4 ENVIRONMENTAL CONSEQUENCES

This section discusses the potential impacts of the Preferred Line on the social, natural, and physical environment.

Since both the Toll and Non-toll funding alternative concepts are still under study, the Environmental Consequences section uses the Non-toll Alternative as the standard (or worst case) scenario to evaluate and compare potential impacts. The Toll Alternative should result in equal or fewer impacts than the Non-toll Alternative. In those impact areas where the Toll Alternative could substantially change the potential for impacts, the Toll Alternative will be discussed in the narrative.

4.1 LAND USE

The primary direct impact to existing land use in the project area will be conversion to highway right-of-way. September 2004 aerial imagery was used to determine land use in the vicinity of the Preferred Line. Land use conversions were determined using a Geographic Information System (GIS) platform. Table 4-1 provides estimates of the existing land use categories that would be converted to highway right-of-way by construction of the Preferred Line. The amounts reported in the table are the spatial intersections of the land use features utilizing an estimated 300-foot (90-meter) right-of-way along the alignment, proposed interchanges with an estimated 150-foot (46-meter) right-of-way outside of the interchange ramps, and any anticipated reconstruction of existing roadways and interchanges associated with the project. The Miscellaneous category includes borrow and waste areas and some abandoned areas.

Table 4-1
Existing Land Use Converted to Highway Right-of-Way*
Acres (Hectares)

Agricultural	Woodland	Existing Roadways	Commercial	Industrial	Residential	Miscellaneous	Total
607 (245)	247 (100)	133 (54)	30 (12)	38 (15)	95 (39)	19 (8)	1169 (473)

*Based on an average right-of-way width of 300 feet (90-meter)

The largest land use conversion will be agricultural land. This category is largely pasture (see also Table 4-15, Land Cover), but also includes agricultural complexes, primarily confined poultry operations. Additionally, 18 acres (7 hectares) of utility right-of-way will be impacted, of which ten acres (4 hectares) are presently utilized as pasture.

Secondary impacts to existing land use may occur in two ways: 1) increased commercial development at local access interchange locations where direct access to the facility will be possible, or 2) increased development in the project area encouraged by connectivity.

These impacts will include conversions of property from mainly agricultural use to residential, commercial, and industrial use. Local access interchanges are planned on the eastern and western termini with existing Highway 412, and at Highway 112, Highway 71B, and Highway 265 (Old Wire Road). Typically, increased commercial development will occur around these interchanges. Due to the many variables involved, precise predictions of the type and extent of secondary development are not possible. However, based on regional growth studies (see Regional Growth Section of Purpose and Need), it is likely that the study area will continue to develop whether or not the project is implemented. The Preferred Line does not relocate the I-540/Wagon Wheel Road local access or Wagon Wheel Road, thereby minimizing these secondary development impacts.

Transportation demand and local traffic along existing Highway 412 will continue to be high. The traffic analysis information shown in Section 2.3.6.3 supports this conclusion. Therefore, it is not expected that the bypass would unduly affect service-related businesses along the existing highway.

A secondary impact associated with the Preferred Line will be the conversion of 55 acres (22 hectares) of existing agricultural land to a transportation use because of the proposed construction of an interchange with the NWARA Access Road. No local access would be provided at this interchange that would promote increased secondary development.

Land-use planning studies developed by cities in the region were used to evaluate how the project might affect planned future land use. This information is shown on Figure 3-1 and is based upon zoning maps for cities in the project area provided by the Northwest Arkansas

Planning Commission. Table 4-2 provides estimates of planned land use types converted by the Preferred Line. Future land use planning and city zoning would be affected by the project, since property close to the facility's local access interchanges will be more attractive for development. As with the conversion of existing land uses discussed previously, this is most likely to happen near interchanges located at the project's eastern and western termini with existing Highway 412, and at Highway 112, Highway 71B, and Highway 265 (Old Wire Road).

Table 4-2
Planned Land Use Types Converted to Highway Right-of-Way*
Acres (Hectares)

Agricultural	Commercial	Residential	Industrial	Public	Not zoned (County)	Total
225 (91)	91 (37)	19 (8)	15 (6)	0 (0)	882 (357)	1,233 (499)

*Based on an average right-of-way width of 300 feet (90 meters) and City Zoning Maps

If the No-Action Alternative is selected, development will continue, but travelers will have to depend on the existing highway system and street network to serve the growing population and development in the study area.

4.1.1 Visual Environment

The Preferred Line is located in more rural settings than the existing route shown in Figure 4-1. Typical rural views include cattle or hay pastures as shown in Figure 4-2 and confined poultry structures as shown in Figure 4-3. With the rapid development presently occurring in the project area, urban and rural elements intermix as shown in Figure 4-4. Two large quarries will be viewed from the Preferred Line: the McClinton-Anchor Sharps Quarry as shown in Figure 4-5 and Northwest Arkansas Quarries as shown in Figure 4-6. Construction of the I-540 interchange will impact Belmont Estates on the north side of Callahan Mountain as shown in Figures 4-7 and 4-8.

Negative temporary aesthetic impacts during construction are unavoidable. Secondary impacts to the visual environment would occur due to development of adjacent properties into commercial and residential areas. While presently the conversion of agricultural

Figure 4-1. A view of existing Highway 412.

Figure 4-2. Pasture is very common in the project area.

Figure 4-3. Confined poultry structures are common in the project area.

Figure 4-4. New residential development is rapidly displacing the rural landscape.

Figure 4-5. An eastward view of the McClinton-Anchor Sharps Quarry.

Figure 4-6. A northeast view of the Northwest Arkansas Quarry.

Figure 4-7. A view of Belmont Estates development on the north side of Callahan Mountain.

Figure 4-8. A view of Callahan Mountain from the location of the I-540/Preferred Line Interchange.

property in the area is principally to a residential use, conversion of property near the local access interchanges will likely be from agricultural to commercial.

The No-Action Alternative would have no direct effect on the visual environment along existing Highway 412.

4.1.2 Air Quality

The primary mobile source of air pollution emissions associated with the project is motor vehicles using the proposed highway facility. An air quality assessment was performed following the guidelines established by the AHTD, FHWA, and EPA. Based on historical monitoring data in the project area, Benton and Washington Counties are currently designated as being in attainment for carbon monoxide and ozone (CO and O_3). Therefore, this project is not subject to transportation conformity requirements.

This section includes discussion on assessment methodology, existing mobile source (traffic-related) air quality in the project area, predicted impacts to the local air quality from construction of the proposed highway, and construction mitigation measures analysis.

4.1.2.1 Methodology

A microscale analysis was used to predict the affect that traffic on the proposed facility would have on local air quality. The microscale analysis predicts the generation and transportation of CO in the immediate area. The design year 2024 traffic projections were used in the analysis and the results were compared to the National Ambient Air Quality Standards (NAAQS).

Motor vehicle emission rates were computed using the EPA's MOBILE emissions model. To provide a worst-case scenario, the emission factors were developed using conservative model inputs. Carbon monoxide concentrations from highway vehicles were calculated by using a linear dispersion model (CALINE 3).

A realistic worst-case approach was taken for nearly all meteorological conditions. Wind directions were analyzed at predominant directions to determine the maximum CO concentrations. Other factors included a wind speed of one meter per second, a rural stable

atmospheric condition, a mixing height of 3,280 feet (1,000 meters) and worst case minimum and maximum January temperatures of 29.1 and 49.0°F, respectively.

Modeling was done for the peak 1-hour traffic condition. A background concentration of 2.0 parts per million (ppm) for the 1-hour concentration was used to account for CO sources outside the study area. Speeds for the existing roadways and the proposed highway were based on the travel demand model inputs.

Receptor sites along the roadway were chosen at locations where the highest CO concentrations could be expected and where the general public would have access during the analysis periods. These were placed at representative points along the proposed right-of-way lines where human activity may occur. The CO concentrations were compiled to assure the proposed highway, cross-streets, and background concentrations were included.

Since the project area is in attainment for O_3 and is included in the Northwest Arkansas Regional Planning Commission's (MPO) Year 2025 Transportation Plan, a mesoscale or "regional" analysis was not required.

4.1.2.2 Impacts

Table 4-3 shows the predicted highest one-hour CO receptor concentrations for the existing year and design year 2024. The highest concentrations, which include a conservative one-hour background level of 2.0 parts per million (ppm), would be located in areas where the greatest traffic volumes are moving at their slowest probable speed. This area is located between Highway 71B and I-540. Because the Toll Funding Alternative has lower predicted traffic volumes, it would have lower CO concentrations than the Non-toll Funding Alternative. The worst-case situation, which uses the highest traffic of both the Toll and Non-toll Funding Alternatives, is well within the one-hour NAAQS for CO and is shown in Table 4-3. For the existing year and design year conditions, there are no receptor concentrations above the 35 ppm NAAQS for CO. Therefore, the Preferred Line, regardless of the funding alternative, will have minimal impacts on air quality as related to CO concentrations.

An eight-hour analysis was not performed since the predicted one-hour concentrations did not exceed 9 ppm, the more stringent eight-hour NAAQS concentration criteria. Typical

eight-hour concentrations are 60-70 percent of the one-hour concentrations and therefore will always be lower than their one-hour counterpart.

Table 4-3
Predicted Highest One-Hour CO Concentrations
Compared to the 1-Hour NAAQS for CO
All units are in ppm

Receptor Links	Existing Year (2004)	1-Hour NAAQS	Design Year 2024			
			No-Action	1-Hour NAAQS	Build Alternative	1-Hour NAAQS
Worst-Case Existing Route: Hwy. 412 located south of proposed highway	*2.7	35	*2.9	35	*2.6	35
Worst-Case Proposed Highway Alignments: site located between Hwy. 71B & I-540	*2.3	35	N/A	35	*2.4	35

*A CO background of 2.0 ppm included in totals

The No-Action Alternative would likely lead to higher CO concentrations on existing Highway 412, resulting from slower speeds caused by increasing congestion.

Cumulative air quality impacts are a potential concern for residents located near the project. Once the bypass has been constructed, traffic volumes on the new facility will likely continue to increase over time which will result in rising background air pollution, particularly ozone precursors and CO. Both the human activity and the visual appearance of a community can be altered with increasing levels of background air pollution. However, no substantial air quality impacts are anticipated in the project's planning period.

Based on the microscale analysis results, no mitigation measures are required for the proposed highway. Further, the project is in an area where there are no transportation control measures and is in attainment for the appropriate pollutants. However, during construction, the selected project contractor will minimize air quality impacts through a combination of fugitive dust control, equipment maintenance, and compliance with state and local regulations.

4.1.3 Noise Levels

4.1.3.1 Methodology

The FHWA's Noise Abatement Criteria (NAC) and the respective interpretations of the NAC by the AHTD were used in the analysis of the acoustic impact of the proposed Highway 412 improvements. This analysis was conducted according to the guidelines as presented in the Federal Code of Regulations, Title 23, Part 772, which provides procedures to assess the acoustic impact of the proposed action and the need for abatement measures when the noise levels approach or exceed the FHWA's NAC for various land uses. The noise level descriptor is the equivalent sound level, $L_{eq}(h)$, defined as the steady state sound level which contains the same sound energy as the actual time-varying sound in a stated time period (usually one hour).

Noise abatement measures for traffic noise impacts are considered when the predicted noise levels "approach" or exceed those values shown for the appropriate activity category of the FHWA NAC (Table 4-4), or when the predicted traffic noise levels "substantially" (10 dBA or more) exceed the existing noise levels.

Table 4-4
Noise Abatement Criteria
Hourly A-Weighted Sound Level-Decibels (dBA)

Activity Category	$L_{eq}(h)$ (1 Hr)	Description of Activity / Land Uses for Receptors
A	57 dBA (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 lands are to continue to serve their intended purpose.
B	67 dBA (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, golf courses, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 dBA (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: Code of Federal Regulations, Title 23 Part 772, Revised August 1982.

4.1.3.2 AHTD Noise Abatement Criteria (NAC)

The AHTD has defined "approach" as being one dBA less than the noise levels shown in Table 4-4, and defines an increase of 10 dBA or more over the existing noise levels as being "substantial." The AHTD's definition of feasible noise mitigation is the ability to achieve a 10 dBA reduction in the peak hour $L_{eq}(h)$ noise level for at least one residence. Reasonableness is a more subjective criterion than feasibility. Therefore, the AHTD has established seven factors that are reviewed prior to the determination of reasonableness. A weighted system is used to rate each factor as a "High Yes," "Low Yes," "Low No," or a "High No." The factors are summarized as follows:

- **Mitigation Cost per Residence** – Cost per residence should be no more than $20,000 with a minimum decrease of 5 dBA. Rating Scale: Less than $15,000/residence – "High Yes" to greater than $25,000/residence – "High No."

- **Opinion of Residents –** Rating Scale: Greater than 80% of residents want noise abatement – "High Yes" to Less than 40% - "High No."

- **Date of Residence –** Rating Scale: Greater than 80% of housing development predated initial highway construction – "High Yes" to less than 30% - "High No."

- **Age of Structures –** Rating Scale: Greater than 80% of impacted developments have existed for at least 10 years – "High Yes" to less than 30% - "High No."

- **Activity Category –** Rating Scale:

    - Activity Category "A" $L_{eq}(h)$ noise level greater than 62 dBA – "High Yes" to less than 52 dBA – "High No."

    - Activity Category "B" $L_{eq}(h)$ noise level greater than 72 dBA – "High Yes" to less than 62 dBA – "High No."

    - Activity Category "C" $L_{eq}(h)$ noise level greater than 78 dBA – "High Yes" to less than 68 dBA – "High No."

- **Magnitude of Noise Increase over Existing –** Rating Scale: Future "build" noise levels greater than existing noise levels by 15 dbA $L_{eq}(h)$ – "High Yes" to less than 5 dBA $L_{eq}(h)$ – "High No."

- **Magnitude of Noise Increase over "No-Action"** – Future "build" noise levels greater than "no-action" noise levels by 10 dBA $L_{eq}(h)$ – "High Yes" to less than 4 dBA $L_{eq}(h)$ – "High No."

4.1.3.3 Noise Analysis Methods

The FHWA highway traffic noise prediction computer program STAMINA 2.0/OPTIMA was used for the DEIS to project future design-hour traffic noise levels within the study area for the year 2024. The following parameters were used in the model to calculate an hourly $L_{eq}(h)$ at a specified receiver location:

- Distance between roadway and receiver.
- Hourly traffic volumes for the following vehicles:
  - Light-duty (two axles, four tires)
  - Medium-duty (two axles, six tires)
  - Heavy-duty (three or more axles)
- Vehicle speed.
- Noise source height of the following vehicles:
  - Light-duty - 0 feet (0 meter)
  - Medium-duty - 2.3 feet (0.7 meter)
  - Heavy-duty - 8.0 feet (2.4 meters)

However, for the SDEIS, Traffic Noise Model version 2.0 (TNM) was utilized as the highway traffic noise prediction computer program to project future design-hour traffic noise levels for the year 2024. This transition was implemented due to the recent release of TNM as the new and updated highway traffic noise prediction model approved by the FHWA. Since it was necessary to update the traffic analysis for the SDEIS, the noise analysis for this project was updated by using TNM, the current state-of-the-art technology. TNM is considered a more advanced and precise program as a result of its capability for an increased number of input types and is currently required by the FHWA for all noise analysis. The same parameters were used in TNM to calculate an hourly Leq(h) at a specific distance as with the STAMINA model, except that an additional parameter, Ground Types, was added. TNM has a wider range of Ground Type selections for use in analysis than STAMINA, ranging from hard surfaces (example-pavement) to soft surfaces (example-field grass).

For the SDEIS and FEIS, the number of noise receptors was estimated by using the 66 dBA Leq(h) contour (NAC "approach" level) and the 10 dBA or greater ("substantial" increase from existing) contour. Aerial maps at a scale of 1 inch = 1000 feet (2.5 centimeters = 305 meters) were used to count the receptors within the contours. Windshield surveys were used

to establish the use of various structures affected. Also, structures that may benefit from shielding by other structures, earth berms, or earth cuts were still counted as noise receptors.

4.1.3.4 Predicted Noise Levels

The preferred alignment alternative for the Highway 412 improvements was evaluated for current (ambient) conditions, and modeled for an estimated increase in noise levels. The study corridor was divided into segments based upon changes in the projected design-hour traffic volumes. Design-hour traffic for the years 2004 and 2024 was the basis for the analysis. This analysis used the highest traffic volumes predicted through each segment of the alignment in order to model the worst-case potential noise impacts. From the western terminus of the project to I-540, Segments A-B and B-C, estimated traffic from the NWARA Access Road was included in the analysis.

For each of the analysis segments, typical noise contour widths were estimated based on both the design-hour traffic volumes and the features of the roadway. The model analysis utilized the typical cross section identified in the Purpose and Need Section for the proposed improvements on the new alignment location. The noise prediction program was then used to determine the predicted noise contour widths. Artificial receivers were simulated extending 600 feet (182 meters) at 50 feet (15 meter) intervals from the roadway centerline. The distances to the 66 dBA $L_{eq}(h)$ noise level were then interpolated from the receivers to develop the NAC contour widths. This same methodology was used to determine the distance to the 10 dBA or greater ("substantial" increase) contour. This procedure provides a conservative estimate of the future design-hour noise levels, but does not account for natural barriers such as cuts or fills.

4.1.3.5 Construction Alignments and Alternatives

The number of noise receptors was estimated for each segment of the alignments under study in the DEIS and SDEIS. Since performing this analysis, location and preliminary design changes were made in Preferred Segment A-B. The Alternatives Section 2.4.2.1.1 contains information relating to why this change was implemented. In order to verify that these

changes had not substantially affected the number of sensitive receptors, another noise analysis and receptor count was performed for the four alignments analyzed in the SDEIS. The results of this analysis can be found in Appendix H. This analysis illustrated that the number of receptors predicted for Preferred Segment A-B showed a slight decrease as a result of the adjustments for most of the four alignments studied in the SDEIS.

The following tables document the number of receptors on the Preferred Line for both the Non-toll and Toll Funding Alternatives. The number of receptors above the noise abatement criteria (NAC) is shown in Table 4-5, and the numbers that will experience a 10 dBA or greater increase are shown in Table 4-6.

Table 4-5
Estimated Noise Receptors Near Preferred Line
That Approach the Noise Abatement Criteria (66 dBA)

Year	Segment A-B		Segment B-C		Segment C-D		Segment D-E		Segment E-F		Totals	
	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll
YR 2004	3	2	1	1	0	0	0	0	0	0	4	3
YR 2024	7	6	6	6	0	0	2	0	0	0	15	12

Table 4-6
Estimated Noise Receptors Near Preferred Line With a 10 dBA or
Greater Increase Above the Estimated Existing Levels

Year	Segment A-B		Segment B-C		Segment C-D		Segment D-E		Segment E-F		Totals	
	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll	Non-toll	Toll
YR 2004	8	7	7	6	0	0	1	0	0	0	16	13
YR 2024	23	18	12	10	1	0	8	2	3	1	47	31

A substantial number of receptors will experience increases in noise levels along the Preferred Line alternative. However, the noise increase these receptors experience may not be above the FHWA noise criteria. The Preferred Line had the fewest number of affected sensitive noise receptors based upon the totals for the number of receptors approaching the noise abatement criteria and/or experiencing a 10 dBA or greater increase above existing noise levels. Also, the Toll Funding Alternative had lower numbers of noise receptors impacted than the Non-toll Funding Alternative. Specific evaluation of abatement options will be discussed later in this section and will be fully evaluated during the design phase of the project.

Cumulative impacts associated with construction of the conceptual interchange for the NWARA Access Road may result in the relocation of four homes, removing three potential sensitive noise receptors from Segment A-B for the Preferred Line.

Cumulative noise impacts are also a concern for noise sensitive areas near the project. Once the bypass has been constructed, traffic volumes on the new facility will continue to increase over time, which will result in rising background noise levels. Consequently, day-to-day activities will likely be affected as traffic volumes increase during the project planning period of twenty years. Individuals who reside in areas with low background noise, such as most rural locations, tend to spend more time outdoors and non-enclosed. In response to increasing noise levels, some people develop refuges, such as sunrooms versus open patios. Thus, the character of a neighborhood and/or rural community can be altered with increasing background noise levels.

4.1.3.6 No-Action Alternative

The No-Action Alternative would result in overall beneficial effects for both the residents along existing Highway 412 and the proposed bypass, particularly the new location areas. As discussed in Section 2.3.6.1, the "No-Action" Alternative would result in severe congestion on existing Highway 412. The congestion would cause lower speeds, thereby resulting in a

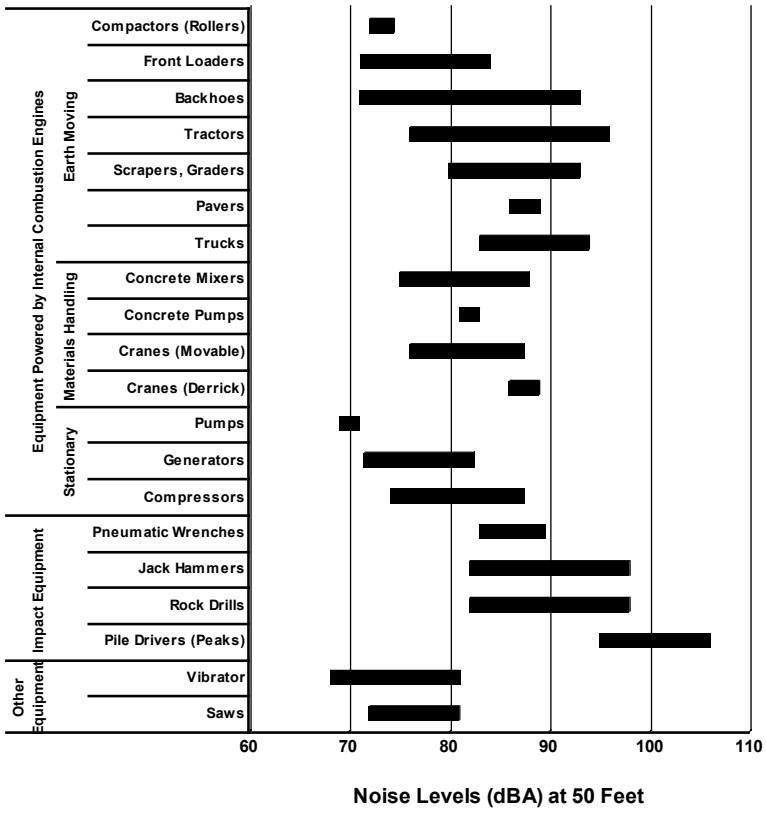
reduction in noise levels on existing Highway 412. In addition, with no new highway facility nearby, many residents along the new location areas of the proposed bypass would be exempt from exposure to increases in traffic related ambient noise levels. However, many of the existing developments are already currently affected by existing and future traffic on I-540.

4.1.3.7 Construction Noise

The major construction elements of this project are expected to consist of land clearing, earth moving, hauling, grading, paving, and bridge construction. General construction noise impacts for passing traffic and those individuals living or working near the project can be expected particularly from clearing, earth moving and paving operations. Table 4-7 lists some typical peak operating noise levels at a distance of 50 feet (15 meters), grouping construction equipment according to mobility and operating characteristics. Such motorized equipment shall be maintained with appropriate mufflers to minimize construction noise levels. In general, for a project of this magnitude, any given area requires two years to complete. However, during certain phases of construction (example, land clearing) and during certain seasons of the year, there will be areas along the project where no construction activity is taking place. Also, considering the relatively short-term nature of construction noise, impacts are not expected to be substantial. Yet, for brief

Table 4-7

Construction Equipment Sound Levels
SOURCE: U.S. Report to the President and Congress on Noise, February, 1972



periods of time, some construction noise impacts could be substantial (an increase in existing noise levels by 10 dBA or greater). These episodes usually occur during daytime work hours. As a result, these impacts will be minimized to adjacent residents. Additionally, nearby structures usually contribute to transmission loss and a resulting moderation of intrusive construction noise.

4.1.3.8 Noise Mitigation Summary

Various methods of mitigation are available to minimize the potential noise impact of the proposed improvements. Among these are reduction of speed limits, restriction of truck traffic to specific times of the day, and a total prohibition of trucks. Also, alteration of horizontal and vertical alignments, property acquisition for construction of noise barriers or berms, acquisition of property to create buffer zones to prevent development that could be adversely impacted, noise insulation of public use or nonprofit institutional structures, the use of berms, and the use of sound barriers can be considered.

Restriction or prohibition of trucks would not be consistent with the project's stated purpose and need. However, restrictions on the operation of heavy trucks, such as the use of "jake-brakes" in urban areas, are common. Reduction of speed limits, although acoustically beneficial, is seldom practical due to the resulting reduction of the system's operational efficiency. Design criteria and recommended termini for the proposed project prevent substantial horizontal and vertical alignment shifts that would produce significant changes in the projected acoustical environment. Normally, the desire to purchase a limited amount of right-of-way prohibits the acquisition of buffer zones or the construction of earth berms; however, where opportunities occur to incorporate earth berms as part of the highway construction and placement of excavated waste materials, they will be evaluated as part of the design phase of the selected alignment. Therefore, the construction of noise barriers and/or earth berms is considered the only prudent noise mitigation measure for this proposed highway project.

For all areas where noise impacts would be most notable, noise abatement (i.e., barriers) would have to be constructed between the road and the receiver in order to effectively abate the noise being produced by the traffic. These areas are located in the more dense residential

developments in the study corridor and will be reviewed to determine the reasonableness and feasibility of noise mitigation in future studies.

The AHTD's policy of "reasonableness" and "feasibility" will be applied to the residential areas near the selected alignment that are identified as having the potential to be impacted by noise. Based upon the preliminary data related to noise contour information, the following residential areas warrant additional and detailed studies for noise barrier analysis if the Preferred Line is chosen as the selected alignment:

1) Residential development near Kimberly Place
2) Residential development in Old Highway 68 area and Brush Creek Subdivision
3) Churchill Subdivision adjacent to Brush Creek Road
4) Belmont Estates Subdivision adjacent to Silent Grove Road

This detailed noise mitigation analysis will be conducted as part of the design phase of the selected alignment. The focus of this analysis will be in the segments that currently have existing and/or expanding residential development. The current residential development within the study area is increasing the number of sensitive receptors on a continuing basis. These changes will be evaluated and considered during the noise barrier feasibility evaluation.

If the Toll Funding Alternative is selected, detailed evaluation on toll plaza locations and identified impacts will be performed. These toll plazas will have unique noise characteristics including braking, gearing and engine noises that are difficult to mitigate. An evaluation to determine if noise barrier systems are warranted will be conducted as part of the project's detailed design and presented at the design public hearing.

4.2 SOCIOECONOMIC

The following discussion will address potential socioeconomic impacts such as economics, community infrastructure, social, relocations, and environmental justice.

4.2.1 Economic Impacts

The economy of Benton and Washington Counties has grown throughout the 1990s and is expected to continue to grow. All industrial sectors are expected to contribute to economic growth.

The bypass could encourage population, retail, wholesale, and service growth. The bypass would allow commuters to travel more efficiently to business and employment areas, thus encouraging residential development and a demand for consumer services.

Negative impacts due to the diversion of through traffic to the bypass are not expected. Local traffic on existing Highway 412 through Springdale and Tontitown will continue to support the existing highway related businesses located near the facility.

Construction of the proposed project will have a positive impact on the local economy. Jobs are created or sustained by highway construction. Along with the jobs, revenue is generated for many years through direct purchases and investments in the area's economy.

Each $1 million of highway investment generates 47 jobs within the State. Eight jobs are directly related to on-site construction. Twenty-two jobs are indirect or supply industry jobs. The remaining seventeen jobs are induced or jobs supported throughout the economy. (FHWA, 1999). Table 4-8 compares the estimated jobs and economic activity based on estimated costs for the alignment.

Table 4-8
Estimated Economic Activity

Alignment	Number of Jobs	Economic Activity (in million $)
Preferred	14,136	$692

In addition, each $1 million of highway investment also generates $2.3 million dollars in economic activity (AGCA). Highway construction industry employees spend their wages for hotels, restaurants, education, medical, clothing and other goods and services. Secondarily, businesses will take these earnings and make capital or saving investments for themselves.

The McClinton-Anchor Sharps Quarry is a major producer of quarried materials in the area. The alignment under study could potentially impact the quarry in two ways. The Preferred Line could directly impact the quarry by crossing it, impeding operations and affecting material reserves.

Closing this quarry or reducing access could increase the costs of development, possibly for several years. This will effectively increase costs to developers and subsequently to residence or business owners. However, other quarries are operating in the area that have comparable materials available for the local market and can provide enough construction material for future anticipated development within the region. However, hauling costs could be higher on similar materials from other quarries and therefore increase the cost to local consumers.

Any economic impacts associated with the implementation of a toll facility will be examined during the process of completing an investment-grade study on tolling of the proposed facility. These impacts will be included in the social, economic, and environmental evaluation performed during the Design Reassessment associated with the selection of the Toll Funding Alternative.

The No-Action Alternative could have a negative economic effect due to the lack of adequate transportation in the region.

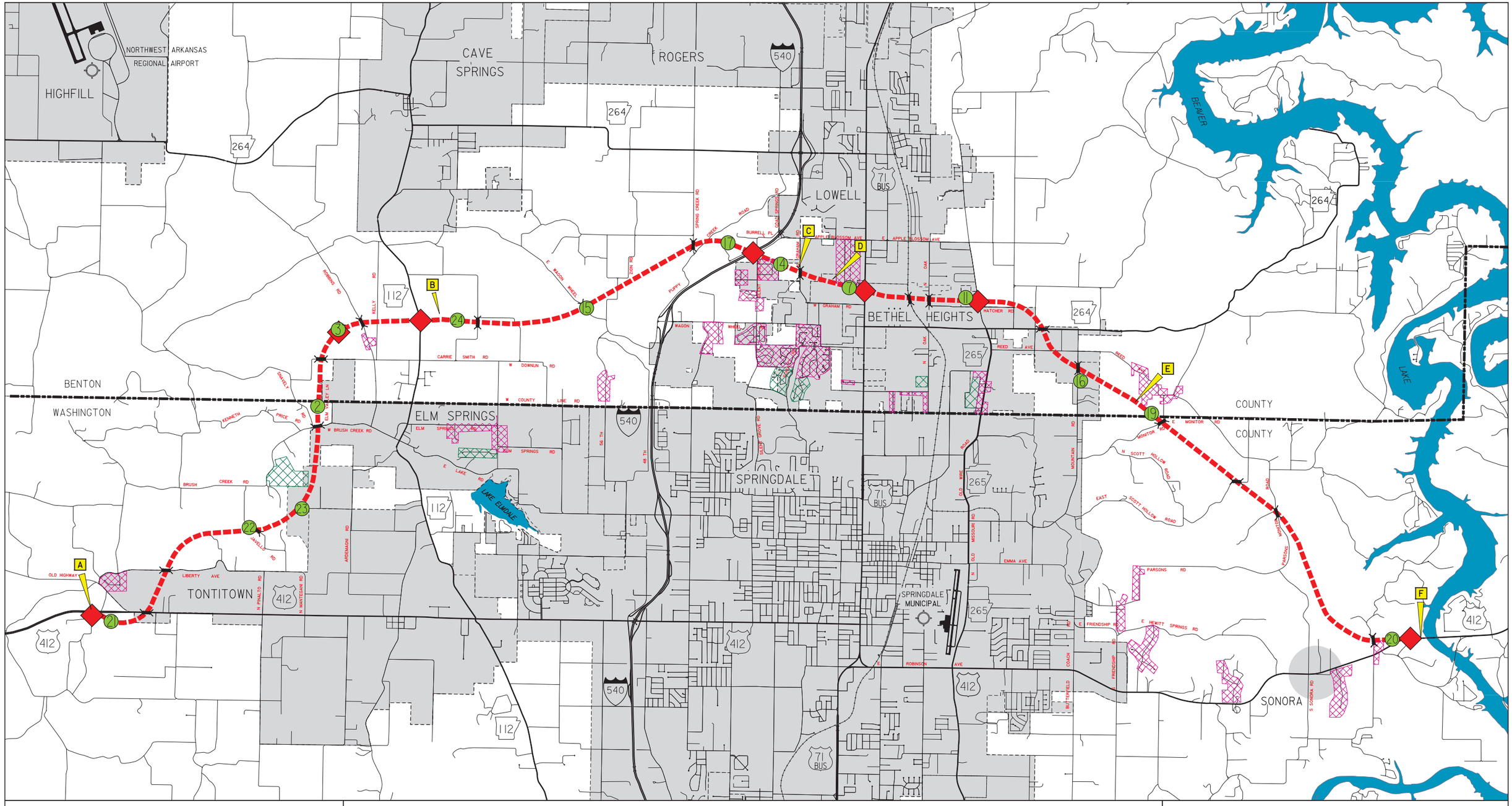
4.2.2 Social Impacts

Potential impacts to communities and neighborhoods near the project are primarily noise, visual effects and division by the facility. Table 4-9 contains a summary of the community impacts and neighborhoods affected by the Preferred Line. Figure 4-9 identifies the general location of social impacts in relation to the alignment.

The presence of the proposed bypass will result in some community changes. However, the Preferred Line was specifically developed and located to minimize community, residential and business impacts while attempting to maximize public access to the new transportation facility and working with the design constraints throughout the project area. Design issues that placed limitations on the Preferred Line included avoidance of environmentally sensitive areas, undesirable topography, and consideration of potential interchange locations. The following discussion describes potential impacts to community cohesion, neighborhood disruption, relocations, and environmental justice.

Table 4-9
Social Impacts for the Preferred Line

Segment	Location No.	Impact Area	Type of Impact
A-B	21	Highway 412	1 residential relocatee
	22	Javello Road	2 residential relocatees
	23	Millsap Road	1 residential relocatee
	2	Brush Creek Road	1 residential relocatee
		Elm Valley Lane (West End)	4 residential relocatees
	3	Marchant Road	2 residential relocatees
		Off Fair Lane	1 residential relocatee
		Robbins Road	2 residential relocatee
	24	Highway 112	1 residential relocatee
B-C	24	West Miller Road	1 residential relocatee
	15	East Wagon Wheel	1 residential relocatee
	17	Spring Creek Road	1 residential relocatee
		Puppy Creek Road	1 residential relocatees
		Conrad Place	3 residential relocatees
	14	Silent Grove Road	2 residential relocatee
		Belmont Subdivision	15 residential relocatees directly impacted neighborhood
		North Graham	1 residential relocatee
D-E	7	Hiland Street	2 residential relocatees
		Walden Street	6 residential relocatees
		Highway 71 B	1 residential relocatee
	11	Hatcher Street	4 residential relocatees
		Old Wire Road	4 residential relocatees
	16	Mountain Road	1 residential relocatees
E-F	19	Katie Lane	1 residential relocatee
		Off Katie Lane	1 residential relocatee
		Monitor Road	1 residential relocatee
	20	Coonskin Bluff Road (Perry Road)	3 residential relocatees
		Highway 412	5 residential relocatees



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Legend

- Social Impact Area
- Subdivisions Under Development
- Dense Residential Development
- Preferred Line
- Overpass
- Segment Break
- Proposed Interchange

Figure 4 - 9

Social Impact Locations

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4.2.2.1 Community Cohesion

Community cohesion is defined as behavioral and perceptual relationships that are shared among residents in a community. These relationships cause the community to be identified as a discrete, distinctive entity. Relationships can cover a broad spectrum of areas such as historical background; common values and issues (e.g., security and solitude); shared public services and facilities such as schools, police, fire, libraries, and hospitals; and community focal points or informal meeting locations such as places of worship, playgrounds, and businesses.

As defined in the FHWA Technical Advisory T6640.8A, changes in community cohesion as a result of highway construction and improvements may be beneficial or adverse, and may include splitting communities, isolating a portion of a community or an ethnic group, generating new development, changing property values, and separating residents from community facilities. Direct impacts to community cohesion may result from widening of an existing facility as well as from the construction of a new highway.

Field inspections and area maps were used to identify communities within the project area. Since communities are not necessarily shown on a map and not necessarily discernable to the unfamiliar observer, communication with local officials and public involvement was utilized. An affected neighborhood is identified by a subdivision name or by the nearby road or intersection.

One factor that will impact neighborhood cohesion is termination or severance of roads. Street severance can cause the isolation of portions of communities. Grade separations (overpasses) will be utilized to minimize community and neighborhood impacts caused by street severance. City, county and state roads/highways will be considered for grade separations or realignment to maintain nearby access. However, the Preferred Line will require road severance.

The City of Springdale has expanded their northern city limits to border the City of Bethel Heights on the west, south, and east. Bethel Heights has expressed its concern with any alignment that would split the community, fearing that the severed portion would be annexed

into Springdale. The Preferred Line passes through the City of Bethel Heights, splitting the community east/west in approximate halves. A grade separation is planned for North Oak Street and Highway 265 (Old Wire Road) to lessen severance impacts within Bethel Heights.

Springdale is also extending its city limits northward to annex areas of Benton County currently being developed. The Preferred Line will traverse these recently annexed and rapidly developing areas of Springdale north of the Washington/Benton County line. Grade separations are planned for North Graham Road, Highway 71B, Highway 265 (Old Wire Road), and Mountain Road to lessen severance impacts within Springdale.

The No-Action Alternative will have no effect on community cohesion other than those associated with increasing congestion along existing Highway 412.

4.2.2.2 Affected Neighborhoods

In more severe cases, the proposed highway may split a neighborhood. Not only are homes relocated, but residents, especially the elderly, will not be able to freely travel to the far side of the neighborhood to visit former neighbors. Grade separations may be utilized in these cases to reconnect the street and lessen neighborhood impacts as shown in Figure 4-9.

In addition, mitigation of the impacts on a neighborhood can include installation of pedestrian bridges, noise abatement barriers (earthen berms or structural walls), and visual barriers or vegetative screening.

Figure 4-9 locates the areas of residential development in the vicinity of the Preferred Line. Table 4-9 identifies areas by subdivision name or by the primary road or intersection for a cluster of residences.

The No-Action Alternative will have no direct effect on neighborhoods.

4.2.3 Relocations

Relocation impacts are among the most sensitive of community-related effects associated with transportation improvements because they involve modifying relationships between people and their neighbors. The removal of families from neighborhoods, or businesses from

their existing locations affects not only the relocatees themselves, but also those who remain in the affected neighborhood and those who live in the new areas where the relocatees will live.

The impacts to a person's social attachment to a particular community or the loss of close proximity to customary services and recreation facilities are difficult to offset through financial assistance or physical relocation.

Table 4-10 shows the estimated number and type of relocations for the Preferred Line. The No-Action Alternative will have no relocations since it would not require additional right-of-way.

Table 4-10
Relocation Summary

	No Action	Preferred Line
Residential Owners	0	60
Residential Tenants	0	9
Businesses	0	39
Farms	0	6
Non-Profit Business	0	0
TOTAL RELOCATIONS	0	114
Total Minority Households	0	4
Total Elderly Households	0	9
Total Low Income Households	0	2

4.2.3.1 Residential Relocations

The most obvious impact associated with relocation is the displacement of residents. The severity of displacement impacts varies greatly with the people involved and impacts are often related to demographic characteristics. If a person is highly mobile and has had a history of changing residences frequently, the impact may be only an inconvenience. If the community is stable and cohesive and residents have been in their homes for many years, many of those displaced may have a difficult time adjusting to new homes and neighborhoods because they have a strong attachment to their existing home and neighborhood. Improved financial assistance has helped to offset the adverse economic

impacts of residential relocation. The adverse psychological and social impacts of relocation have understandably been more difficult to mitigate. Certain population groups such as senior citizens, low income residents and non-English speaking people often have strong community ties and depend on primary social relationships and important support networks that can be severed upon relocation. Households with school age children may consider relocation especially disruptive if school transfers would be involved. Disabled people and those without automobile transportation often have special relocation problems.

Appendix J provides a Conceptual Stage Inventory Record that is a general listing of residences affected by the Preferred Line. Residents in the proposed right-of-way for the project will be eligible for relocation assistance in accordance with Public Law 91-646. Construction of the project will not begin until decent, safe and sanitary replacement housing is in place and offered to all affected persons.

Appendix J also includes a conceptual stage relocation statement that was compiled with the cooperation of local real estate companies and newspapers. The housing inventory provides an estimate of the available housing and is an indication of the state of the market for this area. This information will be further refined when the project is undergoing design and right-of-way is being purchased.

The dwellings and sites contained in the inventory have been determined to be comparable, decent, safe and sanitary, in an area not less desirable in regards to public utilities and public and commercial facilities, reasonably accessible to the displacee's place of employment, adequate to accommodate the displacees, and in a neighborhood not subject to unreasonably adverse environmental factors. Special attention will be given to elderly and low-income relocatees to insure that replacement housing will be obtained that is within their economic means and within the same area, resulting in minimal psychological adjustment problems.

If the NWARA Access Road and the proposed bypass both were to be constructed, an interchange between the two facilities would be required west of Highway 112. A secondary impact of construction of the Preferred Line may result in the relocation of four additional homes at the interchange for the NWARA Access Road.

4.2.3.2 Business Relocations

Table 4-10 provides a summary tabulation of businesses potentially displaced by the project. The greatest concentration of affected businesses is located along Highway 71B. The Conceptual Stage Relocation Statement in Appendix J indicates that replacement properties are available, in addition to adequate vacant tracts to accommodate new construction for those businesses affected by the proposed project. The Conceptual Stage Inventory Record, also in Appendix J, provides a summary of business relocations. The businesses and farms affected should have the opportunity to relocate. If they are not able to relocate in the immediate area of their displacement, loss of existing patronage may result in termination of operation. However, in order to assist the displaced businesses and farms relocating in the same area, the AHTD will explore all possible sources of funding or other resources that may be available to businesses and farms.

All relocations for the proposed action would be conducted in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-46) and the AHTD relocation policies and procedures (see Appendix J).

4.2.3.3 Community Facilities and Non-Profit Organizations

There are no Community Facilities or Non-Profit Organizations directly impacted by the Preferred Line or the No-Action Alternative.

4.2.4 Environmental Justice

Executive Order 12898, Federal Actions to address Environmental Justice in minority and low-income populations, directs all federal agencies to determine whether a proposed action would have an adverse or disproportionate impact on minority and low-income populations. For more information about Environmental Justice Requirements, see Appendix M. The first step in identifying the potential for environmental justice concerns is to characterize the population affected by the proposed action in terms of racial and ethnic composition. The characterization of the affected population should then be compared to the characteristic of the local general population (e.g., percentage of a minority population residing near a

proposed project versus the percentage of a minority population located within a single or multiple-county area surrounding the proposed project).

While updating the information for the Environmental Justice Section, it was discovered that an error had occurred in calculating the percentages of total minority households and low-income families contained in the Study Area (Benton and Washington Counties) for the SDEIS. This information has been corrected and provided for information in Appendix M. Although this information shows that the percentage of minority households relocated is slightly higher than the Study Area's percentage for Line 2, and the percentage of low-income households relocated is slightly higher than the Study Area's percentage for Line 4, these percentages are not considered substantial, and therefore do not constitute environmental justice issues.

The United State Census Bureau identifies low-income populations with the annual statistical poverty thresholds in 1999. This federal definition of poverty level varies by the number of related children under 18 years of age and family size. Average poverty thresholds in 2005 ranged from $8,501 for one person to $34,417 for households with nine or more family members.

The Conceptual Stage Inventory Record in Appendix J estimates the number of minority and low-income households directly affected by each of the proposed alignments. These relocatees are dispersed along the Preferred Line. On-site assessments and a review of the 2000 census tract information confirm that no primarily minority or low-income neighborhoods will be directly impacted by the Preferred Line.

As shown by the information in Table 4-11, in the 2000 census, minority households accounted for 10.0 % of the 118,425 households in Washington and Benton Counties combined. The estimated number of minority households relocated by the Preferred Line was compared to the total number of households relocated by the Preferred Line, as shown in Table 4-12. The results of this comparison reveals no disproportionate adverse impact on minority populations from the Preferred Line, since the percent of minority households

affected by the Preferred Line is below the 10.0% minority households identified for the two-county study area.

Table 4-11
Minority and Low-Income Census Information for Study Area

County	Total Households	Minority Households	% Minority Households	Total Families	Low-Income Families	% Low-Income Families
Benton	58,242	5,405	9	43,669	3,205	7
Washington	60,183	6,816	11	39,770	3,756	9
Total	118,425	12,221	10	83,439	6,961	8

Table 4-12
Estimated Minority and Low-Income Impacts

Segments A-F	Total # Households Relocated	# of Minority Households Relocated	% Minority Households Relocated	# of Low-Income Households Relocated	% Low-Income Households Relocated
Preferred Line	69	4	6	2	3

As shown by the information in Table 4-11, the 2000 census (summary file SP3, SF4), low-income families account for 8.0% of the 83,439 total families in Washington and Benton Counties. The estimated number of low-income households relocated by the Preferred Line was compared to the total number of households relocated by the alignment, as shown in Table 4-12. The estimated percentage of low-income families affected is below the 8% level of low-income families identified in the census for the two-county study area, indicating no disproportionate adverse impact on low-income populations.

Further steps to minimize relocations will be considered during final project design. Where avoidance is not possible, the acquisition and relocation process will be conducted in accordance with the Uniform Relocation Assistance and Real Property Policies Act of 1970. Relocation resources are made available to all residents and businesses without discrimination and comparable to the need of the relocatees.

The No-Action Alternative will have no Environmental Justice effects since it will affect all populations.

4.3 NATURAL ENVIRONMENT AND RESOURCES

The following section discusses those features and resources of the natural environment that could potentially be impacted by the proposed project.

4.3.1 Geology

There are three potential impact areas discussed below which are associated with the geology of the region: the soils, mineral resources, and caves found in the project study area.

4.3.1.1 Soils

Soils traversed by the Preferred Line are classified as the Captina-Peridge Association. Construction of this project will result in impacts to soils that may include vegetation removal, soil redistribution, and/or soil compaction. These soil impacts can create water quality concerns. Construction of this project can lead to decreased water infiltration of the soil, increased water runoff and increased sediment load in the runoff. Commitments related to water quality protection can be found in the Surface Water Quality section, Section 4.3.4.

There would be no impacts to soils for the No-Action Alternative since no new construction would occur.

4.3.1.2 Mineral Resources

Two quarries, the McClinton-Anchor Sharps Quarry and Northwest Arkansas Quarry are located near the Preferred Line. The McClinton-Anchor Sharps Quarry is a major producer of quarried materials in the area and is located adjacent to Wagon Wheel Road and I-540 in the center of the project area. The quarry currently has direct access to I-540 at the Wagon Wheel Road interchange.

The Preferred Line could directly impact the McClinton-Anchor Sharps Quarry mining operation and reserves, crossing on the northern part of the quarry. However, for this alignment, local access at the existing Wagon Wheel Road interchange would remain.

Maintaining this local access could limit additional use and damage to the local road system associated with other alignments.

The Northwest Arkansas Quarries facility is located near the Preferred Line in the eastern portion of the project area, with the Preferred Line crossing on the western portion of the quarry. Potential impacts could include relocation of the processing equipment at the quarry.

Other quarries in the project area have comparable materials available for the local market. However, impacts to these quarries could lead to increased hauling costs on similar materials from other quarries and increase the cost to local consumers.

Construction of this and other related road projects would result in extensive use of existing mineral resources in the area. However, as indicated in the Mineral Resources discussion in the Affected Environment Section, reserves of these mineral construction resources are very large and would not be adversely impacted by construction of the proposed project.

The No-Action Alternative will have no effect on mineral resources since no additional construction would be involved with this alternative.

4.3.1.3 Caves and Cave Resources

Members of the U.S. Fish and Wildlife Service (USFWS) and the AHTD Environmental Division conducted on-site surveys at two identified cave openings and sinkholes near the Preferred Line. The caves were investigated to determine if they contained any protected cave resources, such as endangered species. Split Cave is located near Sonora Road approximately 0.1 mile (0.16 km) west of the Preferred Line, and it apparently has a subsurface connection to Beaver Lake. No cave crayfish or Ozark cavefish have been recorded from this cave, and recent diving explorations concluded that these troglobytic species are not likely to exist in the project vicinity. No indications were found that these caves contained any biological resources of special concern. Efforts will be made during the design, construction, and operations stage to minimize the impacts to and to protect the cave habitat for this cave system and any others discovered within the right of way.

After access is obtained, the proposed right of way will again be surveyed for karst features, such as cave openings and sinkholes. In the event construction operations encounter any indications that a previously unidentified cave has been discovered, work will immediately be discontinued in the area, access shall be denied, and the opening secured to prevent unauthorized entry.

In the event of cave discovery, the USFWS will be contacted for the proper procedures to be followed and to examine the cave to determine usage by any listed species.

4.3.2 Floodways and Floodplains

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration (FIA) as the base flood for purposes of flood plain management measures. The 500-year flood is used to indicate additional areas of flood risk in the community. Encroachment on floodplains, such as placement of artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. Under the concept used by the National Flood Insurance Program (NFIP), the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the NFIP limit such increases in flood heights to 1.0 foot (0.3 meter), provided that hazardous velocities are not produced.

The Federal Emergency Management Agency (FEMA) delineates zones within the floodplain and demonstrates these on Flood Insurance Rate Maps. Crossing lengths within these zones by the Preferred Line are shown in Table 4-13. The Preferred Line is not expected to have any longitudinal encroachment impacts.

Secondary impacts to floodplains can result when development occurs around new interchange areas. Due to its proximity to a floodplain, the Preferred Line/I-540 interchange is the only proposed interchange area along the Preferred Line that has the potential to result in secondary impacts. However, the Preferred Line/I-540 directional interchange would

Table 4-13
Floodplain Crossing Lengths for the Preferred Line
Linear Feet (Linear Meters)

		*SFHA	Floodway
Segment A-B	Brush Creek	1,000 (305)	0
Segment B-C	Spring Creek and Puppy Creek	1,200 (366)	200 (61)
I-540 Interchange	Puppy Creek	0	400 (122)
Segment C-D	None	0	0
Segment D-E	None	0	0
Segment E-F	Friendship Creek	400 (122)	0
	Total	2,600 (793)	600 (183)

*Special Flood Hazard Areas Inundated by 100-year Flood

function as a system-to-system connection and should not accommodate or promote adjacent secondary development because no access to adjacent property would be provided. Therefore, no secondary impacts to floodplains are expected due to development around the proposed bypass/I-540 directional interchange. Cumulative impacts to floodplains related to other past and reasonably foreseeable future actions would be related to interchange locations with other proposed transportation projects. Currently, the NWARA Access Road, the Eastern Fayetteville Bypass Corridor, and the Eastern Bypass to Rogers are the only major projects in the foreseeable future. As with the current bypass project, floodplain impacts will be minimized on these projects through location and design considerations. No floodplain exists at the proposed location of the NWARA interchange.

In the design phase of the project, surveys of the alignment and stream crossing areas will be made and the current effective flood insurance study models will be obtained (or constructed if not available). The surveys will provide the information required to develop a preliminary project design including roadway embankment and bridge locations, heights, lengths, and widths that will be used to perform hydraulic model modifications to determine the effects of the project's construction on potentially impacted floodplains. The hydraulic model modifications will be made prior to the completion of the final project design, and the

information will be available to the communities when a floodplain development permit/approval is requested from them.

Benton and Washington Counties both participate in the National Flood Insurance Program. All of the floodplain and floodway encroachments previously identified will be designed to comply with the respective county's local flood damage prevention ordinance. The local ordinances prohibit any new construction within the boundaries of any identified regulatory floodway(s) that would cause any increase in flooding depths on upstream, or adjacent, properties. Similarly, the local ordinances require that the cumulative effects of all construction within any identified 100-year floodplain or Special Flood Hazard Area may not cause more than one foot (0.3 meter) of increase in flooding depths anywhere within the community. The AHTD's own internal policy is to design projects within these areas so that any permanent construction within an identified 100-year floodplain, or Special Flood Hazard Area, may not cause an increase in flooding depths during passage of the 100-year flood if there are any existing insurable buildings within the boundaries of the floodplain with floor elevations below the current 100-year flood elevation. Additionally, increases in flooding depth caused by any new construction may not cause other insurable buildings to be flooded during passage of the 100-year flood. During the project design, hydraulic data and construction plans will be submitted to the counties for review, approval and/or permitting as specified by their ordinance.

The design measures to minimize floodplain impacts include (1) avoiding/minimizing longitudinal encroachments, (2) sufficient bridging and/or drainage structures to minimize adverse effects from backwater, (3) sufficient bridging and/or drainage structures to minimize increases in water velocity, (4) minimizing channel alterations, (5) adequate and timely erosion control to minimize erosion and sedimentation, and (6) utilizing standard specifications for controlling work in and around streams to minimize adverse water quality impacts. The final project design will be reviewed to confirm that the design is adequate and that the potential risk to life and property are minimized. Adjacent properties should not be impacted nor have a greater flood risk than existed before construction of the project. None of the encroachments will constitute a significant floodplain encroachment or a significant risk to property or life.

For all of the streams previously identified, bridging and/or other large drainage structures will be used to span most of the streams' natural floodplains in order to comply with the local floodplain development ordinance restrictions on increasing upstream flood depths. The construction will not cause a significant reduction of floodwater storage or retention functions. Bridges and/or drainage structures will be sized sufficiently to minimize impacts on natural and beneficial floodplain values. These values include, but are not limited to, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquiculture, forestry, natural moderation of floods, water quality, maintenance, and groundwater recharge. The project will be designed so as to minimize adverse impacts to streams, and to correct any project-related impacts that may destroy, diminish, or impair the character and function of those streams.

This project will serve as a principal arterial and, as such, will serve emergency vehicles in time of disaster. This project will be designed to avoid roadway overtopping by the 50-year flood and, therefore, will not have a significant potential for interruption or termination due to flooding. The project will be on new location, so detours for bridge construction will not be required.

The No-Action Alternative would not involve any additional construction in floodplains. Therefore, the No-Action Alternative will have no impact on floodplains.

4.3.3 Wetlands and Waters of the United States

4.3.3.1 Regulatory Permits

4.3.3.1.1 Section 9 of the Rivers and Harbors Act (U. S. Coast Guard)

This act regulates construction of bridges and causeways on navigable waterways of the United States. This project does not cross any navigable waterways of the United States, and therefore would not be regulated by this act.

4.3.3.1.2 Section 10 of the Rivers and Harbors Act (U. S. Army Corps of Engineers)

This act regulates the obstruction or alteration of navigable waters of the United States. There are no navigable waters in the project area that would be regulated by this act.

4.3.3.1.3 Section 404 of the Clean Water Act (U. S. Army Corps of Engineers)

This act regulates the discharge of dredged or fill material into "Waters of the U. S.," including wetlands, unless exempted or authorized by the U. S. Army Corps of Engineers (USACE). Section 404 of the Clean Water Act is the primary Federal statute that implements Federal regulatory policies concerning the protection of wetlands as specified in various executive orders and regulations. The Little Rock District of the USACE maintains jurisdiction over the water resources in the project area.

Based on data gathered for this project, it has been determined that waters of the U. S. are present within the Preferred Line. These waters have been identified as streams and springs. Since impacts to these areas by the selected alternative would be avoided and/or minimized through alignment decisions or by spanning the streams with bridge structures, it is anticipated that a nationwide permit(s) would be applicable at most stream crossings.

A few small isolated wetlands are located in the general project area. One of these occurs within the Preferred Line. The wetland within the Preferred Line was evaluated in accordance with Executive Order 11990 as described in Section 3.3.4. The USACE has determined that the small wetland is less than 0.25 acre (0.1 hectare) and is isolated. A formal merged Section 404/NEPA process (FHWA 1988) will not be required for this project.

The AHTD will comply with all requirements of the Clean Water Act, as Amended, for the construction of this project. This includes Section 401, Water Quality Certification; Section 402, National Pollutant Discharge Elimination System (NPDES); and Section 404, Permits for Dredged or Fill Material.

4.3.3.2 Impacts to Streams and Springs

Within Segments A-F, the Preferred Line will impact 21 streams. Within Segments A-B, the Preferred Line will directly impact one small spring (Refer to Figure 3-11). Segment A-B passes through an area downstream (west) of Lake Elmdale in the Brush Creek drainage that

has a high spring concentration. Impacts to four additional springs that are within approximately 500 to 1000 feet (152 to 305 meters) of the proposed right-of-way (see Figures 4-10A, 4-10B, and 4-10C) will depend on the final alignment design and grade (cut or fill) in the areas of the springs and the location of the recharge areas for each spring. Even if the springhead is avoided, the recharge area may be impacted.

Table 4-14 summarizes the information regarding 21 streams crossed by the Preferred Line. Refer to Figures 4-10A, 4-10B, and 4-10C for the location of the stream crossings shown in Table 4-14.

The construction of bridges is anticipated at Preferred Line crossings of Brush, Spring, Puppy and Friendship Creeks. The remaining small streams will be crossed utilizing box or pipe culverts.

The No-Action Alternative would have little direct impact on wetlands or waters of the U. S. resources, as there would be no construction activities. If no construction were to occur, wetlands and waters of the U. S. resources on existing Highway 412 would remain constant. These resources would, however, be subject to the same development pressures as they are now. Residential and commercial construction, land clearing, livestock operations, agricultural production, and resource extractive uses would all continue to impact waters of the U. S. resources at present levels.

4.3.3.3 Commitments to Minimize Harm to Streams and Springs

Commitments to minimize harm to streams and springs are as follows:

- Springheads will be avoided to the maximum extent practicable.
- Context Sensitive design will be utilized in areas where springs are present.
- Dredged or fill material used for construction will be nonpollutional material in accordance with EPA Guidelines for the Discharge of Dredged or Fill Material found in 40 CFR 230.

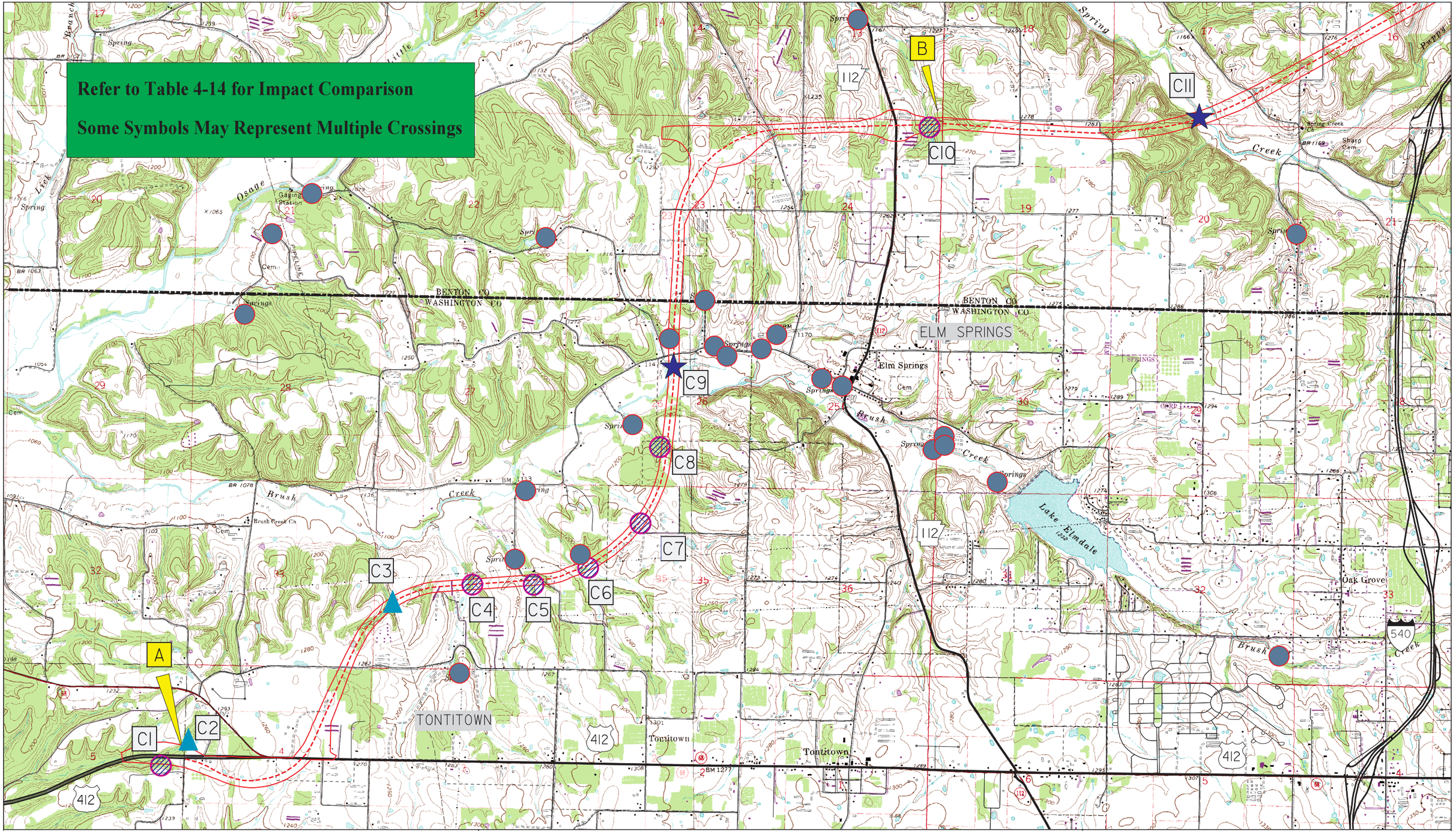
- All construction activity will be performed in a manner that would minimize increased turbidity of the water in the work area and otherwise avoid adverse effects on water quality and aquatic life.
- All dredged material not used as backfill will be placed on land and no runoff water from the disposal site will be allowed to enter the waterway.
- The discharge will not be located in the proximity of a public water supply intake.
- Erosion, both during and after construction, will be controlled as outlined in the latest edition of the *AHTD's Standard Specifications for Highway Construction*.
- The project will not significantly disrupt the movement of those species of aquatic life indigenous to the water body.
- Temporary work ramps or haul roads, when needed, will provide sufficient waterway openings to allow the passage of expected high flows.
- Precautions in the handling and storage of hazardous materials, including lubricants and fuels, will be taken to prevent discharges or spills that would result in degradation of water quality.
- Stream Mitigation (if required) will be determined by the USACE during the Section 404 permit application process. At that time, preliminary plans will be available for each stream crossing. Further information relating to stream mitigation will be contained in the Section 404 permit application documents.

4.3.3.4 Impacts to Wetlands

Segment D-E of the Preferred Line will impact a 0.2 acre (0.08 hectare) ponded pasture wetland at the Highway 71B interchange. The wetland is in a hay pasture, has been determined isolated (non-regulated), and therefore does not require a Section 404 permit or mitigation by the USACE. Unavoidable wetland impacts will be mitigated at a 1:1 ratio in accordance with Executive Order 11990. Refer to Figure 3-13 for a color infrared view of the wetland location.

Refer to Table 4-14 for Impact Comparison

Some Symbols May Represent Multiple Crossings



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Legend

- Spring Locations
- Perennial Stream Crossing
- Intermittent Stream Crossing
- Ephemeral Stream Crossing
- Centerline of Preferred Line
- Estimated Right-of-way
- Segment Break (A)

Figure 4 - 10A

Streams and Springs

in the Study Area

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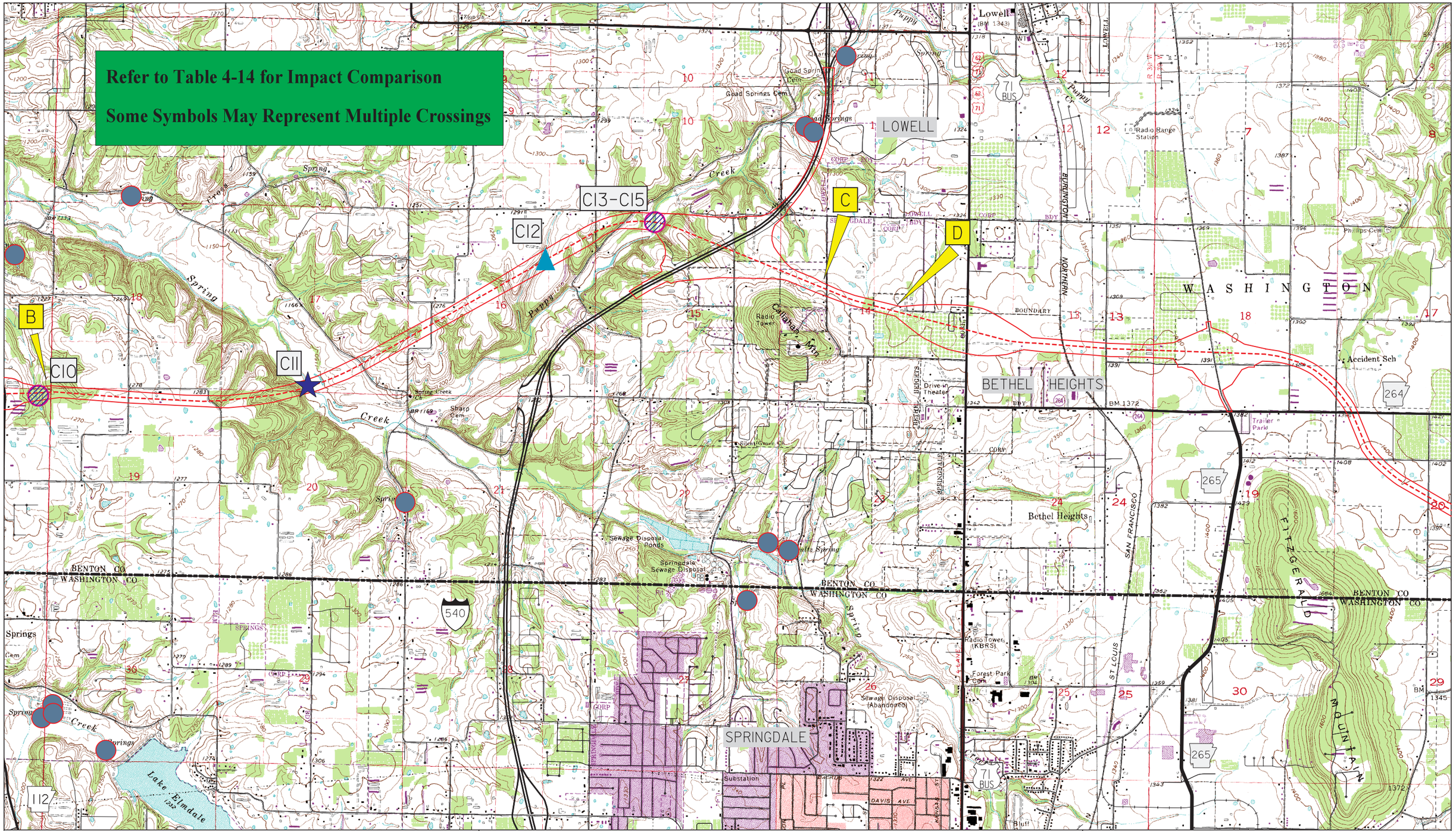
Refer to Table 4-14 for Impact Comparison

Some Symbols May Represent Multiple Crossings



Job Number - 001966
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04/18/2005

Legend

- Spring Locations
- Perennial Stream Crossing
- Intermittent Stream Crossing
- Ephemeral Stream Crossing
- Centerline of Preferred Line
- Estimated Right-of-way
- Segment Break

Figure 4 - 10B

Streams and Springs

in the Study Area

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Refer to Table 4-14 for Impact Comparison

Some Symbols May Represent Multiple Crossings

E

C16

C17

C18

C19

C20

C21

F

SPRINGDALE MUNICIPAL

0 1.0 2.0 MI

0 1.0 2.0 3.0 KM

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

- Spring Locations
- Perennial Stream Crossing
- Intermittent Stream Crossing
- Ephemeral Stream Crossing
- Centerline of Preferred Line
- Estimated Right-of-way
- Segment Break (A)

Figure 4 - 10C

Streams and Springs in the Study Area

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Table 4-14
Stream and Structure Data on the Preferred Line

Crossing Number	Stream Name	Stream Type	Contributing Drainage Area Acres (ha)	Estimated Design Discharge (Q50), cfs (cms)	Estimated Waterway Opening Area Sq. ft (sq. m)	Proposed Structure Type	Estimated Area of Impact Acres (ha)
1	Unnamed	Intermittent	76 (31)	290 (8.2)	40 (3.7)	Box Culvert	0.07 (0.03)
2	Unnamed	Ephemeral	32 (13)	160 (4.5)	20 (1.9)	Pipe Culvert	0.05 (0.02)
3	Unnamed	Ephemeral	41 (17)	190 (5.4)	25 (2.3)	Pipe Culvert	0.05 (0.02)
4	Unnamed	Intermittent	896 (363)	1,230 (34.8)	140 (13.0)	Box Culvert	0.12 (0.05)
5	Unnamed	Intermittent	320 (130)	530 (15.0)	60 (5.6)	Box Culvert	0.08 (0.03)
6	Unnamed	Intermittent	512 (207)	770 (21.8)	90 (8.4)	Box Culvert	0.10 (0.04)
7	Unnamed	Intermittent	175 (71)	550 (15.6)	60 (5.6)	Box Culvert	0.08 (0.03)
8	Unnamed	Intermittent	128 (52)	400 (11.3)	45 (4.2)	Box Culvert	0.07 (0.03)
9	Brush Creek	Perennial	9,920 (4,015)	7,000 (198.2)	1,800 (167.2)	Bridge	0.20 (0.08)
10	Unnamed	Intermittent	68 (23)	310 (8.8)	40 (3.7)	Box Culvert	0.07 (0.03)
11	Spring Creek	Perennial	17,344 (7,020)	10,700 (303.0)	3,000 (278.7)	Bridge	0.25 (0.10)
12	Unnamed	Ephemeral	98 (40)	380 (10.8)	45 (4.2)	Box Culvert	0.07 (0.03)
13, 14, 15*	Puppy Creek	Intermittent	4,800 (1,943)	4,000 (113.3)	1,200 (111.5)	Bridge	0.30 (0.12)
16	Unnamed	Ephemeral	80 (33)	810 (22.9)	100 (9.3)	Box Culvert	0.10 (0.04)
17	Unnamed	Ephemeral	53 (21)	240 (6.8)	30 (2.8)	Pipe Culvert	0.05 (0.02)
18	Unnamed	Ephemeral	35 (14)	180 (5.1)	25 (2.3)	Pipe Culvert	0.05 (0.02)
19	Unnamed	Ephemeral	58 (23)	270 (7.6)	35 (3.3)	Pipe Culvert	0.06 (0.02)
20	Friendship Creek	Intermittent	6,272 (2,538)	4,760 (134.8)	1,400 (130.1)	Bridge	0.15 (0.06)
21	Unnamed	Ephemeral	31 (13)	160 (4.5)	20 (1.9)	Pipe Culvert	0.05 (0.02)

* Crossings 13, 14, & 15 are three adjacent crossings of Puppy Creek on the west side of the I-540/Preferred Line Interchange.
Ha = hectares. Cfs = cubic feet per second. Cms = cubic meters per second. Q50=50 year flood discharge.

4.3.3.5 Commitments to Protect Wetlands

Commitments to protect wetlands will include:

- Wetland areas will be avoided to the maximum extent practicable.
- Wetlands outside the construction limits will not be used for construction support activities (borrow sites, waste sites, storage, parking access, etc.).
- Heavy equipment working in wetlands will be placed on mats.

4.3.3.6 Secondary Wetland and Stream Impacts

Development with subsequent impacts to wetlands or streams at any location would require coordination with the USACE and other permitting agencies and would require an Alternative Analysis documenting avoidance and minimization efforts, as well as a mitigation plan if appropriate. Interchange locations with local access were examined to determine potential wetland and stream impacts due to secondary development adjacent to the proposed project. No wetlands were identified near any of these proposed interchange locations; therefore wetlands should not be impacted if secondary development occurs at the interchange locations.

While Puppy Creek is associated with and adjacent to the Preferred Line/I-540 directional interchange area, no secondary development should occur at this location since this directional interchange functions as a system-to-system connection and no access to adjacent property is provided.

4.3.4 Surface Water Quality

Table 4-14 in Section 4.3.3.2 illustrates the number of streams which will be impacted by the Preferred Line. None of these streams are Extraordinary Resource Waters, Ecologically Sensitive Waterbodies, or Natural and Scenic Waterways.

The Preferred Line has the least potential to impact surface water quality of all the new location alignments studied. This determination was made through a method developed by the AHTD as outlined in Appendix L, Surface Water Quality Impacts.

In the design phase of the project, field investigations will be conducted in order to minimize water quality impacts through planning and design. Stream crossings will be located to maximize protection of wetlands, wildlife, and water quality. Erosion control will be an important component for water quality protection in this area due to the steep slopes and fine textured soils. Site-specific erosion control plans will be developed for the project and reviewed by the ADEQ. Some in-stream work will be required to complete this project regardless of the alignment chosen. Even with extensive controls in place, this construction in and around streams could result in localized, short-term adverse water quality impacts, including exceedances of state water quality standards. A short-term activity authorization (ADEQ Regulation 2) will be obtained from the ADEQ for these activities.

The Preferred Line/I-540 directional interchange would function as a system-to-system connection and would not accommodate or promote adjacent secondary development because no access to adjacent property would be provided. No secondary impacts to surface water related to development around this interchange are expected since there would be no direct access to the interchange or the highways at this location. Control of any development that may occur is outside the legal authority of the AHTD, and would have to be restricted by local government. Cumulative impacts to surface water would be related to interchange locations with other proposed transportation projects. Special provisions during the design and construction phase will be utilized to minimize surface water impacts from this project.

The No-Action Alternative would not involve new construction, thus no new sources for transmission of pollutants to surface water would be created. However, increased traffic volumes on the existing facility will result in greater amounts of pollutants in highway runoff and a greater potential for hazardous waste spills due to decreased safety levels. Because of these reasons, the existing potential for impacts to surface water quality by the No-Action Alternative would increase.

4.3.4.1 Storm Water Runoff

Storm water runoff has the potential, if uncontrolled, to become an adverse impact on the natural and man-made environment. Runoff can affect surface waters, ground water, and other natural and man-made environments.

Three basic problems associated with runoff are erosion and sedimentation, highway pollutants from the operations of the facility, and hazardous material spills.

4.3.4.1.1 Regulatory Permits

The AHTD will comply with all requirements of The Clean Water Act, as Amended, for the construction of this project. This includes Section 401, Water Quality Certification; Section 402, National Pollutant Discharge Elimination System Permit (NPDES); and Section 404, Permits for Dredged or Fill Material.

The Federal Water Pollution Control Act declares that the discharge of any pollutants into the waters of the United States from any point source is unlawful, except under the terms and conditions of a permit issued under the NPDES.

Any construction disturbing an area of one acre (0.4 hectare) or more in Arkansas is required to comply with NPDES regulations for storm water discharge from construction sites as issued by the ADEQ. The AHTD will prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the requirements of the permit. Before construction begins, the AHTD will file the requisite Notice of Intent with the ADEQ. The SWPPP will include all specifications and best management practices (BMPs) needed for control of erosion and sedimentation. This will be prepared when the roadway design work is advanced enough to best integrate the BMPs with the project design.

Discharge of storm water from a large, medium, or designated small municipal separate storm sewer system (MS4) also requires an NPDES permit. A portion of the study area is within a designated MS4 area. The AHTD is preparing and implementing a statewide Storm Water Management Plan for this area in accordance with the requirements of the Regulated Small MS4 General Permit.

4.3.4.1.2 Highway Runoff

Runoff related to permanent operation of the facility can contribute an array of pollutants to surface and groundwater resources. Highway runoff may contain solids, heavy metals, nutrients, oil and grease, bacteria, and other pollutants. These pollutants accumulate on

highway surfaces, roadside areas, and rights-of-way from sources such as highway use, maintenance, natural sources, and deposition of air pollution. Highway pollutants, such as solids, heavy metals, and organics (found in fuels and motor oils) have been found to relate directly to traffic volume. Traffic-related pollutants are better controlled using site-specific measures. Other pollutants (herbicides and nutrients) are found in highway runoff mainly as a result of highway maintenance activities and adjacent land use contributions. Maintenance related pollutants are better controlled through the use of general measures, such as herbicide and fertilizer application management. Herbicide use along the state and federal highway system is already restricted throughout the project area because of the karst topography and potential impacts to surface and groundwater.

The impacts of highway runoff pollution on aquatic ecosystems are extremely site and runoff-event specific. Although all highway runoff contains pollutants, the pollutant loading does not always constitute a problem for receiving waters.

General measures to be used to manage highway storm water runoff include curb elimination, litter control, good management usage of deicing chemicals and herbicides, establishment and maintenance of vegetation, and reducing direct discharges to receiving waters wherever practicable.

Specific measures to be considered and used for management of a potential pollution problem include grassed channels, overland flow through vegetation, wet detention basins, infiltration basins, and wetlands.

4.3.4.1.3 Hazardous Or Toxic Materials Spills

During construction or after the facility is operating, runoff impacts may be caused by spills of materials. If a material spill should occur during construction, clean-up procedures are followed as outlined in the *AHTD's Standard Specifications for Highway Construction*. Measures taken to ensure accidental spill and runoff control while the facility is operating are coordinated by the Arkansas State Police, the Arkansas Highway Police, the AHTD, and a contracted hazardous spill containment team. The State Emergency Operations Center's HAZMAT Hot Line is notified for official notification and response.

4.3.5 Groundwater Quality

The Preferred Line will be within a physiographic area known for its karst topography. Areas of karst topography include features such as caves, sinking streams, sinkholes, and springs. All of these features can provide direct connection between surface water and groundwater. Any effects on the surface water in these areas are essentially affecting the groundwater in a similar manner. Studies have shown that land-use practices are potential hazards to the quality of near-surface ground water in this area.

The greater potential for impacts would be to the Springfield Plateau aquifer, which is directly recharged by surface waters. This aquifer is used primarily for agricultural purposes, with some use by rural homeowners. Its domestic value has been reduced because of identified contamination from: 1) animal wastes spread on pastures; 2) ineffective septic systems; and 3) chemicals used for agricultural and industrial purposes. A large percentage of the study area utilizes public water supplies originating at Beaver Lake Reservoir.

The construction of highways and associated activities can introduce other pollutant contamination into the groundwater resources because of the minimal filtration and rapid introduction of the surface water into the groundwater through fractures, sinks, and disappearing streams. The introduction of contaminants such as sediment, petroleum products, chemicals, etc., could be detrimental not only to water quality in the wells, springs, and caves, but to the survival of any organisms which may inhabit the study area's caves.

The Preferred Line may impact some existing springs, either by disruption of their recharge areas, or contamination during construction. If the impacted springs are used for domestic or agricultural purposes, damages will be paid or provisions made to replace the water.

Special provisions and actions will be required during the design and construction phase to protect the Springfield Plateau aquifer, especially if any spring locations will be impacted by the proposed project. These commitments will include ditch paving through highly vulnerable areas, including areas where conduits directly leading to the groundwater are discovered during construction. Coordination with State and Federal Agencies involved with groundwater quality protection will be conducted as needed when concerns are identified.

The Preferred Line/I-540 directional interchange would function as a system-to-system connection and should not accommodate or promote adjacent secondary development because no access to adjacent property would be provided. No secondary impacts to groundwater related to development around the proposed Preferred Line/I-540 directional interchange are expected since there would be no direct access to the interchange or the highways at this location. Control of any development that may occur is outside the legal authority of the AHTD, and would have to be restricted by local government. Cumulative impacts to groundwater would be related to interchange locations with other proposed transportation projects. Special provisions in the design and construction phase will be utilized to minimize groundwater impacts from these projects.

The No-Action Alternative would not involve new construction, thus no new conduits for transmission of pollutants to groundwater will be opened. However, increased traffic volumes on the existing facility will result in increasing amounts of pollutants in highway runoff, decreasing safety levels, and a greater potential for hazardous materials spills that could impact the groundwater.

4.3.6 Drinking Water Supplies

No sole source aquifers, wellhead protection areas or public water supplies will be affected by the project.

Although public water is available throughout the study area, some residents choose to remain on private water supplies for their domestic and/or agricultural purposes. Private wells are typically installed in the first water bearing rock formation encountered during drilling. Some rural residents also use springs as a water source. Because of the difficulty in assessing the recharge areas for these surficial individual wells, groundwater systems, and springs, no assessment of impacts on these systems was performed. If any permanent impacts to private drinking water sources occur as a result of this project, the AHTD will mitigate these impacts by providing an alternative water source, either by drilling a new well or connecting the residents to a community or rural water system.

The No-Action Alternative is not within a public drinking water wellhead protection area. However, increased traffic volumes on the existing facility will result in greater amounts of

pollutants in highway runoff and a greater potential for hazardous waste spills due to decreased safety levels. Because of these reasons, the No-Action Alternative could increase the potential impacts to private drinking water sources.

4.3.7 Terrestrial Communities

4.3.7.1 Terrestrial Flora

The primary impact to flora in the project area will be conversion of pasture and woodland to highway right-of-way. Table 4-15 provides estimates of the acreage of pasture and woodland converted by the Preferred Line. These land cover types were delineated using aerial photography in a GIS platform. The category "developed land" includes industrial and commercial uses, existing roadways, residences and agricultural complexes (see also Table 4-1, Land Use). A large amount of pasture will be converted to highway right-of-way. Additionally, proximity to a new transportation facility will make adjacent properties more likely to be developed. Due to the intensive human impacts already inflicted on the local environment, expected impacts to local biodiversity are negligible. This is primarily due to the historical conversion of prairie and forest to cropland and orchards, then to modern pasture and suburban development.

Table 4-15
Land Cover Types Converted to Right-of-way for Preferred Line
Acres (Hectares)

Woodland	Pasture	Developed Land	Total
247 (100)	609 (246)	377 (153)	1,233 (499)

Secondary impacts to the terrestrial environment include the spread of invasive plant species onto newly disturbed roadside right-of-way. Potentially invasive species noted in the project area include Johnson grass (*Sorghum halepense*), mimosa tree (*Albizia julibrissen*), chicory (*Cichorium intybus*), Queen Ann's lace (*Daucus carota*), sericea lespedeza (*Lespedeza cuneata*), Japanese honeysuckle (*Lonicera japonica*), barren brome grass (*Bromus sterilis*), common ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), and great

mullein (*Verbascum thapsus*). These plants typically invade disturbed ground and will likely occur on the new right-of-way. However, the effects to natural vegetation and floral biodiversity will be minor because a high percentage of the vegetative land cover is already converted to foreign pasture grasses for livestock forage. Direct application of appropriate herbicides will be a part of the AHTD's right-of-way management program in order to combat the invasive species Johnson grass. Due to the easily contaminated groundwater in the region (see the Hydrogeology Section and Groundwater Quality Sections), the AHTD does not use broadcast herbicides for vegetation control in Benton or Washington County.

The No-Action Alternative will have no impact to the terrestrial flora since no construction or other action will occur that converts terrestrial land cover to highway right-of-way. Remaining tracts of pasture and woodland adjacent to the existing highway will eventually be developed.

4.3.7.2 Terrestrial Fauna

Some individual mortality will occur to the smaller, less mobile species during construction. Construction on new location will convert existing habitat communities to early successional grassy or shrubby vegetation commonly associated with highway right-of-way, and wildlife impacts will likely follow those observed on similar existing highways. Construction and operation of highways does not affect the distribution and abundance of the majority of bird and mammal species, including game species (Michael 1975; Burke and Shelburne 1982; Adams and Geis 1982).

Bird species that are protected by the Migratory Bird Act Treaty could be impacted by this project. Nesting habitat for migratory bird species will be cleared and grubbed during the construction phase. Existing bridges, culverts and other structures provide nesting sites for migratory birds. Netting of the structures may occur before nesting and brood raising activities begin to prevent nest disturbance and/or destruction of nestlings during construction activities. If the structure is being utilized by migratory birds as nesting habitat, demolition will not be permitted between April 1 through August 31. Every attempt will be made, where practicable, to schedule construction clearing and grubbing activities so that they do not occur during the primary nesting season for migratory birds.

Many wildlife species will be able to utilize the new habitat created by the right-of-way and its associated edge. This habitat approaches old field-pasture habitat, and will be used by a variety of wildlife species including cottontail rabbits, white-tailed deer, red fox, coyotes, a variety of small mammals, and many bird species. Much of the proposed project area has already been converted to grassland for cattle grazing. Upland forest habitat has been greatly reduced in the project area due to this conversion for agricultural use. The Preferred Line will impact approximately 247 acres (100 hectares) of upland forest habitat out of a total of 1,233 acres (499 hectares) that will be impacted by the project. No animal populations or communities should be extirpated by the proposed project because of the overall availability of the habitat types within the project area. There will be loss of habitat due to conversion of woodland to highway right-of-way and the population of terrestrial faunal species will be reduced by the number supported by the converted acreage.

The No-Action Alternative will have no impact to terrestrial fauna since no additional habitat will be lost by land conversion to highway right-of-way. Secondary development will continue to occur on the remaining tracts of pasture and woodland adjacent to the existing highway.

4.3.8 Aquatic Communities

4.3.8.1 Aquatic Fauna

The aquatic community will be impacted by filling of vernal pool habitat associated with a 0.2 acre (0.08 hectare) pasture wetland depression and increased sedimentation at crossings associated with the stream systems that will be traversed. No aquatic populations are likely to be eliminated from the project area due to construction of the project. Some individual species mortality will occur to less mobile species during initial construction activities. Erosion and sedimentation must be adequately controlled during construction to minimize impacts to the aquatic fauna. The No-Action Alternative will have no impact on aquatic communities.

4.3.8.2 Threatened and Endangered Species

The Preferred Line lies outside the delineated Cave Springs recharge area, and therefore should not directly impact the listed species utilizing the cave habitat. However, the USFWS

expressed concerns that the construction of the bypass could promote secondary development in the area, especially around local access interchanges and/or along frontage roads.

To minimize potential impacts that could result from the construction of the Preferred Line, the USFWS requested the FHWA and AHTD not to build additional interchanges between I-540 and Highway 112 and to limit frontage roads. The following commitments were established.

1) The directional interchange of the Preferred Line and I-540 will provide no local access.

2) No additional interchanges will be constructed between Highway 112 and I-540.

3) No frontage roads will be built along the proposed project between the Highway 112 and I-540 interchanges, including local road construction under federal or state control, except for two short lengths of road that would provide connectivity for local roads severed by the proposed facility. The severed roads that could be reconnected are: A) Puppy Creek Road/Spring Creek Road, and B) Wagon Wheel/South Zion Road. A grade separation should be placed on both Wagon Wheel Road and South Zion Road if design and budget criteria allow.

4) Drainage from the proposed project will not be allowed to enter the Cave Springs recharge area as delineated and shown in the DEIS.

A complex of 11 springs is present along Brush Creek between the Lake Elmdale Dam and approximately 0.25 mile (0.4 km) downstream of the Highway 112 crossing of Brush Creek. In July 2004, a single specimen of *Cambarus aculabrum* was recovered by a local landowner from one of the spring openings. The recharge area for the spring complex is currently unknown, but surrounding topography suggests that recharge would occur from the south from the vicinity of Highway 412 and Tontitown. The spring and purported recharge area are approximately 0.5 mile (0.08 km) east of the Preferred Line at the closest point. A recharge delineation study for the spring complex is underway to assure that construction of the Preferred Line does not fall within the recharge area for this spring complex. If the

Preferred Line falls within the recharge zone, a biological assessment will be conducted to determine potential impacts to the endangered cave crayfish and the need for further consultation under Section 7 of the Endangered Species Act.

None of the cave/sinkhole systems investigated during preparation of the FEIS were found to contain endangered species. No federally protected endangered species are known to inhabit the impact area for the Preferred Line. A no effect determination will be solicited from the USFWS upon completion of the FEIS.

The No-Action Alternative will not affect any endangered species.

4.3.9 Natural Areas

No designated natural areas will be impacted by any of the alternatives. A pedestrian survey of the proposed project failed to disclose any additional areas that would be of interest to the Natural Heritage Inventory Program.

4.3.10 Wild and Scenic Rivers

The Preferred Line will not impact a Wild and Scenic River or a stream listed on the Nationwide Rivers Inventory. There are no streams with these designations located in the proximity of the project study area.

4.3.11 Public Recreational Lands, Section 4(f), and Section 6(f)

The Preferred Line will not impact existing or proposed parks or recreation areas. A pedestrian survey and correspondence with Arkansas Department of Parks and Tourism failed to disclose any existing public recreation land in proximity to the Preferred Line. Although a segment of the Trail of Tears National Historic Trail runs through the project area, the exact route has not been verified and there are no associated public lands. The designated Trail of Tears driving route follows Highway 71 through the study area, but will not be affected by the Preferred Line. Therefore, Section 4(f) of the USDOT Act of 1966 concerning the use of public recreation lands and Section 6 (f) of the Land and Water Conservation Act do not apply.

4.3.12 Cultural Resources

Potential impacts to cultural resources were assessed by comparing the proximity of known resources to the proposed right-of-way and buffer zone for the Preferred Line. Because preliminary design is not yet available, the right-of-way used in this study is an estimate. An estimated 300-foot (90 m) right-of-way along the alignment and an estimated 150-foot (46 m) right-of-way outside of the proposed interchange ramps was used for assessment purposes (herein after referred to as the impact zone). Those resources that touch or that are within this estimated right-of-way area are considered to be within the impact zone of the Preferred Line and could be affected by the proposed project. A half-mile wide buffer zone of 0.25 mile (0.1 hectare) on each side of the centerline was also analyzed in the study. While no impacts are anticipated to those resources within the area identified as the buffer zone, final project design is not complete and could include minor shifts in alignments or cross–sections that are wider than the anticipated 300-foot (90 m) corridor. Including a buffer zone insures, as much as possible, that sites which may be affected by subsequent adjustments to the line will be known, and the ability to cope with future impacts is at least partially in place.

4.3.12.1 Probability Areas

Landforms and most land surfaces in the project area are old enough to contain evidence of the earliest known period of human occupation (Paleo Indian period) in the State. Most of the soils and land surfaces in the upland portions of the project area have been stable or have been deflating for a long period of time and most prehistoric sites in these areas can be expected to be on or near the surface. Buried sites could be present in the stream valleys where recent alluvium may have covered earlier stream terraces or near the bases of hills where colluvium may have been deposited.

Prehistoric settlement patterns on the Springfield Plateau have not been extensively studied but judging from the existing data, the lithic scatter is probably the most commonly occurring prehistoric site type that can be expected in the project area. Lithic scatters are generally characterized by concentrations of stone chipping debris and other tools, such as stone projectile points or “arrowheads.” They can occur in a variety of settings but the most

intensively occupied sites are usually adjacent to perennial water sources and/or underneath rock overhangs (bluff shelters) or caves that are large enough to serve as natural shelters. Open lithic scatters (those that are not situated within bluff shelters) rarely contain well-preserved bone and many are thought to be the result of temporary camp sites related to the seasonal exploitation of the environment by hunting and gathering societies. Archaic period components seem to dominate at most sites but many contain multiple components that can span the entire period of known human occupation. Of the five known prehistoric sites identified along the Preferred Line, all are open lithic scatters and others are likely to be identified along the route as more intensive work is conducted.

An analysis of the current topographic maps show that the Preferred Line crosses terrain and ecological zones that are similar to those along all of the alternative alignments. Likewise, prehistoric site probability along the Preferred Line can be expected to be about the same as that of all of the routes studied. Most of the terrain along the Preferred Line is level enough for comfortable, sustained human occupation and more intensive fieldwork will likely result in the discovery of additional prehistoric sites, most of which will likely consist of lithic scatters. Site probabilities would appear to be highest on well-drained, relatively level terraces adjacent to stream crossings and springs. Springs and water crossings are illustrated in Figures 4-10A, 4-10B, and 4-10C. Near the eastern end of the Preferred Line, the terrain is highly dissected and contains slopes too steep for sustained human habitation. Even though bluff shelters are known to occur in similar terrain, the geology in this particular area does not appear to be favorable for bluff shelter formation and site probability here is expected to be relatively low.

Like many Indian sites, most of the earliest historic sites in the state are also oriented toward natural resources. Many are located along streams or springs, on prairies, or in areas that have soils suitable for farming, but as transportation and communication networks were developed, settlements became less dependent on proximity to natural resources. Later historic development is often clustered along roads and railroad lines. Both historic archeological sites identified along the Preferred Line (3BE708 and 3BE658) are situated along road systems.

Judging from the low density of cultural features shown on the GLO maps, historic settlement in the project area during the early to mid 1800s is sparse and sites dating to this period are expected to be rare or non-existent along the Preferred Line. Populations grew substantially after the Civil War and rural family based farmsteads are common in much of the project area dating from about the 1870s to the 1930s or 40s. Both of the historic archeological sites identified along the Preferred Line date to this period of occupation and more sites of this type are likely to be discovered as the fieldwork intensifies.

4.3.12.2 Public Involvement

Of the approximately 650 comment forms that were received as a result of the public involvement process, 28 make reference to cultural resources. Many refer to well known historic landmarks located in areas that are outside the proximity of the Preferred Line, such as Rabbit's Foot Lodge, Fitzgerald Station, Friendship Cemetery, the Arnold-Jones House, and Hewitt Springs. Several refer to events such as a reported Civil War skirmish that took place near Fitzgerald Mountain, while others provide leads on local finds of arrowheads, Indian relics, Indian villages and Civil War encampments. Two archeological sites, one cemetery and several of the standing structures mentioned in other sections of this document were identified as a result of tips from the public. However, most of the references do not give precise locational information and are in need of field verification and mapping to determine their locations and proximity to the project area. All potential site leads pertaining to the Preferred Line that were received from the public will be investigated during the final survey.

4.3.12.3 Archeological Resources

Table 4-16 shows the results of the impact analysis regarding the archeological sites identified along the Preferred Line during the study.

Of the sixteen sites identified during the AAS records check of the entire study area, eight, (3BE658, 3BE659, 3BE662, 3BE716, 3BE718, 3BE719, 3BE721 and 3BE708) occur along the Preferred Line within the buffer zone. Five (3BE659, 3BE662, 3BE716, 3BE718, 3BE719) are prehistoric lithic scatters, while two (3BE658, 3BE721) are the remains of historic farmsteads and one (3BE708) is a cemetery. Neither of the sites identified during the

reconnaissance survey are located along the Preferred Line. A brief description of each site follows below.

Of the eight sites identified along the Preferred Line, one (3BE716) is within the impact zone and will likely be affected by project construction. This site has been previously evaluated and has been determined to be ineligible for nomination to the National Register. The other seven sites are within the half-mile buffer zone and should not be affected by project.

Table 4-16
Known Archeological Sites
Along the Preferred Line

Line Segment	Site Numbers	Impacted
A-B	3BE658*	No
B-C	3BE659^ 3BE662^ 3BE716* 3BE718^ 3BE719^ 3BE721*	No No Yes No No No
C-D	None	N/A
D-E	3BE708^	No
E-F	None	N/A

* Sites determined ineligible for the National Register
^ Sites of undetermined eligibility

3BE658-(No Impact) This site consists of an early 20th century farmstead represented by the remains of a dilapidated board and batten house and an associated artifact scatter. This site was identified during the survey for the proposed NWARA Access Road. The site was determined to be ineligible for nomination to the National Register. It lies within the buffer zone and should not be impacted by the Preferred Line.

3BE659-(No Impact) This site consists of a lithic scatter located on a terrace overlooking Spring Creek adjacent to a large spring. A single dart point and abundant chipping debris

suggest an archaic period placement for site occupation. The site was recorded as a result of the NWARA Access Road survey. Further testing is recommended to determine if it qualifies for nomination to the National Register. It lies within the buffer zone and should not be impacted by the Preferred Line.

3BE662-(No Impact) This site is situated on a bottomland terrace east of a tributary of Spring Creek. It consists of a lithic scatter first discovered during the NWARA Access Road survey. Further testing is recommended to determine if it qualifies for nomination to the National Register. It lies within the buffer zone and should not be impacted by the Preferred Line.

3BE716-(Impacted) This site consists of a 1920s Craftsman bungalow-style house on the northwest edge of a stone quarry. The quarry has cut around the east and south sides of the house lot, but it is presumed that a farm complex originally stood in the area. The house has been boarded shut and appears to have been remodeled before being closed by the quarry operation. The site was determined to be ineligible for nomination to the National Register. It lies within the impact zone and will likely be destroyed by construction of the Preferred Line.

3BE718-(No Impact) This site is situated on a small levee remnant on the north side of Brush Creek. The site appears to be confined to the upper 24 inches (60 centimeters) of finer silt deposits in the levee and includes a small hearth exposed on the bank cut. Flakes, tools, and charcoal are common on the levee and in exposed areas. Further testing is recommended to determine if it qualifies for nomination to the National Register. It lies within the buffer zone and should not be impacted by the Preferred Line.

3BE719-(No Impact) This site is situated on a high second terrace facing Brush Creek. The site consists of a lithic scatter with flakes, fire cracked rock and a preform. Shovel testing determined that artifact concentration was higher under the plow zone. Further testing is recommended to determine if it qualifies for nomination to the National Register. It lies within the buffer zone and should not be impacted by the Preferred Line.

3BE721- (No Impact) This site is a 20th century historic farm complex with a recently remodeled ranch style house and wooden dairy barn. An older farmhouse originally stood behind the house but has been replaced. The barn is a wood frame German style dairy barn with a gambrel roof and new tin roofing. The site was determined to be ineligible for nomination to the National Register. It lies within the buffer zone and should not be impacted by the Preferred Line.

3BE708-(No Impact) This site is the Wilson Cemetery. It lies within the buffer zone and should not be impacted by the Preferred Line.

4.3.12.4 Native American Consultation

As part of the current regulations (36 CFR Part 800.4(a) of the National Historic Preservation Act of 1966) regarding cultural resources, all Federal agencies are required to consult with pertinent Indian Tribes if an undertaking may affect ancestral lands or properties that may be of religious or cultural significance. Historically, the Osage Indians are known to have claimed most of north Arkansas, including the Ozarks, as hunting territory. They, like most other Southeastern Indians, were forced from their homelands and pushed west into parts of Kansas and Oklahoma. Today there are about 10,000 Osages listed on their tribal roll, most of who have assimilated into American society.

Headquarters for the Cherokee Nation is now located in Tahlequah, Oklahoma. Even though northwest Arkansas was not the Cherokees' ancestral homeland, thousands passed briefly through the project area on their forced march into Oklahoma along the Trail of Tears. Many died, and there is a possibility that some were buried along the route.

In accordance with the above-mentioned directives, the consultation process has been initiated with the Osage and the Cherokee (see Appendix B). Letters initiating the project and copies of the SDEIS have been provided to the tribes. To date the Cherokee have responded (see Appendix B). Consultation with both of these tribes will continue throughout the duration of the project and other tribes may be included as research regarding the history and prehistory of the project area intensifies.

4.3.12.5 Historic Resources

4.3.12.5.1 Maps

The GLO maps were the only map resources that provided information helpful in tracking down specific site areas. This is largely due to the fact that they often accurately show the location of cultural resources and are tied to the Section/Township and Range system that can be easily compared with modern topographic maps that use the same reference system. A review of the 1936 Benton and Washington County road maps and the 1899 Fayetteville quadrangle shows a basic infrastructure of roads and buildings in the project area, many of which survive today. However, the exaggerated scale used on these maps makes accurate comparison of specific building locations and potential archeological sites somewhat difficult.

Cultural features shown on the GLO maps along the Preferred Line are listed in Table 4-17. Figure 4-11 shows the cultural features recorded on the GLO maps as they relate to the Preferred Line.

Table 4-17
Cultural Resources Shown on the GLO Maps Along the Preferred Line

Line Segment	Sites	Impacted
A-B	None	N/A
B-C	Field E And House	No No
C-D	None	N/A
D-E	Field C Field D Road Segment	No No Minor
E-F	None	N/A

Cleared fields are the most commonly occurring cultural feature shown on the GLO maps. Of the five fields shown within the project area, three (Fields C, D and E) are located along the Preferred Line. While some of these may still be marked by landscape features such as fieldstone walls or associated farmstead sites, others may leave little recognizable evidence of their presence in the archeological record. Even though these resources are currently known only from the archival record, they generally should be considered as potential archeological resources until they are field checked. None of the three fields are within the impact zone; all are on the outer margin of the buffer zone and no impacts are anticipated to any of them.

The only other cultural features shown on the GLO maps along the Preferred Line includes one house associated with Field E and a segment of a road. The house is no longer standing and like field E, lies well outside of the impact zone. The road segment corresponds roughly with the current location of Old Wire Road. The Preferred Line crosses a small segment of this feature (see following section on Old Roads and Historic Trails).

4.3.12.5.2 Historic Structures

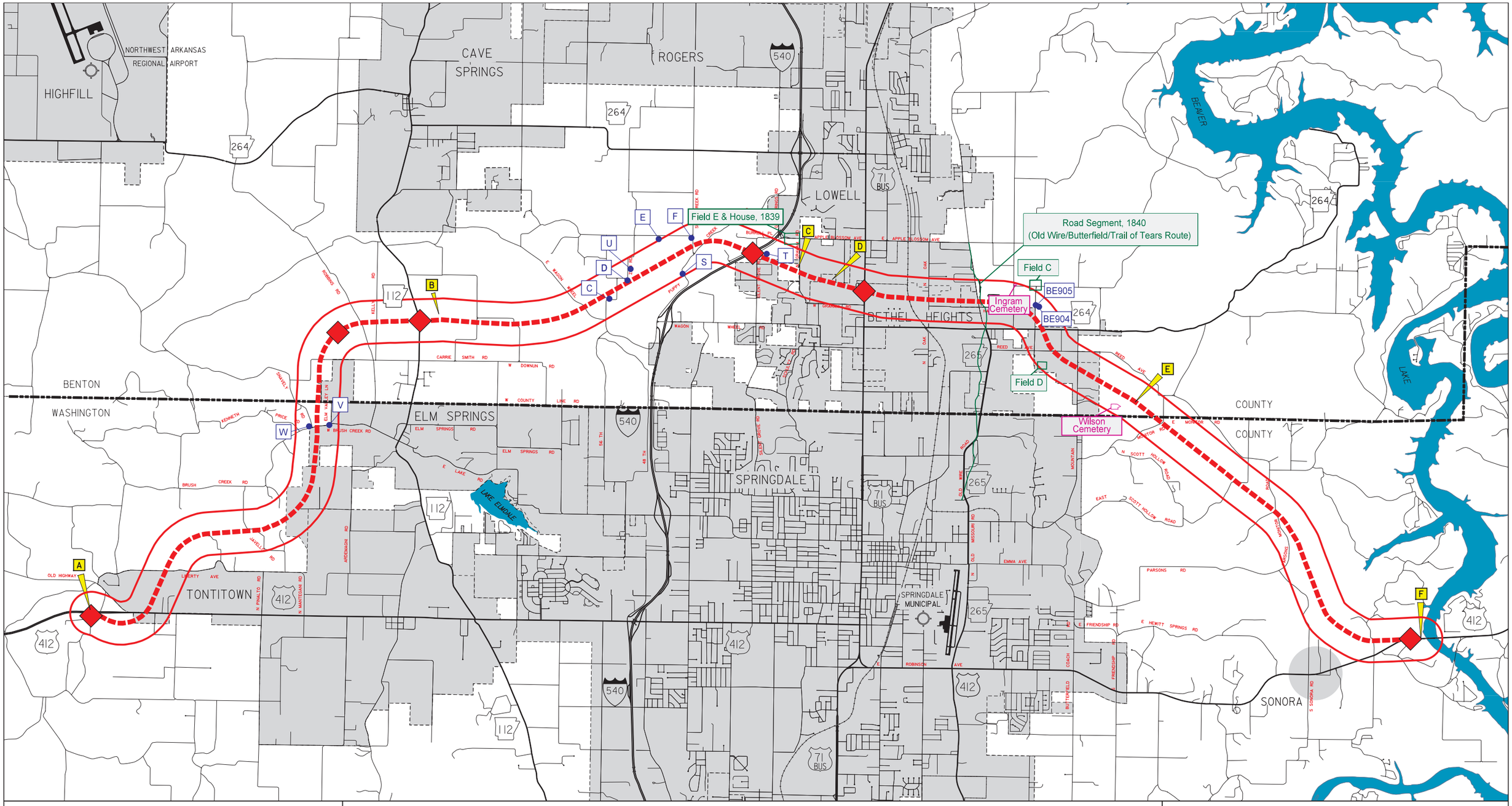
Table 4-18 shows the result of the impact analysis on the structures identified within the study area for the Preferred Line.

Table 4-18
Historic Structures Along the Preferred Line

Line Segment	Site Numbers	Impacted
A-B	Structure V	No
	Structure W	No
B-C	Structure C*	No
	Structure D	Yes
	Structure E	No
	Structure F	No
	Structure S	No
	Structure T	Yes
	Structure U*	No
C-D	None	N/A
D-E	BE904	No
	BE905*	No
E-F	None	N/A

* Structures eligible to the National Register

Of the 37 standing structures identified during the initial survey, seven have been destroyed. All of the remaining structures were evaluated for eligibility to the National Register. Of the remaining 31 structures, 11 (Structures V, W, C, D, E, F, S, T, U, BE904 and BE905) are located along the Preferred Line (see Figure 4-11). Of these 11 structures, three (Structures C, U and BE905) have been determined eligible for nomination to the National Register; the remaining eight (Structures V, W, D, E, F, S, T and BE904) have been determined ineligible. None of the eligible structures lie within the impact zone and no impacts are anticipated to these structures. Two ineligible structures (Structures D and T) are within the impact zone and could be affected by the project. The remaining ineligible structures are within the buffer zone and no impacts are expected regarding these properties.



0 1.0 2.0 3.0 MI
0 1.0 2.0 3.0 4.0 5.0 KM

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

- Field, 1840 — Cultural Feature Shown on the GLO Maps
- S — Historic Structure
- Cemetery
- Preferred Line (Impact Zone)
- Buffer Zone
- A — Segment Break
- Proposed Interchange

Figure 4 - 11

Location of Cultural Resources * Within Buffer Zone and Impact Zone for Preferred Line

*** Archeological Sites Not Included**

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4.3.12.5.3 Bridges

As discussed previously in the Affected Environment Section, all potentially historic bridges currently on the state highway system, the county road system, and the urban street system have been evaluated for significance. Of the twelve bridges currently listed on the National Register for Benton and Washington Counties, none are within the proposed study area.

4.3.12.5.4 Old Roads and Historic Trails

Most of the old roads in the project area have been significantly modified and bear little resemblance to the narrow wagon trails that they once were. While most of the roads today follow the general routes of the earlier trails, their alignments have been straightened, they have been widened to accommodate automobile traffic, and most have been paved. Any archeological evidence of any old or unmodified roadbeds will be examined during the final survey.

The Preferred Line will cross the ten-mile (16 kilometer) wide corridor designated by the National Park Service (NPS) as Trail of Tears National Historic Trail (see Figure 4-11). According to the Trail of Tears National Historic Trail Draft Comprehensive Management and Use Plan – Map Supplement, the actual location of the trail in the project vicinity is represented by a dashed line indicating that its exact location is unknown. The trail is illustrated along what is now known as Old Wire Road in this vicinity, but it more than likely followed a roughly parallel route shown on the 1840 GLO map just east of Old Wire Road. A signed auto driving route for this segment of the trail lies about 1.25 miles (2.9 km) west of Old Wire Road on Highway 71B and has nothing to do with the actual location of the trail other than, in this area, it roughly parallels the route and provides a more convenient route for vehicular traffic than does Old Wire Road. No historic or archeological sites associated with the trail have been identified or designated in or near the project area. While both Highway 71B and Old Wire Road are publicly owned roads, no segments of the trail along either of these routes have been purchased in or near the project area specifically for public use related to the Trail of Tears. Both Highway 71B and Old Wire Road now consist of modern highways, neither of which bear any resemblance to the dirt track described during Indian

removal. The route shown on the 1840 GLO map, which may or may not be accurate, is located several hundred feet east of the current location of Old Wire road on private property and is currently used as pasture and orchard in the area of the Preferred Line. No clear evidence of a roadbed was noted here during the windshield survey and none of the features or routes mentioned above have attributes that might qualify them as a Section 4(f) property. Consultation with the NPS Superintendent of Long Distance Trails regarding possible impacts to the trail was initiated during preparation of the DEIS (see Appendix B). No response was received and a second request for information was sent during the preparation of the SDEIS (see Appendix B), followed by a telephone call. To date no guidance or response has been received from the Long Distance Trails Group, but the Department of the Interior did issue general comments regarding the Trail in response to both the DEIS and SDEIS. These comments have been addressed in the text above and by both the AHTD and FHWA in the Comments and Response Section. The trail has also been mentioned in tribal consultation with the Cherokee and Osage (see Appendix B). Additional tribal consultation and coordination with the Long Distance Trails Group will continue regarding this resource as the project proceeds.

Even though the Preferred Line will cross the Trail of Tears corridor, no significant impacts are expected given the current data on hand. Construction of the Preferred Line will not change the access or the alignment of the auto driving tour and the original route along Old Wire Road has yet to be confirmed.

Landscapes adjacent to both of these crossings are in the process of being disturbed by modern development and there is a relatively low probability of finding associated archeological sites or trail remnants in these areas that might qualify for eligibility to the National Register. Nevertheless, during the final survey, particular attention will be given to any sites or landscape features that might be associated with the trail. Should the intensive survey reveal well-preserved segments of the trail or archeological sites that might be associated with it, additional consultation will be implemented to insure that any

management recommendations area consistent with the NPS Comprehensive Management and Use Plan.

4.3.12.5.5 Cemeteries

Of the seven cemeteries identified during the study, two (Ingram and Wilson Cemeteries) have been identified along the Preferred Line (see Figure 4-11). Both are located along the outer margins of the buffer zone and neither will be impacted by the proposed project (Table 4-19). It has always been the AHTD intention to avoid such resources when they can readily be identified.

Table 4-19
Cemeteries Along the Preferred Line

Line Segment	Sites	Impacts
A-B	None	N/A
B-C	None	N/A
C-D	None	N/A
D-E	Ingram Wilson	No No
E-F	None	N/A

4.3.12.6 Section 4(f) Historic Properties

Section 4(f) of the USDOT Act of 1966 prohibits the use of significant historic properties unless it can be shown that:

1) There are no prudent and feasible alternatives that meet the project purpose and need that avoids use of that land; and

2) The proposed action has considered all possible planning to minimize harm to the property that would result from the proposed action.

A number of steps have been taken to insure that all known properties that might qualify for Section 4(f) analysis have been identified. All standing structures identified during the study were evaluated by qualified architectural historians at the Arkansas Historic Preservation

Program for eligibility to the National Register of Historic Places. The potential eligibility of all known archeological sites was also reviewed. Those structures and certain archeological sites that have been determined eligible for nomination have the potential to qualify as Section 4(f) properties.

Analysis of the current data reveals that no known Section 4(f) properties will be affected by the construction of the Preferred Line. All three standing structures (Structures C, U and BE905) identified along the Preferred Line that were determined eligible for the National Register are considered as potential Section 4(f) properties. All lie outside of the impact zone and it is anticipated that no portions of these properties will be required for construction of the Preferred Line. No physical impacts are expected to any of them. Even though all three fall within the half-mile wide buffer zone, accurately determining secondary impacts without preliminary design is not possible at this stage in the process. All three structures are privately owned and are residences. They are considered eligible under Criterion C and are important for their architectural characteristics (see SHPO correspondence in Appendix B). While determining whether or not there will be the need for additional constructive use analysis of these properties will ultimately be the responsibility of the FHWA, it is doubtful that construction of the Preferred Line would have any adverse effect on use or the existing architectural qualities of any of these structures.

Because standing structures are usually represented on maps and aerial photographs and are easily recognized by a simple visual examination, the identification of standing structures along the route has been comprehensive. On the other hand, archeological sites are generally not evident without some type of sub-surface excavation and an intensive archeological survey of the Preferred Line will likely result in the discovery of additional archeological sites (probably consisting of lithic scatters and late 19th/early 20th century farmstead sites). Most archeological sites, even when determined eligible, in Arkansas are considered important for the information that they contain (Criterion D) and do not warrant preservation in place. Section 4(f) usually does not apply to such sites when FHWA, SHPO and the Advisory Council on Historic Preservation agree that the resource has minimal value for preservation in place (see 23 CFR771.135(2)(g)). Exceptions might include sites with standing architecture (i.e., sites with mounds, embankments, moats, etc.), sites with elements

or components that make them unique, or sites that certain cultural groups consider sacred. While such sites could conceivably exist along the Preferred Line, the probability that they do is extremely low, based on the work done to date. A Section 4(f) evaluation will be prepared, if warranted, once all sites have been identified and impacts are fully known. Additional comments on the DEIS and SDEIS issued by the Department of the Interior regarding Section 4(f) historic properties have been addressed by FHWA in Section 7, Comments and Response.

The only three known resources (Structures D, T and archeological site 3BE716) within the impact zone that will be affected by the project have been determined ineligible for nomination to the National Register and do not qualify as Section 4(f) properties. As stated earlier in the section on Old Roads and Historic Trails, the Trail of Tears National Historic Trail contains no features or attributes within the project area that would qualify it as a Section 4(f) property in this location. To date, no specific sites or properties within the project area have been identified as traditional cultural properties by any of the Indian tribes contacted.

4.3.12.6.1 Summary and Limitations

Table 4-20 compares the anticipated impacts to all cultural resources identified along the Preferred Line (see also Figure 4-11). While this assessment gives a reasonably accurate listing of the currently known resources, there are limitations in the existing data that should be taken into account before a conclusive analysis can be made. First of all, preliminary design has not yet been developed for the Preferred Line and there is still room for slight changes or adjustments in the alignment due to unknown constraints that may arise as more detailed survey data is collected. In some areas where topography is extreme, cuts and fills may extend beyond the estimated 300-foot right-of-way, while the project footprint in other areas may be considerably less than expected. Because a stable project footprint has not yet been developed and because landowner access to conduct additional archeological work along the route has not yet been granted, a phased approach to the identification and

Table 4-20
Comprehensive List of Cultural Resources Identified for the Preferred Line

Alignment	Archeological Sites	Historic Sites	Cemeteries	GLO Sites	Roads
A-B	3BE658◊	Structure V¤ Structure W¤	None	None	None
B-C	3BE659♦ 3BE662♦ 3BE716◊ - I 3BE718♦ 3BE719♦ 3BE721◊	Structure C* Structure D¤ - I Structure E¤ Structure F¤ Structure S¤ Structure T¤ Structure U*	None	Field E House (E)	None
C-D	None	None	None	None	None
D-E	3BE708†	BE904¤ BE905*	Ingram Wilson	Field C Field D	Old Wire Road - I
E-F	None	None	None	None	None

I indicates the resource will be impacted
* Historic Property eligible to the NRHP
¤ Historic Property ineligible to the NRHP
♦ Archeological site requires testing
◊ Archeological site ineligible to NRHP
† Archeological site not evaluated

evaluation of cultural resources has been implemented in this study as defined in 36 CFR Part 800.4 (b)(2). The greatest limitation regarding cultural resources is the fact that most of the project area has not been subject to an intensive archeological survey. Additional archeological sites are almost certainly present along the Preferred Line, some of which could prove to meet the criteria for nomination to the National Register. While the probability for unknown sites along the route that would qualify as Section 4(f) properties is relatively low, it is possible that some could warrant treatment programs that would involve data recovery that is often costly and time consuming.

4.3.12.7 No Action Alternative

The No-Action Alternative does not have the potential to directly affect cultural resources. Because archeological sites, cemeteries, old roads, historic structures, etc., are location-

specific resources, any impact would normally require acquisition and modification of new right-of-way before there would be a potential to directly affect such resources.

4.3.12.8 Cumulative and Secondary Impacts to Cultural Resources

While it is impossible to accurately predict all of the secondary and cumulative impacts that such an undertaking might cause, it is probably safe to assume that it would result in additional or more rapid development in the project vicinity especially near local access interchange locations. Any earth altering activities (i.e., utility relocation or construction, road improvements, urban development, etc.) that often follow large-scale road projects have the potential to adversely affect archeological sites. Such impacts are difficult to assess at this stage in the process because the extent and absolute cause of any additional development cannot be accurately predicted. Currently, the Springdale area is growing so rapidly, that many archeological sites that have managed to survive to this day will be destroyed or covered by commercial or urban development in the very near future whether the project is built or not.

4.3.12.9 Recommendations for Additional Work

As soon as preliminary design has been developed and a stable right-of-way footprint of the final alignment is available, an intensive cultural resources survey will be conducted covering the proposed project right-of-way. Prior to and during fieldwork, consultation between FHWA and any appropriate Indian Tribe or Tribes will be maintained according to 36 CFR part 800.4(a) of the National Historic Preservation Act. All phases of fieldwork, evaluation and reporting will conform to the Secretary of the Interior's "Standards and Guidelines for Archeology and Historic Preservation" (48 CFR 44716); the standards for field work and report writing in *A State Plan for the Conservation of Archeological Resources in Arkansas*; and all other pertinent State and Federal laws and regulations. A full report documenting the results of the survey and stating the AHTD's recommendations will be prepared and submitted to the SHPO for review. All sites identified will be evaluated to determine if Phase II testing is necessary.

Eligibility determinations will be made by the FHWA in consultation with the SHPO and any appropriate Indian tribe or tribes. Should any of the sites be found to be eligible or

potentially eligible for nomination to the National Register of Historic Places and avoidance is not possible, site specific treatment plans will then be developed and submitted to the SHPO and the appropriate tribes for review and comment. A corresponding Memorandum of Agreement between SHPO, the FHWA and the appropriate tribes will then be implemented and the appropriate treatment plan will be carried out at the earliest practicable time.

Should any of the sites be found to qualify as a Section 4(f) property, there should be enough flexibility within the study corridor (a quarter mile on either side of the center line) to modify actual roadway designs to consider avoidance of all but the very largest of sites.

4.3.13 Farmland

The impacts of highway construction upon prime and unique farmland has become an important consideration in highway planning. The U. S. Soil Conservation Service, in cooperation with the Arkansas Agricultural Experimental Station (1969, 1977), has published a soil survey of Benton and Washington Counties. The survey was used to determine the number of acres of prime farmland, farmland of statewide importance, and unique farmland that could be impacted by the project. Estimated right-of-way for the alignments under study and the city limit boundaries were superimposed on the digitized soil data. Soils falling inside city limits and the existing I-540 right-of-way were not included in the analysis.

Recent aerial imagery (2004) was used to determine the existing land use within and near the area of the Preferred Line. Estimated right-of-way for the alignment and the city limit boundaries were superimposed on the aerial and used for a determination of existing agricultural land that would be impacted. The area of prime farmland, farmland of statewide importance, and existing agricultural land use that will be converted to highway right-of-way was evaluated for the Preferred Line. The Preferred Line would convert 120 acres (49 hectares) of prime farmland and 66 acres (27 hectares) of Farmland of Statewide Importance to highway right-of-way. No unique farmland is located in the project study area. Coordination with the National Resource Conservation Service (NRCS) is located in Appendix G, along with Forms SCS-CPA-106, the Farmland Conversion Impact Rating.

On most farms in the project area, open land is used to grow forage for livestock. This area is where the major impacts to agriculture will occur. Right-of-way acquisition for the

proposed facility will reduce the amount of land available to some farmers, and it may become less economical for some to continue farming.

Bisection of farms will not only convert farmland to highway right-of-way, but also result in the disruption of some operations. Locating the facility near property lines could minimize farm severance. Farm severance can be mitigated through the construction of access roads and overpasses when economically feasible. Access roads would allow farming to continue, but may encourage urban development along the facilities. Severance payments will be used to compensate farm owners for their lack of access to the severed portion of the farm. Severed farmland that cannot be used by the original farmer is expected to remain in production through lease or sale to adjacent farm owners.

The construction of the new facility will also result in certain positive impacts on farm operations. Highway 412 is the major east-west route in the area. The new facility will make farm-to-market transportation easier and more efficient.

Secondary impacts can be anticipated to prime farmland and farmland of statewide importance; commercial and residential developments around new local access interchanges will occur. The area is currently experiencing rapid urban development and the new facility will likely accelerate this.

A secondary impact associated with the Preferred Line would be the conversion of 55 acres (22 hectares) of existing agricultural land use to a transportation use by the construction of an interchange with the proposed NWARA Access Road. Four acres (2 hectares) of this potential impact area are Farmlands of Statewide Importance. No local access would be provided at this interchange that would promote increased secondary development.

The No-Action Alternative will not impact Prime or Unique Farmland. If the proposed project is not constructed, no new right-of-way will be needed. Therefore, there would be no impacts to prime or unique farmland.

4.3.14 Hazardous Materials

Figure 3-17 identifies the potential hazardous materials sites associated with the project area. The Preferred Line will not impact any hazardous waste sites, illegal dumps or known areas of contamination.

The project will require the acquisition and demolition of standing structures. An asbestos survey will be conducted on each building prior to the development of demolition plans. If the survey detects the presence of any asbestos-containing materials, plans will be developed to accomplish the safe removal of these materials prior to demolition. All asbestos abatement work will be conducted in conformance with ADEQ, Environmental Protection Agency, (EPA), and Occupational Safety and Health Administration asbestos abatement regulations.

The probability of impacting an unknown hazardous material or waste site is reduced due to the preliminary investigations conducted to avoid such sites. If a hazardous waste site is identified, observed, or accidentally uncovered within the right-of-way area, it will be the AHTD's responsibility to determine the type and extent of the contamination. The AHTD will determine the remediation and disposal methods to be employed for that particular type of contamination. All remediation work will be conducted in conformance with ADEQ, EPA and Occupational Safety and Health Administration regulations.

The AHTD's *Standard Specifications for Highway Construction* that will be utilized during the construction of the project requires the contractor to employ best management practices to prevent pollution by spills; proper use, storage, and disposal techniques; and limit the amount of hazardous materials stored on-site.

The No-Action Alternative will not impact any hazardous waste sites, since no right-of-way acquisition will occur.

4.4 ENERGY

Energy consumption related to construction is based on the construction cost of the alignment. The amount of energy required for the production and placement of materials (asphalt, structures, cut, fill, etc.) during construction will be a fixed cost. This cost will be offset over the life of the project by the energy efficiencies gained with the use of an improved transportation facility.

In most situations, fuel efficiencies will be improved because of higher levels of service including uniform speeds, less congestion, and free flow of traffic. The new facility will

provide better service and minimize through traffic indirection, thereby reducing energy consumption. As traffic is diverted to the proposed bypass, previously congested segments of Highway 412 would experience a decrease in traffic. Consequently, the operating efficiency would likely improve on the existing Highway 412 facility. An improvement in operating efficiency will likely occur in all segments of the system. Improved levels of service would also reduce travel times between destinations, thereby reducing overall fuel consumption.

Decreased operating efficiency caused by congestion will increase the use of energy resources for the No-Action Alternative.

4.5 POLLUTION PREVENTION MEASURES

In keeping with Executive Order (EO) 12856 – Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (August 1993), EO 12873 – Federal Acquisition, Recycling, and Waste Prevention (October 1993) and EO 12902 – Energy Efficiency and Water Conservation at Federal Facilities (March 1994) and other supporting Environmental Laws, the AHTD has implemented pollution prevention measures over the years that address pollution at its source.

EO 12902-Energy Efficiency and Water Conservation at Federal Facilities (March 1994) does not apply to this project, since it includes requirements for buildings and structures that are constructed, renovated or purchased for use by the federal government.

EO 12873-Federal Acquisition, Recycling, and Waste Prevention (October 1993) directs the federal government to more efficiently use natural resources by maximizing recycling and preventing waste whenever possible, and to "serve as a model in this regard for private and other public institutions."

EO 12856–Federal Compliance with Right-to Know Law and Pollution Prevention Requirements (August 1993) includes commitments that the federal government "should become a leader in the field of pollution prevention through the management of its facilities, its acquisition practices, and in supporting the development of innovative pollution prevention programs and technologies."

The Community Right-to-Know Act of 1986, was signed into law as part of the Superfund Amendments and Reauthorization Act. This act establishes reporting and emergency notification requirements for companies that use, manufacture, or process any of approximately 1,500 chemicals. Companies using 10,000 pounds or more of certain chemicals or manufacturing or processing 25,000 pounds or more of highly toxic chemicals must follow additional notification requirements. The act also requires that companies maintain a current file of Material Safety Data Sheets (MSDS) for each hazardous chemical in their facility and that companies provide information about these chemicals in reports submitted to the local fire department, the local emergency planning committee and the state emergency response commission. The AHTD follows these regulations and keeps a copy of all MSDS sheets for all materials that will be used in the construction process.

The impacts of road construction are initially seen as a severe and detrimental force, changing the project area from a common visual element into a new and unfamiliar landscape. As time progresses, the public gradually accepts these impacts. Interstate construction requires clearing and grubbing, relocating streams, demolishing and/or removing existing structures, erosion and sediment controls, excavation and placement of fill materials, construction of bridges and box culverts, drainage improvements, storing materials and equipment, access improvements, compaction control, road bed construction, and erecting highway support structures such as signs, signals, signal poles and their accompanying traffic control facilities. It is the intention of the AHTD to lessen these environmental impacts through pollution prevention measures that have been incorporated into the *AHTD's Standard Specifications for Highway Construction, Edition of 2003*. In order for the AHTD to incorporate pollution prevention measures, the AHTD requires the contractor to comply with pollution prevention measures. In Appendix E, the reader will find Standard Construction Specifications addressing responsibilities of the AHTD's contractors as they relate to pollution prevention; issues such as how to lessen impacts to temporary rights-of-way; applicable environmental permits, licenses and taxes; Section 404 permits; and ways to reduce or eliminate point and non-point sources of pollution.

Pollution prevention is comprised of reducing, reusing and recycling materials in a cost effective manner that will greatly reduce the potential for pollutants to enter the environment from the work zone.

By not using certain chemicals, components or ingredients known to be of a toxic nature, the AHTD is reducing possible environmental consequences. A responsibility of the AHTD is to ensure that the contractor reduces the use of potentially hazardous materials during construction of this project.

Re-use of materials during construction is a financial incentive to the contractor. The movement of soils from one area to another is a prime example of reuse. The contractor can re-use excavated material from one area as fill material in another area.

Another aspect of pollution prevention is the use of recyclables in road building applications. The AHTD will allow the usage of recyclable materials in road construction where they yield economic, engineering and environmental benefits. If the contractor wishes to use recyclable materials, a written statement of the type, quantity and location the material is to be used is submitted to the AHTD for approval.

The AHTD allows the addition of fly ash in cement mixes. Fly ash is a waste product of coal-fired electric generation plants. Certain classes of concrete can accept 15% by weight of fly ash added to the concrete mix. Granulated blast furnace slag (25%), a waste product of steel production, is also accepted in certain types of cement mixes. The addition of rubber to asphalt in hot-mix asphalt pavement containing crumb rubber modifiers is sometimes used.

The AHTD allows up to 15% recycled asphalt pavement and even up to 30% recycled asphalt to be added to virgin asphalt. Mulch tackifiers are made from recycled newsprint or other paper products. Rubblized concrete has been used as a substitution for aggregate by the AHTD in past Interstate rehabilitation projects. The feasibility of using rubblized concrete for this project is limited since it is a new facility with minimal pavement to be rehabilitated.

Although the project area has been surveyed for the presence of hazardous materials, pollution prevention should also address discovery situations of hazardous materials that sometimes occur. As discussed previously in Section 4.3.15, in these instances immediate action is taken to assure that pollutants are immediately contained and remediated using the *Standard Specifications for Highway Construction* to address the hazard (see Appendix E).

The AHTD's specifications concerning pollution prevention guide the AHTD and contractors in preventing unwanted environmental problems. By limiting the pollution generated by construction and having measures in place to address unforeseen accidents the AHTD will be striving to preserve, protect and beautify the affected environment.

4.6 CONSTRUCTION IMPACTS

Construction activities for the proposed facility will impact the environment with most impacts being classified as temporary or short-term. The most common impacts associated with highway construction include temporary air and water quality degradation; noise; temporary disruption of traffic including safety, control, and maintenance; the storage and disposal of construction materials; and the establishment, maintenance, and use of haul roads, borrow and waste areas. Air, noise and water quality impacts are discussed in greater detail in other portions of this Environmental Consequences Section. In general, although the noise associated with construction activities cannot be eliminated, noise impacts can be reduced by the establishment of reasonable working hours. Sensitive noise areas such as residential neighborhoods will be identified and work restricted to daylight hours in these areas. Dust associated with construction can be reasonably controlled with a watering program. Erosion from construction sites will be controlled using standard practices as described in the *AHTD Erosion and Sediment Control Design and Construction Manual*. Traffic disruption should be minimized due to the entire route being on new location, minimizing the involvement with residential and commercial areas.

The No-Action Alternative will not cause construction impacts.

4.7 SECONDARY AND CUMULATIVE IMPACTS

Secondary effects are those that are caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Foreseeable actions are generally defined as those for which plans exist. Cumulative impacts are defined as those impacts that result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions. Each impact area in this document has previously

addressed these secondary and cumulative effects to the degree that was reasonably foreseeable.

Three such actions are currently under study or planned. Refer to Figure 1-6 for information relating to the proposed location of these road projects.

These actions are described below:

1) The Northwest Arkansas Regional Airport Access Road. This proposed project is currently undergoing study and design. An Environmental Impact Study is being conducted to ultimately connect the southern entrance of the airport to either I-540 or Highway 412. Figure 2-2 illustrates the corridors currently under study for this project.

2) The Eastern Fayetteville Bypass Corridor. This conceptual corridor was included in the Major Investment Study (MIS) conducted for the Springdale Northern Bypass. The conceptual corridor connects to I-540 south of Fayetteville and circles Fayetteville to the east to connect to Highway 412 near Springdale. Although this conceptual corridor is included on the 2025 Regional Transportation Plan Constrained Projects Regional Map, currently no work is planned or being performed on this project and no funding is available for this project during the 25-year planning period. The City of Fayetteville is not actively pursuing the bypass, and has removed it from the City's master street plan.

3) The Eastern Bypass to Rogers. This conceptual corridor was also included in the MIS conducted for the proposed Springdale Northern Bypass. The conceptual corridor illustrates a completed eastern corridor from the Springdale Northern Bypass to Rogers and is included on the 2025 Regional Transportation Plan Constrained Projects Regional Map. Currently, the City of Rogers is pursuing a route along the eastern side of town, consisting of an upgrade of existing streets with the possibility of a connection to the City of Springdale by Benton County. However, no funding is available for this project during the 25-year planning period.

Planning for the Preferred Line of the Springdale Northern Bypass has included consideration of interchange sites for future connections to all of these three projects. These projects will be designed and planned to minimize cumulative impacts for the four projects.

From the beginning of the studies for the Springdale Northern Bypass and the NWARA Access Road projects, commitments were made to closely coordinate the projects and investigate the possibility of shared roadway sections for the two projects to minimize cumulative impacts to the area. Concurrent segments for the two roadways would reduce costs and lessen impacts to the region caused by road construction and operation.

As the corridor and alignment studies progressed for the two projects, information used for the NWARA Access Road DEIS was also used in the development of the Springdale Northern Bypass corridors and vice versa. The importance and consequences of using concurrent segments for the two projects has played an important role in the determination of the Preferred Line for this project. A secondary impact of the use of this concurrent segment for the two projects is the construction of an interchange for the bypass and the NWARA Access Road west of Highway 112.

Construction of the Preferred Line may result in potential impacts to 55 acres (22 hectares) of existing agricultural land use at the conceptual interchange for the NWARA Access Road. Four acres (2 hectares) of this potential impact area are Farmlands of Statewide Importance.

Construction of the Preferred Line may result in the relocation of four homes at the interchange for the NWARA Access Road. The relocation of these homes would remove three potential sensitive noise receptors for the bypass from this area.

4.8 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The impacts associated with the Preferred Line would be local and short-term in nature. Efforts to minimize and mitigate for these impacts have been discussed previously under each impact category. The proposed action has been identified by the FHWA, the AHTD, and the Northwest Arkansas Regional Transportation Study as essential for the continued

growth, development, and long-term productivity of northwestern Arkansas. The planning goal is to create a facility that fulfills traffic service needs on a regional and local basis, is environmentally acceptable, and is compatible with present and future land use. Therefore, the short-term disruption due to the construction of the proposed facility should be offset by the potential to enhance the productivity of the region.

4.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES INVOLVED IN THE PROPOSED ACTION

Construction of the Preferred Line would involve a commitment of land, labor, materials, equipment and funds. These resources would be permanently committed to the project and could not be expended for other purposes. The land which would be converted from its present uses to highway use would not be available for other purposes, unless at some time in the future it is determined that the proposed highway is no longer needed. At present, there is no reason to consider that this would ever occur.

Other resources would be completely irreversible such as labor, paving materials and the fossil fuels required to construct the proposed highway. The commitment of these resources would not adversely affect other uses for these materials, as they are not in short supply in the region. Federal and state funds for construction as well as continued maintenance of the facility would be committed and not available for other uses.

4.10 IMPACT SUMMARY

Impacts to the social, economic, natural, and cultural environment would result from the construction of the Preferred Line evaluated in this document. Many of the perceived benefits that are related to the purpose and need of the project cannot be measured, and are therefore listed below.

1) Provide a vital link in the Highway 412 High Priority Corridor and the National Highway System, as well as the state and regional transportation system.
2) Improve connectivity between Highway 412 and I-540.
3) Improve the connectivity of existing air, rail, truck and bus transportation modes.

4) Improve efficiency of transportation for the trucking industry and businesses dependent on trucking.

5) Improve traffic safety.

6) Provide safe and efficient movement of traffic within the region while accommodating through travelers.

7) Produce travel time savings of approximately 340 hours per day along the existing facility, and 625 hours a day along the new access-controlled facility.

8) Promote the retention of a higher level of service on the new facility by the construction of a fully access-controlled highway.

9) Minimize traffic through cities.

10) Alleviate congestion along existing facilities.

Eight of the most important adverse impact areas as measured and detailed earlier in the Environmental Consequences Section, are summarized for the Preferred Line in Table 4-21.

A summary of the measures to minimize harm is located in the Commitments Section, Section 5.

Table 4-21

FEIS ALIGNMENT IMPACT SUMMARY

	Length	Acreage	Total Cost *	Existing Land Use Converted to Highway Right-of-Way							Cultural Resources-Direct Impacts				
				Commercial	Residential	Industrial	Woodland	Agricultural	Prime Farmland	Farmland of S. I.	Recorded Archeological Sites	Historic Structures	GLO Resources	Cemeteries	Old Roads
	miles (km)	(hectares)	(in million $)	acres (hec.)	acres (hec.)	acres (hec.)	acres (hec.)	acres (hec.)	acres (hec.)	acres (hec.)					
Line 2	19.8 (31.9)	1141 (463)	314	49 (20)	126 (51)	18 (7)	234 (95)	630 (255)	100 (41)	80 (32)	6	2#	1	0	1
Line 3	20.2 (32.5)	1201 (486)	341	55 (22)	104 (42)	79 (32)	175 (71)	615 (249)	139 (57)	88 (36)	2	0	0	0	1
Line 4	20.6 (33.2)	1232 (499)	310	34 (14)	118 (48)	28 (11)	225 (91)	741 (300)	128 (52)	82 (33)	4	1#	2	0	1
Preferred Line 5	20.6 (33.2)	1169 (473)	300	16 (6)	48 (19)	38 (15)	344 (139)	653 (264)	120 (49)	66 (27)	1	1#	0	0	1

#Determined ineligible to National Register of Historic Places

Continued	Relocations									Noise Impacts***		Hazardous Materials Impacts
	Residential Owners	Residential Tenants	Businesses	Farms	Non-Profit Organizations	Total	Minority Households	Elderly Households	Low Income Households	Estimated Receptors - 2004 Traffic	Estimated Receptors - 2024 Traffic	
Line 2	112	18	36	5	3	174	13	11	5	47	79	0
Line 3	61	18	33	3	0	115	3	8	1	19	60	0
Line 4	76	15	23	4	1	119	5	12	5	20	68	0
Preferred Line 5	60	10	43	6	0	114	4	9	2	16	47	0

Continued	Floodplain Impacts			USACE Section 404 Impacts					Surface Water Quality Impact Ratings		
	SFHA**	Floodway	Long. Encroachments	Springs	Stream Crossings				Low	Medium	High
	Linear Ft (Lin. Meter)	Linear Ft (Lin. M)	Linear Ft (Lin. M)		Ephemeral	Intermittent	Perennial	Total			
Line 2	1400 (427)	4050 (1234)	300 (91)	1	9	20	11	40	10	5	1
Line 3	2600 (793)	2140 (652)	1220 (372)	1	8	13	6	27	3	4	1
Line 4	1400 (427)	3550 (1082)	300 (91)	1	9	17	11	37	6	5	1
Preferred Line 5	2600 (793)	600 (183)	0 (0)	1	8	11+	2	21	5	1	0

*Includes ROW and Construction costs for the Non-toll Alternative. Toll Alternatives will require an additional $21 million for toll plazas.
**Special Flood Hazard Area
***Noise receptors with 10 dBA or greater increase using Non-toll Alternative traffic. 10 dBA level receptors also include the receptors that approach the noise abatement criteria (66 dBA).
+ Three adjacent crossings of Puppy Creek on the west side of the Bypass/I-540 Interchange

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