



United States  
Department of  
Agriculture

Forest  
Service

Southwestern  
Region



# **Environmental Assessment for the Reconstruction of Forest Roads 612 and 87**

**Pecos/Las Vegas Ranger District  
Santa Fe National Forest**

# Acronyms and Abbreviations

BBS	Breeding Bird Survey	NMED	New Mexico Environment Department
BCC	Birds of Conservation Concern	NMPIF	New Mexico Partners in Flight
BCR	Bird Conservation Region	NO <sub>2</sub>	nitrogen dioxide
BMP	Best Management Practice(s)	NPDES	National Pollution Discharge Elimination System
CAA	Clean Air Act of 1977	NRHP	National Register of Historic Places
CO	carbon monoxide	O <sub>3</sub>	ozone
CR	County Road	Pb	lead
CWA	Clean Water Act	PM <sub>10</sub>	particulate matter less than or equal to 10 microns in diameter
dB	decibel	PM <sub>2.5</sub>	particulate matter less than or equal to 2.5 microns in diameter
dbh	diameter at breast height	ROS	Recreation Opportunity Spectrum
E	Endangered	ROW	Right-of-way
EA	Environmental Assessment	SHPO	State Historic Preservation Office
EPA	United States Environmental Protection Agency	SO <sub>2</sub>	sulfur dioxide
ESA	Endangered Species Act	T	Threatened
FR	Forest Road	T&E	Threatened and Endangered
FS	Forest Sensitive	TES	Terrestrial Ecosystem Survey
GBDS	Great Basin Desert Shrub	USFS	United States Department of Agriculture-Forest Service
PMG	Plains & Mesa Grassland	USFWS	United States Fish and Wildlife Service
PJ	Piñon-juniper	USGS	United States Geological Survey
HP	High Priority	VQO	Visual Quality Objective
HR	High Responsibility	WQCC	Water Quality Control Commission
I	Interstate		
m	meter		
m <sub>2</sub>	square meter		
MIS	Management Indicator Species		
NAAQS	National Ambient Air Quality Standards		
NM	New Mexico		

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# Chapter 1 – Purpose and Need

## Purpose and Need

The purpose of the project is to provide safe vehicular passage, in accordance with Santa Fe County's requirements, across Forest Road (FR) 612 from a point on County Road (CR) 63 approximately 98 feet (30 m) uphill (southwest) from the boundary with the private land along FR 612 to a point about 1,450 feet (442 m) up FR 87 beyond where it "Ys" east at the cattleguard on Glorieta Mesa. As such, there is a need for a road gradient, width, and stability sufficient to ensure a 10 mile per hour speed limit, with a possible future expansion to a 25 mile per hour limit.

## Background

The Santa Fe National Forest is scattered with private land inholdings that use Forest Service roads for access. One private parcel within the boundaries of the Pecos/Las Vegas Ranger District is located approximately 12 miles southeast of Santa Fe, near the town of Glorieta. Access to the parcel is from CR 63, which turns into FR 612 approximately 1.5 miles south of Interstate 25 (I-25). **Figure 1** shows the project area and region of the proposed road construction.

In order for private land to be developed on Glorieta Mesa, Santa Fe County zoning ordinances require the landowner to make road access to the property safe for travel by passenger and emergency vehicles. The existing road has a natural surface that is susceptible to erosion during storms and has areas with poor drainage and ruts.

## Desired Future Condition

The desired future condition for these access roads is a stable road surface that enables safe travel and sufficient access by passenger and emergency vehicles. Future conditions would meet Santa Fe County's access road requirements to facilitate development of a maintenance agreement with the county.

## Proposed Action

The Proposed Action is to reconstruct and realign approximately 3,700 feet (1128 m) of portions of FR 612 and FR 87 where the existing road is steep, shown in **Figure 2**. The project area, which includes 100 feet on both sides of the road centerline, is almost 17 acres. In general, the road would have a 50-foot (15 m) right-of-way (ROW) within the project area, with a crowned center and a crushed gravel base. The cut slopes would be graded and stabilization measures approved by the Forest Service and Santa Fe County would be installed. The average road gradient in the project area would be reduced to 11%.

Chapter 2 of this Environmental Assessment (EA) has a detailed description of the Proposed Action as well as mitigation measures.

## Decision to be Made

The District Ranger will decide whether to implement the Proposed Action or whether an environmental impact statement is needed before making that decision.

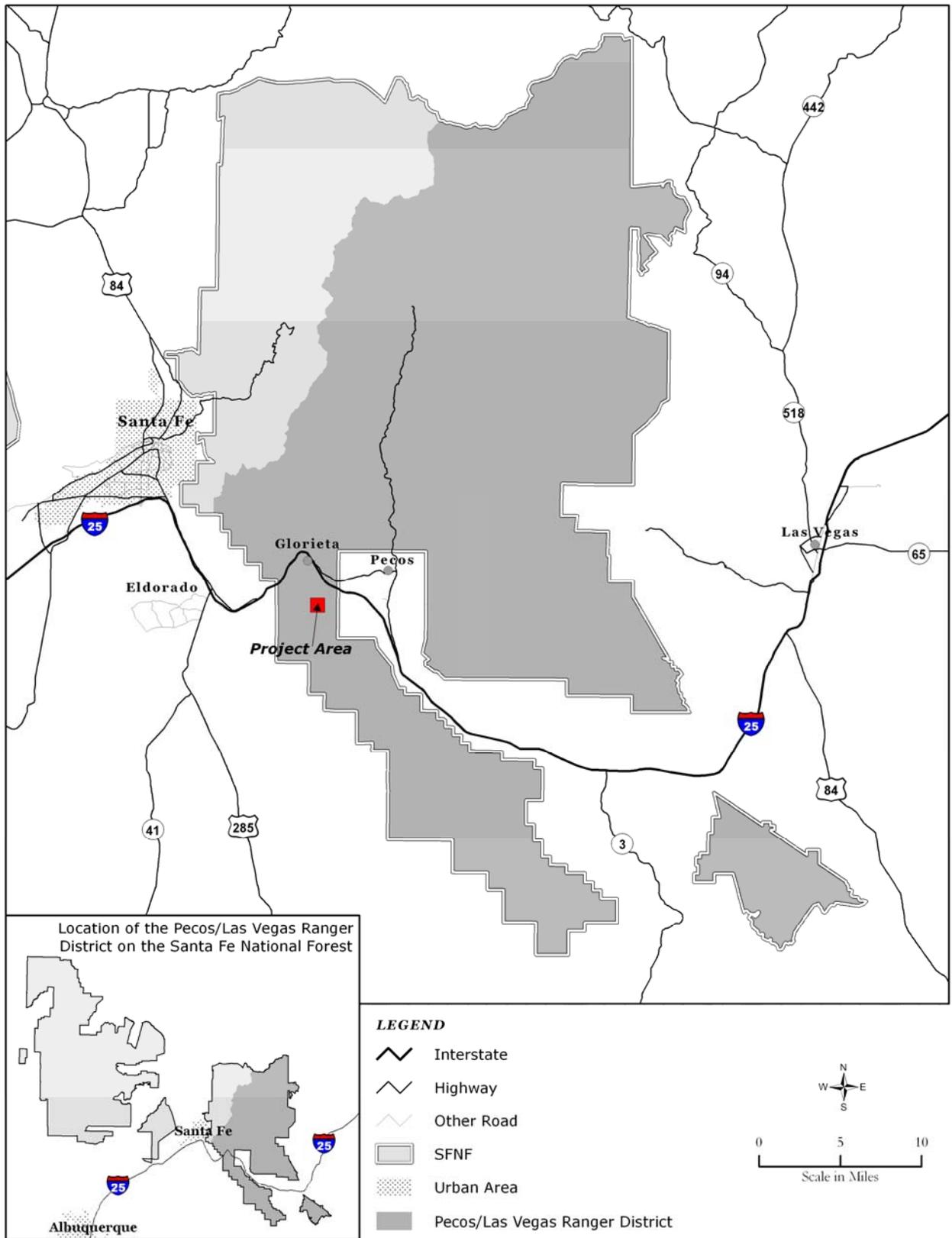


Figure 1. Location of Project Area

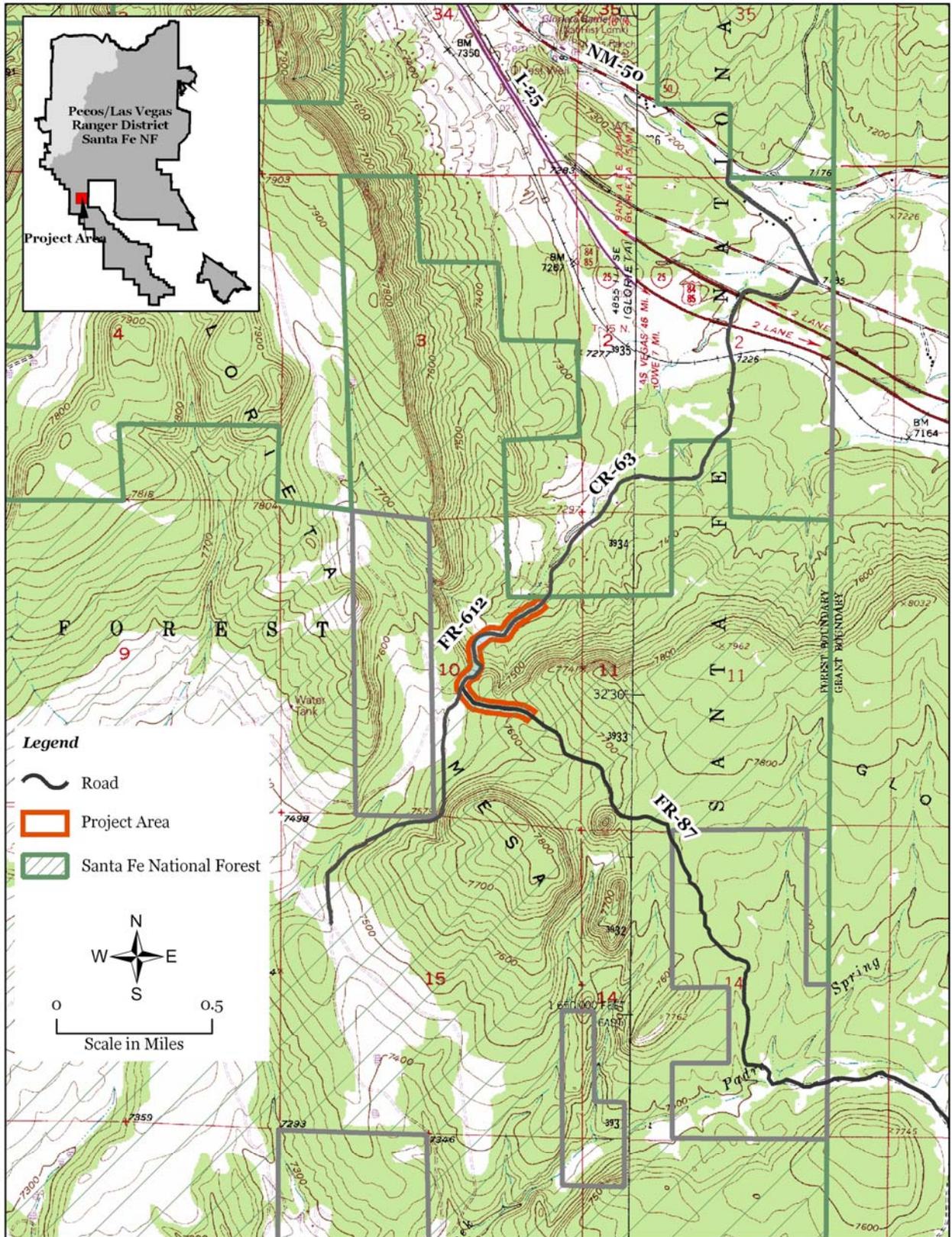


Figure 2. Location of Roads and Project Area

## Public Involvement and Scoping

The Forest Service, in cooperation with Science Applications International Corporation (SAIC) and the landowner or project proponent, developed the Proposed Action and distributed a scoping letter to solicit comments, concerns, and issues. Highlights of the public participation process to date include:

- Listing the project on the Santa Fe National Forest's Schedule of Proposed Actions as of May 2006 ([www.fs.fed.us/r3/sfe](http://www.fs.fed.us/r3/sfe)).
- Mailing the scoping letter to 157 recipients, including elected representatives, Federal and State agencies, municipal offices, businesses, special interest groups, and landowners in the vicinity of the project. The Forest Service received a total of 6 responses to the notices by telephone, letters, and personal visits.
- Separate letters inviting comments, accompanied by the scoping letter, were sent to 13 Native American tribes and 14 pueblos that may have interests in the project area. The Forest Service received one written response to these letters.
- Meeting with two local landowners at their request at the Pecos Ranger District office on September 5, 2006 to present the project and answer questions.

## Key Issues

Key issues are concerns about the potential effects of a proposed action, expressed in this case through public comments. The key issues may be used to design project alternatives, ensure that impacts are adequately analyzed to address concerns, and to identify mitigation measures that would limit adverse effects. This section lists the key issues analyzed in detail in Chapter 3, along with a few other non-key issues that are required to be included in an environmental analysis. Where appropriate, we combined similar issues into one issue statement.

### Key Issue 1: Cultural Resource Protection

*Threats of suburban style construction and land uses on historically significant resources.*

**Evaluation criteria:** The potential for adverse impacts to archaeological sites due to road reconstruction will be evaluated qualitatively, based on the proximity of construction to known sites. Mitigation measures and compliance with State and Federal laws and regulations will be assumed to be implemented to protect cultural resources.

### Key Issue 2: Impacts on Visual Resources

*Any and all mitigating measures be considered which will minimize the visual impact of the re-alignment, cuts and fills, grade change, etc. If built, the scars from this cut/fill operation will be visible from a large area north of Glorieta Mesa.*

**Evaluation criteria:** The effects on visual resources will be analyzed from key locations to determine whether the construction would be visible from the National Park, the Scenic Byway, and area residences. Mitigation measures that include contouring and seeding will be included in the Proposed Action and monitored by the Forest Service to ensure their success in stabilizing the site and minimizing visual resources impacts.

## Issues Eliminated from Detailed Study

Some concerns identified were outside the scope of the decision-making authority of the Forest Service or conjectural. Issues eliminated from this analysis are summarized below.

Those issues considered to be outside the scope of the project are:

- *Without the project, development will proceed far slower and less dense. Whether there is enough water to support new development. The indirect and cumulative impact of the proposed project will be to encourage the development of over 1500 acres of private land into suburban sprawl in this area of Glorieta Mesa.* The Forest Service can only make decisions regarding the construction and maintenance of National Forest System roads and cannot deny access to private inholdings. Provisions of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, Section 1323(a)(16 U.S.C. 210) provides that the owners of non-Federal land within the National Forest System shall be provided adequate access to their land.
- *Improvements will not match up with existing road condition. Who will maintain the road after it is improved? The two single-lane underpasses beneath I-25 can not handle ... the volume of traffic which will be generated by the indirect and cumulative residential development caused by the proposed project.* Improvements on the entire road, road maintenance of non-Federal roads, and traffic controls on roads outside the National Forest System are beyond the scope of this EA and Forest Service decision-making.
- *The Forest Service firefighting crews will be challenged with additional residential areas to protect in case of natural or man-caused wildfires on federal land.* While the Forest Service recognizes the issues related to increased development in rural areas (USFS 2006), it can only make decisions regarding the construction and maintenance of National Forest System roads and cannot deny access to private inholdings. Proposed road improvements would facilitate access by local firefighters who would respond to protect private holdings.

## Project Record Availability

Additional documentation may be found in the project record that will be located at the Pecos/Las Vegas Ranger District of the Santa Fe National Forest upon completion of the EA. Please contact Julie Bain at (505) 757-6121 for more information.



# Chapter 2 – Alternatives

## Introduction

Following receipt of scoping comments, it was determined that the key issues could be addressed as part of the Proposed Action or in the impacts analyses. No new alternatives have therefore been developed other than the Proposed Action and No Action. One alternative suggested by the public was eliminated from detailed study and possible selection.

## Alternatives Considered but Eliminated from Detailed Study

After preliminary analysis, one alternative was eliminated from detailed study because it was not reasonably feasible and did not address the purpose and need. It is briefly summarized below.

*Access should be provided to the private inholdings via Forest Service roads from Rowe and Canyoncito at Apache Canyon. Access through the suggested route would be much longer than the proposed route and would still require reconstruction of portions of National Forest System roads to meet county requirements. The suggested route is considered not reasonably feasible to access the private land owned by the developer who proposed the project.*

## Alternatives Considered in Detail

In addition to the alternative considered then dropped from further study, the Proposed Action and the No Action alternatives were considered. The Proposed Action alternative meets the purpose and need by reconstructing the road to meet minimum county specifications for access by emergency vehicles.

### Alternative 1 – No Action

In the No Action Alternative, the Forest Service would not reconstruct any Forest Roads. The No Action Alternative does not meet the purpose and need of the project because it would not meet the county requirements for emergency vehicle access to private land and structures accessed through National Forest System lands. The No Action Alternative would not move the project area towards the desired condition.

### Alternative 2 – Proposed Action

The Proposed Action involves reconstruction and realignment of approximately 3,700 feet (1128 m) of road, primarily where the existing road is steep, in the area shown in **Figure 3**. Approximately 14,850 square feet (1,380 m<sup>2</sup>) would be cut and filled. Up to 8.5 acres would be disturbed within the treatment area, which includes the 50-foot ROW measured from the road centerline, with approximately 2 acres of bare ground remaining for the road surface after reclamation. Earthmoving may occur within the ROW to grade slopes, shape the road, and stabilize fill areas and road banks.

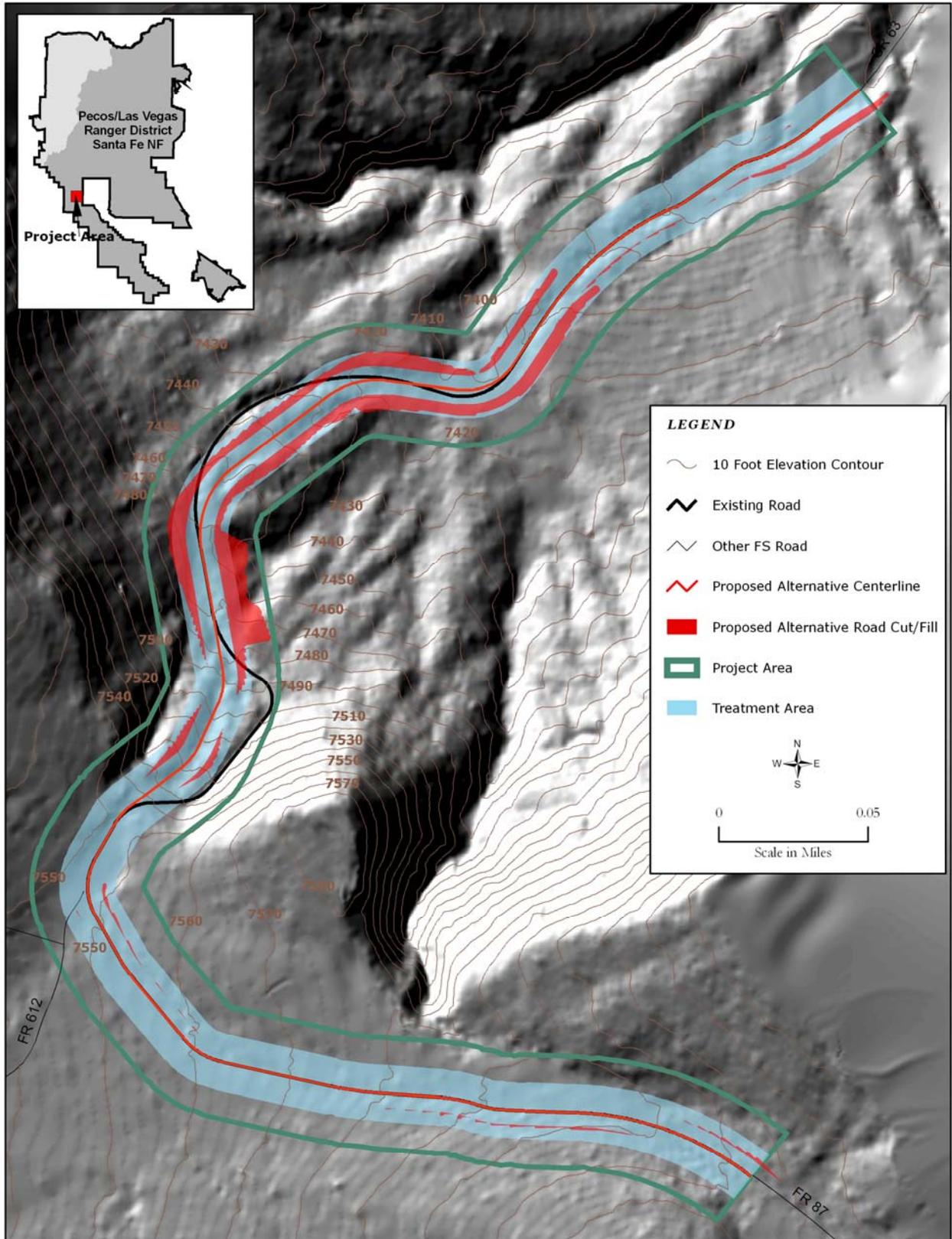
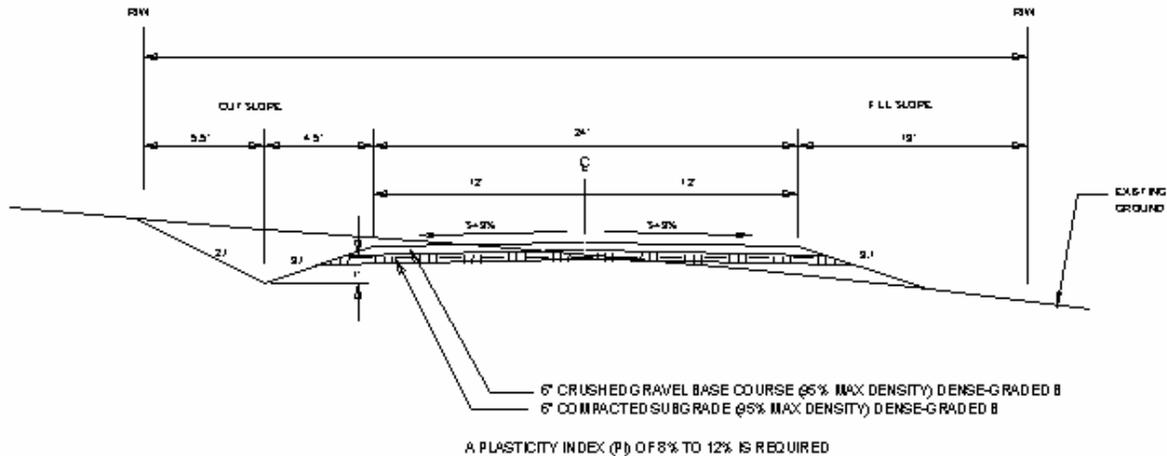


Figure 3. Treatment and Project Area with Road Realignment

In general and as shown in the typical cross-section in **Figure 4**, the road would have a 50-foot (15 m) ROW with a 24-foot (7 m) road bed and a crowned center. The road would be constructed with a 6-inch crushed gravel base and a 6-inch compacted subgrade. About 14,850 square feet (1,380 m<sup>2</sup>) would be cut and filled. The cut slopes would be graded at a 2:1 ratio and stabilization measures approved by the Forest Service and Santa Fe County would be implemented. The average road gradient in the project area would be reduced from the current 14% to 11%.



**Figure 4: Typical Design Specifications for Proposed Road Changes (not to scale)**

The road design and construction would be contracted by the developer of the private parcel at the end of the project area. Construction duration is anticipated to last 30 days, but not longer than 90 days if there are weather delays. It would be accomplished by using heavy equipment to excavate the high portions of the road and fill the low areas to form a road with an even grade not exceeding 11%. After moving the excavated (cut) materials to be used as fill to the low side of the road or to low areas along the road, the fill would be compacted, adding water as necessary to ensure that the moisture content is optimal for compaction. Fill would be placed in 6-inch lifts to ensure stability and compaction. The engineering design would balance the amount of cut and fill soil materials to the degree possible. If additional fill soil were required, it would be trucked in from a licensed supplier offsite and would be certified as weed-free and free of any cultural artifacts.

Structural measures, such as straw bale diversions or excavated water bars would be installed to divert surface water runoff around disturbed areas during construction. Water would be used to dampen exposed soil as needed to minimize airborne dust during dry weather conditions. Gravel would be trucked in from a licensed supplier and spread on the newly constructed road to stabilize the surface.

Grading, seeding, and mulching of bare soil resulting from surface-disturbing activities would minimize soil erosion and maximize vegetative recovery of disturbed areas after construction is completed. Surface water would be diverted from the newly planted disturbed areas outside of the travel surface of the road. Where seeding and mulching are needed, certified weed-free seeds and mulches would be used to minimize the spread of invasive non-native plants. The seed mixture, stabilization measures, and best management practices installed would be those appropriate for the area, as determined and approved by the Forest Service.

Where the estimated 1,339 feet (408 m) of the existing road alignment is to be abandoned as shown in Figure 3, road decommissioning would be accomplished with the objective of restoring the disturbed area to a more natural and stable state. This decommissioning would be completed by physically blocking the ends of the old road using fencing, tree trunks/branches, boulder arrays, or earthen berms to limit vehicle access. It would also involve recontouring slopes and reestablishing native vegetation in a portion of the decommissioned road, as needed, by ripping and seeding the bare ground.

## Mitigation and Monitoring

The mitigation and monitoring measures contained in this section pertain to the Proposed Action Alternative. Mitigation measures are prescribed to avoid, minimize, or compensate for adverse environmental effects that may occur from project implementation. Some were included to address issues listed in Chapter 1. Monitoring determines whether the treatments and mitigation measures were implemented as planned. Implementation of mitigation measures and monitoring will be the responsibility of the developer who is the proponent of the Proposed Action. It is assumed that the Forest Service will also monitor and will provide final approval once the project is completed. Monitoring activities are indicated by an arrow.

## Soil and Water

Many of the following measures are derived from the Best Management Practices (BMP) contained in Forest Service Handbook 2509.2 “Soil and Water Conservation Practices Handbook.”

- All fill brought in from offsite will be certified weed-free and free of cultural artifacts.
- Structural measures, such as straw bale diversions or excavated water bars, will be installed to divert surface water runoff around disturbed areas during construction and following seeding.
- Water will be used to dampen exposed soil as needed to minimize airborne dust during dry weather conditions.
- All heavy equipment will be washed of mud and debris prior to entry on Forest Service lands to prevent introduction of non-native invasive weeds.
- Gravel will be trucked in from a licensed supplier and spread on the newly constructed road to stabilize the surface.
- After treatments are complete, disturbed areas will be stabilized to reduce soil loss and subsequent sedimentation. Stabilized areas are those that are resistant to soil erosion because disturbed or bare soils have been covered by vegetation or stone.
- Seed mixture will consist of native seed suitable for the site, as approved by the Forest Service. All seed and mulch will be certified weed-free and free of cultural artifacts. If the side slopes of the road bank are too steep to be stabilized with vegetation (greater than a 2:1 slope or 45-degree slope), then a rock retaining wall or rock riprap may be required.
- Seeding and stabilized areas will be monitored to ensure successful establishment of vegetation and stable slopes. If needed, additional seedbed preparation and reseedling will be completed.
- Water bars and/or turnouts will be installed if needed to direct overland flow away from roads. Water bars and/or turnouts may also be installed if the project is temporarily shut down.

- Vehicles will not be permitted to travel on wet soils when tire tracks result in visible rutting, compaction, or displacement to minimize erosion.
- Conventional, ground-based, heavy equipment is limited to slopes less than 40 percent (Forest Plan, p. 75).

### **Wildlife and Terrestrial Habitat**

- If any proposed, threatened, endangered, or sensitive plant or animal species are discovered during project implementation, work will stop in the immediate vicinity of the species and consultation with a biologist or botanist will provide appropriate protective measures.

### **Scenery**

- Stabilize disturbed areas with natural materials in order to maintain desired scenic integrity objectives and landscape character defined in the Forest Plan and to minimize visual background changes. Natural materials include native plants and stones and gravel that are similar color to those that are locally available. See Chapter 3 for more information on these terms.
- Where trees are cut, stumps should be cut flush with the ground where feasible.

### **Social Environment and Public Safety**

- Post warning signs about truck traffic and construction where appropriate.
- Close work areas as needed during project implementation.

### **Heritage Resources**

- Project implementation will comply with the Programmatic Agreement among the USDA Forest Service, Southwestern Region, the New Mexico State Historic Preservation Officer, and the First Amended Programmatic Agreement regarding Historic Property Protection and Implementation among the New Mexico State Historic Preservation Officer, Arizona State Historic Preservation Officer, Texas State Historic Preservation Officer, Oklahoma State Historic Preservation Officer, the Advisory Council on Historic Preservation and the USDA Forest Service, Region 3 (“the Amended Region 3 Programmatic Agreement”).
- Avoid damage and loss to heritage resources, including sites, structures, and traditional cultural properties, through avoidance or other mitigation measures. If it is not possible to avoid or protect heritage resources or if mitigation measures prove unsuccessful, then data recovery (archeological excavations and/or investigations) may be conducted.
- If previously undocumented heritage resource sites are discovered during project activities, or if sites are damaged during project activities, all work will be stopped in the immediate vicinity of the sites and will not restart until authorized by the Forest Archeologist.

## Comparison of Alternatives

The only items listed below are those for which the outputs or effects differed between alternatives.

**Table 1. Effects by Alternative**

Potential Impact	Alternative 1 – No Action (baseline)	Alternative 2 – Proposed Action
<b>Soil and Water</b>		
Acres disturbed	0	Up to 8.5 acres short-term (3–5 years), with approximately 2 acres of bare ground for the road surface after reclamation
Water quality	Same as current conditions (existing erosion on roads)	Minimized by implementation of Storm Water Pollution Prevention Plan and erosion and sediment control plan in compliance with NPDES Construction General Permit. No impact to water quality of the Pecos River.
Water quantity	None	None
<b>Air Quality</b>		
Ambient Air Quality	None, area in attainment	No long-term impacts; may be short-term temporary and localized impacts from earthmoving and construction equipment
<b>Forest Vegetation</b>		
Removal of vegetation	None	Removal of up to 8.5 acres of piñon-juniper woodlands for construction, with vegetation reestablished on all but approximately 2 acres of road surface. Due to stabilization of disturbed areas and decommissioning of former road alignment, there would be no net long-term reduction in vegetation.
<b>Scenic Resources</b>		
Changes to scenery visible in foreground	None	Temporary changes visible nearby until revegetation and stabilization are established.
Changes to scenery visible in middle ground and background	None	Minor changes may be visible to viewers at Pecos National Historical Park and on I-25 that would blend in as revegetation and stabilization are established.

Potential Impact	Alternative 1 – No Action (baseline)	Alternative 2 – Proposed Action
<b>Terrestrial Wildlife</b>		
Disturbance of common wildlife species	None	Minor and temporary only during construction
<b>Federally Listed and Sensitive Species</b>		
Disturbance of T&E species likely to occur in project area	None	No T&E or sensitive species documented to use the project area other than as transients, so no impacts would occur.
<b>Management Indicator Species</b>		
Alteration of habitat viability for 5 MIS that may occur in project area	None	Temporary displacement of individuals may occur during construction; no long-term impacts to habitat trends or species viability
<b>Migratory Birds</b>		
Disturbance of migratory bird habitat	None	Removal of up to 8.5 acres of piñon-juniper woodlands for construction may cause temporary displacement of individual birds; no long-term impacts
<b>Recreation</b>		
Changes to visitor usage of area	None	Visitor usage would stay the same or increase slightly due to improved road conditions
<b>Heritage Resources</b>		
Potential damage from construction	None	No impact on heritage resources or traditional cultural properties. Portions of the Galisteo Trail are already eroded and not eligible for NRHP.
<b>Social and Economic</b>		
Economic changes to region	None	Potential for temporary, short-term increased employment of local people during construction
Increased noise levels		Temporary, short-term elevated noise levels due to operation of trucks and heavy equipment; no long-term impacts
Adverse impacts to minority and low-income populations	None	None



# Chapter 3 – Affected Environment and Environmental Consequences

## Introduction

This chapter describes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to the implementation of the Proposed Action and the No Action alternatives. Within each resource section, the affected environment is briefly described, followed by the potential effects of implementing the No Action and Proposed Action Alternatives. The discussion of resources and potential effects takes advantage of the best available science that is relevant to the issues, existing information from the Santa Fe National Forest Plan, project-specific resource reports, and other sources. The project record for the Reconstruction of Forest Roads 612 and 87 contains the full text of all project-specific information. The project record will be located at the Pecos Ranger Station in Pecos, New Mexico following completion of the EA and will be available for review during regular business hours.

## Santa Fe National Forest Plan Management Direction

The Santa Fe National Forest Plan (page 121, Amendment #6, October 1996) provides the general emphasis for Management Area G, which encompasses the project area. Management Area G includes primarily low elevation grasslands, piñon-juniper, oak, and lower ponderosa pine areas with flat to steep terrain that contain key wildlife habitat for some woodland and shrub dependent species.

Management emphasis in this area is on key wildlife habitat protection and improvement, forage and firewood production, visual quality according to levels identified in the Forest Visual Resource Inventory, and dispersed recreational opportunities.

## Climate

Average climatic statistics for the project area were determined using the closest weather station, Pecos Ranger Station (296676) in the Santa Fe National Forest, approximately 6 miles east of the project area. Average annual maximum temperature for the area is 66 degrees Fahrenheit (°F). Average annual minimum temperature is 33°F (WRCC 2004). Average annual precipitation in this region is 16 inches, occurring as both rain and snow (WRCC 2004). The rainiest months tend to be July and August; the most snow tends to fall in December and January. Moist air generated from the Gulf of Mexico acts as a source of rainfall in the summer months, while the Pacific Ocean affects climatic patterns for the winter months during El Niño Southern Oscillation activity (NOAA 2003). The average growing season in the project area is between 100 to 140 days, from mid-May through mid-September (WRCC 2004).

## Physiography, Geology

The project area is located in the eastern part of the Northern Rio Grande Basin Section (331J) of the Southern Rocky Mountain Province Ecological Subregion (USFS 1996). This Section is located in north-central New Mexico and south-central Colorado. Dominant physiographic features in this province are deep structural basins of the Rio Grande rift valley separating high ranges of the Rocky Mountain System. Landforms include valley, lowland, and elevated plains

and hills (USFS 1996). Elevation in the region ranges from 6,875 to 8,800 feet (2,100 to 2,680 meters). Major landform features are the Rio Grande Rift Valley and Jemez Mountains to the west, the Sangre de Cristo Range to the north, and Pecos River to the west.

Surficial geology of the area is characterized by Cenozoic sedimentary rocks along with some tertiary volcanic rocks and terrestrial basin fills of late Tertiary and Quaternary age (USFS 1996). The project area is contained on Glorieta Mesa, an escarpment composed primarily of Permian sandstones and limestones, capped by Triassic sandstones with Quaternary colluvium in outwash areas (Chronic 1987). The treatment area moves through a portion of Quaternary colluvium on the lower part of the escarpment before emerging into Yeso Formation and Glorieta sandstone (Permian) further up the escarpment (Ilg et al. 1997).

## Soil and Water

### Affected Environment

The soil map units present within the project area are 101, 174, and 278, according to the Santa Fe National Forest Terrestrial Ecosystem Survey (TES) (USFS 1993a). **Table 2** summarizes some characteristics of these soils. There are no hydric soils present in the project area.

**Table 2. Soils Present in the Project Area**

Soil Map Unit Symbol	Surface Texture	Slope Range (%)	Depth to Bedrock
101	Very stony loam	40 – 120	Deep
174	Loam	0 – 15	Moderately deep
278	Gravelly loam	0 – 40	Deep

Source: USFS 1993

The TES (USFS 1993) provides descriptions of the hazards and limitations for specific uses of soils that are relevant to the proposed construction activities. **Table 3** summarizes some important soil characteristics to be considered when evaluating the effects of surface-disturbing activities. The characteristics are briefly describes as follows:

- Erosion hazard indicates the relative susceptibility of the soil to erode if the ground cover were removed.
- Mass wasting describes a variety of processes that result in large masses of soil moved by gravity from one place to another and is used as an indicator of the stability of the land, especially when disturbed. Mass wasting is most visible along slopes like road banks or streambanks where cut slopes have fallen away or slowly moved downhill.
- Roadfill Suitability describes the general suitability for the soil material to be used as fill.
- Unsurfaced road suitability describes the soil limitations that would cause problems for roads of minimal design and construction. This category is used to alert planners

to areas where mitigation measures would be needed to minimize long-term damage to soils.

**Table 3. Suitability of Soil Map Units for Uses Relevant to the Proposed Action**

Map Unit Symbol	Erosion Hazard	Mass Wasting Hazard	Roadfill Suitability	Unsurfaced Road Suitability
101	Severe	Moderate	Poor (Too steep)	Severe (Too steep)
174	Moderate	Not Rated	Fair (Low strength)	Moderate (Low strength)
278	Moderate	Severe	Poor (Low strength)	Severe (Low strength)

Source: USFS 1993a

The project area is located in the northwestern corner of the Pecos Headwaters Watershed (USGS Hydrologic Unit Code 13060001), a subwatershed of the larger Pecos River Basin. The Pecos Headwaters drains a mountainous area of approximately 3,610 square miles.

Several intermittent unnamed washes drain from Glorieta Mesa, and three named creeks are present in the area surrounding the mesa: Ortega Creek, Padre Spring Creek, and Glorieta Creek. FR 612 currently crosses one of the unnamed intermittent washes that drains into Glorieta Creek. Glorieta Creek drains into the Pecos River. There are no perennial streams in the project area.

The New Mexico Environment Department (NMED) Water Quality Control Commission (WQCC) monitors stream conditions in accordance with the Federal Clean Water Act and publishes a list that identifies the condition of assessed streams (NMWQCC 2004). The WQCC considers Glorieta Creek an at-risk water body with designated uses of the perennial reaches of domestic water supply, fish culture, high quality coldwater fishery, irrigation, livestock watering, secondary contact, and wildlife habitat. According to the WQCC, Glorieta Creek does not fully support its designated uses of domestic water supply and high quality cold water fishery due to impairment from ammonia (unionized), nitrogen (nitrate), oxygen (dissolved), specific conductance, water temperature, and turbidity. Probable sources of impairment are listed as municipal point discharges (NMWQCC 2004).

The WQCC also designates the Pecos River as an at-risk water body. In the reach closest to the project area (Cañon de Manzanita to Alamitos Canyon), designated uses are listed as domestic water supply, fish culture, high quality coldwater fishery, irrigation, livestock watering and wildlife habitat. In this reach, the Pecos River does not support livestock watering and high quality coldwater fishery uses, with probable causes of impairment listed as turbidity in spring and temperature. Probable sources of impairment are flow alterations from water diversions, loss of riparian habitat, natural sources, and rangeland grazing (NMWQCC 2004).

Groundwater is the primary water supply for domestic use in the area, provided by wells with a range of yields, depths, and quality. Groundwater quantity is variable in the area and is of concern to local residents. In the private parcel on Glorieta Mesa to be accessed by FR 612 and 87, there is one well drilled to a depth of 1,800 feet with a yield of over 50 gallons per minute. This well is intended to be used by 5 houses.

Section 404 of the Clean Water Act provides for the protection of waters and wetlands of the United States from impacts associated with discharges of dredged or fill material into waters of the United States. Wetlands are protected from development under Executive Order (EO) 11990 (Protection of Wetlands). Guidance from the Order requires Federally-funded activities associated with wetlands to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural beneficial values of wetlands. No delineated wetlands are present in the project area.

Executive Order 11988 (Floodplain Management) provides Federal guidance for activities within floodplains of inland and coastal waters. Preservation of the natural values of floodplains is of critical importance to the nation and to the State of New Mexico. Federal agencies are required to “ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management.” Flood hazard zones (100-year floodplains), as delineated by the Federal Emergency Management Agency, are not present in the project area.

## **Environmental Consequences**

### **Methodology**

The following analysis was performed by considering the soil characteristics derived from the Santa Fe National Forest TES spatial and tabular databases to determine the possible effects of the proposed actions. Identification and evaluation of impaired reaches and watersheds was performed using spatial and tabular data in geographic information systems (GIS) to determine potential impacts to surface water resources. In general, the vicinity of the project area and the streams and watersheds downstream of the project area were used as the geographic boundaries for cumulative effects analysis.

### **No Action Alternative**

Under the No Action Alternative, there would be no change to the current soil and water conditions, so no new impacts to soil and water resources would occur. Existing water erosion on roads and poor road conditions would continue.

### **Proposed Action Alternative**

Under the Proposed Action, there would be some localized disturbance of soils for cut and fill, as well as decommissioning the former road alignment once the new location is established. Moderate to severe limitations for water erosion and mass wasting are indications that mitigation measures and BMPs would be important to implement and maintain to minimize soil erosion and downstream sedimentation in drainages or washes downstream from the project area. Revegetating or otherwise stabilizing disturbed soils with rock or gravel during and after construction would minimize erosion and facilitate long-term (permanent) site stabilization. It is anticipated that revegetation would take between three and five years to become established. The Proposed Action would improve the current poor road conditions and reduce sediment yield by installing gravel surface materials and surface water controls. There would be no adverse impact to water quality of the Pecos River.

Section 402(p) of the Clean Water Act (CWA) specifies that storm water discharge associated with construction activities disturbing one (1) or more total acres of land must be authorized by a

Construction General Permit under the National Pollutant Discharge Elimination System (NPDES), which is managed by the New Mexico Environment Department. A Construction General Permit would be required for the Proposed Action, which would necessitate development and implementation of a Storm Water Pollution Prevention Plan that identifies BMPs to be implemented.

### **Cumulative Effects**

Cumulative impacts for soil and water resources take into account other ground-disturbing activities currently underway or planned over the next several years in or near the project area. While small areas of construction near the project area are anticipated as private land is developed, compliance with permit requirements and installation and maintenance of appropriate BMPs would minimize potential erosion during construction activities and suitable vegetation or other landscaping materials would be established on the sites to ensure soil stabilization. Improved road conditions, reduced sediment yield, improved road drainage is anticipated to result from implementation of the Proposed Action. Under the No Action Alternative, development is likely to occur without these improvements in the vicinity of the project area.

New domestic water wells are likely to be drilled in the future as the private parcels are developed under either alternative. However, the proposed road reconstruction and realignment would not contribute to any changes in water supply or demand. Cumulative impacts to soil and water resources are expected to be minor.

## **Air Quality**

### **Affected Environment**

The Clean Air Act of 1977 (CAA), as amended, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of NAAQS. Primary standards set limits to protect the public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection from decreased visibility, damage to animals, crops, vegetation, or buildings.

Under the authority of the CAA, the EPA and NMED set standards for six principal pollutants, called “criteria” pollutants. These include carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), lead (Pb), and particulate matter less than or equal to 10 microns in diameter (PM<sub>10</sub>) and less than or equal to 2.5 microns in diameter (PM<sub>2.5</sub>).

The NMED Air Quality Bureau monitors and enforces ambient air quality throughout New Mexico and has permanent sites in Santa Fe relatively close to the project area. Two out the six criteria pollutants, CO and PM (both PM<sub>10</sub> and PM<sub>2.5</sub>), are monitored in Santa Fe County because they are problematic pollutants for the area. None of these measured averages exceed the national or state standards (**Table 4**). Thus, the project area is in attainment with NAAQS (NMED 2002). The project area is not within or close to a pristine federal Class I areas, identified as National Parks greater than 6,000 acres or National Wilderness Areas greater than 5,000 acres (NMAQB 2006).

**Table 4. Ambient Air Quality for the Monitoring Stations in Santa Fe County, New Mexico**

Site Name	Site Number	Pollutant Monitored	EPA National Standard Maximum	2000 High Values Average
Cerrillos Road	35-049-0019	CO	9 ppm (8-hour average)	1.67 ppm (8-hour average)
Runnels Building	35-049-0020	PM <sub>10</sub>	150 µg/m <sup>3</sup> (24-hour average)	27.4 µg/m <sup>3</sup> (24-hour average)
Runnels Building	35-049-0020	PM <sub>2.5</sub>	65 µg/m <sup>3</sup> (24-hour average)	8.94 µg/m <sup>3</sup> (24-hour average)
PERA Building	35-049-0001	PM <sub>10</sub>	150 µg/m <sup>3</sup> (24-hour average)	19.7 µg/m <sup>3</sup> (24-hour average)

Source: NMED 2002

Notes: ppm = parts per million.

PM<sub>2.5</sub> = particulate matter that measures 2.5 microns or less in diameter.

PM<sub>10</sub> = particulate matter that measures 10 microns or less in diameter.

µg/m<sup>3</sup> = micrograms per cubic meter.

## Environmental Consequences

### Methodology

The following analysis was performed by considering the current regional air quality and determining whether any of the actions under either alternative would be likely to exceed state and federal air quality standards over the short or long term. The analysis is qualitative. In general, the vicinity of the project area and the airshed downwind of the project area was considered to determine whether long term cumulative impacts to air quality is likely to result.

### No Action Alternative

Under the No Action Alternative, air quality would not change from existing conditions, and blowing dust from the natural surface road would continue under windy conditions.

### Proposed Action Alternative

Under the Proposed Action, increased dust and emissions from earthmoving and construction equipment may contribute to temporary local increases in PM<sub>10</sub>. However, through the use of BMPs, increased dust would be kept to a minimum during construction and reduced in windy conditions over the long term where gravel is added to surface the road. The Proposed Action would not produce significant or long-term (more than 5 years or permanent) reductions in or benefits to air quality.

### Cumulative Effects

Any effect on air quality would be minimal and temporary. Because Santa Fe County is well under non-attainment status for particulates and carbon monoxide, it is unlikely that the effects from this project would alter that status, even at local levels. Increases in vehicle traffic and

subsequent increases in dust and emissions due to road improvements are expected to be minor and would be improved through regional travel management planning and implementation.

## **Forest Vegetation**

### **Affected Environment**

According to Dick-Peddie (1993), the project area is characterized as montane coniferous forest. The vegetation community in the general area is dominated by ponderosa pine (*Pinus ponderosa*), piñon species (*Pinus edulis* and *P. discolor*), juniper species (*Juniperus* spp.), and several oak species (*Quercus* spp.).

Forest Service data classifies the project area primarily as piñon-juniper vegetation community (USFS 2005), containing two-needle piñon (*Pinus edulis*) and one-seed juniper (*Juniperus monosperma*) tree species. Gambel oak (*Quercus gambelii*) is often present.

### **Environmental Consequences**

#### **Methodology**

The following analysis was performed by considering the potential changes to existing vegetative communities as mapped by the Forest Service. Vegetation was identified based on Santa Fe National Forest vegetative communities in GIS and narrative descriptions of the area. In general, the vegetation in the vicinity of the project area was used as the geographic boundaries for cumulative effects analysis.

#### **No Action Alternative**

No forest vegetation would be disturbed under this alternative. Therefore, the No Action Alternative would not impact on forest vegetation.

#### **Proposed Action Alternative**

The Proposed Action would remove approximately 8.5 acres of the piñon-juniper vegetation community where necessary to construct the new road. This is a relatively small amount compared to the total amount of piñon-juniper woodland in the region. Construction would not pose a threat to forest vegetation communities due to the localized area of impact. Disturbed ground would be reseeded with native vegetation where possible, taking into account slope and soil limitations. The seeding would leave all but approximately 2 acres of road surface revegetated, similar to the bare ground under current conditions and the No Action Alternative. The Proposed Action would not have a significant impact on forest vegetation.

#### **Cumulative Effects**

Few other projects that would affect forest vegetation are foreseeable near the project area. While small areas of construction near the project area are anticipated as private land is developed, the small amount of localized disturbance in the project area would contribute little to the cumulative impacts on forest vegetation. Impacts would be temporary and likely to return to conditions similar to those before construction.

## Scenic Resources

### Affected Environment

The project area is located on the northern aspect of an escarpment as FR 612 climbs from the valley bottom onto the mesa top. The character of the landscape is one which is hilly, dominated by the mesa and the escarpment that is dissected by drainages. The vegetation ranges from heavily forested piñon-juniper woodlands and ponderosa pine forest to less densely covered, depending on slope, aspect, and topography.

Specifically the project area is located in a heavily forested subtle drainage-swale much shallower in slope than the rest of the escarpment. The landform and road alignment has an overall line of sight positioned roughly from north-northwest to southeast, and not visible from western or southern vantage points.

Drivers on the northbound lane of I-25 (heading towards Las Vegas, New Mexico), are elevated so they have a view of the existing alignment of FR 612 and the project area. FR 612 blends into the background and is partially concealed by the dominant piñon-juniper canopy, and is visible for less than a minute while traveling on I-25. As a function of location and elevation differences, the project area is not readily visible from southbound I-25 (heading towards Santa Fe). Views while driving on FR 612 and 87 are limited to the slopes and trees within a short distance from the roads.

Portions of FR 612 and 87 are visible from parts of the Pecos National Historical Park approximately 2.5 miles distance, but not from the battlefield or from the proposed Pigeon's Ranch Trail because the line of sight is obstructed by the elevated I-25 roadway.

### Forest Plan Management Direction/Standards and Guidelines

The existing Visual Quality Objective (VQO) for the moderately sloped part of the project area is Partial Retention, viewable from the middleground (0.5 mile to 5 miles away). Partial Retention is defined by the Forest Service as an area where management activities are visually evident but subordinate to the characteristic landscape. The steep parts of the project area, where the majority of the realignment is planned to occur, is identified as Modification, viewable from the background (over 5 miles away). Modification is defined as an area where management activities may visually dominate the original characteristic landscape, but alterations must borrow from naturally established form, line, color, or texture to keep the character of this VQO.

I-25 is designated as the Santa Fe Trail Scenic Byway. Popular scenery-based activities include driving for pleasure, picnicking, camping, and hiking. Visitors and area residents place a high value on the scenic quality and have an interest and concern in impacts to the resource. The current alignments of FR 612 and 87 meet the VQOs from the Santa Fe National Forest Management Plan and the Santa Fe Trail Scenic Byway.

## **Environmental Consequences**

### **Methodology**

The following analysis was performed using 1:24,000 topographic maps, Santa Fe National Forest Visitor maps; digital, spatial and tabular databases; and field reconnaissance for determining existing conditions and the possible effects of the proposed actions. Spatial databases such as digital elevation models, transportation (roads) layers, Terrestrial Ecosystem Unit Inventory, and others were used in GIS analysis. In general, the I-25 corridor and the communities of Glorieta and Pecos, New Mexico were used as the geographic boundaries for cumulative effects analysis.

### **No Action Alternative**

There would be no impacts to scenery from No Action because there would be no change from current conditions. The existing character of the landscape would change gradually over time with natural succession.

The area would continue to meet Forest Plan Management Direction and the current VQOs for form, line, color, and texture. Views from the Pecos National Historical Park would not change. The project area would remain obscured by I-25 at the battlefield and the proposed Pigeon's Ranch Trail. The current alignment of FR 612 would continue to be visible from the northbound lane of I-25 and not visible from the southbound lane.

### **Proposed Action Alternative**

Based on viewshed analysis using terrain in a geographic information system, a portion of the proposed new alignment would be visible in the middleground (0.5 mile to 5 miles away) for approximately 0.4 miles along the northbound lane of I-25 (the Santa Fe Trail Scenic Byway). However, this view is partially concealed by vegetation. Due to the removal of trees during the road construction and realignment, the project area would likely become more visible in the short term, during construction and until revegetation and stabilization measures are established, usually within 3 years. The proposed construction in the project area would eventually blend into the background due to the dissected landscape and the domination of the landscape by trees and the rock formations on Glorieta Mesa.

The project area would continue to meet Santa Fe Trail Scenic Byway, VQOs and Forest Plan Management Direction. The scenery viewed from the background, middle ground, and foreground would change slightly as the new road is constructed and the former alignment is decommissioned. In any case, the project area would be visible to travelers on I-25 for less than one minute if they are traveling at the maximum speed limit of 75 miles per hour. The road construction would be visible in the middleground to local residents from Glorieta Mesa and to some of those driving to houses along CR 63. Road construction would be visible in the foreground to recreational visitors on the road. In the short term, there would be no change in VQO class (Partial Retention and Modification) as a result of implementation of the Proposed Action.

All disturbed areas would be stabilized with native vegetation or natural rock, as required by the engineering design and the erosion control plan, so the visibility of the construction areas would

decrease as vegetation grows, resulting in minor short-term (3–5 years) and no long-term, permanent impacts to scenic resources.

### **Cumulative Effects**

Individual house construction on Glorieta Mesa is the only reasonably foreseeable action near the project area in addition to the Proposed Action. There is a potential for 26 lots to be developed on the mesa in the future, with some requirements for open space. As the development is planned for private land, it is likely to occur under either alternative. There is a required setback from the mesa edge and a height restriction on houses, so they are not likely to be visible to the houses below. This development is anticipated to be localized and intermittent in time and space. The short-term visual effects from construction would be reduced until vegetation grows along the disturbed areas of the roads and near newly constructed houses. None of these construction activities would have a significant cumulative effect on scenic resources.

### **Wildlife**

This section addresses wildlife, threatened or endangered species (T&E), species proposed for the T&E list, sensitive species, Management Indicator Species (MIS), migratory birds, and their habitats.

### **Methodology**

The analysis was performed using source materials including Santa Fe National Forest wildlife survey data and reports cited in the respective sections, the lists of species of concern from the U.S. Fish and Wildlife Service, the NM Department of Game and Fish, and New Mexico Partners in Flight. Determination of wildlife habitat was made using the Santa Fe National Forest vegetative communities in GIS and narrative descriptions of the area. In general, the vicinity of the project area was used as the geographic boundaries for cumulative effects analysis.

### **Affected Environment: Terrestrial Wildlife**

Common animals likely to occur in the plant communities and locations near the project area include, but are not limited to, mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus nelsoni*), woodrat (*Nestoma fuscipes*), deer mouse (*Peromyscus maniculatus*), and mountain cottontail (*Sylvilagus nuttallii*). Nuthatches (*Sitta* spp.), gray and Steller's jay (*Perisoreus canadensis capitalis* and *Cyanocitta stelleri macrolopha*), and mountain bluebirds (*Sialia currucoides*) are avian fauna that may occur in or near the project area (Bailey 1995).

### **Environmental Consequences: Terrestrial Wildlife**

#### **No Action Alternative**

No habitat would be disturbed under this alternative. Therefore, the No Action Alternative would have no impact on terrestrial wildlife species.

#### **Proposed Action Alternative**

The Proposed Action would disturb approximately 8.5 acres of piñon-juniper habitat. Construction would not pose a significant threat to wildlife or this wildlife habitat due to the

localized area of impact and extensive piñon-juniper habitat in the region. Disturbed soils would be reseeded where practical to reestablish native vegetation and restore some of the habitat lost. Due to the localized nature and small size of the treatment area for the Proposed Action, few individual animals inhabit the area and no other projects are planned for this specific treatment area. The long-term effect from improving the roads could increase traffic over time, but this would not be likely to affect wildlife because the common species are adapted to the existing road corridor and the traffic increase is not expected to be great. The Proposed Action would not affect common wildlife species.

**Cumulative Effects**

The cumulative impact on wildlife from the likely development of 26 houses on Glorieta Mesa should be considered in combination with the Proposed Action. Deed restrictions would limit the number of houses and the amount of disturbance within the private parcels to be developed. This would minimize the habitat to be disturbed. The removal of a limited amount of piñon-juniper habitat as a result of the private land development and the road construction under the Proposed Action would be spread over a relatively large area and would not significantly affect wildlife or wildlife habitat.

**Affected Environment: Federally Listed and Sensitive Species**

Special status wildlife, fish, and plants discussed in this section include species that are listed as threatened or endangered (T&E) under the Federal Endangered Species Act (ESA), Forest Service Region 3 sensitive species, or other species of special concern.

The Forest Service has adopted policies to ensure that agency actions do not result in the decline of species and the subsequent listing under the ESA. Those plants and animals listed as sensitive with the Forest Service have been identified by the Regional Forester for which population viability is a concern as evidenced by significant or predicted downward trends in either population or habitat capability.

**Table 5** lists special status species occurring on the Santa Fe National Forest, with information on status and likelihood of occurrence in the Study Area (NMDGF 2003; NMRPTC 1999). Two of the 22 species listed in Table 3-5 may occur in or near the project area. The other 20 species are unlikely to occur based on their known distribution and the lack of suitable habitat, and would not be affected by Forest Service actions within the project area.

**Table 5. Special Status Species Occurring on or near the Santa Fe National Forest**

Common Name	Scientific Name	Status	Occurrence in the Project Area & Typical Habitat
<b>Birds</b>			
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	FS	NOT LIKELY. Riparian habitat does not exist in or near the project area.
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E	NOT LIKELY. Riparian habitat does not exist in or near the project area.

Common Name	Scientific Name	Status	Occurrence in the Project Area & Typical Habitat
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	MAY OCCUR. Transient occurrence is possible; bald eagles are known to occur as winter residents in the Santa Fe NF but the occurrence of breeding bald eagles in New Mexico is very limited.
Mexican spotted owl (Designated Critical Habitat)	<i>Strix occidentalis lucida</i>	T	NOT LIKELY. Canyons and steep slopes in old growth mixed conifer, broad-leaved forests, and oak or spruce-fir forests absent in or near the project area. <b>No critical habitat is present in or near the project area.</b>
American peregrine falcon	<i>Falco peregrinus anatum</i>	FS	NOT LIKELY. Douglas fir, hemlock-Sitka spruce, redwood, ponderosa pine, larch/white pine, lodgepole pine, fir-spruce, aspen, chaparral, rocky, steep cliffs near water are absent in or near the project area. Lack of preferred prey species (swallows, ducks and large shorebirds) would confirm that this species does not occur in the project area.
Northern goshawk	<i>Accipiter gentilis</i>	FS	MAY OCCUR. Transient occurrence is possible because piñon-juniper habitat is a preferred habitat type used by this species. However, no goshawks are known to be present in the project area.
Boreal owl	<i>Aegolius funereus</i>	FS	NOT LIKELY. Alpine habitat does not exist in or near the project area.
White-tailed Ptarmigan	<i>Lagopus leucurus</i>	FS	NOT LIKELY. Alpine habitat does not exist in or near the project area.
Amphibians			
Jemez Mountain salamander	<i>Plethodon neomexicanus</i>	FS	NOT LIKELY. Mixed conifer, spruce-fir forests above 7,200 feet with relatively high humidity and soils with specific rock structure is absent in or near the project area.
Northern leopard frog	<i>Rana pipens</i>	FS	NOT LIKELY. Aquatic and riparian habitat is absent in or near the project area.
Fish			
Rio Grande silvery minnow	<i>Hybognathus amarus</i>	E	NOT LIKELY. Extirpated from Santa Fe County
Rio Grande chub	<i>Gila pandora</i>	FS	NOT LIKELY. Perennial water does not exist in or near the project area.

Common Name	Scientific Name	Status	Occurrence in the Project Area & Typical Habitat
Rio Grande cutthroat trout	<i>Oncorhynchus clarki virginalis</i>	FS	NOT LIKELY. Perennial water does not exist in or near the project area.
<b>Plants</b>			
Holy ghost ipomopsis	<i>Ipomopsis sancti-spiritus</i>	E	NOT LIKELY. Relatively dry, steep, west to southwest-facing slopes in open ponderosa pine or mixed conifer forest with partly weathered limestone is absent in or near the project area.
Hairless fleabane	<i>Erigeron subglaber</i>	FS	NOT LIKELY. Rocky, open meadows in subalpine coniferous forest above 10,000 feet is absent in or near the project area.
Chiricahua (Bloomer's) Dock	<i>Rumex orthoneurus</i>	FS	NOT LIKELY. Moist, loamy soils within riparian and wetland habitat is absent in or near the project area.
Arizona willow	<i>Salix arizonica</i>	FS	NOT LIKELY. Riparian habitat does not exist in or near the project area.
<b>Insects</b>			
Blue-black silverspot butterfly	<i>Speyeria Nokomis nokomis</i>	FS	NOT LIKELY. Streamside meadows and open wet areas with an abundance of violets are absent in or near the project area.
<b>Mammals</b>			
Black-footed ferret	<i>Mustela nigripes</i>	E	NOT LIKELY. Extirpated from Santa Fe County
New Mexican meadow jumping mouse	<i>Zapus hudsonius luteus</i>	FS	NOT LIKELY. Riparian habitat with streamside vegetation of dense grass and willows and montane meadow grassland is absent in or near the project area.
Goat peak pika	<i>Ochotona princeps nigrescens</i>	FS	NOT LIKELY. Alpine habitat does not exist in or near the project area.
Swift fox	<i>Vulpes velox</i>	FS	NOT LIKELY. Plains-mesa sand scrub and grasslands habitat with large populations of rodents, especially kangaroo rats is absent in or near the project area.

Source: USFWS 2006

Notes: E = Endangered

FS = Forest Sensitive

T = Threatened

Specialized habitat requirements such as vegetation type and cover, elevation, and geographic location for the species listed above comprise the preferred habitat regimes for these flora and

fauna (NMDGF 2003). Of the species listed in Table 3-5, the bald eagle and northern goshawk are the only species that may occur in the project area and only as transients. There is no documentation of bald eagles or goshawks nesting or winter roosting near the project area.

## **Environmental Consequences: Federally Listed and Sensitive Species**

### **Northern Goshawk**

#### **No Action Alternative**

No goshawk occurrence or nesting is documented in the project area. Under the No Action Alternative, no habitat loss would occur so any potential habitat would not be affected. There would be no impacts to northern goshawks under the No Action Alternative.

#### **Proposed Action Alternative**

Because no goshawks are likely to be found in the project area, no individuals would be affected. Under the Proposed Action, the small amount of habitat that would be disturbed (8.5 acres) is not likely to affect northern goshawk individuals or populations because their occurrence is transitory in the project area. Therefore, there would be no effect to northern goshawks.

#### **Cumulative Effects**

Within the project area and adjacent forest, no individual northern goshawks are inhabitants. A potential long-term cumulative impact could be an increase in traffic on the Forest roads. However, this would not be likely to adversely affect goshawks because they typically avoid roads for nesting and other habitat uses. For these reasons, there would be no cumulative impacts to northern goshawk populations from this project or other construction activities likely to occur.

### **Bald Eagle**

#### **No Action Alternative**

No bald eagle occurrence or nesting is documented in the project area. Under the No Action Alternative no habitat loss is proposed and therefore any potential habitat that may exist would not be impacted. There would be no impacts to bald eagles under the No Action Alternative.

#### **Proposed Action Alternative**

There are no records of occurrence in or near the project area. There are no large water bodies to provide breeding/foraging habitat within or near the project area. Because no nesting bald eagles are known to occur in the project area and only transient bald eagles are likely in the vicinity, no individuals would be affected. The Proposed Action would disturb 8.5 acres, which would not be likely to affect transient bald eagles individuals or populations in the project area. There would be no effect to bald eagles as a result of implementing the Proposed Action.

#### **Cumulative Effects**

Within the project area and adjacent forest, no individual bald eagles are inhabitants. A potential long-term cumulative impact could be an increase in traffic on the Forest roads. However, this would not adversely affect bald eagles because they typically avoid roads for nesting and other

habitat uses. For these reasons, there would be no cumulative impacts to bald eagle populations from this project or other construction activities likely to occur.

### Management Indicator Species (MIS)

The Land and Resource Management Plan for the Santa Fe National Forest, adopted in 1987, identified eight Management Indicator Species (MIS), or species whose population trends can point to possible effects of management activities on plant communities and seral stages (USFS 1987). These findings were updated based on the Santa Fe National Forest MIS Assessment in June 2003 (USFS 2003). Factors considered in the selection of the eight species included monitoring feasibility, migratory habits, and habitat versatility (USFS 1987). The eight MIS include one federally listed threatened species, the Mexican spotted owl, and one Forest Service Region 3 sensitive species, the Rio Grande cutthroat trout. The other species are Merriam's turkey, hairy woodpecker, Rocky Mountain bighorn sheep, Rocky Mountain elk, piñon jay, and mourning dove (USFS 2003). Five of the eight MIS occur or potentially occur in or near the project area. Discussions in this section on populations and habitat trends are reported for the entire Santa Fe National Forest, based on the most recent MIS status document (USFS 2003) and are not specific to the project area (see **Table 6**).

**Table 6** lists the five MIS that may be present in the project area, along with their habitat associations by vegetation cover types.

**Table 6. MIS That May Occur in or near the Project Area**

Management Indicator Species	Habitat Associations (Vegetation Cover Types)
Rocky Mountain elk ( <i>Cervus canadensis</i> )	Aspen Douglas-fir Englemann spruce Grassland Oak woodland Piñon-juniper woodland Ponderosa pine Rocky Mountain juniper Sagebrush Southwestern white pine White fir
Merriam's turkey ( <i>Meleagris gallopavo</i> )	Aspen Douglas-fir Grassland Piñon-juniper woodland Ponderosa pine White fir

Management Indicator Species	Habitat Associations (Vegetation Cover Types)
Hairy woodpecker ( <i>Picoides villosus</i> )	Aspen Douglas-fir Englemann spruce Piñon-juniper woodland Ponderosa pine Southwestern white pine White fir
Mourning dove ( <i>Zenaida macroura</i> )	Grassland Piñon-juniper woodland Ponderosa pine Rocky Mountain juniper Sagebrush
Piñon jay ( <i>Gymnorhinus cyanocephalus</i> )	Piñon-juniper woodland

### Affected Environment: Rocky Mountain Elk (*Cervus canadensis*)

The Rocky Mountain elk is a subspecies that is distributed over much of the western United States (U.S.). Elk populations in the mountainous western U.S. tend to inhabit coniferous forests associated with rugged, broken terrain or foothill ranges (USFS 1993b). Elk use most forest types with adequate cover and forage. During the summer, elk spend most of their time in high mountain meadows in the alpine or subalpine zones or in stream bottoms (USFS 2003). In the winter, they typically migrate to lower elevation areas (winter ranges). The project area is potential elk habitat.

On the Santa Fe National Forest, forage availability is the limiting habitat component for elk. Forage availability is conditioned by the acreage of alpine and montane meadows, which itself is determined in part by encroaching canopy closure (USFS 2003). Thus, the elk tends to benefit from natural events (e.g., wildfires) or management activities leading to the creation of early seral stage habitat, and elk habitat trend is assessed through the percentage of habitat that has been disturbed to date (11.4%) within the Forest. On this basis, the trend for elk habitat on the Forest is rated as stable: new forage areas (mostly following large wildfires but also prescribed burns, timber harvest, and thinning projects) are created at approximately the same rate that coniferous forests encroach upon existing meadows (USFS 2003).

The elk is considered demonstrably secure globally. On the Forest, elk population levels are assessed through aerial surveys conducted by the New Mexico Department of Game and Fish and by estimated hunter success rate (USFS 2003). The elk population appears to have increased on the Forest since implementation of the Forest Plan. The species is ranked as common, with an estimated number of breeding females ranging between 1,000 and 10,000 individuals. Conflicts with grazing permittees have arisen due to competition between elk and livestock on grazing allotments. While at the same time conducting activities to increase the availability of forage, the New Mexico Game and Fish strives to hold the elk population at its current levels, by providing a limited number of late hunting cow permits (USFS 2003).

## **Environmental Consequences: Rocky Mountain Elk**

### **No Action Alternative**

Under the No Action Alternative, no habitat loss or construction would occur. Therefore, there would be no impacts to elk under the No Action Alternative.

### **Proposed Action Alternative**

Elk occurrence and habitat use in the project area is marginal directly adjacent to FR 612 and 87. Elk calving or other important life history stages are not known to occur in the project area. During construction, temporary displacement of individuals to adjacent forest areas is likely, but they would return when construction has been completed. The impacts to elk would be minimal.

### **Cumulative Effects**

There would be no cumulative effect to the elk population on the Forest from the Proposed Action in combination with other reasonably foreseeable future construction of houses in the private inholdings on Glorieta Mesa. Even slight increases in vehicle traffic in elk habitat over time would not be likely to affect individual elk, as they generally avoid roads and are most likely already conditioned to the existing road corridor.

### **Affected Environment: Merriam's Turkey (*Meleagris gallopavo merriami*)**

Merriam's turkey is the most common subspecies of wild turkey and occurs in many mountain ranges of northern New Mexico (USFS 2003). Turkey habitat on the Santa Fe National Forest includes a wide variety of vegetation types, listed in Table 6, ranging from grassland to mixed coniferous forest. The project area is potential turkey habitat.

Among the species' most important habitat requirements are proximity to open water, roosting trees, and forage. The importance of open water is underscored by the fact that during the nesting season, hens typically nest within ½ mile of water. Favorite roosting trees of Merriam's turkey consist of mature or over-mature ponderosa pines with a diameter at breast height (dbh) of over 14 inches, a relatively open crown, and large horizontal branches originating from the trunk at heights of 20 to 30 feet above ground. Roosting trees provide protection from the wind, and are often located in sites with an open ridge or rocky ledge nearby for easier access to the roost site. Turkeys forage in grasslands, brush communities, deciduous tree-brush, and ponderosa pine. They eat grasses and grasshoppers in the summer. In the fall, they rely on oak mast and mature ponderosa pine seeds, while in the winter they forage on tall grasses. Piñon nuts are also an essential component of the turkey's diet in New Mexico (USFS 2003).

Turkey habitat is plentiful on the Santa Fe National Forest. Forage areas appear to be more limiting than other components (i.e., cover, roosting trees, nesting) of the turkey's habitat on the Forest. Grass, forbs, and mast are more abundant where the forest canopy remains open, and due largely to a human history of fire suppression, many forested areas have witnessed an increase in tree density and higher canopy closure. Thus, Merriam's turkey tends to benefit from natural events (e.g., wildfires) or management activities (e.g., prescribed burns in ponderosa pine forest), leading to the creation of early seral stage habitat or opening of the forest canopy. The turkey habitat trend on the Forest is assessed through the amount of habitat that has been disturbed (10%) since development of the Forest Plan. On this basis, the trend for turkey habitat on the

Forest is rated as stable; new forage areas (mostly following wildfires but also prescribed burns, timber harvest, and thinning projects) are created at approximately the same rate that coniferous forests encroach upon existing forage areas (USFS 2003).

The wild turkey is considered secure both globally and at the state level. Merriam's turkey occurs on all districts of the Forest and is ranked as common, with the estimated number of breeding female birds ranging between 1,000 and 10,000 individuals (USFS 2003). The estimate is based on the amount of habitat available, hunter success rate, breeding bird surveys, and the professional judgment of Forest biologists.

### **Environmental Consequences: Merriam's Turkey**

#### **No Action Alternative**

Under the No Action Alternative no construction or habitat loss would occur. There would be no impacts to Merriam's turkey under the No Action Alternative.

#### **Proposed Action Alternative**

Turkey occurrence and habitat use in the project area is limited to directly adjacent to the existing road. Merriam's turkey occurrence in the project area is not documented for nesting or other important life history stages. During construction, temporary displacement of individuals to adjacent forest areas is likely, but they would return when construction has been completed. The impacts to Merriam's turkey would be minimal.

#### **Cumulative Effects**

There would be no cumulative effect to the Merriam's turkey population on the Forest from the Proposed Action in combination with other reasonably foreseeable future construction of houses in the private inholdings on Glorieta Mesa. Even slight increases in vehicle traffic in Merriam's turkey habitat over time would not be likely to affect individual turkeys, as they are most likely already conditioned to the existing road corridor.

### **Affected Environment: Hairy Woodpecker (*Picoides villosus*)**

Hairy woodpeckers are year-round residents in nearly all forest types from central Canada to the southern U.S. (Scott et al. 1977). The project area is potential woodpecker habitat. Although the hairy woodpecker is a forest generalist, it is an indicator species for the presence of snags and down logs (USFS 2003) and relies on live aspen. Nests are predominantly in trees averaging 17 inches dbh and approximately 60 feet tall. The woodpecker forages for insects mostly on tree trunks averaging 17 inches dbh and greater than 30 feet in height. Down logs are also important in supporting insect populations for the hairy woodpecker.

On the Forest, hairy woodpecker numbers may be more limited by nesting habitat than foraging opportunities. In general, habitat affected by wildfire or insect infestation will have more snags than the minimum required by the Forest Plan. Of the total acreage of potential woodpecker habitat in the Forest, 9.8 percent has been disturbed. Based on this relatively low percentage and management efforts to maintain a minimum number of snags per acre, the habitat of the hairy woodpecker appears to be stable (USFS 2003).

The hairy woodpecker is one of the most common woodpeckers in the Southwest, particularly in riparian habitats and ponderosa pine/mixed conifer forests (Hubbard 1978). The species is listed as secure both globally and at the scale of New Mexico, while Breeding Bird Survey (BBS) data indicate that hairy woodpecker numbers in New Mexico remained stable or increased between 1968 and 1998 (USFS 2003).

The hairy woodpecker is ranked as abundant on the Santa Fe National Forest, with an estimated number of breeding pairs ranging from 10,000 to 100,000. This estimate is based on the amount of hairy woodpecker habitat available forest-wide (estimated at more than 900,000 acres), BBS data, local studies, and the professional judgment of Forest biologists. A study conducted in northern New Mexico found hairy woodpecker densities averaging 11 to 12 breeding pairs per square kilometer in habitat generally comparable to that found on the Forest. Based on that study, hairy woodpecker densities on the Forest may range between 0 and 22 breeding pairs per square kilometer across mixed conifer vegetation types (USFS 2003). The population of hairy woodpeckers on the Santa Fe National Forest is considered to be stable to increasing (USFS 2003).

### **Environmental Consequences: Hairy Woodpecker**

#### **No Action Alternative**

Under the No Action Alternative, no construction or habitat loss would occur. There would be no impacts to the hairy woodpecker population or habitats under the No Action Alternative.

#### **Proposed Action Alternative**

Hairy woodpecker habitat use in the project area is likely limited to directly adjacent to the existing road. Hairy woodpeckers are not known to nest within or near the project area. During construction, temporary displacement of individuals to adjacent forest areas is likely, but they would return when construction has been completed, so the impacts to hairy woodpeckers would be minimal.

#### **Cumulative Effects**

There would be no cumulative effect to the hairy woodpecker population on the Forest from the Proposed Action in combination with other reasonably foreseeable future construction of houses in the private inholdings on Glorieta Mesa. Even slight increases in vehicle traffic over time would not be likely to affect individual woodpeckers because they are most likely already conditioned to the existing road corridor.

### **Affected Environment: Mourning Dove (*Zenaida macroura*)**

The mourning dove ranges from southern Canada south through most of Central America (Mirarchi and Baskett 1994). It is a habitat generalist occurring in many vegetation communities including most forest types (USFS 2003). It is also found in towns and near farms, and frequents backyard feeders. Water and abundant food are essential habitat requirements.

On the Forest, six vegetation types, listed in Table 6, are considered suitable habitat for the mourning dove. Most nesting occurs in the lower elevation vegetation types. However, the mourning dove also uses ponderosa pine, located in the higher elevations, where water

developments and understory burn areas create favorable feeding areas (USFS 2003). The project area is potential dove habitat.

Of the total acreage of potential mourning dove habitat on the Forest, 9.2 percent is considered affected by disturbance. In general, disturbances will result in a more open canopy, allowing for the growth of more understory that benefits the mourning dove (USFS 2003). Mourning dove habitat is considered stable or increasing across the Forest.

The mourning dove occurs in 43 U.S. states and is the most abundant dove species in all of North America (USFS 2003). It is considered secure both globally and at the scale of New Mexico. In New Mexico, mourning dove numbers remained stable or slightly declined between 1968 and 1998 (USFS 2003). The only known threats to the mourning dove are habitat encroachment and over-harvesting.

On the Forest, it is ranked as common, with an estimated number of breeding pairs ranging from 1,000 to 10,000 individuals. This estimate is based on the amount of suitable habitat available to the species, hunter success statistics, BBS data, and the professional opinion of Forest biologists. BBS data indicate that mourning dove numbers may have increased between 1966 and 2000 on or near the Forest (USFS 2003).

### **Environmental Consequences: Mourning Dove**

#### **No Action Alternative**

Under the No Action Alternative, no construction or habitat loss would occur, so there would be no impacts to mourning doves.

#### **Proposed Action Alternative**

During construction, temporary displacement of individuals to adjacent forest areas is likely, but they would return when construction has been completed. The impacts to mourning doves would be minimal.

Mourning dove occurrence and habitat use in the project area is likely limited to directly adjacent to the existing road. Mourning doves are not known to nest in the project area. During construction, temporary displacement of individuals may occur, but the impacts to mourning doves and their habitat would be minimal.

#### **Cumulative Effects**

There would be no cumulative effect to the dove population on the Forest from the Proposed Action in combination with other reasonably foreseeable future construction of houses in the private inholdings on Glorieta Mesa. Even slight increases in vehicle traffic in mourning dove habitat over time would not be likely to affect individual mourning doves because they generally avoid roads and are most likely already conditioned to the existing road corridor.

### **Affected Environment: Piñon Jay (*Gymnorhinus cyanocephalus*)**

Piñon jay habitat is related to stands of piñon-juniper. Open stands for nesting and the availability of piñon nuts are especially important. Crown fires, bark beetle infestations, and disease represent disturbances of piñon-juniper woodland with potential adverse impacts on the piñon jay.

However, the acreage of piñon-juniper woodland on the Forest affected by disturbances since implementation of the Forest Plan is minimal (0.8% of the total acreage of piñon-juniper). On that basis, the habitat trend for the piñon jay on the Forest is considered stable (USFS 2003).

The piñon jay is considered secure both globally and at the scale of New Mexico. In New Mexico, numbers remained stable or slightly declining between 1968 and 1998. With an estimated number of breeding pairs ranging between 1,000 and 10,000, the piñon jay is ranked as common on the Santa Fe National Forest. Despite annual variations, BBS results suggest no apparent long-term trend in piñon jay numbers on or near the Forest between 1966 and 2000. Since then, severe piñon mortality occurred in various places on the Forest, but additional monitoring is needed to determine whether this will affect piñon jay populations (USFS 2003).

### **Environmental Consequences: Piñon Jay**

#### **No Action Alternative**

Under the No Action Alternative, no construction or habitat loss would occur, and there would be no impacts to piñon jays.

#### **Proposed Action Alternative**

Piñon jay habitat use in the project area is likely limited to directly adjacent to the existing road. Piñon jays are not known to nest. During construction, temporary displacement of individuals to adjacent forest areas is likely. The impacts to piñon jays would be minimal.

#### **Cumulative Effects**

There would be no cumulative effect to the piñon jay population on the Forest from the Proposed Action in combination with other reasonably foreseeable future construction of houses in the private inholdings on Glorieta Mesa. Even slight increases in vehicle traffic in piñon jay habitat over time would not be likely to affect individuals, because they are most likely already conditioned to the existing road corridor.

### **Migratory Birds**

#### **Affected Environment**

The Migratory Bird Treaty Act of 1918 (16 United States Code [U.S.C.] §§ 701-715s, as amended) provides management authority for the following section. This act established protections for migratory birds and their parts (including eggs, nests, and feathers) from take, hunting, capture, transport, sale, or purchase. Although emphasis has been placed on the status of neotropical migratory birds (birds that breed north of the Tropic of Cancer but winter in the neotropics), some species exhibit other migration patterns, for example breeding in Canada and wintering mainly in the U.S.

Two documents help identify those migratory species with a higher susceptibility to human-caused impacts in New Mexico. The New Mexico Partners in Flight (NMPPIF) Bird Conservation Plan (NMPPIF 2001) lists two categories of birds, High Priority and High Responsibility species, by vegetation type. High Priority (HP) species are those that tend to be declining over their entire range. In contrast, High Responsibility (HR) species are those with an important portion of their

range in New Mexico, irrespective of their overall population status. For the latter category, any mitigation or conservation measures in the state are disproportionately important. The second document is the Birds of Conservation Concern report issued by the U.S. Fish and Wildlife Service (USFWS 2002). It is organized by Bird Conservation Region (BCR), and the project area occurs within BCR 16, the Southern Rockies/Colorado Plateau bird conservation region.

**Table 7** includes all species listed in the Birds of Conservation Concern Report for the Southern Rockies/Colorado Plateau BCR (USFWS 2002) and the HP and HR species identified by NMPIF with associated habitat types within the project area (NMPIF 2001). Species are grouped based on their potential to occur in the project area.

**Table 7. Migratory Birds Considered in the Project Area**

Species	BCC	Primary Habitat	New Mexico Partners in Flight Listing by Habitat Type		
			GBDS	PMG	PJ
<b>Migratory Birds with Potential Habitat in the Project Area</b>					
Thrasher, Bendire’s	X	Open grasslands, brushy desert	HP	HP	HP
Hawk, Ferruginous	X	Piñon-juniper woodlands	—	HP	HP
Flycatcher, Gray	—	Piñon-juniper, sagebrush	—	—	HP
Vireo, Gray	X	Brushy mountain slopes, mesas, scrub oak	—	—	HP
Warbler, Black-throated Gray	X	Dry oak slopes, piñons, junipers	—	—	HP
Jay, Piñon	X	Piñon-juniper, ranges into sagebrush	—	—	HR
<b>USFWS Listed or Partners in Flight Priority Species with Low Potential of Occurring within Project Area</b>					
Pewee, Greater	—	Mountain pine-oak woodlands (Arizona, southwestern New Mexico)	—	—	HP
Warbler, Olive	—	High mountains (southwestern New Mexico, Gila National Forest, & southeast Arizona)	—	—	HP

Source: USFWS 2002

Notes: BCC = Birds of Conservation Concern (listing by the U.S. Fish and Wildlife Service)

GBDS = Great Basin Desert Shrub

PMG = Plains & Mesa Grassland

PJ = Piñon-juniper

HR = High Responsibility

HP = High Priority

The project area consists of piñon-juniper woodland habitat. PIF high priority species associated with this habitat type are listed in **Table 8**.

**Table 8. Migratory Bird Habitat and Life History Features for Piñon-Juniper Habitat**

PIF High Priority Species	Important Habitat Features and Life History Considerations
Ferruginous Hawk	<ul style="list-style-type: none"> <li>• Requires close proximity to high quality grassland or irrigated cropland.</li> <li>• Prefers forest edge or mature, isolated, flat-topped junipers, with thick branches for nesting.</li> <li>• In northwest New Mexico; often nests on rock spires.</li> <li>• Highly sensitive to human disturbance.</li> <li>• Prey mainly consists of small- to medium-sized mammals.</li> </ul>
Gray Flycatcher	<ul style="list-style-type: none"> <li>• Prefers open piñon-juniper forest, often with interspersed ponderosa.</li> <li>• Shrub cover cannot be too dense; prefers approximately 60%.</li> <li>• Logging and fire may create new habitat after several years.</li> </ul>
Gray Vireo	<ul style="list-style-type: none"> <li>• Project area may or may not be within the distribution area of this species; often found in clusters, with other areas of apparently good habitat unoccupied. More frequent in northwest New Mexico.</li> <li>• Prefers open piñon-juniper woodland or juniper savanna with a shrub component (35-45% cover).</li> <li>• Feeds on ground and up to 16 feet.</li> <li>• No water required.</li> </ul>
Bendire's Thrasher	<ul style="list-style-type: none"> <li>• Prefers relatively open grassland with large scattered shrubs and/or trees (usually present; cholla, junipers, or sagebrush); may use densely vegetated washes or riparian areas.</li> <li>• Breeds in relatively open, degraded grasslands with a moderate to dense shrub component.</li> <li>• Nests are typically placed 0.7 meters to 1.5 meters in height above the ground in semidesert shrubs, cacti, or trees.</li> </ul>
Black-Throated Gray Warbler	<ul style="list-style-type: none"> <li>• Prefers large stands of piñon-dominated woodland.</li> <li>• Often found in dense forests with a canopy.</li> <li>• Understory can be variable.</li> <li>• Uses edges: tree/shrub or tree/grass.</li> <li>• Current breeding bird survey trends for the western U.S. region show this species increasing slightly.</li> </ul>
Piñon Jay	<ul style="list-style-type: none"> <li>• Inhabits piñon-juniper woodlands, ponderosa pine, and lodgepole pine forests at middle elevations (5,000-7,500 feet).</li> <li>• Population may be regulated by the size of the pine seed crops.</li> <li>• Nests in piñons 3-18 feet high and ponderosa pines 5-78 feet high.</li> </ul>

Source: NMPIF 2001

All USFWS Birds of Conservation Concern and NMPIF high priority species associated with each habitat type were considered for this analysis. However, only species that have habitat

characteristics associated with the project area were analyzed and are discussed in detail in the following section.

## **Environmental Consequences: Migratory Birds**

### **No Action Alternative**

Under the No Action Alternative, there would be no construction so no habitat loss would occur. There would be no impacts to migratory birds under the No Action Alternative.

### **Proposed Action Alternative**

Migratory bird habitat use in the project area is likely limited to directly adjacent to the existing road. Migratory birds are not known for nesting or other important life history stages in the project area. During construction, temporary displacement of individuals that may be present to adjacent forest areas is likely. The impacts to migratory birds would be minimal.

### **Cumulative Effects**

There would be no cumulative effect to migratory bird populations on the Forest from the Proposed Action in combination with other reasonably foreseeable future construction of houses in the private inholdings on Glorieta Mesa. Even slight increases in vehicle traffic in bird habitat over time would not be likely to affect migratory birds, as they are most likely already conditioned to the existing road corridor.

## **Recreation**

### **Affected Environment**

The project area is within the boundary of Management Area G described in the Santa Fe National Forest Plan. The Glorieta Mesa area currently has limited visitation and recreational use because the roads are accessible primarily by high clearance vehicles and there are no campgrounds or designated day use areas in the vicinity. Although overall visitation in and near the project area is limited, mountain biking has been a steadily increasing activity in recent years (Doyle 2006).

According to the Forest Service ROS Users Guide (USFS 1982), “the Recreation Opportunity Spectrum (ROS) provides a framework for defining the types of outdoor recreation opportunities the public might desire, and identifies that portion of the spectrum a given National Forest might be able to provide. Each class is defined in terms of its combination of activity, setting, and experience opportunities.” The ROS in the lower part of FR 612 is classified as Roded Natural and the upper part of FR 612 and FR 87 are Semi-Primitive Motorized.

The Roded Natural setting is characterized as a natural-appearing environment, with low to moderate interaction of land users, where modification of the natural environment is moderate but evident and intended to harmonize with the surroundings (USFS 1982). According to Forest Service Manual 2330.3, Roded Natural areas have a development density about 3 family units per acre. The Semi-Primitive Motorized setting is characterized as predominantly natural or natural-appearing, with low concentration of land users but frequent evidence of other users. Motorized vehicles are allowed within both areas (USFS 1982).

## **Environmental Consequences**

### **Methodology**

The following analysis was performed using information on recreation usage provided by the Santa Fe National Forest staff and ROS categories in the Santa Fe National Forest Plan, as well as visitor maps displaying developed recreation facilities. In general, the vicinity of the project area and the communities of Glorieta and Pecos, New Mexico were used as the geographic boundaries for cumulative effects analysis.

### **No Action Alternative**

Under No Action, recreational usage would continue as described under the Affected Environment section.

### **Proposed Action Alternative**

Under the Proposed Action, current recreation usage would continue or increase due to improved road conditions. No significant alteration of the ROS definitions would occur under this alternative because there would be little change from current conditions, i.e., the new road construction would replace and improve an existing road but no additional recreation destinations would be developed.

### **Cumulative Effects**

Future proposed changes to the Pecos National Historical Park to improve NM 50 and the Glorieta Pass Battlefield may increase recreational visitation to the area in general. No other reasonably foreseeable projects in the area would alter current visitation patterns. While there may be some increased visitation to the FR 612 and 87 area due to road improvements, without recreational destinations in the vicinity, no cumulative changes to recreation use are anticipated under either alternative.

## **Heritage Resources**

### **Affected Environment**

The full text and rationale of the archeologist's report will be on file in the project record and will be available during regular business hours at the Pecos Ranger Station in Pecos, New Mexico. The Forest Plan requires the survey and protection of heritage resources, the assessment of the effects of proposed projects on heritage resources, and consultation with the State Historic Preservation Office (SHPO) and Native American tribes.

Two archaeological sites were identified during a field survey of the project area, in addition to the two previous archaeological sites identified by the Forest Service. These include portions of the historic Galisteo Trail within the project area. Portions of the Galisteo Trail are considered eligible for the National Register of Historic Places (NRHP) because of their association with Union troop movements during the Battle of Glorieta Pass during the Civil War. The portions of the Galisteo Trail within the project area cross or are located within the FR 612 roadbed and are in poor condition due to erosion. Those portions of the trail have previously been determined to

be non-contributing elements to the site’s overall eligibility for the National Register of Historic Places.

## **Cultural History**

The summary below provides a brief cultural and historical overview of the Upper Pecos and Glorieta region. The archaeological record suggests both prehistoric (pre-9000 b.c. – a.d. 1450) and historic (a.d. 1450 – present) occupations. Most relevant to the project area are the prehistoric cultures that are represented by sites in the vicinity and the periods when the Santa Fe and Galisteo Trails were created.

### **Prehistoric Periods**

The Palaeoindian period (pre-9000 b.c. – 5000 b.c.) is generally characterized by small, highly mobile bands of hunter-gatherers who relied upon now extinct megafauna, such as mammoth and bison. Paleoindian sites are ephemeral, reflecting movement of bands to areas where food might be found. Within the Upper Pecos area, sites of this period are rare (Scheick 1996), as they are in much of New Mexico.

The Archaic period (5000 b.c. – a.d. 500) is marked by the extinction of large Pleistocene fauna. Although hunting continued to be important, the focus during this period was on smaller animals and the beginning of reliance upon food derived from plants. There is a larger number and more widespread distribution of Archaic sites in northern New Mexico and neighboring regions relative to sites of the Palaeoindian period, suggesting a more intensive use of these areas and a gradually increasing population (Irwin-Williams 1971; Scheick 1996; Cordell 1979).

During the Developmental period (a.d. 500 – 1100), the Upper Pecos Basin began to see the first settled communities dependent on the cultivation of domesticated crops, although few sites of this period have been identified in the Pecos and Glorieta areas (Nordby and Creutz 1993, Scheick 1996). Sites of the early Developmental period are generally single residential units, largely pit houses with associated trash deposits. By the later Developmental period, from approximately a.d. 900 – 1200, sites are characterized by small rectangular roomblocks built of masonry (Scheick 1996).

By the Coalition period (a.d. 1100 – 1300), small agricultural communities were established at several sites in the Upper Pecos region which eventually expanded into large, 200 – 300-room communities. While populations in other areas of the Southeast—such as Chaco and Mesa Verde—were witnessing substantial population declines, the Upper Pecos region appears to have seen a substantial increase in occupation (Scheick 1996).

Much of the information about the Classic period (a.d. 1300 – 1450) in the Upper Pecos is the result of archaeological work and insights gained from the accounts of the first Spanish explorers in the region. During this period, there is good evidence that pueblos like Pecos became major foci for the exchange of agricultural and meat products between the Pueblo and Plains communities (Kenner 1994; Scheick 1996). Unsuccessful attempts by the Apaches to capture Pecos Pueblo, beginning in the 1520s, led to an alliance between the two and a further enhancement to the links between Puebloan and Plains groups (Rasor 1988).

## Historic Periods

The protohistoric period (a.d. 1450 – 1598) occupies a relatively short period between the initial Spanish contact and the establishment of the first Spanish settlement at San Gabriel del Yunque in a.d. 1598. Spanish settlement of the Upper Pecos area seems to have occurred only later, around 1619, when seasonal livestock grazing appears to have begun in the area (Scheick 1996). Many of the details concerning sites of this period are lacking. There is evidence to suggest, however, that Pueblo-Plains economic interactions continued to accelerate during this period and continued until the last quarter of the seventeenth century, when attacks from Comanches became more frequent and serious (Rasor 1988). There is also evidence to suggest an increasing aggregation of population in defensive style multistory pueblos (Scheick 1996).

During the Spanish Colonial period (a.d. 1598 – 1821) occupation in the Upper Pecos area appears to have been relatively sparse, with much of it dating to the later part of the eighteenth century, when Spanish land grants were established in the Pecos River valley (Ebright 1994). This period also saw a considerable influx of explorers and traders into the region and a significant expansion of new towns within the Pecos River valley (Meinig 1974).

By the Mexican period (a.d. 1821 – 1846), the firm control that the Spaniards maintained over their northern frontier was relaxed with the granting of Mexican independence in 1821. Borders with New Mexico were opened and a significant expansion of trade with the United States began via the Santa Fe Trail.

The Territorial period (a.d. 1846 – 1912) began with the arrival of American troops in New Mexico in 1846 and ends when New Mexico became a state. Within the Santa Fe National Forest, Scheick (1996) found that most of the sites dating to this period were field houses associated with agricultural activities. General Stephen Watts Kearny used the Santa Fe Trail as his route in securing New Mexico for the United States. Under American administration, the trail saw the termination of international traffic, the construction of a series of forts as defense against Indian attacks, and the expansion of traffic in military supplies (Simmons 1984). As the railroads expanded into more of the southwest from the 1870s onwards, the importance of the Santa Fe Trail gradually declined, until rail lines reached Santa Fe in 1880 and effectively ended the trail as a major economic artery (Simmons 1984).

During the American Civil War, the Upper Pecos region gained a strategic importance, particularly for Confederate forces who were seeking to control the Santa Fe Trail in northern New Mexico and the proposed Southern Pacific Railroad route in the south. Following their victory at the battle of Valverde in March 1862, Confederate forces began to move north toward Santa Fe to capture the strategic site of Fort Union. The Battle of Glorieta Pass, between March 26 and 28 in 1862, frustrated these attempts and helped the Union forces in New Mexico resist any major threats by the Confederates in New Mexico for the rest of the war. The battle took place, along the Santa Fe Trail, less than 2 miles southeast of the town of Glorieta. Although the engagement was a military victory for Confederate forces, they suffered a major tactical defeat when Union forces took an upland route via the Galisteo Trail and destroyed the Confederate supply train at Johnson's Ranch (Edrington and Taylor 1998)

The town of Glorieta was founded in 1879 during the construction of the Santa Fe Railroad. Shortly afterward, the Pecos and Glorieta areas saw some efforts at mining metal ores in the 1880s and early twentieth century, the latter being more successful and resulting in the

employment of a significant number of workers (deBuys 1985). Following the establishment of the Pecos River Forest Reserve in 1892 and the depression in the 1930s, the area ceased to be a focus of industrial and commercial activity.

## **Environmental Consequences**

### **Methodology**

The following analysis was performed using cultural resource site records, field notes, and site locations provided by the Pecos Ranger District staff, 1:24,000 topographic maps, field reconnaissance for determining existing conditions and the possible effects of the proposed actions, and GIS analysis using spatial and tabular data. The analysis below summarizes the information provided in the detailed Heritage Resources Survey Clearance Report prepared for this project. In general, the vicinity of the project area was used as the geographic boundaries for cumulative effects analysis.

### **No Action Alternative**

Under No Action, prehistoric and historic archaeological sites in the project area would remain in their current condition.

### **Proposed Action Alternative**

With the exception of the Galisteo Trail, all known sites within the project area would be avoided by all construction activity; therefore there would be no effect to or loss of any archaeological sites or data. The proposed road alignment would ensure that all recorded archaeological sites are located either outside the ROW that is 50 feet on either side of the road centerline or avoided during construction. Those portions of the Galisteo Trail segments within the project ROW were previously determined to be non-contributing elements to the site's overall National Register eligibility, and the New Mexico SHPO has concurred with this determination.

Twenty-six Native American Tribes and Pueblos were sent scoping letters in September of 2006 regarding the project. Only one Tribe, the Comanche Tribe of Oklahoma, responded to the scoping letter and stated that they had no concerns or issues regarding the project. The mailing of the scoping letter to all potentially concerned tribes and the general lack of response, meets the requirements for tribal consultation as stipulated in the National Historic Preservation Act (as amended), NEPA, 36 CFR 800 Regulations, and the First Amended Region 3 Programmatic Agreement with the SHPO regarding heritage property protection and responsibilities. No known Traditional Cultural Properties are located within the project area.

According to the most recent listings of the NRHP maintained by the National Park Service, no sites in the project area are listed or nominated to the NRHP. The Proposed Action would be in compliance with the National Historic Preservation Act of 1966 as amended, 36 CFR 800 Federal regulations protecting cultural resources, direction in the Forest Service Manual 2360, and the First Amended Region 3 Programmatic Agreement with the SHPO regarding heritage property protection and responsibilities.

Monitoring of road construction activities to ensure that equipment remains outside of National Register-eligible archaeological site boundaries would ensure adequate protection of those sites

near the existing FR 612 and 87. Monitoring would also be conducted for road decommissioning where the former FR 612 alignment is to be abandoned.

If any unrecorded sites are found during the proposed project activities, work in the vicinity of the site(s) will cease, and the Forest Service archaeologist would be notified. Assuming the sites would be avoided and all mitigation and monitoring measures are implemented, no effects to heritage resources are anticipated as a result of implementing the Proposed Action.

### **Cumulative Effects**

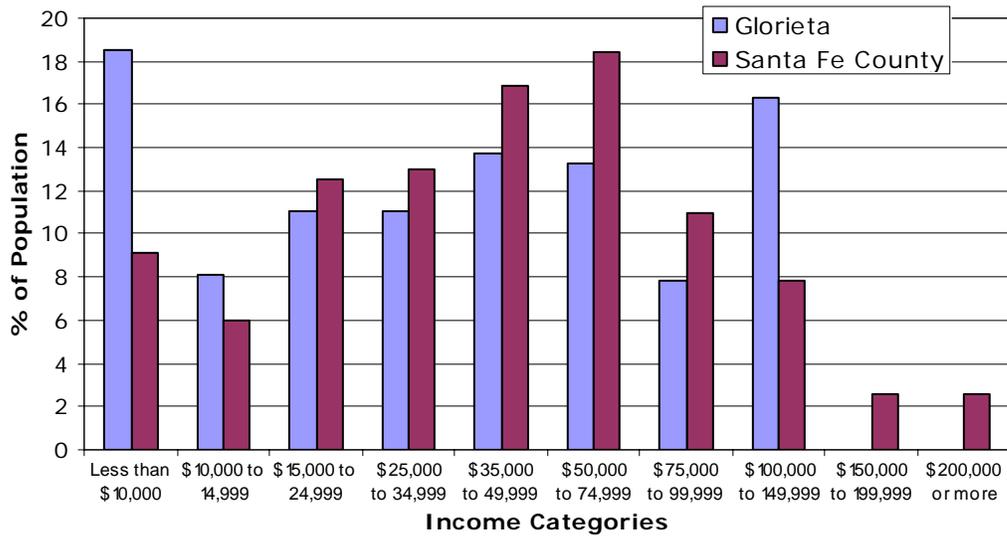
Reasonably foreseeable future projects such as private parcel development, improvements to the Pecos National Historical Park, in combination with improved road access on FR 612 and 87, are likely to slightly increase public travel in and near the project area. A cultural resources survey of some of the private parcels proposed for development on Glorieta Mesa was completed and protections are in place for documented heritage resources. Increased development and improved road access are thought to contribute to potential archaeological site vandalism (Nickens 2000). However, the known historic and prehistoric sites in the project area are not obvious to the public or have protections established to minimize damage. For these reasons, increased threats or damage to heritage resources are not anticipated to occur under either alternative.

## **Social and Economic**

### **Affected Environment**

#### **Income/Poverty**

Glorieta (3.5 miles north of the project area) is the closest town and the project area is located within Santa Fe County. In 2000, the median household income in Glorieta was \$36,250, less than for Santa Fe County (\$42,207) and slightly higher than for New Mexico (\$35,091). The household income for Glorieta is well below the national average of \$41,994 and slightly higher than the state average (U.S. Census 2002). **Figure 4** compares the annual incomes of Glorieta and Santa Fe County.



**Figure 5. Distribution of Annual Household Income, Glorieta and Santa Fe County, 2000**

Source: U.S. Census 2002

As shown in **Table 9**, retail trades employ the greatest number of Glorieta residents. Other industries providing employment to the residents of Glorieta are listed.

**Table 9. Industries Employing Glorieta Residents**

Industry Group	% of Population
Retail Trade	14.2%
Professional, scientific, management, administrative, and waste management services	12.6%
Finance, insurance, real estate and rental and leasing	10.9%
Educational Health and Social Services	10.4%
Manufacturing	10.4%
Arts, entertainment, recreation, accommodation and food services	9.6%

Source: U.S. Census Bureau 2002

In the year 2000, Glorieta had a population of 859 (U.S. Census Bureau 2002). Population statistics for Glorieta, and the other towns in the region, Eldorado, Pecos and Santa Fe are compared to the county, state, and national demographics in **Table 10**. Statistics at the county level are assumed to reflect the urban concentration of people, and would not necessarily reflect the rural nature of the project area.

**Table 10. Profile of Ethnic and Racial Demographic Characteristics, Year 2000**

Geographic Area	Total Population	Race									
		Total	One Race							Two or More Races	Hispanic or Latino (of Any Race)
			White	Black or African American	American Indian	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race			
U.S.	281,421,906	274,595,678 (98%)	75%	12%	<1%	4%	<1%	6%	6,826,228 (2%)	35,305,818 (13%)	
New Mexico	1,819,046	1,752,719 (96%)	67%	2%	10%	1%	<1%	17%	66,327 (4%)	765,386 (42%)	
Santa Fe County	129,292	124,024 (96%)	74%	<1%	3%	<1%	<1%	18%	5,268 (4%)	63,405 (49%)	
Santa Fe, NM	62,203	59,589 (96%)	76%	<1%	2%	1%	<1%	15%	2,614 (4%)	29,744 (48%)	
San Miguel County	30,126	28,821 (96%)	75%	1%	2%	1%	<1%	36%	1,305 (4%)	23,487 (78%)	
Eldorado, NM	5,799	5,638 (97%)	91%	<1%	1%	<1%	<1%	4%	161 (3%)	783 (14%)	
Pecos Village, NM	1,441	1,401 (97%)	69%	<1%	1%	<1%	<1%	27%	40 (3%)	1,154 (80%)	
Glorieta, NM	859	829 (97%)	78%	<1%	2%	<1%	<1%	16%	30 (4%)	481 (56%)	

Sources: U.S. Census Bureau 2002

Note: Totals may not equal 100% due to rounding.

**Noise**

Current noise levels in the project area are very low due to the remote location of the project area and are typical for rural areas. The bulk of noise is caused by natural phenomena. Human-created noise is generated from recreational visitors, vehicles, and sporadic equipment usage by local residents.

**Environmental Justice**

Executive Order 12898 (February 11, 1994) directs Federal agencies to focus on environmental conditions in minority and low-income communities. The purpose of the order is to ensure that these communities do not bear disproportionately adverse environmental effects from Federal actions. Glorieta contains a majority of the population that is Hispanic and the median household income is less than the national average, both characteristics of a minority, low-income community.

## **Environmental Consequences**

### **Methodology**

The following analysis was performed by considering whether any of the actions under either alternative would result in changes to the economic situation of the local population, the background noise levels in the vicinity of the project area, and whether either alternative would disproportionately affect any specific racial or ethnic group in the region. The analysis was qualitative. In general, the the communities of Glorieta and Pecos, New Mexico were used as the geographic boundaries for cumulative effects analysis.

### **No Action Alternative**

Under the No Action Alternative, there would be no change from current conditions related to social impacts of income, poverty, noise, and environmental justice.

### **Proposed Action Alternative**

#### **Income/Poverty**

Under the Proposed Action, it is possible that some local people employed for the road reconstruction work would benefit financially, but these effects would be short-term and temporary. Because of its proximity to the project area, Glorieta might experience slight increases in visitation as passenger vehicles stop before accessing the improved road, providing an increase in local retail sales, but such visitation would be slight, as would any associated benefits.

#### **Noise**

To be considered significant, noise levels must be elevated over the long term. Earthmoving equipment and trucks generate decibel (dB) levels 15 to 30 units higher than the prescribed Federal Highway Administration recommended levels for residential areas close to highways (LHH 2001).

Under the Proposed Action, road construction would temporarily elevate noise levels through the operation of trucks and heavy equipment, but would not persist, only occurring during daylight hours while construction is underway (anticipated to be 30 days). Noise levels would be affected directly in the project area, and would temporarily increase heavy equipment traffic on NM 50, CR 63, and FR 612. These elevated noise levels would be temporary and short-term, during construction only, and therefore would not significantly affect the local environment.

#### **Environmental Justice**

While the population near the project area consists of a majority of minority, low-income people, there would be no adverse impacts to the area or this population if the Proposed Action were implemented.

#### **Cumulative Effects**

Reasonably foreseeable future actions in the region, to be considered in combination with the Proposed Action, include development of private land on Glorieta Mesa, in addition to other subdivisions closer to Glorieta. All of these actions would involve the use of construction

equipment and are likely to increase vehicle traffic and population numbers in the future. Construction projects would not occur at the same time and would be spread over a relatively large area, so elevated noise levels from heavy equipment and worker vehicles would be localized and intermittent. Population increases and road improvements may provide a small boost to the local economy as the people frequent local businesses. The projected construction activities and increased population numbers would not substantially alter the income of Glorieta residents or adversely affect noise levels or environmental justice populations.



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