in the project area included visual observations for invasive species populations. The EO directs Federal agencies to expand and coordinate their efforts to combat the introduction and spread of plants and animals not native to the United States. Roadways can provide opportunities for the spread of invasive species in several ways, including: the introduction by automobile traffic;

mowing and spraying operations; the importing of dirt, gravel, or sod; or through the use of nonnative plants for erosion control, landscape, or wildflower projects. Some of the most common non-native plant species observed in the proposed project corridor included Japanese honeysuckle (*Lonicera japonica*), sericea lespedeza (*Lespedeza cuneata*), multiflora rose (*Rosa multiflora*), and kudzu (*Pueraria lobata*).

Current development, including residential areas and roads bisecting the project area, has permanently altered the natural landscape and provided a variety of existing impacts to fish and wildlife. Some areas containing kudzu were encountered in the SR-18 study area, however the populations were primarily along the existing SR-18 and along other existing roadways.

Transportation systems can facilitate the spread of plant and animal species outside their natural range. Those species that are likely to harm the environment, human health, or economy are of particular concern. Nonnative flora and fauna can cause major changes to ecosystems, upset the ecological balance, and cause economic harm to agriculture and recreation sectors.

No widespread populations of invasive species were observed within the ROW of any of the build alternatives. However, small, isolated populations of invasive species were identified in the project area during the field surveys. Isolated populations of other invasive plants are possibly present within the project area as well, but no evidence of widespread infestations of such plants was observed during the field surveys.

3.3.6.1 Potential Invasive Species Impacts

Potential Invasive Species Impacts Associated with the No-Build Alternative

Direct Impacts due to Invasive Species (No-Build Alternative)

The No-Build Alternative would not result in any substantial changes in the baseline conditions of invasive species. Therefore the scattered populations of invasive species would remain in the general project area. Populations of such species would not be expected to spread rapidly unless other projects that result in major land disturbances are implemented.

Indirect Impacts due to Invasive Species (No-Build)

The No-Build Alternative would not result in any substantial changes in the baseline conditions of invasive species. Therefore the scattered populations of invasive species would remain in the general project area.

Potential Invasive Species Impacts Associated with Alternative 1 (Widen Existing SR-18).

Direct Impacts due to Invasive Species (Alternative 1-Widen Existing)

Construction activities associated with Alternative 1 would potentially increase the chance of spreading invasive plant species in the project area, due primarily to soil disturbance and removal of native vegetation. Many invasive species thrive in newly disturbed areas and effectively out-compete native vegetation before it can become reestablished. Areas that already contain a population of invasive species would be the most likely areas to be concerned with. Although even if no identifiable population of invasive species occurs in an area, it is possible for seeds from nearby populations to lie idle on the surface awaiting

disturbances such as removal of native vegetation, to allow them to germinate. Prompt reseeding of disturbed areas with native plants that are easily established would help reduce the risk of invasive species spreading along the disturbed areas created during construction. Other BMPs and control methods would be utilized to help control the spread of invasive species as described in the Mitigation section below.

Indirect Impacts due to Invasive Species (Alternative 1-Widen Existing)

Secondary developments associated with the improved SR-18 corridor would result in additional land disturbances that could result in the spread of invasive plant species. However, it is likely that disturbed areas associated with secondary developments would be replaced with residences, businesses, parking lots, and/or maintained lawns that would not allow invasive species to become established. However, disturbed areas on the fringes of those developments could facilitate the spread of invasive species.

In some areas populations of invasive species may actually be removed as part of the development of SR-18 or secondary developments, thereby removing potential seed sources of those species. For instance, a few known areas of kudzu and serecia lepedeza within the existing SR-18 ROW would likely be completely cleared to add the proposed new lanes thus removing those areas as potential seed sources.

Potential Invasive Species Impacts Associated with Alternative 2

Direct Impacts due to Invasive Species (Alternative 2)

Invasive species impacts associated with Alternative 2 would be similar to those discussed under Alternative 1. However, more land would need to be disturbed and/or cleared under Alternative 2, because much of this Alternative would occur on new alignment. Although there were not as many populations of invasive species in the less disturbed areas along Alternative 2, any new disturbance would have the potential to facilitate the spread of invasive species into those areas. Appropriate measures would be taken to help control the spread of invasive species with implementation of this project.

Indirect Impacts due to Invasive Species (Alternative 2)

Indirect invasive species impacts associated with Alternative 2 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 2, because much of Alternative 2 would occur on new alignment. In addition placement of new roadway segments in previously less disturbed areas could result in the introduction or spread of invasive species into those areas due to general soil disturbance during construction activities, seeds being transported into the area on mowers or other equipment, or seeds contained in soils or other materials transported into the area. In addition, seeds could also fall from vehicles using the roadway, especially open bed trucks that could be used to transport plant materials or clippings through the area.

Potential Invasive Species Impacts Associated with Alternative 3

Direct Impacts due to Invasive Species (Alternative 3)

Invasive species impacts associated with Alternative 3 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 3, because a portion of this Alternative would occur on new alignment. Therefore, there would be an increased risk of promoting the spread of invasive species.

Appropriate measures would be taken during and following construction to reduce the risk of spreading invasive species.

Indirect Impacts due to Invasive Species (Alternative 3)

Indirect invasive species impacts associated with Alternative 3 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 3 because a portion of this Alternative would occur on new alignment.

Potential Invasive Species Impacts Associated with Alternative 4

Direct Impacts due to Invasive Species (Alternative 4)

Invasive species impacts associated with Alternative 4 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 4, because a portion of this Alternative would occur on new alignment. Therefore, there would be an increased risk of promoting the spread of invasive species. Appropriate measures would be taken during and following construction to reduce the risk of spreading invasive species.

Indirect Impacts due to Invasive Species (Alternative 4)

Indirect invasive species impacts associated with Alternative 4 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 4, because a portion of this Alternative would occur on new alignment.

Potential Invasive Species Impacts Associated with Alternative 5

Direct Impacts due to Invasive Species (Alternative 5)

Invasive species impacts associated with Alternative 5 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 5, because a portion of this Alternative would occur on new alignment. Therefore, there would be an increased risk of promoting the spread of invasive species. Appropriate measures would be taken during and following construction to reduce the risk of spreading invasive species.

Indirect Impacts due to Invasive Species (Alternative 5)

Indirect invasive species impacts associated with Alternative 5 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 5, because a portion of this Alternative would occur on new alignment.

Potential Invasive Species Impacts Associated with Alternative 6.

Direct Impacts due to Invasive Species (Alternative 6)

Invasive species impacts associated with Alternative 6 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 6, because a portion of this Alternative would occur on new alignment. Therefore, there would be an increased risk of promoting the spread of invasive species. Appropriate measures would be taken during and following construction to reduce the risk of spreading invasive species.

Indirect Impacts due to Invasive Species (Alternative 6)

Indirect invasive species impacts associated with Alternative 6 would be similar to those discussed under Alternative 1 above. However, more land would need to be disturbed and/or cleared under Alternative 6, because a portion of this Alternative would occur on new alignment.

3.3.6.2 Mitigation of Invasive Species Impacts

The FHWA has developed guidance to implement Executive Order 13112. It provides a framework for preventing the introduction of and controlling the spread of invasive plant species on highway ROWs. Controlling invasive plants on ROWs can often be a complex effort involving various governmental jurisdictions, adjacent landowners, and the general public. Incorporating elements of the FHWA guidance into planning and implementation of construction, erosion control, landscaping, and maintenance activities, would facilitate the use of best management practices. Key elements of this guidance would include inspection and cleaning of construction equipment, commitments to ensure the use of invasive-free mulches, topsoils, and seed mixes, and eradication strategies to be deployed should a population become established (FHWA, 1999).

The Tennessee Exotic Pest Plant Council (TN-EPPC) has produced a detailed manual, Tennessee Exotic Plant Management Manual (TN-EPPC, 1997), aimed at providing information to help control and manage 20 of Tennessee's worst exotic pest plant problems. This manual provides the entire list of invasive exotic pest plants in Tennessee, detailed species descriptions, and recommended herbicide application methods for controlling these species. This resource would be used as an additional tool to control the spread of invasive species with construction of any of the build alternatives.

The following measures would be used to the extent possible to help prevent the introduction and spread of invasive species:

- Native grasses, shrubs, and trees would be planted for beautification purposes or to prevent erosion, wherever needed. Native species would be consistent with local community types.
- Whenever possible, all disturbed soil would be seeded with temporary annual species to reduce the ability of exotics to become established. This would also act to reduce erosion potential during stormwater events; and
- Consideration would be given to the types and quality of plants and soils at borrow sites. Soil from borrow sites used as project area fill could contain viable plant parts or seeds and could increase the spread of invasive species to new locations.

3.4 Cultural Resources

In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, TDOT consulted with the Tennessee State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), federally recognized Native American tribes, and local governments to determine potential impacts associated with this project. Appendix B of this document contains a brief summary of the Section 106-related coordination and consultation efforts for this project, including a list of Native American

tribes contacted and copies of coordination letters related to cultural resources issues for this project.

3.4.1 Architectural/Historical Resources

Federal laws require TDOT and FHWA to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. Regulations detailing the implementation of this act are codified at 36 CFR 800. For the purposes of this legislation, historic significance is defined as those properties which are included in the National Register of Historic Places (NRHP) or which are eligible for inclusion in the NRHP. Once historic resources are identified, legislation requires these agencies to determine if the proposed project would affect the historic resource. The criteria used to determine effect are defined in 36 CFR 800.5.

The project area contains commercial, residential, and agricultural architecture dating from the mid-nineteenth century to the present. Part of the impetus for this project is to remove traffic congestion from the route from Bolivar to Jackson. There is no known architectural or historic significance that would make the road between the two towns (east and west along State Route 18 and the communities of Medon and Malesus) eligible for listing on the NRHP under Criterion A, B, or C as defined in 36 CFR 800.5.

Pursuant to 36 CFR 800.4, a TDOT consultant surveyed the area of potential effect (APE) in 1998 for a proposed widening of SR-18 from Bolivar to SR- 5 (U.S. 45) in Jackson. The consultant identified one property that was determined eligible for the NRHP, the Henry H. Swink House, a mid-nineteenth century house remodeled in the Queen Anne style in the 1890s.. For the 1998 assessment, the consultant surveyed an additional 41 properties and it was his opinion none were eligible for the NRHP.

Due to changes in the project alternatives since the 1998 surveys, TDOT architectural historians have conducted additional surveys. Some of those surveys were conducted along potential alternative alignments that were located west of the existing SR-18 alignment. Those alignments have been subsequently eliminated from further consideration due to a combination of large wetlands and the presence of two large farms, the Gobelet Farm and the Lucas Farm, that were determined to be potentially eligible for the NRHP (see Chapter 2 for more discussion involving the eliminated alignments).

The 2007 Historical/Architectural Assessment summarizes all of the past studies as well as new inventories conducted for the current alternative alignments being considered in the EA.

The area of potential effect (APE) for the 2007 Historical/Architectural Assessment included the following:

- A corridor approximately 1,500 feet from the proposed alternatives that require additional ROW and subsequent transition work;
- Areas within the nearby viewshed of the proposed project; and
- Areas within the potential noise impact area (up to 500 feet from the proposed improvements).

The historians inventoried several properties not previously studied in the 1998 surveys. It is in the opinion of TDOT, and the Tennessee SHPO agreed, that none of the properties are eligible for the NRHP.

The Henry H. Swink House, the only property identified as eligible for the NRHP within the current project APE, is located on the east side of SR-18 on a large lot. The house is set far back on the 13.6 acres along with rolling topography and landscaping that limits views of the road from the house. If a line that uses Segment A-3 adjacent to the historic Swink House is chosen, it is anticipated that the proposed project would not adversely affect the historic property contingent upon a landscaping plan that will be prepared in coordination with TDOT historians and the Tennessee SHPO.

The U.S. Department of Transportation Act of 1966, as amended, also requires FHWA to assess the applicability of Section 4(f). This law prohibits the Secretary of Transportation from approving any project, which requires the "use" of a historic property unless there is no prudent and feasible alternative to that use and unless the project includes all possible planning to minimize harm to the historic resource. Because no NRHP-listed properties will be adversely affected, and no ROW will be required from the historic Swink House property, there will be no Section 4(f) use of a historic property.

3.4.1.1 Potential Impacts to Architectural/Historical Resources

Potential Impacts to Architectural/Historical Resources Associated with the No-Build Alternative

Direct Impacts to Architectural/Historical Resources (No-Build Alternative)

The No-Build Alternative would not have any impacts to architectural/historical resources located within the APE of the SR-18 project.

Indirect Impacts to Architectural/Historical Resources (No-Build Alternative)

The No-Build Alternative would not result in any indirect impacts to architectural/historical resources within the APE of the SR-18 project.

Potential Impacts to Architectural/Historical Resources Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Architectural/Historical (Alternative 1-Widen Existing)

Although Alternative 1 would utilize Segment A-3, which runs adjacent to the historic Swink House, it is anticipated that the proposed project would not adversely affect the historic property contingent upon a landscaping plan that will be prepared in coordination with TDOT historians and the Tennessee SHPO.

Indirect Impacts to Architectural/Historical Resources (Alternative 1-Widen Existing)

No known indirect impacts to architectural/historical resources are anticipated due to construction of Alternative 1. However, there is some potential that secondary developments promoted by the improved highway could impact architectural/historical resources outside of the SR-18 ROW. The location of impacts due to secondary projects cannot be determined at this time because it is not known what types of, or exactly where, induced developments would occur.

Potential Impacts to Architectural/Historical Resources Associated with Alternative 2

Direct Impacts to Architectural/Historical (Alternative 2)

Alternative 2 would not impact any known NRHP-listed or eligible historical/architectural resources because no such features were located within the APE of the Alternative 2 corridor. This alternative would shift SR-18 traffic to new alignment located east of the existing SR-18. This would result in a reduction of traffic passing by the NRHP eligible Swink House. The view of existing SR-18 from the Swink House would remain unchanged.

Indirect Impacts to Architectural/Historical Resources (Alternative 2)

Indirect impacts associated with Alternative 2 would be similar to those discussed under Alternative 1, except the potential for secondary developments may increase due to portions of Alternative 2 being on new alignment. Shifting the roadway to the east of the existing SR-18 may promote new developments along the length of the roadway due to improved access to those new areas. New developments along much of the new alignment would likely primarily consist of residential developments due to the rural setting of much of the project area. However, improved access to developable land may also promote other developments such as industrial or commercial developments.

The proposed intersection of SR-18 and SR-5 (U.S. 45) under Alternative 2 would be located in an area south of the existing intersection in an area with vacant, developable land. Placement of the intersection at this new location may promote new development in that area including new gas stations, retail stores, hotels, and other highway-oriented businesses.

Potential Impacts to Architectural/Historical Resources Associated with Alternative 3

Direct Impacts to Architectural/Historical Resources (Alternative 3)

Impacts to architectural/historical resources under Alternative 3 would be similar to those expected under Alternative 1.

Indirect Impacts to Architectural/Historical Resources (Alternative 3)

Indirect impacts to architectural/historical resources under Alternative 3 would be similar to those expected under Alternative 2, except the potential for impacts would be slightly lower due to less of the proposed roadway being on new alignment. Because less of the proposed roadway would be on new alignment there would be less potential for secondary developments because access would not be improved to as many new properties as would occur under Alternative 2, which utilizes over 10 miles of new alignment.

Alternative 3 would result in placement of the new intersection of SR-18 with SR-5 (U.S.-45) to the south of the existing location, which may promote additional secondary development in that immediate area.

Potential Impacts to Architectural/Historical Resources Associated with Alternative 4

Direct Impacts to Architectural/Historical Resources (Alternative 4)

Impacts to architectural/historical resources under Alternative 4 would be similar to those expected under Alternative 2, except the potential for impacts would be slightly lower due to less of the proposed roadway being on new alignment. Alternative 4 would bypass Medon and the Swink House.

Indirect Impacts to Architectural/historical Resources (Alternative 4)

Impacts to architectural/historical resources under Alternative 4 would be similar to those expected under Alternative 2, except the potential for impacts would be slightly lower due to less of the proposed roadway being on new alignment. Because less of the proposed roadway would be on new alignment there would be less potential for secondary developments because access would not be improved to as many new properties as would occur under Alternative 2, which utilizes over 10 miles of new alignment.

The intersection of SR-18 and SR-5 (U.S.-45) would be reconstructed at its existing location, which would not allow as much secondary development as alternatives that move the intersection to a new location to the south. This is because most of the area adjacent to the existing intersection is already fully developed with little vacant land being available for new development.

Potential Impacts to Architectural/Historical Resources Associated with Alternative 5

Direct Impacts to Architectural/Historical Resources (Alternative 5)

Impacts to architectural/historical resources under Alternative 5 would be similar to those expected under Alternative 4, except the potential for impacts would be slightly lower due to less of the proposed roadway being on new alignment. Alternative 5 would utilize Segment A-3, which runs adjacent to the Swink House. However, contingent upon landscaping plans that would be developed in coordination with the Tennessee SHPO, it is not expected that this project would adversely impact the historic property.

Indirect Impacts to Architectural/Historical Resources (Alternative 5)

Impacts to architectural/historical resources under Alternative 5 would be similar to those expected under Alternative 4, except the potential for impacts would be slightly lower due to less of the proposed roadway being on new alignment.

Potential Impacts to Architectural/Historical Resources Associated with Alternative 6

Direct Impacts to Architectural/Historical Resources (Alternative 6)

Impacts to architectural/historical resources under Alternative 6 would be similar to those discussed under Alternative 2. Alternative 6 would utilize slightly less new alignment and would therefore have less potential for impacts. Alternative 6 would utilize Segment A-3, which runs adjacent to the Swink House. However, contingent upon landscaping plans that would be developed in coordination with the Tennessee SHPO, it is not expected that this project would impact the historic property.

Indirect Impacts to Architectural/Historical Resources (Alternative 6)

Impacts to architectural/historical resources under Alternative 6 would be similar to those discussed under Alternative 2. Alternative 6 would utilize slightly less new alignment than Alternative 2 and would therefore have less potential for impacts associated with secondary developments. Alternative 6 would utilize Segment A-3, but no adverse impacts to the Swink House are anticipated. Alternative 6 would result in potential for secondary developments associated with the SR-18/SR-5 (U.S.-45) intersection being shifted to a new location to the south of the existing intersection.

3.4.2 Archaeological Resources

A Phase I Archaeological Survey was conducted for the proposed SR-18 project in Hardeman and Madison Counties, Tennessee. The purpose of the Phase 1 study was to identify cultural resources present in the project area and to provide appropriate management recommendations for any identified cultural resources. Significant cultural resources are any material remains of human activity that are eligible for the NRHP. The federal statutes and responsibilities include Section 106 of the National Historic Preservation Act of 1966, as amended: Executive Order 11593, the Advisory Council's Protection of Historic Sites (36 CFR Part 800) effective June 17, 1999; and section 5 of the Abandoned Shipwreck Act of 1987.

The APE for the Phase 1 Cultural Resources survey included 150-feet on either side of the existing ROW for the Build Alternative segments that utilize the existing SR-18 alignment. For the remaining segments, which utilize new alignment, a 300-foot wide corridor was surveyed on either side of the proposed centerline of the new alignment.

Surveys were conducted using a combination of literature reviews, pedestrian surveys, and intensive field surveys consisting of shovel tests. Pedestrian (visual) survey was employed in areas such as the cultivated fields that offered good (>25 percent) surface visibility. Pedestrian survey transects were spaced at no more than 15 m intervals. Those portions of the new alignments that were not deemed high-probability areas were investigated in this manner.

Intensive field surveys were conducted in areas deemed high probability sites by TDOT based on previous studies in similar terrain and study area history. High-probability areas consisted of locations where the SR-18 alternatives cross drainages illustrated as "blue-line" streams on USGS quads. A total of 15 high-probability locations were identified during initial map reviews of the study area. The primary site detection method utilized at each of the 15 high-probability locations consisted of the excavation of four transects at 20 m intervals on either side of the stream or drainage (i.e., an 80-x-400 m rectangle). Shovel tests were placed at 20 m intervals along each of the transects within each area.

A literature and records search at the TDOA indicated that there were only nine sites mapped within 3 km of the project area, with only one of these located very near or within the current ROW. Site 40HM142 is located within the existing SR-18 ROW.

One site, 40MD247, was identified during the fieldwork; no other cultural resources were encountered or identified. The site is located within the C-2 segment that is utilized by Alternative 4. Site 40MD247 is interpreted as a sparse and quite deflated prehistoric scatter representing the remains of a short-term camp. Since the collected material was almost entirely recovered from a surface context and the recovery from the single positive shovel test was confined to the plow zone, the site is recommended not eligible for the NRHP and no further work is recommended at this location. As the new site is recommended as not eligible for the NRHP, the project area is recommended cleared from further archaeological work or management action. The Phase 1 Archaeological Survey Report contains more detailed information regarding the methods and findings of the study.

3.4.2.1 Potential Impacts to Archaeological Resources

Potential Impacts to Archaeological Resources Associated with the No-Build Alternative

Direct Impacts to Archaeological Resources (No-Build Alternative)

The No-Build Alternative would not have any impacts to archaeological resources located within the APE of the SR-18 project.

Indirect Impacts to Archaeological Resources (No-Build Alternative)

The No-Build Alternative would not be expected to result in any indirect impacts to archaeological resources within the APE of the SR-18 project.

Potential Impacts to Archaeological Resources Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Archaeological Resources (Alternative 1-Widen Existing)

Based on the Phase 1 Archaeological Surveys, Alternative 1 is not expected to result in any major impacts to archaeological resources. Alternative 1 would likely have the least chance of encountering any undiscovered archaeological sites, because this alternative consists of widening the existing SR-18. Therefore, much of the construction area will occur in previously disturbed areas with less likelihood of containing intact artifacts. There is a small chance artifacts could be discovered in any previously undisturbed areas within the expanded ROW for the additional lanes.

Indirect Impacts to Archaeological Resources (Alternative 1-Widen Existing)

No known indirect impacts to archaeological resources are anticipated due to construction of Alternative 1. However, there is some potential that secondary developments promoted by the improved highway could impact archaeological resources outside of the SR-18 ROW and other surveyed areas. This would primarily be due to construction activities associated with secondary developments that involve excavation or heavy grading, which could impact archaeological resources. The location of impacts due to secondary projects cannot be determined at this time, because it is not known what types or where induced developments would occur.

Potential Impacts to Archaeological Resources Associated with Alternative 2

Direct Impacts to Archaeological Resources (Alternative 2)

Based on the Phase 1 survey, Alternative 2 would not be expected to result in any substantial archaeological impacts, because no sites were located within the APE. However, the potential for uncovering or impacting unknown archaeological resources during construction would be higher under Alternative 2 than for other Build Alternatives that utilize more of the existing SR-18 ROW. Construction on new alignment would require disturbance of additional soils, which could contain archaeological resources. Although some of the project area has been disturbed by past land uses, such as farming operations, and roadway and other developments, many of the soils in the proposed ROW have had only minor surface disturbances. Therefore, deeper layers of soils may not have been substantially disturbed in the past and could potentially contain intact archaeological resources.

Indirect Impacts to Archaeological Resources (Alternative 2)

Indirect impacts associated with Alternative 2 would be similar to those discussed under Alternative 1, except the potential for secondary developments may increase due to portions of Alternative 2 being on new alignment. Shifting the roadway to the east of the existing SR-18 may promote new developments along the length of the roadway due to improved access to those new areas. Future developments along much of the new alignment would likely primarily consist of residential developments due to the rural setting of much of the project area. However, improved access to developable land may also promote other developments, such as industrial or commercial expansions.

The proposed intersection of SR-18 and SR-5 (U.S.-45) under Alternative 2 would be located in an area south of the existing intersection that has vacant, developable land. Placement of the intersection at this new location may promote new development in that area including new gas stations, retail stores, hotels, and other highway-oriented businesses.

Potential Impacts to Archaeological Resources Associated with Alternative 3

Direct Impacts to Archaeological Resources (Alternative 3)

Impacts to archaeological resources under Alternative 3 would be similar to those expected under Alternative 2, except the potential for impacts to unknown archaeological resources would be slightly lower due to less of the proposed roadway being on new alignment.

Indirect Impacts to Archaeological Resources (Alternative 3)

Indirect impacts to archaeological resources under Alternative 3 would be similar to those expected under Alternative 2, except the potential for unknown impacts to archaeological resources would be slightly lower due to less of the proposed roadway being on new alignment. Less of the proposed roadway would be on new alignment, and there would be less potential for secondary developments, because access would not be improved to as many new properties as would occur under Alternative 2, which utilizes over 10 miles of new alignment.

Alternative 3 would result in placement of the new intersection of SR-18 with SR-5 (U.S.-45) to the south of the existing location, which may promote additional secondary development in that area.

Potential Impacts to Archaeological Resources Associated with Alternative 4

Direct Impacts to Archaeological Resources (Alternative 4)

Impacts to archaeological resources under Alternative 4 would be similar to those expected under Alternative 2, except the potential for impacts to archaeological resources would be slightly lower due to less of the proposed roadway being on new alignment. The one site located during the Phase 1 Survey, Site 40MD247, is located within the edge of the Alternative 4 ROW in Segment C-2. Because the site is not recommended for listing on the NRHP, it is not expected that this project would result in any substantial impacts to archaeological resources. It is likely that a small shift in the alignment or ROW boundary in that area could avoid the site.

Indirect Impacts to Archaeological Resources (Alternative 4)

Impacts to archaeological resources under Alternative 4 would be similar to those expected under Alternative 2, except the potential for impacts to archaeological resources would be slightly lower overall due to less of the proposed roadway being on new alignment. Less of the proposed roadway would be on new alignment, and there would be less potential for secondary developments, because access would not be improved to as many new properties as would occur under Alternative 2, which utilizes over 10 miles of new alignment. There is a chance that SITE 40MD247 could be impacted by secondary developments associated with Alternative 4. However, the site is not considered highly unique from an archaeology standpoint and was therefore not recommended to be eligible for the NRHP.

The intersection of SR-18 and SR-5 (U.S.-45) would be reconstructed at its existing location, which would not allow as much secondary development as other alternatives that move the intersection to a new location to the south. The area adjacent to the existing intersection is already fully developed with little vacant land being available for new development.

Potential Impacts to Archaeological Resources Associated with Alternative 5

Direct Impacts to Archaeological Resources (Alternative 5)

Impacts to archaeological resources under Alternative 5 would be similar to those expected under Alternative 2, except the potential for impacts to archaeological resources would be slightly lower due to less of the proposed roadway being on new alignment.

Indirect Impacts to Archaeological Resources (Alternative 5)

Impacts to archaeological resources under Alternative 5 would be similar to those expected under Alternative 2, except the potential for impacts to archaeological resources would be slightly lower due to less of the proposed roadway being on new alignment.

Potential Impacts to Archaeological Resources Associated with Alternative 6

Direct Impacts to Archaeological Resources (Alternative 6)

Impacts to archaeological resources under Alternative 6 would be similar to those discussed under Alternative 2. Alternative 6 would utilize slightly less new alignment and would have less potential for impacts to archaeological resources.

Indirect Impacts to Archaeological Resources (Alternative 6)

Impacts to archaeological resources under Alternative 6 would be similar to those discussed under Alternative 2. Alternative 6 would utilize slightly less new alignment than Alternative 2 and would have less potential for impacts to archaeological resources associated with secondary developments.

3.4.3 Mitigation of Cultural Resources Impacts

TDOT will continue to work in coordination with the SHPO and other consulting parties to ensure all cultural resources impacts are handled according to all applicable laws and regulations.

Although Alternative 1, Alternative 3, Alternative 5, and Alternative 6 utilize the existing SR-18 alignment within Segment A-3, which runs adjacent to the historic Swink House, it is not anticipated that the project would result in adverse effects contingent upon a landscaping

plan that will be prepared in coordination with TDOT historians and the Tennessee SHPO. Therefore, TDOT is committed to developing a landscaping plan that will mitigate any potential impacts the project could otherwise have on the historic property.

Since the one site identified during the Phase 1 Archaeological Survey was not recommended for the NRHP and was cleared from further investigations, no Phase 2 testing is required for this project.

Should any previously undiscovered cultural resources be discovered during construction of the new roadway, all construction activities would cease in that vicinity until further investigations and coordination with the SHPO are completed. Construction activities would commence in the area once the SHPO has made a determination on the site or until any artifacts are properly documented/recovered.

3.5 Air Quality Affected Environment

3.5.1 Air Quality Background Information

Detailed discussions of the air quality analyses and results are provided in the air quality and noise evaluation technical report for the project, Air Quality and Noise Evaluation for State Route 18 Improvements.

3.5.1.1 Carbon Monoxide (CO)

Based upon the analyses of highway projects with similar meteorological conditions and traffic volumes, the carbon monoxide levels of the subject project are expected to be below the National Ambient Air Quality Standard (NAAQS).

3.5.1.2 Conformity

The proposed project is not currently located in a nonattainment or maintenance area, so conformity does not apply to this project.

3.5.1.3 Mobile Source Air Toxics (MSATs)

Background

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources, 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source

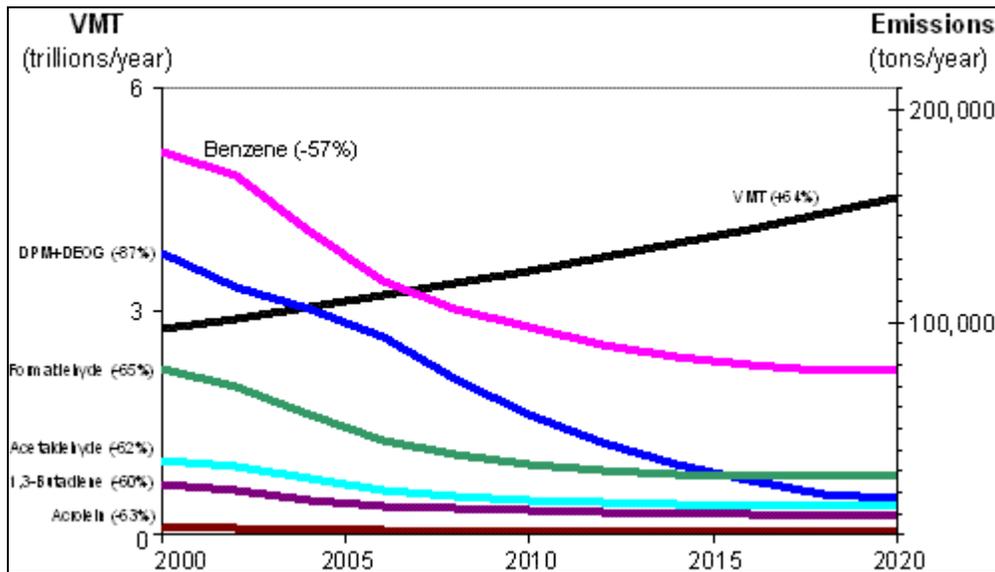
control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in Figure 3-3.

As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Unavailable Information for Project Specific MSAT Impact Analysis

The air quality analysis for this project includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable the prediction of the project-specific health impacts of the emission changes associated with the proposed alternative. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

Figure 3-3. U.S. Annual Vehicle Miles Traveled (VMT) vs. Mobile Source Air Toxics Emissions, 2000-2020*



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: Highway Statistics 2000, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO₄ from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion

modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

Emissions

The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model; emission factors are projected based on a typical trip of 7.5 miles and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

Dispersion

The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

Exposure Levels and Health Effects

Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude TDOT and FHWA from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult, because it is difficult to accurately calculate

annual concentrations of MSATs near roadways and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs.

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the EPA conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at <http://www.epa.gov/iris>. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- Benzene is characterized as a known human carcinogen.
- The potential carcinogenicity of acrolein cannot be determined, because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- Formaldehyde is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- 1,3-butadiene is characterized as carcinogenic to humans by inhalation.
- Acetaldehyde is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.

- Diesel exhaust (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- Diesel exhaust also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable performance of a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

Qualitative Analysis

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions. The qualitative assessment presented below has been prepared in accordance with FHWA's "Interim Guidance on Air Toxic Analysis in NEPA Documents" and is derived in part from a study conducted by the FHWA entitled "A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives."

For each alternative, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The estimated VMT under each of the Build Alternatives are the same as or lower than the VMT for the No-Build Alternative as shown in Table 3.22. Therefore, it is expected that there would be no appreciable difference in overall MSAT emissions among the various alternatives.

Additionally, travel speeds for the Build Alternatives will be higher than for the No-Build Alternative. According to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases and cannot be reliably projected due to the inherent deficiencies of technical models.

Table 3.22. Design Year VMT Projections on Affected Roadway Network

Alternative	Year 2031 VMT
No-Build	264,400
Alternative 1	264,400
Alternative 2	245,300
Alternative 3	251,000
Alternative 4	261,000
Alternative 5	264,400
Alternative 6	251,000

Source: Air Quality and Noise Evaluation Report, Bowlby and Associates, 2008.

Climate Change

FHWA's current approach on the issue of climate change is summarized in this section. To date, no national standards have been established regarding greenhouse gases, nor has EPA established criteria or thresholds for greenhouse gas emissions. On April 2, 2007, the Supreme Court issued a decision in Massachusetts et al v. EPA et al that the EPA does have authority under the CAA to establish motor vehicle emissions standards for CO₂ emissions. The EPA is currently determining the implications to national policies and programs as a result of the Supreme Court decision. However, the Court's decision did not have any direct implications on requirements for developing transportation projects.

FHWA does not believe it is informative at this point to consider greenhouse gas emissions in an EA. The climate impacts of CO₂ emissions are global in nature. Analyzing how alternatives evaluated in an EA might vary in their relatively small contribution to a global problem will not better inform decision makers. Further, due to the interactions between elements of the transportation system as a whole, emissions analyses would be less informative than ones conducted at regional, state, or national levels. Because of these

concerns, FHWA concludes that they cannot usefully evaluate CO₂ emissions in this EA in the same way that we address other vehicle emissions.

FHWA is actively engaged in many other activities with the DOT Center for Climate Change to develop strategies to reduce transportation's contribution to greenhouse gases, particularly CO₂ emissions, and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. FHWA will review and update its approach to climate change at both the project and policy level as more information emerges and as policies and legal requirements evolve.

3.5.1.4 Potential Air Quality Impacts

Potential Air Quality Impacts Associated with the No-Build Alternative

Direct Impacts to Air Quality (No-Build Alternative)

The No-Build Alternative would not result in measurable impacts to air quality. Although traffic congestion may become worse by the design year, especially along the northern sections of existing SR-18, the effects on air quality would not be substantially different when compared to baseline conditions. The project area is presently within an attainment area.

Indirect Impacts to Air Quality (No-Build Alternative)

The No-Build Alternative would not result in measurable impacts to air quality as no substantial secondary impacts would be associated with the No-Build conditions.

Potential Air Quality Impacts Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Air Quality (Alternative 1-Widen Existing)

The project is not predicted to result in a project-specific air quality impact and, therefore, would not have a measurable air quality impact.

The estimated VMT under Alternative 1 and the other Build Alternatives are the same as or lower than the VMT for the No-Build Alternative as shown in Table 3.22 above. Therefore, it is expected that there would be no appreciable difference in overall MSAT emissions between alternatives.

Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes contemplated as part of the Alternative 1, and the other Build Alternatives, will have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher than the No-Build Alternative. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-Build

Alternative cannot be accurately quantified due to the inherent deficiencies of current models.

Even though widening the existing highway would move traffic closer to some receptors, thereby increasing the localized level of MSAT emissions; it is possible that the effects could be offset by increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be substantially lower than present baseline conditions.

Substantial construction-related MSAT emissions are not anticipated for this project, because construction is not planned to occur over an extended building period. However, construction activity may generate temporary increases in MSAT emissions in the project area. Equipment exhaust and dust would be the primary air quality concerns during construction. It is not anticipated that the construction of the proposed project would occur simultaneously with any other major transportation projects in area.

Indirect Impacts to Air Quality (Alternative 1-Widen Existing)

The project is not predicted to result in a project-specific air quality impact and, therefore, would not have a measurable air quality impact. There may be minor short-term air quality impacts during the construction phase of the project that could temporarily affect areas downwind of the project site.

Construction of secondary developments that may be promoted by the SR-18 project may result in short-term air quality impacts in areas adjacent to any such developments. These impacts would primarily be due to construction equipment exhaust and dust.

Potential Air Quality Impacts Associated with Alternative 2

Direct Impacts to Air Quality (Alternative 2)

Air Quality impacts under Alternative 2 would be similar to those described under Alternative 1 above, except there may be a slight reduction in potential for air quality impacts. This reduced potential for air quality impacts under Alternative 2 would be due to a reduction in localized impacts related to ambient concentrations of MSATs and construction related dust and emissions, because fewer existing residences occur in the immediate project area for Alternative 2. The higher density residential areas and the school located along the northern sections of the existing SR-18 would be avoided by Alternative 2. Alternative 2 would shift the alignment further south and east, and would involve relocating the SR-18/SR-5 (U.S.-45) intersection south of the existing intersection to a less populated area.

Indirect Impacts to Air Quality (Alternative 2)

Impacts to air quality under Alternative 2 would be similar to those discussed under Alternative 1 above, except Alternative 2 may promote additional secondary developments compared to Alternative 1. The relocation of SR-18 to the south and east would provide improved access to new parcels of land, some of which may be developed in response to the new roadway. These new developments could result in minor, short-term air quality impacts during construction. It is expected that these temporary impacts would primarily affect any residences that may be located adjacent to those properties being developed. It is anticipated that most secondary developments associated with Alternative 2 would occur

in the vicinity of the new intersection of SR-18 with SR-5 (U.S.-45) that would be located south of the existing intersection. There are some residences in the general vicinity of that location.

Potential Air Quality Impacts Associated with Alternative 3

Direct Impacts to Air Quality (Alternative 3)

Air quality impacts associated with Alternative 3 would be similar to those discussed under Alternative 2 above, except slightly more residences would be located adjacent to the portions of Alternative 3 that utilize the existing SR-18 alignment. Alternative 3 would avoid the more densely populated areas associated with Segment A-4 at the northern end of existing SR-18.

Indirect Impacts to Air Quality (Alternative 3)

Impacts to air quality under Alternative 3 would be similar to those discussed under Alternative 2 above.

Potential Air Quality Impacts Associated with Alternative 4

Direct Impacts to Air Quality (Alternative 4)

Air Quality impacts under Alternative 4 would be similar to those described under Alternative 1 above, except there may a slight reduction in potential for air quality impacts. This reduced potential for air quality impacts under Alternative 4 would be due to a reduction in localized impacts related to ambient concentrations of MSATs and construction related dust and emissions. Fewer existing residences occur in the immediate project area for Alternative 4 (compared to Alternative 1), because it would bypass the City of Medon and associated residences. The higher density residential areas and the school located along the northern sections of the existing SR-18 would not be avoided by Alternative 4.

Indirect Impacts to Air Quality (Alternative 4)

Impacts to air quality under Alternative 4 would be similar to those discussed under Alternative 1 above.

Potential Air Quality Impacts Associated with Alternative 5

Direct Impacts to Air Quality (Alternative 5)

Impacts to air quality under Alternative 5 would be similar to those discussed under Alternative 1 above.

Indirect Impacts to Air Quality (Alternative 5)

Impacts to air quality under Alternative 5 would be similar to those discussed under Alternative 1 above.

Potential Air Quality Impacts Associated with Alternative 6

Direct Impacts to Air Quality (Alternative 6)

Impacts to air quality under Alternative 6 would be similar to those discussed under Alternative 2 above, except there would be slightly more existing residential areas encountered by Alternative 6 due to utilization of more of the existing SR-18 alignment. Alternative 6 would result in widening of the existing SR-18 through Medon and areas just

north of Medon. However, Alternative 6 would avoid the more densely populated areas and the school at the northern end of SR-18.

Indirect Impacts to Air Quality (Alternative 6)

Impacts to air quality under Alternative 6 would be similar to those discussed under Alternative 2 above.

3.5.1.5 Mitigation of Air Quality Impacts

No violations of the NAAQS are projected for this project. Therefore, no air quality mitigation measures are required for the project improvements.

During construction the contractor must comply with all federal, state, and local laws and regulations governing the control of air pollution. Adequate dust-control measures would be maintained so as not to cause detriment to the safety, health, welfare, or comfort of any person or cause any damage to any property or business.

Demolition and construction activities can result in short-term increases in fugitive dust and equipment-related particulate emissions in and around the project area. (Equipment-related particulate emissions can be minimized, if the equipment is well maintained.) The potential air quality impacts would be short-term, occurring only while demolition and construction work is in progress and local conditions are appropriate. The potential for fugitive dust emissions typically is associated with building demolition, ground clearing, site preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of materials. The potential is greatest during dry periods, periods of intense construction activity, and during high wind conditions.

Dust and airborne dirt generated by construction activities would be controlled through dust control procedures or a specific dust control plan, when warranted. The contractor and TDOT will meet to review the nature and extent of dust-generating activities and would cooperatively develop specific types of control techniques appropriate to the specific situation. Techniques that may warrant consideration include measures such as minimizing track-out of soil onto nearby publicly-traveled roads, reducing speed on unpaved roads, covering haul vehicles, and applying chemical dust suppressants or water to exposed surfaces, particularly those on which construction vehicles travel. With the application of appropriate measures to limit dust emissions during construction, this project would not cause any short-term particulate matter air quality impacts.

3.6 Noise

3.6.1 Noise Background Information

The noise analysis was completed in accordance with FHWA noise standards, *Procedures for Abatement of Highway Traffic and Construction Noise, 23 CFR 772* [2], and the Tennessee Department of Transportation's *Policy on Highway Traffic Noise Abatement* [3] and included the following tasks:

- 1) Identification of noise-sensitive land uses in the project area;
- 2) Determination of existing sound levels at sensitive receivers in the project area;
- 3) Determination of future sound levels for each alternative;
- 4) Determination of impacts for each alternative;
- 5) Evaluation of noise abatement;

- 6) Discussion of construction noise; and
- 7) Coordination with local officials.

3.6.1.1 Identification of Noise-Sensitive Land Uses

Review of available electronic mapping and field reconnaissance revealed numerous residences on SR-18 and local intersecting local roads that might be affected by the project. Residential development near SR-18 is typically low-density with pockets of higher density development north of Medon-Malesus Road. The historic Swink Stage House at 2034 Highway 18 is also a residence.

Several churches are located near SR-18 including the New Union Baptist Church, the Clover Creek Baptist Church, the Faith Tabernacle Worship Center, the Church of God, the South Jackson Church of Christ, the Bemis Pentecostal Church, and the Malesus Baptist Church.

Other noise-sensitive land uses near SR-18 include the Malesus Elementary School and the Malesus Civic Park & South Jackson Community Center.

There are also residences near the segments of new alignment for Build Alternatives 2 through 6. These residences are on Dacus Road, Swink Road, Lowery Road, Parkburg Road, Medon-Malesus Road, John Anderson Road, Mandy Road, and Seavers Road.

3.6.1.2 Determination of Existing Sound Levels

Measurements were conducted at several noise-sensitive land uses in the project area on February 27, 2007 and September 18-19, 2007. The measurement locations are shown and summarized in the air quality and noise evaluation report.

Existing peak hour equivalent sound levels at the residences near existing SR-18 range from 47 dBA to 69 dBA. The sound level differences are primarily a function of the distance between the residences and existing SR-18, and the existing terrain such as the top of cuts and intervening hills.

Sound levels at the measurement locations near the roadway segments on new alignment range from 40 to 44 dBA. These levels are representative of background sound levels in the project area where no substantial noise sources exist.

3.6.1.3 Determination of Future Sound Levels

No-Build Alternative

Sound levels for the No-Build Alternative can be reasonably estimated by evaluating existing and future traffic volumes on SR-18. Year 2031 traffic volumes on SR-18 are predicted to be approximately 50% higher than existing volumes. This increase in traffic would increase existing sound levels at nearby receivers by approximately 2 dB.

Future Peak Hour Equivalent Sound Levels With Project

The FHWA Traffic Noise Model (TNM 2.5) computer program was used to calculate peak hour equivalent sound levels in the design year 2031 for the residences, churches, and other noise-sensitive land uses in the project area, including the measurement locations, for each alternative.

The predicted future peak hour equivalent sound levels for each alternative are discussed in detail in the in the air quality and noise evaluation report.

3.6.1.4 Noise Impact Analysis

Noise impact is determined by comparing future sound levels: (1) to a set of Noise Abatement Criteria (NAC) for a particular land use category, and (2) to existing sound levels.

The FHWA noise standards (contained in 23 CFR 772) and TDOT noise policy state that traffic noise impacts warrant consideration of abatement when worst-hour equivalent sound levels approach or exceed the NAC listed in Table 3.23. TDOT policy defines “approach” as one decibel below the NAC, or 66 dBA for Category B land uses.

Table 3.23. Noise Abatement Criteria in 23 CFR 772

Activity Category	L _{eq} (1h) dBA	Description of Activity
A	57 (Exterior)	Land 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	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	---	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: TDOT, 2008.

The FHWA noise standards and TDOT policy also define impacts to occur if there is a substantial increase in design year sound levels above the existing sound levels when the predicted design year sound levels are between 57 and 67 dBA L_{eq}. Table 3.24 presents the TDOT criteria used to define noise increase.

Table 3.24. TDOT Criteria to Define Noise Increase

Increase (dB)	Subjective Descriptor
0 to 5	Minor Increase
6 to 9	Moderate Increase
10 or more	Substantial Increase

Source: TDOT, 2008.

The primary areas of concern for this project are residential properties, churches, a school, and a park, so the NAC for Activity Category B apply. Therefore, impacts would occur if predicted future sound levels are 66 dBA or higher, or if a substantial increase in existing sound levels (10 dB or more) is predicted and the design hour sound level is between 57 dBA and 67 dBA. Table 3.25 summarizes the number of noise impacts predicted to occur under each alternative.

As indicated in Table 3.25, Alternative 1 and Alternative 5 are each predicted to result in a total of 135 noise impacts followed by Alternative 4, which is predicted to result in a total of 108 noise impacts. All three of these alternatives include the widening of SR-18 from north of Medon-Malesus Road to SR-5 (U.S.-45) (Segment A-4) where 94 impacts are predicted. Alternative 3 and Alternative 6 are each predicted to result in a total of 56 noise impacts while Alternative 2 will result in only 23 noise impacts. The No-Build Alternative is predicted to result in a total of 59 impacts.

Table 3.25. Design Year 2031 Noise Impact Summary

Alternative	Impacts Due to Substantial Increase	Impacts due to NAC	Total Impacts
No-Build	0	59*	59*
1	0	135*	135*
2	12	11	23
3	11	45	56
4	7	101*	108*
5	7	128*	135*
6	18	38	56
* Includes the exterior of the Malesus Elementary School. Source: <i>Bowlby and Associates, 2008.</i>			

It should also be noted that the diversion of traffic from existing SR-18 to the new alignment segments included in Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 6 will result in a significant reduction in existing sound levels at receivers along existing SR-18. These reductions are predicted to range from 4 to 9 dB depending on location.

Predicted design year sound levels at the Swink Stage House under the No-Build and Build Alternatives are well below 66 dBA. As a result, the historic Swink Stage House is not predicted to be impacted based on the NAC.

Additionally, sound level increases are predicted to be 2 dB under the No-Build Alternative and 1 dB under Alternative 1, Alternative 3, Alternative 5, and Alternative 6. These increases are defined as “minor” in accordance with TDOT’s policy. Predicted sound levels under Alternative 2 and Alternative 4 are 7 dB lower than the existing level. Therefore, the Swink Stage House will also not be impacted by a substantial increase in sound levels.

Table 3.26 presents predicted design year equivalent sound levels for areas along SR-18 where vacant and possibly developable lands exist. Noise predictions were made at distances between 100 and 500 feet from SR-18 for the year 2031 design hour. These values do not represent predicted levels at every location. Sound levels will vary with changes in terrain and will be affected by the shielding of objects, such as houses.

Table 3.26. Design Year 2031 Sound Levels (dBA) – Undeveloped Areas

Distance ⁽¹⁾	L _{Aeq} (1h) ⁽²⁾
100 feet	67
200 feet	63
300 feet	58
400 feet	55
500 feet	53
(1) Perpendicular distance to the centerline of the roadway. (2) Reflects at-grade situation.	
Source: Bowlby and Associates, 2008.	

The future year 2031 noise analysis includes projected traffic volumes for the project as well as forecasted background traffic growth and other planned and programmed projects in the area. As a result, the noise impacts predicted for the noise analysis represent both direct and cumulative noise impacts.

Potential Noise Impacts Associated with the No-Build Alternative

Direct Impacts to Noise (No-Build Alternative)

As described previously, design year sound levels under the No-Build Alternative at receivers along SR-18 will be approximately 2 dB higher than existing sound levels. These increases are defined as “minor” in accordance with TDOT noise policy. No residences will experience a substantial increase in sound levels under the No-Build Alternative.

Design year sound levels under the No-Build Alternative at most receivers are predicted to be below 66 dBA. However, design year sound levels at 58 residences are predicted to be 66 dBA or higher. These residences are predicted to be impacted under the No-Build Alternative. Additionally, the predicted design year sound level at exterior of the Malesus Elementary School at 610 Bolivar Highway is 68 dBA. Therefore, the exterior areas of the school near SR-18 are predicted to be impacted under the No-Build Alternative. The historic Swink Stage House will not be impacted under the No-Build Alternative.

Finally, the design year sound level at the exterior of the Clover Creek Church at 2112 Highway 18 is predicted to be 70 dBA. Since no exterior areas of “frequent human use” exist at the Church, impacts are assessed for interior conditions. The Church is air-conditioned and would normally be expected to operate under a “closed windows” condition. Applying a 25 dB reduction for building attenuation results in predicted interior sound levels well below the NAC of 52 dBA for Activity Category E land uses. As a result, the Clover Creek Church is not predicted to be impacted under the No-Build Alternative.

Indirect Impacts to Noise (No-Build Alternative)

No indirect noise impacts are anticipated under the No-Build Alternative.

Potential Noise Impacts Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Noise (Alternative 1-Widen Existing)

Design year sound levels under Alternative 1 at most receivers are predicted to be between 1 and 8 dB higher than existing sound levels. These increases are defined as “minor” or “moderate” in accordance with TDOT noise policy. No receivers will experience a substantial increase in sound levels under Alternative 1.

Design year sound levels under Alternative 1 at most receivers are predicted to be below 66 dBA. However, design year sound levels at 134 residences are predicted to be 66 dBA or higher. These residences are predicted to be impacted by the project. Most of these residences are located on the east side of Segment A-3 north of Medon-Malesus Road, including street addresses between 1611 Highway 18 and 1861 Highway 18, or on the east and west sides of Segment A-4 south of Quinn Drive including street addresses between 103 Bolivar Highway and 411 Bolivar Highway.

In some areas, design year sound levels are predicted to be the same or lower with Alternative 1 than existing sound levels as a result of the shifting of the existing SR-18 alignment farther from some receivers.

Additionally, the predicted design year sound level at exterior of the Malesus Elementary School at 610 Bolivar Highway is 68 dBA. Therefore, the exterior areas of the School near SR-18 are predicted to be impacted under Alternative 1.

Finally, the predicted design year sound level at the exteriors of both the Clover Creek Church at 2112 Highway 18 and the Faith Tabernacle Worship Center at 1925 Highway 18 is 66 dBA. Since no exterior areas of “frequent human use” exist at either Church, impacts are assessed for interior conditions. The Churches are air-conditioned and would normally be expected to operate under a “closed windows” condition. Applying a 25 dB reduction for building attenuation results in predicted interior sound levels well below the NAC of 52 dBA for Activity Category E land uses. As a result, no impacts are predicted to occur at the Churches under Alternative 1.

The project will result in intermittent and temporary noise above existing ambient levels due to construction activities in the project vicinity. Land uses that would be sensitive to vehicular noise would also be sensitive to construction noise. However, the actual level of noise impact during this period will be a function of the number and type of equipment used, as well as the type of construction activities. This may include heavy equipment movement and grading. However, the construction noise increases would be temporary and would not

constitute a noise impact as defined by the FHWA noise standards and TDOT's noise policy.

Indirect Impacts to Noise (Alternative 1-Widen Existing)

Implementation of the project could cause some redistribution of traffic on the surrounding roadway network beyond the modeled network. The project could also affect development and land use patterns in the project area. These situations could result in higher traffic volumes and indirect noise impacts at locations near roadways beyond the project limits. However, a doubling of the traffic volume is required to increase the hourly equivalent sound level by 3 dBA, which is usually the smallest change in sound levels that people can detect without specifically listening for the change. Traffic volumes are not anticipated to double as a result of the redistribution of traffic or changes in development, therefore any increases in sound levels beyond the project would be less than 3 dBA and defined as "minor" in accordance with TDOT's noise policy. As a result, the project is not predicted to cause any substantial indirect noise impacts.

Potential Noise Impacts Associated with Alternative 2

Direct Impacts to Noise (Alternative 2)

As discussed for Alternative 1, no residences along the widened segments of SR-18 will experience a substantial increase in existing sound levels. Seven residences along Segment A-1 are predicted to have design year sound levels of 66 dBA or higher and are, therefore, impacted under Alternative 2.

Design year sound levels at some receivers along Segment A-1 are predicted to be the same or lower than existing sound levels as a result of the shifting of the existing SR-18 alignment farther from those receivers. Existing sound levels at most receivers near the roadway segments on new alignment are between 40 and 44 dBA. Design year sound levels at most of these receivers are predicted to be more than 10 dB higher than existing sound levels. However, the design year sound levels at most receivers are predicted to be below 57 dBA. Therefore, most receivers will not be impacted by a substantial increase in sound levels. However, 12 residences are predicted to have design year sound levels between 57 and 67 dBA and are predicted to be impacted by a substantial increase in sound levels.

Additionally, four residences near the roadway segments on new alignment will have design year sound levels of 66 dBA or higher. These residences are also impacted.

A total of 23 residences are predicted to be impacted under Alternative 2. Of these, 11 residences are predicted to be impacted with sound levels approaching or exceeding the NAC, and 12 residences are predicted to be impacted by a substantial increase in existing sound levels.

Indirect Impacts to Noise (Alternative 2)

Indirect impacts to noise under Alternative 2 would be similar to those discussed under Alternative 1 above.

Potential Noise Impacts Associated with Alternative 3

Direct Impacts to Noise (Alternative 3)

As discussed for Alternative 1, no residences along the widened segments of SR-18 will experience a substantial increase in existing sound levels. Design year sound levels at 41 residences along the widened segments of SR-18 are predicted to be 66 dBA or higher. These residences are predicted to be impacted under Alternative 3.

As with Alternative 2, design year sound levels at some receivers along Segment A-1 are predicted to be the same or lower than existing sound levels as a result of the shifting of the existing SR-18 alignment farther from those receivers.

Design year sound levels at 11 residences along the new alignment segments are predicted to be 10 dB or more higher than existing levels with design year sound levels between 57 and 67 dBA. These residences are predicted to be impacted by a substantial increase in sound levels.

Additionally, four residences along the new alignment segments have predicted design year sound levels of 66 dBA or higher and are, therefore, predicted to be impacted under Alternative 3.

A total of 56 residences are predicted to be impacted under Alternative 3. Of these, 45 residences are predicted to be impacted with sound levels approaching or exceeding the NAC, and 11 residences are predicted to be impacted by a substantial increase in existing sound levels.

Indirect Impacts to Noise (Alternative 3)

Indirect impacts to noise under Alternative 3 would be similar to those discussed under Alternative 1 above.

Potential Noise Impacts Associated with Alternative 4

Direct Impacts to Noise (Alternative 4)

As discussed for Alternative 1, no residences along the widened segments of SR-18 will experience a substantial increase in existing sound levels. Design year sound levels at 100 residences and the exterior of the Malesus Elementary School along the widened segments of SR-18 are predicted to be 66 dBA or higher. These residences and the school are predicted to be impacted under Alternative 4.

As with Alternatives 2 and 3, design year sound levels at some receivers along Segment A-1 are predicted to be the same or lower than existing sound levels as a result of the shifting of the existing SR-18 alignment farther from those receivers.

Design year sound levels at seven residences along the new alignment segments are predicted to be 10 dB or more higher than existing levels with design year sound levels between 57 and 67 dBA. These residences are predicted to be impacted by a substantial increase in sound levels. No residences along the new alignment segments have predicted design year sound levels of 66 dBA or higher.

A total of 107 residences and the exterior of Malesus Elementary School are predicted to be impacted under Alternative 4. Of these, 100 residences and Malesus Elementary School

are predicted to be impacted with sound levels approaching or exceeding the NAC, and seven residences are predicted to be impacted by a substantial increase in existing sound levels.

Indirect Impacts to Noise (Alternative 4)

Indirect impacts to noise under Alternative 4 would be similar to those discussed under Alternative 1 above.

Potential Noise Impacts Associated with Alternative 5

Direct Impacts to Noise (Alternative 5)

As discussed for Alternative 1, no residences along the widened segments of SR-18 will experience a substantial increase in existing sound levels. Design year sound levels at 126 residences and the exterior of the Malesus Elementary School along the widened segments of SR-18 are predicted to be 66 dBA or higher. These residences and the School are predicted to be impacted under Alternative 5.

As with Alternatives 2, 3, and 4, design year sound levels at some receivers along Segment A-1 are predicted to be the same or lower than existing sound levels as a result of the shifting of the existing SR-18 alignment farther from those receivers.

Design year sound levels at seven residences along the new alignment segments are predicted to be 10 dB or more higher than existing levels with design year sound levels between 57 and 67 dBA. These residences are predicted to be impacted by a substantial increase in sound levels. One additional residence along the new alignment segments is predicted to have a sound level above 66 dBA.

A total of 134 residences and the exterior of Malesus Elementary School are predicted to be impacted under Alternative 5. Of these, 127 residences and Malesus Elementary School are predicted to be impacted with sound levels approaching or exceeding the NAC, and seven residences are predicted to be impacted by a substantial increase in existing sound levels.

Indirect Impacts to Noise (Alternative 5)

Indirect impacts to noise under Alternative 5 would be similar to those discussed under Alternative 1 above.

Potential Noise Impacts Associated with Alternative 6

Direct Impacts to Noise (Alternative 6)

As discussed for Alternative 1, no residences along the widened segments of SR-18 will experience a substantial increase in existing sound levels. Design year sound levels at 33 residences along the widened segments of SR-18 are 66 dBA or higher. These residences are predicted to be impacted under Alternative 6.

As with Alternatives 2 through 5, design year sound levels at some receivers along Segment A-1 are predicted to be the same or lower than existing sound levels as a result of the shifting of the existing SR-18 alignment farther from those receivers.

Design year sound levels at 18 residences along the new alignment segments are predicted to be 10 dB or more higher than existing levels with design year sound levels between 57

and 67 dBA. These residences are predicted to be impacted by a substantial increase in sound levels.

Additionally, five residences along the new alignment segments will have a design year sound level of 66 dBA or higher and are, therefore, predicted to be impacted under Alternative 6.

A total of 56 residences are predicted to be impacted by Alternative 6. Of these, 38 residences are predicted to be impacted with sound levels approaching or exceeding the NAC, and 18 residences are predicted to be impacted by a substantial increase in existing sound levels.

Indirect Impacts to Noise (Alternative 6)

Indirect impacts to noise under Alternative 5 would be similar to those discussed under Alternative 1 above.

3.6.1.5 Mitigation of Noise Impacts

Noise Abatement Evaluation

Abatement is generally evaluated when impacts are predicted to occur. Noise abatement measures may include substantial alteration of horizontal and vertical alignment, and traffic management measures (such as reducing speed limits, prohibition of heavy trucks, etc.). Discussions with TDOT's Environmental Division staff indicated that these forms of mitigation were not possible at this point in project development and that noise barriers would be the best available abatement measure to reduce sound levels for impacted areas.

In order for noise barriers to be included in a project, they must be determined to be both feasible and reasonable in accordance with TDOT's noise policy. However, the final decision on implementation of abatement measures will be made during the project design phase and after consideration of input from the public involvement process. It is possible that some noise attenuation measures may be considered on a case-by-case basis in an effort to reduce noise impacts. Some of these noise attenuation measures may include minor alignment shifts (where feasible) and/or construction of earthen berms.

Noise Barrier Feasibility

Feasibility means that:

- the construction of a barrier would not be anticipated to pose any major design, construction, maintenance or safety problems; and
- the noise barriers will provide a noise reduction (or insertion loss) of at least 7 dB at impacted first-row receivers ("acoustic feasibility").

Most of the residences that are predicted to be impacted are located along existing SR-18. However, existing SR-18 is not a limited access roadway, so the construction of noise barriers is not possible since the barriers would limit access from adjacent properties. As a result, noise abatement is not feasible for impacted residences along existing SR-18.

The only area where there are more than two impacted residences near the new alignment segments is the Parkburg Road area near Segment B-4. Impacted residences are located

on both the east and west sides of Segment B-4, so two noise barriers would be needed for this area.

At the present time, there do not appear to be any major design, construction, maintenance, or safety problems associated with construction of noise barriers along Segment B-4. However, this analysis was completed based on functional design plans. The final decision on implementation of abatement measures will be made during the project design phase and consideration of input from the public involvement process.

Additionally, the results of the noise barrier evaluation indicate that the noise barriers would provide at least 7 dB noise reduction at the impacted residences and are, therefore, acoustically feasible. Feasibility alone, however, does not dictate whether a noise barrier will be built. Noise barriers must also pass a “reasonableness” test as described below.

Noise Barrier Reasonableness

Reasonableness refers to the cost of the noise barriers weighed against the benefits. TDOT’s noise policy states that a barrier is reasonable if the cost of the barrier divided by the number of benefitted residences does not exceed the allowable cost per benefitted residence for that area. The allowable cost per benefitted residence for the Parkburg Road area is \$38,000.

The insertion loss for each modeled receiver was used to determine the total number of benefitted residences for the area. Benefitted residences are ones that would receive five or more dB of insertion loss due to construction of the barrier. The barriers are predicted to benefit eight residences.

The cost of the noise barriers is estimated at \$780,000 and the resulting cost per benefitted residence is \$97,500. This cost substantially exceeds the allowable cost per benefitted residence of \$38,000. Therefore, noise barriers are not reasonable for this area.

Finally, TDOT currently has an active Type II Noise Barrier Program to facilitate the construction of “retrofit” noise barriers along existing highways. To be eligible for a Type II noise barrier, an area must meet the following criteria:

- The neighborhood must be located along a limited-access roadway;
- The neighborhood must be primarily residential;
- The majority (more than 50%) of residences in the neighborhood near the highway pre-dated the initial highway construction;
- A noise barrier for the neighborhood must not have been previously determined to be not reasonable or not feasible as part of a new highway construction or through-lane widening study (Type I project);
- Existing noise levels measured in the neighborhood must be above the Noise Abatement Criteria (NAC) of 66 dB (1-hour equivalent sound level);
- A barrier must be feasible to construct and will provide substantial noise reduction; and
- A barrier must be reasonable (barrier cost per benefitted residence) in accordance with TDOT noise policy. A residence is considered “benefitted” if the noise barrier will reduce the traffic noise by at least 5 dB.

Based on this preliminary evaluation, noise barriers would not be considered reasonable for this project due to the cost per protected receptor exceeding the allowable costs. However, the final decision on implementation of abatement measures will be made during the project design phase and after consideration of input from the public involvement process. It is possible that some noise attenuation measures may be considered on a case-by-case basis in an effort to reduce noise impacts. Some of these noise attenuation measures may include minor alignment shifts (where feasible) and/or earthen berms.

Construction Noise

If TDOT's construction specifications apply to this project, construction procedures shall be governed by the *Standard Specifications for Road and Bridge Construction* as issued by TDOT and as amended by the most recent applicable supplements. The contractor will be bound by Section 107.01 of the Standard Specifications to observe any noise ordinance in effect within the project limits. Detoured traffic shall be routed during construction so as to cause the least practicable noise impact upon residential and noise sensitive areas.

Coordination with Local Officials

TDOT encourages local communities and developers to practice noise compatible land use planning in order to avoid future noise impacts. The following language is included in TDOT's noise policy:

"Highway traffic noise should be reduced through a program of shared responsibility. Local governments should use their power to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway or that the developments are planned, designed and constructed in such a way that noise impacts are minimized."

Additionally, TDOT's noise policy states that:

"noise abatement will also not be considered reasonable for land uses constructed after the date of adoption of this noise policy (based upon local Assessor's records), except for projects involving construction of a roadway on a new alignment."

TDOT's noise policy was adopted in April 2005. Development constructed after this date will not be eligible for noise abatement for future projects.

3.7 Hazardous Waste Sites

3.7.1 Hazardous Waste Background Information

A Phase I Preliminary Site Investigation (PSI) of SR-18, from SR-100 in Hardeman County to SR-5 (U.S.-45) in Jackson, Madison County, Tennessee (EnSafe 2007)). The goal of the Phase I PSI was to determine whether the condition of properties along the SR-18 project area indicated that hazardous substances or petroleum products may be present from past releases.

The Phase I PSI included:

- An environmental database search and report;
- Review of 1992, 1996, 2000, and 2004, aerial photographs at the TDOT Aerial Survey Division, Nashville, Tennessee;
- Review of Internet Web sites:
 - U.S. Environmental Protection Agency (USEPA) Envirofacts Web site (www.epa.gov/enviro);

- List of Underground Storage Tank Facilities without certificates on the Tennessee Department of Environment and Conservation (TDEC) Web site (www.state.tn.us/environment);
- Terra Server-USA aerial photographs website (<http://terraserver.microsoft.com>);
- A review of pertinent environmental documents at TDEC Jackson Environmental Field Office (EFO);
- A review of a 1998 Phase I Initial Project Assessment (IPA) report for the SR-18 corridor; and
- A visual assessment of properties along SR-18, from SR-100 in Hardeman County to SR-5 (U.S.-45) in Jackson, Madison County, Tennessee.

3.7.1.1 Regulatory Research

An environmental database study, dated June 4, 2007, was conducted for SR-18 covering the American Society for Testing and Materials (ASTM) Standard Practice E 1527-05 approximate minimum search distance for all standard environmental sources within the project area. The study provides regulatory agency information from federal and state environmental agencies for all properties within a specified search radius of SR-18.

The study lists “orphan sites,” which are those that it cannot map due to inadequate address information. Attempts were made to locate these sites using internet mapping sites, visual reconnaissance, and TDEC file information. TDEC Division of Underground Storage Tanks (DUST) and Division of Hazardous Waste files in Jackson, Tennessee were reviewed to determine the existence, location, and other pertinent underground storage tank (UST) information for potential properties of concern along SR-18, as identified during the site reconnaissance or from historical research.

3.7.1.2 Historical Information

Historical information was gathered from discussions with occupants and by reviewing aerial photographs and a 1998 Phase I report for the SR-18 corridor project. Aerial photographs dated February 1, 1997, and covering the proposed project area were downloaded and reviewed from www.TerraServer-USA.com. Aerial photographs were also reviewed at TDOT's Aerial Surveys Division in Nashville, Tennessee on May 29, 2007. Photographs of the proposed project area dated January 31 and February 2, 1992; March 12, March 21, and April 1, 1996; December 22, February 29, and March 6, 2000; and February 21 and 28, 2004, were reviewed.

3.7.1.3 Properties of Potential Concern

Properties of potential concern in the SR-18 project area were categorized to determine the potential for impacts caused by those sites. Residential properties were not investigated because these properties had no historical records pertaining to the present or past use or existence of hazardous materials. All properties investigated were assigned one of three categories:

- **No indication:** Implies that there was no indication of the present or past use of hazardous materials and therefore no potential for impacts to the project;
- **Low:** Implies that there is evidence of present or past use or existence of hazardous materials on the site. However, because of the storage method, use, or type of material it is not expected that the site would impact the project as the

materials would be easily removed with no additional clean-up activities required; and

- **High:** Implies that there is evidence of present or past use or existence of hazardous materials on the site and that there is a possibility of soil and/or groundwater contamination that may impact the project. Additional clean-up efforts would potentially be required.

Based on this site investigation and historical information, 25 properties had environmental concerns along the existing SR-18. Fifteen of the properties have a low probability of impacting the project and ten have a high probability of impacting the project. Table 3.27 lists the properties of potential environmental concern by individual alignment segment and shows the probability of impact from the SR-18 project.

Several active and former gasoline service stations were identified along the existing SR-18 and/or SR-5 (U.S. 45) that are a concern because of the lack of leak detection or control during operation, abandoned underground storage tanks (USTs) containing product that may have leaked over time, USTs removed without confirmation sample data, and pipes with petroleum product remaining in the ground after UST removal. Several active and former automobile repair and service operations are a concern because of the types of chemicals (oils, solvents, etc.) routinely used. Insufficient information was available for several properties to determine previous operations, requiring further investigation ranging from additional research of documents to discussions with past owners to determine the necessity for soil investigation.

Two facilities have documented releases that may have impacted soil along SR-18:

- **Upton's Grocery (Medon Flooring)** has had a release of petroleum product to the soil and groundwater, which is considered drinking water at this location, along SR-18. The site is currently under clean-up activities.
- **Fuel Mart (Snappy Mart, Q-Mart)** has had a release of petroleum product to the soil and groundwater at the junction of SR-18 and U.S. Highway 45S. The site is currently under clean-up activities.

Table 3.27. Properties with Environmental Concerns within the State Route 18 study area from State Route 100 in Hardeman County to State Route 5 (U.S.-45) in Jackson, Madison County, Tennessee.

Site Name and Location/Parcel Number	Segment	Probability of Impact
Snow White Tavern - Tax Parcel 22-19.01	A-1	high
McNeil's Laundromat & Garage -Tax Parcel 22-6	A-1	low
Phinnessee's Earthmoving- Tax Parcel 166-4	A-2	low
Residence East of SR-18, Just north of Hardeman/Madison County Line	A-2	low
Richard's One-Stop Café -Tax Parcel 160-47.02	A-2	low

Site Name and Location/Parcel Number	Segment	Probability of Impact
Abandoned Bldg, West of SR-18, North of Clover Creek Missionary Baptist Church	A-2	high
Country Junction Trading Post - Tax Parcel 160-14.02	A-3	low
J.F. Upton and Son, West of SR-18, NW of Post Office	A-3	low
Upton's Grocery (Medon Flooring) - Tax Parcel 151-3400P	A-3	high
Fuller Remodeling, West of SR-18, next to Hi-Way 18 Auto Salvage	A-3	high
Hi-way 18 Auto Salvage - Tax Parcel 150-2400P	A-3	high
White Oak Stave Company - Tax Parcel 142-36.02P	A-4	low
Madison Timber - Tax Parcel 142-36	A-4	low
Malesus Auto Service -Tax Parcel 121 D-27	A-4	low
Abandoned Building, East of SR-18	A-4	low
Vacant Lot, West of SR-18, South of Fitzgerald Rd	A-4	low
Sherry Goddie's (McNeil's Grocery) Tax Parcel 121-D-2	A-4	high
Auto Repair and Sales, West of SR-18 at Quinn St	A-4	low
Forbo Adhesives, West of SR-18	A-4	low
Mid-South Milling- Tax Parcel 109-P-D-1	A-4	low
Madison Industries - 73 Quinn Street — West of SR-18	A-4	high
Raceway - 2023 S. Highland	A-4	high
Fuel Mart - 2016 S. Highland	A-4	high
Texaco (Marathon) Tax Parcel 109-J-4	A-4	high
HR&M Compressors, The Chimney Doctors, SofPools — 2405 Highway 45 S	B-4	low
<i>Source: EnSafe 2007.</i>		

The Snow White Tavern (Market) (Tax Parcel 22-19.01)

This site is located west of SR-18, north of Ran Road. Trash and other debris were observed around this active establishment. A camper was parked on a concrete pad north of the tavern, obscuring view of the ground surface for evidence of underground storage tanks (USTs). This facility was not listed in the PSI report. The 1998 Phase I IPA stated that this property was a former gasoline service station. The report indicated a 2,000-gallon UST was onsite when it operated as Ballard's Bar, but the UST has since been removed. The former gas station operation and lack of information regarding UST removal indicate a high probability that the use of petroleum product may impact the project.

McNeil's Laundromat & Garage (Tax Parcel 22-6)

This site is located at 27920 SR-18, east of McNeal Road. This vacant commercial building is between private residences on SR-18. Signs on the facility advertise a laundromat. Several dryer vents were observed on the south side of the building. The facility is listed in the PSI report on the UST database. No file was available for review at TDEC. However, the 1998 PSI report indicated that one 1,000-gallon and two 500-gallon gasoline USTs were removed September 30, 1992. According to the report, McNeil's Grocery received final approval of UST closure October 30, 1992, after analytical results from soil samples collected during UST removal did not detect contamination or evidence of releases. Previous sampling results from the UST closure indicate a low probability that the past use of petroleum products may impact the project.

Phinnessee's Earthmoving Contractor (Tax Parcel 166-4)

This site is located west of SR-18, just north of the Hardeman/Madison county line. This combined residential and commercial operation consists of a house, warehouse/workshop, and heavy equipment, such as bulldozers, backhoes, and other equipment. No evidence of USTs was observed from the property entrance. Drums were observed behind the house; however, the contents were not viewable. Information obtained for this property indicates a low probability that the past or present use of hazardous materials may impact the project.

Residence East of SR-18

This site is located just north of the Hardeman/Madison County line. Drums labeled as grease appeared to be for sale along with other yard sale items in the front yard of this private residence. The contents of the drums could not be confirmed. No staining was observed in the vicinity of the drums. Based on information obtained in a limited site visit, this property has a low probability that the past or present use of hazardous materials may impact the project.

Richard's One Stop & Café (Tax Parcel 160-47.02)

This site is located west of SR-18. No file was available for review for this property with the exception of a no further action letter from the Division of Underground Storage Tanks dated November 8, 1999. A propane AST and drums of unknown contents were observed west of the building. The 1998 PSI report identified this property as formerly being Phillips Grocery & Upholstery and Speedy Mart. According to the report, USTs were previously onsite, and a site map indicated the tanks were south of the building, where the canopy is today. Although the case received a no further action status, due to a lack of reviewable information concerning tank removal and potential clean up, there is a low probability that the past or present use of hazardous materials may impact the project.

Abandoned Building

This site is located west of SR-18, just north of Clover Creek Missionary Baptist Church. North of the church is an abandoned building, obscured by overgrown vegetation, that appears to have been a gas station. Approximately 25 feet east of the building is a ground pipe, likely belonging to part of the UST system. Stressed vegetation and bare ground were observed in the vicinity of the pipe. This property was not identified in the PSI report on the UST list. Although the property is not in the ROW, a lack of information concerning the possible UST creates a high probability that the past or present use of hazardous materials may impact the project.

Country Junction Trading Post (Murry's Grocery) (Tax Parcel 160-14.02 2108)

This site is located along SR-18. This property was identified in the PSI report as an UST site; however, no file was available for review with the exception of a no further action letter dated July 19, 1993. The 1998 IPA report stated that two 1,000-gallon USTs formerly existed onsite but had been closed in place with no detected contamination. A TDEC employee recalled that the two USTs were removed from the property in 2004, but there was no supporting documentation available for review. Based on the available information for this property, there is a low probability that past use of petroleum products may impact the project.

J.F. Upton and Son

This site is located west of SR-18, northwest of the Post Office. Two buildings that look like repair shops exist just northwest of the Post Office. The property was not identified in the PSI report, and there was no evidence of USTs existing on the property. Based on available information and a limited site visit, there is a low probability of present or past use of hazardous material at this property.

Upton's Grocery (Medon Flooring) (Tax Parcel 151-3400P=2052)

This site is located along SR-18, north of Bowman Collins Street. This property is currently operating as Medon Flooring. TDEC files indicate that a 1,000-gallon and a 500-gallon gasoline UST previously existed onsite but were removed in 2000. Soil contamination was discovered during tank removal, and the soil was excavated. Groundwater was also found to be contaminated. Groundwater was classified as drinking water and was treated using a Mobile Enhanced Multi-phase Extraction treatment. Currently, groundwater is being monitored by SCS Environmental Group. The information obtained for this property indicates a high probability that past use of petroleum products may impact the project.

Fuller Remodeling and Refinishing and Abandoned Building

This site is located west of SR-18, next to Hi-way 18 Auto Salvage. This property refurbishes furniture as its primary business. The odor of chemicals was noted during the site reconnaissance. Chemicals used in refurbishing furniture are a concern, because they contain hazardous materials, such as solvents. A large pile of waste wood, empty, 1- and 5-gallon containers of paint, and other trash were discarded west of the abandoned building. Additionally spilled paint was observed in this area. The interior of the building was viewed, and it was noted that there were 5-gallon containers of paint and paint thinner. This property was not identified in the PSI report. Based on poor housekeeping practices, there is a high probability that past or present use of hazardous materials may impact the project.

Hi-Way 18 Auto Salvage (Tax Parcel 150-2400P 2000)

This site is located along SR-18, east of Riverside Drive. This inoperative auto shop has several automobiles and auto parts scattered throughout the property north and west of the building. Additionally, auto parts, drums containing trash, and tires are east of the building. The ground in this area is heavily stained with what appears to be petroleum product. EnSafe viewed the interior of the building and observed several tires, car parts, machinery, and 55-gallon drums of unknown contents. This facility is not listed in the PSI report. There was no indication of an UST previously onsite. The condition of the stained soil due to releases of petroleum product indicates a high probability that the use of petroleum products and other hazardous materials may impact the project.

White Oak Stave Company (Tax Parcel 142-36.02P)

This site is located east of SR-18, south of a private drive. This lumber operation has active ASTs onsite. The location of viewable ASTs appeared to be out of the ROW. The 1998 IPA reported that two tanks hold propane, and three hold diesel fuel. This information could not be confirmed. Several piles of cut lumber, wood pallets, and other wood products, in addition to semi truck trailers and heavy equipment, were observed onsite. The facility is not listed in the PSI report. Based on the available information for this property, there is a low probability that past or present use of petroleum products may impact the project.

Madison Timber (James Melton Sawmill) (Tax Parcel 142-36)

This site is located east of SR-18. This facility is listed in the PSI report as having one 560-gallon gasoline UST that is permanently out of use. The UST is reportedly owned by River Oil Company of Jackson, Tennessee. No file was available for review at TDEC, indicating the facility is active with no history of releases, closures, or removals. Large (>10,000 gallons), rusted storage tanks were observed during the site visit. Lumber and heavy equipment could be seen from the property boundary; however, a fence and overgrown vegetation obstructed view of most of the property. Based on the available information for this property, there is a low probability that past or present use of petroleum products may impact the project.

Malesus Auto Service (Tax Parcel 121-D-27)

This site is located at 588 SR-18, south of Hudson Drive. This small service shop was not listed in the PSI report. There was no evidence of an UST present onsite. Drums of unknown contents were stored south of the building. Auto repair is a concern because of the use of hazardous material such as oils, lubricants, and solvents. Based on the information obtained for the property, there is low probability that past or present use of hazardous materials may impact the project.

Abandoned Building

This site is located east of SR-18. There were no signs indicating past operations or any USTs observed at this property. The 1998 IPA report indicated the previous occupants were Johnson Fence Company, a U.S. Post Office, and Red Barn Appliance. Appliance and auto repair are a concern because of the use of hazardous materials, such as refrigerants and oils. Based on the available information for this property, there is low probability that past or present use of hazardous materials may impact the project.

Vacant Lot

This site is located west of SR-18, south of Fitzgerald Road. This paved lot had tractor trailer beds, drums, tires, and other debris stored on it on the day of the site visit. The 1998 IPA report indicated this property was a welding facility and numerous automotive repair shops; however, the buildings no longer exist. This property was not listed in the PSI report. Welding and automotive repair operations are a concern because of use of oils, lubricants, and solvents. Based on the available information for this property, there is a low probability that past or present use of hazardous materials may impact the project.

Sherry Goddie's Inside Yard Sale (McNeil's Grocery) (Tax Parcel 121-D-2)

This site is located at 555 SR-18, north of Fitzgerald Road. This property had signs stating that the current business was in the process of moving to another location. The presence of a canopy, a pump island, and underground piping indicate this property formerly operated as a gas station. The facility was listed in the PSI report as having a 1,000-gallon and two 560-gallon gasoline USTs; however, no file was available for review at TDEC. The 1998 IPA reported the property had not operated as a gas station since 1983, and these tanks had not been removed. The previous use of the property as a gas station and the presence of the USTs indicate a high probability that petroleum products may impact the project.

Auto Repair and Sales

This site is located west of SR-18 at Quinn Street. Abandoned cars, car parts, piles of miscellaneous wood and metal, and some drums with unknown contents are scattered throughout the property. No information was obtained indicating the presence of an UST or any other impact to the property along SR-18; however, the use of the property as an auto repair shop is a concern due to the use of oils, lubricants, and solvents. Based on the property's use as an auto repair shop and its location in the ROW, there is low probability that past or present use of hazardous materials may impact the project.

Forbo Adhesives

This site is located west of SR-18. Hazardous waste files reviewed at TDEC indicated in the early 90s there was a release of non-hazardous adhesive resins to the soil on this property. Approximately 250 cubic yards of soil were excavated and disposed offsite. Additionally, approximately 3,040 pounds of a discontinued, non-hazardous adhesive waste referred to as 'hot melt' was transported to an authorized local landfill. Adhesive manufacturing is a concern due to the chemicals involved; however, based on the distance of the property from the project, there is low probability that past or present use of hazardous materials may impact the project.

Mid-South Milling Company (Tax Parcel 109-P-D-1)

This site is located at 111 Quinn Street. The PSI report lists this facility as having a 500-gallon gasoline UST and a 1,000-gallon diesel UST. No file was available for review at TDEC with the exception of a no further action letter date August 16, 1994.

The 1998 IPA reported the USTs were removed in late summer of 1994, and no soil contamination was identified. Based on the available information for this property, there is a low probability that past or present use of hazardous materials may impact the project.

Madison Industries (Former RC Cola Bottling Plant)

This site is located at 73 Quinn Street, west of SR-18. In November 1990, TDEC was notified that two onsite gasoline USTs had been removed from this property. No closure plans were submitted to TDEC for approval and no soil samples were collected during tank removal. No other file information was available for this property. Based on the lack of sampling and available information for this property, there is a high probability that past or present use of hazardous materials may impact the project.

Raceway

This site is located at 2023 South Highland (SR-5). This operating gas station has three 12,000-gallon gasoline USTs located onsite. Recent site visits by TDEC personnel did not reveal any violations in relation to the USTs. Because this property is an active gas station, there is a high probability that past or present use of petroleum products may impact the project.

Fuel Mart (Snappy Mart, Q-Mart)

This site is located at 2016 South Highland (SR-5). This gas station was listed on the UST list of the PSI report. According to the PSI report, there are three 2,000-gallon gasoline USTs and a 1,000-gallon gasoline UST that are permanently out of use at this facility. Currently, there is an 8,000-gallon diesel UST and a 6,000-, 8,000-, and 12,000-gallon gasoline UST active at the site. Files reviewed at TDEC indicated a 10,000-gallon and two 8,000-gallon USTs were removed in 1998. A release to approximately 500 cubic yards of soil was discovered during tank removal. The contaminated soil was excavated and disposed offsite. Further investigation revealed groundwater contamination in relation to the petroleum release. Groundwater is being treated using a Mobile Enhanced Multi-phase Extraction treatment and is being monitored by Moring Environmental Services. As of March 29, 2007, the property was still being monitored under clean-up activities. Based on the available information for this property, there is a high probability that past or present use of petroleum products may impact the project.

Texaco (Marathon) (Tax Parcel 109-J-4)

This site is located at 1984 South Highland (SR-5). This closed gasoline station was listed on the UST list in the PSI report. No file was available for review at TDEC with the exception of a no further action letter dated January 31, 1990. The PSI report indicates there are six 1,000-gallon USTs with gasoline or unknown contents, an 8,000-gallon gasoline UST, and a 2,000-gallon kerosene UST that are permanently out of use at this property. Additionally, there are two 1,000-gallon gasoline USTs, a 1,000-gallon diesel UST, and a 2,000-gallon kerosene UST still active for this location. This facility had a violation in 1995 regarding a bad probe, which was repaired. Because of a lack of information about the USTs and the closed status of the station, there is a high probability that past or present use of petroleum products may impact the project.

H R & M Compressors, The Chimney Doctors, and SofPools

This site is located at the end of Segment B-4 at U.S. Highway 45S. This multi-tenant building had stacks of wood pallets, metal shelving, bins of metal waste, and a 55-gallon drum and a 500-gallon tote that were observed to be empty on the east side of the property. On the west side were stacks of wood pallets and piles of bricks. No evidence of an UST or other hazardous materials were observed. Based on the available information for this

property, there is a low probability that past or present use of hazardous materials may impact the project.

Other Properties

Several other properties were identified within the proposed project area that had some evidence of present or past use of hazardous materials. However, due to the method of storage, use, or type of materials, it was determined that there would be little or no potential for substantial hazardous materials issues. For instance, most residential properties in the area of the project are supplied with a heating oil and/or propane aboveground storage tank (AST). Many of the ASTs are located in or near the proposed ROW and would need to be properly removed before construction. These properties would be assigned to the "Low" category because of the presence of an AST, but because there are no additional environmental concerns, they were not listed in Table 3.27. In addition, any property that is used for agricultural crop production would also be assigned a "Low" category because of the potential for residual herbicides and pesticides to remain in the surface soil. TDOT should be aware of these residential and agricultural properties during construction. However, it is not anticipated that such properties would pose substantial environmental concern. More details regarding properties not listed in Table 3.27 can be found in the Phase 1 PSI Report available at TDOT.

3.7.1.4 Potential Impacts to Hazardous Waste Sites

Potential Impacts to Hazardous Waste Sites Associated with the No-Build Alternative

Direct Impacts to Hazardous Waste Sites (No-Build Alternative)

No construction impacts would occur under the No-Build Alternative. Therefore no additional hazardous materials issues due to disturbance of contaminated areas are expected.

There would continue to be a continuous chance for accidental spills of hazardous materials along the existing route due to continued use of the roadway to transport such materials through the area via trucks.

Indirect Impacts to Hazardous Waste Sites (No-Build Alternative)

The No-Build Alternative would not result in any major changes from the baseline conditions. However, the potential for crashes along the existing route would continue to increase as traffic volumes increase. Therefore, there would be an increased risk for accidental spills of hazardous materials along the existing SR-18. Increasing traffic volumes, including increased truck traffic, without substantially improving the current deficient design of the existing roadway would eventually result in more safety concerns along the route both for individuals living or traveling along the route and for the surrounding environment, especially natural resources, such as streams and wetlands located adjacent to the roadway.

Potential Impacts to Hazardous Waste Sites Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Hazardous Waste Sites (Alternative 1-Widen Existing)

Alternative 1 would have the highest potential for impacts due to hazardous materials. This Alternative would impact 24 sites with potential environmental concerns due to past or present use or storage of hazardous materials on the site. Ten of the sites are considered

to have “High” probability for impact to the project meaning that additional site testing and clean-up activities would likely be necessary prior to construction. Table 3.27 showed the sites that would be impacted by Alternative 1 (all sites listed for Segments A-1, A-2, A-3, and A-4).

Alternative 1 would encounter some residences and agriculture properties containing ASTs or potential agricultural contaminants in the surface soils. TDOT would remove any hazardous materials from those sites prior to construction and would use BMPs to protect adjacent streams from runoff of disturbed soils.

As with the existing SR-18, there would be a long-term potential for accidental spills or leakage of hazardous materials within the SR-18 project area both during construction and operation of the new roadway. It is not anticipated that construction of SR-18 would result in a direct increase in transportation of these types of materials through the region.

Indirect Impacts to Hazardous Waste Sites (Alternative 1-Widen Existing)

Improved highway conditions could result in greater volumes of hazardous materials being transported through the study area. Spills on highways are a potential source of water quality degradation and a possible public health hazard. The Tennessee Emergency Management Agency (TEMA) has the responsibility and authority for coordination of all state and local agencies during accidents involving hazardous materials. The TEMA has demonstrated its ability to effectively manage such incidents.

Any hazardous wastes encountered within the proposed ROW would be subject to the applicable sections of the Federal Resource Conservation and Recovery Act (RCRA), the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Tennessee Hazardous Waste Management Act of 1983.

Construction on the existing hazardous and/or special waste sites located within the Alternative 1 ROW could result in disturbance of contaminated soils that could in turn result in contaminated runoff entering nearby streams or groundwater. Soils around known hazardous materials sites would be tested and clean-up efforts would be conducted prior to construction to help reduce potential impacts.

The potential for accidental spills or leaks of hazardous materials being transported along SR-18 may result in adverse impacts to nearby streams or groundwater resources in the area should such an event occur. The likelihood of such spills or leaks impacting such resources would be considered low. Spill response teams in the area can normally contain accidental spills or leaks in a timely manner limiting the adverse impacts of such events to the localized area of the spill site.

Potential Impacts to Hazardous Waste Sites Associated with Alternative 2

Direct Impacts to Hazardous Waste Sites (Alternative 2)

Alternative 2 would impact the fewest hazardous materials sites due to most of the alignment being placed on relatively non-developed lands with few structures. This alternative would only impact a total of three potential hazardous materials sites, with only one site being listed as “High” potential for impact to the project. That one site, Snow White Tavern, would possibly require additional testing and clean-up activities prior to construction. Alternative 2 would avoid the other nine sites listed as “High” that would be impacted by Alternative 1.

Alternative 2 would encounter some residences and agriculture properties containing ASTs or potential agricultural contaminants in the surface soils. TDOT would remove any hazardous materials from those sites prior to construction and would use BMPs to protect adjacent streams from runoff of disturbed soils.

Other general impacts related to transportation of hazardous materials on SR-18 would be similar to Alternative 1. However, construction of SR-18 on the proposed new alignment under Alternative 2 may result in a direct shift in the routes taken to transport these materials through the area by allowing some of these materials to be transported around the more populated and sometimes congested portions of the northernmost portions of existing SR-18. This shift in routes is especially important, because it is expected that a large number of the trucks and/or other vehicles transporting hazardous materials would use the new alignment causing them to bypass Malesus Elementary School located along the existing SR-18. This shift in traffic would reduce the risk of such materials being accidentally spilled or released directly in front of the school.

Indirect Impacts to Hazardous Waste Sites (Alternative 2)

Indirect impacts associated with hazardous materials under Alternative 2 would be similar to Alternative 1. However, secondary developments, especially new gas stations that would possibly be built at or near the new SR-18/SR-5 (U.S. 45) intersection location could result in additional hazardous or special waste sites in the project vicinity. However, due to TDEC regulations requiring all USTs to have leak detection equipment and strict product accountability measures, the potential for impacts to the environment would be minimal.

Potential Impacts to Hazardous Waste Sites Associated with Alternative 3

Direct Impacts to Hazardous Waste Sites (Alternative 3)

Alternative 3 would impact a total of 12 hazardous materials sites with potential environmental concerns. Five of those sites were rated "High" in terms of potential impacts to the project. Similar to Alternative 2, Alternative 3 would shift traffic onto new alignment to avoid the residential areas and more congested portions of SR-18 along the northernmost sections of the roadway. This would reduce the potential for accidental spills or releases near the school and more dense residential areas. All other general hazardous materials impacts associated with Alternative 3 would be similar to those of Alternative 1.

Indirect Impacts to Hazardous Waste Sites (Alternative 3)

Indirect impacts associated with hazardous materials under Alternative 3 would be similar to Alternative 1. However, secondary developments, especially new gas stations that would possibly be built at or near the new SR-18/SR-5 (U.S. 45) intersection location could result in additional hazardous or special waste sites in the project vicinity. However, due to TDEC regulations requiring all USTs to have leak detection equipment and strict product accountability measures, the potential for impacts to the environment would be minimal.

Potential Impacts to Hazardous Waste Sites Associated with Alternative 4

Direct Impacts to Hazardous Waste Sites (Alternative 4)

Alternative 4 would impact a total of 15 hazardous materials sites with potential environmental concerns. Six of those sites were rated "High" in terms of potential impacts to the project. All other general hazardous materials impacts associated with Alternative 4 would be similar to those of Alternative 1.

Indirect Impacts to Hazardous Waste Sites (Alternative 4)

Indirect impacts associated with hazardous materials under Alternative 4 would be similar to Alternative 1.

Potential Impacts to Hazardous Waste Sites Associated with Alternative 5

Direct Impacts to Hazardous Waste Sites (Alternative 5)

Alternative 5 would impact a total of 20 hazardous materials sites with potential environmental concerns. Nine of those sites were rated “High” in terms of potential impacts to the project. All other general hazardous materials impacts associated with Alternative 5 would be similar to those of Alternative 1.

Indirect Impacts to Hazardous Waste Sites (Alternative 5)

Indirect impacts associated with hazardous materials under Alternative 5 would be similar to Alternative 1.

Potential Impacts to Hazardous Waste Sites Associated with Alternative 6

Direct Impacts to Hazardous Waste Sites (Alternative 6)

Alternative 6 would impact a total of eight hazardous materials sites with potential environmental concerns. Four of those sites were rated “High” in terms of potential impacts to the project. Similar to Alternative 2, Alternative 6 would shift traffic onto new alignment to avoid the residential areas and more congested portions of SR-18 along the northernmost sections of the roadway. This would reduce the potential for accidental spills or releases near the school and more dense residential areas. All other general hazardous materials impacts associated with Alternative 6 would be similar to those of Alternative 1.

Indirect Impacts to Hazardous Waste Sites (Alternative 6)

Indirect impacts associated with hazardous materials under Alternative 6 would be similar to Alternative 1. However, secondary developments, especially new gas stations that would possibly be built at or near the new SR-18/SR-5 (U.S. 45) intersection location could result in additional hazardous or special waste sites in the project vicinity. However, due to TDEC regulations requiring all USTs to have leak detection equipment and strict product accountability measures, the potential for impacts to the environment would be minimal.

3.7.1.5 Hazardous Waste Sites Mitigation

Any hazardous wastes encountered within the proposed ROW would be remediated in accordance with the applicable sections of the Federal Resource Conservation and Recovery Act (RCRA), the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Tennessee Hazardous Waste Management Act of 1983. All project-related activity that involves USTs would adhere to the Tennessee Petroleum Underground Storage Tank Act of 1998 (Tennessee Code Annotated, section 68-215-101 et seq.) and the rules set forth by TDEC’s Underground Storage Tank Program (Tennessee Code Annotated, section 68-215-201 et seq.).

3.8 Energy

3.8.1 Energy Background Information

The current commitment of energy resources (mainly gasoline and diesel fuels) in the project area is influenced by traffic flow patterns. When traffic flow is hampered, which often occurs along northern portions of the existing SR-18, higher consumption of fuel is required than when traffic flow is flowing more freely.

Construction equipment used for roadway projects requires the use of additional energy. However, the short-term uses of extra energy during construction are typically offset by the energy resources saved due to improved traffic flows in the long-term.

There are no energy sources in the SR-18 project area that would be potentially impacted. If electrical lines and gas pipelines are impacted in the project construction zone, they would be relocated as part of the project. Details regarding utility relocations would be determined during the design phase of the project.

3.8.1.1 Potential Energy Impacts

Potential Energy Impacts Associated with the No-Build Alternative

Direct Impacts to Energy (No-Build Alternative)

The No-Build Alternative would potentially result in adverse impacts to energy in terms of decreased fuel efficiency due to continued decreases in LOS, especially along the northern section of SR-18 where traffic flow issues already occur and would be expected to become worse by the design year 2031.

Indirect Impacts to Energy (No-Build Alternative)

The No-Build Alternative would potentially result in additional fuel consumption due to local commuters utilizing other adjacent roadways in the project area to bypass the traffic flow issues along SR-18, especially at the existing SR-18/SR-5 (U.S.-45) intersection. As more traffic attempts to utilize the secondary routes, more congestion issues could occur resulting in more fuel consumption. Also, if commuters take less direct routes to avoid problem areas, the VMT would increase, again resulting in additional fuel consumption.

Potential Impacts to Energy Associated with Alternative 1 (Widen Existing SR-18)

Direct Impacts to Energy (Alternative 1-Widen Existing)

Alternative 1 would have potential beneficial impacts on energy consumption. The improved traffic flow and resulting reduction in commuting time would potentially increase overall direct fuel efficiency for vehicles operated in the area over the long term.

There would be short-term adverse impacts due to decreased fuel efficiency during construction activities due to potential construction delays and detours. However, the long-term benefits would outweigh the short-term adverse impacts.

There is some potential that improvements to SR-18 could result in some commuters traveling additional miles to take advantage of the improved traffic flows. However, the more efficient travel and reduced travel times expected on the new SR-18 may offset any

increases in VMT. Regardless, the project is not expected to have substantial impacts on energy consumption rates.

Indirect Impacts to Energy (Alternative 1-Widen Existing)

Secondary commercial and residential development could increase following completion of the proposed project due to improved transportation facilities and improved access in some locations. Increased construction activities resulting from new developments, along with subsequent increases in populations, would likely result in increased energy demands within the area. It is not anticipated that these secondary effects would result in substantial changes to energy consumption over baseline conditions or No-Build conditions. This is because the improved traffic efficiency would offset much of the increased energy consumption that could be attributed to secondary developments that are promoted by the SR-18 project.

Potential Impacts to Energy Associated with Alternative 2

Direct Impacts to Energy (Alternative 2)

Impacts to energy associated with Alternative 2 would be similar to those discussed under Alternative 1. However, there would be additional energy consumption during construction due to much of this alternative being on new alignment that would likely require increased grading and other site preparation activities. These short-term impacts would be offset by the long-term traffic improvements.

Indirect Impacts to Energy (Alternative 2)

Impacts to energy associated with Alternative 2 would be similar to those discussed under Alternative 1. However, there may be additional secondary developments associated with Alternative 2 due to the new alignment segments included with this alternative. Placement of SR-18 on new alignment would provide improved access to some properties that previously were less accessible by local roads. Also shifting the SR-18/SR-5 (U.S.-45) intersection to the south of the existing location may promote secondary developments in that area. These additional developments may result in increased energy consumption in the local area. However, compared with baseline conditions, most of the increases in energy consumption that could be attributed to the SR-18 project would be offset by improved traffic flow and the resulting fuel efficiency.

Potential Impacts to Energy Associated with Alternative 3

Direct Impacts to Energy (Alternative 3)

Impacts to energy associated with Alternative 3 would be similar to those discussed under Alternative 2.

Indirect Impacts to Energy (Alternative 3)

Impacts to energy associated with Alternative 3 would be similar to those discussed under Alternative 2.

Potential Impacts to Energy Associated with Alternative 4

Direct Impacts to Energy (Alternative 4)

Impacts to energy associated with Alternative 4 would be similar to those discussed under Alternative 2. However, Alternative 4 may require additional energy consumption during construction due to some of the alternative being on new alignment.

Indirect Impacts to Energy (Alternative 4)

Impacts to energy associated with Alternative 4 would be similar to those discussed under Alternative 2.

Potential Impacts to Energy Associated with Alternative 5

Direct Impacts to Energy (Alternative 5)

Impacts to energy associated with Alternative 5 would be similar to those discussed under Alternative 2.

Indirect Impacts to Energy (Alternative 5)

Impacts to energy associated with Alternative 5 would be similar to those discussed under Alternative 2.

Potential Impacts to Energy Associated with Alternative 6

Direct Impacts to Energy (Alternative 6)

Impacts to energy associated with Alternative 6 would be similar to those discussed under Alternative 2.

Indirect Impacts to Energy (Alternative 6)

Impacts to energy associated with Alternative 6 would be similar to those discussed under Alternative 2.

3.8.1.2 Mitigation of Energy Impacts

Construction of SR-18 would be conducted in the most efficient manner possible to avoid unnecessary consumption of energy (fuel). Construction equipment will be maintained regularly to allow for efficient operation and fuel efficiency.

SR-18 has been developed in part to improve traffic flow conditions in the area. It is expected that traffic would remain in free-flow conditions when operation of the improved SR-18 begins, except for the very northern terminus, where traffic delays may occur due to traffic congestion issues on northbound SR-5 (U.S.-45).. Improvements in traffic flow throughout most of the project area would result in improved fuel efficiency for some vehicles traveling in the area. Therefore implementation of this project has potential to result in long-term improvements in terms of fuel consumption.

3.9 Section 4(f) Properties

According to Section 4(f) of the Department of Transportation Act of 1966, recodified as 49 United States Code Section 303, "The Secretary [of Transportation] shall not approve any program or project which requires the use of any publicly-owned land from a public park,

recreation area, or wildlife and waterfowl refuge of national, state, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic structure of National, State, or local significance as so determined by such officials unless:

- There is no feasible and prudent alternative to the use of such land; and
- The project includes all possible planning to minimize harm to the land resulting from such use.”

No Section 4(f) eligible properties are expected to be impacted by this project. It is also the opinion of TDOT, pursuant to 36 CFR 800.5, that the project would have no adverse effect to the NRHP-eligible Swink House contingent upon a landscaping plan that will be prepared in coordination with TDOT historians and the Tennessee SHPO. Therefore, there will be no Section 4(f) involvement with a historic property.

3.10 Construction Impacts

Adverse impacts from construction would be primarily short term in duration. Construction inconveniences such as noise, dust, and traffic conflicts are likely to be unavoidable yet are greatest during the construction phase only.

In order to minimize potential detrimental effects from noise, siltation, soil erosion, or possible pollution of area watercourses, the construction contractors would be required to comply with the special provisions of *Standard Specifications for Road and Bridge Construction* (TDOT, 2006) and the *Best Management Practices for Erosion and Sediment Control* (FHWA, 1995). These provisions implement the requirements of the Federal Highway Administration’s Federal-Aid Policy Guide (Subchapter G part 650b).

Contractors would be required to conduct and schedule operations according to these provisions. For example, the contractor would be bound by the Standard Specifications to observe any noise ordinance in effect within the project limits. Detoured traffic would be routed during construction in a manner that has the least noise impact practicable upon residential and noise sensitive areas. In addition, coordination with affected utility companies would minimize disruption to utility services. Furthermore, TDOT would coordinate with local governments during the construction phase to minimize disruption to communities accepting detoured traffic.

Any action involving open burning would be in accordance with Chapter IV (“Open Burning”) of the Tennessee Air Pollution Control Regulations and specifications regarding air pollution control (Section 107.21). Any action resulting in fugitive dust would be in accordance with Chapter VIII (“Fugitive Dust”). The general contractor and all related subcontractors associated with the project would be required to have a valid operation permit from the Tennessee Air Pollution Control Division or to obtain an exception from the regulations through board action.

Solid waste generated by construction activities would be disposed of in accordance with all state rules and regulations concerning solid waste management. Where possible, land debris would be disposed at a registered sanitary landfill site. If the use of a landfill is not possible, the contractor would dispose of the solid waste in a manner that is compliant with NEPA regulations.

If archeological material is uncovered during construction, all construction will cease in that area and the Division of Archaeology and the recognized American Indian Tribes contacted so a representative can have the opportunity to examine and evaluate the material. TDOT would continue to coordinate with the SHPO should any new cultural resources be discovered.

Short-term adverse impacts to fish and wildlife would likely result from construction activities. Noise impacts could alter wildlife behavior and inhibit mating, breeding, nesting, and feeding/foraging activities. Construction activities could result in direct mortality to less mobile terrestrial and aquatic species. All reasonable precautions would be taken to minimize short-term and long-term impacts to plants and wildlife and their habitat. Several mitigation measures that would avoid or minimize short-term and long-term adverse impacts to species would be required conditions of the build alternative. These would include:

- Streamside and in-stream construction work would occur during dry periods.
- Removal of vegetation near the streams would occur only as necessary to accomplish the proposed action. Where removal of vegetation is necessary, bank stabilization measures would be used. Streambank restoration measures would include seeding with native species and the placing of rip-rap or other bank stabilization techniques, as outlined in TDEC's *Riparian Restoration and Streamside Erosion Control Handbook* (TDEC, 1998a).
- Proper sediment control measures, such as silt fences, would be used as outlined in the *Tennessee Erosion and Sediment Control Handbook* (TDEC, 2001b) and *Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites* (Smoot et al., 1992).

3.11 Summary of Environmental Consequences

Table 3.28 contains comparative summary environmental consequences information for the proposed SR-18 Build Alternatives.

Table 3.28. Summary of project data and resources present within the SR-18 study area in Hardeman and Madison Counties, Tennessee.

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Roadway Length (miles)	14.6	14.1	14.6	14.6	14.8	14.8
New Alignment Length (miles)	0.0	10.1	5.4	5.9	3.2	8.6
Total Size of Study Area (acres)*	885	865	883	887	895	894
Land Uses/Wildlife Habitat Present						
Forest (acres)*	315	436	406	375	344	436
Old Field (acres)	34	184	59	86	45	70
Grassland/Agriculture (acres)	141	144	176	139	156	191
Developed/Disturbed (acres)	394	100	241	285	348	196
Open Water (acres)	1	1	1	2	2	1
Residential Displacements	72	16	48	53	63	39
Business Displacements	8	1	5	5	7	4
Non-Profit Organization/Church Displacements	0	0	1	0	0	1
Farmland Conversion Impact Rating Score (out of 260 points possible)	141	159	153	151	144	158
Noise Receptors Impacted	135	23	56	108	135	56
Aquatic Resources Present						
Streams Present in 500-foot Corridor	23	26	19	28	26	22
Stream Channel in 500-foot Corridor (feet)	13,659	14,247	11,474	17,574	15,899	13,689
Streams Crossed in 500-foot Corridor	15	15	12	19	18	14
Streams Channelized within 250-foot ROW**	10	12	10	16	13	13
Length of Stream Channelization within 250-foot ROW (feet)**	2, 889	5,311	3,639	6,678	4,741	5,491
WWCs Present***	45	36	44	38	41	40
Springs Present	8	7	6	7	7	5
Seeps Present	2	4	3	5	5	6
Ponds Present	9	10	10	10	9	11
Lakes Present	0	0	0	0	0	0

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Wetlands Present						
Number of Wetlands Present in 500-foot Corridor	14	11	15	12	12	13
Wetlands in 500-foot Corridor (acres)	19	10	21	7	7	9
Wetlands in 250-foot ROW (acres)**	6	5	9	2	2	5
Mapped Hydric Soils (acres)	36	91	82	52	32	78
100-year Floodplains Present						
Floodplains Crossed (linear feet)	312	1,582	312	993	407	407
Floodplains (acres)	6	18	5	11	6	5
Archaeological Sites Impacted (number)	0	0	0	1	0	0
Historic Sites Impacted (number)	0	0	0	0	0	0
Hazardous Materials Sites Impacted (number of "High" impact potential sites)	10	1	5	6	9	4

* The study area for the land use and natural resources reported in this table was 500-foot-wide corridor (250-feet on either side of the centerline of each Build Alternative alignment). All resources present within the 500-foot corridor were documented and reported on this table for general comparison unless otherwise noted. Because the actual ROW would be narrower than 500 feet, the actual impacts to many of the resources in this table would be less. This data characterizes the general corridors used by each of the Build Alternatives that can be extrapolated to the narrower ROW boundary in most cases. Exact impacts to the various resources in this table will be refined following development of more detailed design plans.

** For stream channelization and wetland impacts, data were reported based on a 250-foot ROW. This represents the worst-case scenario for these features because a portion of the ROW will be narrower than 250-feet and the entire stream-channel may not require rechannelization. Exact impacts to streams and wetlands will be determined following development of more detailed design plans. The data in this table provides a good representative of the potential impacts for comparison purposes.

***WWC = Wet Weather Conveyance, which are small man-made or natural watercourses, including natural watercourses that have been modified by channelization, that flow only in direct response to precipitation runoff in their immediate locality and whose channels are above the groundwater table, do not support fish or aquatic life, and are not suitable for drinking water supplies. Wet weather conveyances are not streams. (Rules of Tennessee Department of Environment and Conservation (1200-4-3-.04)

3.12 Cumulative Impacts Analysis

3.12.1 Introduction to Cumulative Impacts

Cumulative impacts are impacts on the environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions. This cumulative impact analysis has been prepared at a level of detail that is reasonable and appropriate to support an informed decision in determining if the proposed project should be implemented. Additionally, this cumulative impacts analysis has been prepared to assist in determining if any of the potential cumulative impacts would be considered substantial in accordance with established CEQ criteria.

Cumulative impact analysis involves evaluating the direct and indirect impacts of implementing any of the study alternatives in association with past, present, and reasonably-foreseeable future actions of other parties in the surrounding area (where applicable). Cumulative impacts analyses typically focus on the impact to an entire resource and at a broader scale than the initial analysis of direct and indirect impacts associated with a specific individual project or action.

Those projects or activities analyzed in the cumulative impacts analysis may or may not be related to SR-18 but may affect the same resources as the SR-18 project. Although impacts resulting from secondary developments that may be induced by the SR-18 improvements are considered as part of the indirect impacts discussions, impacts associated with such developments are also covered in the cumulative impacts discussions. The idea is that at least some secondary development is considered reasonably foreseeable and could result in cumulative impacts to the same resources that are impacted by the SR-18 improvements.

3.12.1.1 Definitions

Past Actions

Past actions are defined as actions within the cumulative impact analysis area that occurred before the current SR-18 NEPA study was initiated. These include past actions in the project area, and past demographic, land use, and development trends in the areas that surround the project area. Past actions are discussed in greater detail below. In most cases, the characteristics and results of these past actions comprise the baseline conditions that set the framework for determining what impacts the proposed project would have on those existing or remaining resources.

Present Actions

Present actions include:

- Current activities within the cumulative impact analysis areas; and
- Current resource management programs, land use activities, and development projects that are being implemented by other governmental agencies and the private sector (where they can be identified) within the cumulative impact analysis areas.

Reasonably-Foreseeable Future Actions

Reasonably-foreseeable future actions may include those actions in the planning, budgeting, or execution phases. Actions may be those of the federal government, state government, local government, private organizations or companies, or individuals.

Cumulative effects can be analyzed with respect to all resource areas, including ecological resources, physical resources, historical and archaeological resources, economic resources, and social conditions. Cumulative effects can be both beneficial and adverse.

3.12.2 Past and Present Actions within the SR-18 Project Vicinity

The affected environments of the social, economic, natural, and cultural resources occurring within the SR-18 project area are discussed in Sections 3.2 through 3.10 of this EA. Additional details regarding some of the resources are contained in the various Technical Study Documents that have been prepared in support of the EA. These reports include: the Conceptual Stage Relocation Plan, Ecology Study Report, Hazardous Materials/Special Waste Report, Historical and Architectural Survey Report, Phase I Archaeological Resources Survey Report, and Air Quality and Noise Evaluation Report. These documents are available through the TDOT.

The affected environments of the various resources considered have resulted from all past and present actions in the project area. These actions have provided the baseline conditions against which to evaluate any cumulative impacts that could result from the proposed project.

3.12.3 Reasonably Foreseeable Future Actions within the Surrounding Community

The following reasonably foreseeable future actions would likely occur near and within the project area regardless of whether the proposed project is implemented:

- **Continuation of private project development and activity trends including:**
 - The conversion of agricultural and open land to urban land uses. This primarily involves the construction of new housing units within the surrounding community.
 - The continuation of the trend for the development of larger lot (1-3 acre) residences in small, dispersed subdivisions or individual lots within the open unincorporated areas of the region.
 - The continuation of trends toward the concentration of growth and development within and adjacent to the Jackson and South Jackson areas in Madison County.
- **Minor improvements and/or maintenance of existing roadways and bridges** - Routine roadway, bridge, and ROW maintenance activities and other minor improvements would continue to be required on existing local and regional roadways to improve safety and traffic flow, and to support the anticipated increases in vehicular traffic within the region.

Maintenance activities may include resurfacing roadways, widening or repairing shoulders, repairing or replacing culverts and small bridges, improving intersections by adding turn lanes and/or signals, mowing, snow removal, and various other activities. Most of these activities are expected to have minor environmental impacts due to their small area of impact and short-lived construction period. Therefore, those activities would not have a high potential to result in cumulative impacts with other projects such as this SR-18 improvement project.

- **Major roadway construction or improvement projects in Hardeman or Madison County** –Two relatively major roadway projects have been identified in the general project vicinity within Hardeman and Madison Counties that would have potential to impact some of the same resources as this SR-18 improvement project.

The first project is another SR-18 improvement project. That project would be a related project that is expected to be implemented to improve the segment of SR-18 between SR-100 and Bolivar, located just south of the SR-18 project being studied in this EA. In general, that southern SR-18 project would be expected to have similar types of impacts as the SR-18 project being assessed in this EA. The two projects' primary cumulative impacts would be to improve the travel efficiency and safety of commuters traveling between Bolivar and Jackson by providing a four-lane highway throughout. Additional potential cumulative impacts of the two SR-18 projects are discussed under the various resource categories below.

The second reasonably foreseeable roadway project is the proposed Southern Extension of the U.S. 45 Bypass in South Jackson (U.S. 45 Bypass Extension). This project, led by the City of Jackson, is currently in the early planning stages. However, conceptual plans for the new bypass include at least one alignment that could extend the proposed U.S. 45 Bypass southward to SR-18. Regardless of how far south the project extends, it is likely that the U.S. 45 Bypass extension project would complement the SR-18 project by reducing overall travel times and improving LOS compared to LOS expected without the U.S. 45 Bypass Extension project or other SR-5 (U.S. 45) improvements. Depending on the type of intersection/interchange constructed at SR-18 and the proposed U.S. 45 Bypass, northbound travelers on SR-18 could potentially have the option to continue onto the U.S. 45 Bypass Extension without stopping and vice versa. This will be determined as the two projects progress and more detailed design options are developed. The cumulative impacts associated with the two projects are discussed in more detail under the various resource categories below.

3.12.3.1 Reasonably Foreseeable Future Actions Specific to the No-Build Alternative

Reasonably foreseeable future actions associated with the No-Build Alternative include potential cumulative impacts to surrounding communities relating to continued increases in traffic volumes predicted on SR-18 and other area roadways. The increased numbers of vehicles on SR-18 will continue to result in traffic congestion issues and decreased safety. Decreases in LOS on the existing SR-18 under the No-Build Alternative would combine with similar decreases in LOS on other local or regional highways resulting in adverse cumulative impacts.

3.12.3.2 Reasonably Foreseeable Future Actions Specific to the Build Alternative

The proposed SR-18 improvement project, in conjunction with other past, present, and reasonably foreseeable future projects, could encourage secondary development within the general SR-18 corridor. This would likely occur first near existing intersections and at other strategic locations where improved access may be provided. The primary considerations of this secondary growth used for the cumulative impacts analyses for the Build Alternatives include:

- An increase in conversion of land near SR-18 to commercial land uses, especially service or vehicle oriented facilities such as restaurants and gas stations;
- Conversion of low-density rural residential areas to single-family and multi-family residential communities; and
- An increase in conversion of land near SR-18 to industrial land uses due to anticipated improved access for large trucks typically used to ship products or supplies to and from such facilities in Tennessee.

It is assumed that secondary growth would result in conversion of relatively non-developed rural areas into more urbanized areas that may include a combination of retail businesses, industrial developments, or residential developments. This conversion of otherwise non-developed areas would lead to additional loss of farmland, fish and wildlife habitat, and open space in the immediate project area. Some of the impacts due to secondary growth associated with SR-18 were discussed earlier in this chapter under the indirect impacts discussions for each resource category. Those impacts will be summarized again for each resource category in this section, because the impacts of secondary developments resulting from improving SR-18 must also be considered as part of the cumulative impacts of the project.

3.12.4 Cumulative Impact Analysis Area

The cumulative impact analysis area includes the area that has the potential to be affected by the project. The boundary of the cumulative impact analysis area varies according to the resource evaluation category being considered. For many of the resource categories considered, the impacts of the potential alternatives are not expected to extend beyond the project area boundaries because the impact to the resource is negligible beyond the analysis area. For other resources, the potential area for impacts would extend beyond the 500-foot project area study boundaries.

Because this cumulative impacts analysis is focused on the individual resources present in the SR-18 project vicinity, the analysis area studied varies in size by individual resource categories. This differs somewhat from the direct and indirect impacts analyses that are discussed earlier in this Chapter in that those analyses were focused more on the site specific impacts to those resources anticipated to be caused by the action of constructing SR-18 or the secondary developments anticipated to be induced by the new roadway. In this cumulative impacts analysis, the direct or indirect impacts of the project will be looked at in addition to the direct and indirect impacts of other non-related projects in the vicinity that may cumulatively affect the same resources, but on a broader scale.

The cumulative impact analysis area includes that area that has a reasonable potential to be affected by implementation of any of the proposed SR-18 alternatives in combination with other past, present, and reasonably foreseeable projects. The boundaries of the cumulative impact analysis area for each resource category are identified on Table 3.29.

Table 3.29. Analysis area for each resource category considered in the cumulative impacts analysis for SR-18 in Hardeman and Madison Counties, Tennessee.

Resource Category	Analysis Area
Land Use and Infrastructure	Cumulative impacts to Land Use and Infrastructure were assessed based upon a 2-mile buffer from the centerline of each alternative. These impacts were assessed relative to development projects identified in the field in the immediate area and in relation to known projects or plans provided by the Jackson Metropolitan Planning Organization, along with plans provided by other state and local government planning organizations with known projects in Madison and Hardeman Counties.
Social Environment and Community Resources	In general, cumulative impacts to the Social Environment and Community Resources were assessed relative to Madison and Hardeman Counties. Some of the various Social Environment and Community Resources were assessed at more local levels as appropriate. For instance, the Environmental Justice analyses were conducted within the appropriate census block, block group, and or tract levels.
Economic Environment	Cumulative impacts to the Economic Environment were assessed relative to Madison and Hardeman Counties.
Farmland	Cumulative impacts to Farmland were assessed relative to the individual counties of Hardeman and Madison.
Aquatic Resources	Cumulative impacts to Aquatic Resources were assessed based upon the drainage area of watersheds that intersect the project area. Numerous small to medium sized streams intersect the project area. Assessment of impacts considered reaches both upstream and downstream of the project area. Downstream consideration terminates 15 miles from the centerline of each Build Alternative crossing.
Wetlands	Cumulative impacts to wetlands were assessed relative to the immediate watershed containing them.
Floodplains	Cumulative impacts to floodplains were considered based upon the drainage area of watersheds that intersect the project area. Downstream consideration terminated 15 miles downstream of the nearest Build Alternative floodplain impact.
Threatened and	Cumulative impact consideration for endangered species was

Resource Category	Analysis Area
Endangered Species	dependent upon the organism. Cumulative impacts to listed aquatic organisms were assessed to 4 miles downstream and 1-mile upstream of the project. Cumulative impacts to listed terrestrial species were assessed in a 1-mile buffer from the centerline. Cumulative impacts to endangered bats were considered for any known populations within 5 miles of the centerlines of each alternative.
Fish and Wildlife Resources	Cumulative impacts to aquatic habitats and species were assessed based upon the drainage area of watersheds that intersect the project area. This assessment considered impacts both upstream and downstream of the project area. Downstream consideration terminated 4 miles downstream of each Build Alternative crossing. Cumulative impacts to terrestrial wildlife were assessed based upon a 1-mile buffer from the centerline of each alternative.
Cultural Resources	Cumulative impacts consideration was based upon the Area of Potential Effect (APE) for Cultural Resources which includes all areas within and immediately adjacent to the proposed ROW of each project alternative.
Air Quality	Cumulative impacts to Air Quality were assessed relative to the attainment status of Madison and Hardeman Counties.
Noise	Cumulative impacts of Noise were assessed based upon a 1-mile buffer from the centerline of each alternative.
Hazardous Materials	Cumulative impacts to Hazardous Materials were assessed based upon a 1-mile buffer from the centerline of each alternative.
<i>Source: Parsons, 2007.</i>	

3.12.5 Social/Community and Economic Resources Cumulative Impacts

3.12.5.1 Land Use and Infrastructure

No-Build Alternative Cumulative Impacts to Land Use and Infrastructure

The goal of providing an efficient and safe transportation facility yielding maximum user benefits (e.g. vehicle operating costs, travel time savings, reduced crash rates) would not be realized under this alternative. Based on future traffic projections, roadway safety and traffic flow issues on the existing SR-18 and other highways within the South Jackson, Malesus, and Medon area would continue to deteriorate over time under the No-Build Alternative. Traffic congestion at the SR-18/SR-5 (U.S. 45) intersection would continue to deteriorate over time. Associated transportation costs (e.g. vehicle operating cost, travel time) would become higher as the transportation system worsened.

There would be little or no changes in the rate of development or growth in the area under the No-Build Alternative. New highway-oriented business developments and other land use

changes would likely occur at a relatively slow pace, if the proposed SR-18 project were not implemented. Some new small-scale residential and commercial developments would likely continue to occur in the area, at least initially. However, development rates may slow down if the limited capacity of the existing roadway is exceeded enough that the entire area becomes less attractive for potential buyers. If the transportation system were not improved to keep up with growth in the area, eventually the area would not attract additional developments such as new neighborhoods or commercial developments.

Build Alternatives Cumulative Impacts to Land Use and Infrastructure

The local and regional transportation network would be enhanced through construction of SR-18, especially when combined with other roadway infrastructure improvements likely to occur in the foreseeable future, including widening of portions of SR-18 south of SR-100 and construction of the U.S. 45 Bypass Extension.

Implementation of any of the Build Alternatives would have several long-term cumulative impacts when combined with other foreseeable future development projects and highway improvement projects expected to occur in the region. Property values and land use intensities would increase for some properties near the new or improved roadway, especially in areas near intersections and other improved access points. Developments associated directly with the new or improved roadway would likely primarily be for highway-oriented business uses, but may also include residential developments, commercial developments, and industrial developments. The land use impacts would diminish with increasing distance from the new or improved roadway segments.

Employment opportunities, earnings, and tax collection would possibly increase in the general project area if land uses change from the existing rural uses, including agricultural uses, to more intensive uses that may be induced by the transportation improvements. These benefits would be in addition to similar benefits associated with residential, commercial, and mixed-use development projects that would likely continue to be implemented in the region in the foreseeable future.

Based on past and present development trends, it is anticipated that some land use changes would occur in the project area in the foreseeable future regardless of whether the SR-18 project is completed. Therefore, improving SR-18 would not necessarily be the cause of the land use changes in much of the area but may shorten the timeframe in which some of the changes occur.

Any increase in populations would place additional demands on provision of public infrastructure (roadways, utilities, etc.). This could cause short-term adverse impacts in terms of existing infrastructure and its ability to keep up with the increasing demand. Property tax, sales tax, and other revenue sources would be expected to increase as a result of the new residential and commercial developments. Some of those new tax dollars would likely be used to fund the required improvements or addition of public services and facilities required to support the new developments and would eventually allow those services to catch up with the demand in the area. Because of the increased growth potential and development pressure, land use policies/plans and development regulations may require updating and revision to accommodate the new development environment.

3.12.5.2 Social Environment and Community Resources

No-Build Alternative Cumulative Impacts to the Social Environment and Community Resources

Not constructing SR-18 would have cumulative impacts to the social environment in the area mainly in terms of continued declines in safety and travel efficiency due to anticipated increased traffic volumes. Increased traffic volumes would result in additional traffic safety and efficiency issues due to the current design of the roadway. Decreases in the LOS or safety of the roadway would combine with any other declines in safety or efficiency that may occur on other roadways in the region resulting in overall adverse cumulative impacts. Impacts would be shared equally among all demographics in the project area.

Build Alternatives Cumulative Impacts to the Social Environment and Community Resources

There would be both long-term adverse and beneficial cumulative social impacts resulting from implementation of any of the proposed Build Alternatives. Long-term beneficial impacts in terms of increasing property valuations would be anticipated for many areas due to the improved transportation network associated with SR-18 in combination with other transportation improvements that have occurred or are likely to occur in the region.

The transportation improvements could promote new developments within the SR-18 corridor. As more residential and commercial developments are implemented, including those induced by SR-18, adjacent property values would likely increase. The overall increases in property values in the region, which would be at least partially attributable to SR-18, would outweigh the potential adverse impacts to properties directly impacted by noise and visual affects of the project. Properties located close to the roadway may decrease in value as residential areas, but increase in value for other purposes, such as commercial or industrial areas.

Displacement and relocation of households, businesses, and other facilities would result in short-term and potentially some long-term impacts. Displacement and relocation of households and businesses would cause temporary disruption in quality of life and adjustments to daily or weekly routines. In addition, some of the displaced households and businesses may not be able to relocate within the same neighborhood or vicinity of their previous residence and business because of financial reasons, land availability, or other reasons.

Every effort would be made to minimize the adverse impacts of displacements resulting from implementation of the Build Alternatives. The relocation of displaced households, businesses, and any other affected parties would be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646). TDOT would comply with Title VI to ensure that no person shall, on the grounds of race, color, religion, or national origin, be excluded from participation in, denied the benefits of, or subject to discrimination under any program or activity receiving federal assistance. It is expected that impacts associated with this project would be distributed equally among all populations within the project area and there would not be disproportionate impacts to any one specific group, such as minority or low-income populations.

The additional housing needed to relocate the SR-18 displacees would not likely result in major shifts in regional development plans or activities in the area. No housing shortages are expected due to this project, even when combined additional housing that may be needed for growing populations in the area.

Some displacees may choose to construct new residences or businesses within the project area which would result in additional loss of open space and impacts to natural resources. This loss of open space and potential impacts to natural resources would combine with similar impacts associated with other reasonably foreseeable development projects in the area. However, because of the population growth and continued urban growth in the area, these impacts would likely occur regardless of construction of SR-18. The length of time in which these impacts occur may be reduced as a result of SR-18.

Increases in populations would place additional demands on provision of public services and facilities (e.g. educational, recreational, police, fire, EMS). There is a chance that all of this development, especially in areas near the SR-18 could cause short-term adverse impacts in terms of existing public services and facilities being able to keep up with the quickly increasing demand. Property tax, sales tax, and other revenue sources would be expected to increase as a result of the new residential and commercial developments. Some of those new tax dollars would likely be used to fund the required public services and facilities required to support the new developments and would eventually allow those services to catch up with the demand in the area.

The combination of the proposed project coupled with the continued expansion of residential and commercial areas into the project area would create cumulative adverse visual impacts. Although SR-18 would result in adverse visual impacts in areas currently not developed, these visual impacts appear to be inevitable regardless of whether this project is completed. Based on current growth trends, even if SR-18 were not constructed, many of the lands within the proposed ROW would likely be developed in the foreseeable future as residential or commercial developments continue to expand into the area. Therefore, not constructing SR-18 would not eliminate adverse visual impacts from occurring in the project area. The overall timeframe at which the visual impacts occur may be slightly decreased with construction of SR-18. In some cases visual impacts may be beneficial as the new roadway may result in elimination of otherwise rundown or poorly maintained areas or structures and replacement of them with better maintained areas.

3.12.5.3 Economic Environment

No-Build Alternative Cumulative Impacts to the Economic Environment

The current roadway deficiencies would not only continue but would increasingly deteriorate under the No-Build Alternative resulting in decreased LOS and safety. Therefore, potential transportation savings in respect to vehicle operating costs, travel time, and accident reduction would not be realized under this alternative. Some potential development opportunities in strategic areas of the SR-18 project area, resulting in increased employment, business volume, and personal income, would not materialize under the No-Build Alternative.

Build Alternatives Cumulative Impacts to the Economic Environment

Temporary decreases in the real property tax base, tax revenues, housing stock, and population would occur as a result of project implementation. However, these short-term

adverse impacts would be neutralized by the anticipated induced development opportunities and potential positive economic impacts of other non-project related developments.

Cumulative impacts resulting from this new development could be reflected in increased population, housing stock, and employment opportunities, which could require supportive commercial services, public services, and publicly provided infrastructure. This new development could generate additional tax revenues, which can be utilized for the provision of supportive public infrastructure and services. The combination of improved transportation facilities along with increased economic growth would result in an overall increase in property values in the region.

3.12.5.4 Farmland

No-Build Alternative Cumulative Impacts to Farmland

Cumulative impacts to farmland are anticipated with the No-Build Alternative, because current conditions and development trends would be expected to continue regardless of SR-18 being constructed. When combining the impacts of all development projects in the area, it is anticipated that some additional loss or conversion of farmland would occur. Current trends in the area that indicate a shift away from farming would likely continue. Several areas previously used for farming of annual row crops have been converted to other uses, including pine plantations.

Build Alternatives Cumulative Impacts to Farmland

Implementation of any of the Build Alternatives would have adverse long-term cumulative impacts to farmland when combined with other foreseeable future development projects and highway improvement projects expected to occur in the region. Farmland would be lost or altered during construction of SR-18. Additional farmland would be permanently lost or altered as other transportation, residential, commercial, and other developments occur in the area.

Based on current trends in the project area, it is anticipated that farmland would continue to be lost or converted to other uses in the foreseeable future regardless of whether SR-18 is constructed. Therefore, SR-18 would not necessarily be the cause of the farmland impacts in much of the area but would likely shorten the timeframe in which some of the changes begin. The main developments that SR-18 may be responsible for would be highway-related businesses that develop near the proposed SR-18 intersections, such as gas stations, truck stops, or fast-food restaurants.

3.12.6 Ecological Resources Cumulative Impacts

3.12.6.1 Aquatic Resources

No-Build Alternative Cumulative Impacts to Aquatic Resources

The No-Build Alternative would not result in any major changes to baseline conditions of aquatic resources. Other non-related projects, such as local roadway and bridge repair projects, commercial and residential developments, agricultural practices, and private landowner activities would continue to influence water quality in local watersheds due to the increased potential for erosion and sedimentation, loss of wetlands, and use of chemicals or fertilizers near watercourses. However, there would not be substantial changes from baseline conditions in the reasonably foreseeable future.

Build Alternatives Cumulative Impacts to Aquatic Resources

Culverting, stream channelization and modifications, sediment impacts, and the addition of impervious surfaces in a geographic area all tend to degrade overall quality of aquatic habitats and water quality. The placement of lengths of streams in culverts is considered by TDEC to be a permanent impact. While the water quality impacts of culverts over 200 feet in length are mitigated by off-site programs, increases in numbers of culverts associated with public highways and other roadways or driveways associated with private residential, industrial, and commercial developments may cumulatively reduce available habitats over time. TDOT would make every effort to minimize water quality impacts associated with SR-18. Use of appropriate BMPs and continued coordination with regulatory agencies during project design and permitting would be implemented to help reduce the overall cumulative impacts to aquatic resources caused by the SR-18 project.

It is anticipated that SR-18 would promote some secondary commercial and residential developments within the project area resulting in increased potential for water quality impacts. Regulatory agencies would be responsible for monitoring private developments in the project area to help ensure no substantial water quality impacts occur. Any adverse impacts associated with future projects constructed in the watersheds crossed by SR-18 have potential to add to the adverse impacts to water quality associated with construction and operation of SR-18 in these watersheds. However, since adverse impacts associated with new construction projects are often temporary, it is not anticipated that substantial long-term water quality impacts would occur.

3.12.6.2 Wetlands

No-Build Alternative Cumulative Impacts to Wetlands

The No-Build Alternative would not result in any major changes to baseline conditions of wetlands. Other non-related projects, such as local roadway and bridge repair projects, commercial and residential developments, agricultural practices, and private landowner activities would continue to influence wetlands due to the continued potential for direct loss or filling of wetlands or indirect impacts due to sedimentation problems resulting from runoff from upstream construction projects or other activities. However, under the No-Build Alternative there would not be substantial changes from baseline conditions in the reasonably foreseeable future.

Build Alternatives Cumulative Impacts to Wetlands

Each of the SR-18 Build Alternatives would result in impacts to wetlands traversed by the project. Although some of the larger, higher quality wetlands have been successfully avoided by the Build Alternative alignments, some wetlands would still be impacted. Any impacts to wetlands could result in cumulative impacts to water quality in adjacent streams due to loss of natural filtration of sediments and contaminants often provided by wetlands. Wetlands filled or altered as part of this project would add to previous impacts to wetlands already caused by other past developments and roadway construction projects. This additional loss of wetlands coupled with ongoing and future development in the various watersheds of the project area would result in adverse cumulative impacts to wetlands in the area.

All impacts to jurisdictional wetlands resulting from the SR-18 project would be mitigated as required by regulatory agencies, thus no net loss of wetlands is anticipated. Where possible, wetlands impacts would be avoided or reduced by changes in the design of the

roadway if one of the Build Alternatives is chosen. Other related and non-related development projects that could result in additional impacts to wetlands in the project vicinity would also require mitigation to be completed.

Wetland mitigation could potentially result in the creation or restoration of wetlands that provide higher functional value than some of the impacted wetlands currently exhibit. For instance, creation of additional wetlands or restoration, acquisition, and protection of existing high quality wetlands within the Meridian Creek watershed could potentially benefit the water quality in that stream. Details regarding wetland mitigation would be determined through coordination with regulatory agencies during the environmental permit acquisition phase of the projects. TDOT would comply with all applicable laws related to wetlands and the environment to minimize overall impacts to natural resources in the area.

Private developments, such as subdivisions and commercial sites, would be the greatest threat to wetlands within the project area. Local zoning and planning authorities would be responsible for controlling some of the private developments occurring in the SR-18 vicinity to ensure that lands such as wetlands and floodplains that are less suitable for development are avoided. Regulatory agencies would be responsible for monitoring private developments in the area to ensure that proper wetland and other environmental permits are obtained by developers and that any necessary mitigation is implemented.

3.12.6.3 Floodplains

No-Build Alternative Cumulative Impacts to Floodplains

Because no activities related to the proposed SR-18 would occur under the No-Action Alternative, no cumulative impacts would occur. However, other developments in the area would result in some cumulative impacts to floodplains. Cumulative impacts to floodplains would be possible due to encroachment on floodplains associated with new development in the area. It is not anticipated that a substantial amount of development would occur in floodplains at this time, because there is enough non-floodplain or upland areas available to accommodate much of the anticipated development in the area. Implementing the SR-18 No-Build Alternative would not result in substantial changes in the amount of floodplain impacts in the area compared to baseline conditions.

Build Alternatives Cumulative Impacts to Floodplains

Some floodplain impacts would be associated with each of the SR-18 Build Alternatives. The floodplain impacts would be minimized to the extent practical during the design phase of this project lessening the potential for long-term cumulative impacts to floodplains. Where possible, bridges would be constructed at stream crossings in a manner that allows the existing floodplains to maintain their function and most of their flood storage capacity.

Minor loss of floodplain area may slightly reduce the flood storage capacity when combined with other projects in the same floodplain. Loss of additional floodplain vegetation, especially bottomland hardwood forests, may impact water quality when combined with other projects in the same watershed. Due to the minor amount of floodplain impacts associated with this project and other projects in the area, only minor impacts to floodplains are anticipated. It is anticipated that most secondary or induced developments would be constructed in upland areas and therefore would not result in substantial impacts to floodplains.

3.12.6.4 Threatened and Endangered Species

No-Build Alternative Cumulative Impacts to Threatened and Endangered Species

No cumulative impacts to threatened and endangered species are anticipated under the No-Build Alternative as no construction activities would occur. Other non-related developments in the project vicinity would have some potential to impact threatened and endangered species. However, because few records of such species exist in the general vicinity, the potential for impacts would be considered very low.

Build Alternatives Cumulative Impacts to Threatened and Endangered Species

Construction of SR-18 would not directly impact any known populations of threatened or endangered species or their habitats. Secondary developments associated with SR-18 are not expected to result in impacts to threatened and endangered species, because there are few records of such species or their required habitats within the vicinity of the project area. Therefore, no cumulative impacts to threatened or endangered species would be anticipated.

Information received from TDEC is periodically reviewed and updated. If any protected species or their habitats are identified as project development continues, they would be addressed in accordance with applicable laws and regulations.

3.12.6.5 Fish and Wildlife Resources

No-Build Alternative Cumulative Impacts to Fish and Wildlife Resources

No cumulative impacts would occur under the No-Action Alternative as SR-18 would not be constructed. However, all of the unrelated development projects expected to occur in the region would likely have cumulative impacts on fish and wildlife resources, especially those projects that occur on previously undeveloped lands. Much of the land in the project area has been disturbed in the past due to agricultural uses and other land uses; therefore, no large blocks of unique or high quality wildlife habitats remain in the project area. There are some high quality wetlands in the project vicinity, but for the most part direct impacts to those areas would likely be avoided by new developments in the area. The undeveloped upland habitats are currently utilized by habitat generalist species that are adapted to a mosaic of habitat types and frequent human disturbances. Therefore, those species would likely continue to be capable of coexisting with humans in areas where small amounts of development occur and some of the surrounding lands/habitats remain undeveloped.

Build Alternatives Cumulative Impacts to Fish and Wildlife Resources

In semi-rural areas adjacent to large cities the pressure to develop existing wildlife habitats into neighborhoods, businesses, and roadways can be intense. In the project area there is an increasing demand for undeveloped land and the amount of forest, grassland, and old field is gradually decreasing. This is primarily true in the northern portions of the project area, closer to Jackson.

Unavoidable loss of additional undeveloped wildlife habitats would occur with implementation of any of the SR-18 Build Alternatives. Build Alternatives that require construction of the roadway on new alignment would have the most potential to add to the cumulative impacts to fish and wildlife resources. Clearing of terrestrial habitats and modification of aquatic resources would result in local habitat loss and fragmentation. However, it is not anticipated that the habitat loss required for the project would substantially

impact populations of species currently inhabiting the area. Most species living in the SR-18 corridor are adapted to human disturbances and smaller, fragmented habitats. Those species would continue to utilize remaining habitats in the area, including undeveloped areas that remain within the SR-18 ROW. Most species that require less disturbance and large blocks of habitats do not occur in the general project area due to past and present land uses and activities. Even when combined with other foreseeable development and projects in the project vicinity, it is not expected that overall impacts to fish and wildlife would be substantial.

Culverting, sediment impacts, and the addition of impervious surfaces in a geographic area all tend to degrade overall quality of aquatic habitats and water quality. The additional stream channel modifications required for this project are not anticipated to substantially reduce overall quality of existing aquatic habitats or water quality in the area. Proper design and construction techniques would be implemented for SR-18 to reduce potential for impacts. Mitigation would be implemented to further reduce the potential for long-term impacts to aquatic habitats and species in the project vicinity. Similar efforts would likely be required of private developments as regulatory agencies would require permits and mitigation for most major projects that may be developed in the area.

Much of the land in the project area has been disturbed in the past due to agricultural uses and other land uses; therefore, no large blocks of unique or high quality wildlife habitats remain in the project area. There are some high quality wetlands in the project vicinity, but for the most part direct impacts to those areas have been avoided by shifting the alignments of the Build Alternatives. Therefore, the fish and wildlife species that utilize those wetland habitats will not be substantially impacted by the project under any of the Build Alternatives.

3.12.7 Cultural Resources Cumulative Impacts

3.12.7.1 Historical/Architectural Resources

No-Build Alternative Cumulative Impacts to Historical/Architectural Resources

Because no activities related to the proposed SR-18 would occur under the No-Build Alternative, there would be no cumulative impacts to historical/architectural resources. Other non-related projects in the vicinity would continue to have some potential to impact historical/architectural resources.

Build Alternatives Cumulative Impacts to Historical/Architectural Resources

The Build Alternatives for SR-18 have been developed through an intensive NEPA study process. The continuous public and agency coordination associated with this process has helped with the identification of Build Alternatives that have been designed to completely avoid known historical/architectural resources in the region. TDOT and the FHWA would continue to work closely with the SHPO to avoid, minimize, and/or mitigate for impacts to such resources associated with SR-18. Therefore, the potential for this project to substantially impact historical/architectural resources is considered low.

No major cumulative impacts would be expected, even when combined to other past, present, and reasonably foreseeable projects in the general vicinity. Although secondary developments promoted by the SR-18 project and other non-related projects would have some potential to impact historical/architectural resources, it is not anticipated, because the area most likely to be developed does not contain historical/architectural resources listed and/or eligible for the NRHP. At this time it is not considered likely that existing

historical/architectural sites would be sold or removed to support new developments in the area due to the amount of vacant undeveloped land available in the region.

3.12.7.2 Archaeological Resources

No-Build Alternative Cumulative Impacts to Archaeological Resources

Because no activities related to the proposed SR-18 would occur under the No-Build Alternative, there would be no cumulative impacts to archaeological resources. Other non-related projects in the vicinity will continue to have potential to impact archaeological resources.

Build Alternatives Cumulative Impacts to Archaeological Resources

There is potential for cumulative impacts to archaeological resources associated with SR-18 that would be in addition to past, present, and reasonably foreseeable future developments in the area. However, because the impacts to archaeological resources associated with SR-18 are expected to be relatively minor, this project would not contribute substantially to the cumulative impacts to those resources in the area.

Secondary developments and other non-related developments are expected to be constructed in the project vicinity in the future. However, it is not possible to determine exactly what impacts to archaeological resources would occur with implementation of those projects, because many of these projects have not been planned to date. In general, the project vicinity does not contain a substantial amount of archaeological resources based on the Phase 1 Survey. However, there is always the potential for construction activities to impact unknown archaeological resources. If any previously unknown archaeological resources or sites are discovered during construction of SR-18, construction activities would be halted in the area of the findings and additional coordination with the SHPO would occur.

3.12.8 Air Quality and Noise Cumulative Impacts

3.12.8.1 Air Quality Cumulative Impacts

No-Build Alternative Cumulative Impacts to Air Quality

Not improving SR-18 could result in cumulative adverse impacts to air quality in the general project area due to potential for continued declines in LOS and traffic flow. As LOS continues to decline on the existing facility, air quality would continue to be reduced due to congestion-related impacts. Congestion would reduce fuel efficiency and increase travel times (holding times) for vehicles passing through the area resulting in increases in the amount of vehicle emissions.

Build Alternatives Cumulative Impacts to Air Quality

Improving SR-18 would help to maintain baseline air quality conditions or possibly improve air quality in the area when considered cumulatively. Although short-term adverse impacts to air quality would be expected during the construction period, long-term positive impacts would occur due to improved travel efficiency. It is not anticipated that the construction of the proposed project would occur simultaneously with other major transportation projects in area. Improving traffic flow through the area would help reduce overall vehicle emissions, because traffic congestion would be reduced, especially when comparing the No-Build to the Build Alternatives.

The improved and/or relocated SR-18 would not be expected to substantially increase the amount of traffic in the region compared to the No-Build Alternative, but would function primarily to improve traffic flow through the area. In combination with other roadway improvements aimed at improving traffic flow through the area, this project could result in cumulative beneficial impacts to air quality in the Jackson area.

Additional development in the SR-18 project vicinity would have potential to result in localized air quality impacts. However, at this time, it is not anticipated that there would be enough new development to result in measurable air quality impacts in the region. Also, improvements to SR-18 and other roadways in the region would help maintain traffic flow as increases in traffic volume resulting from new developments occur.

3.12.8.2 Noise Cumulative Impacts

No-Build Alternative Cumulative Impacts to Noise

There would be no substantial cumulative noise impacts associated with the No-Build Alternative. However, increased traffic congestion anticipated along the existing SR-18 without any substantial improvements to the roadway may lead to increased noise along the route in the future. Increased noise along the existing route may occur as additional truck engine idling, acceleration, and deceleration is required when congestion occurs. Also, other sounds, such as vehicle horns and sirens may increase with reduced LOS because of congestion related issues.

Build Alternatives Cumulative Impacts to Noise

No substantial long-term cumulative impacts to noise are anticipated as part of this project. Noise impacts for this project were evaluated in accordance with the FHWA Noise Assessment Guidelines. Although noise impacts are expected to occur with this project for each of the Build Alternatives, most of the noise impacts occur in areas that would not be expected to receive major noise impacts from other past, present, or reasonably foreseeable projects or activities. As distance from SR-18 increases, the lower the potential for cumulative noise impacts.

The project will result in intermittent and temporary noise above existing ambient levels due to construction activities in the project vicinity. However, the noise increases would be temporary and would not constitute a noise impact as defined by the FHWA noise standards and TDOT's noise policy.

Construction of a noise wall or other noise barriers could be considered along the improvements to the northernmost portions of existing SR-18, if noise impacts and cost/benefit ratios warrant it. Construction of such noise barriers would also reduce the chances of cumulative impacts occurring at that location. Based on costs and anticipated reduction in noise levels, it is not likely that any form of noise abatement would be considered at other locations along the Build Alternative routes.

3.12.10 Hazardous Materials Cumulative Impacts

3.12.10.1 No-Build Alternative Cumulative Impacts to Hazardous Materials

No substantial changes in hazardous materials impacts would occur under the No-Build Alternative since no major construction would occur. However, some of the existing hazardous materials sites would remain in place and potentially cause concerns later in time. Also, there would be a slight increase in risks related to transportation of hazardous

materials through the SR-18 corridor. Without improvements to the existing roadway, LOS would deteriorate over time resulting in increased potential for crashes, some of which could include crashes involving trucks carrying hazardous materials.

3.12.10.2 Build Alternatives Cumulative Impacts to Hazardous Materials

Although some potential hazardous or special waste sites would be encountered with construction of SR-18, no adverse cumulative impacts to the environment are anticipated. Instead, there would be slight beneficial impacts to the nearby environment as the existing hazardous or special waste sites identified within the ROW boundaries would be removed and cleaned up as part of the SR-18 project. Many of the existing sites containing ASTs or USTs would be properly cleaned up thus removing the potential for these sites to adversely impact nearby soils, groundwater, and/or surface water streams.

Any new hazardous materials or special waste sites that could be attributed to the SR-18 improvements, such as new gas stations, would be constructed under newer, stricter TDEC regulations thus reducing the potential for adverse impacts to the surrounding environment. Other non-related developments in the area would also be required to comply with modern environmental regulations which would also reduce the risk of cumulative impacts due to hazardous materials.

3.12.11 Energy Cumulative Impacts

3.12.11.1 No-Build Alternative Cumulative Impacts to Energy

Not constructing SR-18 would lead to adverse cumulative impacts in terms of energy consumption in the Jackson region. These impacts would mainly be due to increased congestion within the existing roadway network as increased traffic volumes may overload the current facilities in the foreseeable future. Increased congestion and travel times would result in inefficient fuel consumption and adverse impacts to energy.

Build Alternatives Cumulative Impacts to Energy

Construction of SR-18 would not result in substantial cumulative adverse or beneficial impacts to energy as the overall impacts of this project would be negligible when coupled with other known projects in the area. The beneficial impacts to energy associated with the project, such as increased fuel efficiency for vehicles used in the area, would likely be somewhat negated by the potential increased energy demands required by secondary developments in the project area and other developments in the region. Population growth and continued urban expansion in the region will result in an overall increase in energy consumption in the Jackson region. Much of the growth and development would be expected to occur regardless of the SR-18 project. Although this project may reduce the timeframe in which some of the developments occur.

3.12.12 Section 4(F) Properties Cumulative Impacts

3.12.12.1 No-Build Alternative Cumulative Impacts to Section 4(F) Properties

No cumulative impacts would occur to existing Section 4(F) properties under the No-Build Alternative.

3.12.12.2 Build Alternatives Cumulative Impacts to Section 4(F) Properties

No cumulative impacts to Section 4(F) properties are anticipated with implementation of any of the Build Alternatives. A small pedestrian trail located in Medon would be impacted by the project. Details regarding impacts to this trail are difficult to determine at this time, because it is possible that the trail could either be avoided or rerouted during the final design phase of the project should one of the Build Alternatives utilizing the existing segment of SR-18 through Medon be implemented. TDOT will continue to work with the community to determine the importance of the trail and to find a way to avoid or reduce overall impacts to the trail.

3.12.13 Construction Cumulative Impacts

3.12.13.1 No-Build Alternative Cumulative Impacts due to Construction

There would be no cumulative construction impacts, because no construction activities would occur under the No-Build Alternative.

3.12.13.2 Build Alternatives Cumulative Impacts due to Construction

Adverse impacts from construction activities associated with any of the SR-18 Build Alternatives would be short-term in duration. Unavoidable construction inconveniences such as noise, dust, and traffic conflicts would occur. These temporary impacts would be cumulative to any other construction projects, including any induced developments, which may be occurring at the same time and in the same vicinity. No other large scale projects are known to be planned in the project area that would be under construction at the same time as the SR-18 project. However, by the time the construction phase commences for the SR-18 project, there may be other local projects being implemented. The primary cumulative impacts anticipated would likely be due to noise and traffic conflicts. However, that would depend on the nature of other projects. TDOT would coordinate any traffic detours with local authorities to minimize impacts in the area.

Additional concerns during the construction phase would be due to increased soil erosion and subsequent siltation in nearby streams and wetlands. Such impacts would be cumulative with other local construction projects or land uses that may also contribute to erosion problems.

In order to minimize potential detrimental effects on local resources due to construction activities, contractors would be required to comply with the special provisions of *Standard Specifications for Road and Bridge Construction* (TDOT, 2006) and the *Best Management Practices for Erosion and Sediment Control* (FHWA, 1995). These provisions implement the requirements of the Federal Highway Administration's Federal-Aid Policy Guide (Subchapter G part 650b).

Contractors would be required to conduct and schedule operations according to these provisions. For example, the contractor would be bound by Section 107.01 of the Standard Specifications to observe any noise ordinance in effect within the project limits. Detoured traffic would be routed during construction in a manner that has the least noise impact practicable upon residential and noise sensitive areas. In addition, coordination with affected utility companies would minimize disruption to utility services. Furthermore, TDOT would coordinate with local governments during the construction phase to minimize disruption to communities accepting detoured traffic. All of those efforts would help to reduce the potential for cumulative impacts that may be associated with this project.

3.13 Environmental Permits

The acquisition of permits would occur prior to initiation of construction activities, pursuant to Section 69-3-108(a) of the Tennessee Water Quality Control Act of 1977 and other State and Federal laws and regulations. These permits could include:

- Clean Water Act Section 404 Permit – required for construction that involves placement of dredge and fill material in Waters of the U.S. and/or impacts to Waters of the U.S. where federally listed Threatened or Endangered species are present. Typical Waters of the U.S. include rivers, blueline streams, headwaters streams, and special aquatic sites, such as wetlands. Section 404 Permits are issued by the U.S. Army Corps of Engineers (USACE).
- Aquatic Resource Alteration Permit (ARAP) – required for any alterations of State waters, including wetlands that do not require a Federal (Section 404) permit. The ARAP permits are required for construction at locations where the proposed project involves placement of fill in the following: a pond that is spring fed or impacts springs; reservoirs; wetlands; blueline streams; intermittent blueline streams on the United States Geologic Survey (USGS) 7.5 quadrangle map; any stream that supports any form of aquatic life; or is in the vicinity of a State-listed endangered species. Tennessee Department of Environment and Conservation (TDEC), Division of Water Pollution Control issues ARAP permits.
- National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit – required for grubbing, clearing, grading, or excavation of one or more acres of land. TDEC’s Division of Water Pollution Control issues NPDES permits.
- Tennessee Construction General Permit for Storm Water Discharges from Construction Activities (TNCGP) – required by operators of construction sites in Tennessee.

In addition, the State of Tennessee would require water quality certification under Section 401 of the CWA. Section 401 certification ensures that activities requiring a Federal permit or license will not cause pollution in violation of State water quality standards.

4.0 PUBLIC INVOLVEMENT and INTER-AGENCY REVIEW

4.1 Initial Coordination with Federal, State, and Local Agencies

On July 19, 2006 an initial coordination package was sent to a total of 52 Federal, State, local, and regional agencies and officials as well as other interested organizations. This package consisted of a letter requesting review and comment and a project location map showing the various study alternatives.

This initial coordination effort afforded concerned agencies and local officials an opportunity to provide input into the project planning process during the early stages of project development. This ensures that all foreseeable impacts and concerns are considered in the environmental and location studies.

The Tennessee Valley Authority (TVA) and U.S. Army Corps of Engineers (USACE) were requested to become Cooperating Agencies by TDOT. In addition, the U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) were invited to become Participating Agencies. A list of all agencies, organizations, and other community representatives that were sent an initial coordination package are shown below on Table 4.1.

Table 4.1. List of agencies, organizations, or community representatives that were sent an initial coordination package for the State Route 18 project in Hardeman and Madison Counties, Tennessee.

AGENCY TYPE	NAME	RESPONSE
Federal	U.S. Army Corps of Engineers-Memphis District Regulatory Functions Branch	X
Federal	Tennessee Valley Authority Environmental Policy and Planning	
Federal	U.S. Fish and Wildlife Service Field Supervisor	X
Federal	Environmental Protection Agency EIS Review Section	X
Federal	Department of Housing and Urban Development Environmental Officer	
Federal	Federal Emergency Management Agency Regional Environmental Officer	
Federal	U.S. Department of Interior U.S. Geological Survey Office of Environmental Affairs	
Federal	U.S. Department of the Interior U.S. Geological Survey Water Resources Division	
Federal	U.S. Department of the Interior Office of Surface Mining	X
Federal	National Oceanic and Atmospheric Administration Department of Commerce	

AGENCY TYPE	NAME	RESPONSE
Federal	U.S. Department of Interior U.S. Fish and Wildlife Service	
Federal	Federal Railroad Administration Office of Economic Analysis	
Federal	Federal Aviation Administration	
Federal	U.S. Department of Agriculture Forest Service	
Federal	U.S. Department of Agriculture Natural Resources Conservation Service	X
Federal	Federal Energy Regulatory Commission	
State	Tennessee Department of Environment and Conservation Commissioner	
State	Tennessee Historical Commission State Historic Preservation Office	X
State	Tennessee Department of Economic and Community Development Local Planning and Assistance Office, West Tennessee Region	
State	Tennessee Department of Environment & Conservation Environmental Review Coordinator Tennessee Division of Natural Heritage	
State	Tennessee Department of Environment & Conservation Division of Air Pollution Control	X
State	Tennessee Department of Environment & Conservation Division of Water Supply	X
State	Tennessee Department of Environment & Conservation Division of Water Pollution Control	X
State	Tennessee Department of Environment & Conservation Division of Ground Water Resources	X
State	Tennessee Department of Environment & Conservation Division of Solid Waste Management	
State	Tennessee Wildlife Resources Agency NEPA Contact	X
State	Tennessee Department of Environment & Conservation Tennessee Commission of Indian Affairs	X
State	Tennessee Department of Agriculture NEPA Contact	
State	Tennessee Department of Education Nashville, Tennessee	
State	Tennessee Department of Environment and	

AGENCY TYPE	NAME	RESPONSE
	Conservation Division of Water Supply	
Local	Jackson Housing Authority	
Local	Jackson Transit Authority	
Local	Jackson Regional Planning Commission	
Local	Tennessee State Planning Office East Tennessee Section	
Local	Southwest Tennessee Development District	X
Local	Mayor City of Jackson	X
Local	Mayor City of Medon	X
Local	Mayor Hardeman County	
Local	Mayor Madison County	X
Local	Senator District 27	
Local	Senator District 26	
Private	Tennessee Trail Association	
Private	Tennessee State Chapter of the Sierra Club	
Private	Tennessee Conservation League	
Private	Sierra Club	
Private	Tennessee Scenic Rivers Association	
Private	Tennessee Environmental Council	
Private	The Nature Conservancy	
Private	Tennessee Wildlife Federation	
Private	World Wildlife Fund	
<i>Source: Parsons 2008.</i>		

4.2 Summary and Disposition of Comments Received from the Initial Coordination

There were 17 replies to the initial coordination that was sent to the 52 Federal, State, and local planning/resource management agencies, and private groups. The following is a brief summary of the main comments contained in the initial coordination replies. Copies of the full response letters are attached in Appendix A.

4.2.1 Federal Agencies

4.2.1.1 Department of the Army-Corps of Engineers, Memphis District - Regulatory Branch

SUMMARY:

“The project should have no major effect on any projects of the Corps of Engineers, Memphis District. However, please note that wetlands and other water courses are present within the proposed project corridor. A Department of the Army permit would be required

under Section 404 of the Clean Water Act prior to the discharge of dredged or fill material into waters of the U.S.”

“We appreciate the opportunity to serve as a Cooperating Agency for the preparation of the Environmental Assessment...”

“Of particular interest to the Corps are the following:

- Avoidance and minimization of impacts to wetlands and other waters of the U.S.;
- Documentation of compliance with the Section 404(b)(1) guidelines;
- Development of appropriate compensatory mitigation for unavoidable adverse impacts to jurisdictional waters; and
- Assurance that the proposed alternatives will not impact any Corps projects (specifically the West Tennessee Tributaries Project).”

DISPOSITION:

TDOT concurs that wetlands and other jurisdictional Waters of the U.S. are present in the project corridor and intends to comply with all environmental regulations including Section 404 of the Clean Water Act. TDOT has changed the alignments of several alternatives and added new alternatives during the initial phases of the project to help minimize or avoid substantial adverse impacts to jurisdictional Waters of the U.S.. TDOT intends to work with the Corps of Engineers during the permit phase of the project to obtain the appropriate permits and determine appropriate mitigation measures for all impacts to jurisdictional waters. TDOT does not anticipate that this project would have any substantial impact on Corps of Engineers projects.

TDOT appreciates the Corps of Engineers agreement to serve as a Cooperating Agency for preparation of the EA. TDOT will continue to coordinate with the Corps of Engineers throughout the completion of the EA and beyond if a Build Alternative is selected for this project.

4.2.1.2 U.S. Environmental Protection Agency - Region 4 Office of Policy and Management

SUMMARY:

“...we accept your invitation to become a participating agency for this project and will endeavor to participate in project activities in the manner suggested in your letter. EPA has been participating in project development activities, dating back to September 2005, as part of the initiation of the TDOT streamlined environmental review process for this project. EPA submitted initial scoping comments on the purpose and need and provided comments on the proposed alternatives at an interagency meeting on April 25, 2006. We look forward to finalizing the range of reasonable alternatives that will be advanced into the EA.”

DISPOSITION:

TDOT appreciates EPA's agreement to serve as a Participating Agency for preparation of the EA. EPA's initial scoping comments were considered during the development of reasonable alternatives that were eventually carried forward for review in this EA. TDOT will continue to coordinate with the EPA throughout the completion of the EA.

4.2.1.3 U.S. Department of Agriculture - Natural Resources Conservation Service**SUMMARY:**

"Enclosed is the completed AD-1006 Farmland Conversion Impact Rating for the above-mentioned project."

DISPOSITION:

TDOT utilized the information provided by the Natural Resources Conservation Service to determine the degree of impact to farmland resources that would occur under each of the Build Alternatives considered in this EA.

4.2.1.4 U.S. Department of the Interior - Office of Surface Mining**SUMMARY:**

"...the proposed road project would have no effect, either adverse or favorable, on our program or any action contemplated under our program. Office of Surface Mining is the Federal regulatory agency for all coal mining activities in Tennessee. However, as per Federal regulations at 30 CFR, Part 707, projects such as government-financed highway construction are exempted from Federal coal mining regulations when certain criteria are met."

DISPOSITION:

TDOT concurs that there would be no impacts to any current or anticipated surface mining operations regulated by the Office of Surface Mining.

4.2.1.5 U.S. Department of the Interior – U.S. Fish and Wildlife Service**SUMMARY:**

"...information available to the Service indicates that wetlands exist in the vicinity of the proposed project. Due to the number of sites involved, it is infeasible for us to provide specific data regarding potential wetland conflicts with this response. The Corps of Engineers and Tennessee Department of Environment and Conservation should be contacted regarding the definitive presence of regulatory wetlands....Since the proposed project will involve construction activities over creeks, we recommend that silt barriers be put in place to prevent runoff and sediment. Perennial streams should be bridged rather than culverted..."

"Endangered species collection recordsdo not indicate federally listed or proposed endangered or threatened species occur within the impact area of the project....based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended are fulfilled..."

DISPOSITION:

TDOT concurs that there are wetlands in the vicinity of the project. The alternative alignments were shifted in some areas to avoid the larger, higher quality wetlands encountered by the original alignments resulting in a substantial reduction in wetland impacts for this project. Information regarding wetland impacts is included in this EA and in the associated Ecology Study prepared for the project. TDOT will continue to work with regulatory agencies through the design and permitting phases of this project to ensure impacts to streams and wetlands are minimized or avoided to the extent possible. TDOT concurs that no federally-listed species are known to occur in the project area based on USFWS and TDEC records. No federally-listed species are expected to be impacted by this project.

4.2.2 State Agencies**4.2.2.1 Tennessee Department of Environment and Conservation - Air Pollution Control Division****SUMMARY:**

“Hardeman and Madison Counties are designated as attainment under the Federal National Ambient Air Quality Standards (NAAQS). As per the Transportation Conformity rule in 1200-3-34, this project is not subject to transportation conformity.”

“This agency’s other interests, above what would be addressed through the standard NEPA process, concern the control of fugitive dust and equipment exhaust emissions during the construction phase. Additionally, our concerns include that any structures requiring demolition are asbestos free, as per the requirements of Chapter 12300-3-11, Hazardous Materials. ...open burning regulations have changed dramatically. Before the burning of any wood waste, please refer to Chapter 1200-3-4; Open Burning Certification Process at <http://state.tn.us/environment/apc/apcregs/>.”

DISPOSITION:

TDOT will analyze the potential impacts to air quality due to this project and will continue to monitor any changes in the attainment status of the two counties in the project area. TDOT will incorporate BMP’s during the construction phase to help control fugitive dust and will keep equipment properly maintained to help control equipment emissions. TDOT and any contractors doing work on the site will comply with all open burning regulations.

4.2.2.2 Tennessee Department of Environment and Conservation - Ground Water Protection Division**SUMMARY:**

“The Division of Ground Water Protection regulates all aspects of the subsurface disposal (SSD) program in the State of Tennessee. In this regard, Division staff has worked closely with TDOT on construction projects where it is anticipated that the project will potentially impact existing SSD systems.”

“...the Division of Ground Water Protection anticipates that it is likely the project may impact existing SSD systems that are located along the route proposed for the above referenced project.”

DISPOSITION:

TDOT will continue to work closely with the Division of Ground Water Protection to help ensure that impacts to SSD systems due to construction activities are handled appropriately to reduce the chance of adversely affecting ground water and/or surface water resources in the area.

4.2.2.3 Tennessee Department of Environment and Conservation - Ground Water Management Section**SUMMARY:**

“A review of the community water supplies in the area shows that the proposed routes have no community public wells, springs, or wellhead protection areas or surface water intakes in the vicinity.”

DISPOSITION:

TDOT concurs with the findings of the Ground Water Management Section but will continue to coordinate with them if alternatives change or if any known public wells, springs, or wellhead protection areas are determined to be impacted by the project.

4.2.2.4 Tennessee Department of Environment and Conservation - Water Pollution Control Division**SUMMARY:**

“The Division’s general concerns about construction projects such as the one proposed include, but are not limited to:

- Identification and assessment of all water resources must be made prior to construction
- All appropriate permits must be obtained prior to commencement of construction
- Impacts to water resources, including wetlands should be avoided when possible
- Appropriate mitigation must be undertaken for unavoidable impacts
- Appropriate erosion prevention and sediment control measures must be installed and maintained.”

“Specifically for this project, the division will require identification and assessment of all water courses with an estimate of linear footage of stream to be altered for each crossing, and a total for each alternative (including proposed culverts and relocation). Wetland impacts should include locations, acreage for each site, a description of the type of wetland impacted at each location, and a total wetland acreage impact for each alternative.”

“An Aquatic Resources Alteration Permit will be needed if there are any alterations to waters of the state, and coverage under Tennessee’s General NPDES Permit for Discharges of Stormwater Associated with Construction Activities (CGP) will be needed for any land disturbance of one acre or more.”

DISPOSITION:

TDOT has conducted studies in the project area of each of the proposed alternatives to identify and characterize all streams and wetlands within the project area. That information is contained in the Ecology Study Technical Appendix prepared as part of this EA. Additional studies would be conducted once final design of the roadway was complete to determine specific impacts in terms of linear footage of stream impacts and acreage of wetland impacts. TDOT would then use that information to obtain all appropriate permits. TDOT would comply with all regulations and items associated with those permits. Mitigation of impacts to streams and wetlands would be conducted as appropriate. Details of the mitigation efforts would be determined following final design of the project and as part of the permit phase of the project. TDOT will implement BMP's, including proper erosion control methods, to ensure that impacts to water resources are minimized to the extent possible.

4.2.2.5 Tennessee Wildlife Resources Agency**SUMMARY:**

"Our current concerns are potential environmental impacts associated with potential stream and wetland impacts that may occur due to the construction of this project. We also have concerns regarding potential impacts associated with this project on the Firebelly Darter, (*Etheostoma pyrrhogaster*), a State Deemed In-Need-Of -Management species. We encourage continued consultation with our agency in future phases of this project to reduce impacts to fish and wildlife resources."

"We accept your invitation to participate with TDOT and FHWA in the development of the EA for the SR-18 Project in Hardeman and Madison Counties, Tennessee."

DISPOSITION:

TDOT will continue to coordinate with appropriate regulatory agencies throughout the NEPA process and during the final design and permit phases of the project to help find ways to minimize impacts and/or mitigate for impacts to streams and wetlands. Based on information contained in the TDEC Natural Heritage database, no known populations of firebelly darters occurred in the streams impacted by this project. TDOT has already shifted or abandoned previously considered alternatives to help reduce impacts to several streams and wetlands. Additional minor shifts in the layout of the roadway may occur during final design phase to help further reduce impacts to streams and wetlands. This would also reduce the potential impacts to aquatic organisms.

4.2.2.6 Tennessee Department of Environment and Conservation - Tennessee Historical Commission**SUMMARY:**

"Considering available information, we find that the project as currently proposed MAY AFFECT PROPERTIES THAT ARE ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. You should continue consultation with our office and designated consulting parties and invite them to participate in consultation and provide us with appropriate survey documentation for review and comment."

DISPOSITION:

TDOT has and will continue to coordinate with the State Historic Preservation Office to ensure that all potential impacts to historic properties are adequately considered and that

the Section 106 review process is conducted appropriately. Some previously considered alternatives were shifted or abandoned early in the NEPA process to avoid impacts to some of the known historic properties in the project area. Based on the surveys conducted for the project no historic properties will be impacted by the current alternative alignments. Section 3.4 contains a summary of the cultural resources studies conducted for the project.

4.2.2.7 State of Tennessee - Commission on Indian Affairs

SUMMARY:

“At this time...the Tennessee Commission on Indian Affairs is unaware of any effects, favorable or adverse, on any programs or issues we are concerned with or that may be of concern to Native American Indians in Tennessee.”

“We are, of course, very interested in the discovery of any Indian burial site or historic or prehistoric site sacred to Indian people in Tennessee, or of interest to federal tribes who occupied the area of the project in historic or prehistoric periods. We would certainly expect to be notified if such site or sites were found and before any effort is made by TDOT or its contractors to excavate.”

DISPOSITION:

TDOT would notify all appropriate authorities if any discovery of Native American remains and /or funerary objects or artifacts were discovered during construction activities. In the event of a discovery of human remains or artifacts, TDOT and their contractors would halt construction activities at that location and notify the appropriate authorities. Construction would commence only if or when those authorities allowed it.

4.2.3 Local Agencies/Organizations

4.2.3.1 Southwest Tennessee Development District

SUMMARY:

“...we contacted several local governments as well as the NAACP State Conference of Branches, located in Jackson, and inquired about any known special interest groups that may be located along one of the proposed alternates or crossovers for Highway 18, from the 45 Bypass in Jackson to Highway 100 in Hardeman County. Here are the responses:

- NAACP State Conference of Branches – No known special interest groups.
- City of Jackson – No known special interest groups.
- City of Medon – No known special interest groups
- Madison County – No known special interest groups. However, the County state that there were several concerns voiced by interested citizens living along the proposed routes at a TDOT public hearing held in October 2004.
- Hardeman County – No known special interest groups.”

DISPOSITION:

TDOT appreciates the efforts to identify known special interest groups that may be impacted by the project. TDOT will consider comments provided by the City of Jackson, City of Medon, and Madison County in separate letters provided to TDOT.

4.2.3.2 Madison County- County Mayor**SUMMARY:**

"I have conducted a number of town hall meetings along State Route 18 along with staff from TDOT. The routes that were discussed did not provide my office any information that might impact Title VI services or have a major impact on the environment. There is a great amount of concern about the final decision on any re-routing of State Route 18."

DISPOSITION:

TDOT has provided more details regarding environmental impacts anticipated with the project as part of this EA. A final decision would be made after completion of the NEPA study. TDOT will inform local communities in advance of public hearings so that public input can be incorporated in to the final decision made for this project.

4.2.3.3 City of Medon - City Mayor**SUMMARY:**

"The following is the City of Medon's proposal for widening of State Route 18 through the City of Medon:

- Five (5) 12-foot wide traffic lanes, with one (1) 12-foot wide lane being a continuous center turning lane from the north city limits to the south city limits.
- Two (2) 6-foot wide bicycle lanes with 2-foot wide curbs and gutters from the north city limits to the south city limits.
- 5-foot wide sidewalks on both the east and west sides of State Route 18 from the north city limits to the south city limits.
- This will narrow the right-of-way needed from 104 feet to 86 feet from the north city limits to the south city limits of Medon.
- Relocate the entrance to Riverside Drive as previously indicated on preliminary drawing No. 30, issued to the City of Medon in 1999 by TDOT.
- We would also like for TDOT to take equal amounts of needed right-of-way from each side, where possible. This will affect less people if this is possible to do."

"...we have been told by TDOT in the past that if a by-pass is carried around Medon, the city will have to start maintaining the 3.1 miles of State Route 18 that now exists within the corporate limits of the City of Medon. The City of Medon does not have the financial means to take on this responsibility. We don't foresee any detrimental environmental impact with this proposal, and we feel this would be more practical economically for the state transportation department. The proposed sidewalks would be beneficial to people without

transportation in the City of Medon to get to the Medon City Hall & Community Center, the Medon Post Office, area churches, and other places of business.

DISPOSITION:

If the existing SR-18 is widened through the City of Medon, TDOT would consider changes to the proposed design of the roadway as long as the integrity of the overall design is not compromised. Certain design standards would need to be met in order for the roadway to function properly and provide a facility that meets the purpose and need of the project to improve efficiency and safety of the roadway, starting at the base year of 2011 and continuing through the design year of 2031. TDOT will continue to coordinate with the City of Medon to help determine the best way to reduce impacts to the community while providing an adequate transportation connection for the entire region. Build Alternatives that result in constructing a bypass around the City of Medon are still being considered as part of this EA. The adverse and beneficial impacts of constructing a bypass will be considered in the final decision.

4.2.2.4 City of Jackson - City Mayor

SUMMARY:

“It is my recommendation that Alternative 2 or Crossover C5 be used in this project.”

DISPOSITION:

TDOT is still considering Alternative 2, Alternative 3, and Alternative 6, each of which would result in construction of a new intersection of SR-18 and SR-5 (U.S. 45) located south of the existing intersection. Based on the City of Jackson comments, it appears shifting the intersection southward would be their preferred choice. However, TDOT would need to consider environmental impacts, costs, and other information prior to making a final decision on which Alternative to select. The City of Jackson’s preference, as well as all other public and agency comments, will be considered during the final decision-making process.

4.3 Public Involvement Meetings

A Public Meeting was held for the project on November 22, 2004 at the South Jackson Community Center in Jackson, Tennessee. The purpose of the meeting was to make available to the public all information concerning the project, present at least four possible alignments for viewing and discussion, and solicit comments and suggestions on alternatives for consideration by the TDOT. The meeting was from 5:00 to 7:00 PM and consisted of a one-hour viewing of displays, a PowerPoint presentation, a question and answer period, and followed by a second brief viewing period.

A total of 191 people signed-in at the meeting. Two state senators and two state representatives were in attendance, as well as county officials from Hardeman and Madison Counties, and local officials from the cities of Bolivar, Jackson, and Medon.

Four alternative routes were shown on aerial photos as wall displays for viewing. A handout document with project location map was also available, showing the alternative routes but also breaking the routes into segments. The segmentation was intended to create multiple choice options to demonstrate the flexibility of choice to property owners and stakeholders viewing the displays.

Alternative 1 displayed at the Public Meeting was to widen and improve the existing route. Alternative 2 departed from the existing SR-18 south of the Clover Creek and Cypress Creek bottoms to the east and stayed east until joining SR-5 (U.S.-45) south of the existing SR-18 intersection. Alternative 3 tracked Alternative 2 except that it connected further south on SR-5 (U.S.-45) than Alternative 2. Alternative 4 attempted to maximize use of an abandoned railroad to bypass Medon on the west and tie back into existing SR-18 at the community of Malesus, then continue on to the existing SR-18/SR-5 (U.S. 45) intersection.

Comments were taken from the public in the form of written comments turned in at the meeting, recorded comments made to the court reporter, and comments submitted by mail and e-mail. All forms of comments were collected and made part of the official transcript of the meeting.

4.3.1 Question and Answer Period

The following comments were made during the question and answer period:

- Six respondents supported the Alternative 1 improvement, including the existing tie-in at SR-5 (U.S.-45);
- Nine were in favor of a version simply avoiding Malesus, staying west of the existing SR-18/SR-5 (U.S. 45) intersection, and tying back in further north;
- Eighteen were in support of some version of shifting the SR-18 tie-in to SR-5 (U.S.-45) to the south of the existing intersection if it included some type of interchange. This group opposed an intersection solution;
- Seven chose a version of Alternative 4, utilizing the abandoned railroad line. It should be noted that most of these also wanted to avoid tying in at the existing intersection;
- Five favored avoiding Medon and Malesus but declined to cite a preference of alternative;
- Three supported the Medon Mayor's request for improving the existing route through Medon; and
- One voiced the opinion that TDOT should "stop talking and do something."

4.3.2 Written Comments (left at the meeting, mailed, or e-mailed)

The following written comments were submitted:

- Thirteen respondents wanted the Alternative 1 improvement, including the existing tie-in;
- Twenty-one were in favor of a version avoiding Malesus and tying in further north of the existing SR-18/SR-5 (U.S. 45) intersection;
- Twenty-eight were in support of shifting the SR-18/SR-5 tie in to the south with an interchange instead of an intersection;

- Nine wanted some version of Alternative 4 using the abandoned railroad and avoiding the existing intersection at SR-5 (U.S.-45);
- Twelve were in favor of avoiding both Medon and Malesus with no specific preference for an alternative;
- Six wanted the improvement of existing SR-18 to come through Medon. No mention was made of the project in its entirety; and
- Six commented that TDOT should begin the project without further delay.

Many comments were in a form that included combinations of some of the alternatives. Some were very specific and dealt only with a single section or two sections of a single alternative. Therefore, the comments received had to be interpreted to some degree to distinguish between the different interests. The largest issues were summarized to the extent possible. There was solid support from respondents for four common themes:

1. Avoid going through the Malesus Community;
2. Avoid going through Medon on the existing SR-18;
3. Tie-in to SR-5 (U.S.-45) at an interchange located south of the existing intersection. An intersection is not favored at the new location; and
4. Improvement or modification of the existing intersection of SR-18 and SR-5 (U.S.-45) should not be considered an option.

The current alternatives in the DEA include some of the same segments as were viewed at the original 2004 Public Meeting. However, based on the public comments received, additional input from regulatory agencies and local officials, and preliminary environmental constraints studies, some of the original alternative segments were abandoned and some new ones were developed. There are currently a total of six potential Build Alternatives for the project using a combination of eleven segments.

None of the remaining segments discussed in this DEA were located west of existing SR-18 due to environmental constraints including wetlands and cultural resources. Since the 2004 Public Meeting, TDOT had further coordination with the City of Medon regarding the options of widening the existing SR-18 through the community versus providing a bypass around Medon. TDOT informed the Mayor of Medon that if a bypass route were chosen, the City of Medon would be responsible for the long-term maintenance of the existing SR-18 through the community. Due to that information, the Mayor of Medon subsequently requested that TDOT do not bypass the City of Medon as they did not have funding to maintain the length of SR-18 through their community. For that reason, TDOT has added an additional crossover segment that would allow the route to go around some large wetland areas near Cypress and Clover Creek to the east and then return back to the original alignment to widen the existing stretch of roadway through Medon. North of Medon, there would then be the option to continue on the existing route or provide a new alignment that would carry traffic east to a new connection at SR-5 (U.S.-45) south of the existing SR-18/SR-5 (U.S.-45) intersection. The current alternatives are discussed in detail in this DEA.

The public will have the opportunity to provide additional comments on the alternatives during the DEA public comment period, which will include a Public Hearing. These comments will be evaluated and considered in development of the Final EA and will be used by decision-makers for the project. Selection of an alternative would be made after all public comments have been reviewed and all environmental impacts have been considered.

4.4 Tennessee Environmental Streamlining Agreement

This project has been developed following the procedures set forth in the Tennessee Environmental Streamlining Agreement (TESA). TESA establishes a single decision-making process to identify and address agency issues at four key points (referred to as concurrence points), during the planning and NEPA process. In addition to TDOT and FHWA, signatories to TESA include eight federal agencies and authorities, three state agencies, and the eleven Metropolitan Planning Organizations (MPOs) in the state. Agencies involved in TESA have been, or will be participating in the concurrence points at the following four major milestones in the environmental review process for the SR-18 EA:

- 1) Purpose and Need and Study Area;
- 2) Project Alternatives to be Evaluated in the EA and Methodologies for Conducting Evaluation;
- 3) Adequacy of the Preliminary Draft EA; and
- 4) Designation of Preferred Alternative and Preliminary Mitigation.

Although this project began while TESA was still being developed and finalized, TDOT committed to applying the basic principles of the TESA process for the SR-18 EA.

4.4.1 Concurrence Point 1 - Purpose and Need

The Concurrence Point 1 (CP-1) portion of the SR-18 project included development of the project purpose and need. The CP-1 document was submitted to the TESA agencies with final concurrence in September 2005. Three agencies provided concurrence with the purpose and need and provided comments they would like addressed in future concurrence points.

The issues brought up during CP-1 included agencies wanting to see data regarding traffic projections and LOS to help support the stated need for the project; wanting to ensure that widening the existing route was considered as an alternative; and noting that there were 303(d) listed streams in Hardeman and Madison Counties that needed to be considered in the document. TDOT has included information pertaining to all of these issues in the EA including traffic projections, LOS analysis, identification of 303(d)-listed streams, and including the widening the existing SR-18 as an alternative (Alternative 1 in the EA).

4.4.2 Concurrence Point 2 - Alternatives

The Concurrence Point 2 package containing the potential project alternatives that were anticipated to be evaluated in the EA was submitted to the TESA agencies with final concurrence in September 2006.

The issues commented on during Concurrence Point 2 were that placing SR-18 on the B-1 alignment may be less environmentally damaging than widening the existing alignment in that area due to the presence of wetlands along the existing route in that area. TDOT concurred with those findings. Following the detailed field investigations in late 2006, after completion of Concurrence Point 2 it was determined that shifting the starting point of Segment B-1 further south would further reduce impacts to wetlands in that area. In early 2007 the alignment of Segment B-1 was shifted to further reduce the impacts to wetlands.

Other issues involved agencies requesting that the length of stream channel impacts and acres of wetlands be analyzed and reported in the EA. It was also requested that discussions regarding state and federal listed species be included in the EA. TDOT has provided all of the requested information in the appropriate sections of the EA and in the associated Ecology Study.

4.4.2 Concurrence Point 3 – Preliminary Draft EA document

Based on the output of CP-1 and CP-2, and the subsequent detailed investigation of alternatives and analysis of impacts, TDOT prepared a Preliminary Draft EA document and submitted it to the TESA agencies for their review and comment prior to publishing the Draft EA for public review.

APPENDIX A - INITIAL COORDINATION LETTERS



REPLY TO
ATTENTION OF:

Operations Division

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
167 NORTH MAIN STREET B-202
MEMPHIS, TENNESSEE 38103-1894

August 25, 2006

Mr. Tom Love
TDOT, Environmental Division
505 Deaderick Street
James K. Polk Building, Suite 900
Nashville, Tennessee 37243

Dear Mr. Love:

This is in response to your request for comments regarding the draft Purpose and Need statement for proposed highway improvements to State Route (SR) 18. This project entails improvements to SR-18 between SR-100 and SR-5 in Hardeman and Madison Counties, Tennessee.

This project should not have a major effect on any projects of the Corps of Engineers, Memphis District. However, please note that wetlands and other water courses are present within the proposed project corridor. A Department of the Army permit would be required under Section 404 of the Clean Water Act prior to the discharge of dredged or fill material into waters of the United States.

We appreciate the opportunity to serve as a Cooperating Agency for the preparation of the Environmental Assessment for this project. Of particular interest to the Corps are the following:

1. Avoidance and minimization of impacts to wetlands and other waters of the U.S.;
2. Documentation of compliance with the Section 404(b)(1) guidelines; and
3. Development of appropriate compensatory mitigation for unavoidable adverse impacts to jurisdictional waters; and
4. Assurance that the proposed alternatives will not impact any Corps projects (specifically the West Tennessee Tributaries Project).

We look forward to working with you on this project. If you have questions, please contact Roger Allan at (901) 544-3682 and refer to File MVM-2005-528-RSA.

*6 Sep 06
JWM*

Sincerely,

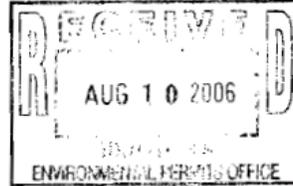
Larry D. Watson
Chief
Regulatory Branch



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

AUG 07 2006



*21 Aug 06
dwm*

Charles Bush
Transportation Manager II
Tennessee Department of Transportation
James K. Polk Building
505 Deaderick Street, Suite 900
Nashville, Tennessee 37243-0334

SUBJECT: Participating Agency Request for the State Route 18 Environmental Assessment in Hardeman and Madison Counties, Tennessee

Dear Mr. Bush:

The U.S. Environmental Protection Agency (EPA) received your letter dated July 19, 2006, inviting EPA to become a "participating agency" with the Tennessee Department of Transportation (TDOT) and Federal Highway Administration in the development of the Environmental Assessment (EA) for the improvement and/or relocation of State Route 18 from State Route 100 in Hardeman County to State Route 5 in Madison County, Tennessee. In accordance with this request, we accept your invitation to become a participating agency for this project and will endeavor to participate in project activities in the manner suggested in your letter. EPA has been participating in project development activities, dating back to September 2005, as part of the initiation of the TDOT streamlined environmental review process for this project. EPA submitted initial scoping comments on the purpose and need and provided comments on the proposed alternatives at an interagency meeting on April 25, 2006. We look forward to finalizing the range of reasonable alternatives that will be advanced into the EA.

We appreciate the opportunity to work with TDOT as a participating agency on this project. Please contact Ben West at (404) 562-9643 to discuss this letter or if you have additional questions.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office
Office of Policy and Management

cc: Federal Highway Administration – Tennessee Division

Internet Address (URL) • <http://www.epa.gov>

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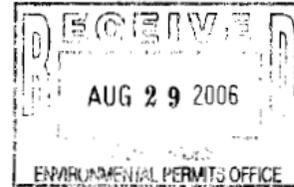
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United States Department of the Interior

OFFICE OF SURFACE MINING
Reclamation and Enforcement
710 Locust Street, Second Floor
Knoxville, TN 37902

AUG 25 2006



Mr. Charles E. Bush
Tennessee Department of Transportation
Environmental Division
Suite 900 – James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243

Subject: State Route 18 Environmental Assessment
Hardeman and Madison Counties, Tennessee

*30 Aug 06
JWM*

Dear Mr. Bush:

Thank you for your correspondence of July 19, 2006, concerning development of the above subject document. As part of your agency's scoping process, you were inquiring as to whether the proposed road project would have an effect on any programs administered by my agency, the Office of Surface Mining (OSM). I want to assure you that the proposed road project would have no effect, either adverse or favorable, on our program or any action contemplated under our program.

OSM is the Federal regulatory agency for all coal mining activities in Tennessee. However, as per Federal regulations at 30 CFR, Part 707, projects such as government-financed highway construction are exempted from Federal coal mining regulations when certain criteria are met. I have attached a copy of the above referenced Federal regulations for your information.

We appreciate being given the opportunity to participate in the scoping process. If at any time in the future you have questions or need additional information, please don't hesitate to contact us.

Sincerely,

Tim L. Dieringer, Director
Knoxville Field Office

Attachment



§ 706.19

which are the motivating factors. An employee may accept:

(1) Food and refreshments of nominal value on infrequent occasions in the ordinary course of a luncheon, dinner, or other meeting where an employee may properly be in attendance, and

(2) Unsolicited advertising or promotional material, such as pens, pencils, note pads, calendars and other items of nominal value.

(c) Employees found guilty of violating the provisions of this section will be subject to administrative remedies in accordance with existing Federal regulations or policies.

§ 706.19 Resolving prohibited interests.

Actions to be taken by the Director, the heads of other Federal agencies, and the heads of other affected bureaus and offices within the U.S. Department of the Interior include:

(a) Remedial action to effect resolution. If an employee has a prohibited financial interest, the head of the organizational entity (Department, bureau, office, etc.) where the employee works shall promptly advise the employee that remedial action which will resolve the prohibited interest is required within 90 days.

(b) Remedial action may include: (1) Reassignment of the employee to a position which performs no function or duty under the Act, or

(2) Divestiture of the prohibited financial interest, or

(3) Other appropriate action which either eliminates the prohibited financial interest or eliminates the situation which creates the conflict.

(c) Reports of noncompliance. If 90 days after an employee is notified to take remedial action that employee is not in compliance with the requirements of the Act and these regulations, the official, other than the Director, who ordered the remedial action shall promptly report the facts of the situation to the Director. The reports to the Director shall include the original or a certified true copy of the employee's statement and any other information pertinent to the Director, including a statement of actions being taken at the time the report is made. Within 30 days of receipt of a noncompliance report, the Director shall notify the head

30 CFR Ch. VII (7-1-06 Edition)

of the employing organization and the employee involved of additional action to be taken. Actions which the Director may take include but are not limited to the granting of additional time for resolution or the initiation of action to impose the penalties prescribed by the Act.

§ 706.21 Appeals procedures.

Employees have the right to appeal an order for remedial action under § 706.19 and shall have 30 days to exercise this right before disciplinary action is initiated.

(a) Office employees and other Department of the Interior employees may file their appeal, in writing, in accordance with the provisions in 43 CFR 20.735-25(b).

(b) Employees of other Federal agencies may file their appeal, in writing, in accordance with the established procedures of their employing agency.

PART 707—EXEMPTION FOR COAL EXTRACTION INCIDENT TO GOVERNMENT-FINANCED HIGHWAY OR OTHER CONSTRUCTION

Sec.

707.1 Scope.

707.3 Responsibility.

707.5 Definitions.

707.10 Information collection.

707.11 Applicability.

707.12 Information to be maintained on site.

AUTHORITY: Secs. 102, 201, 501, and 528 of Pub. L. 95-87, 91 Stat. 448, 449, 467, and 514 (30 U.S.C. 1202, 1211, 1251, 1278).

SOURCE: 44 FR 15322, Mar. 13, 1979, unless otherwise noted.

§ 707.1 Scope.

(a) This part establishes the procedures for determining those surface coal mining and reclamation operations which are exempt from the Act and this chapter because the extraction of coal is an incidental part of Federal, State, or local government-financed highway or other construction.

(b) This part exempts the extraction of coal which is incidental to government-financed construction from the requirements of the Act and this Chapter, if that extraction meets specified criteria which ensure that the construction is government-financed and

Surface Mining Reclamation and Enforcement, Interior**§ 707.12**

that the extraction of coal is incidental to it.

§ 707.4 Responsibility.

(a) The regulatory authority is responsible for enforcing the requirements of this part.

(b) Any person conducting coal extraction as an incidental part of government-financed construction is responsible for possessing, on the site of the extraction operation, the documentation required by 30 CFR 707.12.

§ 707.5 Definitions.

As used in this part, the following terms have the specified meaning:

Extraction of coal as an incidental part means the extraction of coal which is necessary to enable the construction to be accomplished. For purposes of this part, only that coal extracted from within the right-of-way, in the case of a road, railroad, utility line or other such construction, or within the boundaries of the area directly affected by other types of government-financed construction, may be considered incidental to that construction. Extraction of coal outside the right-of-way or boundary of the area directly affected by the construction shall be subject to the requirements of the Act and this chapter.

Government financing agency means a Federal, State, county, municipal, or local unit of government, or a department, bureau, agency or office of the unit which, directly or through another unit of government, finances construction.

Government-financed construction means construction funded at 50 percent or more by funds appropriated from a government financing agency's budget or obtained from general revenue bonds. Government financing at less than 50 percent may qualify if the construction is undertaken as an approved reclamation project under Title IV of the Act. Construction funded through government financing agency guarantees, insurance, loans, funds obtained through industrial revenue bonds or their equivalent, or in-kind

payments does not qualify as government-financed construction.

[44 FR 15322, Mar. 13, 1979, as amended at 64 FR 7482, Feb. 12, 1999; 68 FR 65625, Nov. 20, 2003]

§ 707.10 Information collection.

Since the information collection requirement contained in 30 CFR 707.12 consists only of expenditures on information collection activities that would be incurred by persons in the normal course of their activities, it is exempt from the requirements of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*) and does not require clearance by OMB.

[64 FR 7482, Feb. 12, 1999]

§ 707.11 Applicability.

(a) Coal extraction which is an incidental part of government-financed construction is exempt from the Act and this chapter.

(b) Any person who conducts or intends to conduct coal extraction which does not satisfy paragraph (a) of this section shall not proceed until a permit has been obtained from the regulatory authority under a State, Federal or Federal lands program.

§ 707.12 Information to be maintained on site.

Any person extracting coal incident to government-financed highway or other construction who extracts more than 250 tons of coal or affects more than two acres shall maintain, on the site of the extraction operation and available for inspection, documents which show—

(a) A description of the construction project;

(b) The exact location of the construction, right-of-way or the boundaries of the area which will be directly affected by the construction; and

(c) The government agency which is providing the financing and the kind and amount of public financing, including the percentage of the entire construction costs represented by the government financing.

United States Department of Agriculture



Natural Resources Conservation Service
235 Oil Well Road
Jackson, Tennessee 38305

Date: August 15, 2006

Mr. Charles E. Bush
Department Of Transportation
Suite 900 - James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243



Re: State Route 18 Environmental Assessment, Hardeman and Madison Counties, Tennessee

Mr. Bush:

Enclosed is the completed AD-1006 Farmland Conversion Impact Rating for the above-mentioned project.

If you have any additional questions, please contact me at (731) 668-0700.


Charles L. Davis
Resource Soil Scientist

Jcc: Joel M. Budnik, Parsons, Chesterfield, Missouri

Helping People Help the Land

An Equal Opportunity Provider and Employer

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)		Date Of Land Evaluation Request 8/7/06			
Name Of Project State Route (S.R.) 18 from S.R. 100 to S.R. 5		Federal Agency Involved Federal Highway Administration			
Proposed Land Use Roadway Improvement Project		County And State Hardeman and Madison Counties, Tennessee			
PART II (To be completed by NRCS)		Date Request Received By NRCS 08-09-2006 * SHEET 1 of 2			
Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply - do not complete additional parts of this form).		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Acres Irrigated N/A	Average Farm Size M = 255 / H = 297
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres M = 244,268 H = 143,971 % 68 54	Amount Of Farmland As Defined In FPPA Acres M = 177,147 H = 79,327 % 73 55		Date Land Evaluation Returned By NRCS 08-15-2006	
Name Of Land Evaluation System Used HARDEMAN & MADISON CO.	Name Of Local Site Assessment System N/A				
PART III (To be completed by Federal Agency)		Alternative Site Rating			
		Alt. 1 (M/H)	Alt. 2 (M/H)	Alt. 3 (M/H)	Alt. 4 (M/H)
A. Total Acres To Be Converted Directly		107 / 52	276 / 149	289 / 144	294 / 149
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site		107 / 52	276 / 149	289 / 144	294 / 149
PART IV (To be completed by NRCS) Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		37 / 3	99 / 8	113 / 8	82 / 11
B. Total Acres Statewide And Local Important Farmland		N/A	N/A	N/A	N/A
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		< 0.01	< 0.01	20.01	< 0.01
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		36 / 46	26 / 46	36 / 46	36 / 46
PART V (To be completed by NRCS) Land Evaluation Criterion					
Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)		97	99	97	98
PART VI (To be completed by Federal Agency)					
Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))		Maximum Points			
1. Area In Nonurban Use		15	10	14	13
2. Perimeter In Nonurban Use		10	2	10	9
3. Percent Of Site Being Farmed		20	1	4	2
4. Protection Provided By State And Local Government		20	20	20	20
5. Distance From Urban Builtup Area		NA	-	-	-
6. Distance To Urban Support Services		NA	-	-	-
7. Size Of Present Farm Unit Compared To Average		10	5	5	5
8. Creation Of Nonfarmable Farmland		25	2	3	3
9. Availability Of Farm Support Services		5	2	2	2
10. On-Farm Investments		20	1	1	1
11. Effects Of Conversion On Farm Support Services		25	0	0	0
12. Compatibility With Existing Agricultural Use		10	1	1	1
TOTAL SITE ASSESSMENT POINTS		160	0 44	0 60	0 56
PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)		100	0 97	0 99	0 97
Total Site Assessment (From Part VI above or a local site assessment)		160	0 44	0 60	0 56
TOTAL POINTS (Total of above 2 lines)		260	0 141	0 159	0 153
Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>			

* In early 2007, the alignments of Alternatives 2 through 4 shifted slightly to avoid stream and wetland impacts. The alignment shifts did not substantially change the amount of farmland impacted. Therefore, the data provided by NRCS in 2006 for the original four alternatives was utilized in the comparison of impacts between Alternatives.

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)		Date Of Land Evaluation Request		10-3-2007* SHEET 2 of 2	
Name Of Project		State Route (S.R.) 18 from S.R. 100 to S.R. 5		Federal Agency Involved	
Proposed Land Use		Roadway Improvement Project		County And State	
		Hardeman and Madison Counties, Tennessee		Date Request Received By NRCS	
PART II (To be completed by NRCS)		08-09-2006 / 10-04-2007			
Does the site contain prime, unique, statewide or local important farmland? (if no, the FPPA does not apply - do not complete additional parts of this form).		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Acres Irrigated	Average Farm Size
Major Crop(s)		Farmable Land In Govt. Jurisdiction Acres: M=244,268 H=143,971 % 68 34		NA	M=255 H=297
Name Of Land Evaluation System Used		Name Of Local Site Assessment System		Amount Of Farmland As Defined In FPPA Acres: M=177,197 H=79,321 % 73 55	
HARDMAN & MADISON CO		NA		Date Land Evaluation Returned By NRCS 08-15-2006	
PART III (To be completed by Federal Agency)		(M/H)		Alternative Site Rating	
A. Total Acres To Be Converted Directly (Separated by County)		M=Madison County H=Hardeman County	Alternative 5	Alternative 6	
B. Total Acres To Be Converted Indirectly			141/87	248/87	
C. Total Acres In Site			141/87	248/87	
PART IV (To be completed by NRCS) Land Evaluation Information					
A. Total Acres Prime And Unique Farmland			60/8	115/8	
B. Total Acres Statewide And Local Important Farmland			NA	NA	
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted			<0.01	<0.01	
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value			36/46	36/46	
PART V (To be completed by NRCS) Land Evaluation Criterion					
Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)			98	99	
PART VI (To be completed by Federal Agency)					
Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))		Maximum Points			
1. Area In Nonurban Use		15	10	14	
2. Perimeter In Nonurban Use		10	3	9	
3. Percent Of Site Being Farmed		20	2	4	
4. Protection Provided By State And Local Government		20	20	20	
5. Distance From Urban Buildup Area		NA	-	-	
6. Distance To Urban Support Services		NA	-	-	
7. Size Of Present Farm Unit Compared To Average		10	5	5	
8. Creation Of Nonfarmable Farmland		25	2	3	
9. Availability Of Farm Support Services		5	2	2	
10. On-Farm Investments		20	1	1	
11. Effects Of Conversion On Farm Support Services		25	0	0	
12. Compatibility With Existing Agricultural Use		10	1	1	
TOTAL SITE ASSESSMENT POINTS		160	0 46	0 59	0 0
PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)		100	0 98	0 99	0 0
Total Site Assessment (From Part VI above or a local site assessment)		160	0 46	0 59	0 0
TOTAL POINTS (Total of above 2 lines)		260	0 144	0 158	0 0
Site Selected:		Date Of Selection		Was A Local Site Assessment Used?	
Reason For Selection:				Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

* Data for Alternative 5 and Alternative 6 was estimated using data provided by the NRCS in 2006 for the original four Alternatives because the alignments of Alternatives 5 and 6 differ only slightly from other potential alternative alignments (Alternatives 3 and 4).

See Instructions on reverse side

This form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)



United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

April 12, 2006

Mr. Tom Love
Tennessee Department of Transportation
Environmental Division
James K. Polk Building, Suite 900
505 Deaderick Street
Nashville, TN 37243-0334

Re: FWS #06-FA-0602

Dear Mr. Love:

Thank you for your correspondence of March 9, 2006, regarding the Tennessee Department of Transportation's (TDOT) proposed State Route 18 Reconstruction Project (Pin 101599.00) in Madison and Hardeman counties, Tennessee. TDOT proposes several possible alternatives to reconstruct approximately 15 miles of highway from State Route 100 to State Route 5 as shown on the attachments to your correspondence. Fish and Wildlife Service (Service) personnel have reviewed the information submitted and we offer the following comments.

Information available to the Service indicates that wetlands exist in the vicinity of the proposed project. Due to the number of sites involved, it is infeasible for us to provide specific data regarding potential wetland conflicts with this response. The Corps of Engineers and Tennessee Department of Environment and Conservation should be contacted regarding the definitive presence of regulatory wetlands and the requirements of wetlands protection statutes.

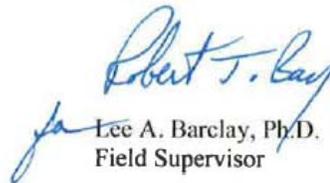
Since the proposed project will involve construction activities over creeks, we recommend that silt barriers be put in place to prevent runoff of sediment. Perennial streams should be bridged rather than culverted. Construction within or adjacent to the streams should be accomplished during low-flow periods, and the streambanks reseeded with native vegetation beneficial to wildlife immediately following disturbance.

Endangered species collection records available to the Service do not indicate that federally listed or proposed endangered or threatened species occur within the impact area of the project. We note, however, that collection records available to the Service may not be all-inclusive. Our data base is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus does not necessarily provide conclusive evidence that protected species are

present or absent at a specific locality. However, based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Thank you for the opportunity to comment on this proposed action. If you have any questions regarding the information which we have provided, please contact Wally Brines of my staff at 931/528-6481, extension 222.

Sincerely,



Lee A. Barclay, Ph.D.
Field Supervisor



TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

August 31, 2006

Tom Love
State of Tennessee
Department of Transportation
Environmental Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, TN 37243-0334

Re: Participation with TDOT and FHWA in the Development of the EA for the SR-18 Project in Hardeman and Madison Counties, Tennessee

Dear Mr. Love:

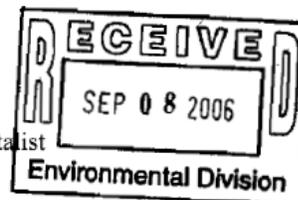
The Tennessee Wildlife Resource Agency has received and reviewed the information your office provided to us regarding the proposed project listed above. Our current concerns are potential environmental impacts associated with potential stream and wetland impacts that may occur due to the construction of this project. We also have concerns regarding potential impacts associated with this project on the Firebelly Darter, *Etheostoma pyrrhogaster*, a State Deemed In-Need-Of-Management species. We encourage continued consultation with our agency in future phases of this project to reduce impacts to fish and wildlife resources.

We accept your invitation to participate with TDOT and FHWA in the development of the EA for the SR-18 Project in Hardeman and Madison Counties, Tennessee. We thank you for the opportunity to participate during the coordination process and look forward to working with TDOT personnel in the future to reduce potential impacts to fish and wildlife resources associated with this project.

Sincerely,

A handwritten signature in cursive script that reads "Robert M. Todd".

Robert M. Todd
Fish and Wildlife Environmentalist



cc: Steve Seymour, Region I Habitat Biologist
Jerry Strom, Region I Assistant Manager

The State of Tennessee

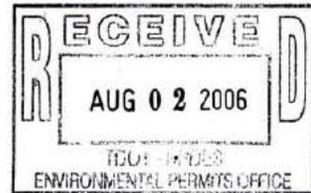
AN EQUAL OPPORTUNITY EMPLOYER

AN EQUAL OPPORTUNITY EMPLOYER



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Air Pollution Control Division
9th Floor L&C Annex, 401 Church Street
Nashville, TN 37243-1531

July 28, 2006



Charles E. Bush
Transportation Manager II
Department of Transportation
Environmental Division
Suite 900 – James K. Polk Bldg.
505 Deaderick St.
Nashville, TN 37243

Subject: State Route 18 Environmental Assessment, Hardeman and Madison Counties,
Tennessee

Dear Mr. Bush:

The Division of Air Pollution Control has reviewed the information provided on the scoping letter for the Environmental Assessment for State Route 18 in Hardeman and Madison Counties. Hardeman and Madison Counties are designated as attainment under the Federal National Ambient Air Quality Standards (NAAQS). As per the Transportation Conformity rule in 1200-3-34, this project is not subject to transportation conformity.

This agency's other interests, above what would be addressed through the standard NEPA process, concerns the control of fugitive dust and equipment exhaust emissions during the construction phase. Additionally, our concerns include that any structures requiring demolition are asbestos free, as per the requirements of Chapter 1200-3-11, Hazardous Materials. I would also like to point out that the open burning regulations have changed dramatically. Before the burning any wood waste, please refer to Chapter 1200-3-4; Open Burning Certification Process at <http://state.tn.us/environment/apc/apcregs/>.

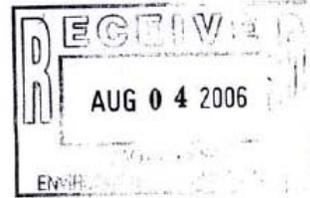
We appreciate the chance to comment on the document. If you have any questions or comments, please feel free to call me at (615) 532-0554.

Sincerely,

Barry R. Stephens, P.E.
Director

*08 days of
JWB*

cc: Robin Cathcart



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Ground Water Protection
10th Floor, 401 Church Street
Nashville, Tennessee 37243

August 3, 2006

Mr. Charles E. Bush
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

Re: State Route 18 Environmental Assessment, Hardeman and Madison Counties, Tennessee

Dear Mr. Bush:

The Division of Ground Water Protection regulates all aspects of the subsurface sewage disposal (SSD) program in the State of Tennessee. In this regard, Division staff has worked closely with TDOT on those construction projects where it is anticipated that the project will potentially impact existing SSD systems.

Regarding the above referenced project, the Division of Ground Water Protection anticipates that it is likely the project may impact existing SSD systems that are located along the route proposed for the above referenced project.

If you have any questions or think that assistance will be requested on this project, you should contact Mr. Conner Franklin at (731) 512-1302.

Sincerely,

Kent D. Taylor
Director
Division of Ground Water Protection

KDT/deh

CC: Mr. Conner Franklin

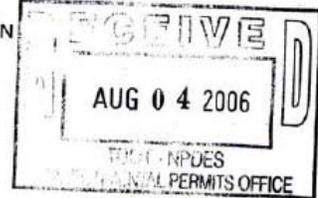
TDOTresponse74

*08 Aug 06
JWM*



August 1, 2006

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550



Mr. Charles Bush
Tennessee Dept. of Transportation
Suite 700/J. K. Polk Bldg.
Nashville, Tennessee, 37243-0349

RE: FHWA, SR-18 IMPROVEMENTS, MADISON, HARDEMAN COUNTY

Dear Mr. Bush:

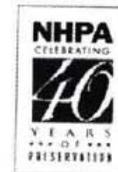
In response to your request, received on Tuesday, July 25, 2006, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process.

Considering available information, we find that the project as currently proposed **MAY AFFECT PROPERTIES THAT ARE ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES.** You should continue consultation with our office, designated consulting parties and invite them to participate in consultation, and provide us with appropriate survey documentation for review and comment. Please direct questions and comments to Joe Garrison (615) 532-1550-103. We appreciate your cooperation.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jyg





**STATE OF TENNESSEE
COMMISSION ON INDIAN AFFAIRS**

August 28, 2006

Dear Mr. Bush,

Thank you for the notice letter dated July 19, 2006 advising us of the proposed road project shown as State Route 18 Environmental Assessment, Hardeman and Madison Counties, Tennessee.

At this time, without knowing any more of the details of the project other than the proposed route as shown on the map provided us, the TCIA is unaware of any effects, favorable or adverse, on any programs or issues we are concerned with or that may be of concern to Native American Indians in Tennessee.

We are, of course, very interested in the discovery of any Indian burial site or historic or prehistoric site sacred to Indian people in Tennessee, or of interest to federal tribes who occupied the area of the project in historic or prehistoric periods. We would certainly expect to be notified if such site or sites were found and before any effort is made by TDOT or its contractors to excavate. In fact, it is our understanding that TDOT may have recently adopted an internal provision to notify this agency and the Native American members of the Tennessee Archaeological Advisory Council in the event of the discovery of Native American remains and/or funerary objects or artifacts of any nature that are Native American Indian in origin. We request that notification be addressed to me at the address shown, and even if TDOT has not adopted such a provision, we respectfully request notification because such findings would most definitely be of interest to our program.

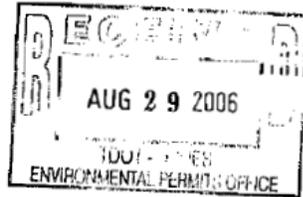
Thank you for notifying us about this project. We will work with you in the spirit of cooperation and in a timely fashion. We assume you will provide us a copy of the EA when it is available for agency comment.

26 Sep 06
JWM

Respectfully,

Doris Tate Trevino

Doris Tate Trevino
Chair TCIA



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER SUPPLY
GROUND WATER MANAGEMENT SECTION
 9th Floor, 401 Church Street
 Nashville, Tennessee 37243-1539
 Phone: (615) 532-0191; Fax: (615) 532-0503

*20 Aug 06
JWM*

August 25, 2006

Mr. Charles E. Bush
 Environmental Division
 Department of Transportation
 Suite 900- James K Polk Building
 505 Deaderick Street
 Nashville, TN 37243-0334

RE: State Route 18
 Hardeman and Madison Counties, TN

Dear Mr. Bush:

The Division of Water Supply appreciates the opportunity to provide water supply information in the furtherance of Department of Transportation projects. A review of the community water supplies in the area show that the proposed routes have no community public wells, springs or wellhead protection areas or surface water intakes in the vicinity.

If you have any questions, feel free to call me at (615) 532-0170 or e-mail me at tom.moss@state.tn.us.

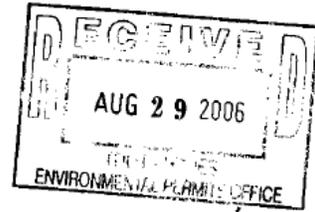
Sincerely,

Thomas A. Moss, P.G.
 Source Water/Wellhead Protection Coordinator
 Manager, Ground Water Management Section
 Division of Water Supply

c: David Draughon, Director, TN Division of Water Supply
 Brian Caton, Jackson DWS Field Office Manager



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
WATER POLLUTION CONTROL
401 CHURCH STREET
6TH FLOOR L&C ANNEX
NASHVILLE, TN 37243



*06 Sept 06
jwm*

August 28, 2006

Charles E. Bush
Transportation Manager II
Tennessee Department of Transportation
James K. Polk Building, Suite 900
505 Deadrick Street
Nashville, Tennessee 37243

SUBJECT: State Route 18 Environmental Assessment, Hardeman and Madison Counties, Tennessee

Dear Mr. Bush:

The Tennessee Department of Environment and Conservation (TDEC)'s Division of Water Pollution Control (division) appreciates the opportunity to participate in the development of an Environmental Assessment (EA) for the improvement and/or relocation of the existing State Route 18 from State Route 100 in Hardeman County to State Route 5 (U.S. 45) in Jackson, Madison County, Tennessee.

The division's general concerns about construction projects such as the one proposed include, but are not limited to:

- Identification and assessment of all water resources must be made prior to construction
- All appropriate permits must be obtained prior to commencement of construction
- Impacts to water resources, including wetlands should be avoided when possible
- Appropriate mitigation must be undertaken for unavoidable impacts
- Appropriate erosion prevention and sediment control measures must be installed and maintained

Specifically for this project, the division will require identification and assessment of all water courses with an estimate of linear footage of stream to be altered for each crossing, and a total for each alternative (including proposed culverts and relocations). Wetland impacts should include locations, acreage for each site, a description of the type of wetland impacted at each location, and a total wetland acreage impact for each alternative.

An Aquatic Resource Alteration Permit will be needed if there are any alterations to waters of the state, and coverage under Tennessee's *General NPDES Permit for Discharges of Storm Water Associated with Construction Activities* (CGP) will be needed for any land disturbance of one acre or more. Please understand that there may be other regulatory programs applicable to this project that are administered by other divisions of the Department of Environment and Conservation. The applicant is responsible to determine all regulatory programs that are applicable to this project.

For any questions regarding these comments, please contact Ms. Pat Patrick, Manager of the Division of Water Pollution Control in the Jackson Environmental Field Office (731-512-1301) or Ronnie Bowers, the division's TDOT Coordinator (615-687-7051). Please copy Ms. Patrick and Mr. Bowers on all further correspondence regarding this EA.

Sincerely,



Regan W. McGahen
Environmental Specialist
Division of Water Pollution Control

RWMC/jaw

cc: File

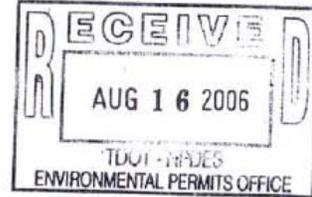
Robin Cathcart, Environmental Policy Analyst, TDEC
Pat Patrick, Water Pollution Control Manager, Jackson Environmental Field Office
Ronnie Bowers, TDOT Coordinator, Nashville Environmental Field Office
Dan Eagar, Manager, Water Pollution Control, Natural Resources Section

CITY OF MEDON

**25 College Street / P.O. Box 23
Medon, Tennessee 38358
Phone - 731.422.6237 / Fax - 731.422.1764
Email - medon@aeneas.net
Website - www.cityofmedontn.homestead.com**

August 15, 2006

Charles Bush, Transportation Manager II
NEPA Documentation Office
State of Tennessee
Department of Transportation - Environmental Division
Suite 900 - James K. Polk Building
505 Deaderick Street
Nashville, TN 37243



*21 Aug 06
jwn*

Dear Mr. Bush,

The following is the City of Medon's proposal for the widening of State Route 18 through the City of Medon, in response to your request to Mr. Evelyn C. Robertson, Jr., Executive Director of Southwest Tennessee Development District in Jackson, for advice and comments concerning this improvement project.

1. Five (5) 12-foot wide traffic lanes, with one (1) 12-foot wide lane being a continuous center turning lane from the north city limits to the south city limits.
2. Two (2) 6-foot wide bicycle lanes with 2-foot wide curbs and gutters from the north city limits to the south city limits.
3. 5-foot wide sidewalks on both the east and west sides of State Route 18 from the north city limits to the south city limits.

This will narrow the right-of-way needed from 104 feet to 86 feet from the north city limits to the south city limits of Medon.

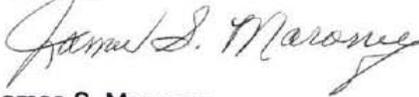
4. Relocate the entrance to Riverside Drive as previously indicated on preliminary drawing No. 30, issued to the City of Medon in 1999 by TDOT.
5. We would also like for TDOT to take equal amounts of needed right-of-way from each side, where possible. This will affect less people if this is possible to do.

One of the reasons we are requesting this proposal is that we have been told by TDOT in the past that if a by-pass is carried around Medon, the city will have to start maintaining the 3.1 miles of State Route 18 that now exists within the corporate limits of the City of Medon. The City of Medon does not have the financial means to take on this responsibility. We don't foresee any detrimental environmental impact with this

proposal, and we feel this proposal would be more practical economically for the state transportation department. The proposed sidewalks would be beneficial to people without transportation in the City of Medon to get to the Medon City Hall & Community Center, the Medon Post Office, area churches, and other places of business.

This proposal is being presented on behalf of the residents of the City of Medon as represented by the Mayor, James S. Maroney, and Board of Aldermen: Gordon Harris, Marlyce Harris, Doris Jackson, and Fred Stevenson.

Sincerely,



James S. Maroney
Mayor, City of Medon, Tennessee

cc: Gerald Nicely, Commissioner, TDOT
Evelyn C. Robertson, Jr., Director, SWTDD
Monique Hazlewood, Economic Dev. Coord., SWTDD
State Representative Jimmy Eldridge
State Representative Johnny Shaw
State Senator Don McCleary
Mayor Charles Farmer, City of Jackson
Mayor Jerry Gist, Madison County

OFFICE OF
Jerry Gist
Madison County Mayor



100 EAST MAIN, SUITE 302
JACKSON, TENNESSEE 38301
PHONE: 731-423-6020
FAX: 731-988-3820

July 28, 2006

Mr. Charles E. Bush
Transportation Manager, II
NEPA Documentation Office
Tennessee Department of Transportation
Environmental Division
Ste. 900 – James K. Polk Building
505 Deaderick St.
Nashville, TN 37243

Subject: State Route 18 Environmental Assessment, Hardeman and Madison Counties, Tennessee

Dear Mr. Bush:

I have conducted a number of town hall meetings along State Route 18 along with staff from TDOT. The routes that were discussed did not provide my office any information that might impact Title VI services or have a major impact on the environment.

There is a great amount of concern about the final decision on any re-routing of State Route 18. Please keep my office apprised of any decisions forthcoming and any planned or scheduled hearings on this subject. This assistance request will allow my office to update concerned citizens.

Sincerely,

Jerry Gist
Jerry Gist, County Mayor
Madison County, Tennessee

JG/m

*August
JWM*



27 Conrad Drive
 Suite 150
 Jackson, Tennessee 38205-2850
 731-668-7112
 731-668-8421
 swtd@swtdd.org

Evelyn C. Robertson, Jr., Executive Director

Kevin Davis, Chairman

Franklin Smith, Vice Chairman

Troy Kitzer, Secretary-Treasurer

CHESTER DECATUR HARDEMAN HARDIN HAYWOOD HENRITSON MADISON MCNAIRY

August 30, 2006

RECEIVED

SEP 07 2006

TDOT
Environmental Permits Section

Charles Bush, Transportation Manager II
 NEPA Documentation Office
 State of Tennessee
 Department of Transportation – Environmental Division
 Suite 900 – James K. Polk Building
 505 Deaderick Street
 Nashville, TN 37243

Re: State Route 18 Environmental Assessment, Hardeman and Madison Counties,
 Tennessee

Dear Mr. Bush,

In response to your letter dated July 19, 2006, we contacted several local governments as well as the NAACP State Conference of Branches, located in Jackson, and inquired about any known special interest groups that may be located along one of the proposed alternates or crossovers for Highway 18, from the 45 Bypass in Jackson to Highway 100 in Hardeman County. Your letter, along with a map of the proposed alternate routes was sent to each government entity/organization. Here are the responses:

NAACP State Conference of Branches: No known special interest groups.

City of Jackson: No known special interest groups.
 Recommendation that Alternative 2 or Crossover C5 be used (please see attached letter).

City of Medon: No known special interest groups.
 Recommendations for project stated (please see attached letter).

*125-006
 JWM*

Madison County:

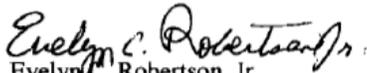
No known special interest groups. However, the County stated that there were several concerns voiced by interested citizens living along the proposed routes at a TDOT public hearing held in October of 2004.

Hardeman County:

No known special interest groups.

We hope that this information assists you in your improvement or relocation of Highway 18. Should you have any questions, please contact me at 731-668-6402.

Sincerely,


Evelyn C. Robertson, Jr.
Executive Director

121 EAST MAIN STREET, SUITE 301
P.O. BOX 2508
JACKSON, TENNESSEE 38302-2508



TELEPHONE: 731-425-8240
FAX: 731-425-8605
E-MAIL: CFARMER@CITYOFJACKSON.NET

City of Jackson

CHARLES H. FARMER
MAYOR

August 11, 2006

Mr. Drew Christian
Southwest Tennessee Development District
27 Conrad Drive, Suite 150
Jackson, TN 38305

Re: State Route 18 Environmental Assessment, Hardeman and Madison Counties, TN

Dear Mr. Christian:

This is to advise that I am in receipt of the information on the proposed improvement and/or relocation of State Route 18. It is my recommendation that Alternative 2 or Crossover C5 be used in this project.

Thank you for your consideration in this matter.

Yours very truly,


Charles H. Farmer
Mayor, City of Jackson

CHF:tpr

*125800
jwm*

APPENDIX B - CULTURAL RESOURCES COORDINATION EFFORTS and COPIES OF LETTERS

B.1 Section 106 Coordination Efforts

On January 8, 2007, TDOT mailed letters to the Madison County Mayor, Mr. Jerry Gist, and the Hardeman County Mayor, Mr. Willie E. Spencer asking them to be consulting parties in the Section 106 process. On May 1, 2000, TDOT mailed letters to seven groups or tribes representing Native American interests and asked them if they wished to participate in the historic review process as consulting parties. The list of groups or tribes contacted include:

- Mr. Jim Henson - United Keetowah Band of Cherokee;
- Charles D. Enyart - Eastern Shawnee Tribe;
- Mr. Jerry G. Haney - Seminole Nation of Oklahoma;
- Mr. R. Perry Beaver - Muscogee (Creek) Nation;
- Mr. Gregory E. Pyle - Choctaw Nation of Oklahoma;
- Mr. Bill Anoatubby - Chickasaw Nation;
- Mr. Chadwick Smith - Cherokee Nation of Oklahoma;
- Mr. Leon Jones - Eastern Band of Cherokee Indians;
- Mr. Corky Allen - E.U.C.H.E.E.; and
- Mr. Toye Heape - Tennessee Commission of Indian Affairs.

To date, TDOT has received one response to letters mailed out. Copies of the letters sent and received are included in this Appendix.

Copies of the SHPO letters approving the Historic Architecture and Archaeology studies are also contained in this Appendix.

B.2 Cultural Resources/Section 106 Coordination Letters

Sample Letter to Native Americans



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL PLANNING AND PERMITTING DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADEBUCK STREET
NASHVILLE, TENNESSEE 37243-0334
(615) 741-3653

June 08, 2000

Mr. Toye Heape
Tennessee Commission of Indian Affairs
Seventh Floor, L&C Annex
401 Church Street
Nashville, TN 37243-0459

SUBJECT: State Route 18 from Bolivar to State Route 5 in Jackson, Hardeman and Madison Counties

Dear Mr. Heape:

The Tennessee Department of Transportation (TDOT) in cooperation with the Federal Highway Administration is proposing to build the above referenced project. The location of the proposed project is shown on the enclosed map.

The 1999 Advisory Council on Historic Preservation regulations stipulate that Indian tribes that attach religious and cultural significance to historic properties that may be affected by an undertaking be invited to participate in the project review process as consulting parties, pursuant to 36 CFR 800. TDOT would like to invite you to participate as a consulting party for the proposed project. This letter is also TDOT's request for comments on the identification of historic properties in the project's area of potential effect that may be of religious and cultural significance to your tribe.

If you choose to participate as a consulting party on the above-referenced project, you will receive copies of cultural resource assessments that identify Native American related resources. You will also be invited to attend project-related meetings with FHWA, TDOT and the Tennessee State Historic Preservation Office (TN-SHPO), if any are held. We respectfully request written responses to project reports and other materials within thirty (30) days of receipt.

If you would like to participate as a consulting party, please respond to me at the above address via letter, telephone or E-mail. To facilitate our planning process, please respond within 30 days of receipt of this letter. If you do not respond, TDOT will not send any reports related to this project unless you specifically request such copies at a later date. Thank you for your assistance.

Sincerely,

A handwritten signature in cursive script that reads "Gerald Kline".

Gerald Kline
Archaeologist Supervisor

Enclosure
cc: Mr. Herbert Harper, TN-SHPO

Sample Letter to Local Government Officials



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
THE ENVIRONMENTAL DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334
(615) 741-3855
Fax (615) 741-1098

January 8, 2007

Willie E. Spencer
Hardeman County Mayor
P.O. Box 250
Bolivar, TN 38008

RE: Section 106 Initial Coordination for Proposed Improvements to State Route 18 from State Route 100 to State Route 5 (U.S. 45), Hardeman & Madison Counties, Tennessee

Dear Mr. Spencer:

The Tennessee Department of Transportation (TDOT) in cooperation with the Federal Highway Administration is proposing to improve the above referenced project. Its location is shown on the enclosed map.

The 2001 Advisory Council on Historic Preservation regulations stipulate that TDOT invite local government representatives to participate in the historic review process as a consulting party. TDOT would like to invite you, as the local government official, to participate as a consulting party for the proposed project.

If you choose to participate as a consulting party, you will receive copies of TDOT's environmental reports and will be invited to attend project-related meetings between TDOT and the Tennessee State Historic Preservation Office (TN-SHPO), if any are held. As a consulting party, you should be prepared to attend any such meetings between TDOT and the TN-SHPO and provide a response to TDOT's reports in written form within 30 days upon receipt of the report. TDOT also wishes to seek your comments on the identification and evaluation of historic properties that the proposed project might impact.

If you would like to participate as a consulting party, please write to me at the above address. To facilitate our planning process, please respond within 30 days of receipt of this letter. Thank you for your assistance.

Sincerely,

Martha Carver
Historic Preservation Program Manager

Enclosure



the
Chickasaw
Nation HEADQUARTERS

Arlington at Mississippi / Box 1548 / Ada, OK 74821-1548 / (580) 436-2603

Bill Anoatubby
Governor

Jefferson Keel
Lieutenant
Governor

August 21, 2000

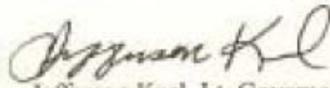
Gerald Kline
Tennessee Department of Transportation
Suite 900, 505 Deaderick Street
Nashville, TN 37243-0334

Dear Mr. Kline:

This is in response to your letter regarding proposed improvements to State Route 18 from Bolivar to State Route 5 in Jackson, Hardeman and Madison Counties. At this time we are not aware of any culturally sensitive or sacred sites in or near the project site. However, this area is located in our ceded lands and the possibility for uncovering such sites is highly possible. We expect that if there is an inadvertent discovery that all work would cease and we would be notified as soon as possible, according to all applicable federal laws that apply.

Thank you for your sensitivity to these issues. If you have any questions, please contact Mrs. Rena Duncan, director of cultural resources, at (580) 332-8685.

Sincerely,


Jefferson Keel, Lt. Governor
The Chickasaw Nation





TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

June 11, 2008

Ms. Martha Carver
Tennessee Department of Transportation
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

RE: FHWA, SR-18 FROM SR-100 TO SR-5, UNINCORPORATED,
MADISON COUNTY

Dear Ms. Carver:

Pursuant to your request, this office has reviewed documentation concerning the above-referenced undertaking received Friday, June 6, 2008. This is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Considering available information, and contingent upon development of an appropriate landscaping plan, we find that the project as currently proposed will not adversely affect any property that is eligible for listing in the National Register of Historic Places. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Jennifer M. Barnett (615) 741-1588, ext. 105. We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb



TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

June 9, 2008

Mr. Gerald Kline
Tennessee Department of Transportation
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

RE: FHWA, ARCHAEOLOGICAL ASSESSMENT, SR-18/SR-100 TO SR-5,
UNINCORPORATED, MULTI COUNTY, TN

Dear Mr. Kline:

At your request, our office has reviewed the above-referenced archaeological survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we find that the project area contains no archaeological resources eligible for listing in the National Register of Historic Places.

If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

A handwritten signature in black ink that reads "E. Patrick McIntyre, Jr.".

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb