US 89 Antelope Hills – Junction US 160

Final Environmental Assessment and Section 4(f) Evaluation

Project No. STP-089-C(AEA)
TRACS No. 089 CN 445 H5172 01L

August 2006
FEDERAL HIGHWAY ADMINISTRATION
FINDING OF NO SIGNIFICANT IMPACT
FOR

STP-089-C(AEA)
TRACS No. 089 CN 445 H5172 01L
US-89; Antelope Hills to Junction US-160
Coconino County, Arizona

The Federal Highway Administration has determined that this project will not have any significant impact to the human or natural environment. This Finding of No Significant Impact is based upon the attached Environmental Assessment and Section 4(f) Evaluation, which has been independently evaluated by the Federal Highway Administration and determined to adequately discuss the environmental issues and impacts of the proposed project. The Environmental Assessment provides sufficient evidence and analysis for the Federal Highway Administration to determine that an Environmental Impact Statement is not required. The Federal Highway Administration takes full responsibility for the accuracy, scope, and content of the Environmental Assessment and Section 4(f) Evaluation.

This Environmental Assessment and Section 4(f) Evaluation clearly demonstrates that there is no feasible or prudent alternative to the use of the Section 4(f) properties and that all planning to minimize the harm to the Section 4(f) properties has been accomplished. It is concluded that the use of the Little Colorado River Tribal Park is approved.

August 17, 2006
Date

[Signature]
Division Administrator
Arizona Department of Transportation
Intermodal Transportation Division
Environmental Planning Group
205 South 17th Avenue
Phoenix, Arizona 85007

Final Environmental Assessment and Section 4(f) Evaluation

for

US 89 Antelope Hills – Junction US 160
Coconino County, Arizona
Project No. STP-089-C(AEA)
TRACS No. 089 CN 445 H5172 01L

Approved by: [Signature]
THOR ANDERSON
Manager
On: 8-9-06

This environmental assessment has been prepared in accordance with provisions and requirements of Chapter 1, Title 23 USC, 23 CFR Part 771, relating to the implementation of the National Environmental Policy Act of 1969.
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<th>Description</th>
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<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>ADA</td>
<td>Arizona Department of Agriculture</td>
</tr>
<tr>
<td>ADEQ</td>
<td>Arizona Department of Environmental Quality</td>
</tr>
<tr>
<td>ADOT</td>
<td>Arizona Department of Transportation</td>
</tr>
<tr>
<td>ADT</td>
<td>average daily traffic</td>
</tr>
<tr>
<td>AGFD</td>
<td>Arizona Game and Fish Department</td>
</tr>
<tr>
<td>APS</td>
<td>Arizona Public Service</td>
</tr>
<tr>
<td>ARS</td>
<td>Arizona Revised Statutes</td>
</tr>
<tr>
<td>ASLD</td>
<td>Arizona State Land Department</td>
</tr>
<tr>
<td>BE</td>
<td>Biological evaluation</td>
</tr>
<tr>
<td>BIA</td>
<td>Bureau of Indian Affairs</td>
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<tr>
<td>CAA</td>
<td>Clean Air Act</td>
</tr>
<tr>
<td>CAAA</td>
<td>Clean Air Act Amendments</td>
</tr>
<tr>
<td>CDP</td>
<td>Census Delineated Places</td>
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<tr>
<td>CEQ</td>
<td>Council on Environmental Quality</td>
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<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
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<tr>
<td>CO</td>
<td>carbon monoxide</td>
</tr>
<tr>
<td>COE</td>
<td>US Army Corps of Engineers</td>
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<tr>
<td>CWA</td>
<td>Clean Water Act</td>
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<tr>
<td>dBA</td>
<td>A-weighted sound level in decibels</td>
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<tr>
<td>EA</td>
<td>Environmental Assessment</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>EPG</td>
<td>Environmental Planning Group</td>
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<td>ESA</td>
<td>Endangered Species Act</td>
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<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
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<td>Group 2</td>
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<td>G3</td>
<td>Group 3</td>
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<td>G4</td>
<td>Group 4</td>
</tr>
<tr>
<td>I</td>
<td>Interstate</td>
</tr>
<tr>
<td>kV</td>
<td>kilovolt</td>
</tr>
<tr>
<td>LE</td>
<td>listed endangered</td>
</tr>
<tr>
<td>LOS</td>
<td>level of service</td>
</tr>
<tr>
<td>LT</td>
<td>listed threatened</td>
</tr>
<tr>
<td>LUST</td>
<td>leaking underground storage tanks</td>
</tr>
<tr>
<td>MP</td>
<td>milestone</td>
</tr>
<tr>
<td>MSAT</td>
<td>Mobile Source Air Toxics</td>
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<tr>
<td>mph</td>
<td>miles per hour</td>
</tr>
<tr>
<td>msl</td>
<td>mean sea level</td>
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<tr>
<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
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<tr>
<td>NAC</td>
<td>Noise Abatement Category</td>
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<tr>
<td>NAP</td>
<td>Noise Abatement Policy</td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<tr>
<td>NESL</td>
<td>Navajo Nation Endangered Species List</td>
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<tr>
<td>NFWD</td>
<td>Navajo Fish and Wildlife Department</td>
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<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
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<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
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</table>
LIST OF ACRONYMS AND ABBREVIATIONS - continued

NPS National Park Service
NRHP National Register of Historic Places
PA Programmatic Agreement
PM$_{10}$ particulate matter less than 10 microns in diameter
ppm parts per million
RCRA Resource Conservation Recovery Act
RV recreation vehicle
SAFETEA-LU Safe, Accountable, Flexible, Efficient Transportation Equity Act
SHPO State Historic Preservation Office
SR State Route
SWPPP Stormwater Pollution Prevention Plan
VMT vehicle miles traveled
US United States
US 89 United States Highway 89
US 160 United States Highway 160
USC United States Code
USFWS United States Fish and Wildlife Service
UST underground storage tanks
vpd vehicles per day
WL watch list
WCTAC Wildlife Connectivity Technical Advisory Committee
XN nonessential experimental
MITIGATION MEASURES

The following mitigation measures and commitments are not subject to change without the prior written approval of the Federal Highway Administration.

Arizona Department of Transportation Design Responsibilities:

1. Contingent upon the signing of an intergovernmental agreement among the Arizona Department of Transportation, the Navajo Nation, and the Bureau of Indian Affairs, 8-foot wide concrete sidewalks and four lighted pedestrian underpasses will be constructed between milepost 464.6 and milepost 467.1 in Cameron. The Arizona Department of Transportation will be responsible for the design and construction of these pedestrian facilities. The Navajo Nation and Bureau of Indian Affairs will be responsible for the maintenance of the sidewalks, underpasses, and associated underpass lighting and drainage features. (Refer to Page 22.)

2. During final design, the Arizona Department of Transportation will coordinate with the Navajo Nation and the appropriate Chapters to establish consensus for the roadside stand locations and access plan. (Refer to Page 27.)

3. The Arizona Department of Transportation will coordinate during final design with the Navajo Department of Transportation and Western Agency of the Bureau of Indian Affairs with regards to access to private driveways to Navajo residents, businesses, and grazing allotment leases along US 89 in addition to the intersections of US 89 with Navajo Routes N6150, N6730, N6731, and N6135. (refer to Page 27.)

4. The Arizona Department of Transportation will need to reach an agreement with the Navajo Nation on the terms, e.g., in perpetuity versus 10 years, for the term of the easement on the Navajo Indian Reservation prior to any ground-disturbing activities. (Refer to page 28.)

5. Cut slopes will be designed to match the natural slope and topography. (Refer to Page 55.)

6. Bridge structures (including but not limited to piers and abutments, bridge girders, the exposed outward-facing exterior surfaces of the bridge barriers, and metal handrails on the bridges) will be colored with an approved coloring agent and/or patterned or textured to blend with the natural surroundings. The colors, patterns, and textures to be used on concrete surfaces will be coordinated with the Navajo Nation, Coconino County, National Park Service, and Arizona Department of Transportation during final design. (Refer to Page 55.)
7. Any riprap used in the project will blend with the surrounding rock and exposed soil color and will be approved prior to construction by the Arizona Department of Transportation, Navajo Nation, Coconino County, and National Park Service, depending on the location of the riprap. (Refer to Page 55.)

8. Rock outcrops within the project limits will be left in place if they are stable and do not create a hazard to the traveling public, interfere with construction, or look out of place in the natural landscape. (Refer to Page 55.)

9. The clearing limits will be irregular and staked by the contractor for approval by Arizona Department of Transportation Engineer prior to the start of clearing. Straight clearing lines will be avoided where possible by varying the width of the area to be cleared or by leaving selected clumps of vegetation near the edge of the clearing limit. (Refer to Page 55.)

10. All required United States Army Corps of Engineers Section 404 Permits and Section 401 Water Quality Certification will be obtained during final design. (Refer to Page 58.)

11. Drainage culverts used as livestock structures will need to be extended with minimal horizontal or vertical breaks in the alignment. The entrance and exit design of the approach grades to these livestock passes shall accommodate livestock and wildlife movement. (Refer to Page 62.)

12. In compliance with Executive Order 13112 regarding invasive species, all disturbed soils that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity. (Refer to Page 64.)

13. Arizona Department of Transportation, in consultation with Federal Highway Administration, will make a good faith effort to find the funding for a proposed 3-year research project to determine American pronghorn movements north of Interstate 40 in Arizona that will be completed a minimum of 1 year prior to final design for projects between milepost 442.0 to milepost 458.0 (Navajo Indian Reservation boundary). (Refer to Page 76.)

14. The section of right-of-way fence from milepost 444.1 to milepost 444.2 will remain open until the Wildlife Connectivity Technical Advisory Committee recommends the construction of a pronghorn crossing structure and/or wildlife crossing or drift fences. (Refer to Page 76.)
Arizona Department of Transportation Roadside Development Section Responsibilities:

1. Arizona Department of Transportation’s Roadside Development Section will determine who will prepare the Stormwater Pollution Prevention Plan. (Refer to Page 58.)

2. Arizona Department of Transportation’s Roadside Development Section will develop the seed mixture for the areas disturbed. On Navajo Nation lands, the Arizona Department of Transportation will contact the Range Conservation Officer, Navajo Nation Department of Agriculture, for review of the appropriate seed mixture on tribal lands. The Arizona Department of Transportation will contact the National Park Service Flagstaff Area National Monument’s office for the appropriate seed mixture for use on areas disturbed on land managed by the National Park Service. (Refer to Page 63.)

3. Arizona Department of Transportation’s Roadside Development Section will contact the Navajo Fish and Wildlife Department and the National Park Service Flagstaff Area National Monuments office during final design regarding the removal of native plants on Navajo Nation and National Park Service lands, respectively. (Refer to Page 77.)

4. In accordance with the Arizona Native Plant Law, the Arizona Department of Transportation Roadside Development Section will submit a Notice of Intent to the Department of Agriculture to clear protected native plants at least sixty (60) days prior to any construction activity on non-Navajo Nation and non-federal lands to afford commercial salvagers the opportunity to remove and salvage these plants. (Refer to Page 77.)

Arizona Department of Transportation Environmental Planning Group Responsibilities:

1. Appropriate mitigation measures will be developed and implemented by Arizona Department of Transportation’s Environmental Planning Group in consultation with the signatories of the Programmatic Agreement for those cultural resources that cannot be avoided. All consultation and data recovery will be completed prior to construction. (Refer to Page 32.)

2. One year prior to final design, the Arizona Department of Transportation's Environmental Planning Group will contact the United States Fish and Wildlife Service, National Park Service, and the Navajo Fish and Wildlife Department to update the 2003 Biological Evaluation, initiate Section 7 consultation, modify the mitigation measures outlined in Section IV. P. Threatened/Endangered Species, Designated Critical Habitat, and Sensitive Species, and address any potential impacts to species not covered in this environmental assessment and their potential mitigation requirements. (Refer to Page 65.)
3. Arizona Department of Transportation’s Environmental Planning Group will conduct Fickeisen pincushion cactus surveys in suitable habitat from approximately milepost 443.0 to milepost 445.4 (Wupatki National Monument) and milepost 457.3 to milepost 459.7 during final design. (Refer to page 69.)

4. Arizona Department of Transportation’s Environmental Planning Group will coordinate a Wildlife Connectivity Technical Advisory Committee with the Federal Highway Administration, National Park Service, Navajo Fish and Wildlife Department, and Arizona Game and Fish Department. (Refer to Page 76.)

Arizona Department of Transportation Natural Resources Management Section Responsibility:

1. Existing invasive species will be treated prior to construction according to Arizona Department of Transportation’s Natural Resources Management Section’s invasive species management plan. The Arizona Department of Transportation will continue any necessary treatments following construction completion according to the Natural Resource Management Section’s invasive species management plan. (Refer to Page 64.)

Arizona Department of Transportation District Office Responsibilities:

1. Any riprap used in the project will blend with the surrounding rock and exposed soil color and will be approved prior to construction by the Arizona Department of Transportation, Navajo Nation, Coconino County, and National Park Service, depending on the location of the riprap. (Refer to Page 55.)

2. Arizona Department of Transportation’s District Office will ensure that the contractor complies with all required United States Army Corps of Engineers Section 404 Permits and Section 401 Water Quality Certification for work affecting any of the drainages within the project area that are under the jurisdiction of the United States Army Corps of Engineers. (Refer to Page 58.)

3. Because more than 1 acre of land will be disturbed, a National Pollutant Discharge Elimination System General Permit will be required. Arizona Department of Transportation’s District Office will submit the Notice of Intent and the Notice of Termination. (Refer to Page 58.)
Contractor Responsibilities:

1. The contractor shall notify the public of the start of construction by placing notices in local newspapers 14 calendar days prior to the beginning of construction activities affecting traffic flow or access. The contractor shall also notify emergency services such as police and fire departments before construction activities begin, and maintain continued coordination throughout construction. (Refer to Page 28.)

2. The contractor shall contact the Arizona Department of Transportation Environmental Planning Group, Historic Preservation Team, a minimum of 14 calendar days prior to any ground-disturbing activities to arrange for a qualified archaeologist to flag sensitive resource sites for avoidance. (Refer to Pages 33 and 36.)

3. The contractor shall avoid all flagged sensitive resource areas within or adjacent to the project area. (Refer to Pages 33 and 36.)

4. All remnant landforms within Arizona Department of Transportation right-of-way/easement uncharacteristic of the surrounding landscape shall be removed. Remaining land shall be graded to blend with the existing terrain. (Refer to Page 54.)

5. Any riprap used in the project shall blend with the surrounding rock and exposed soil color and will be approved prior to construction by the Arizona Department of Transportation, Navajo Nation, Coconino County, and National Park Service, depending on the location of the riprap. (Refer to Page 55.)

6. Rock outcrops within the project limits shall be left in place if stable and do not create a hazard to the traveling public, interfere with construction, or look out of place in the natural landscape. (Refer to Page 55.)

7. The vegetation clearing limits shall be irregular and staked by the contractor for approval by Arizona Department of Transportation Engineer prior to the start of clearing. The National Park Service will also approve the clearing limits on lands within the Wupatki National Monument prior to the start of clearing. Straight clearing lines shall be avoided where possible by varying the width of the area to be cleared or by leaving selected vegetation near the edge of the clearing limit. (Refer to Page 55.)

8. In the event of accidental chemical spills during construction, the site shall be treated to prevent chemical introduction into the surface water drainages. (Refer to Pages 56 and 59.)

9. The contractor shall comply with the terms and conditions of the United States Army Corps of Engineer’s Section 404 permit and the Section 401 Water Quality Certification for work affecting any of
the drainages within the project area that are under the jurisdiction of the United States Army Corps of Engineers. (Refer to Page 58.)

10. Because more than 1 acre of land will be disturbed, a National Pollutant Discharge Elimination System General Permit will be required. The contractor shall submit the Notice of Intent and the Notice of Termination. (Refer to Page 58.)

11. The contractor shall install game fencing immediately after removal of existing barbed wire fencing to keep livestock from entering the highway and limit off-road vehicular access. (Refer to Page 62.)

12. To prevent the introduction of invasive species, all construction equipment shall be washed prior to entering the construction site. To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation debris prior to leaving the construction site. Vehicles not involved with construction, such as inspection or supervisory type vehicles and contractor personnel vehicles, must be staged in an area where there are no invasive species. Any fill, seed, or mulch material brought in from off-site shall be free of invasive species, and construction equipment shall be free of invasive species and toxic materials. The contractor shall contact the Arizona Department of Transportation, Natural Resources Management Section and, the National Park Service to inform them of the wash site and staging locations, so that these areas can be monitored and treated, as appropriate. (Refer to Page 64.)

13. All disturbed soils that shall not be landscaped or otherwise permanently stabilized by construction shall be seeded using species native to the project vicinity to prevent the reestablishment of invasive species in the future. (Refer to Page 64.)

14. The section of right-of-way fence from milepost 444.1 to milepost 444.2 that was removed to facilitate pronghorn crossing shall remain open unless the Wildlife Connectivity Technical Advisory Committee were to recommend the construction of a pronghorn crossing structure and/or wildlife crossing or drift fences. (Refer to Page 76.)

15. The contractor shall contact the Arizona Department of Transportation Environmental Planning Group at least 14 calendar days prior to construction to arrange for a qualified environmental firm to be on-site during ground-disturbing activities near Hank’s Trading Post (milepost 446.0), Thriftway (milepost 457.1), Speedy’s (milepost 464.8), Chevron (milepost 465.1), and Texaco (milepost 466.7) for hazardous materials monitoring. (Refer to Page 79.)
Standard Specifications included as Mitigation Measures:

1. According to Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Section 107 Legal Relations and Responsibility to the Public (2000 Edition) (Stored Specification 107.05 Archaeological Features) if previously unidentified cultural resources are encountered during activity related to the construction of the project, the contractor shall stop work immediately at that location and shall take all reasonable steps to secure the preservation of those resources and notify the Arizona Department of Transportation Engineer. The Arizona Department of Transportation Engineer will notify Arizona Department of Transportation Environmental Planning Group Historic Preservation Team, who will contact the appropriate agency(ies) to evaluate the significance of the resources. (Refer to Page 33.)

2. During construction, the contractor shall give special attention to the effect of its operations upon the landscape and shall take special care to maintain natural surroundings undamaged in accordance with Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Section 104.09 (2000 Edition). All construction vehicles shall be restricted to construction zones to reduce trampling of vegetation and compaction of soils. (Refer to Page 55.)

3. During construction of the improvements, care shall be taken to ensure that construction materials are not introduced into the washes, in accordance with Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction Section 104.09 (2000 Edition). Excess concrete, curing agents, form work, loose embankment materials, and fuel will not be disposed of within the project boundaries. In the event of accidental chemical spills during construction, the site shall be treated to prevent chemical introduction into the surface water drainages. (Refer to Pages 56 and 59.)

4. According to Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Section 107 Legal Relations and Responsibility to the Public (2000 Edition) (Stored Specification 107HAZMT, 01/15/93), if previously unidentified or suspected hazardous materials are encountered during construction, work shall cease at that location and the Arizona Department of Transportation Engineer shall be contacted to arrange for proper assessment, treatment, or disposal of those materials. Such locations shall be investigated and proper action implemented prior to the continuation of work in that location. (Refer to Page 79.)

5. Any material sources required for this project outside of the project area shall be examined for environmental effects, by the contractor, prior to use, through a separate environmental analysis in accordance with Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction, Section 1001 Material Sources (2000 Edition) (Stored Specification 1001.2 General). (Refer to Page 79.)
6. Excess waste material and construction debris shall be disposed of at sites supplied by the contractor in accordance with *Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction* Section 107.11, Protection and Restoration of Property and Landscape (2000 Edition). Disposal shall be made at either municipal landfills approved under Title D of the Resource Conservation and Recovery Act, construction debris landfills approved under Article 3 of the Arizona Revised Statutes 49-241 (Aquifer Protection Permit) administered by the Arizona Department of Environmental Quality, or Inert Landfills. (Refer to Page 80.)
I. INTRODUCTION

A. Explanation of Environmental Assessment
This environmental assessment (EA) has been prepared to comply with the National Environmental Policy Act (NEPA) of 1969 and the policies of the Federal Highway Administration (FHWA), as the lead federal agency. The National Park Service (NPS) is a cooperating agency on the EA. Other laws with which this EA will comply include, but are not limited to, the Clean Water Act (CWA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA).

The EA process provides steps and procedures to evaluate the potential social, economic, and environmental impacts of a proposed action, while providing an opportunity for public, local, state, or other agencies to provide input and/or comment through scoping, public information meetings, and a public hearing. The magnitude of impacts is evaluated based on context and intensity as defined in the Council on Environmental Quality’s (CEQ) regulations. In addition, this EA also provides FHWA and the Arizona Department of Transportation (ADOT) a detailed analysis with which to examine and consider the level of impacts on any sensitive social and environmental resources and assists in their decision-making process.

B. Location
The project area is located along United States Highway 89 (US 89) approximately 35 miles north of Flagstaff in Coconino County. The project limits are US 89 from milepost (MP) 442.0 (Antelope Hills) to MP 484.0 (approximately 3.6 miles north of the US 160 and US 89 junction), a total distance of 42 miles. Approximately 60 percent of the corridor is located within the Navajo Indian Reservation (MP 458.0 to MP 484.0) and approximately 6 percent is within the Wupatki National Monument (MP 443.0 to MP 445.4). The unincorporated communities of Antelope Hills, Gray Mountain, and Cameron are located within the project area.

C. Background and Overview
US 89 is the primary north-south route between Interstate 40 (I-40) in Flagstaff and the Utah border, and serves as the principal access route to a number of tourist attractions north of Flagstaff (Sunset Crater National Monument, Wupatki National Monument), the Navajo Nation, and the Glen Canyon National Recreation Area (Lake Powell). US 89 also provides a connection to State Route 64 (SR 64), which is a secondary access route to the south rim of Grand Canyon National Park. In addition to tourist, recreational, and trucking interests, US 89 serves a vital role for the people of the Navajo Nation in providing necessary connections to medical, educational, employment, and shopping facilities in Flagstaff.
Figure 1. State location
**Figure 2.** Project vicinity
Figure 3. Project area
In 1998, ADOT completed the *Phoenix-Flagstaff-Page Corridor Profile Report*. The report recommended a more detailed study to evaluate improvements to US 89 between Flagstaff and Page. The report focused on the need to evaluate the addition of travel lanes to US 89 to improve traffic operations. To provide this additional detailed information, ADOT and FHWA initiated a design concept study and EA to focus on alternatives that improve capacity and operational characteristics within the corridor.

The existing roadway is a two-lane undivided highway with limited passing opportunities. US 89 is classified as a Rural Principal Arterial highway in the State Highway System Log. Rural Principal Arterial highways are the state’s principal corridors for statewide travel, i.e., they carry the highest volume of long distance trips in Arizona, according to the ADOT Transportation Planning Division. Two major highways intersect US 89 within the project area, SR 64 (MP 465.2) and US 160 (MP 480.8). A few lane restriping and minor shoulder-widening projects have been completed by ADOT to provide short stretches of passing lanes; however, these are limited throughout the project area.
II. PROJECT PURPOSE AND NEED

A. Purpose and Need

Because US 89 is the primary north-south route between I-40 in Flagstaff and the Utah border, it serves as the principal access route to major tourist attractions such as Grand Canyon National Park and the Glen Canyon National Recreation Area. Present conditions provide few passing opportunities, yet the demand to pass is high. Groups of vehicles traveling closely together are characteristic of the peak or highest-use travel hours, and slow moving trucks and recreational vehicles pulling boats delay traffic and add to the congestion. Some areas have been widened and re-striped within the existing roadway footprint to include passing lanes. It is not desirable to restripe the roadway footprint for passing lanes because it takes away shoulders for emergency situations and does not separate traffic. Areas to use for vehicular breakdowns or to pull off to allow emergency vehicles to pass are limited to unpaved areas where the natural terrain permits.

Projected traffic volumes along US 89 continue to increase (refer to Table 1, Page 6), with a resulting decline in level of service (LOS). LOS is a qualitative measure referring to the degree of congestion or delay experienced by motorists. Levels of service range from A to F, with A being the best quality of traffic flow and F being the poorest (refer to Figure 4, Page 7). ADOT’s objective for this type of highway is to achieve a LOS of B or better. About 77 percent of the highway corridor currently falls below ADOT’s desired LOS B for this route. The only areas that are operating at LOS B or better for both the northbound and southbound directions are 1) where passing lanes are located and 2) north of the US 160 and US 89 intersection (MP 480.8), where the average daily traffic (ADT) drops off substantially.

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing 2000 ADT (vpd)(^a)</th>
<th>2025 (No Action Alternative) ADT (vpd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 442.0 to Jct. SR 64</td>
<td>4,800</td>
<td>10,000</td>
</tr>
<tr>
<td>SR 64 to US 160</td>
<td>6,600</td>
<td>13,800</td>
</tr>
<tr>
<td>US 160 to MP 484.0</td>
<td>3,400</td>
<td>7,100</td>
</tr>
</tbody>
</table>

\(^{a}\) ADT (vpd) - average daily traffic (vehicles per day)

By the 2025 design year, the traffic volumes would be too high for the existing two-lane facility to efficiently accommodate the traffic, except where passing lanes exist. Tables 2 and 3 indicate the LOS for US 89 by the 2025 design year. Areas where passing lanes are present would operate at LOS B or better.
Figure 4. Level of service categories
Table 2. Northbound LOS categories for the 2025 design year

<table>
<thead>
<tr>
<th>Milepost</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 442.0 to MP 443.0</td>
<td>B</td>
</tr>
<tr>
<td>MP 443.0 to MP 444.3</td>
<td>D</td>
</tr>
<tr>
<td>MP 444.3 to MP 445.1</td>
<td>B</td>
</tr>
<tr>
<td>MP 445.1 to MP 448.1</td>
<td>D</td>
</tr>
<tr>
<td>MP 448.1 to MP 449.0</td>
<td>B</td>
</tr>
<tr>
<td>MP 449.0 to MP 449.8</td>
<td>D</td>
</tr>
<tr>
<td>MP 449.8 to MP 450.5</td>
<td>B</td>
</tr>
<tr>
<td>MP 450.5 to MP 453.8</td>
<td>D</td>
</tr>
<tr>
<td>MP 453.8 to MP 454.1</td>
<td>E</td>
</tr>
<tr>
<td>MP 454.1 to MP 457.7</td>
<td>D</td>
</tr>
<tr>
<td>MP 457.7 to MP 460.6</td>
<td>E</td>
</tr>
<tr>
<td>MP 460.6 to MP 461.8</td>
<td>B</td>
</tr>
<tr>
<td>MP 461.8 to MP 465.2</td>
<td>E</td>
</tr>
<tr>
<td>MP 465.2 to MP 467.2</td>
<td>F</td>
</tr>
<tr>
<td>MP 467.2 to MP 467.6</td>
<td>E</td>
</tr>
<tr>
<td>MP 467.6 to MP 468.5</td>
<td>B</td>
</tr>
<tr>
<td>MP 468.5 to MP 480.8</td>
<td>E</td>
</tr>
<tr>
<td>MP 480.8 to MP 484.0</td>
<td>D</td>
</tr>
</tbody>
</table>

Table 3. Southbound LOS categories for the 2025 design year

<table>
<thead>
<tr>
<th>Milepost</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 442.0 to MP 443.0</td>
<td>B</td>
</tr>
<tr>
<td>MP 443.0 to MP 444.3</td>
<td>D</td>
</tr>
<tr>
<td>MP 444.3 to MP 445.1</td>
<td>B</td>
</tr>
<tr>
<td>MP 445.1 to MP 448.1</td>
<td>D</td>
</tr>
<tr>
<td>MP 448.1 to MP 449.0</td>
<td>B</td>
</tr>
<tr>
<td>MP 449.0 to MP 449.8</td>
<td>D</td>
</tr>
<tr>
<td>MP 449.8 to MP 450.5</td>
<td>B</td>
</tr>
<tr>
<td>MP 450.5 to MP 453.8</td>
<td>D</td>
</tr>
<tr>
<td>MP 453.8 to MP 454.1</td>
<td>E</td>
</tr>
<tr>
<td>MP 454.1 to MP 457.7</td>
<td>D</td>
</tr>
<tr>
<td>MP 457.7 to MP 459.5</td>
<td>B</td>
</tr>
<tr>
<td>MP 459.5 to MP 463.5</td>
<td>E</td>
</tr>
<tr>
<td>MP 463.5 to MP 464.5</td>
<td>B</td>
</tr>
<tr>
<td>MP 464.5 to MP 465.2</td>
<td>E</td>
</tr>
<tr>
<td>MP 465.2 to MP 467.2</td>
<td>F</td>
</tr>
<tr>
<td>MP 467.2 to MP 469.6</td>
<td>E</td>
</tr>
<tr>
<td>MP 469.6 to MP 470.9</td>
<td>B</td>
</tr>
<tr>
<td>MP 470.9 to MP 479.1</td>
<td>E</td>
</tr>
<tr>
<td>MP 479.1 to MP 480.2</td>
<td>B</td>
</tr>
<tr>
<td>MP 480.2 to MP 480.8</td>
<td>E</td>
</tr>
<tr>
<td>MP 480.8 to MP 484.0</td>
<td>D</td>
</tr>
</tbody>
</table>

Accident data provided by ADOT for the US 89 corridor were analyzed for the period between August 1, 1995, and October 31, 2003. There were 352 reported accidents, 27 of which were fatal, during the 8-year time period. When compared with the 1995 Arizona state average accident rate for rural two-lane highways, three areas were found to have higher-than-average accident rates, each of
which is located in the Cameron area. Two higher-than-average accident locations are related to the intersection at SR 64 and the entrance to Cameron Trading Post. Almost all of the collisions were with other vehicles and common to intersection accidents: angle, left-turn, rear-end, and sideswipe. The other high-accident location was just south of Cameron Trading Post where steep grades are present.

Grades steeper than recommended by ADOT design guidelines, numerous intersecting side roads, and minimal lighting may contribute to the accident rate. Pedestrian-vehicular conflicts also occur at Gray Mountain and Cameron. Uncontrolled access to roadside stands and the location of the stands within the existing right-of-way/easement also create traffic conflicts.

The alignment of US 89 was analyzed using current AASHTO roadway design guidelines. The roadway is deficient in shoulder widths, grades, and bridge railings at three bridge locations. The existing Little Colorado River (MP 466.9) and Fivemile Wash Bridges (MP 471.4) do not satisfy current ADOT structural capacity guidelines.

Based on regional transportation needs, input from the affected agencies and the public, and existing roadway conditions, the objectives of the US 89 improvements include: 1) increasing capacity and improving LOS; 2) providing more passing opportunities while maintaining a consistent roadway width with standard shoulders for emergency situations; 3) separating directions of traffic; 4) improving the main intersections to reduce accidents, especially at the US 89 and SR 64 intersection; 5) providing improved opportunities for pedestrians crossing the roadway, specifically at Gray Mountain and Cameron; 6) reducing traffic conflicts at turnout locations, especially at roadside stands; and 7) correcting roadway deficiencies.

B. Conformance with Regulations, Land Use Plans, and Other Plans

According to the April 1990 Coconino County Comprehensive Plan, US 89 is functionally classified as a Rural Principal Arterial highway. According to the Plan, special considerations should be given to highways leading to NPS areas such as Wupatki National Monument and Grand Canyon National Park to avoid detracting from tourists’ overall experience. These highways “are not only used by local residents but also attract people from around the world, and thus protection of these areas [the highway corridors] is important to maintain a viable tourist economy.” Measures will be implemented to minimize visual resource impacts to the landscape.

A small portion (MP 442.0 to MP 442.3) of the US 89 corridor lies within the Coconino National Forest. The widening of this portion of US 89 to a four-lane divided facility was addressed in the US Route 89 Fernwood Road to Wupatki Final Environmental Assessment, and a Finding of No Significant Impact was determined by FHWA on June 30, 1997. The Forest Service was a cooperating agency on the 1997 EA. No additional easement will be required in this portion of the corridor. The new roadway will match the
existing four-lane highway alignment in the Coconino National Forest. Therefore, the improvements will comply with the Coconino National Forest Plan’s land management and resource objectives.

A comprehensive land use plan is not currently available for the Navajo Nation. However, new developments are planned along the corridor near the US 89 and SR 64 intersection in Cameron and at the intersection of US 89 and US 160. The improvements will accommodate the development planned near these intersections.

US 89 traverses Wupatki National Monument in the southern portion of the corridor between MP 443.0 to MP 445.4. US 89 serves as the north entrance to the Monument (MP 444.8). Although the Final General Management Plan (2002) for Wupatki National Monument recognizes the potential for the widening of US 89 to four lanes as a foreseeable future action, the NPS prefers that the highway remain in its current footprint through the Monument. In addition, NPS would like to expand the Monument by 23,000 acres to the north. The expansion will involve lands administered by the Arizona State Land Department (ASLD) and Bureau of Land Management in addition to private lands. Because the Monument’s Final General Management Plan assumes the widening of US 89, the improvements will comply with the Plan.

C. General Project Schedule
No construction projects within the project limits of this EA are listed in ADOT’s current Five-Year Construction Plan.

D. Resource Issues Eliminated from Detailed Study
There are no known wetlands, National Natural Landmarks, sole source aquifers, or wild and scenic rivers within the project area. There will be no impacts on these resources.
III. ALTERNATIVES

For the purposes of developing and evaluating alternatives, the corridor was separated into seven segments (refer to Figure 5, Page 12). The milepost delineations of the segments include the areas needed to transition between the various roadway sections. Alternatives considered included adding new lanes to the east or west, using the historic US 89 right-of-way/easement, using an undivided section in developed areas, and bypassing specific areas. In addition to the alternatives for the seven roadway segments, alternatives were evaluated for the US 89/SR 64 and US 89/US 160 intersections, the Cameron Trading Post area, and the Little Colorado River Bridge. The alternatives considered in the corridor are discussed in this section of the EA. The No Action Alternative is also considered in addition to the build alternatives.

A. Mainline Alternatives Considered but Eliminated from Further Consideration

The following describes the build alternatives that were evaluated but eliminated from further consideration. Evaluation matrices, which include a more detailed summary of the build alternatives, are included in Appendix A. The No Action and Selected Alternatives are described in detail in the next sections of the document.

1. US 89 Antelope Hills (MP 442.0 to MP 443.0) Build Alternatives

Four build alternatives were evaluated at Antelope Hills; three were eliminated from further consideration. The Widen to East and Widen to West Alternatives were eliminated because they would physically impact businesses (requiring relocation of buildings and/or parking), create a potential economic impact as a result of the loss of these business impacts, disturb cultural resources sites considered potentially eligible for the National Register of Historic Places (NRHP), potentially impact hazardous materials from petroleum products and above-ground storage tanks associated with commercial developments at Antelope Hills, conflict with utilities, create potential noise impacts to residents, and require additional right-of-way/easement. The Four-lane Divided Alternative with a raised median was eliminated because the raised median would create a hazard to motorists traveling at the current posted speed limit and impact access to the few existing businesses.

2. Wupatki National Monument (MP 443.0 to MP 445.4) Build Alternatives

Twelve build alternatives were evaluated in the section through the Wupatki National Monument (11 were eliminated from further discussion). The Widen to East and Widen to West Alternatives were eliminated because they would require acquisition of land at the Monument and would disturb cultural resources sites considered potentially eligible for the NRHP. The Widen to East Alternative also conflicted with existing utilities.

The Four-lane Undivided Alternative would not provide storage capacity for vehicles making left-turn movements, possibly delaying through-traffic on US 89 during periods of high traffic volume, and adding
Figure 5. Corridor segments
to the potential for rear-end collisions. Adding left-turn bays to access points within this section of US 89 would require tapering the through-traffic lanes outward and inward or providing a continuous center left-turn lane. The **Four-lane Undivided Alternative** was eliminated from further consideration primarily because it would not provide the desired separation of opposing traffic to reduce accident potential.

The **Four-lane Divided with Median Barrier on Existing Alignment Alternative** was eliminated because it would create a notable change in the visual character of the landscape and potentially increase mortality of wildlife crossing the road because of the presence of the solid median barrier. Additionally, it would not allow for emergency cross-over.

The **Five-lane on Existing Alignment Alternative** would provide two lanes in each travel direction with a continuous two-way turn lane centered on the existing alignment. A continuous center left-turn lane would not be warranted in this primarily undeveloped section of the corridor, nor are there future development plans that would justify the construction of this type of roadway section. It may also create the potential for motorists to use the continuous center left-turn lane as a passing lane. The **Five-lane on Existing Alignment Alternative** was primarily eliminated from further consideration because it would not provide separation of opposing traffic to reduce accident potential.

The **Four-lane Divided with 84-foot Median Avoiding Monument Entrance Landform Alternative** would widen the existing roadway to the west then shift to the east to avoid the landform at the Monument entrance. This alternative would require approximately 29 acres of new right-of-way from the Monument [a Section 4(f) resource] that would be permanently incorporated into a transportation facility. The **Four-lane Divided with 84-foot Median Avoiding Monument Entrance Landform Alternative** was eliminated from further consideration because of the Section 4(f) resource impacts.

To avoid acquiring easement through Wupatki National Monument, consideration was given to bypassing the Monument west of the current US 89 alignment. **Five Western Realignment Alternatives (A thru E)** were evaluated. These alternatives would require from 78 to 193 acres of new right-of-way, and the realignment alternatives would directly and/or indirectly impact Hank’s Trading Post, whose property line lies approximately 3,000 feet north of the Monument boundary. The **Western Realignment Alternatives** would fragment and eliminate wildlife habitat with the development of a new roadway. The **Western Realignment Alternatives** were eliminated because of the fragmentation and elimination of wildlife habitat, loss of grasslands, substantial change in the visual character of the landscape, the amount of new right-of-way/easement required, potential economic impacts to Hank’s Trading Post, and out-of-direction travel for US 89 motorists. In addition, all but one of the Western Realignment Alternatives would have the potential to induce private development along the US 89/Monument western boundary, which the NPS would oppose.
3. **US 89 Wupatki National Monument to Gray Mountain (MP 445.4 to MP 456.0) Build Alternatives**

Four build alternatives were evaluated in the portion of the corridor north of Wupatki National Monument and south of Gray Mountain; three of these alternatives were eliminated from further consideration. The **Widen to East Alternative** was eliminated from further consideration because it would disturb cultural resources sites considered potentially eligible for the NRHP and would conflict with utilities. The **Widen to West Alternative** was eliminated from further consideration because it would impact businesses at Wauneta and Hank’s Trading Post and require the relocation of one residence and two mobile homes at Hank’s Trading Post as well as disturbing a historic property considered to be a Section 4(f) resource. The **Undivided Alternative** was eliminated from further consideration because it would not provide the desired separation of opposing traffic to reduce accident potential. Additionally, traffic operations would be negatively impacted by the accommodation of left-turn bays.

4. **US 89 Gray Mountain (MP 456.0 to MP 458.1) Build Alternatives**

Four build alternatives were evaluated at Gray Mountain; three alternatives were eliminated from further consideration. The **Widen to East** and **Widen to West Alternatives** were eliminated from further consideration because they would impact businesses in Gray Mountain, create an economic impact as a result of the loss of businesses, and create potential noise impacts to sensitive receivers in Gray Mountain. In addition, the **Widen to East Alternative** would potentially require the relocation of a residence and a church.

The **Bypass Gray Mountain Alternative** would involve shifting the alignment of US 89 approximately 1,800 feet east of the Gray Mountain area to avoid conflicts with businesses and improve pedestrian movements. This alternative was eliminated from further consideration because of the amount of new right-of-way that would be required and the potential economic impact of the diversion of traffic away from businesses in Gray Mountain.

5. **US 89 Gray Mountain to Junction SR 64 (MP 458.1 to MP 464.0) Build Alternatives**

Four alternatives were evaluated between Gray Mountain and just south of the intersection of US 89 and SR 64; three alternatives were eliminated from further consideration. The **Widen to West Alternative** was eliminated from further consideration because it would require more right-of-way/easement, locate the roadway closer to the Cameron School, and impact several sets of transmission line towers compared with the **Widen to the East Alternative**. The **Historic US 89 Highway Alignment Alternative** was eliminated because the opposing directions of traffic would be separated by up to 1,500 feet, which may cause access problems with potential crossover locations; have greater utility relocation cost than the other build alternatives, and would create isolated islands of land that could not be easily used for other purposes.

The **Undivided Alternative** was eliminated from further consideration because it would not provide the desired separation of opposing traffic to reduce accident potential. There would be no storage capacity
for drivers making left-turn movements, possibly delaying through-traffic on US 89 during periods of high traffic volume.

6. **US 89 Junction SR 64 to Little Colorado River (MP 464.0 to MP 467.1) Build Alternatives.**

Three build alternatives were evaluated in the portion of the corridor from just south of the intersection of US 89 and SR 64 to the north side of the Little Colorado River; two were eliminated from further consideration. The **Widen to East** and **Widen to West Alternatives** were eliminated because they would impact businesses in Cameron, directly impact a property considered to be Section 4(f) resource (Little Colorado River Tribal Park), and create an economic impact as a result of the loss of businesses. In addition, the **Widen to West Alternative** would require the relocation of residences and the visitor center in Cameron.

7. **US 89 Little Colorado River to Junction US 160 (MP 467.1 to MP 481.9) Build Alternatives**

Five build alternatives were evaluated in the portion of the corridor north of the Little Colorado River to the intersection of US 89 and US 160; four were eliminated from further consideration. The **Widen to East Alternative** was eliminated because it would require extensive bank protection and impact riparian habitat at Moenkopi Wash. The **Widen to West Alternative** was eliminated from further consideration because it would directly impact a Section 4(f) resource (Little Colorado River Tribal Park) if additional easements were required and disturb cultural resources sites considered eligible for the NRHP.

The **Four-lane Undivided Alternative** would not provide storage capacity for vehicles making left-turn movements, possibly delaying through traffic on US 89 during periods of high traffic volume. Adding left-turn bays to access points within this section of US 89 would require tapering the through traffic lanes outward and inward or providing a continuous center left-turn lane. Left-turn bays would reduce the flow of traffic as vehicles slow down to move into the left-turn bay. A continuous left-turn lane would not be warranted in this primarily undeveloped section of the corridor, nor are there known development plans that would justify the construction of this type of roadway section. This alternative would also create the potential for motorists to use the continuous left-turn lane as a passing lane. The **Four-lane Undivided Alternative** was primarily eliminated from further consideration because it would not provide the desired separation of opposing traffic to reduce accident potential.

The alignment for historic US 89 lies to the west of the present highway from MP 467.1 to 472.0. From there it parallels the current highway alignment, crosses at MP 477.0 and continues north on the east side of US 89 to US 160. Portions of this alignment could be used for the southbound or northbound lanes. Some areas of the old alignment are unusable because of sharp curves and undesirable alignment through washes. Conflicting easement information is available for historic US 89: ADOT’s as-built construction plans show a 100-foot easement width and ADOT’s right-of-way maps show a 400-foot width. This alternative would directly impact riparian habitat associated with Moenkopi Wash and require easement from the Little Colorado River Tribal Park (a Section 4(f) resource). Power poles are located
along the west side of the existing alignment and may need to be moved in some areas to construct the new roadway. The **Historic US 89 Alignment Alternative** was eliminated from further consideration because of the greater disturbance to the riparian area associated with Moenkopi Wash than most of the other build alternatives, greater construction difficulty in using the historic US 89 grade, and greater right-of-way/easement costs compared to the Selected Alternative and to other build alternatives.

**B. US 89/SR 64 Intersection Build Alternatives**

Seven alternatives were evaluated at the intersection of US 89 and SR 64, six were eliminated from further consideration. These alternatives are also illustrated in Appendix A. The **Channelized Y, Standard Diamond, Single Point Urban Diamond, Jug Handle, and Compact Diamond Alternatives** were eliminated from further consideration because of the potential impacts to existing businesses, amount of easement acquisition required, potential contamination with hazardous materials from petroleum products and underground storage tanks associated with commercial development, and reconfiguration of access impacts to residences and businesses.

The **Traffic Signal Alternative** would disrupt the continuity of the corridor by stopping traffic on US 89, which could lead to an increase in accidents for drivers not anticipating a signal. Effective management of driver expectation, according to AASHTO design guidelines, is one of the most important ways to reduce driver error. AASHTO also recommends that “unusual or nonstandard design should be avoided,” and “care should be taken to maintain consistency from one segment to another.” US 89 is a rural highway that currently has little development along its corridor. The nearest traffic signal is located in the city of Flagstaff (about 60 miles away from SR 64, where the first signal could be implemented). Drivers would expect a signal in Flagstaff because of the commercial/residential development and higher amounts of traffic in a city. Research indicates that the most important variable in driver reaction time is driver expectation (Green 2000). Another study reports that high truck traffic volumes at isolated rural signalized intersections increase the hazards of the intersection because of differences in trucks’ braking characteristics (Sunkari 2001). US 89 carries 12 percent truck traffic south of US 160 and 11 percent truck traffic north of US 160. ADOT determined that placing a traffic signal on US 89 may increase the potential for accidents along the highway because of the relatively high percentage of truck traffic.

**C. US 89/US 160 Intersection Build Alternatives**

Five US 89/US 160 Intersection Alternatives are included in Appendix A, four were eliminated from further consideration. Only the **Traffic Signal** and the **Standard Diamond Traffic Interchange Alternatives** would be compatible with future development on both sides of US 89. In addition, the **Traffic Signal Alternative** would disrupt the continuity of traffic flow in the corridor by stopping the traffic on US 89, which could lead to an increase in accidents because of drivers’ not anticipating a signal in this rural setting. The importance of driver expectation in reducing the driver error/accident potential is described in the preceding section and also applies to conditions at the US 89 and US 160 intersection.
The **Channelized Y Alternative** would not meet LOS requirements and would introduce the potential for traffic conflicts because of drivers’ unfamiliarity with its operation. The **Modified Channelized Y Alternative** would have similar drawbacks to the **Channelized Y Alternative** and its construction costs would be higher than those of alternatives not requiring an overpass structure. The **Westbound Flyover Alternative** would have a greater chance for traffic conflicts compared with the **Standard Diamond Traffic Interchange Alternative** and was eliminated from further consideration.

**D. Cameron Trading Post**

Several roadway improvements were evaluated to address the traffic problems at Cameron Trading Post (MP 466.8) on US 89. Potential improvements considered included installing a traffic signal, widening the median, constructing a raised median, and relocating the access point to the trading post by constructing a frontage road. A traffic signal would introduce delays to US 89 traffic, disrupt the continuity of travel for motorists, and potentially raise the accident rate because of unexpected stopping of traffic on US 89. New easement would have to be acquired from the adjacent business if the median were widened. The additional easement requirements, construction cost of a frontage road, and potential economic impacts to businesses eliminated the consideration of modifying the access point to Cameron Trading Post.

**E. Little Colorado River Bridge**

Four different bridge alternatives were evaluated at the crossing of the Little Colorado River; the following three alternatives were eliminated from further consideration. Widening the existing bridge was considered, but it has limited roadway width and load capacity and cannot be economically widened to carry four lanes of traffic. Although the steel structure is adequate for two traffic lanes, the deck of the existing bridge would need to be replaced to meet current ADOT design standards. Constructing a new four-lane bridge would be substantially more expensive than rehabilitating the existing bridge and building a second two-lane bridge. The historic Cameron Suspension Bridge is too close to the existing bridge and would prohibit constructing a new two-lane bridge west of the existing bridge.

**F. No Action Alternative**

The No Action Alternative would allow for minor improvements and routine maintenance. This alternative proposes no major improvements for US 89 or the intersections of US 89 and SR 64 or of US 89 and US 160. The roadway would remain as a two-lane roadway with limited passing opportunities, and the No Action Alternative would not improve traffic operations in the design year when compared with current build recommendations. Only areas of the corridor with passing lanes would maintain LOS B or better in the design year. Where there are no passing lanes, US 89 would experience LOS ranging from LOS D to LOS F. The accident rates would be expected to rise due to the higher traffic volumes and limited passing opportunities.
G. Selected Alternative

The Selected Alternative will consist of widening US 89 to two lanes in each direction, employing a combination of a five-lane roadway, a four-lane roadway with a raised median, or a four-lane divided roadway with new lanes added either to the east or to the west of the existing centerline (refer to Figure 6, Page 19). The typical sections for the Selected Alternative are included in Appendix B. A roundabout will be constructed at the US 89 and SR 64 intersection and a standard diamond traffic interchange at the US 89 and US 160 intersection (refer to Figure 7, Page 20). As opposed to a traffic signal, the roundabout design does not require an absolute stop condition, just controlled slowing. Signs will be provided to alert motorists in advance of the roundabout as well as to provide operational and directional information. The Selected Alternative was identified because the improvements to US 89 will minimize right-of-way/easement acquisition and environmental impacts, accommodate future development plans, provide the needed capacity to meet 2025 traffic projections, meet ADOT’s desired LOS B requirements, provide for passing opportunities, reduce the potential for pedestrian and vehicle conflicts, and reduce the accident potential that may be associated with roadway design deficiencies relative to current AASHTO guidelines and current major intersection configurations.

The Selected Alternative for the mainline improvements respectively for US 89 and the intersection improvements at SR 64 and US 160 will consist of the following:

- **Antelope Hills** (MP 442.0 to MP 443.0): Five-lane undivided roadway with two lanes in each direction and a two-way continuous left-turn lane centered on the existing centerline.

- **Wupatki National Monument** (MP 443.0 to MP 445.4): Four-lane divided section with 30-foot median width, widening centered about the existing centerline.

- **Wupatki National Monument to Gray Mountain** (MP 445.4 to MP 456.0): Four-lane divided section with 84-foot median width, widening to the west of the existing centerline with the exception of between MP 445.4 and MP 447.0 and between MP 451.7 and MP 453.2, where the roadway will be widened to the east to avoid impacting Hank’s and Wauneta Trading Posts, respectively.

- **Gray Mountain** (MP 456.0 to MP 458.1): Four-lane divided section with a 16-foot raised median, left-turn bays, and curb and gutter centered on the existing roadway centerline.

- **Gray Mountain to Junction SR 64** (MP 458.1 to MP 464.0): Four-lane divided section with 84-foot median width, widening to the east of the existing roadway centerline.
Figure 6. US 89 mainline Selected Alternative

- Little Colorado River to North of Junction US 160:
  Four-lane divided roadway with 84-foot median, east of the existing roadway except shifts west at Moenkopi Wash

- Junction SR 64 to Little Colorado River:
  Four-lane divided roadway with a raised median and curb and gutter, centered on the existing roadway centerline

- Gray Mountain to Junction SR 64:
  Four-lane divided roadway with 84-foot median, east of the existing roadway

- Gray Mountain:
  Four-lane divided roadway with a raised median and curb and gutter, centered on the existing roadway centerline

- Wupatki National Monument to Gray Mountain:
  Four-lane divided roadway with 84-foot median, west of the existing roadway centerline, except between MP 445.4 and MP 447.0 and between MP 451.7 and MP 453.2 where roadway shifts east

- Wupatki National Monument:
  Four-lane divided roadway with 30-foot median, centered on the existing roadway centerline

- Antelope Hills:
  Five-lane undivided roadway centered on the existing centerline

Project limit Milepost 484.0

Project limit Milepost 442.0
Figure 7. US 160 and SR 64 intersections Selected Alternative
• Junction SR 64 to Little Colorado River (MP 464.0 to MP 467.1): Four-lane divided section with a 16-foot wide raised median, left-turn bays, and curb and gutter centered on the existing roadway centerline. The existing Little Colorado River Bridge will carry southbound traffic, and a new two-lane northbound bridge will be constructed to the east of the existing bridge. The existing bridge will undergo rehabilitation to bring it up to current design standards. The new northbound bridge will be designed to include a barrier-separated sidewalk along the east edge.

• Little Colorado River to Junction US 160 (MP 467.1 to MP 482.0): Four-lane divided section with 84-foot median width, widening to the east of the existing centerline with the exception at Moenkopi Wash, where the roadway will be widened to the west. The existing bridges will be replaced and new parallel northbound bridges will be constructed at Fivemile Wash (MP 471.4) and three unnamed washes (MP 467.5, MP 476.2, and MP 480.3). A new parallel southbound bridge will also be constructed at Moenkopi Wash (MP 477.2). Between MP 467.1 and MP 481.9, US 89 will transition from the proposed four lane divided highway to a two lane undivided highway to match the existing roadway configuration at the north end of the project limits.

• Junction US 89 and SR 64 (MP 465.2): Roundabout. The Selected Alternative at the US 89 and SR 64 intersection will consist of a standard four-leg roundabout with two-lane yield-controlled approaches on US 89 and single-lane approaches on SR 64. Approaching vehicles will not be required to stop, but will yield to traffic in the roundabout. A raised median, curb and gutter, and turn bays will regulate business access.

• Junction US 89 and US 160 (MP 480.8): Standard diamond traffic interchange. As part of the standard diamond traffic interchange, an elevated overpass structure over US 89 and entrance and exit ramps will be added to the improvements to the intersection at US 89 and US 160. US 89 traffic will flow freely beneath the bridge, with northbound and southbound exiting traffic controlled by stop signs at the ramp intersections. Each entrance ramp and exit ramp will consist of one lane, widening to two lanes at the crossroad intersections as necessary. Signals could be added to the ramp intersections in the future if necessary. The west leg of the west intersection will allow for a future access point so that future development west of the interchange could be easily accommodated.

• North of Junction US 160 to northern project limits (MP 481.9 to MP 484.0): No improvements will occur between MP 481.9 and MP 484.0.

The newly constructed lanes of the four-lane divided section (either northbound or southbound lanes, depending on the location) will have a total pavement width of 38 feet (two 12-foot lanes, a 10-foot outside shoulder, and a 4-foot inside shoulder). With the exception of the roadway section through Wupatki National Monument, the 40-foot existing roadway width will be retained with an 84-foot median between the northbound and southbound travel lanes. The four-lane divided section through the
Monument will construct two new roadways, both 38 feet wide (two 12-foot lanes, a 10-foot outside shoulder, and a 4-foot inside shoulder) separated by a 30-foot median. The existing roadway will be removed to provide the median ditch.

A design variance will be required from the ADOT State Roadway Engineer since ADOT’s standards indicate that the minimum width of an open median should be 46 feet, and the width of the median of the Selected Alternative through the Monument will be 30 feet. The reduced median width is considered acceptable in order to avoid taking additional lands from the Section 4(f) property, Wupatki National Monument.

The four-lane roadway with raised median will have a total width of 88 feet (two 12-foot outside lanes, two 14-foot inside lanes, 10-foot outside shoulders, and a 16-foot center section that will consist of a raised median and/or left-turn lane). The five-lane roadway will have a total width of 80 feet (four 12-foot lanes, 10-foot outside shoulders, and a 12-foot left-turn lane). The roadway improvements will be designed to current ADOT standards wherever possible, and AASHTO guidelines.

New right-of-way/easement will be required for the project. The property to be acquired is a combination of ASLD land (approximately 83 acres), private land (approximately 97 acres), and Navajo Nation land (approximately 41 acres) for a total of approximately 221 acres that will need to be acquired to construct the Selected Alternative.

There is one bridge, 44 reinforced concrete box culverts, and approximately 127 pipe culverts that will require modification for the roadway widening. In areas where there are curb and gutter, catch basins or other similar drainage facilities will also be required to intercept stormwater flows from being directed onto adjacent developed properties.

For the Selected Alternative, most existing turnout locations will be replaced with new turnouts and crossovers where necessary. Some turnouts will be consolidated to provide better alignment and spacing and, in divided highway sections, to reduce the need for crossovers in the median. Existing driveway accesses could be further consolidated during final design. In the more developed areas through Gray Mountain and Cameron, curb and gutter and raised medians will direct turning movements and delineate access points.

Contingent upon the signing of an intergovernmental agreement among ADOT, the Navajo Nation, and the Bureau of Indian Affairs (BIA), 8-foot wide concrete sidewalks and four lighted pedestrian underpasses will be constructed between MP 464.6 and MP 467.1 in Cameron. This area is of special concern because of pedestrian traffic and the existing pedestrian/vehicular conflicts. ADOT will be responsible for the design and construction of these pedestrian facilities. The Navajo Nation and BIA will be responsible for the maintenance of the sidewalks, underpasses, and associated underpass lighting and drainage features.
Median crossovers will be provided minimally at 2-mile intervals and at major crossroads. Final crossover locations will be determined during final design, with input from the Navajo Nation and BIA, when mapping is available and sight distances could be accurately considered.

As part of the improvements, roadway lighting will be installed where the highway will widen from the existing undivided facility to the four-lane divided facility and where there will be a raised median or a center left-turn lane. Lighting will also be necessary to illuminate the merges and diverges for the US 89 and US 160 traffic interchange.

The construction of the roundabout at SR 64 and the traffic interchange at US 160 will require guide signing along the approaches to the intersections. Placement of regulatory signs, warning signs, route markers, and pavement markings will be detailed during final design.
IV. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

The following information describes the affected environment within the project area and presents the potential effects of the Selected Alternative and the No Action Alternative. Measures to avoid or minimize impacts have also been identified and are summarized in the mitigation measures beginning on Page vi of this document. The agency and public involvement activities undertaken as part of the environmental assessment process are presented in Chapter V. For this document, the north-south and east-west limits of the project area are approximately 0.25 mile from the center of the existing US 89 roadway between MP 442.0 and MP 484.0. Land ownership is identified in terms of public or private ownership. Jurisdiction implies the authority to regulate land uses. The visual or scenic resources identified could extend beyond the project limits. The figures in this document depict a graphic representation of the width of the project area for illustrative purposes only.

A. Ownership, Jurisdiction, and Land Use

The project area includes lands that are managed or owned by the United States (US) Department of Agriculture Forest Service (Coconino National Forest), the NPS (Wupatki National Monument), the Navajo Nation, ASLD, and private entities (refer to Figure 8, Page 25). The entire project area is located in Coconino County. This portion of US 89 passes through or is immediately adjacent to four chapters of the Navajo Nation: the Cameron, Bodaway/Gap, Coalmine Canyon, and Tuba City Chapters.

Land uses adjacent to the project area include livestock grazing, recreation, commercial/retail businesses, residential, and multiple uses associated with National Forest and Park Service lands. Small communities within the project limits include Antelope Hills (MP 442.4), Gray Mountain (MP 457.4), and Cameron (MP 446.8). Businesses in Antelope Hills include Fort Sinagua, Many Trails Indian Village Trading Post, and Jewelry Center. Anasazi Inn (112 rooms), Gray Mountain Café and Trading Post, and Thriftway Service Station are located in Gray Mountain. An Arizona Department of Public Safety office, an ADOT maintenance facility, and Gray Mountain Bible College in addition to single-family homes are also present in Gray Mountain. Preliminary plans have been prepared for new housing developments around the Gray Mountain area; however, no details of these developments are available at this time.

Cameron is the largest community within the project limits, with numerous businesses and single-family homes located just south of the Little Colorado River. Retail businesses in Cameron that have direct access from US 89 include Cameron Trading Post, Navajo Arts and Crafts Store, Simpson's Market, Painted Desert Trading Company, and Chevron and Texaco service stations.

The Cameron Chapter of the Navajo Nation has plans for extensive development of the US 89 and SR 64 intersection, in the future, including additional retail, commercial, and residential structures. The Coalmine Canyon Chapter is in the early planning stages of a casino, resort, and airstrip on the north...
Figure 8. Land ownership and jurisdiction
side of the Little Colorado River along the east side of US 89, and a 300-unit housing development across from the casino on the west side of US 89. No development currently exists at the intersection of US 89 and US 160, although there are plans for developing the northeast quadrant. A 100-unit hotel, restaurant, gas station, and associated development, referred to as the Shadow Mountain Native American Complex Project, is being proposed in the northeast quadrant of the US 89 and US 160 intersection.

Two trading posts, Hank’s Trading Post near MP 446.0 and Wauneta Trading Post near MP 452.5, are located in the southern portion of the corridor and consist of one or two retail stores and a few residences. Other commercial enterprises within the project limits include seven roadside stands that occur within the existing ADOT easement. ADOT allows these unpermitted stands to remain in the easement. These stands are located at MP 461.8, MP 462.7, MP 469.4, MP 472.4, MP 477.7, MP 480.4, and MP 483.0.

According to the 1962 Navajo Tribal Council Resolution CF-31-57, a 360,990-acre park, the Little Colorado River Tribal Park, is located within the project limits. The park is on both sides of the roadway starting south of Cameron at MP 464.3 and continuing until the Little Colorado River (MP 467.0). At approximately MP 470.5, US 89 becomes the park’s eastern boundary until just south of The Gap, near MP 498.0. According to the resolution, the park is intended to preserve and develop this area of the Navajo Nation for scenic, historical, recreational, and scientific purposes. The Cameron Chapter is planning commercial development within the park boundaries along US 89 and is coordinating with the Navajo Nation Parks and Recreation Department that will allow the Chapter to proceed with its community development plans. No park facilities currently exist adjacent to the roadway.

Wupatki National Monument was established in 1924 and encompasses approximately 35,422 acres. Wupatki is known as the only location in the Southwest where three separate Puebloan cultures (Anasazi, Cohonina, and Sinagua) are found together. The Monument’s north entrance is at MP 444.8 on US 89. This location marks the beginning of the NPS’ Scenic Loop Road (also known as Forest Road 545) that provides access through the Monument, to the various developed features, and on to Sunset Crater Volcano National Monument. The southern end of the Scenic Loop Road can be accessed at MP 430.5 on US 89. Monument facilities include a visitor center with an associated residential area and maintenance complex and several developed interpretive use areas that provides access to a number of the park’s primary archeological resources, park vistas, and natural environs and landscapes. All areas beyond the Monument’s developed facilities are closed to unguided entry (National Park Service 2002).

The project area also includes a small portion of the Coconino National Forest from MP 442.0 to MP 442.3. There are no designated Forest Roads or trails that provide access off of this portion of US 89.
Short-term impacts to the existing land uses will result during project construction. People living or working in the immediate vicinity of the roadway will be exposed to increased levels of noise and dust from construction activities. There will be temporary traffic delays for vehicles requiring access from US 89 to businesses or individual residences. Access to properties will be maintained during construction. The final design plans will include traffic control plans that will address construction-related safety and access problems.

Access control measures will be implemented, where possible, at the roundabout at the intersection of US 89 and SR 64 and at the traffic interchange at US 89 and US 160. Right-of-way fencing controls access in most sections of the corridor. During the past several years, ADOT has worked with the Navajo Nation to consolidate access points along US 89. Access points to the roadside stands need to be consolidated and more closely controlled to reduce traffic conflicts. A formal plan will be developed during the final design process to relocate these stands. During final design, ADOT will coordinate with the Navajo Nation and the appropriate Chapters to establish consensus for the roadside stand locations and access plan. ADOT will coordinate during final design with the Navajo Department of Transportation and Western Agency of Bureau of Indian Affairs (BIA) with regards to access to private driveways to Navajo residents, businesses, and grazing allotment leases along US 89 in addition to the intersections of US 89 with Navajo Routes (N6150, N6730, N6731, and N6135).

The long-term effects on land use will be that a portion of the ASLD, Navajo Nation, and private lands will be removed permanently (or for the term of the easement) from their current uses and incorporated into a transportation facility. The amount of land required for the improvements will be a relatively small percentage of land compared with the amount of public and private land adjacent to the 42-mile-long corridor. The improvements will require the use of approximately 6.6 acres from the Little Colorado River Tribal Park (less than 1 percent of the total park area), but the use of the park land will be limited to those portions of US 89 currently adjacent to the planned developed area near the US 89 and US 160 traffic interchange. Pavement tapering, to blend the improvement to the existing roadway, will extend into the Coconino National Forest approximately 600 feet on existing ADOT easement. The Selected Alternative will have minimal effect on current land uses because existing uses will continue and access will be maintained.

There will be no impact to land ownership, jurisdiction, or land use with the No Action Alternative.

B. Right-of-Way/Easement
The Selected Alternative will result in the acquisition of approximately 221 acres for right-of-way/easement. The roadway improvements within Wupatki National Monument will occur within the existing easement and will not require any new easement from the NPS. The new right-of-
way/easement to be acquired is a combination of private land (approximately 97 acres), Arizona state land administered by ASLD (approximately 83 acres), and Navajo Nation land (approximately 41 acres). Table 4 provides the details of where the new right-of-way/easement will be acquired. Of the approximately 41 acres of new easement on the Navajo Indian Reservation, approximately 6.6 acres will be within the Little Colorado River Tribal Park. ADOT will need to reach an agreement with the Navajo Nation on the terms, e.g., in perpetuity versus 10 years, for the term of the easement on the Navajo Indian Reservation prior to any ground-disturbing activities. Private property owners will be compensated at market value for land that will be acquired for project right-of-way, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended in 1987.

C. Social and Economic Resources

Based on the US Bureau of the Census’ 2000 data, the total population of the three census tracts through which this portion of US 89 passes is 2,329. Populated areas within the project limits are relatively small and scattered along the corridor, with the largest community located at Cameron. Tourism-related services are the largest economic sector, and the largest employers are the private retail businesses, Cameron Elementary School, and the Navajo Nation.

Limited social services are provided at the Cameron Chapter House, a Navajo Nation government unit, in Cameron. The Cameron Elementary School is located on the west side of US 89 near MP 462.9. Higher education facilities are located in Flagstaff and Tuba City. The closest medical emergency services are located in Flagstaff and Tuba City. The Flagstaff Medical Center and Civil Air Patrol Squadron out of Sedona provide air evacuation services for medical emergencies. The NPS also provides emergency services in the project area. The Navajo Tribal Police, Coconino County Sheriff’s Department, or the Arizona Department of Public Safety provide law enforcement. An Arizona Department of Public Safety Office is located in Gray Mountain (MP 457.6). Fire departments that serve the project area are located in Tuba City and Flagstaff (Doney Park Fire Department).

There will be short-term social and economic impacts during construction of the project. The specific construction sequencing and duration will be determined during final design and included in the construction documents prepared for the contractor. The contractor shall notify the public of the start of construction by placing notices in local newspapers 14 calendar days prior to the beginning of construction activities affecting traffic flow or access. The contractor shall also notify emergency services such as police and fire departments before construction activities begin, and shall maintain continued coordination throughout construction.
### Table 4. New right-of-way/easement acquisition

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**Total:** 220.5 acres
During construction, traffic will be kept on the existing US 89 while the new northbound/southbound section is constructed. There will be impacts to motorists and business owners in Gray Mountain and Cameron during construction because of the inconvenience caused by typical slowing of traffic in construction zones. These types of construction impacts will be substantially reduced in the majority of the corridor because the improvements will take place away from the existing roadway.

The improvements to US 89 will require approximately 221 acres of additional right-of-way/easement. There will be no residential or business displacements as a result of the implementation of the improvements, with the exception of the existing roadside stands. Seven roadside stands are located within the existing easement. During final design, ADOT will coordinate with the Navajo Nation and the appropriate Chapters to establish consensus for the roadside stand locations and access plan.

A number of local access roads intersect with US 89. They consist of paved and unpaved roads providing access to state, federal, Tribal, or private land. Access to all adjacent properties will be maintained during and after construction. Median crossovers will be placed minimally at 2-mile intervals and at major crossroads.

The majority of the long-term changes that will be created by the improvements will be related to vehicular access to and egress from the highway. In Gray Mountain and Cameron, individual driveways will replace the numerous unpermitted access points that connect to US 89. Raised medians will limit left-turn movements to specific areas along the highway. The medians in the highway will create an increase in travel distance for the local residents who want to turn left onto local roads in areas where there are no crossovers. The median will force motorists to travel to the next crossover before they could turn around and turn onto the local road. In addition, businesses in the Gray Mountain and Cameron areas that rely on drop-in patrons to augment the local customer base for a portion of their business will be more likely to experience a loss in revenue than other businesses that are destination businesses. These impacts are not considered to be substantial and will be mitigated by the improved mobility and potential for accident reduction. While the median might impede direct motorist access to some businesses, the greater number of motorists who could more easily travel through the retail areas will offset this. Additionally, a median will make it easier and safer for pedestrians to cross and visit businesses. Construction of sidewalks and lighted pedestrian underpasses in Cameron will be a long-term beneficial impact that will also help reduce pedestrian and vehicular conflicts.

In conclusion, there will be short-term impacts during construction to motorists and business owners because of the inconvenience caused by typical slowing of traffic in construction zones. Long-term impacts will result from changes to vehicular access and acquisition of property. Once the roadway improvements will be in-place, tourists and local residents and businesses will benefit by the more efficient, safe, and effective traffic operations along US 89. The improvements to US 89 will have a beneficial effect on emergency services to the corridor. The pattern of traffic along the majority of US 89
will not notably change with the increased capacity of the expanded highway. Therefore, the Selected Alternative will not have a substantial impact on social and economic resources in the project limits.

The No Action Alternative would not result in any partial or full acquisitions of private property or require additional easement from state or federal agencies or from the Navajo Nation. There would be no change in vehicular access to residences or businesses. However, in the long-term, an increase in delays experienced by motorists because of traffic congestion, continued traffic conflicts with uncontrolled access, and the lack of adequate passing opportunities may increase the accident rates on US 89 and at the intersections with SR 64 and US 160. Therefore, the No Action Alternative would have no short-term social or economic impact, but would result in long-term negative social impacts.

D. Title VI/Environmental Justice

Under Title VI of the Civil Rights Act of 1964 and related statutes, federal agencies are required to ensure that no person is excluded from participation in, denied benefits of, or subjected to discrimination under any program or activity receiving federal financial assistance on the grounds of race, color, religion, national origin, sex, age, or disability. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by President Clinton on February 11, 1994, requires federal agencies to identify, and address as appropriate, disproportionately high and adverse effects on minority and low-income populations.

The Census data reported in Appendix C represent the use of the most recent statistics for the smallest geographic unit encompassing the project area. Census tracts are small, relatively permanent statistical subdivisions of a county used for tallying census information; they do not cross county boundaries. Block groups are geographic subdivisions of Census tracts; their primary purpose is to provide a geographic summary unit for Census block data. The data reported may extend outside the project area; therefore, the exact population and demographic characteristics of the project area may vary from these data.

According to 2000 Census data, two block groups (census tract 9445, block groups 2 and 4) contain percentages of minority groups at levels higher than the surrounding Coconino County: Native American and disabled. The majority of the project is on the Navajo Indian Reservation, which is populated almost completely (96.1 percent) by Native Americans. Disabled populations in block group 2 (54.4 percent) and block group 4 (21.4 percent) are notably higher than the surrounding Coconino County.

Because the roadway follows the existing alignment through the corridor’s developed areas, temporary impacts will be experienced by all segments of the population; therefore, no segment of the population will be disproportionately affected. When the project is completed, these same groups will experience long-term benefit from decreased travel times as compared with the existing conditions. Benefits of the Selected Alternative for all motorists using the improved facility will include more efficient and effective
traffic operations along US 89. The improvements have been developed in accordance with Title VI of the Civil Rights Act of 1964, as amended by the Civil Rights Act of 1968 (Title VIII), and they conform to the requirements of the Americans with Disabilities Act of 1990.

Based on this analysis, the Selected Alternative will cause no short- or long-term disproportionate negative effect, either direct or indirect, upon minority, elderly, disabled, low-income, or female heads of household within the project area. Similarly, the No Action Alternative would cause no short or long-term disproportionate negative effect, either direct or indirect, upon minority, elderly, disabled, low-income, or female heads of household within the project area.

E. Cultural Resources
The project limits have been surveyed for cultural resources in accordance with Section 106 of the National Historic Preservation Act (NHPA). Eight surveys, conducted by ADOT, NPS, the Navajo Nation, and ASLD, have been undertaken in the project corridor. Thirty-seven cultural resources sites have been identified within the project corridor. These sites date to the prehistoric, historic, and historic/modern periods. The prehistoric sites include small habitations, field houses, and artifact scatters; the historic and historic/modern sites include segments of the historic US 89, trash scatters, and Navajo home sites. Additionally, numerous in-use structures, including commercial businesses, roadside stands, residential structures, and a variety of buildings, were identified on Navajo Nation land.

Of the 37 cultural resources sites located within the project corridor, 20 are within the existing or new right-of-way/easement. Of these 20, 2 are listed in the NRHP, 12 are considered NRHP-eligible, 3 are considered potentially eligible for listing in the NRHP, and 3 are considered ineligible for inclusion in the NRHP. The two NRHP-listed properties, Wupatki National Monument (also designated as the Wupatki Archaeological District, which consists of multiple contributing sites) and the Cameron Suspension Bridge, are discussed further in the following section.

ADOT and FHWA have consulted with the State Historic Preservation Office (SHPO), NPS, ASLD, the Navajo Nation, and the Hopi, Hualapai, Havasupai, Zuni, Kaibab-Paiute and the Fort Mohave tribes on the cultural resources of the project area. Copies of the correspondence are included in Appendix D. No response was received from the Hualapai and Havasupai tribes. Ethnographic surveys have been conducted at the request of the Navajo Nation and the Hopi Tribe to identify Traditional Cultural Properties within the project limits; no Traditional Cultural Properties will be affected by the project.

A Programmatic Agreement (PA) has been executed among the consulting parties regarding the cultural sites along the corridor (Appendix E). The intent of the PA is to ensure that a site-specific recovery plan will be developed for all sites prior to the project’s implementation. Appropriate mitigation measures, including testing and data recovery plans, will be developed and implemented by the ADOT
Environmental Planning Group (EPG) in consultation with signatories of the PA for those NRHP-eligible and potentially eligible cultural resources that cannot be avoided. All consultation and data recovery will be completed prior to construction. Subsequent to the initial signing of the PA in 2004, the agreement was amended in 2006 to include additional stipulations requested by the Navajo Nation and to add the Navajo Nation as a signatory to the PA. Execution of the PA fulfills FHWA’s NHPA Section 106 obligations.

ADOT, SHPO, and FHWA have determined that the project will have an adverse effect on 12 NRHP-eligible and three potentially NRHP-eligible sites. The adverse effects to these sites will be treated through the implementation of an archaeological testing and data recovery program in accordance with the terms of the PA. ADOT, SHPO, and FHWA have determined that the project will have no effect on the Cameron Suspension Bridge, an NRHP-listed property, because the property will be avoided by the project. ADOT, SHPO, FHWA, and NPS have determined that the effects to Wupatki National Monument, an NRHP-listed property, will be treated through the implementation of an archaeological testing and data recovery program in accordance with the terms of the PA, resulting in no adverse effect to the property. The contractor shall contact ADOT EPG Historic Preservation Team, a minimum of 14 calendar days prior to any ground-disturbing activities to arrange for a qualified archaeologist to flag sensitive resource sites for avoidance. The contractor shall avoid all flagged sensitive resource areas within or adjacent to the project area.

According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Section 107.05 Archaeological Features (2000 edition), if previously unidentified cultural resources are discovered during construction, the contractor shall stop work immediately at the location, take all reasonable steps to secure preservation of those features, and notify the ADOT Engineer. The ADOT Engineer will notify ADOT EPG Historic Preservation Team, who will contact the appropriate agency(ies) to evaluate the significance of the resources.

The No Action Alternative would have no short- or long-term impacts on cultural resources.

F. Section 4(f) of the Transportation Act
Section 4(f) of the US Department of Transportation Act of 1966 (as amended and recodified in 1983) states that FHWA:

may approve a transportation program or project — requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if there is no prudent and feasible alternative to using that land; and the program or project includes all possible
planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use. (49 United States Code [USC] § 303[c])"

A “use” of a Section 4(f) resource, as defined in 23 Code of Federal Regulations [CFR] § 771.135)(p) occurs: 1) when land is permanently incorporated into a transportation facility, 2) when there is a temporary occupancy of land that is adverse in terms of the statute’s preservationist purposes, or 3) when there is a constructive use of land. A constructive use of a Section 4(f) resource occurs when the transportation project does not incorporate land from the Section 4(f) resources, but the project’s proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. For example, a constructive use can occur when:

1) The projected noise level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a resource protected by Section 4(f);
2) The proximity of the Preferred Alternative substantially impairs aesthetic features or attributes of a resource protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the resource. An example of such an effect would be the location of a proposed transportation facility in such proximity that it obstructs or eliminates the primary views of an architecturally substantial historical building, or substantially detracts from the setting of a park or historic site which derives its value in substantial part due to its setting; and/or
3) The project results in a restriction on access, which substantially diminishes the usefulness of a substantial publicly owned park, recreation area, or historic site.

There are no wildlife or waterfowl areas within or immediately adjacent to the project limits. However, there are four historic properties warranting consideration under Section 4(f) (Wupatki Archeological District, historic US 89, the Cameron Suspension Bridge, and 1940s–1950s historic structures with associated trash dump), and a park (Little Colorado River Tribal Park) (Figure 9). The Wupatki National Monument/Archaeological District is also considered a recreation area in addition to being a historic property.

The improvements will not directly impact the Wupatki National Monument, Cameron Suspension Bridge, or the historic structures with associated trash dump. While the Selected Alternative will directly impact the historic US 89 segments, SHPO has concurred that the improvements will not adversely effect the historic qualities of these segments of US 89 that make them contributing elements to the sites’ overall NRHP eligibility (refer to SHPO concurrence in Appendix D). Therefore, Section 4(f) will not apply to these road segments.

1. **Wupatki National Monument and Archaeological District**

US 89 crosses the westernmost portion of the Wupatki National Monument and Archaeological District (Figure 9). The Monument encompasses approximately 35,254 acres, and is also listed in the NRHP as
Figure 9. Section 4(f) resources
an archaeological district under Criteria A (event), C (design), and D (information potential). A total of 2,688 sites have been located within the Wupatki boundary. The archaeological sites within the project limits have been determined to be contributing elements to the Archeological District only under Criterion D.

The Selected Alternative will be designed to improve the operational characteristics of US 89, within the existing alignment, and will not require any new easement from NPS. Therefore there is no ‘use’ of the Monument. During construction, access to the Monument will be maintained. The landscape character will not substantially change as a result of the improvements and, therefore, will not impact the aesthetic values of the Monument or interfere with the use or enjoyment of the Monument. The projected noise level increase attributable to the Selected Alternative will not substantially interfere with the use or enjoyment of the Monument.

The archaeological sites within the project limits have been determined to be contributing elements to the Archaeological District only under Criterion D. Concurrence by NPS with the recommendation that the Selected Alternative will have “no adverse effect” on the characteristics of the Wupatki Archaeological District that contributes to its NRHP eligibility under Criteria A and C was received on March 31, 2003. Therefore there is no ‘use’ of the Wupatki Archaeological District. A copy of the concurrence letter is included in Appendix D.

2. Cameron Suspension Bridge
The Cameron Suspension Bridge is located at MP 467.0 along US 89 where it crosses the Little Colorado River. The bridge was erected in 1911 by the Midland Bridge Company of Kansas City, Missouri. According to ADOT (1987), this bridge opened the Navajo Indian Reservation to traffic from the south, is the earliest existing vehicular suspension bridge in Arizona, and is one of the few territorial period bridges in the state. The bridge is “one of the state’s most historically and technologically significant vehicular spans.” The bridge was listed in the NRHP in 1986 under Criteria A (event) and C (design). The Cameron Suspension Bridge will not be directly impacted by construction of the Selected Alternative. Furthermore, the roadway improvements will not alter the existing pedestrian access to the bridge or substantially change the visual quality and character of the existing bridge’s setting. The bridge is not a noise-sensitive facility. The projected noise level increase attributable to the Selected Alternative will not interfere with the use of the bridge. Therefore, there will be no constructive use to this Section 4(f) resource.

3. 1940s–1950s Historic Structures and Associated Trash Dump
A historic-period artifact scatter is located along the western side of US 89. The artifact scatter and associated structures date primarily to the 1940s–1950s. SHPO determined that the site is eligible for inclusion in the NHRP for its association with the historic US 89 and its potential to contribute important data about the economic history of the region. This historic-period resource will not be directly impacted by construction of the Selected Alternative. Although located in the ADOT right-of-way, roadway improvements will be conducted east of the existing road and, therefore, avoid this historic resource. The contractor shall contact ADOT EPG Historic Preservation Team, a minimum of 14 calendar days prior to any ground-disturbing activities to arrange for a qualified archaeologist to flag sensitive resource sites for avoidance. The contractor shall avoid all flagged sensitive resource areas within or adjacent to...
the project area. Furthermore, the improvements will not alter existing access to the site or change the visual quality and character of its setting. The historic-period artifact scatter is not a noise-sensitive facility. Therefore, there is no constructive use to this Section 4(f) resource.

4. Little Colorado River Tribal Park

The Little Colorado River Tribal Park consists of 360,990 acres that is located primarily along the west side of US 89, beginning just south of Cameron and extending north to just south of The Gap (Figure 9). The park was established by a quorum of the Navajo Tribal Council on March 27, 1962, under authorities granted by Resolution Number CF-31-57. According to the resolution of the Advisory Committee of the Navajo Tribal Council, the park is intended to preserve and develop the previously mentioned area of the Navajo Nation for scenic, historical, recreational and scientific purposes. Since the establishment of this park, no improvements (e.g., trails systems, picnic areas) are known to have occurred within the designated park boundaries. Portions of the Little Colorado River Tribal Park have multiple uses; the community of Cameron is within the boundaries of the park. The Cameron Chapter has approved commercial development (e.g., an auto body shop, motel, restaurant) within the park adjacent to US 89. In addition, the Coalmine Canyon Chapter is planning a casino, resort, airstrip, and housing development within the park limits on the north side of the Little Colorado River.

a. Alternatives

The following alternatives were considered as part of the evaluation of potential impacts to the Little Colorado River Tribal Park: 1) No Action, 2) improvement without using the adjacent Section 4(f) land, 3) an alternative on a new location, and 4) the Selected Alternative. Other build alternatives were also considered but eliminated from further consideration; these alternatives are summarized in Appendix A.

The No Build Alternative was eliminated because it would not correct existing or projected capacity and operational deficiencies.

Improving the roadway on the existing alignment would minimally require construction of a four-lane roadway section with a 30-foot at-grade median centered on the existing roadway centerline and a traffic signal to control turning movements at the intersection of US 89 and US 160. A traffic signal at the intersection of US 89 and US 160 would disrupt the continuity of traffic flow in the corridor by stopping the traffic on US 89, which could lead to an increase in accidents because of drivers’ not anticipating a signal in this rural setting. It is not feasible and prudent to avoid Section 4(f) lands by improving the roadway on the existing alignment because there is not sufficient easement to construct the improvements and a traffic signal at this intersection would have the potential to increase in accidents rather than decrease.

The Little Colorado River Tribal Park is located along the west side of US 89 for approximately 30 miles, including 14 miles beyond the limits of the project. It is not feasible and prudent to avoid the Little Colorado River Tribal Park by constructing the intersection on a new alignment to the west because the
park extends to the eastern boundary of the Grand Canyon National Park, another Section 4(f) resource. It is not feasible and prudent to avoid the Little Colorado River Tribal Park by constructing the improvement on a new alignment to the east because the new location would result in substantial costs and environmental impacts. Shifting the intersection on a new alignment farther to the east would adversely impact the planned commercial development (Shadow Mountain Native American Complex Project) and the series of landforms that parallel the existing highway. To avoid the planned commercial development and the landforms, the alignment would have to move approximately 0.5 mile farther to the east and would result in substantial increase in construction costs, right-of-way/easement requirements, and disturbance to previously undisturbed terrain.

b. Selected Alternative
The Selected Alternative (Standard Diamond Traffic Interchange) will consist of the addition of a standard diamond interchange at the intersection of US 89 and US 160, with US 89 being the main thoroughfare. US 89 traffic will flow freely beneath the US 160 overpass with northbound and southbound exiting traffic controlled by stop signs at the ramp intersections. This alternative will require approximately 15 acres of new right-of-way/easement, including approximately 6.6 acres of land from the Little Colorado River Tribal Park. The Standard Diamond Traffic Interchange Alternative will meet ADOT’s design objectives to accommodate the projected increase in traffic volumes within the corridor, reduce accident rates, and achieve separation of traffic while maintaining uninterrupted through traffic on US 89. Potential future development could be accommodated on the west side of US 89.

Sound levels will range from between 57 to 63 decibels and will not cause proximity impacts on the use and visitor expectation of the park. The landscape character will substantially change as a result of the improvements because of the footprint of the traffic interchange. The change in the setting will not detract from or impair the intended use of the park. There are no designated access points from this portion of US 89 that connect to the park; therefore, there will be no impact on access.

The Standard Diamond Traffic Interchange Alternative is both prudent and feasible because although it will require approximately 6.6 acres (0.002 percent) of park land, it will achieve separation of traffic while maintaining uninterrupted through traffic on US 89, accommodate potential future development at the intersection, reduce the potential for traffic conflicts, and better meet driver expectations on the US 160 westbound-to-southbound movement since drivers no longer have to stop after rounding the curve on approach to US 89.

c. Measures to Minimize Harm
ADOT and FHWA will implement measures to minimize harm to the Little Colorado River Tribal Park. These measures include bridge structures that will be colored with Navajo Nation approved coloring agent and/or patterned or textured to blend with the natural surroundings. Colors, patterns, or textures to be used on concrete surfaces will be coordinated with the Navajo Nation.
d. Coordination
Coordination has occurred with the Navajo Nation Parks and Recreation Department, Cameron, Coalmine Canyon, Tuba City and Bodaway/Gap Chapters, and BIA. There have been project status meetings every other month since December 2000 on the improvements to US 89 and presentations to the Chapters. A letter of concurrence from the Director of the Navajo Nation Parks and Recreation Department indicating that he agrees with the assessment of impacts and the mitigation proposed for impacts to the Section 4(f) resource is included in Appendix D.

5. Summary
In summary, the Selected Alternative will result in the permanent incorporation of Little Colorado River Tribal Park lands into a transportation facility. The Selected Alternative will improve the operational characteristics of the existing highway on the same alignment and will allow flexibility of design to better fit the landscape. The Little Colorado River Tribal Park is located adjacent to the existing highway, the amount and location of the park land incorporated into a transportation facility will not impair the intended use of the park, and the proximity impacts of the project will not impair the intended use and enjoyment of the park. The Navajo Nation Parks and Recreation Department, which has jurisdiction over the parklands (Appendix D), has agreed in writing with the assessment of impacts of the project and measures to minimize harm to the park.

In accordance with U.S.C. §303, this section documents the avoidance alternatives evaluated to ensure that there is no prudent and feasible alternative to using this land, and that the project includes all possible planning to minimize harm to the public park resulting from the direct use of the Little Colorado River Tribal Park.

The Wupatki National Monument, Cameron Suspension Bridge, and the historic structures with associated trash dump will not be directly impacted by construction of the Selected Alternative. Furthermore, the roadway improvements will not alter the existing access to these resources, change the visual quality and character of their settings, or substantially interfere with the use of the facilities because of the projected increase in noise levels. Therefore, there are no proximity impacts to these Section 4(f) resources.

The No Action Alternative would have no impacts, short- or long-term, to Section 4(f) resources in the project area.

G. Air Quality Analysis
The 1990 Clean Air Act Amendments (CAAA) and NEPA require that air quality impacts be addressed in the preparation of the environmental document. Evaluation of these impacts may vary from simple descriptions to detailed, microscale analyses, depending on factors such as the type of environmental
document to be prepared, the project location and size, the micrometeorology of the project area, the air quality attainment status of the area, and the State Air Quality Standards.

An air quality study of this project area was completed in October 2001 and reported in Air Quality Assessment US 89: Antelope Hills to Jct. US 160, Coconino County, Arizona (ADOT 2001a). The purpose of this study was to provide information regarding potential air quality changes as a result of the Selected Alternative when comparing the existing conditions with the 2025 No Action Alternative and the build alternatives. Existing peak-hour traffic volumes and 2025 peak-hour traffic volumes were used for this analysis. The air quality analysis focused on vehicle emissions of carbon monoxide (CO). Other pollutants, such as particulate matter and oxides of nitrogen, are also components of vehicular emissions; however, the impacts of CO are most easily assessed and provide a convenient measure of air quality impact.

Table 5 (Page 40) illustrates the projected maximum 1-hour and 8-hour concentrations of CO for 1) the current traffic conditions and roadway configuration (existing condition), 2) the future traffic conditions and current roadway configuration (No Action Alternative at 2025), and 3) the future traffic conditions and US 89 configuration (Selected Alternative).

<table>
<thead>
<tr>
<th>Scenario modeled</th>
<th>Year</th>
<th>Maximum afternoon CO concentration (ppm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1-Hour averaging time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(NAAQS Standard = 35 ppm)</td>
</tr>
<tr>
<td>Existing Condition</td>
<td>2001</td>
<td>1.0–4.1</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>2025</td>
<td>1.0–5.3</td>
</tr>
<tr>
<td>Selected Alternative</td>
<td>2025</td>
<td>1.2–3.8</td>
</tr>
</tbody>
</table>

Source: ADOT 2001a

parts per million

NAAQS – National Ambient Air Quality Standards

Under the No Action Alternative, maximum predicted 2025 1-hour and 8-hour concentrations of CO were increased over those concentrations recorded for the existing conditions. This increase is due to the increase in traffic volume predicted for 2025 (refer to Table 1). When comparing the Selected Alternative predicted 1-hour and 8-hour concentrations with both the No Action Alternative and existing conditions, concentrations will be reduced. Both the No Action and the Selected Alternatives are below National Ambient Air Quality Standards (NAAQS).

Short-term impacts to particulate matter (PM₁₀) levels may also occur during the construction phase, but these impacts may be reduced through using watering or other dust control measures. Overall, air quality impacts will be reduced as a result of less traffic congestion with the implementation of the Selected Alternative.
Projected maximum 1-hour and 8-hour concentrations associated with the alignment generally remain near those values obtained for the No Action Alternative. The CO concentrations for both the future No Action and Selected Alternatives were well below the state and federal standards. The improvements are expected to have no adverse long-term impacts on the air quality of the area.

Short-term impacts to CO concentrations may occur during construction because of the interruption of normal traffic flow. Efforts should be made to reduce queuing, especially during peak travel hours. Impacts to CO concentrations associated with the improvements may be considered very minor. Short-term impacts to PM\textsubscript{10} may also occur during the construction phase, but these may be reduced through the use of watering or other dust-control measures as specified in the \textit{ADOT Standard Specifications for Road and Bridge Construction}, 2000, as well as any other local rules or ordinances.

The project area does not lie in an air quality nonattainment area and is not included in the State Transportation Improvement Program: FY2001–2003 (ADOT2001).

1. \textit{Mobile Source Air Toxics}

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

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

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program, its national low emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent
increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in the following graph:

![Graph showing VMT and emissions over time](image)

**Figure 10.** Mobile source air toxics emissions

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

a. Unavailable Information for Project Specific MSAT Impact Analysis

This EA includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable the prediction of project-specific health impacts of the emission changes associated with the No Action and Action Alternatives in this EA. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:
b. Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

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

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

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

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

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions—if any—between the No Action and Selected alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm
For the Selected Alternative in this EA, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for the No Action and Selected alternatives. The Selected Alternative will add capacity to the existing roadway; however, the Selected Alternative VMT is expected to be similar to the No Action Alternative VMT because no nearby alternative routes exist (See Table 6). Any increase in VMT would lead to proportionally higher MSAT emissions for the Selected Alternative along the highway corridor. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA’s MOBILE 6.2 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Table 6. VMT for the 2025 design year

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Vehicle Miles Traveled (VMT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action Alternative</td>
<td>171.5 million*</td>
</tr>
<tr>
<td>Selected Alternative</td>
<td>171.5 million*</td>
</tr>
</tbody>
</table>

*Traffic engineers anticipate negligible differences in future VMT due to induced travel.

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

The additional travel lanes contemplated as part of the Selected Alternative will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher under the Selected Alternative than the No Action Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded roadway sections. However, as discussed above, the magnitude and the duration of these potential increases compared to the No Action Alternative cannot be accurately quantified due to the inherent deficiencies of current models. In sum, when a highway is widened and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Selected Alternative could be higher relative to the No Action Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions, except for diesel particulate matter). However, on a regional basis, EPA’s vehicle and fuel regulations, coupled with fleet turnover, will over
time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Construction activity may generate a temporary increase in MSAT emissions. Project-level assessments that render a decision to pursue construction emission mitigation will benefit from a number of technologies and operational practices that should help lower short-term MSATs. In addition, the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) has emphasized a host of diesel retrofit technologies in the law’s Congestion Mitigation and Air Quality Improvement Program provisions - technologies that are designed to lessen a number of MSATs.¹

Construction mitigation includes strategies that reduce engine activity or reduce emissions per unit of operating time. Operational agreements that reduce or redirect work or shift times to avoid community exposures can have positive benefits when sites are near vulnerable populations. For example, agreements that stress work activity outside normal hours of an adjacent school campus would be operations-oriented mitigation. Also on the construction emissions front, technological adjustments to equipment, such as off-road dump trucks and bulldozers, could be appropriate strategies. These technological fixes could include particulate matter traps, oxidation catalysts, and other devices that provide an after-treatment of exhaust emissions. The use of clean fuels, such as ultra-low sulfur diesel, also can be a very cost-beneficial strategy.

The EPA has listed a number of approved diesel retrofit technologies; many of these can be deployed as emissions mitigation measures for equipment used in construction. This listing can be found at: [www.epa.gov/otaq/retrofit/retroverifiedlist.htm](http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm).

**H. Noise Analysis**

An analysis of potential noise impacts was conducted within the project area, pursuant to the ADOT Noise Abatement Policy (NAP), dated March 21, 2000, and in accordance with the provisions of Title 23 CFR § 772 - Procedures for Abatement of Highway Traffic Noise and Construction Noise. The analysis was documented in *US 89 Antelope Hills to Junction US 160, Coconino County, Arizona* (ADOT 2001b). The purpose of the noise study was to analyze the impacts on potential receivers from the traffic-generated noise that will occur as a result of the improvements.

¹ SAFETEA-LU, Public Law 109-59, August 10, 2005
As identified in Table 7, FHWA’s Noise Abatement Criteria (NAC) are used to compare results of field monitoring. The NAC are formulated by combining land use designations with the acceptable exterior noise levels. The range of common indoor and outdoor noise levels is illustrated in Figure 10 (Page 48).

A total of 71 receiver locations were identified in the noise analysis. Three alternatives were used to compare results of the noise study, including the existing conditions, a No Action Alternative in 2025, and the Selected Alternative. For the purposes of the noise study, the 42-mile-long project area was divided into 10 segments: 1) Antelope Hills, 2) Hank’s Trading Post, 3) Wauneta Trading Post, 4) Gray Mountain, 5) Cameron School, 6) Cameron, 7) Cameron Trading Post, 8) North of Little Colorado River, 9) South of Moenkopi Wash, and 10) North of Moenkopi Wash. As identified in Table 8 (Page 50), noise levels ranged from 1) 51 to 63 decibels under existing conditions, 2) 52 to 66 decibels under the No Action Alternative in 2025, and 3) 54 to 66 decibels as identified under the Selected Alternative. When comparing the existing noise levels with both of the future-year (i.e., 2025) conditions, the decibel increases are primarily attributable to the increase in traffic volumes. Three receivers will reach or exceed the ADOT NAP under the Selected Alternative, and, for comparison, six receivers would reach or exceed the ADOT NAP under the 2025 No Action Alternative (refer to Table 8, Page 50).

For the most part, receivers within the project area were sparsely distributed and considered as “isolated receivers” under ADOT’s NAP. Isolated receivers are defined as “one or two sensitive affected receivers (e.g., residences) set apart from other receivers in the project area.” According to the ADOT NAP, it generally will not be considered reasonable to provide abatement for isolated receivers. However, ADOT considered noise mitigation for the three receivers impacted under the Selected Alternative. The overall goal will be to reduce the noise levels by 5 dBA.

### Table 7. Noise Abatement Criteria (hourly A-weighted sound level—decibels [dBA])

<table>
<thead>
<tr>
<th>Noise Activity Category</th>
<th>$L_{Aeq1h}$</th>
<th>Description of Activity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57 (exterior)</td>
<td>Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.</td>
</tr>
<tr>
<td>B</td>
<td>67 (exterior)</td>
<td>Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.</td>
</tr>
<tr>
<td>C</td>
<td>72 (exterior)</td>
<td>Developed lands, properties, or activities not included in Categories A or B above.</td>
</tr>
<tr>
<td>D</td>
<td>Undeveloped lands.</td>
<td></td>
</tr>
</tbody>
</table>

*Source:* 23 CFR § 772
A sound barrier was modeled at the location of Receiver 4-2 (Anasazi Inn located along the east side of US 89 at Gray Mountain). To effectively mitigate noise concerns, a 6-foot-high barrier, covering approximately 1,530 square feet, will be required. At an approximate cost of $25 per square foot, the sound barrier will cost approximately $38,250. This cost will exceed ADOT’s NAP’s maximum recommended cost of abatement per benefited receiver of $35,000. Furthermore, motels and hotels normally prefer visibility from passing motorists. Therefore, no mitigation is recommended (ADOT 2002b).

Another sound barrier was evaluated for Receiver 4-13 (Gray Mountain Church). A 9-foot-high barrier, totaling 2,250 square feet, will be required to reduce predicted noise levels by 5 decibels to 61 decibels. The estimated cost of this sound barrier will be approximately $56,250, which is substantially more than the NAP’s recommended cost-per-benefited receiver allowance. Therefore, no noise mitigation for Receiver 4-13 is recommended.

A sound barrier was also evaluated for Receiver 10-1. To reduce predicted noise levels by 5 decibels, a 9-foot-high barrier totaling 4,500 square feet will be required and was estimated to cost approximately $112,500. This estimate is nearly three times the current ADOT NAP’s recommended cost-per-benefited receiver allowance. As a result, no mitigation is recommended.

The noise study did not include analyses of specific site receivers within the Wupatki National Monument. The ADOT right-of-way varies from 300 feet to 600 feet adjacent to the Monument property. The low traffic volumes (existing and projected) produced predicted traffic noise levels that were below the ADOT NAC of 64 decibels for peak hour traffic for properties located closer to the roadway than the Monument. Therefore, it was concluded that traffic noise impacts will not be present along the portion of US 89 abutting the Monument site.

In summary, three receiver locations will be impacted under the Selected Alternative. No mitigation is recommended because sound barriers will not effectively reduce decibel levels below the ADOT NAP threshold and remain within the ADOT NAP for cost-per-benefited receiver criteria. Therefore, the Selected Alternative will impact project area receivers, but will not substantially impact the overall noise quality of the project area. Some short-term/temporary noise disturbances will occur during construction. Even though the severity of disturbance is difficult to estimate, some predictions can be made based on previous noise studies. Based on the noisiest equipment that is anticipated to be used and data from the US Department of Transportation’s *Highway Construction Noise: Measurement, Prediction and...*
<table>
<thead>
<tr>
<th>Common Outdoor Noise Level</th>
<th>Noise Level (dBA)</th>
<th>Common Indoor Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet Flyover at 1000 feet</td>
<td>110</td>
<td>Rock Band</td>
</tr>
<tr>
<td>Gas Lawn Mower at 3 feet</td>
<td>100</td>
<td>Food Blender at 3 feet</td>
</tr>
<tr>
<td>Diesel Truck at 50 feet</td>
<td>90</td>
<td>Garbage Disposal at 3 feet</td>
</tr>
<tr>
<td>Noisy Urban Daytime</td>
<td>80</td>
<td>Shouting at 3 feet</td>
</tr>
<tr>
<td>Gas Lawn Mower at 100 feet</td>
<td>70</td>
<td>Vacuum Cleaner at 10 feet</td>
</tr>
<tr>
<td>Commercial Area</td>
<td>60</td>
<td>Normal Speech at 3 feet</td>
</tr>
<tr>
<td>Quiet Urban Daytime</td>
<td>50</td>
<td>Large Business Office</td>
</tr>
<tr>
<td>Quiet Urban Nighttime</td>
<td>40</td>
<td>Dishwasher Next Door</td>
</tr>
<tr>
<td>Quiet Suburban Nighttime</td>
<td>30</td>
<td>Small Theater, Large Conference Room (background)</td>
</tr>
<tr>
<td>Quiet Rural Nighttime</td>
<td>20</td>
<td>Library</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Concert Hall (background)</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>Broadcast and Recording Studio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Threshold of Hearing</td>
</tr>
</tbody>
</table>


**Figure 11.** Common indoor and outdoor noise levels
<table>
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<tr>
<th>Receiver site</th>
<th>NAC</th>
<th>Receiver description</th>
<th>Existing Peak 2001 (dBA)</th>
<th>No Action Peak 2025 (dBA)</th>
<th>Selected Alternative Peak 2025 (dBA)</th>
</tr>
</thead>
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<td>1-1</td>
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<td>59</td>
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<td>62</td>
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<td>1-2</td>
<td>B</td>
<td>RV Park behind store</td>
<td>57</td>
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<td>60</td>
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<tr>
<td>2-1</td>
<td>B</td>
<td>Mobile home next to trading post</td>
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<td><strong>64</strong></td>
<td>63</td>
</tr>
<tr>
<td>2-2</td>
<td>B</td>
<td>Mobile home next to trading post</td>
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<td><strong>64</strong></td>
<td>63</td>
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<td>2-3</td>
<td>B</td>
<td>Mobile home next to trading post</td>
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<td><strong>64</strong></td>
<td>63</td>
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<td>Mobile home behind trading post</td>
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<td>59</td>
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<td>4-2</td>
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<td><strong>64</strong></td>
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<td>B</td>
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<td>House behind motel</td>
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<td>57</td>
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<tr>
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<td>B</td>
<td>Mobile homes behind motel</td>
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<td>4-9</td>
<td>B</td>
<td>Houses on corner</td>
<td>59</td>
<td>62</td>
<td>62</td>
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<td>4-10</td>
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<td>Mobile homes behind café</td>
<td>56</td>
<td>59</td>
<td>59</td>
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<tr>
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<td>Houses at ADOT compound</td>
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<td>Houses at ADOT compound</td>
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<td>Gray Mountain Church</td>
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<td>Houses in subdivision</td>
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(continued on next page)
### Table 8. Summary of noise analysis (continued)

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<thead>
<tr>
<th>Receiver site</th>
<th>NAC</th>
<th>Receiver description</th>
<th>Existing Peak 2001 (dBA)</th>
<th>No Action Peak 2025 (dBA)</th>
<th>Selected Alternative Peak 2025 (dBA)</th>
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<td>55</td>
<td>57</td>
</tr>
<tr>
<td>10-1</td>
<td>B</td>
<td>Stone Building</td>
<td>61</td>
<td>63</td>
<td>64</td>
</tr>
<tr>
<td>10-2</td>
<td>B</td>
<td>Houses behind roadside stand</td>
<td>59</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>10-3</td>
<td>B</td>
<td>Hogan behind roadside stand</td>
<td>56</td>
<td>57</td>
<td>59</td>
</tr>
<tr>
<td>10-4</td>
<td>B</td>
<td>House</td>
<td>52</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>10-5</td>
<td>B</td>
<td>Houses</td>
<td>51</td>
<td>53</td>
<td>55</td>
</tr>
<tr>
<td>10-6</td>
<td>B</td>
<td>Houses</td>
<td>51</td>
<td>52</td>
<td>54</td>
</tr>
<tr>
<td>10-7</td>
<td>B</td>
<td>Houses</td>
<td>51</td>
<td>53</td>
<td>55</td>
</tr>
<tr>
<td>10-8</td>
<td>B</td>
<td>Hogan</td>
<td>52</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>10-9</td>
<td>B</td>
<td>Hogan</td>
<td>53</td>
<td>54</td>
<td>56</td>
</tr>
</tbody>
</table>

*Bold numbers indicate those receiver sites at or above the ADOT NAP 64-dBA threshold for Category B land uses.*

**Mitigation**, grading and earthwork by scrapers and dozers will most likely increase noise levels to 93 decibels at approximately 50 feet. However, these disturbances will be temporary in nature. The predicted future No Action Alternative noise levels were 1 to 4 dBA higher than the existing year noise levels. Therefore, the No Action Alternative would produce long-term minor negative noise impacts in the project area.

### I. Utilities

Existing utilities within the project area are listed in Table 9 (Page 52). Several utilities along this portion of US 89 will be affected to varying degrees. Coordination efforts with the appropriate utility companies have occurred to reduce potential impacts. There is an Arizona Public Service (APS) 500-kilovolt (kV) transmission tower within the new easement at MP 462.6, but, should have sufficient clear distance from the roadway to remain in place. At MP 463.4, an APS power substation lies about 1,500 feet west of the US 89 easement. Questar, Inc. has converted an existing crude oil pipeline to a natural gas pipeline through this area. The pipeline crosses US 89 at approximately MP 461.5, MP 465.9, and MP 467.3. There is a compressor station, recently converted from a crude oil pumping station, present to the east of US 89 at MP 461.7. ADOT will coordinate adjustments to existing facilities with the appropriate utility owners during final design. Prior rights will be determined during final design to identify who is
responsible for paying relocation costs. Utility companies with prior rights will be compensated according to ADOT policies and guidelines.

**Table 9. Existing utilities**

<table>
<thead>
<tr>
<th>Description</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 kV Transmission line</td>
<td>APS</td>
</tr>
<tr>
<td>69 kV Overhead power line</td>
<td>APS</td>
</tr>
<tr>
<td>345 kV Transmission line</td>
<td>APS</td>
</tr>
<tr>
<td>500 kV Transmission line</td>
<td>APS</td>
</tr>
<tr>
<td>Power substation</td>
<td>APS</td>
</tr>
<tr>
<td>Overhead power line</td>
<td>APS</td>
</tr>
<tr>
<td>Overhead power line</td>
<td>APS/Qwest/Indevideo</td>
</tr>
<tr>
<td>Overhead power line</td>
<td>APS/Qwest</td>
</tr>
<tr>
<td>Transmission tower</td>
<td>APS</td>
</tr>
<tr>
<td>Transmission line</td>
<td>APS</td>
</tr>
<tr>
<td>Water line</td>
<td>Arizona Water Company</td>
</tr>
<tr>
<td>2-inch water line</td>
<td>C O Bar Livestock</td>
</tr>
<tr>
<td>6-inch water line</td>
<td>NAIHS</td>
</tr>
<tr>
<td>6-inch water line</td>
<td>Navajo Tribe</td>
</tr>
<tr>
<td>3-inch water line</td>
<td>Private</td>
</tr>
<tr>
<td>1½-inch water line</td>
<td>Private</td>
</tr>
<tr>
<td>3-inch sleeve for water line</td>
<td>Unknown</td>
</tr>
<tr>
<td>Overhead telephone</td>
<td>Mountain Bell</td>
</tr>
<tr>
<td>Oversea telephone</td>
<td>Qwest</td>
</tr>
<tr>
<td>Sewer line</td>
<td>NAIHS</td>
</tr>
<tr>
<td>16-inch Sewer line</td>
<td>Navajo Nation</td>
</tr>
<tr>
<td>8-inch sewer line</td>
<td>Private</td>
</tr>
<tr>
<td>4-inch sewer line</td>
<td>Private</td>
</tr>
<tr>
<td>Utility sleeve (6-inch)</td>
<td>Unknown</td>
</tr>
<tr>
<td>20-inch natural gas pipe line</td>
<td>Questar</td>
</tr>
<tr>
<td>18-inch coal slurry line</td>
<td>Black Mesa Pipeline</td>
</tr>
</tbody>
</table>

*Source: ADOT 2002a*

It is anticipated that utility relocations and adjustments will include the following removals and/or relocations:

- Relocation of Qwest line from MP 445.4 to 447.0 and MP 451.8 to 453.2
- Relocation of power pole on the west side of US 89 at MP 450.8
- Relocation of APS power poles on the east side of US 89 at MP 469.8 and MP 469.9
- Extensions of the various conduits and sleeves crossing beneath the US 89 roadway

During final design, the appropriate utility to notify customers who will be affected by utility work will be determined. ADOT’s Utility and Railroad Engineering section or its designated consultant will investigate utility involvement during the design phase.
There will not be any long-term impacts to existing utilities from the Selected Alternative because the effected utilities will be relocated prior to construction and service to customers will be continued. The No Action Alternative would have no impact on utilities.

J. Visual Resources

South of the Little Colorado River, US 89 traverses a broad shortgrass prairie where the landscape is punctuated by geologic outcrops of red sandstone and white limestone and cut by small, treeless washes. The San Francisco Peaks and O’Leary Peak, visible on the southern horizon, provide landmarks for southbound motorists. The existing two-lane roadway does not detract from the relatively undisturbed natural setting because of the vastness of the grassland, relatively flat terrain, and the unobstructed vistas. Notable built features in the southern portion of the corridor include overhead transmission lines and towers and the small communities of Antelope Hills, Gray Mountain, and Cameron. The buildings and streetscapes in the communities are loosely organized and the types of businesses are typical of rural highway-frontage development. For the most part, these built features consist of one-story buildings constructed with a variety of materials and in varying colors and architectural styles. The Little Colorado River, the Cameron Trading Post and Motel, and Cameron Suspension Bridge are three of the most distinct features in the corridor. The steep red sandstone cliffs of the river, presence of mature vegetation along the river valley and at the trading post, stone masonry construction of the buildings, and the classic form of the suspension bridge collectively make this location along US 89 a memorable landscape within the corridor.

After crossing the Little Colorado River and continuing to the northern limit of the project area, the roadway passes through the Painted Desert, the multihued badlands of the Chinle formation. The Chinle formation is a very soft layer of earth consisting mainly of mud, sandstone, and volcanic ash. The softness allows for erosion effects as well as colorful staining by mineralized water flows and mineral deposits that have occurred over time. The intensity of the colors and hues changes with the seasons, moisture content, and the angle of the sun. The rolling terrain is marked by the smooth-textured landforms of the Chinle formation that enclose the motorist’s views and create a distinctly different pattern in the landscape compared with the expansive vistas of the shortgrass prairie found in the southern portion of the corridor. Notable built features in this portion of the corridor are limited to a few scattered bridge segments from the historic US 89, overhead transmission lines and towers, and roadside stands. Cut slopes created by US 89 interrupt the natural forms of the Chinle formation and detract from the cohesiveness of the landscape.

Depending on the topography and location in the corridor, the Selected Alternative will create a subtle to substantial change in the existing visual character. The roadway will become a more notable feature because of the increased footprint of the highway. Modifications to the landscape in terms of new cut slopes and removal of mature vegetation will be visible from both travel directions. The landform modifications will be more substantial in the northern portion of the project area where the terrain has a
more rolling character and landforms are more prominent. Exposed soil and the loss of vegetation primarily associated with the drainages in the northern portion of the corridor will reduce the level of naturalness of the area immediately adjacent to the roadway. All disturbed areas not paved will be revegetated, and over time the vegetation will return to existing conditions. Small remnant landforms left within the right-of-way/easement after construction could create uncharacteristic landforms that will not blend with the gently rolling terrain. These remnant landforms will be removed and the land graded to blend with adjacent terrain.

In Gray Mountain and Cameron, the construction of the four-lane undivided roadway section with a raised median and curb and gutter will create a subtle change in the character of the communities. Bridge structures (including but not limited to piers and abutments, bridge girders, the exposed outward-facing exterior surfaces of the bridge barriers, and metal handrails on the bridges) will be colored with an approved coloring agent and/or patterned or textured to blend with the natural surroundings. A third bridge over the Little Colorado River will notably change the existing visual character of the setting by increasing the dominance of built features in the natural landscape. The traffic interchanges at US 160 and the roundabout at the SR 64 intersection will create a substantial change in the visual character of the setting at both locations. At US 160, the overpass structure will be approximately 26 feet in height. The scale, dominance, and height of the US 160 overpass structure will contrast with the surrounding features and dominate the existing setting. The SR 64 roundabout will introduce an element that is not currently found in the rural landscape, but will provide the community of Cameron with the opportunity to make a gateway statement.

The change from a two-lane to a four-lane divided roadway will create a notable to substantial change in the existing visual character of the roadway because of the physical modifications to the landscape, increase in the footprint of the roadway, presence of the elevated structure at the traffic interchange, and the removal of mature vegetation.

NPS does not have a formal visual resource management system. The agency does, however, address visual resources in its policy on natural resource preservation, which states that NPS manages its jurisdictional area for retention (or no noticeable change that would detract from the natural setting) of scenic resources. This policy applies to all national parks, monuments, and recreation areas.

Six key viewpoints were selected by NPS within the Monument to evaluate the potential impact that the Selected Alternative will have on visitor experience and existing visual resources. These key viewpoints included the Citadel Pueblo, Nalakihu Pueblo, Box Canyon dwellings, Lomaki Pueblo, a future interpretive trail near the north boundary of the Monument, and the north Monument entrance at US 89. Neither the existing roadway nor vehicles traveling the roadway were visible from the Box Canyon dwellings, Nalakihu Pueblo, or Lomaki Pueblo. The divided roadway will also not be visible from these sites. From the estimated location of the future north boundary interpretive trail and from the Citadel Pueblo, intermittent views of vehicles traveling US 89 were visible in the distance (both sites are over
3 miles away from US 89), but the roadway surface was not. This will not change with the construction of the Selected Alternative. US 89 at the north entrance to the Monument currently consists of a five-lane roadway section, approximately 80 feet in width from outside roadway shoulder to outside roadway shoulder. The same shoulder-to-shoulder width of the roadway section at the Monument’s north entrance will be approximately 98 feet. Because the widths of the existing and roadway sections are relatively similar, the adjacent landform at the entrance will not be disturbed. In addition, the improvements will not detract from the natural setting because of the open, expansive character of the landscape. Therefore, the improvements through the Wupatki National Monument will meet the NPS’s objectives for retention.

Coconino County Comprehensive Plan’s objective to maintain the scenic integrity of the corridor because of the high volume of tourists using the roadway will also be met with the implementation of the following measures. Cut slopes will be designed to match the natural slope and topography. Bridge structures (including but not limited to piers and abutments, bridge girders, the exposed outward-facing exterior surfaces of the bridge barriers and metal handrails on the bridges) will be colored with an approved coloring agent and/or patterned or textured to blend with the natural surroundings. The colors and patterns or textures to be used on concrete surfaces will be coordinated with the ADOT, Navajo Nation, Coconino County, and NPS during final design. Any riprap used in the project will blend with the surrounding rock and exposed soil color and will be approved prior to construction by ADOT, Navajo Nation, Coconino County, and NPS, depending on the location of the riprap. Rock outcrops within the project limits will be left in place if stable and if they will not create a hazard to the traveling public, interfere with construction, or look out of place in the natural landscape. The clearing limits will be irregular and staked by the contractor for approval by ADOT prior to the start of clearing. Straight clearing lines will be avoided where possible by varying the width of the area to be cleared or by leaving selected clumps of vegetation near the edge of the clearing limit.

During construction, the contractor shall give special attention to the effect of its operations on the landscape and shall take special care to maintain natural surroundings undamaged in accordance with Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction, Section 104.09 (2000 Edition). All construction vehicles shall be restricted to construction zones to reduce trampling of vegetation and compaction of soils.

There would be no short-term or long-term impacts to the visual resources with the No Action Alternative.

K. Water Resources Considerations

1. Surface Water

The project is located within the Moenkopi Wash and the lower Little Colorado River watersheds. Within the project area, US 89 crosses numerous small drainages, several large washes (Fivemile Wash at
MP 471.4 and Moenkopi Wash at MP 477.2), and the Little Colorado River at MP 467.0. The overall drainage patterns in the project vicinity can be separated into three major sections. The first section is from the south end of the project to the Little Colorado River. The drainage in this area generally flows from the southwest to northeast, with most drainage crossings flowing from west to east. The second section is from the Little Colorado River to Moenkopi Wash. In this section, the terrain adjacent to US 89 generally slopes from the northeast to the southwest, with most culverts draining from east to west. The third section extends from Moenkopi Wash to the north end of the project. In this area the drainage pattern is from northwest to southeast, with most drainage crossings flowing from west to east.

There are no springs, lakes, ponds, or other impoundments within the existing or new right-of-way/easement. Most discharge occurs during the spring snowmelt and occasional intense thunderstorm. The rainfall and snowmelt patterns in the project area result in streamflows that fluctuate seasonally and annually.

The improvements will not block or impound drainages within or adjacent to the project area. Required culvert upgrades will be determined during the final design phase of the project. Culvert upgrades for capacity constraints are warranted if an existing structure does not have sufficient capacity to convey a 25-year storm. New culverts constructed along the project will be designed to convey the 50-year design storm without causing adverse ponding on adjacent properties.

Traffic from the Selected Alternative will not have a long-term effect on water quality. The number of vehicles traveling the highway determines the amount of hydrocarbons and heavy metals deposited on the roadway surface and in adjacent areas. These pollutants are transported by runoff and may affect downstream water quality. The level of pollutants will increase with more traffic; however, the traffic is projected to increase regardless of whether the Selected Alternative is constructed. The impact of the Selected Alternative on the quality of stormwater runoff is anticipated to be negligible.

The Selected Alternative will not substantially impact surface water resources because measures will be implemented during construction to control and prevent the release of water pollutants, and drainages within or adjacent to the project area will not be blocked or impounded.

During construction of the improvements, care will be taken to ensure that construction materials are not introduced into the washes, in accordance with Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction Section 104.09 (2000 Edition). Excess concrete, curing agents, form work, loose embankment materials, and fuel will not be disposed of within the project boundaries. In the event of accidental chemical spills during construction, the site will be treated to prevent chemical introduction into the surface water drainages.

The No Action Alternative would not have impacts on surface water resources.
2. **Groundwater**

The occurrence and quality of groundwater are controlled by the hydrogeologic conditions in the three distinct water provinces: Basin and Range Lowlands, Central Highlands, and Plateau Uplands. The project area is located in the Plateau Uplands Province. Groundwater in the Plateau Uplands in the northern part of the state derives from consolidated sedimentary rocks. Because of the relatively sparse population, only 3 percent of the total groundwater withdrawn in Arizona is from aquifers in this province.

Only three springs are known to exist in Wupatki National Monument: Heiser Spring, Wupatki Spring, and Cottonwood Spring. Only two are still active, Heiser and Cottonwood. Cottonwood Spring has become a major source of water for wildlife in the area. Wupatki Spring stopped flowing in the 1950s, possibly the result of not only increases or decreases in the groundwater supply, but also of minor earth tremors associated with volcanic activity. In addition to these three springs, there is Coyote Spring, south of Wupatki National Monument, and two small seeps.

The Selected Alternative will have no effect on the groundwater in the area because the project ground disturbance will be limited to a relatively shallow depth (less than 6 feet, except for the new bridge piers planned).

The No Action Alternative would not have impacts on groundwater resources.

**L. Floodplain Considerations**

The project is in an area that has not been delineated on the Federal Emergency Management Agency Flood Insurance Rate Map for the 100-year floodplain. New bridges and roadway encroachments into the washes will be designed to meet ADOT criteria for a 100-year storm or the protection of the highway from flooding. The drainage structures and roadway improvements will also meet the FHWA guidelines for a 50-year storm for protection of adjacent private properties, as required by Title 23 CFR § 650A.

Impacts on floodplains typically occur when the topography within a floodplain is substantially modified either by placement or removal of materials within the floodplains. No impacts on floodplains from the Selected Alternative are anticipated because the existing topography within the project area will not be substantially modified (ADOT 2001c).

The No Action Alternative would not have impacts to the 100-year floodplain.

**M. Section 404 of the Clean Water Act and National Pollutant Discharge Elimination System**

The US Army Corps of Engineers (COE) has jurisdiction over waters of the United States, including navigable waters and their tributaries, wetland and lakes, intermittent streams, prairie potholes (a type of
wetland), and other waters not part of a tributary system to interstate waters or to navigable waters of the United States. In general, for Arizona, such jurisdiction is for any stream, lake, or wash that carries stormwater. This jurisdiction includes those drainages that do not have perennial flowing water.

In 2001, COE field-delineated the jurisdictional waters for the project limits. COE determined that the delineation will remain valid and in effect until October 2006, unless an unusual flood occurs. Coordination with COE indicates that the improvements will fall within the scope of various nationwide permits of Section 404 of the Clean Water Act, with the exception of Moenkopi Wash, which may require a Section 404 Individual Permit. If an Individual 401 Water Quality Certification will be required for potential impacts to Moenkopi Wash, the certification must come from the US EPA and as well, Tribal 401 Conditions will have to be met. The reconstruction and/or placing of box culverts within the washes will require a Nationwide Permit Number 14, “Linear Transportation Crossing” (refer to Appendix F). Some crossings of jurisdictional waters will require a preconstruction notification to authorize activities in those watercourses. All required Section 404 permits and Section 401 Water Quality Certifications will be obtained by ADOT during final design. ADOT EPG will process any Section 404 permit through COE. The ADOT District will ensure that the contractor shall comply with the terms and conditions of the COE’s Nationwide Section 404 Permit, the Section 404 General Conditions, and the Section 401 Water Quality Certification for work affecting any of the washes in the project area that are under the jurisdiction of COE. On tribal lands the Section 401 Certification will need to go to the US EPA for approval and to the Arizona Department of Environmental Quality (ADEQ) on nontribal lands.

The Ninth Circuit Court of Appeals issued an opinion on August 22, 2005, (Defenders of Wildlife v. Environmental Protection Agency, No. 03-71439, slip op. 10983) concerning the EPA’s delegation of Clean Water Act permitting authority to the State of Arizona. Therefore, until a court ruling is issued ADEQ has permitting authority on non-Tribal lands; however, this authority may be removed at a later date. Further, the EPA is not reviewing permit applications that are currently the jurisdiction of the ADEQ.

Under Section 402(p) of the Clean Water Act, a National Pollutant Discharge Elimination System (NPDES) permit is required for all construction activities when 1 or more acres of land are expected to undergo excavation and/or grading during construction. Because the Selected Alternative will disturb more than 1 acre of land, a NPDES General Permit will be required. The Flagstaff District, in addition to the contractor, will submit the Notice of Intent and the Notice of Termination. A Stormwater Pollution Prevention Plan (SWPPP) will be developed as part of the NPDES General Permit. This permit will incorporate temporary erosion control measures to be used during construction and permanent erosion control measures to be used when the project is completed, as well as good housekeeping practices for the control and prevention of water pollutant releases. The main objectives of the permitting program are to reduce erosion, minimize sedimentation, and eliminate the discharge of stormwater pollutants. The ADOT Roadside Development Section will determine who will prepare the SWPPP.
Erosion control will be an important component of the improvements because of the need to protect downstream watercourses. The SWPPP will establish the anticipated techniques for controlling erosion and sediment discharge from any construction area. Possible temporary erosion control techniques may include hay bales, sand bags, earth berms, silt fences, geotextile fabrics, and bioengineering (enhanced vegetation) techniques. Examples of permanent erosion control measures that might be used are the riprap of cut and fill transition areas and headwall and pipe inlet/outlet rock mulch treatment.

The ADOT District will monitor all mitigation measures encompassing sedimentation and erosion control to verify that these measures are being followed correctly and are providing the appropriate protection to sensitive areas.

The effect of sedimentation will be greatest during the construction and revegetation period. Potential sources of erodible material resulting from the highway construction process include loose fill material in adjacent drainage features, disturbed earth from roadway obliteration, and backfilled soil around roadway and drainage structures. Because the surface soils are generally fine-grained, some sediment transport is expected after construction. “Temporary” erosion control measures will be left in place until the ADOT Engineer determines that the site is stabilized as identified in the SWPPP.

The number of vehicles traveling the highway determines the amount of hydrocarbons and heavy metals deposited on the roadway surface and on adjacent areas. These pollutants are transported by runoff and affect the water quality of the immediate downstream portions of drainages. Because pollutants will increase with more traffic, and traffic is projected to increase regardless of whether the project is constructed, the impact of the Selected Alternative on the quality of stormwater runoff is considered to be negligible.

During construction of the project, care shall be taken to ensure that construction materials are not introduced into the washes, in accordance with Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction Section 104.09 (2000 Edition). Excess concrete, curing agents, form work, waste materials, lubricants, and fuel will not be disposed of within the project boundaries. In the event of accidental chemical spills during construction, the site will be cleaned up to prevent chemical introduction into the surface or groundwater systems. ADOT’s Engineer will coordinate incidents involving hazardous materials. These measures will help protect both surface and groundwater systems.

In summary, the Selected Alternative will have no substantial impacts on the water resources within the project limits because of the NPDES permit as well as the Section 404 permits and Section 401 water quality certification conditions that will be required for any disturbances to waters of the United States.

The No Action Alternative would not have impacts on waters of the United States.
N. Land Resources

1. Topography

From approximately MP 442.0 to MP 457.5, the terrain is generally level, with grades ranging from 0.1 percent to 4.1 percent. From approximately MP 457.5 to the Little Colorado River, the terrain is rolling, with grades in the range of flat to 5.7 percent. From MP 467.5 to MP 484.0, the terrain is again level, with grades of 0.2 percent to 2.8 percent. Elevation in the project area ranges from 5,700 feet above mean sea level (msl) at the southern end to 4,200 feet above msl at the Little Colorado River to 4,600 feet above msl at the northern end.

2. Soils

There is no published US Department of Agriculture Natural Resource Conservation Service soil survey for Navajo Nation lands. Much of the bedrock along the project corridor is covered with a thin layer of soil. The soils range in depth from less than 1 foot to greater than 10 feet. Soil types and characteristics encountered along the roadway corridor vary. Soils within the project area are typically representative of the parent deposits, which include limestone, siltstone, sandstone, mudstone, gypsum, claystone, and bentonite (decomposed volcanic ash) as well as mixtures of clay, silt, and fine-grained sand with gravel (Hendricks 1985).

Soil erosion is a major concern north of the Little Colorado River. The sparse vegetation, erosive soils, and the potential for flash flooding can change the surface terrain in a short period of time. Potential sources of erodible material created during construction include loose fill material in adjacent drainage features and backfilled soil around roadway and drainage structures. The effect of sedimentation will be greatest during the construction and revegetation period. Sedimentation will be controlled by leaving the "temporary" erosion control measures in place and will decrease as vegetation is reestablished. An NPDES permit will be required for the Selected Alternative. Therefore, there will not be a substantial impact on soils as a result of the implementation of the Selected Alternative. The No Action Alternative would not have impacts to soils.

3. Geological Setting and Mineral Resources

The project area is located within the Colorado Plateau Physiographic Province. Volcanic rocks of the San Francisco Volcanic Field overlie the sedimentary rocks in the southern portion of the project corridor. Paleozoic and Mesozoic sedimentary rock units exposed along the project corridor include (from oldest to youngest) Kaibab limestone, the Moenkopi Formation, and the Shinarump and Petrified Forest members of the Chinle Formation. The San Francisco Volcanic Field extends northward from the Flagstaff area; basalt lava flows cover the sedimentary rocks within the southern portion of the project corridor. Additionally, there is a basalt lava flow occurs along the south side of the Little Colorado River that stops several hundred feet west of US 89 south of Cameron.
There are quaternary terrace gravels occur along the Little Colorado River in the vicinity of Cameron. These deposits range from about 1 foot to 50 feet in depth and predominantly consist of well-rounded pebbles of quartzite, chert, jasper, and petrified wood in a matrix of medium- to coarse-grained sand. Deposits of unconsolidated alluvium occur along the larger drainages that cross the project corridor, especially the Little Colorado River and Moenkopi Wash. Bedrock along the project corridor is locally covered with a thin layer of soil, typically less than several feet thick, although the soil may locally reach a thickness in excess of 10 feet.

The Kaibab limestone is exposed from about MP 457.0 to MP 459.0, and the rock exposed in outcrops is unweathered to slightly weathered, moderately hard to hard, and yellowish gray to light brown. The Moenkopi Formation is exposed from about MP 450.0 to MP 457.0 and MP 459.0 to MP 461.0, which consists of alternating beds of reddish brown to brownish red mudstone, siltstone, silty sandstone, and fine-grained sandstone, and underlies the alluvial sediments of the Little Colorado River. The Shinarump member of the Chinle Formation is exposed from about MP 461.0 to MP 470.0 and forms the canyon walls along the Little Colorado River.

The Petrified Forest member of the Chinle Formation is visible from about MP 464.0 to the northern limit of the project at MP 484.0. This type of formation consists of siltstone, mudstone, and sandstone beds that erode into badlands and have colors typical of the Painted Desert. The small hills and buttes along the project corridor typically are capped by beds of sandstone.

Alluvial stream deposits are present in the active washes, most notably in the Little Colorado River and Moenkopi Wash. These local deposits generally consist of well-graded sand with variable amounts of gravel. There are local deposits of colluvium present on the slopes of the mesas and buttes. These deposits generally consist of gravel-, cobble- and boulder-sized rock fragments that have been deposited as a result of rock falls and mass wasting.

Road cuts associated with the Selected Alternative will disturb some of the Chinle geologic formations, primarily in the area north of the Little Colorado River. The landscape modifications will be limited to the existing roadway corridor and have relatively minimal impact on the project area’s geologic formations. There are no known commercially extractable mineral resources within the project limits. Therefore, there will be no impact on mineral resources within the project limits from the Selected Alternative. There would also be no impact on mineral resources within the project limits from the No Action Alternative.

4. Agriculture and Grazing
Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, and other agricultural crops. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. Designation of prime or unique farmland is made by the US Department of Agriculture. There are no prime or unique
farmlands in the project area. There are no lands adjacent to the project area that are currently being cultivated for crops. Grazing of sheep, cattle, and horses is a common land use. Some of the drainage culverts within the project limits were originally constructed as livestock passes. Other drainages may currently be in use as livestock passes. Table 10 (Page 62) is a list of culverts known to be used as livestock passes. These structures will need to be extended with minimal horizontal or vertical breaks or changes in the culvert alignment to accommodate livestock movement. The entrance and exit design of the approach grades to these livestock passes will accommodate livestock and wildlife.

### Table 10. Existing livestock/wildlife crossings

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Culvert size</th>
<th>Culvert length</th>
<th>Culvert type</th>
</tr>
</thead>
<tbody>
<tr>
<td>445.3</td>
<td>10 high x 7 wide</td>
<td>84</td>
<td>RCBC(^a)</td>
</tr>
<tr>
<td>449.6</td>
<td>2—10 high x 7 wide</td>
<td>84</td>
<td>RCBC</td>
</tr>
<tr>
<td>451.3</td>
<td>2—10 high x 7 wide</td>
<td>84</td>
<td>RCBC</td>
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<tr>
<td>454.5</td>
<td>6 high x 7 wide</td>
<td>96</td>
<td>RCBC</td>
</tr>
<tr>
<td>456.3</td>
<td>6 high x 7 wide</td>
<td>85</td>
<td>RCBC</td>
</tr>
<tr>
<td>457.4</td>
<td>6 high x 6 wide</td>
<td>85</td>
<td>RCBC</td>
</tr>
<tr>
<td>459.4</td>
<td>10 diameter</td>
<td>170</td>
<td>CMP(^b)</td>
</tr>
<tr>
<td>460.4</td>
<td>10 diameter</td>
<td>142</td>
<td>CMP</td>
</tr>
<tr>
<td>462.2</td>
<td>10 high x 8 wide</td>
<td>121</td>
<td>RCBC</td>
</tr>
<tr>
<td>463.0</td>
<td>10 diameter</td>
<td>88</td>
<td>CMP</td>
</tr>
<tr>
<td>464.2</td>
<td>10 high x 8 wide</td>
<td>97</td>
<td>RCBC</td>
</tr>
<tr>
<td>464.8</td>
<td>10 high x 8 wide</td>
<td>86</td>
<td>RCBC</td>
</tr>
</tbody>
</table>

\(^a\) RCBC – reinforced concrete box culvert  
\(^b\) CMP – corrugated metal pipe

The contractor shall install game fencing immediately after removal of existing barbed wire fencing to keep livestock from entering the highway right-of-way/easement and to limit off-road vehicular access.

There is no farmland adjacent to the project area; therefore, there will be no impact on or involvement with any prime or unique farmland or other farmland of statewide or local importance from the Selected Alternative. There would be no impact on or involvement with any prime or unique farmland or other farmland of statewide or local importance from the No Action Alternative.

**O. Vegetation and Invasive Species**

The project area begins approximately 15 miles northeast of San Francisco Peaks in the Plains and Great Basin Grassland biotic community, transitioning near Gray Mountain into the Great Basin Desertsscrub biotic community, in which the rest of the project area lies (Brown 1994).
Dominant plant species in the southern portion of the project area include grama grasses (*Bouteloua* spp.), juniper (*Juniperus* spp.), rabbitbrush (*Chrysothamnus* spp.), Indian ricegrass (*Oryzopsis hymenoides*), winterfat (*Ceratoides lanata*), sagebrushes (*Artemesia* spp.), and saltbushes (*Atriplex* spp.). In the northern portion of the project area, shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), rabbitbrush, and blackbrush (*Coleogyne ramosissima*) become dominant. Less common plant species found in the project area include globemallow (*Sphaeralcea* spp.), ephedra (*Ephedra* spp.), and desert trumpet (*Eriogonum inflatum*). Sparse cacti are also present, including prickly pear (*Opuntia* spp.), and hedgehog (*Echinocereus* spp.). Dense stands of salt cedar (*Tamarix* spp.) occur on the banks of the Little Colorado River channel and on the banks of Moenkopi Wash.

Although the majority of the grasslands in the surrounding area have been degraded by heavy livestock grazing, the 35,422-acre Wupatki National Monument contains relatively pristine native grassland dominated by native perennial bunchgrasses. Historically, grasslands within the Monument were also heavily grazed. In the late 1980s, livestock grazing on the Monument was discontinued, except for a small flock of sheep on the east side of the Monument that is grazed under a “life estate” agreement between NPS and a private individual. Nonnative plant species such as Russian thistle, camelthorn, and brome grasses persist along roads, trail corridors, and other disturbed areas within the Monument. Park biologists are increasingly concerned that the grassland is also being altered by factors other than exotic species, such as junipers expanding into the Monument. The Wupatki grasslands are currently recovering from historical grazing impacts, and under continued NPS management, should continue to recover and to eventually provide reference conditions for historical grasslands in the project area. In addition, bunchgrasses within Wupatki National Monument provide an excellent source of seeds to surrounding habitats because of the lack of disturbance from recent grazing.

The project will disturb approximately 724 acres of currently unpaved surfaces within the project limits, of which approximately 184 acres will be permanently lost to new pavement or structures. Disturbance to roadside vegetation will be kept within the new right-of-way/easement and to the minimum necessary for construction of the project. All areas of disturbance will be reseeded with species native to the project vicinity. ADOT Roadside Development will develop the seed mixture for the areas disturbed. On Navajo Nation lands, ADOT will contact the Range Conservation Officer, Navajo Nation Department of Agriculture, for review of the appropriate seed mixture on tribal lands. ADOT will contact the NPS Flagstaff Area National Monument’s office for the appropriate seed mixture for use on areas disturbed on land managed by NPS.

Executive Order 13112 requires that federal agencies whose actions may affect the status of an invasive species “shall … subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of
native species and habitat conditions in ecosystems that have been invaded … .” Invasive species are plants not native to an area that cause, or are likely to cause, economic, environmental, or human harm.

In accordance with Executive Order 13112, the project area was surveyed by a qualified invasive species authority, and it was determined that three Arizona listed invasive species occur within the project boundaries: camelthorn (*Alhagi camelorum*), diffuse knapweed (*Centaurea diffusa*), and field bindweed (*Convolvulus arvensis*). Additionally, ADOT determined through an invasive species survey that this project has a moderate risk of introducing or spreading invasive species. The NPS believes that there are other non-native plants in the project area that could potentially be spread including Russian thistle, cheat grass, kochia, halogeton, and others.

Invasive species will be treated prior to construction according to ADOT’s Natural Resources Management Section’s invasive species management plan. To prevent the introduction of invasive species seeds, all construction equipment will be washed prior to entering the construction site. To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation debris prior to leaving the construction site. Vehicles not involved with construction, such as inspection or supervisory-type vehicles and contractor personnel vehicles, shall be staged in an area where there are no invasive species present. The contractor shall contact ADOT’s Natural Resources Management Section and, within the Wupatki National Monument, the NPS, to inform them of the wash site and staging locations, so that these areas can be monitored and treated, as appropriate. All disturbed soils that will not be landscaped or otherwise permanently stabilized by construction will be seeded using native species to help prevent the future reestablishment of invasive species. Any fill, seed, or mulch material brought in from off-site will be free of invasive species, and construction equipment will be free of invasive species and toxic materials. ADOT will continue any necessary treatments following construction completion according to the Natural Resources Management Section's invasive species management plan. Therefore, there will be no substantial impact from vegetation removal or the potential to spread invasive species.

The No Action Alternative would not remove or disturb vegetation and therefore have no impacts on vegetation. The No Action Alternative would not contribute to the potential to spread invasive species.

P. Threatened/Endangered Species, Designated Critical Habitat, and Sensitive Species

The US Fish and Wildlife Service’s (USFWS) list of threatened, endangered, proposed, and candidate species for Coconino County was reviewed by a qualified biologist, and it was determined that listed species or suitable habitat could be affected by construction of this project. Therefore, a biological evaluation (BE) was completed and approved by ADOT. The BE was submitted to and approved by the Navajo Fish and Wildlife Department (NFWD) and informal consultation with USFWS was completed in 2003.
The following species, listed in Table 11 (Page 65), were analyzed in detail within the BE. No other listed species were analyzed in detail because either 1) no suitable habitat for these species is present, or 2) the listed species is not present or will not be affected by the Selected Alternative.

**Table 11.** Endangered Species Act and Navajo Endangered Species List

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Statusa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humpback chub</td>
<td><em>Gila cypha</em></td>
<td>ESA LE, NESL G2</td>
</tr>
<tr>
<td>Razorback sucker</td>
<td><em>Xyrauchen texanus</em></td>
<td>ESA LE, NESL G2</td>
</tr>
<tr>
<td>Bald eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>ESA LT</td>
</tr>
<tr>
<td>California condor</td>
<td><em>Gymnogyps californianus</em></td>
<td>ESA LE/XN</td>
</tr>
<tr>
<td>Southwestern willow flycatcher</td>
<td><em>Empidonax traillii extimus</em></td>
<td>ESA LE, NESL G2</td>
</tr>
<tr>
<td>Black-footed ferret</td>
<td><em>Mustela nigripes</em></td>
<td>ESA LE/XN, NESL G2</td>
</tr>
<tr>
<td>Fickeisen pincushion cactus</td>
<td><em>Pediocactus peeblesianus fickeiseniae</em></td>
<td>ESA C, NESL G3</td>
</tr>
<tr>
<td>Yellow-billed cuckoo</td>
<td><em>Coccyzus americanus</em></td>
<td>ESA C, NESL G3</td>
</tr>
<tr>
<td>Beath's milk-vetch</td>
<td><em>Astragalus beathii</em></td>
<td>NFWD WL</td>
</tr>
<tr>
<td>Peebles' bluestar</td>
<td><em>Amsonia peeblesii</em></td>
<td>NFWD WL</td>
</tr>
<tr>
<td>Round dunebroom</td>
<td><em>Errazurizia rotundata</em></td>
<td>NESL G4</td>
</tr>
<tr>
<td>Tuba City milk-vetch</td>
<td><em>Astragalus sophoroides</em></td>
<td>NESL G4</td>
</tr>
<tr>
<td>Northern leopard frog</td>
<td><em>Rana pipiens</em></td>
<td>NESL G2</td>
</tr>
<tr>
<td>Golden eagle</td>
<td><em>Aquila chrysaetos</em></td>
<td>NESL G3</td>
</tr>
<tr>
<td>Ferruginous hawk</td>
<td><em>Buteo regalis</em></td>
<td>NESL G3</td>
</tr>
<tr>
<td>American pronghorn</td>
<td><em>Antilocapra americana</em></td>
<td>NESL G3</td>
</tr>
</tbody>
</table>

* Status definitions: ESA=Endangered Species Act; LE=Listed Endangered, LT=Listed Threatened, XN=Nonessential Experimental population, and C=Candidate, NESL=Navajo Nation Endangered Species List; G2=Group 2 endangered (prospects of survival or recruitment are in jeopardy), G3=Group 3 endangered (prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future), G4=Group 4 (NFWD does not currently have sufficient information to support listing as endangered, but has reason to consider them). NFWD WL=Watch List (may be in need of concentrated conservation measures).

The Selected Alternative may not be constructed for more than 5 years. The time lapse between the 2003 informal consultation with USFWS and project construction will require additional consultation with USFWS and NFWD to ensure that potential project-related impacts to species which might become threatened, endangered, proposed or candidate species within the project area will be identified and mitigation measures will be implemented for potential project-related impacts. Therefore, beginning 1 year prior to final design, ADOT EPG will contact USFWS and NFWD to update the 2003 Biological Evaluation, initiate formal Section 7 consultation, modify the mitigation measures outlined in this EA, and address any potential impacts to species not covered in this document and their potential mitigation requirements.

1. **Threatened and Endangered Species**
   a. Humpback chub and razorback sucker

   Although the Little Colorado River in the general project area does at times have surface flow, such flow is neither sufficient in volume nor long enough in duration to support the humpback chub or the
razorback sucker. Therefore, suitable habitat for these species does not exist within the project limits. There is occupied critical habitat for the humpback chub and the razorback sucker in the Little Colorado River approximately 52 and 60 miles downstream of the US 89 bridge, respectively.

The Selected Alternative will have no direct effect on the humpback chub or the razorback sucker; however, indirect effects to suitable and critical habitat were evaluated in the BE and are discussed in detail in Section T. Secondary Impacts. Therefore, it was determined through the BE that the Selected Alternative may affect, but will not likely adversely affect, the humpback chub or the razorback sucker, or their habitat.

b. Bald eagle

Because bald eagles forage in a variety of habitats throughout the state during winter migration, suitable foraging habitat for the bald eagle exists throughout the project area. The cliffs surrounding the Little Colorado River could provide nesting habitat; however, water flow through this portion of the Little Colorado River is not sufficient to support a large enough prey base for nesting eagles, and no nesting has ever been documented on the portion of the Little Colorado River in the project area. Critical habitat has not been designated for this species.

The closest known breeding area is located near Clarkdale, approximately 60 miles southwest of the southern project limit. Since 1992, 22 wintering bald eagles have been documented south of the project limits, typically perched in ponderosa pine trees near US 89 in the Coconino National Forest. However, bald eagles are not known to use the US 89 corridor within the project limits. No eagles have been documented north of the US 89 entrance to Sunset Crater National Monument, which is located approximately 12 miles south of the southern project limit, which suggests that habitat within the project limits is not preferred.

The Selected Alternative will result in permanent loss of approximately 178 acres of suitable foraging habitat for the bald eagle. Although wintering bald eagles are known to use the ponderosa pine habitat south of the project area, bald eagles do not use the habitat adjacent to US 89 within the project limits. Furthermore, the amount of habitat that will be disturbed is not substantial relative to the total available foraging habitat in the area, will not result in a reduction in prey availability, and thus will not affect the foraging prospects of bald eagles. Therefore, it was determined through the BE that the Selected Alternative will not affect the bald eagle or its habitat.

ADOT EPG will contact AGFD at the beginning of final design and prior to construction bid to determine whether bald eagles are using the project area. If bald eagles are using the project area, ADOT EPG will reevaluate potential impacts to the bald eagle and contact USFWS to initiate Section 7 Consultation and determine mitigation requirements. Potential mitigation may include seasonal restrictions on construction activities.
c. California condor

Suitable foraging habitat for the California condor species exists within the project area. Condors forage over a variety of habitat types, and the project area is located within the boundaries of the nonessential experimental population\(^2\) area. The cliffs surrounding the Little Colorado River may provide roosting and nesting habitat; however, the only nesting activity of the nonessential experimental population has been in the Grand Canyon. It is unlikely that nesting will occur along the Little Colorado River in the project area because of the distance between the project area and the Grand Canyon. Furthermore, it is unlikely that condors will nest near the human activity associated with the community of Cameron, located immediately adjacent to the Little Colorado River.

The Selected Alternative will result in permanent loss of approximately 178 acres of suitable foraging habitat for the California condor. However, the amount of habitat that will be disturbed is not substantial relative to the total available foraging habitat in the area and thus will not affect the foraging prospects of California condors. There is no evidence that condors currently use the US 89 corridor in or near the project area. Therefore, it was determined through the BE that the Selected Alternative will not affect the California condor or its habitat.

ADOT EPG will contact the Peregrine Fund, the organization that currently monitors the reintroduced California condor population, at the beginning of final design and prior to construction bid to determine whether California condors are using the project area. If condors are using the project area, ADOT EPG will reevaluate potential impacts to the California condor and contact USFWS to determine mitigation requirements. Potential mitigation may include seasonal restrictions on construction activities.

d. Southwestern willow flycatcher

Southwestern willow flycatchers breed only in dense riparian vegetation near a permanent or semipermanent source of water. Marginally suitable habitat for this species exists within the project limits along Moenkopi Wash and the Little Colorado River. Neither of these watercourses supports perennial flow, although there is water and/or saturated soil at times. Surveys, in which only one migrant willow flycatcher was detected, were conducted along the Little Colorado River from 0.5 mile upstream to 0.5 mile downstream of US 89 during the 2003 breeding season. In Arizona, Southwestern willow flycatchers typically do not nest at project area elevations; therefore, habitat within the project area will likely be used only during migration.

The Selected Alternative will result in disturbance to marginally suitable habitat for the Southwestern willow flycatcher. At the Little Colorado River, as much as 3.6 acres of salt cedar could be disturbed.

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\(^2\) USFWS listed the California condor (Gymnops californianus) as endangered in March 1967. In 1996, USFWS established a nonessential experimental population of California condors in northern Arizona with subsequent releases in 1997, 1998, 1999, 2000, and 2002. The reintroduced condors are a “nonessential experimental” population as characterized under Section 10(j) of ESA. By declaring the population “nonessential experimental,” USFWS can treat this population as “threatened” and develop regulations for management of the population that are less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between the management of the condors and other activities.
Aside from the less than 0.1 acre that will be permanently lost to the southern pier of the new bridge, this disturbance will be only temporary in nature because salt cedar generally reestablishes quickly. At Moenkopi Wash, as much as 0.8 acre of salt cedar could be temporarily lost during construction, of which 0.01 acre will be permanently lost to the new bridge structure. In addition, noise and human activity associated with construction of the bridges could disrupt the normal behavior of Southwestern willow flycatchers, if present.

The direct effects associated with the removal of this amount of marginally suitable habitat will be negligible, and it is unlikely this habitat will be used for nesting. Therefore, it was determined through the BE that the Selected Alternative may affect but will not likely adversely affect the Southwestern willow flycatcher or its habitat.

ADOT EPG will conduct a minimum of 2 consecutive years of surveys for the Southwestern willow flycatcher along the Little Colorado River and Moenkopi Wash prior to construction. ADOT EPG will contact USFWS to determine the limits of Southwestern willow flycatcher surveys. Baseline Southwestern willow flycatcher surveys were conducted during the 2003 breeding season, and only one migrant willow flycatcher was found. If breeding Southwestern willow flycatchers are detected, ADOT EPG will contact USFWS to initiate Section 7 consultation and determine mitigation requirements. Potential mitigation may include habitat replacement and/or seasonal restrictions on construction activities at the Little Colorado River and/or Moenkopi Wash. Disturbance to riparian vegetation at Moenkopi Wash and the Little Colorado River will be avoided to the maximum extent practicable.

e. Black-footed ferret

The southern portion of the project area contains Gunnison’s prairie dog towns on arid grassland plains in the known historical distribution and elevation range of black-footed ferret. Critical habitat has not been designated for this species; reintroduced black-footed ferrets are a nonessential experimental population as characterized under Section 10(j) of ESA.

The project area was surveyed for prairie dog towns in accordance with the Black-footed Ferret Survey Guidelines for Compliance with ESA. A prairie dog complex approximately 1,566 acres in size was delineated within 0.5 mile of the project limits; average burrow density for this complex was 26 burrows per acre. This prairie dog complex meets USFWS’s definition of suitable habitat for the black-footed ferret.

The Selected Alternative will result in disturbance to approximately 63 acres of suitable habitat for the black-footed ferret, of which approximately 14 acres will be permanently lost. In addition, if black-footed ferrets were present in prairie dog burrows that will be impacted during construction, those individuals could be displaced. When compared to the total suitable habitat within 0.5 mile of the project area, the amount of suitable habitat that will be disturbed (less than 0.06 percent) is considered negligible. Aside from the nonessential experimental population near Seligman, the black-footed ferret is considered
extirpated from Arizona. The chance that this species is present within the project area is discountable. No surveys, however, have been conducted in the project area. Indirect effects to suitable habitat were evaluated in the BE and are discussed in detail in the Secondary Impacts section, below. Therefore, it was determined through the BE that the Selected Alternative may affect but will not likely adversely affect the black-footed ferret or its habitat.

ADOT EPG will coordinate with USFWS during final design to determine the need for black-footed ferret surveys on prairie dog towns located within 0.5 mile of the construction limits. If surveys are conducted and black-footed ferrets are detected, ADOT EPG will contact USFWS to initiate Section 7 consultation and determine mitigation requirements. Potential mitigation may include habitat replacement, seasonal restrictions on construction activities, and/or relocation of any black-footed ferrets found.

f. Fickeisen pincushion cactus
Suitable habitat for the Fickeisen pincushion cactus exists within the project limits near Gray Mountain, from MP 457.3 to MP 459.7. The Fickeisen pincushion cactus is a candidate for listing, and critical habitat has not been designated for this species.

Since 1986, five populations outside Navajo Nation lands have been monitored. On Navajo Nation lands, 14 populations are known to exist from west of Gray Mountain to west of Cameron along the rim of the Little Colorado River and north from near Shinumo Altar to the Tiger Wash area.

The Selected Alternative will result in disturbance to approximately 36 acres of suitable Fickeisen pincushion cactus habitat, of which approximately 9 acres will be permanently lost. In addition, the project will involve operating heavy equipment off-road, which could result in injury or death to individual cacti if present within the project limits. However, the amount of habitat that will be disturbed is considered minimal. Indirect effects to suitable habitat were evaluated in the BE and are discussed in detail in the Secondary Impacts section, below. Therefore, it was determined through the BE that the Selected Alternative may impact individual Fickeisen pincushion cacti, but is not likely to jeopardize its continued existence.

ADOT EPG will conduct Fickeisen pincushion cactus surveys in suitable habitat from approximately MP 443.0 to MP 445.4 (Wupatki National Monument) and MP 457.3 to MP 459.7 during final design. If Fickeisen pincushion cacti are found during surveys, ADOT EPG will reevaluate potential impacts to the Fickeisen pincushion cactus and coordinate with NFWD to determine the need for mitigation.

g. Yellow-billed cuckoo
In Arizona, yellow-billed cuckoos breed in large blocks of riparian habitat at elevations less than 6,500 feet above msl, particularly in cottonwood-willow and salt cedar forests with dense understory foliage. Riparian habitat lower than 6,500 feet above msl exists within the project limits, but this habitat
consists of even-height, salt cedar stands without a cottonwood or willow overstory. Riparian habitat within the project limits is considered marginally suitable, and cuckoo occupancy of this habitat is unlikely. The yellow-billed cuckoo is a candidate for listing. Critical habitat has not been designated for this species, and no surveys have been conducted in the project area.

At the Little Colorado River, as much as 3.6 acres of salt cedar will be temporarily disturbed and less than 0.1 acre will be permanently lost to the southern pier of the new bridge. At Moenkopi Wash, approximately 0.8 acre of salt cedar will be temporarily disturbed, of which less than 0.1 acre will be permanently lost. In addition, noise and human activity associated with construction of the bridges could disrupt the normal behavior of yellow-billed cuckoos, if present.

The Selected Alternative will result in disturbance to a minimal amount of marginally suitable habitat for the yellow-billed cuckoo, and it is unlikely this habitat will be used for nesting. Therefore, it was determined through the BE that the Selected Alternative may impact the yellow-billed cuckoo, but will not likely jeopardize its continued existence.

ADOT EPG will contact NFWD during final design to determine the need for yellow-billed cuckoo surveys along the Little Colorado River and Moenkopi Wash.

2. Designated Critical Habitat
Critical habitat has not been designated in Arizona for the bald eagle, California condor, black-footed ferret, Fickeisen pincushion cactus, or yellow-billed cuckoo. Critical habitat has been proposed for the Southwestern willow flycatcher, but does not occur within or near the project area. Occupied critical habitat for the humpback chub and razorback sucker occurs in the Colorado River approximately 52 and 60 stream miles downstream of the project area, respectively. Because project activities could increase the amount of sediment in runoff that is transported into occupied critical habitat downstream through ephemeral washes flowing through the project area, the Selected Alternative may result in negligible effects to designated critical habitat for these two fish species.

3. Sensitive Species
At the beginning of final design, ADOT EPG will submit a new species data request for the project to NFWD. Potential impacts to new species not covered in this document will be evaluated prior to construction bid advertisement.
a. Beath’s milk vetch

According to NFWD, Beath’s milk-vetch is known to occur only between Gray Mountain and The Gap near US 89, and its occurrence has been documented in the project area. A survey for this species was conducted in April 2002. Although only two plants were found in the project area, populations of Beath’s milk vetch fluctuate depending on precipitation during winter months, and the April 2002 survey was conducted after a winter with little precipitation.

The Selected Alternative will result in disturbance to approximately 224 acres of suitable Beath’s milk vetch habitat on Navajo Nation lands, of which approximately 110 acres will be permanently lost. The improvements will involve operating heavy equipment away from the current highway alignment, which could result in injury or death to individual plants present within the project limits. Because this species is commonly associated with roadsides, the project will create additional habitat in the long term; however, during construction the project will result in disturbance to suitable Beath’s milk vetch habitat and could result in the loss of individual plants. Indirect impacts to suitable habitat were evaluated in the BE and are discussed in detail in the Secondary Impacts section, below. Because both of the plants found are located within the project limits and because of the limited range of this plant, it was determined through the BE that the Selected Alternative may impact Beath’s milk-vetch on Navajo Nation lands.

At the beginning of final design ADOT EPG will coordinate with NFWD and the design engineer to determine whether known populations of Beath’s milk-vetch will be impacted by construction activities, and to determine the need for additional Beath’s milk-vetch surveys. If Beath’s milk-vetch populations will be impacted, ADOT EPG will contact NFWD to determine the need for mitigation, such as transplanting plants and/or seed germination.

b. Peeble’s bluestar

Currently, there are 23 known populations of Peeble’s bluestar, 13 of which are on Navajo Nation lands. Suitable habitat for Peeble’s bluestar exists within the project limits from Gray Mountain near MP 458.0 to the northern project limit. NFWD has documented occurrences of Peeble’s bluestar along US 89 in the project area, and a survey was conducted for this species from May to June 2002. A total of 12 Peeble’s bluestar plants were found within the project area.

The Selected Alternative will result in disturbance to approximately 224 acres of suitable Peeble’s bluestar habitat on Navajo Nation lands, of which approximately 110 acres will be permanently lost. In addition, the project will involve operating heavy equipment away from the current highway alignment, which could result in injury or death to individual plants present within the project limits. Because this species is commonly associated with roadsides, the project will create additional habitat in the long term. During construction, the improvements will result in disturbance to suitable Peeble’s bluestar habitat and could result in the loss of individual plants. Of the 12 plants found during a survey of the project area, 8 are located within the project limits. Therefore, it was determined through the BE that the construction
of the Selected Alternative may impact individual Peeble’s bluestar, but will not likely jeopardize its continued existence on Navajo Nation lands.

At the beginning of final design, ADOT EPG will coordinate with NFWD and the design engineer to determine whether known populations of Peeble’s bluestar will be impacted by construction activities, and to determine the need for additional Peeble’s bluestar surveys. If Peeble’s bluestar populations will be impacted, ADOT EPG will contact NFWD to determine the need for mitigation, such as transplanting plants and/or seed germination.

c. Round dunebroom

On Navajo Nation lands, this species is found in sandy pockets between outcroppings of Moenave Sandstone in the Great Basin Desertscrub Biotic Community from 4,800 feet to 5,200 feet above msl. Suitable habitat for round dunebroom does not exist within the project limits. The nearest suitable habitat is located approximately 2 miles north of the project area near Moenave. Because the project limits contain no known suitable habitat or known populations, it was determined through the BE that the Selected Alternative will not impact round dunebroom or its habitat.

d. Tuba City milk vetch

This species is known to occur only in Coconino County between Cameron and the Gap. Currently, there are 13 known populations of Tuba City milk vetch located between Cameron and Tuba City. Suitable habitat for Tuba City milk vetch exists within the project limits from Cameron near MP 467.0 to the northern project limit. NFWD has documented occurrences of Tuba City milk vetch along US 89 in the project area. A survey for this species was conducted from May to June 2002, and a total of 203 plants were found.

The Selected Alternative will result in disturbance to approximately 147 acres of suitable Tuba City milk-vetch habitat on Navajo Nation lands, of which approximately 36 acres will be permanently lost. In addition, the improvements will involve operating heavy equipment off-road, which could result in injury or death to individual plants present within the project limits. Because this species is commonly associated with roadsides, the project will create additional habitat in the long term. During construction, the project will result in disturbance to suitable Tuba City milk vetch habitat and could result in injury or death to individual plants. Of the 203 plants found during a survey of the project area, 197 were located within the project limits. Indirect effects to suitable habitat were evaluated in the BE and are discussed in detail in the Secondary Impacts section, below. Therefore, it was determined through the BE that the Selected Alternative may impact individual Tuba City milk vetch, but will not likely jeopardize its continued existence on Navajo Nation lands.

At the beginning of final design ADOT EPG will coordinate with NFWD and the design engineer to determine whether known populations of Tuba City milk vetch will be impacted by construction activities
and to determine the need for additional Tuba City milk vetch surveys. If Tuba City milk vetch populations will be impacted, ADOT EPG will contact NFWD to determine the need for mitigation, such as transplanting plants and/or seed germination.

e. Northern leopard frog

This species is the most cold-adapted of all leopard frogs, and is found in a variety of habitats, including grassland, brushland, woodland, and forest ranging high into mountains, usually in permanent waters with rooted aquatic vegetation. Suitable habitat for the Northern leopard frog consists of a permanent or semipermanent water source at elevations ranging from 3,300 feet to 9,800 feet above msl. There are no permanent sources of water within the project area; however, the Little Colorado River and Moenkopi Wash do support surface flow at times. Therefore, suitable habitat for the Northern leopard frog exists within the project area.

Surveys for the Northern leopard frog were conducted along Moenkopi Wash in May 2002 and along the Little Colorado River in June 2002. During the May 2002 survey, surface water was present in Moenkopi Wash and tadpoles were found approximately 0.25 mile downstream (west) of the US 89 bridge; however, these tadpoles could not be accurately identified. Moenkopi Wash was resurveyed later in May 2002 to see whether these tadpoles were more developed for identification purposes. However, Moenkopi Wash was dry and no evidence of tadpoles, froglets, or frogs was found.

In June 2002, a small, semipermanent pool of surface water was present approximately 0.25 mile downstream (west) of the US 89 bridge over the Little Colorado River. No Northern leopard frog tadpoles, froglets, or frogs were found; however, the pool did contain numerous woodhouse toad (Bufo woodhousei) and/or red-spotted toad (Bufo punctatus) tadpoles and toadlets.

The semipermanent pool west of the Little Colorado River Bridge will not be directly impacted by construction activities. However, the Selected Alternative will result in disturbance to Moenkopi Wash and the Little Colorado River, which do support surface flow at times. At the Little Colorado River, approximately 4.2 acres of potentially suitable habitat will be temporarily disturbed, of which less than 0.1 acre will be permanently lost to the new bridge structure. Within the Moenkopi Wash, approximately 0.2 acre of potentially suitable habitat will be disturbed, of which less than 0.1 acre will be permanently lost to the new bridge structure. The Selected Alternative will involve operating heavy equipment off-road in and near potentially suitable habitat for Northern leopard frogs, which could result in injury or death to individuals if present within the construction limits. The amount of habitat that will be lost is minimal. Therefore, it was determined through the BE that the Selected Alternative may impact individual Northern leopard frogs, but will not likely jeopardize the continued existence of the Northern leopard frog on Navajo Nation lands.
During final design ADOT EPG will contact NFWD to determine the need for additional Northern leopard frog surveys along the Little Colorado River and Moenkopi Wash. Current NFWD protocol requires Northern leopard frog surveys to be conducted from May 1 to July 31.

f. Golden eagle

Golden eagles are usually found in association with rocky cliffs or tall trees and require high points in the landscape for food surveillance and nest sites. Suitable foraging habitat for the golden eagle exists throughout the project area because of the open desertscrub that supports known golden eagle prey (such as cottontail rabbits). In addition, the cliffs surrounding the Little Colorado River could provide nesting habitat; however, no nesting has ever been documented on the portion of the Little Colorado River in the project area. It is unlikely that this species would nest near the human activity associated with Cameron. Surveys for nesting golden eagles are conducted yearly by NFWD on Navajo Nation lands. No known nest sites are located within 1 mile of the project limits.

The Selected Alternative will result in permanent loss of approximately 110 acres of suitable golden eagle foraging habitat on Navajo Nation lands. In addition, NFWD considers excessive noise associated with construction activities to be potentially disruptive to golden eagles nesting within 1 mile of the noise source. The amount of foraging habitat that will be lost will be negligible relative to the total available foraging habitat in the area and, consequently, will not affect the foraging prospects of golden eagles. The Selected Alternative will not be constructed for more than 5 years, and golden eagles could be nesting within 1 mile of the project limits at that time. Therefore, it was determined through the BE that the Selected Alternative may impact individual golden eagles, but will not likely jeopardize the continued existence of the golden eagle on Navajo Nation lands.

ADOT EPG will contact NFWD in the January prior to construction to determine whether a search for golden eagle nests will be required. If NFWD were to determine that a nest search would be required, construction will not begin until the nest search is completed. If a golden eagle nest were found within 1 mile of the construction limits, ADOT EPG will contact NFWD to determine mitigation requirements.

g. Ferruginous hawk

The project area contains suitable foraging habitat because of the presence of open desertscrub and grassland that support known ferruginous hawk prey such as cottontail rabbits. In addition, the project area contains suitable nesting habitat because of the presence of clay or rock pinnacles, small buttes, and short cliffs in flat to rolling desertscrub, particularly in the Chinle Formation from Cameron to the northern project limit and the cliffs along the Little Colorado River. However, no nesting has been documented in the project area. It is unlikely that this species would nest near the human activity associated with Cameron or immediately adjacent to the US 89 corridor within the project limits.
The Selected Alternative will result in permanent loss of approximately 110 acres of suitable foraging habitat on Navajo Nation lands. In addition, NFWD considers excessive noise associated with construction activities to be potentially disruptive to ferruginous hawks nesting within 1 mile of the noise source. However, the amount of foraging habitat that will be lost is not substantial relative to the total available foraging habitat in the area and will not affect the foraging prospects of this species. Although ferruginous hawks are currently not known to nest within 1 mile of the project limits, NFWD has expressed concerns that ferruginous hawks may be nesting in the Chinle formation along US 89 from Cameron to the northern project limit. The Selected Alternative will not be constructed in the relatively near future, and ferruginous hawks could be nesting within 1 mile of the project limits when construction activities were actually to begin. Therefore, it was determined through the BE that the Selected Alternative may impact individual ferruginous hawks, but will not likely jeopardize the continued existence of the ferruginous hawk on Navajo Nation lands.

ADOT EPG will contact NFWD in the January prior to construction to determine whether a search for ferruginous hawk nests will be required. If NFWD were to determine that a nest search will be required, construction will not begin until the nest search was completed. If a ferruginous hawk nest is found within 1 mile of the construction limits, NFWD will be contacted to determine mitigation requirements.

h. American pronghorn

Suitable habitat for the pronghorn exists throughout the project area. Two herds of pronghorn are present at the southern end of the project area outside of Navajo Nation lands (one on each side of US 89). The right-of-way fencing has been removed along a portion of US 89 within the Wupatki National Monument to facilitate movements between herds. Pronghorn are not known to use the habitat adjacent to US 89 on Navajo Nation lands within the project limits.

The Selected Alternative will result in permanent loss of approximately 110 acres of marginally suitable foraging habitat for the American pronghorn on Navajo Nation lands. In addition, the project will widen the existing two-lane US 89 to a four-lane divided roadway in the undeveloped sections of the corridor, which could result in increased road kills by increasing the number of traffic lanes that pronghorn will need to cross. Although the existing two-lane roadway currently constitutes a barrier to east-west movement of pronghorn, widening the roadway to four lanes will increase the effectiveness of that barrier.

Therefore, it was determined through the BE that the Selected Alternative may impact individual pronghorn, but will not likely jeopardize the continued existence of American pronghorn on Navajo Nation lands.

Studies of radio-collared pronghorn, conducted by AGFD, have shown that pronghorn on either side of US 89 will approach the roadway in the southern portion of the project area but are reluctant to cross it. There is no conclusive evidence that the section of right-of-way fencing that was removed from MP 444.1
to MP 444.2 to facilitate pronghorn crossing has been used. However, on one occasion pronghorn tracks were found on both sides of the roadway indicating that limited pronghorn movement through this open area in the fences may be occurring (2005 pers. comm). Within the southern portion of the project area, AGFD indicated that the present highway and right-of-way fence constitute a barrier to movement of pronghorn herds and that a structure to facilitate movement of pronghorn across US 89 should be considered. According to AGFD a wide, naturally vegetated overpass structure over US 89 may facilitate pronghorn movement across the US 89 corridor.

ADOT in consultation with FHWA will make a good faith effort to find the funding for a proposed 3-year research project to determine pronghorn movements north of I-40 in Arizona that will be completed at a minimum 1 year prior to final design for projects between milepost 442.0 to milepost 458.0 (Navajo Indian Reservation boundary). ADOT’s EPG will coordinate the pronghorn research project and will establish at the beginning of the research project a Wildlife Connectivity Technical Advisory Committee (WCTAC) consisting of representatives from FHWA, NPS, NFWD, and AGFD. The NPS, as a cooperating agency, has committed to maintain connectivity for pronghorn and other species as part of its requirements under the NPS Organic Act and NPS policy. The WCTAC will review data from the research project, provide recommendations to ADOT and FHWA on the appropriateness of a pronghorn crossing structure, and identify the potential location and conceptual design of a crossing structure if warranted for consideration prior to final project design. The WCTAC will also address wildlife connectivity in general for the project.

Under the No Action Alternative, US 89 would continue to fragment pronghorn habitat and act as a barrier to free pronghorn movement within an area where such behavior was historically practiced.

4. Wildlife of Special Concern in Arizona
AGFD provided a list of Wildlife of Special Concern in Arizona for consideration during the environmental clearance process for this project. In addition, an AGFD representative attended project coordination meetings to express concerns about American pronghorn populations in the southern portion of the project area. AGFD commented that the present highway and right-of-way fence constitute a barrier to movement of pronghorn herds and that a structure to facilitate movement of pronghorn across US 89 is needed. While it has been shown that elk, deer, and other large mammals will use underpasses, pronghorn tend to avoid the confined space of underpasses. A wide, naturally vegetated overpass structure over US 89 may facilitate pronghorn movement across the US 89 corridor. However, it has not been proven that pronghorn will use such a structure. As described in the preceding section, the WCTAC will provide specific recommendations on the need for construction. Game fencing will replace the standard right-of-way fence in the project area to facilitate movement of pronghorn across US 89 unless a crossing structure were to be built within the project limits, in which case standard right-of-way fencing will be installed to guide pronghorn to the crossing structure. The section of right-of-way fence
from MP 444.1 to MP 444.2 is to remain open until the WCTAC recommends the construction of a pronghorn crossing structure and/or wildlife crossing or drift fences.

Under the No Action Alternative, US 89 would continue to fragment pronghorn habitat and act as a barrier to free pronghorn movement within an area where such behavior was historically practiced.

5. Native Plants

The Arizona Department of Agriculture’s (ADA) protected native plant list was reviewed, and it was determined that there are protected native plants within the project limits on ASLD and private lands. Any protected native plants within the project area will be removed following ADA’s guidelines and will be salvaged prior to construction, except for plants located on Navajo Nation and NPS lands. Plants located on Navajo Nation and NPS lands will be removed and salvaged according to the agencies’ requirements. ADOT’s Roadside Development Section will contact NFWD and NPS during final design regarding the removal of native plants on Navajo Nation and NPS lands.

Protected native plants within the project limits may be impacted by construction; therefore, in accordance with the Arizona Native Plant Law, ADOT’s Roadside Development Section will submit a Notice of Intent to the Department of Agriculture to clear protected native plants on non-Navajo Nation/NPS lands at least 60 days prior to any construction activity to allow commercial removal and salvage of these plants.

The No Action Alternative would have no impact on any native plants.

Q. Other Resources

1. Hunting, Fishing, and Gathering

The southern portion of the US 89 corridor, from MP 443.0 to MP 445.4, is within the boundaries of Wupatki National Monument. NPS regulations prohibit hunting, fishing, and gathering (such as plants or artifacts) within the boundaries of a National Monument. The northern portion of the corridor from approximately MP 458.0 to MP 484.0 is within the boundaries of the Navajo Indian Reservation. Hunting, fishing, and gathering is restricted to Tribal members or otherwise regulated by Special Use Permit issued to non-tribal members. These restrictions and regulations provide adequate protection to these resources. The portion of the project area between MP 445.4 and MP 458.0 lies within the ADOT right-of-way/easement. Hunting is prohibited within the right-of-way/easement. There is no permanent source of water to support a fishery, and state law restricts gathering of native plants. Within the project limits, hunting, fishing, and gathering activities are either prohibited by law or regulated in such a manner as to provide protection to the resource. The Selected Alternative will have no impact on these resources.
The No Action Alternative would have no impact on hunting, fishing, and gathering resources.

2. **Timber Harvesting**
Salt cedar trees and junipers occur sporadically in parts of the project limits. The densest location of salt cedar is in the large drainages like the Little Colorado River and Moenkopi Wash. Timber harvests are restricted to tribal members or otherwise regulated by Special Use Permit issued to non-Tribal members. Within the boundaries of Wupatki National Monument, NPS regulations prohibit timber harvests. Potentially, trees could be salvaged for firewood or other personal use in the remainder of the corridor except on Navajo Nation lands.

There is no timber of commercial value within the project limits. Therefore, the Selected Alternative will have no impact on this resource. Because of the scarcity of trees within the project limits, the Selected Alternative will have minimal impact on tree removal.

The No Action Alternative would have no impact on timber resources.

3. **Mining**
There are no mining operations within or immediately adjacent to the project limits. Therefore, the Selected Alternative will have no impact on these resources.

The No Action Alternative would have no impacts on mining operations.

R. **Hazardous Materials**
A Hazardous Materials Site Assessment was conducted for the presence of hazardous materials within the project area in September 2002 and updated in January 2005. These assessments included a review of applicable federal and state agency records and a review of aerial photographs of the project area. No active or inactive landfills; Water Quality Assurance Revolving Fund “Superfund” sites; Arizona Hazardous Waste Treatment, Storage, and Disposal Facilities; drywells; or septic haulers are reported to be located within the project limits.

There is the potential to encounter hazardous materials because of the use of petroleum products at the service stations on US 89 near MP 446.0, MP 457.1, MP 464.8, MP 465.1, and MP 466.7. Three of these service stations (Hank’s Trading Post at MP 446.0, Thriftway at MP 457.1, and Chevron at MP 465.1) are reported as having underground storage tanks (USTs). Thriftway is reported as containing leaking underground storage tanks (LUSTs). There are two tanks in-use at Hank’s Trading Post and two tanks were removed in 1999. No information regarding the service stations at MP 464.8 (Speedy’s) or at MP 466.7 (Texaco) was available from EPA and ADEQ. However, it is likely that there are USTs and possible LUSTs present at these facilities.
A report produced by EPA, dated October 6, 2000, was consulted to determine the existence of abandoned uranium mines located on Navajo Nation lands: Abandoned Uranium Mines Project: Navajo Lands. This report documented two uranium mines in the project vicinity. Based on the EPA report and aerial photographs of the project area, none of these mines are located within or immediately adjacent to the project limits. The ADOT EPG hazardous materials team has consulted with the Arizona State Mine Inspector’s Office and the Mine Safety and Health Administration Office (federal) who stated that road work in this area is not a concern with respect to the abandoned uranium mines because the possible health issues from uranium mining was associated with the inhalation of radon gas rather than with contact with uranium ore.

The contractor shall contact ADOT EPG at least 14 calendar days prior to construction to arrange for a qualified environmental firm to be on-site during ground-disturbing activities near Hank’s Trading Post (MP 446.0), Thriftway (MP 457.1), Speedy’s (MP 464.8), Chevron (MP 465.1), and Texaco (MP 466.7) for hazardous materials monitoring.

According to Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction, Section 107 (2000 Edition), if previously unidentified or suspected hazardous materials are encountered during construction, work will cease at that location and the ADOT Engineer will be contacted to arrange for proper assessment, treatment, or disposal of those materials. Such locations will be investigated and proper action implemented prior to construction in that location. Any parcels requiring additional hazardous material investigation will be completed by ADOT prior to right-of-way/easement acquisition.

In summary, there is the potential to encounter hazardous materials during construction of the Selected Alternative because of the use and storage of petroleum products at the service stations near MP 446.0, MP 457.1, MP 464.8, MP 465.1, and MP 466.7. ADOT EPG will provide a qualified environmental monitor to be on-site during ground-disturbing activities at these locations. Therefore, there will be no impact from hazardous materials to the human environment in the project area.

The No Action Alternative would have no impact on hazardous materials.

S. Material Sources and Waste Materials

Material sources within the vicinity of the study area are limited in availability. An existing borrow pit is located just west of the roadway near MP 454.5. A number of small pits have been excavated into the volcanic rock on the east side of US 89 near MP 440.5. Commercial sources capable of supplying the required types and amounts of material for this project are located in Flagstaff, Gray Mountain, and Tuba City. The contractor shall use materials from either commercial sources or ADOT sources; in either case, the sources will have to have separate environmental approvals from ADOT. If new sources are to be
used, separate environmental approvals will have to be secured from ADOT according to Section 1001-2 of *Arizona Department of Transportation Standard Specifications for Road and Bridge Construction* (2000 Edition).

Excess waste material and construction debris will be disposed of at sites supplied by the contractor in accordance with the *Arizona Department of Transportation’s Standard Specifications for Road and Bridge Construction*, Section 107.11. Disposal will be made in either Municipal Landfills approved under Title D of the Resource Conservation and Recovery Act (RCRA), in Construction Debris Landfills approved under Article 3 of the Arizona Revised Statutes (ARS) 49-241 (Aqua Protection Permit) administered by ADEQ, or Inert Landfills. Inert Landfills are not regulated by ADEQ. Therefore, the Selected Alternative will not have any known impacts associated with the approved disposal methods as provided for at landfills approved under Title D of RCRA.

With the No Action Alternative, there would be no need to bring in borrow materials, so there would be no impact on material sources and waste materials.

**T. Secondary Impacts**

An assessment of secondary effects of a proposed project is required by CEQ regulations (40 CFR § 1500–1508) to satisfy the requirements of NEPA. The assessment of cumulative impacts in this EA was made based on guidance provided in the April 1992 FHWA position paper *Secondary and Cumulative Impact Assessment in the Highway Project Development Process* and in FHWA’s January 2003 *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process*. The terms “impacts” and “effects” are used interchangeably in the CEQ regulations (40 CFR § 1508.8) as well as within this assessment. In accordance with FHWA guidelines, the terms “secondary” and “indirect” are used synonymously in this assessment.

Secondary impacts are broadly defined by CEQ as those impacts that are “caused by an action and are later in time or are farther removed in distance, but are still reasonably foreseeable” (40 CFR § 1508.8). Such indirect effects may include growth-inducing effects and other effects related to induced changes in land use, population density, or growth rate, and other related effects on air, water, and other natural systems, including ecosystems. Potential impacts are discussed qualitatively in the following text and are based on reasonably foreseeable future actions in the project area attributable to the construction of the Selected Alternative. All impacts discussed are considered long-term. Short-term effects, such as construction-related impacts, are assumed not to contribute to secondary effects.

Increasing the capacity of a highway through undeveloped land may have secondary impacts, depending on the future growth of the local economy and any future changes in land use. There is the potential for land managed by ASLD, the Navajo Nation, and private landowners to be developed in the future. No
development plans are known at this time for ASLD-administered land. Commercial and residential
development plans on Navajo Nation lands are planned in Cameron and at the intersections of SR 64
and US 160 with US 89. The remaining land adjacent to the project area is public land managed by NPS
and the Coconino National Forest and will not be developed in the future for commercial or residential
purposes. According to the Wupatki National Monument’s *Final Environmental Impact Statement;
General Management Plan*, the NPS intends to expand its boundaries to the north by 23,000 acres. This
expansion will involve ASLD-administered lands, private lands, and lands managed by the Bureau of
Land Management. US 89 will be the boundary of the western edge of the northern expansion.

1. *Vegetation and Wildlife*

Secondary impacts to native vegetation and wildlife will result primarily from habitat fragmentation, the
facilitation of secondary development in the vicinity of US 89, and ongoing traffic operations on US 89.
Many species survive through the interconnectivity between discrete populations, with some populations
acting as “source” populations for less successful population “sinks.” Another potential secondary impact
resulting from barriers and habitat fragmentation is the loss of genetic viability that could occur because
of a lack of genetic exchange outside of a small group of reproducing individuals. The tendency of
animals to cross a roadway or other barrier can depend on many variables, such as the similarity of
habitats within and adjacent to the right-of-way/easement, the availability of resources, local population
densities, and the physical properties of the potential barrier.

The secondary effects of a highway project are often from land development that might occur near the
highway after construction. Growth and development along US 89 will likely continue on private lands
regardless of whether US 89 is widened; however, little development is expected to take place on NPS
or Navajo Nation lands. Development-related secondary effects on native vegetation and wildlife are
attributed primarily to continual increases in use of existing and construction of new roadways, in
conversion of natural lands to agriculture/commercial/residential developments with associated
infrastructure (drainage canals and water, sewer, and power lines) and increases in off-highway vehicle
use, and in increased use and access to the area of influence from expanding developments.

Ongoing operations on US 89 will also have secondary effects on native vegetation and wildlife. Traffic
operations on US 89 will likely result in ongoing mortality of various wildlife species that attempt to cross
or are attracted to the roadway. Wildlife/vehicle collisions within existing and new roadways will increase
following the widening of US 89 and may increase the presence of carrion feeders. Additional runoff from
expanding existing and constructing new roadways may create local increases in native vegetation
density or encourage invasion of nonnative vegetative species. The spread of nonnative species is
facilitated by transportation-related activities, and the continued operation of US 89 will contribute, to
some extent, to a degradation of native habitats from the spread of nonnative species.
Construction of the Selected Alternative will have moderate adverse secondary effects on native vegetation and wildlife habitat, resulting primarily from habitat fragmentation, the facilitation of secondary development in the vicinity of US 89 on private lands, and ongoing traffic operations on US 89. Overall, impacts to nonspecial status species and their habitats attributable to US 89 are not expected to result in a need for special protection measures or federal listing.

2. Threatened, Endangered, and Sensitive Species

The secondary effects identified for native vegetation and wildlife will also affect special status species in the project area, to some extent. Secondary effects were considered for humpback chub, razorback sucker, black-footed ferret, Fickeisen pincushion cactus, Beath’s milk vetch, Tuba City milk vetch, and American pronghorn.

a. Humpback Chub and Razorback Sucker

Constructing the bridge over the Little Colorado River will involve ground disturbance and removal of some vegetation within the Little Colorado River channel, and construction of the roadway itself will involve ground disturbance and the use of fill material upslope of the river. These activities could introduce sediment into the Little Colorado River, which could be transported downstream into occupied critical habitat. However, the Selected Alternative will require Section 404 and NPDES permits that involve specific measures to prevent such water pollution.

The specific measures required for the Section 404 and NPDES permits will not completely eliminate sediment transport should a flood occur during construction or shortly thereafter, nor completely eliminate the potential for introduction of hazardous material into the Little Colorado River should an accidental spill of hazardous material occur during or shortly before a rain/storm. However, Colorado River fish species evolved under turbid, high-silt load conditions of the Colorado River prior to damming, and the amount of sediment that might be transported into the Little Colorado River by construction activities will be negligible when compared with the typically high sediment loads normally transported by desert watercourses. In addition, the potential for hazardous material entering the Little Colorado River as a result of an accidental spill is a discountable event that is not reasonably certain to occur because an accident is, by nature, not expected to occur. Furthermore, any sediment or hazardous material introduced into the Little Colorado River as a result of construction activities will be diluted to concentrations that are unlikely to impact humpback chub or razorback suckers in the occupied habitat 52 river miles downstream in the Colorado River. Therefore, it was determined through the BE that the Selected Alternative may affect but will not likely adversely affect the humpback chub or the razorback sucker, or their habitat.

The following mitigation measures will reduce potential effects to the humpback chub and razorback sucker: 1) the contractor shall comply with the terms and conditions of the NPDES and COE’s permits;
2) construction within the Little Colorado River channel will begin when no surface flow is present in the
construction area; 3) if surface flow begins during construction, all work within the Little Colorado River
channel will cease, all construction-related equipment and materials able to be safely moved will be
relocated outside the channel and ADOT EPG will be contacted to determine when work within the
channel could resume; 4) staging and storage areas will be located outside the Little Colorado River
bottom and floodplain; 5) abutment construction will take place outside the Little Colorado River
floodplain on the north and south approaches; and 6) disturbance to riparian vegetation at the Little
Colorado River and Moenkopi Wash will be avoided to the maximum extent practicable.

b. Black-footed Ferret
The Selected Alternative will be unlikely to facilitate development that will exacerbate the loss or
degradation of black-footed ferret habitat. Although traffic volumes will double regardless of whether the
roadway is widened, widening the existing roadway will allow for higher speeds, which could increase
road kills of ferret prey species (i.e., prairie dogs) or ferrets themselves. However, it is extremely unlikely
that the area is occupied or will become occupied by ferrets.

c. Fickeisen Pincushion Cactus, Beath’s Milk vetch, and Tuba City Milk-vetch
Generally, potential indirect impacts to plant species from road improvement projects may include habitat
loss and mortality of plants through facilitation of private development (e.g., improved access to an area,
which attracts new commercial or residential development; habitat degradation caused by increased
recreational use (such as by off-road vehicles of a previously difficult-to-access area made reachable by
road improvements; increased illegal plant collection in a previously hard-to-reach area made more
accessible by road improvements). US 89 is already a major travel route through northern Arizona; thus,
it is unlikely that improvements made to the existing roadway will facilitate further loss of suitable habitat
or individual plants near US 89 as a result of development, recreational use, or illegal collection.
However, future maintenance activities in the right-of-way/easement, such as mowing, could result in
further injury or death to individual plants if present.

d. American Pronghorn
Potential indirect impacts to large ungulates associated with road improvement projects may include habitat
loss through facilitation of private development (e.g., improved access to an area resulting in
attraction of new commercial or residential development), increased mortality (i.e., road kills) from
increased traffic volumes, and habitat fragmentation by the creation of movement barriers.

The Selected Alternative is unlikely to facilitate development that will result in further loss or degradation
of habitat. However, widening the existing two-lane US 89 to a four-lane divided highway (five-lane
undivided in some sections) could result in increased pronghorn road kills by facilitating faster vehicular
speeds and increasing the number of traffic lanes that pronghorn will need to cross. Although the existing
two-lane roadway may already constitute a barrier to east-west movement of pronghorn, widening the
roadway to four lanes will increase the effectiveness of that barrier by making US 89 more difficult for pronghorn to cross.

The proposed pronghorn research project, which will document barriers to pronghorn movements and make recommendations to mitigate these barriers to pronghorn populations, will be presented to the WCTAC at the end of the 3-year research project. The WCTAC will review data from the research project, provide recommendations to ADOT and FHWA on the appropriateness of a pronghorn crossing structure, and identify the potential location and conceptual design of a crossing structure if warranted for consideration prior to final project design.

U. Cumulative Impacts
Cumulative impacts are the combined impacts on the environment that result from the incremental effect of the proposed action when added to past, present, or reasonably foreseeable nonfederal future actions in the immediate vicinity of the project area (40 CFR § 1508.7). These impacts are less defined than secondary effects. The cumulative effects of an action may be undetectable when viewed in the individual context of direct or indirect actions, but could add to a measurable environmental change. For this assessment, past actions are those considered to have occurred since 1990, and foreseeable future actions are based on the best available information from the associated planning agencies.

Previous transportation projects completed by ADOT within the project limits include reconstruction of pavement, addition of passing lanes (MP 463.5 to MP 480.2), and scour protection at the bridge at MP 480.2. In terms of development since 1990, there have been few new commercial or residential properties constructed. Plans for future development center around the intersections with SR 64 and US 160, including additional retail, commercial, and residential development at SR 64 and a mixture of commercial businesses (restaurants, service station, and recreational vehicle park) at US 160. The Coalmine Canyon Chapter is in the early planning stages of a casino, resort, and airstrip on the north side of the Little Colorado River along the east side of US 89, and a 300-unit housing development across from the casino along the west side. The NPS has plans to construct a new visitor contact center near the north entrance to the Monument and expand the Monument by 23,000 acres to the north. The expansion will involve lands administered by ASLD and the Bureau of Land Management in addition to private lands. The US 89 corridor itself will remain largely undeveloped in the future because of the substantial amount of NPS and Navajo Nation land present.

The improvements to the US 89 corridor will provide improved accessibility to major activity centers of Flagstaff, Tuba City, and Page in addition to facilitating interstate commerce. The corridor itself will remain largely undeveloped in the future because of the substantial amount of NPS and Navajo Nation land present.
Construction of the Selected Alternative will contribute to the cumulative loss of existing vegetation and wildlife habitat in the area. The improvements will increase the effectiveness of US 89 as a physical barrier to wildlife movement. This could lead to loss of wildlife genetic diversity by hindering genetic exchange between populations separated by the physical barrier because of the wider footprint of the roadway and the loss of vegetation in the undeveloped portions of the corridor. Historic, current, and future development also cumulatively adds to the permanent loss of existing vegetation, wildlife, and wildlife habitat. The presence of National Forest and NPS lands and the Little Colorado River Tribal Park in the project area helps minimize the loss of habitat, wildlife vegetation, and inherent scenic quality of the landscape by retaining the land for public use and protecting its natural resources and character.

Development impacts on the cultural environment also contribute to cumulative impacts. There will be effects on cultural sites from the improvements to US 89, but their information value will be retrieved, which will contribute to an understanding of past cultures. The cumulative effects within the US 89 corridor represent only a fraction of a percentage of the regional or state resource base.
V. PUBLIC INVOLVEMENT/PROJECT COORDINATION

A. Public Involvement

A Public Involvement Plan was prepared for this project (ADOT 2001d). This plan outlined the strategy to involve the public as well as agencies, including individual Chapters of the Navajo Nation. ADOT held a series of public meetings and made presentations at Navajo Nation chapter meetings. Additionally, during study of the project area, residents expressed concerns about the project to ethnographers. Scoping and information meetings/presentations are described below, followed by a discussion of concerns expressed to the ethnographers.

B. Agency and Stakeholder Coordination

Coordination letters were sent to the following agencies:

- Antelope Springs Land Company
- Arizona Department of Environmental Quality
- Arizona Department of Public Safety
- Arizona Department of Water Resources
- Arizona Game and Fish Department
- Arizona State Land Department
- Bodaway/Gap Chapter, Navajo Nation
- Cameron Chapter, Navajo Nation
- Coalmine Canyon Chapter (formerly Coalmine Mesa Chapter), Navajo Nation
- Coconino County Manager
- Coconino County Planning and Budget Department
- Coconino County Public Works
- Coconino County School District
- Coconino County Sheriff’s Department
- Coconino County Supervisor, Districts 4 and 5
- Coconino National Forest
- Coconino National Forest Lands & Minerals Staff Officer, Mormon Lake Ranger District
- Coconino National Forest, Peaks Ranger District
- National Park Service, Wupatki National Monument
- Navajo Nation Department of Law Enforcement
- Navajo Nation Department of Fish and Wildlife
- Navajo Nation Office of Economic Development
- Navajo Nation Transportation Planning
- Navajo Regional Office Branch of Environmental Services
- Navajo Western Regional Business Development Office
- Northern Arizona Council of Governments
- Tuba City Chapter, Navajo Nation
• US Department of Health and Human Services, Indian Health Service Indian Health Services
• US Department of the Interior, Bureau of Indian Affairs Navajo Area, Western Navajo Agency
• Western Navajo Agency Council

Comments were received from AGFD, ASLD, BIA, the Coconino County Sheriff’s Department, the Coconino National Forest, the Navajo Regional Office Branch of Environmental Services, and the Navajo Nation Department of Transportation. Copies of their letters are included in Appendix D and summaries of their comments are provided below. The Arizona Department of Water Resources also responded and had no concerns regarding the improvements.

AGFD expressed concern regarding a potential pronghorn migration corridor across US 89 within Wupatki National Monument and requested that ADOT consider construction of a vegetated overpass over US 89 to allow pronghorn to cross the US 89 corridor. Further research will be necessary to study pronghorn movements, determine the usefulness of a crossing structure, and, if a structure is warranted, determine the best location(s) for the placement of a structure(s) within the project area. AGFD contacted wildlife regulatory agencies in California, Nevada, Oregon, Wyoming, Montana, Colorado, and North Dakota for information regarding pronghorn use of overpasses. Although no information was available, an experimental overpass crossing for pronghorn is expected to be included in a road-widening project in California. The California project will not be constructed for another 8 to 10 years; however, once completed, AGFD will keep ADOT informed of the experimental project’s success. The Wyoming Game and Fish Department is conducting another study, which will likely include the construction of an overpass to study pronghorn use. In addition, the section of right-of-way fencing along US 89 within Wupatki National Monument that was removed to facilitate pronghorn crossing will remain open until such time as ADOT and AGFD agree on other crossing options. ADOT will continue to coordinate with AGFD and NPS on the subject of pronghorn crossing.

AGFD also expressed concern regarding a prairie dog town located between the Monument and Gray Mountain and recommended considering prairie dog relocation. However, USFWS determined that prairie dog relocation is not warranted. Less than 0.1 percent of the 1,556-acre prairie dog complex surrounding US 89 is located within the construction zone, and many of the burrows located within the construction zone were inactive during prairie dog surveys conducted in 2002. In addition, the species of prairie dog found within the project area, Gunnison’s prairie dog, does not receive protection under ESA and is not listed by AGFD as a Wildlife of Special Concern in Arizona.

BIA expressed concern about the bypass alternative at Gray Mountain negatively impacting the tourist economy in the Gray Mountain area. Additionally, regarding the junction of US 89 and US 160, BIA recommends the inclusion of turnouts to BIA Routes 6134 and 6135. BIA also provided design guidelines for these requested turnouts.
The Coconino County Sheriff’s Department recognized this section of US 89 as one of the most dangerous in the state and remarked that any improvements to the roadway would be a benefit to public safety. The Sheriff’s Department indicated that bypassing the historic Gray Mountain Trading Post would be a substantial economic impact to this community. The Department also commented that a standard diamond interchange at the intersection of US 89 and US 160 would benefit motorists and increase public safety.

Coconino National Forest stated that it would like the project to be consistent with the recent improvement projects south of the project area (on National Forest lands) and that it would like ADOT to consider the long-range goals of having US 89 become a four-lane divided highway to the junction of US 160.

The Navajo Regional Office Branch of Environmental Services provided consultation guidelines, an EA format used by the Navajo Regional Office, and requested a copy of the EA for its files. The Navajo Regional Office Branch of Environmental Services would also make a determination of significance regarding the impact of the improvements.

The Navajo Nation Department of Transportation would like ADOT to consider the possibility of establishing turning lanes for vehicles preparing to cross the opposing lanes of traffic. It suggested that shoulders along the right side of the road should be wide enough for vehicles to turn off and slow down before exiting the highway. It also would like ADOT to provide safe exit lanes to roadside stands and that the Navajo Nation Department of Economic Development be consulted regarding roadside stand vendors. The Navajo Nation Department of Transportation also stated concern about soil erosion as a result of the project and recommended that best management practices for erosion and sedimentation control should be diligently followed.

C. Public Scoping Meetings and Presentations

Two public scoping meetings, as well as four presentations at Navajo Nation Chapter Houses, were held during the scoping portion of the NEPA process. Presentations were made to the Cameron, Bodaway/Gap, Coalmine Canyon, and Tuba City Chapters. The purpose of these meetings and presentations was to introduce the study team, describe the study and the study process, and specifically to learn about the issues and concerns the public believed should be addressed in the study and listen to suggestions for possible solutions.

Public scoping meetings were held on January 30, 2001, at Cameron Trading Post on US 89 in Cameron and on January 31, 2001, at Little America Hotel at 2515 East Butler Avenue in Flagstaff. Notice of these public meetings was published in the Arizona Daily Sun on January 17 and 26, 2001, and the Navajo Times. A Navajo interpreter was present at the meeting at Cameron Trading Post. The meetings
were conducted in an open-house format, followed by a brief presentation describing the study and study process. Question-and-answer sessions followed the presentation. After general questions and comments were addressed, the meeting returned to an open-house format. Comment sheets and handouts were provided to all attendees.

Six individuals signed in at the January 30, 2001, public meeting at Cameron Trading Post in Cameron. Public questions and comments expressed at the meeting included concerns about the impacts to Cameron School, school bus stops, roadside stands, local water sources, utilities, emergency response times, and cultural resources. There was discussion about the problems with the intersection of US 89 and SR 64 and how the solutions may impact the adjacent businesses. Other questions related to how much new easement would be needed, whether new bridges would be constructed at Fivemile Wash and over the Little Colorado River, whether right-turn lanes would be constructed to provide access to individual residences, how ADOT was going to dispose of waste construction material, and how erosion along washes would be contained.

A presentation was made on January 20, 2001, at the Bodaway/Gap Chapter House on the Navajo Indian Reservation during a Bodaway/Gap Chapter Meeting. Notice of this presentation was published in the Navajo Times on January 11 and 18, 2001. Approximately 45 people attended the presentation, including a Navajo interpreter. Attendees were introduced to the Study Team and were invited to review exhibits on display and ask questions or express concerns to project representatives. Comment sheets and handouts were provided. Participants wanted to know how much easement would be taken for the roadway improvements, whether ADOT would pay for acquisition of the new easement, and why the right-of-way/easement widths in the corridor vary. One participant suggested that cattle guards be used instead of gates because people leave gates open.

Five individuals signed in at the January 31, 2001, public scoping meeting at Little America Hotel in Flagstaff. Some of the individuals attending were business owners in the corridor. Participants suggested that ADOT increase the median width to minimize the number of errant vehicles crossing over and causing head-on impacts, maintain right-of-way fencing for access control, reduce the speed limit, install lighting, implement access control in Gray Mountain, and install a flashing yellow light at the intersection of US 89 and SR 64. People attending the meeting also wanted to know the schedule for construction including the sequencing of construction for the improvements.

Presentations were made on March 18, 2001, at the Coalmine Canyon Chapter House (formerly named Coalmine Mesa Chapter) and on March 19, 2001, at the Tuba City Chapter House. The public was notified of these meetings through newspaper announcements in the Navajo Times on March 8 and 15, 2001, and by public service announcements on KGHR (91.5 FM). Both of these meetings followed the format and used the same materials presented at previous project presentations,
and Chapter representatives translated the presentation, questions, comments, and responses into Navajo.

Approximately 40 people were in attendance at the March 18, 2001, meeting at the Coalmine Canyon Chapter House. People identified drainage issues and sight-distance problems that ADOT should address and recommended that ADOT coordinate with the roadside stand vendors on the improvements. They also wanted to know whether ADOT could add telephone/emergency boxes along the corridor. They suggested that ADOT construct an overpass at the intersection of US 89 and US 160, separate truck lanes, provide turn-outs for school buses, and install livestock underpasses.

Approximately 10 individuals attended the March 19, 2001, presentation at the Tuba City Chapter House, in Tuba City, Arizona. Questions and comments expressed dealt with addressing the potential grazing impacts and controlling livestock, limiting signs along the roadway, accommodating any improvements with the existing easement, coordinating with roadside stand vendors, and wanting asphalt driveways constructed to residences. The attendees wanted to know whether ADOT's process for design and construction could be accelerated and whether there would be more meetings on the project.

A presentation was given on June 10, 2001, at the Cameron Chapter Meeting located at the Cameron Chapter House. Approximately 35 people were in attendance at the meeting. Meeting attendees asked whether the improvements would be similar to the roadway section through Antelope Hills, whether there would be funds for improving dirt roads adjacent to US 89 and constructing sidewalks, how the roadside stand vendors’ issues would be addressed, and whether the money paid by ADOT for any new easement could go to the Navajo Nation or to individual Chapters. Vehicular and pedestrian conflicts in Cameron, traffic congestion at the intersection of US 89 and SR 64, preservation of grazing opportunities, lowering of speed limits, and provision of deceleration/acceleration lanes were also discussed at the Chapter meeting. The Chapter officials requested that ADOT continue to coordinate with the Cameron Chapter during the planning process.

D. Public Information Meetings and Presentations
A public information meeting was held on November 15, 2001, at Cameron Trading Post on US 89 in Cameron, Arizona. A notice of the meeting was run in the Arizona Daily Sun and in the Navajo Times on November 1 and 8, 2001, and in the Navajo-Hopi Observer on October 31, and again on November 7, 2001. Announcements of this meeting were also broadcast on KNAU (88.7 FM), KINO (1230 AM), KNAD (91.7 FM), KTBA (1050 AM), and KAFF (92.9 FM/930 AM).

Approximately 25 individuals attended the meeting. The Study Team began the meeting with a brief presentation on project overview, followed by a discussion of the alternatives developed since scoping meetings that had been held earlier in the year. Alternatives were presented for the mainline alignment of US 89 and for the intersections of US 89 with SR 64 and US 160. The Study Team presented the
alternatives, the established evaluation criteria for each alternative, the potential environmental impacts associated with the alternatives, and the evaluation of these alternatives. Following a presentation, the Study Team held a question-and-answer period. Much of the discussion centered on the intersection alternatives for SR 64 and US 160. Participants expressed their support for the Single Point Urban Diamond Traffic Interchange Alternative for the SR 64 intersection because they believe that it would have manageable business impacts. People favored the Diamond Traffic Interchange Alternative at US 160 because it would accommodate the planned development for that intersection. Participants also made several suggestions at the meeting, including lowering the speed limit or installing a blinking light to slow traffic through Gray Mountain, considering the construction of frontage roads in Cameron to keep local access traffic off US 89, and building a rest area in the corridor to benefit the traveling public and provide local business opportunities.

A presentation of the alternatives was held on November 18, 2001, at the Cameron Chapter Meeting at the Cameron Chapter House. Four individuals attended the presentation. The primary concern expressed at this Chapter Meeting centered on access and traffic operations at the intersection of US 89 and SR 64. In response to these concerns, as well as to other public input at previous meetings/presentations, ADOT developed an additional alternative for this intersection.

The Study Team attended the Western Navajo Agency Council Meeting on December 8, 2001, at the Coconino County Law Enforcement Administration Facility Auditorium, located at 911 East Sawmill Road in Flagstaff. Because of a lengthy meeting agenda, however, the Study Team was unable to present. The Western Agency Vice President agreed to give a short project overview to council members at the end of the meeting. After this meeting, ADOT sent letters to the Bodaway/Gap, Cameron, Coalmine Canyon, and Tuba City Chapters and to the Western Navajo Agency Council requesting comments or concerns regarding the alternatives for the US 89 mainline and the intersections at SR 64 and US 160.

Various members of the Study Team met with the Cameron Chapter on October 24 and November 23, 2004; and with the Cameron Chapter Community Land Use Planning Committee on January 29 and May 21, 2003; and September 14 and November 23, 2004, to discuss the specifics of the improvements to US 89 through the Cameron area, including the intersection of US 89 and SR 64. The Chapter passed Resolution CA-11-087-04 in support of ADOT planning and developing a roundabout at the intersection of US 89 and SR 64 (refer to Appendix D).

E. Ethnographic Survey Results
During an ethnographic study of the Navajo Nation lands, completed in August 2002, local residents expressed specific concerns regarding the improvements. They stated that they did not want to give up any more land to expand the existing easement. With an expanded highway, motorists would drive faster and US 89 would become even more dangerous. Many of the concerns dealt with the roadside
stands, stating that vendors would lose money because the higher speeds and the additional traffic would inhibit people from stopping at the stands, that relocating stands may impact those vendors who walk to their particular stands, and that reducing the number of stands would create more competition among the vendors. Respondents believed ADOT should construct permanent buildings to accommodate these stands, provide appropriate highway signs to advertise their locations, and provide gravel parking areas. They would like ADOT to look at different solutions to control livestock straying into the easement. They mentioned that some residents used bicycles for transportation and that ADOT should, therefore, consider including wide paved shoulders that would accommodate bicyclists. Those who were surveyed also encouraged continued coordination with the local Chapters as the planning of the improvements continues.

F. Other Comments
Comment letters were also received from local business and property owners in the corridor. They expressed concerns about the traffic congestion at the intersection of US 89 and SR 64, the need for lighting and sidewalks in Gray Mountain and Cameron, and provision of adequate access to the gravel pit rock quarry for the semi trucks. The Grand Canyon Trust advocated that the design of improvements should be in keeping with the aesthetics of the area and would not support a four-lane divided highway.

G. Public Hearing and Presentations
The agency and public comment period for the Draft EA began on July 27, 2005, and ended on September 8, 2005. Copies of the Draft EA were available for review at the ADOT Flagstaff District Office, ADOT Gray Mountain Maintenance Yard, East Flagstaff Community Library, Cameron, Coalmine Canyon, and Tuba City Chapter Houses, and the Bureau of Indian Affairs Western Region Office. The Draft EA was also posted on the ADOT Web site at www.azdot.gov/highways/EPG/documentsindex.asp. A public hearing was held on August 11, 2005, at the Cameron Chapter House in Cameron to obtain comments from the public on the Draft EA and Preferred Alternative. An advertisement announcing the availability of the Draft EA and the public hearing was placed in the Navajo Hopi Observer and Arizona Daily Sun on July 27, and August 3, 2005, and in the Navajo Times on July 28, and August 4, 2005. A public service announcement was sent to KAFF 93, KAZM 780 AM, KBXZ-AM, KFLX 105.1, KMGN 93.9, KNAU 88.7 and 91.7, KVNA 600 AM, KYBC 1600 AM, KZGL 95.9 and 101.7, KHAC 880 AM, KWIN 104.9 FM, and KTBA 1050 AM. Copies of the newspaper and public service announcements are included in Appendix G.

Eleven people signed in at the public hearing. The hearing began in an open-house format followed by a brief presentation on the Preferred Alternative and potential environmental impacts. ADOT and project consultant representatives made the presentation in both English and Navajo. Exhibits were provided showing the highway improvements and a handout was provided summarizing the information
presented. Immediately following the presentation, the floor was opened to the public for a question-and-answer session. At the conclusion of the question-and-answer session, the hearing returned to an open-house format where project representatives were available to explain the Preferred Alternative and answer questions in a one-on-one setting. A copy of the handout provided at the public hearing and a copy of the hearing transcript are included in Appendix G. Questions asked and the responses made during the question-and-answer session of the public hearing are included in the hearing transcript and will not be re-stated in this section of the Final EA. Additional comments received on the Draft EA have also been included in Appendix G, along with the responses to these comments.

In addition to the public hearing, ADOT and FHWA offered to make presentations on the Draft EA and Preferred Alternative to the Navajo Nation’s Bodaway/Gap, Cameron, Coalmine Canyon, and Tuba City Chapters and to the Hopi Tribe’s Hotevilla, Lower and Upper Moenkopi, and Shungopavi Villages. The Bodaway/Gap, Coalmine Canyon, and Tuba City Chapters and the Upper Moenkopi Village accepted ADOT and FHWA’s presentation offer. A summary of these presentations is provided below.

Members of the Study Team made a presentation on the Draft EA and Preferred Alternative to the Tuba City Chapter members on Wednesday, September 7, 2005, at approximately 11:00 am. The presentation, handout material, and exhibits were the same as provided at the public hearing. Copies of the Draft EA were available at the presentation for people to review. There was voiced support for the Preferred Alternative by the six community members who attended the presentation. Comments made at the presentation focused on clarification of the various features of the improvements. People wanted to know what the next steps were and inquired as to when the improvements would be built. Kenneth Nez who is the President of the District III Council Western Navajo Agency and also Vice President of the Coalmine Canyon Chapter provided copies of the resolution of the District III Council of the Western Navajo Agency and a copy of the June 25, 2005, Western Navajo Agency Council Meeting Minutes. The resolution stated support for the widening of US 89 as well as US 160 within the Navajo Nation. Copies of the resolution and meeting minutes are included in Appendix D.

A presentation to the Upper Moenkopi Village members was made on Wednesday, September 7, 2005, at approximately 6:00 pm. The presentation, handout material, and exhibits were the same as provided at the public hearing. Copies of the Draft EA were available at the presentation for people to review. The four community members who attended the presentation expressed their support for the Preferred Alternative. Comments made at the presentation focused on the roundabout proposed at the junction of US 89 and SR 64. There was concern that the roundabout is a new feature that people have not seen before. They wanted to know what the speed limit would be through the roundabout. One person related that the new roundabout in Payson is dangerous and the one proposed in Cameron would be bigger. There were questions about the type and location of cultural resources and site visits by the Hopi Cultural Resources Advisory Team, which had already occurred as part of the tribal consultation process for the project. They wanted to know what would happen to the existing roadside stands and if there would be right-of-way fencing. There was support stated for the US 89 and US 160 traffic interchange.
configuration. Those attending the presentation also wanted to know what the next steps were and inquired as to when the improvements would be built.

Members of the Study Team made a presentation to the Bodaway/Gap Chapter members on Thursday, September 8, 2005. The presentation, handout material, and exhibits were the same as provided at the public hearing. Copies of the Draft EA were available at the presentation for people to review. The 12 people who attended the presentation expressed support for the Preferred Alternative. Comments made at the presentation focused on the roundabout proposed at the junction of US 89 and SR 64. There was concern that the roundabout and several felt that there are safety concerns associated with it. They indicated that motorists would need to be forewarned about the roundabout. One person wanted to know what the speed limit along the highway and whether or not the community could ask ADOT to lower the speed limit. They wanted to know what would happen to the roadside stands and if the new right-of-way had already been acquired. One person asked if cultural resources surveys were completed. People also wanted to know what the next steps were and inquired as to when the improvements would be built. They wanted to know where this project was ranked among the other projects in the state.

The presentation to the Coalmine Canyon Chapter was made on September 18, 2005, at their monthly Chapter meeting. The presentation, handout material, and exhibits were the same as provided at the public hearing. Copies of the Draft EA were available at the presentation for people to review. Approximately 28 people attended the Chapter meeting. One person had concerns about the interchange at the junction with US 160 because of the ‘T’ intersection at the western ramps. He requested that traffic signals be considered in lieu of stop signs at the ramps and also suggest that roundabouts at the ramp junctions and a partial cloverleaf interchange be considered at the intersection.

The Coalmine Canyon Chapter is in process of planning a large casino, resort, and airport development on the north bank of the Little Colorado River along the east side of US 89. A 300-unit housing development is also being considered across from the casino on the west side of US 89. Although the construction of the development is anticipated to begin in June 2006, the casino and housing development plans are still in the preliminary planning stages and neither the Chapter nor the Tribal Council has yet approved the new developments. The Study Team members informed the community that the design efforts would need to be coordinated with ADOT for access and other impacts for traffic on US 89. The Coalmine Canyon Chapter is interested in the construction schedule and would like to see the improvements on US 89 occur sooner than the current plan.
VI. CONCLUSION

The potential environmental impacts of the improvements were evaluated based on both the context of the effects on the project area and the intensity or severity of impacts as defined in the CEQ Regulations. Table 12 summarizes the potential environmental impacts.

**Table 12. Results of environmental analysis**

<table>
<thead>
<tr>
<th>Environmental consideration</th>
<th>Result of alternative evaluation</th>
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<tr>
<td>Ownership, Jurisdiction, and Land Use</td>
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<tr>
<td>Social and Economic Resources</td>
<td>No substantial impact</td>
</tr>
<tr>
<td>Title VI/Environmental Justice</td>
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<tr>
<td>Cultural Resources</td>
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<tr>
<td>Section 4(f) of the Transportation Act</td>
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<tr>
<td>Air Quality Analysis</td>
<td>No impact</td>
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<tr>
<td>Noise Analysis</td>
<td>No substantial impact</td>
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<td>Utilities</td>
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<tr>
<td>Visual Resources</td>
<td>No substantial impact</td>
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<tr>
<td>Water Resources Considerations</td>
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<tr>
<td>Floodplain Considerations</td>
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<tr>
<td>Section 404 of the Clean Water Act and NPDES</td>
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<tr>
<td>Land Resources</td>
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<td>Secondary Impacts</td>
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</tr>
<tr>
<td>Cumulative Impacts</td>
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</table>
VII. PROJECT PREPARERS AND CONTRIBUTORS

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**Stanley Consultants, Inc.:** Mike Chase (Project Manager), Jackie Noblitt (Engineer), and Eric Daly (Project Engineer).
VIII. BIBLIOGRAPHY

The following references are available on request through the ADOT EPG office located at 205 South 17th Avenue, Phoenix, Arizona, or by phone at (602) 712-7767:


