Grand Canyon

National Park Service
U.S. Department of the Interior

Grand Canyon National Park

Environmental Assessment / Assessment of Effect
July 2007

South Entrance Road Improvements

Grand Canyon National Park • Arizona

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Summary

Grand Canyon National Park proposes to improve the South Entrance Road (Highway 64) between the community of Tusayan and the entrance station, located on the South Rim of Grand Canyon National Park. Proposed actions include constructing up to two additional northbound lanes and an independent bypass lane. Actions are needed because the long waits at the South Entrance Station result in poor visitor, employee and resident experiences; the safety of visitors, employees and residents is compromised due to extended waiting time to enter the park; resource impacts are resulting from congestion at the entrance station, including air quality and social trailing; and immediate needs to relieve congestion at the entrance station have not been sufficiently addressed. The park is working with the Arizona Department of Transportation (ADOT) to address the proposed work in the ADOT easement, south of the park boundary. This Environmental Assessment/Assessment of Effect (EA/AEF) evaluates two alternatives for addressing the purpose and need for action, including a no action alternative. The preferred alternative (Alternative B) includes 1) constructing up to two additional northbound lanes, approximately 1 mile long; 2) restriping Highway 64 between the park boundary and the entrance station; and 3) constructing a ½ mile long independent bypass lane. Other transportation issues in the park will be addressed in the South Rim Visitor Transportation Plan which is currently in progress and expected to be released in fall 2007. The impact analysis concludes that implementation of the preferred alternative would result in beneficial impacts to visitor experience, park operations and public health and safety, and would not have significant impacts on natural and cultural resources.

Public Comment

If you wish to comment on the environmental assessment, the NPS prefers that you post comments online at http://parkplanning.nps.gov/grca or you may mail comments to Steve Martin, Superintendent, Grand Canyon National Park, Attention: South Entrance Road Improvements, P.O. Box 129 / 1 Village Loop, Grand Canyon, Arizona 86023. This environmental assessment will be on public review for 30 days.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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INTRODUCTION

This document's purpose is to disclose expected effects to the human environment from the construction of additional northbound lanes and an independent bypass lane at the South Entrance Station on Grand Canyon National Park's South Rim. Human environment is defined as the natural and physical environment and the relationship of people with that environment. The project area consists primarily of National Park Service (NPS) land and a small amount of Arizona Department of Transportation easement (over Kaibab National Forest) between the access road to the Tusayan Ranger Station and just north of the entrance station on Highway 64 (Map 1). This includes the roadway and the proposed alignment of the bypass lane.

PURPOSE OF AND NEED FOR ACTION

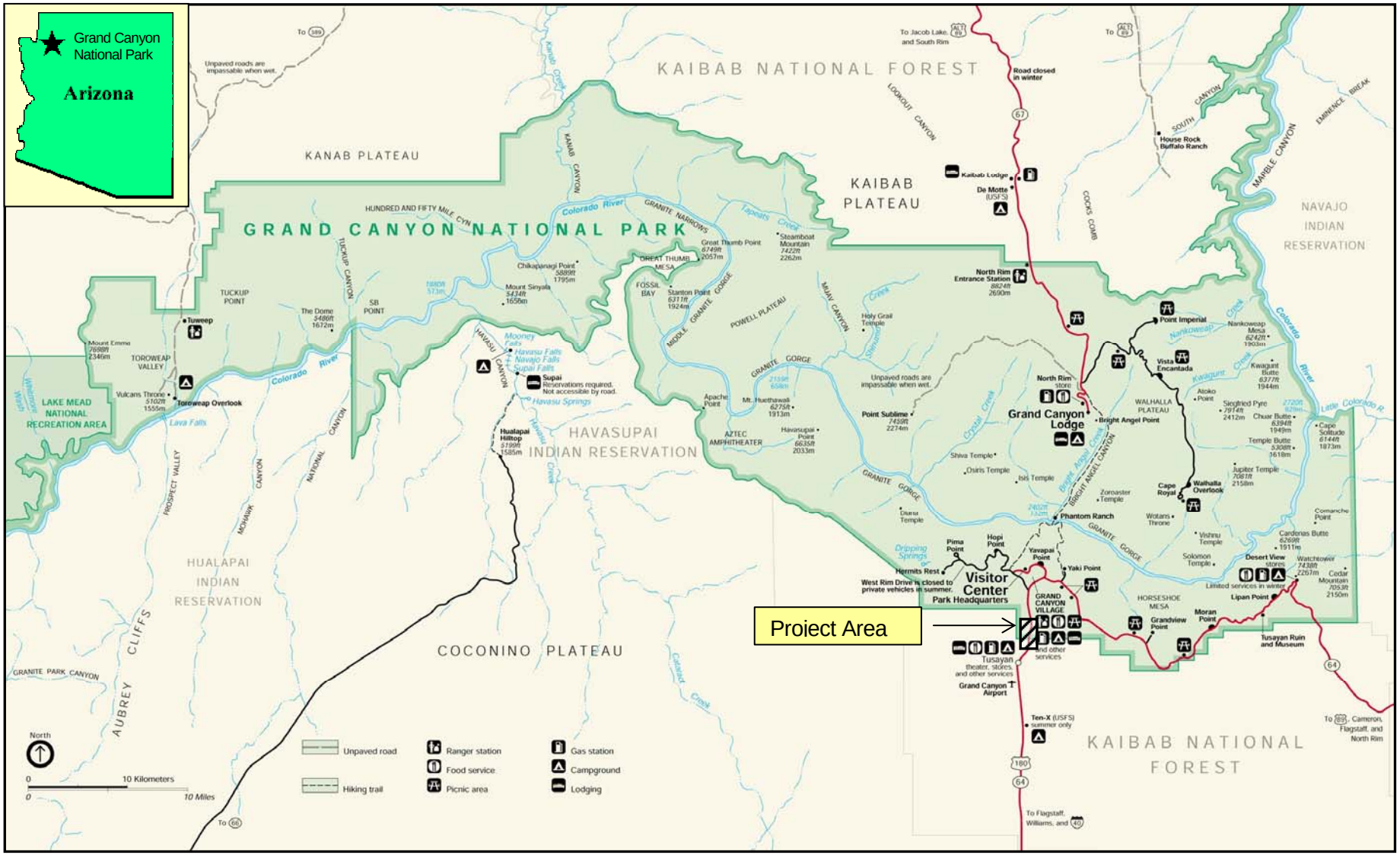
The purpose of the proposal is to provide a safe and effective system that addresses the traffic congestion and safety issues at the south entrance to the park. The project would address current levels of visitation to the South Rim, facilitate enhanced visitor experiences, and protect park resources. This project will not preclude other future transportation systems from being implemented, including those that may be required for substantial increases in visitation.

Actions are needed because:

- The safety of visitors, employees and residents is compromised due to extended waiting time to enter the park. Fee collection employees walk among traffic during high visitation which may lead to pedestrian-vehicle conflicts. Distraction, frustration and discomfort of drivers can increase the likelihood of vehicular and/or pedestrian accidents.
- Resource impacts are resulting from congestion at the entrance station, including air quality and social trailing. Idling vehicles can affect localized air quality. Social trails in the adjacent wooded areas have developed due to long waits and limited restrooms.
- The long waits at the South Entrance Station result in visitor frustration and poor visitor, employee and resident experiences.
- Immediate needs to relieve congestion at the entrance station have not been sufficiently addressed.

<u>Objectives of the Action</u>

1. Improve the entrance experience by reducing long waits at the entrance station for visitors, as well as for employees, residents and commercial traffic.
    - Provide more approach lanes
    - Provide a bypass lane
2. Improve safety of visitors, employees and residents at the entrance and on the two mile approach to the entrance.
3. Ensure compatibility with other future transportation options.
4. Cooperate with gateway communities, agencies, tribes, and other stakeholders to achieve mutual transportation goals.



Map 1. Grand Canyon National Park and Project Area.

Map 2. Project Area from Tusayan to the South Entrance Station.

MANAGEMENT AND PLANNING HISTORY

National Park Service Management Policies 2006 is the guiding document for management of all national parks within the national park system. It is the basic NPS Servicewide policy document and supersedes the 2001 edition. *Management Policies* is the highest of three levels of guidance documents in the NPS Directives System. As stated in its introduction, "It (NPS Directives System) is designed to provide NPS management and staff with clear and continuously updated information on NPS policy and required and/or recommended actions, as well as any other information that will help them manage parks and programs effectively." Among direction on all aspects of park management, *Management Policies* set direction for each unit of the national park system to maintain an up-to-date General Management Plan (GMP). *Management Policies'* Chapter 8, Use of the Parks and Chapter 9, Park Facilities are most applicable to this project.

The primary purpose of the park's GMP is to provide a foundation from which to protect park resources while providing meaningful visitor experiences. The proposed project area is part of a transportation subzone, which connects development zones and includes primarily paved road corridors to a width appropriate for safe travel. The plan's vision for the South Rim is to accommodate large numbers of visitors while minimizing dense crowds and related resource impacts.

Bypass Lane

A bypass lane was originally envisioned in the December 2004 Report to Congress on Transit Alternatives. A bypass lane was considered in Option A, an option created to address only the park's most pressing transportation needs. Option A included a parking area near Canyon View Information Plaza (CVIP), on the rim near Mather Point, a transit staging area (including a parking lot) near Long Jim Canyon, and a bidirectional bypass lane that extended from near Long Jim Canyon to just north of the South Entrance Station, on the west side of the South Entrance Road. The purpose of the bypass road was to ensure that transit vehicles, carrying visitors from the transit staging area near Long Jim Canyon, could enter the park on a regular schedule without having to wait in South Entrance Station queues. It would also function as an employee/resident access lane to facilitate quicker entrance for non-paying entrants, and to help to reduce long waits at the entrance station. The bypass lane included an egress lane for all traffic exiting the park, so that northbound bypass lane users would not be required to cross traffic.

The Arizona Department of Transportation (ADOT) has made a commitment to restripe Highway 64 between Tusayan and the park boundary to provide two northbound lanes. The park intends to complete the proposed road improvements from the park boundary to provide two continuous northbound lanes to the South Entrance Station. A portion of the road widening proposed by the NPS would be in the ADOT easement just south of the park boundary, therefore, ADOT requested to become a cooperating agency on the project. A project agreement was signed between ADOT and the NPS on 18 June 2007.

The proposed road improvements have been considered in the larger planning effort for the upcoming South Rim Visitor Transportation Plan Environmental Assessment (Transportation Plan). This project has been separated from the larger plan to address visitor experience and safety concerns and to expedite implementation. The proposed road improvements need to be implemented as soon as possible. Although this project would precede the finalization of the Transportation Plan, it would ensure compatibility with future transportation options.

Internal Scoping

Preliminary internal scoping identifying NPS specialists' concerns regarding the South Entrance Road improvements began in January 2006 under the auspice of the Transportation Plan. A project-specific interdisciplinary team (IDT) was established in April 2007 for the road improvements project.

Discussions occurred with the IDT to develop purpose, need and objectives in May 2007 and revised alternatives in June 2007 after the public review period ended.

Public Scoping

NPS began the public scoping process in May 2007 with distribution of a general scoping letter describing a preliminary action alternative under consideration for the South Entrance Road improvement project. Scoping occurred for the Transportation Plan in March 2006 and Appendix B is provided in this EA/AEF for reference of those comments. This letter was distributed to the park's approximately 600-person transportation mailing list, which includes Native American tribes, state and Federal agencies, was posted on the park's website and the Planning, Environment and Public Comment (PEPC) website and was included in a press release. Recipients were asked to respond with any issues or concerns with the alternatives described, and with whether they wished to receive a copy of the Environmental Assessment when distributed for public review. Eight (8) letters and e-mails were received in response to the scoping effort; senders are listed below:

- Navajo Nation Parks and Recreation Department
- 7 private individuals

Responses included recommendations for bypass lane user groups, alignment of the bypass lane and road widening to three northbound lanes. Comments received provided overall support for the proposed action alternative.

A set of comments pertaining to the South Entrance Road improvements and the South Entrance Station were received during the March 2006 public scoping period on the Transportation Plan (listed in Appendix B). Comments included recommendations for more traffic lanes, a bypass lane on the east side of the road, a reduction in park fees for shuttle users and coordination of efforts with ADOT.

NPS used these scoping responses, in combination with other input from the project IDT and other NPS staff to re-evaluate the project's purpose, need and objectives. Based on this review, NPS developed a preliminary project proposal designed to best meet the purpose and need for taking action and the specific identified project objectives.

This EA/AEF has been distributed to those who responded to either the public scoping effort, to pertinent agencies and tribes and to local libraries. Availability of the EA/AEF for the 30-day public review was advertised via press release, publication on the park's website and through the NPS PEPC website.

ISSUES AND IMPACT TOPICS

After public scoping, issues and concerns were distilled into distinct impact topics to facilitate analysis of environmental consequences, which allows for standardized comparison between alternatives based on the most relevant information.

An issue is an effect on a physical, biological, social, or economic resource. The predicted effects of an activity create the issue. Issues may come from the public, from within an agency or department, or from another agency (Freeman and Jenson 1998). For this project, the interdisciplinary team identified issues with the preliminary project proposal (shown as Alternative B in Chapter 2), as described in the May 2007 scoping letter. Internal, public, and other agency comments resulted in the following substantive issues:

- The third northbound lane should be constructed concurrently with the bypass lane so that queuing in the two lanes approaching the entrance station does not block access to the bypass lane.
- The bypass lane should diverge from the highway as far south as possible.

Other concerns and comments brought forward (as shown in Appendix B) included appropriate road widening, alignment of the bypass lane, recommendations for bypass lane user groups, and sale of park passes.

No other significant issues not already identified in internal scoping came forward through this scoping effort. Identified issues were used to formulate alternatives and mitigation measures. Impact topics were then selected for detailed analysis based on substantive issues, environmental statutes, regulations, executive orders, and *NPS Management Policies 2006*. A summary of the impact topics and rationale for selection/dismissal are given below.

Relevant Impact Topics

Archaeological and Ethnographic Resources – The 1966 National Historic Preservation Act, as amended, National Environmental Protection Act (NEPA), the 1916 NPS Organic Act, NPS Management Policies 2006 and other NPS guidelines require consideration of cultural resource impacts. Project undertakings have the potential to affect archaeological resources and sites of special ethnographic significance to American Indians. Therefore, archaeological and ethnographic resources are discussed in Chapter 3.

Soundscape – The NPS is mandated to articulate park service operational policies that would require, to the fullest extent practicable, the protection, maintenance or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Proposed project components would generate construction-related noise in the project area above ambient conditions, and actions have the potential to alter, to some extent, visitor use in the project area. Therefore, soundscape is discussed in Chapter 3.

Vegetation – Proposed construction would involve disturbance of vegetative communities and some tree removal would be necessary. There is the potential to increase disturbance to adjacent biotic communities via the spread of exotic vegetation and noxious weeds. Therefore, vegetation is discussed in Chapter 3.

General Wildlife – Proposed activities would involve some disturbance to vegetative communities and thus disturbance of wildlife habitat. Habitat modification as well as noise and other activities associated with project implementation have the potential to impact wildlife populations. Therefore, general wildlife is discussed in Chapter 3.

Special Status Species – Federally listed threatened and endangered species, species proposed for listing on the Endangered Species List and species of particular concern to Grand Canyon National Park have the potential to be affected by proposed actions. Therefore, special status species are discussed in Chapter 3.

Visitor Experience – The 1916 NPS Organic Act and *NPS Management Policies 2006* direct national parks to provide for public enjoyment. The south entrance to the park is the first experience in the park for many visitors and one of the primary objectives of the proposed project is to improve visitor experience. Therefore, visitor experience is discussed in Chapter 3.

Park Operations – Park operations, including shuttle bus operations and concessionaire operations at the entrance station have the potential to be affected by the proposed actions. Therefore, park operations are discussed in Chapter 3.

Public Health and Safety – *NPS Management Policies 2006* directs the park service to protect public health and safety. The policies state that "(w)hile recognizing that there are limitations on its capability to totally eliminate all hazards, the Service and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The Service will strive to identify and prevent injuries from recognizable threats to the safety and health of persons and to the protection of property by applying nationally accepted codes, standards, engineering principles, and the guidance contained in Director's Orders #50B, #50C, #58, and #83 and their associated reference manuals." One of the primary objectives of the proposed project is to address safety hazards at the entrance. Therefore, public health and safety is discussed in Chapter 3.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

Cultural Landscapes and Historic Structures – Direct or indirect impacts to historic structures and cultural landscapes are not expected from implementation of this project, because the South Entrance Station and associated features are not eligible for, nor listed on the National Register of Historic Places. The project location is not within or adjacent to any historic districts and therefore would not have an impact on cultural landscapes. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, Assessment of Adverse Effects), the National Park Service concludes that implementation of the preferred alternative would result in a "no historic properties affected" determination. For these reasons, cultural landscapes and historic structures were dismissed from further analysis.

Air Quality – Clean, clear air is essential to preserve Grand Canyon National Park resources, as well as for visitors to appreciate those resources. Grand Canyon National Park is a federally mandated Class I area under the Clean Air Act. As such, air in the park receives the most stringent protection against increases in air pollution and in further degradation of air quality-related values. The Act then sets a further goal of natural visibility conditions, free of human-caused haze. Park air quality is generally quite good. Park pollution levels fall below those established by the Environmental Protection Agency to protect human health and welfare. However, visibility is usually well below natural levels because of air pollution. Most of this pollution originates far outside park boundaries, and arrives as a well-mixed regional haze, rather than as distinct plumes.

Section 118 of the Clean Air Act requires all Federal facilities to comply with existing Federal, state, and local air pollution control laws and regulations. The park air quality specialist has determined that this project, due to its limited scope, would not require NPS consultation with the State of Arizona regarding air quality. However, because there is some ground disturbance involved, there is a possibility of raising fugitive dust during project implementation or from disturbed areas afterwards. After project completion, paving footprints would address dust there. Revegetation of the site, after work is completed, would provide long-term dust control. Mulch and the plants themselves would stabilize the soil surface and reduce wind speed/shear against the ground surface.

Trenching and other minor onsite work would increase dust and combustion-related emissions. Dust raised during ground disturbance would be limited by project size and equipment used. By clearly marking project boundaries, unnecessary soil disturbance and consequent dust generation would be avoided. Water sprinkling can control fugitive dust emissions from light traffic in the project area. Construction equipment can adversely affect air quality by exhaust emissions. Minimizing the extent

to which construction equipment idles would help reduce this effect. Minimizing idling would also help reduce noise impacts during construction. Indirect air quality impacts from routine daily vehicle emissions from visitors, employees and official business would be unchanged.

Therefore, local air quality may be temporarily degraded by dust generated by the construction activities under the action alternatives and emissions from construction equipment under implementation of the alternatives. This degradation would result in an overall negligible impact to air quality, and would last only as long as rehabilitation activities occurred. Impacts to overall park air quality or regional air quality are not expected. Likewise, impacts from foreseeable future projects in the area would be negligible and would be restricted to the construction period.

The proposed road improvements would result in decreased idle times of vehicles and would therefore reduce emissions. This would provide long-term benefits to air quality; however, overall the benefits would be negligible. Cumulative impacts to air quality would be adverse and beneficial, local, short-term to long-term and negligible. Therefore, air quality was dismissed from further analysis.

Watershed Values – The project area is located within the Coconino Wash Headwaters watershed. There is no standing water or any major or minor drainages in the project vicinity. There is no riparian habitat present within or adjacent to the project area. The Grand Canyon Village area is characterized by the absence of surface water, which generally drains through the ground water system or returns to the atmosphere via evapotranspiration. Surface runoff usually only occurs following severe storm events. This is largely due to the permeable nature of the upper sedimentary layers underlying Grand Canyon Village area (NPS 1995, Roundy and Vernon 1996) and the evapotranspiration potential of the surrounding vegetation type (Huntoon undated).

Proposed construction would involve some soil disturbance. The project components include road widening and the construction of a ½ mile long independent bypass lane. Some trenching may be necessary to provide electrical service to a gate along the bypass lane. These types of activities have the potential to disturb soil and have the potential to result in impacts to watershed values through removal of live vegetation and exposing and compacting bare soil. This can, in turn, sometimes increase surface runoff and erosion and/or subsurface flow to a downstream channel, depending on the amount of disturbance. Increased runoff can result in on-site surface erosion problems or downstream water yield increases which could result in increased peak flows and higher sediment loads in some situations. Higher sediment loads can cause accelerated channel erosion, sedimentation, and flooding in downstream channel systems (Lovely 1991). However, due to the limited size and extent of the ground disturbance proposed for this project, the fact that the area is located within the South Entrance Road transportation subzone of the Grand Canyon Village developed zone, and the adherence to mitigation measures designed to minimize the potential for soil movement off-site during project implementation, soil disturbance would result in an overall negligible impact to watershed resources. For these reasons, watershed resources were dismissed from further analysis.

Visual/Scenic Quality – Conserving the scenery of national parks and providing for visitor enjoyment are elemental purposes of the NPS according to the 1916 Organic Act. Scenic resources are integrally tied to action objectives including maintaining the roadway's historic character, and are related to cultural resources such as maintaining cultural landscapes. The proposed project will not alter the historic character of the South Entrance Road and there are no related cultural landscapes in the project area. This topic was dismissed from further analysis.

Floodplains and Wetlands – Executive Order 11988 (Floodplains) and Executive Order 11990 (Wetlands), which require Federal agencies to examine potential impacts of actions on floodplains

and wetlands, were reviewed for applicability. Because the project is not in or near a floodplain or wetland and would not affect this resource, floodplains and wetlands were dismissed from further analysis.

Environmental Justice – Executive Order 12898 requires consideration of impacts to minority and low-income populations to ensure that these populations do not receive a disproportionately high number of adverse or human-health impacts. This issue was dismissed from further analysis because each alternative would affect everyone equally and would not disproportionately impact minority or low-income populations.

Prime and Unique Farmland – The Farmland Protection Policy Act of 1981, as amended, requires Federal agencies to consider adverse effects to prime and unique farmlands that would result in conversion of these lands to non-agricultural uses. Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. This proposed project's locations and surrounding lands have been evaluated by appropriate park technical area specialists and by specialists from the Natural Resources Conservation Service (NRCS). Based on their observations, the project area is not considered prime or unique farmland (Camp, pers. comm. 2002). Therefore, this topic was dismissed from further analysis.

Socioeconomic Environment – Socioeconomic values consist of local and regional businesses and residents, the local and regional economy and park concessions. The local economy and most business in neighboring communities are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. The GMP Environmental Impact Statement (EIS) discussed socioeconomic environment and impacts extensively. There may be short-term benefits to the local and regional economy resulting from construction-related expenditures and employment. Local and regional businesses would be negligibly affected in the long-term. Therefore, impacts, both adverse and beneficial, would be negligible and thus socioeconomic values were dismissed from further analysis.

Wilderness – Most of the park has been recommended for wilderness designation. Until Congress formally acts on this recommendation, NPS Policies require that these areas be managed under the provisions of the Wilderness Act. However, the project area is part of the Development Zone as defined in the GMP and is outside recommended wilderness. Proposed actions within this area would not occur in recommended wilderness and would not directly affect wilderness character or wilderness values. For these reasons, wilderness was dismissed from further detailed analysis.

Indian Trust Resources – Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is the legally enforceable fiduciary obligation on the part of the United States to project tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. Grand Canyon National Park does not have any Indian trust resources. Therefore, this topic was dismissed from further analysis.

ADDITIONAL NEPA ANALYSIS

The alternatives include all reasonably foreseeable connected actions. Environmental effects estimated for this project consider site-specific effects of all foreseeable actions and mitigation measures. Monitoring during and following project implementation would verify mitigation-measure effectiveness and impact

predictions. This EA/AEF will guide any subsequent project implementation. If new information or unforeseen and unanalyzed actions become necessary in the future, additional site-specific environmental analysis will be conducted before implementation.

Chapter 2 Alternatives

INTRODUCTION

The NPS adopted sustainable design as a guiding principle for facility planning and development (DO-13, *NPS Management Policies 2006*). The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect environmental setting, to maintain and encourage biodiversity, to construct and retrofit facilities using energy-efficient materials and building techniques, to operate and maintain facilities to promote sustainability, and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact. The action alternative subscribes to and supports the practice of sustainable planning, design and human use of developed areas and associated public and administrative facilities.

This document analyzes a No Action Alternative and one action alternative. Analysis of the No Action Alternative is required under NEPA (40 CFR 1502.14(d)). It provides a baseline for assessing potential impacts of the action alternatives. In developing alternatives some actions were considered and subsequently dismissed. A description of alternatives considered but dismissed from detailed study is included in this chapter. A summary table comparing alternative components is also presented at the end of this chapter.

The action alternative is based on preliminary designs and best information available at the time of this writing. Specific distances, areas, and layouts used to describe the alternative are only estimates and could change during final site design. If changes during final site design are not consistent with the intent and effects of the selected alternative, then additional environmental compliance would be conducted as appropriate.

ALTERNATIVE DEVELOPMENT

Several design alternatives were initially developed to address the purpose and need for action during April 2007. As stated in Chapter 1, this project is needed to address the following management concerns:

- The long waits at the South Entrance Station result in visitor frustration and poor visitor, employee and resident experiences.
- The safety of visitors, employees and residents is compromised due to extended waiting time to enter the park.
- Resource impacts are resulting from congestion at the entrance station, including air quality and social trailing.
- Immediate needs to relieve congestion at the entrance station have not been sufficiently addressed.

From the public scoping activities, as fully described in the Management History section in Chapter 1, eight letters were received. The Park Service performed a content analysis on this information, information gained from internal scoping, and information gained from scoping with other agencies. From this effort, the Park Service formed the proposed action alternative.

ALTERNATIVE DESCRIPTION

Alternatives are described below. Table 1 (page 22) summarizes each alternative's primary components, and Table 2 (page 22) summarizes the expected implementation impacts.

ALTERNATIVE A – NO ACTION

The No Action alternative would not implement any road widening nor construction of a bypass of a bypass lane. This alternative would not meet the purpose and need for the project, but provides a basis for comparison with the action alternatives. Alternative A would maintain the existing conditions. Congestion and long wait times would continue to occur at the south entrance, creating safety hazards, visitor frustration and poor visitor experience. Vehicle and pedestrian conflicts would continue. Resource impacts in the forms of social trailing, litter and reduced air quality would continue.

ALTERNATIVE B – PREFERRED (Figure 1, page 15)

The South Entrance Road, Highway 64, would be widened approximately 12 feet to accommodate a total of two northbound lanes and one southbound lane from the access road to the Tusayan Ranger Station north to a point about 400 feet south of the South Entrance Station. The road in the vicinity of the Tusayan Ranger Station can currently accommodate two northbound lanes, widening would begin just south of the park boundary. The existing and proposed lanes would be 12-foot-wide vehicle lanes with one, three-foot-wide paved shoulder on each side of the road. This alternative would increase road width 12 feet.

An additional northbound lane may be constructed at a future date if deemed necessary to address vehicle congestion, however, the park does not believe the third northbound lane will be necessary at this time based on current visitation. This third lane would begin just north of the access road to the Tusayan Ranger Station and feed into the bypass lane on the east side of the highway and would increase the road width an additional 12 feet, for a total of 24 foot increase from current width.

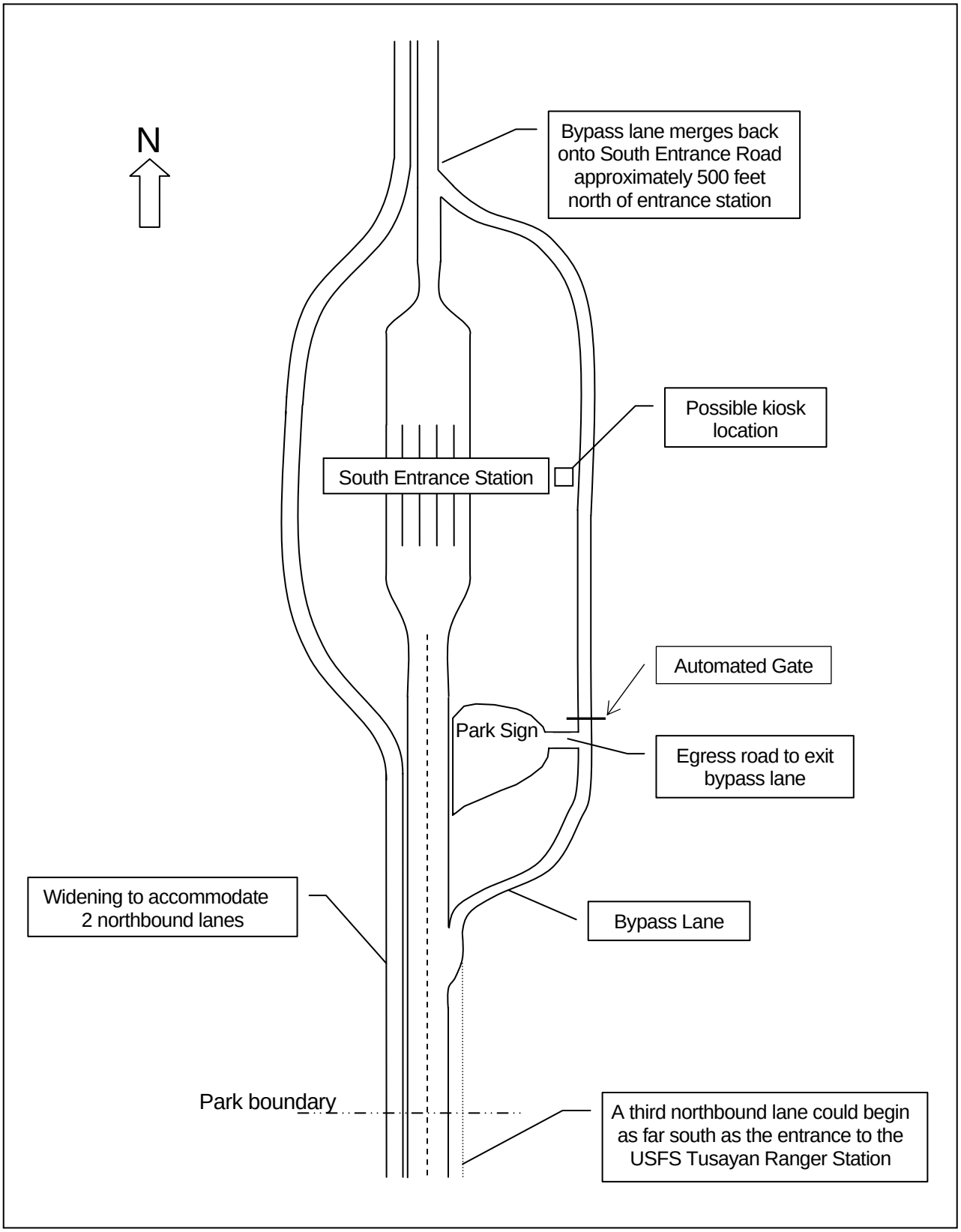
An independent bypass lane would also be constructed under this alternative. The bypass lane would diverge from the highway between the park boundary and the park sign and would merge back onto the highway approximately 500 feet north of the South Entrance Station. This proposed bypass lane would be a 12-foot wide vehicle lane with two, two-foot-wide paved shoulders on each side of the road. An automated gate and a kiosk may be constructed to facilitate the use of the bypass lane. An automated gate would be installed to the east of the park sign parking lot and the kiosk would be adjacent to the South Entrance Station. Trenching to provide electrical service to the gate would occur within the disturbed footprint of the bypass lane. The bypass lane would be available to select user groups, which may include transit vehicles, Park residents, Park and concessionaire employees and others as determined by the NPS.

An egress road from the bypass lane to the Park sign parking lot would be constructed at a point immediately south of the automated gate. This road would be included to allow unauthorized users to exit the bypass lane and return to the South Entrance Road south of the entrance station. This egress road would also allow vehicles to exit if the automated gate was inoperative for any reason.

A permanent vehicle counting station / vehicle detection system for northbound traffic would also be installed on Highway 64 in the vicinity of Long Jim Canyon Road (1.3 miles south of the entrance station). The counting station would consist of an inductive loop detector in the roadway pavement connected to a roadside controller cabinet (within the State Route 64 easement) to house traffic counter electronics. This station would operate on a solar and battery power system. If the Park chooses to utilize real-time data from the traffic counter, a wireless communication system would be used to transmit information from the traffic counter location to the South Entrance Station.

Alternative B would result in approximately 5 acres of total ground disturbance, most of these 5 acres would be new disturbance where vegetation would be removed; 2 acres for road widening (and an additional 1 acre if a third northbound lane is constructed), 3 acres for construction of the bypass lane.

Figure 1. Diagram of the Preferred Alternative. Illustrates road improvements along South Entrance Road (Highway 64) near the South Entrance Station (not to scale).



ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED STUDY

A number of alternatives were developed based on the results of internal and external scoping. Alternatives are different ways to meet the purpose and objectives, while resolving needs or issues. The following section discusses those alternatives considered, but eliminated from further study. This discussion also includes an explanation of why these alternatives did not warrant additional analysis. These alternatives and issues were eliminated from detailed study because they did not meet the criteria below.

1. The alternative must be technically and economically feasible.
2. The alternative must have the ability to meet project objectives and resolve need.
3. The alternative must not duplicate other, less environmentally damaging or less expensive alternatives.
4. The alternative must not conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement.
5. The alternative must not have too great an environmental impact.

Four alternatives were considered, but all four were eliminated from detailed study. Each alternative, and the rationale for why it was eliminated from further study, is described below.

Construct Northbound Bypass Lane on West Side of Highway 64
NPS considered the use of the old entrance road, located to the west of Highway 64, as a bypass lane. In order to accommodate northbound vehicles without requiring cross traffic, a southbound egress lane for all park traffic would have been moved to the westside of the northbound bypass lane, resulting in a 2-lane (north/south) bypass road. The road width, including the bypass lane and the egress lane would have been a minimum of 24 feet. Additionally, the lane and associated kiosk would not be easily accessible to fee staff due to distance from the South Entrance Station. Because the old entrance road is located about ¼ mile west of the South Entrance Road, this alignment would have been longer and would have had greater resource impacts and been more costly. For these reasons, this alternative was dismissed from further consideration.

Use Southbound/Exit Lane as Bypass Lane
The use of the current southbound lane as an additional entrance lane/bypass lane was considered. A new southbound lane either adjacent to the road or as an independent lane would be constructed under this alternative. However, to the west of the existing entrance station, the topography is not as favorable for the entrance station facilities – such as a kiosk or an automated gate – as it is the bypass alignment to the east of the existing entrance station. It may have been possible to use the old entrance road, as discussed in the previous alternative, as the southbound exit lane, but this option would also have been longer, caused greater resource impacts and been more costly. For these reasons this alternative was dismissed from further consideration.

Align Bypass Lane through Park Sign Parking Lot and Move Park Sign
NPS considered the use of the park sign parking lot for the beginning of the bypass lane alignment. This alternative would relocate the park sign north of the entrance station. Construction of a sign parking lot north of the entrance station would have greater environmental impacts, including tree removal and ground disturbance; therefore, this alternative was dismissed from further consideration.

Start Bypass Lane on Independent Alignment South of Park Boundary
An alternative to start the bypass lane as far south as the Tusayan Ranger Station access road, and to have it follow an alignment separated from the existing South Entrance Road was considered. It is anticipated

that the proposed road widening will increase capacity and alleviate congestion. This option would require more ground disturbance and vegetation removal. For these reasons this alternative was dismissed from further consideration.

IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA Section 101":

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Through the process of internal and public scoping, the environmentally preferred alternative selected is Alternative B. Alternative B best meets the purpose and need for action and best addresses overall park service objectives and evaluation factors while minimizing impacts to park resources. Alternative B would result in approximately 5 to 6 (the larger amount of disturbance would occur if a third northbound lane where necessary) acres of new ground disturbance, requiring vegetation removal: 2 to 3 acres for road widening and 3 acres for bypass lane construction. Alternative A, the No Action alternative, does not propose any new construction and would have less resource impacts; however, Alternative A does not meet the purpose and need for action and does not achieve a balance as identified in criteria 5 above. Implementation of Alternative A would also allow safety risks to continue and therefore would not meet criteria 3. The preferred alternative, Alternative B, best achieves the balance between resource use and visitor experience, as specifically identified in numbers 3 and 4 above, while also minimizing new resource impacts as identified in numbers 2, 4 and 5 above.

MITIGATION MEASURES

To minimize resource impacts, the integral design features (i.e., mitigation measures) below would be followed during implementation and are analyzed as part of the action alternative. These actions were developed to lessen the action alternative's adverse effects, in combination with foreseeable future actions, and have proven to be very effective in reducing environmental impacts on previous projects.

Contractor Orientation Contractors working in the park are given orientation concerning proper conduct. This orientation is provided both in writing and verbally at a preconstruction meeting. This policy would continue for this project. Orientation would include, but not be limited to:

- Wildlife should not be approached or fed.
- Collecting any park resources, including plants, animals, and historic or prehistoric materials, is prohibited.

- Contractor must have a safety policy and a vehicle fuel spill and leakage policy.
- Other environmental concerns and requirements discussed elsewhere in this EA/AEF would be addressed, including relevant mitigation measures listed below.
- Construction specifications would include details related to protective measures for cultural resources and existing vegetation along the roadside, as provided by the park resource staff and the park landscape architect.
- All permits, including ADOT encroachment permit, would be obtained prior to start of construction.

Limitation of Area Affected The following mitigation measures would be implemented to minimize the area affected by construction activities and to minimize the potential for adverse impacts due to connected actions:

- Staging areas for construction office (a trailer), construction equipment and material storage would either be located in previously disturbed areas near the project site or in other disturbed areas that best meet project needs and minimize new ground disturbance. All staging areas would be returned to pre-construction conditions or better once construction is complete. Standards for this, and methods for determining when standards are met, would be developed in consultation with the park's South Rim Vegetation Program Manager.
- Construction zones would be fenced with construction tape, snow fencing, or similar material before construction activity. Fencing would define the construction zone and confine activity to the minimum construction area required. All protection measures would be clearly stated in construction specifications, and workers would be instructed to avoid conducting activities beyond the construction zone as defined by fencing.

Soil Erosion To minimize soil erosion, the following mitigation measures would be incorporated into the action alternatives:

- Standard erosion control measures such as silt fences, sand bags or equivalent control methods would be used to minimize any potential soil erosion.
- Trenching operations would be by rock saw, backhoe, track hoe, Pionjar, ditch digger and/or trencher, with excavated material side-cast for storage. After trenching is complete, bedding material would be placed and compacted in the trench bottom. Backfilling and compaction would begin immediately after trenching, and the trench surface would be returned to pre-construction contours. All trenching restoration operations would follow guidelines approved by park staff. Compacted soils would be scarified, and original contours reestablished.
- A Salvage and Revegetation Plan would be developed by the park's South Rim Vegetation Program Manager and the Federal Highway Administration in consultation with a landscape architect. Any revegetation efforts would use site-adapted native species and/or site-adapted native seed, and park policies regarding revegetation and site restoration would be incorporated. The plan would consider, among other things, use of native species, plant salvage potential, exotic vegetation and pedestrian barriers. Policy related to revegetation would be referenced from *NPS Management Policies* (NPS 2006; Chapter 9).

Vegetation To minimize vegetation impacts, prevent exotic vegetation introduction and minimize spread of noxious weeds, the following mitigation measures would be incorporated into the action alternatives:

- A Vegetation Program specialist would provide input on salvage potential and tree avoidance at project sites where necessary. A supervisory biologist would also spot-check work progress.
- All construction equipment that would leave the road (e.g., bulldozers and backhoes) would be pressure-washed prior to entering the park. The location selected for vehicle washing would be approved by a supervisory biologist.
- Staging area location for construction equipment would be park-approved, and need for treatment of exotic vegetation would be considered.
- Vehicle parking would be limited to existing roads or the staging area.
- Pruning necessary for this project would adhere to the park's tree-pruning guidelines with the goal of retaining health and integrity of trees and shrubs treated. Damage to trees or roots in or adjacent to project areas during construction would be avoided as much as possible.
- Any fill, rock or additional topsoil needed would be obtained from a park-approved source. Topsoil from the project area would be retained whenever feasible.
- All areas disturbed by construction would be revegetated using site-adapted native seed and/or plants.
- All areas disturbed would be mulched with a carbon source to decrease nitrophyllic exotic annual species.
- Exotic species encroachment and distribution would be monitored for two-to-three years following construction completion.
- Revegetation efforts would be initiated as soon as possible following construction to minimize exotic species competition with native species.
- Maintain and enhance the protection of existing vegetation in the area, to the extent practical.

Special Status Species To protect any unknown or undiscovered threatened, endangered, or special status species, the construction contract would include provisions for the discovery of such. These provisions would require cessation of construction activities until park staff evaluated the impact, and would allow contract modification for any measures determined necessary to protect the discovery. Mitigation measures for known special status species are as follows:

California Condor

- Prior to the start of a construction project, the park would contact personnel monitoring California condor locations and movement to determine condor status in or near the project.
- If a condor occurs at the construction site, construction would cease until it leaves on its own or until permitted personnel employ techniques resulting in the condor leaving.
- Construction workers and supervisors would be instructed to avoid interaction with condors and to contact the appropriate park or Peregrine Fund personnel immediately if and when condor(s) occur at a construction site.
- The construction site would be cleaned up at the end of each work day (i.e., trash disposed of, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park condor staff would complete a site visit to ensure adequate clean-up measures.
- To prevent water contamination and potential condor poisoning, the park-approved vehicle fluid-leakage and spill plan would be adhered to. This plan would be reviewed by the park biologist for adequacy in addressing condors.
- If non-nesting condors occur within one mile of the project area, blasting would be postponed until condors leave or are hazed by permitted personnel.

Tusayan Flameflower

- Not known in this area, but will be surveyed.
- If flameflower is found in the area of potential effect, an action plan would be developed to mitigate impacts to this species.

Soundscapes To minimize construction impacts on soundscapes, the following mitigation measures would be incorporated into the action alternatives:

- As time and funding allow, information regarding project implementation and other foreseeable future projects would be shared with the public through park publications and other means (this measure is also repeated under the Visitor Experience portion of this Section).
- To reduce noise, construction equipment would not be left idling any longer than is necessary for safety and mechanical reasons.
- Construction may include the use of equipment outside of peak visitation hours.

Cultural Resources To minimize construction impacts on cultural resources, the following mitigation measures would be incorporated into the action alternatives:

- If previously unknown archaeological resources are discovered during the project, a park archaeologist would be contacted immediately. All work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in accordance with the stipulations of the 1995 Programmatic Agreement among the National Park Service, the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation regarding the General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona.
- All workers would be informed of the penalties of illegally collecting artifacts or intentionally damaging any archaeological or historic property. Workers would also be informed of correct procedures if previously unknown resources were uncovered during construction activities.
- To ensure cultural resource protection, a cultural resource specialist would be assigned to conduct spot monitoring of the project during construction.
- Areas selected for equipment and materials staging are expected to be in existing disturbed areas or existing paved overlooks where there is no potential for archaeological resource disturbance. If the sites selected for these activities change during later design phases for implementation of any of the alternatives, additional archaeological surveys would be conducted.
- Cultural resource staff would work with contractors to protect cultural resources. Avoidance measures may include fencing or flagging.

Visual Resources To minimize visual impacts, mitigation measures would include the following:

- The park landscape architect would provide input into the Salvage and Revegetation Plan for prescriptions to use for replanting of vegetation along the roadway.
- Night sky friendly lighting or reflective signs and materials would be used.

Visitor Experience The following mitigation measures would be incorporated into the action alternatives to minimize construction impacts on visitor experience:

- As time and funding allow, information regarding project implementation and other foreseeable future projects would be shared with the public through park publications (such as *The Guide*) and other appropriate means during construction periods. The purpose would be to minimize potential for negative impacts to visitor experience during project implementation and other planned projects during the same construction season.
- Construction may include the use of equipment outside of peak visitation hours.

Park Operations and Safety The following mitigation measures would be incorporated into the action alternatives to minimize construction impacts on park operations and minimize safety risks to employees and visitors:

- NPS, concessionaires and other park employees and residents would receive the public notification on project implementation and road delays or road closures, as appropriate.

Air Quality Air quality impacts of the action alternatives are expected to be temporary and localized. To minimize these impacts, the following actions would be taken:

- To reduce entrainment of fine particles from hauling material, sufficient freeboard would be maintained, and loose material loads (aggregate, soils, etc.) would be tarped.
- To reduce tailpipe emissions, construction equipment would not be left idling any longer than is necessary for safety and mechanical reasons.
- To reduce construction dust in the short term, water would be applied to problem areas. Equipment would be limited to the fenced project area to minimize soil disturbance and consequent dust generation.
- Landscaping and revegetation would control long-term soil dust production. Mulch and plants would stabilize soil and reduce wind speed/shear against the ground surface.

ALTERNATIVES AND PROJECT OBJECTIVES

Project objectives are described in Chapter 1 and listed here. The proposed South Entrance Road Improvements are guided by the GMP vision and the purpose and need for action developed specifically for this project. Specific objectives for the planning effort include:

- Improve the entrance experience by reducing long waits at the entrance station for visitors, as well as for employees, residents and commercial traffic.
  - Provide more approach lanes
  - Provide a bypass lane
- Improve safety of visitors, employees and residents at the entrance and on the two mile approach to the entrance.
- Ensure compatibility with other future transportation options.
- Cooperate with gateway communities, agencies, tribes, and other stakeholders to achieve mutual transportation goals.

The preferred alternative clearly addresses each objective. Alternatives that were considered but dismissed from further analysis were dismissed in part because they did not sufficiently address one or all of these objectives. Table 1 displays alternative components and compares the ability of the alternatives to meet project objectives.

Table 1. Summary of Alternative Components, South Entrance Road Improvements, Grand Canyon National Park

Components	Alternative A No Action	Alternative B Preferred
Number of Northbound Lanes	1	2 to 3
Presence of Bypass Lane	No	Yes
Total Disturbance (approximate, in acres)	0 acres	5 – 6 acres
Accomplishment of Project Objectives	Does not accomplish project objectives	Achieves all project objectives
Objective 1. Improve the entrance experience by reducing long waits at the entrance station for visitors, as well as for employees, residents and commercial traffic	No improvements would be made to the entrance road and long waits would persist.	Construction of up to 2 additional northbound lanes and an independent bypass lane would alleviate long lines and improve the entrance experience.
Objective 2. Improve safety of visitors, employees and residents at the entrance and on the two mile approach to the entrance	Vehicle and pedestrian conflicts would continue near the entrance station. No safety improvements would be implemented.	Shorter wait times and less congestion would improve safety and reduce vehicle and pedestrian conflicts. Fee collection staff would not be needed to direct traffic.
Objective 3. Ensure compatibility with other future transportation options	Future transportation options would be compatible with the No Action alternative.	The road widening and construction of a bypass lane would be compatible with future transportation options.
Objective 4. Cooperate with gateway communities, agencies, tribes, and other stakeholders to achieve mutual transportation goals	Under the No Action alternative, cooperation to achieve mutual transportation goals would not be necessary.	Cooperation with ADOT, the community of Tusayan, tribes, USFS and other stakeholders would be accomplished.

Table 2. Comparative Summary of Environmental Impacts

Impact Topic	Alternative A No Action	Alternative B Preferred	Cumulative Impacts
Archaeological Resources	Negligible, adverse, long-term, direct and indirect impacts.	Negligible, adverse, direct and indirect and both short- and long- term impacts.	Moderate, adverse and long-term impacts.
Ethnographic Resources	Negligible, adverse, long-term, direct and indirect impacts.	Negligible, adverse, long-term, direct and indirect impacts.	Moderate, adverse and long-term impacts.
Soundscape	Negligible, adverse, long-term, direct and indirect impacts.	Negligible, adverse long-term and moderate, adverse short-term, direct and indirect impacts.	Minor, adverse long-term impacts.

Impact Topic	Alternative A No Action	Alternative B Preferred	Cumulative Impacts
Vegetation	Negligible, long-term adverse impacts.	Minor, adverse and minor beneficial, short- and long- term, direct and indirect impacts.	Moderate long-term and adverse impacts.
General Wildlife	Negligible, local, long-term adverse impacts.	Minor, direct and indirect, long-term and moderate short-term adverse impacts.	Minor long-term and moderate short-term, adverse impacts.
Special Status Species	Negligible, long-term, adverse, direct and indirect impacts.	Negligible to minor, short- and long-term, adverse, direct and indirect and minor to moderate beneficial, long-term impacts.	Minor, adverse, short- and long-term impacts.
Visitor Experience	Moderate, long-term, adverse impacts.	Moderate, beneficial, long-term and minor, adverse, short-term impacts.	Moderate, long-term, beneficial impacts.
Park Operations	Minor, adverse, long-term impacts.	Minor to moderate, beneficial, long-term and short-term, minor to moderate, adverse impacts.	Minor to moderate, long-term, beneficial impacts.
Public Health and Safety	Minor to moderate, long-term, adverse impacts.	Moderate long-term, beneficial and minor, short-term adverse impacts.	Minor to moderate, long-term, beneficial impacts.

Chapter 3 – Affected Environment and Environmental Consequences

INTRODUCTION

This Chapter describes the present condition (i.e., affected environment) within the project area and the changes (i.e., environmental consequences) that can be expected from implementing the action alternative or taking no action at this time. The No Action Alternative sets the environmental baseline for comparing effects of the other alternatives. The impact topics (see Chapter 1) define the scope of the environmental concern for this project. The environmental effects or changes from the present baseline condition described in this chapter reflect the identified relevant impact topics and include the intensity and duration of the action, mitigation measures and cumulative effects.

The National Environmental Policy Act requires that environmental documents disclose the environmental impacts of proposed Federal action, reasonable alternatives to that action and any adverse environmental effects that cannot be avoided should the proposed action be implemented.

Grand Canyon National Park encompasses approximately 1.2 million acres in northern Arizona. The project is located on the South Rim at approximately 6,800 feet elevation. The primary vegetation community is ponderosa pine with pockets of pinyon-juniper and oak woodland. The project area extends from the access road to the Tusayan Ranger Station to just north of the South Entrance Station on Highway 64.

Methodology
The impact analysis and conclusions contained in this chapter were based on park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area.

Potential impacts in this chapter are described in terms of type (are the effects beneficial or adverse?), context (are the effects site-specific, local or even regional?), duration (are the effects short-term or long-term?), and intensity (negligible, minor, moderate or major). Because definitions of type, context, duration and intensity can vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this EA/AEF.

Cumulative Impacts
Cumulative impact is defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time (40 CFR 1508.7). Therefore, it is necessary to identify other ongoing or foreseeable future actions within the vicinity of the project area.

Recently completed and in-progress projects on the South Rim are those projects related to visitor services, construction or fire management that have been completed in the last several years or have recently been started, with an expectation of being complete in the next year. These projects have complete NEPA and NHPA analysis. Projects were included if they were located in the vicinity of the

South Entrance Station or were linked in some way with operations or activities taking place in the proposed project (Appendix D).

Foreseeable future actions related to visitor services, construction or fire management were considered to be actions that could occur within the next five years which currently have funding or for which funding is actively being sought. Projects were included if they met the same criteria as the above (Appendix D).

A cumulative impact analysis was conducted for the full implementation of the GMP and is documented in the GMP EIS. The general finding in the GMP EIS for cumulative effects to natural resources was a net reduction in natural habitat within the park and the region, but a net reduction less than that for two other alternatives analyzed. Cumulative effects to ethnographic resources could occur, specifically to traditional cultural properties, but a planned ethnographic survey program would minimize this likelihood. Cumulative effects were not expected to historic structures under the assumption that existing cultural resources within the park would be protected and preserved and some historic buildings would be rehabilitated and restored. Cumulative effects to visitor experience in the park under GMP implementation were expected to be positive overall as the result of additional food service and accommodations and contributions to regional and national efforts to expand informational resources, expand interpretive and educational opportunities and disperse tourism in the area. Because the GMP was a general concept plan and because it required that site-specific analyses be conducted for projects identified in the GMP, a cumulative effects analysis that is more specific to impact topics pertaining to the South Entrance Road Improvements is needed.

Impairment
In addition to determining the environmental consequences of implementing the alternatives, National Park Service policy (*Management Policies 200*6) requires analysis of potential effects to determine whether actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the park's establishing legislation or proclamation;
- key to the park's natural or cultural integrity; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. The potential for

impairment is discussed for each applicable resource for each alternative in this chapter. A statement summarizing the conclusions of this evaluation is included in the conclusion statement at the end of the environmental consequences section for each applicable resource in this chapter.

Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act
In this EA/AEF, impacts to historic properties are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). This EA/AEF is intended, however, to comply with the requirements of both NEPA and §106 of the National Historic Preservation Act (NHPA). To achieve this, a §106 summary is included under the Preferred Alternative for each of the cultural resource topics carried forward. The topics of historic structures and cultural landscapes were dismissed from further consideration in Impacts Dismissed from Further Consideration because none were identified in the project area. The §106 Summary is intended to meet the requirements of §106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations. A letter dated June 27, 2007 was sent to the State Historic Preservation Office (SHPO) initiating formal consultation on this project and informing them of using a combined document to meet §106 obligations.

Under the Advisory Council's regulations, the agency official shall apply the criteria of either adverse effect or no adverse effect for affected historic properties that are either eligible for or listed on the National Register of Historic Places. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the Preferred Alternative that would occur later in time; be farther removed in distance; or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register of Historic Places. An undertaking can be modified to avoid adverse effects and result in a determination of no adverse effect.

In accordance with the Advisory Council on Historic Preservation's (ACHP) regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to historic properties for this project were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

CEQ regulations and the National Park Service's Conservation Planning, Environmental Impact Analysis and Decision-Making (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g. reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

In order for a historic property to be listed in the National Register of Historic Places, it must meet one or more of the following criteria of significance: A) associated with events that have made a significant contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent

the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the historic property must possess integrity of location, design, setting, materials, workmanship, feeling, association (National Register Bulletin, How to Apply the National Register Criteria for Evaluation).

CULTURAL RESOURCES

ARCHAEOLOGICAL RESOURCES

Affected Environment

Archaeological evidence of human occupation and use of the Grand Canyon area appears to begin during the Paleoindian[1] Period (11,500 – 7,500 years before present). Limited archaeological evidence from this period in Grand Canyon consists of one isolated Clovis point fragment and one Folsom point fragment. The Paleoindian Period was followed by the Archaic, Formative, Protohistoric and Historic Periods. Material remains from the early, middle and late phases of the Archaic Period are present at Grand Canyon. Examples include split twig figurines and polychrome pictograph sites. People from the Kayenta, Virgin, and Cohonina cultural traditions occupied the canyon during the Formative Period. The Cohonina people are not visible archaeologically as a distinct cultural group after about AD 1150 (Cartledge 1987). Some archaeologists suggest (Cartledge 1987) that the Cohonina allied themselves with other cultural groups, principally the Ancestral Puebloan and Sinagua traditions, eventually losing what distinct cultural traits they once had by taking on those of their adopted cultures.

Formal settlement of the canyon by the Kayenta and Virgin people (Ancestral Puebloans) appears to end by the 13th century (Gilpin 2004). The end of the formal settlement of canyon areas by Ancestral Puebloans did not mean the end of canyon use by descendents of these people. The Hopi continued to travel to the area during the Protohistoric and Historic Periods, for example. People of the Cerbat culture (thought to be ancestral to the modern day Pai people) may have occupied the area late in the Formative Period. Havasupai, Hualapai, and Southern Paiute canyon use becomes visible archaeologically during the Protohistoric Period. These groups, in conjunction with the Hopi, Zuni, Navajo and Yavapai and White Mountain Apache, maintain close ties to the canyon into the present.

Euro-American use of Grand Canyon has its origins in the AD 1540 expedition of Garcia Lopez de Coronado. However, it was not until the 1860s that Euro-Americans began to settle in the area. Early activities included ranching, prospecting, mining and tourist-related ventures (Anderson and Brennan 2006).

Archaeological inventory surveys were conducted in March 2006 and again in June 2007 specifically to examine the proposed road widening and bypass lane. A total of approximately 277 acres were surveyed in the proposed project area. Four sites were identified in the vicinity of the project and all sites would be avoided upon implementation of the project.

Environmental Consequences

Methodology

The baseline information used to assess impacts to archaeological resources is as described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the

[1] The terms used in this section are archaeological constructs. They do not represent the names people would have called themselves, nor are they the names modern day descendents use to refer to ancestors. They are devices archaeologists use as tools for scientific discussion.

National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated EIS was specifically referenced for information on affected resources in the project area. Additional sources of information on archaeological resources used as a basis for this evaluation are as described above in the affected environment section.

Proposed activities have the potential to impact archaeological resources through direct disturbance during ground disturbing activities in the area.

The thresholds of change for the intensity of an impact on archaeological resources are defined as follows:

Negligible Impacts would be at the lowest levels of detection; historic properties would receive no change to diagnostic artifacts, defining features, or characteristics that contribute to National Register of Historic Places (National Register) eligibility. Negligible impacts are barely perceptible and alter neither resource condition, such as traditional access and site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs. The determination of effect for Section 106 would be "no historic properties affected."

Minor Adverse For archaeological resources, impacts would be detectable but would not diminish the overall integrity of the resource. Impacts such as social trailing, feature degradation, and artifact depletion and displacement could occur and would be measurable but would be localized and would not result in changes to defining elements and would not affect or jeopardize defining features or characteristics or aspects of integrity that contribute to eligibility for the National Register. Depletion or displacement of artifacts (based on baseline documentation) would not affect research potential or National Register eligibility. The determination of effect for Section 106 would be "no historic properties affected."

Beneficial Archaeological sites are maintained and preserved. Effects would be measurable and localized. For purposes of Section 106, the determination of effect would be *"no historic properties affected."*

Moderate Adverse For archaeological resources, disturbance of a site or sites would result in the loss of overall integrity, and *would* jeopardize a site's National Register eligibility. Impacts would include measurable change to character-defining elements and would contribute to increased instability of site landscape. Impacts would require stabilization of eroding sediments and reduction in social trailing, depletion of artifacts, and artifact displacement outside of established trails. The determination of effect for Section 106 would be *"historic properties affected*." It will be necessary to execute a memorandum of agreement (MOA) among the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation, in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from moderate to minor.

Beneficial For archaeological sites, effects would be measurable and contribute to the overall stability of the site. Active intervention is undertaken to preserve the site. The determination of effect for Section 106 would be *"no historic properties affected."*

Major Adverse For archaeological resources, disturbance of a site or sites would result in the loss of overall integrity and significant changes to character-defining elements to the extent that it would no longer be eligible to be listed on the National Register. Impacts would include destabilization of structures or cultural contexts, depletion or displacement of artifact assemblages (based on baseline information), an increase in exposure or vulnerability to natural elements, and compromising of research potential. The determination of effect for Section 106 would be *"historic properties*

affected." In the event of a determination of adverse effect, a MOA would be executed between the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from major to moderate or minor.

Beneficial Active intervention is undertaken to preserve the site. Effects would be measurable and contribute to overall stability of site landscape. The determination of effect for Section 106 would be *"no historic properties affected."*

Duration Short-term Impact An effect that, within five years, would no longer be detectable as the resource was returned to its predisturbance condition or appearance (e.g., trash and other items that could be removed or vegetation that has been trampled, but has not been denuded).

Long-term Impact A change in a resource or its condition that would not return the resource to predisturbance condition or appearance and for all practical purposes would be considered permanent (e.g., damage to elements or removal of artifacts).

Timing: Archaeological site visibility may be more pronounced during the spring growing season, as trampling young vegetation may lead to increased trailing and soil compaction.

Alternative A – No Action

Direct/Indirect Impacts. Surveys have occurred in the proposed project area under Alternative A and under the action alternative. While four archaeological sites were discovered during this survey effort, Alternative A would not create any additional impacts over that which has occurred due to social trailing. Therefore, there would be no change to diagnostic artifacts, defining features or characteristics that contribute to National Register eligibility. Although it is possible that some indirect impacts to these sites may be on-going related to existing use and social trailing, these impacts have not been documented. Changes in current patterns of use or development would not occur under Alternative A. Therefore, the No Action Alternative would have no additional effects on identified archaeological resources within the South Entrance Road project area.

Cumulative Impacts: Past development of park facilities on the South Rim has likely impacted archaeological resources in the area through ground disturbance and exposure of sites leading to increased visitation. Loss or disturbance of archaeological sites on the South Rim (in conjunction with previous losses and prevailing threats to finite numbers of archaeological resources throughout the region) incrementally diminishes the overall understanding of Grand Canyon's cultural history. These past impacts are moderate, adverse, local, and long-term. Most of the recently implemented, in-progress and foreseeable future projects that have the potential to affect archaeological resources have been reviewed by park cultural resource staff and all efforts to document archaeological resources and avoid them during project design would be implemented. Projects with the potential for impact would be discussed with the State Historic Preservation Office (SHPO) and affiliated American Indian tribes as well. Consultation with the SHPO, Tribal Historic Preservation officers, tribal resource specialists and inclusion of park cultural resource staff input during planning and design for future projects would assist in ensuring that any adverse effects of future projects on cultural resources would be negligible to minor. Therefore, adverse cumulative effects would be moderate and long-term.

Impairment: Implementation of Alternative A, the No Action alternative, would result in negligible direct and indirect impacts and moderate cumulative impacts to archaeological resources. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3)

identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's archaeological resources or park values.

Conclusion: Implementation of Alternative A would result in negligible, adverse, direct and indirect impacts and moderate, cumulative adverse impacts to archaeological resources. There would be no impairment of archaeological resources.

Alternative B – Preferred

Direct/Indirect Impacts. The project area has been surveyed and four archaeological sites have been documented adjacent to the proposed project. The alignment proposed for construction of a bypass lane and widening of the South Entrance Road would avoid direct impacts to these known archaeological resources. These project components would result in 5 to 6 acres of new ground disturbance and could have the potential to indirectly impact archaeological resources. Mitigation measures and integral design features have been developed (see Chapter 2) to minimize the possibility of adverse impacts if any previously undocumented sites are discovered during the course of the project. If significant cultural resources are identified during project implementation and cannot be avoided, all work would stop and the park would consult with SHPO and affiliated American Indian tribes. Therefore, Alternative B would have negligible, adverse, direct and indirect effects on identified archaeological resources within the South Entrance Road project area.

§106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, Assessment of Adverse Effects), the National Park Service concludes that implementation of the Preferred Alternative would have "no historic properties affected" on archaeological resources in the area of potential effect.

Cumulative Impacts. Due to the implementation of standard mitigation measures and the consultation with SHPO for future projects, as described under Alternative A, cumulative impacts from implementing Alternative B would be similar to those described for Alternative A. Implementation of Alternative B, combined with past, on-going and future projects, would result in adverse cumulative effects to archaeological resources that would be moderate, local, and long-term.

Impairment. Implementation of Alternative B would result in negligible direct and indirect impacts and moderate cumulative impacts to archaeological resources. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's archaeological resources or park values.

Conclusion: Alternative B would result in negligible, adverse long-and short-term, direct and indirect impacts to archaeological resources. Cumulative impacts would be moderate, adverse and long-term. Impacts would be minimized through the implementation of integral design features (mitigation measures) designed to protect archaeological resources. There would be no impairment of archaeological resources.

ETHNOGRAPHIC RESOURCES

Affected Environment

Ethnographic resources are defined by the NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, subsistence, or other significance in the cultural system

of a group traditionally associated with it" (Cultural Resource Management Guidelines [DO-28:191]). The lands of Grand Canyon National Park are traditionally affiliated eleven American Indian groups: Havasupai, Hopi, Hualapai, Kaibab Band of Paiute Indians, Las Vegas Band of Paiute Indians, Navajo, Paiute Indian Tribe of Utah, White Mountain Apache, Yavapai Apache, San Juan Southern Paiute, and Pueblo of Zuni. Native American groups in the region recognize certain tangible properties as important in their traditional tribal histories. These properties, which may or may not be archaeological sites, are referred to as traditional cultural properties in National Register Bulletin 38 (Parker and King 1990). Like other cultural resources, traditional cultural properties are given consideration under NHPA.

Tribal studies of the Colorado River corridor (Neal and Gilpin 2000) identified ethnographic resources that occur within Grand Canyon National Park, primarily on the river corridor but in other areas as well. These included archaeological sites (including rock art sites, trails and graves), sacred sites, places mentioned in traditional history, subsistence areas, boundary line, natural landmarks, minerals, plants, animals and water (including springs)

Grand Canyon has long been of importance to native cultures, and figures prominently in the origin/religious beliefs and ceremonial practices of many groups. For example, traditional Hopi and Zuni beliefs hold Grand Canyon as the sacred place from which their ancestors emerged to the present world.

Environmental Consequences

Methodology
The baseline information used to assess impacts to ethnographic resources is described in the methodology section at the beginning of this chapter, and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional sources of information on ethnographic resources used for this evaluation are described above in the affected environment section.

The thresholds of change for the intensity of an impact on ethnographic resources are defined as follows:

Negligible Impacts would be at the lowest levels of detection; historic properties would receive no change to diagnostic artifacts, defining features, or characteristics that contribute to National Register of Historic Places eligibility. Negligible impacts are barely perceptible and alter neither resource condition, such as traditional access and site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs. The determination of effect for Section 106 would be "no historic properties affected."

Minor Adverse For ethnographic resources, impacts would be slight and noticeable and would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of beliefs and practices. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *"no historic properties affected."*

Beneficial Impacts would allow access to and/or accommodate a group's traditional practices or beliefs. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be "no historic properties affected."

Moderate Adverse For ethnographic resources, impacts would be apparent and would alter resource conditions or interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs

would survive. The determination of effect on traditional cultural properties for Section 106 would be *"historic properties affected."*

In the event of a determination of adverse effect, a Memorandum of Agreement (MOA) would be executed between the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from moderate to minor.

Beneficial Impacts would facilitate traditional access and/or accommodate a group's practices or beliefs. Beneficial effects would include maintaining natural ecosystem processes. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be "no historic properties affected."

Major Adverse Impact(s) would alter resource conditions. Proposed actions would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices, to the extent that the survival of a group's beliefs and/or practices would be jeopardized. Impacts would result in significant changes or destabilization to defining elements and resource condition and an increase in exposure or vulnerability to natural elements. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be "historic properties affected." In the event of a determination of adverse effect, a Memorandum of Agreement would be executed between the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from major to moderate or minor.

Beneficial Impacts would encourage traditional practices and/or accommodate a group's beliefs or practices. Beneficial effects would include maintaining natural ecosystem processes. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be "no historic properties affected."

Duration Short-term Impact An effect that, within five years, would no longer be detectable as the resource was returned to its predisturbance condition or appearance (e.g. trash and other items that could be removed or vegetation that has been trampled, but has not been denuded).

Long-term Impact A change in a resource or its condition that would not return the resource to predisturbance condition or appearance and for all practical purposes would be considered permanent (e.g., damage to elements or removal of artifacts).

Permanent Irreversible changes such that ongoing cultural traditions associated with those resources are lost.

Timing Ethnographic resources might be more vulnerable to impacts during the spring growing season or at other times of the year depending on specific tribal traditions.

Alternative A – No Action

Direct/Indirect Impact. While ethnographic resources significant to Native Americans may be present in the vicinity of the South Entrance Station, no ethnographic resources have been specifically identified. All affiliated tribes have been contacted for any concerns they have with the implementation of this project and no concerns related to ethnographic resources have been identified. The No Action alternative does not change existing uses and conditions and therefore would result in only negligible impacts to ethnographic resources.

Cumulative Impacts. Ethnographic resources may exist in the project area and it is possible that some have sustained previous impacts as the result of the overall development of the South Entrance Station area. Modern buildings have intruded on historic settings and changed the way the area is used. Past development of park facilities has likely impacted archaeological resources in the area, and is likely to have impacted ethnographic resources. Loss or disturbance of these resources on the South Rim (in conjunction with previous losses and prevailing threats to finite numbers of these resources throughout the region) incrementally diminishes the overall understanding of Grand Canyon's cultural history. These past impacts are moderate, adverse, local, and long-term. Most of the recently implemented, in-progress and foreseeable future projects that have the potential to affect cultural resources have been discussed with the SHPO and tribal groups. Consultation with the SHPO and affiliated tribes as the basis for future projects would ensure that any adverse effects of future projects on cultural resources would be negligible to minor. Therefore, adverse cumulative effects would be moderate and long-term.

Impairment. Direct, indirect, and cumulative impacts to ethnographic resources would be negligible to moderate as a result of implementing the No Action alternative. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's ethnographic resources or park values.

Conclusion: The No Action Alternative would have negligible, adverse direct and indirect impacts to ethnographic resources and cumulative impacts that would be moderate, adverse and long-term. There would be no impairment of ethnographic resources.

Alternative B – Preferred

Direct/Indirect Impacts. While ethnographic resources significant to Native Americans may be present in the vicinity of the South Entrance Station, no ethnographic resources have been specifically identified. All affiliated tribes have been contacted during the scoping efforts and copies of this EA/AEF will be forwarded to each affiliated tribe for review and comment. All affiliated tribes have been contacted regarding the project. No ethnographic resources have been identified during these efforts. If any tribe subsequently identifies the presence of any ethnographic resources within the project areas, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of any ethnographic sites would not be made public. Therefore, implementation of Alternative B would result in only negligible impacts to ethnographic resources.

§106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, Assessment of Adverse Effects), the National Park Service concludes that implementation of the Preferred Alternative would have "no historic properties affected" on ethnographic resources in the area of potential effect.

Cumulative impacts: Because no ethnographic resources are known to occur in the project area, cumulative impacts are as described under Alternative A.

Impairment: Direct, indirect, and cumulative impacts to ethnographic resources would be negligible to moderate as a result of implementing Alternative B, and would be adverse. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service

planning documents, there would be no impairment of Grand Canyon National Park's ethnographic resources or park values.

Conclusion: Alternative B would result in negligible, adverse, long-term direct and indirect impacts to ethnographic resources and moderate adverse cumulative impacts. There would be no impairment of ethnographic resources.

NATURAL RESOURCES

SOUNDSCAPE

Affected Environment

Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the natural functioning of many parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they can at times impede the Service's ability to accomplish its mission.

The natural soundscape, also referred to as "natural quiet," is an important park resource and is specifically identified as a resource requiring protection in the following legal and public documents: the 1975 Grand Canyon NP Enlargement Act; 1987 National Parks Overflights Act; the 1995 Grand Canyon NP General Management Plan (GMP); and the National Parks Air Tour Management Act of 2000. One of the vision statements included in the GMP is as follows:

> *The South Rim should remain the focus for most Park visitors, with diverse opportunities to view the canyon... It should also provide access to areas that allow people to have solitary experiences… Visitors should be able to experience solitude in natural settings as well as social exchange in developed areas. For access to such areas, the West Rim and East Rim Drives should be meandering, rural roads that lead to overlooks where visitors can get away from the more urbanized areas of the Grand Canyon Village.*

Under Management Objectives in the GMP it also states:

> *Protect the natural quiet and solitude of the park, and mitigate or eliminate the effects of activities causing excessive or unnecessary noise in, over, or adjacent to the park.*

The south entrance area and South Entrance Road is managed as a transportation subzone within the South Rim developed zone. On a typically busy summer weekend day, up to 4,800 visitor vehicles enter the park through the south entrance. Human noise sources are present at the South Entrance Station and along the road corridor, and include bus traffic; personal, NPS, and concessionaire vehicle traffic; and noise from overflights (air tour operators and occasional NPS operations).

Extensive noise measurements have been gathered in the Park and an on-going effort is in place to continue to measure sounds in many park areas. A close approximation of natural quiet is the measured natural ambient sound condition, with all sounds of human origin excluded. The natural ambient data show that Grand Canyon is generally a very quiet place (NPS 1995a).

The decibel (dB) is a standard unit of measurement for sound. Sound measurements are often weighted for human sensitivity in particular frequencies, expressed as dBA. Typical existing ambient levels in

Grand Canyon Village are in the 50 to 60 dBA range (Table 3). As a point of reference, a typical conversation between two people is about 60 dBA while busy street traffic is about 70 dBA (NPS 1995a).

Table 3. Expected Existing Ambient Sound Levels at selected areas of Grand Canyon National Park (taken from NPS 1995a).

Location	Ambient Sound Level (dBA)	Range of Ambient Levels (dBA)
Grand Canyon Village	50-60	NA
Desert View Watchtower Area	34-48	29-58
Phantom Ranch Overlook (Bright Angel Creek clearly audible)	41	39-44
Inner Canyon Locations away from the sound of moving water	22-28	12-38

A site-specific sound analysis is currently being conducted in the project area for the Transportation Plan and data will be available in the EA for that project, expected to be released in October 2007. Sound information will include median and maximum daytime dBA and percent time audible of human noise sources.

Human noise intrusions during peak visitation hours in the middle of the day are constant. However, the general loudness along South Entrance Road near the entrance station, based on these data, seems to be considerably less than Grand Canyon Village. Human noise intrusions are expected to occur frequently and the local soundscape environment is negatively impacted by traffic noise for most of the daylight hours. There is little expectation to hear or experience natural sounds within the travel corridor, particularly at the entrance station. Human noise intrusions are mostly confined to daylight hours and negatively impact the more sensitive quiet times in the early morning and late evening hours. There is additional noise from aircraft arriving and departing the Grand Canyon National Park Airport approximately 3-4 miles southwest of the entrance station. The project area lies directly under an air tour route and experiences frequent aircraft noise.

Environmental Consequences

Methodology

The baseline information used to assess impacts to soundscape is as described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgment.

Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area. Additional sources of information on soundscape used as a basis for this evaluation are as described above in the affected environment section.

Proposed activities have the potential to impact soundscapes through changes in duration and level of human-caused noise. For a person with normal hearing, a change of 3 dBA is noticeable and a change of 10 dBA is perceived as a doubling of loudness.

While long-term changes in the existing ambient sound levels are not expected as a result of this project, short-term changes are expected due to construction noise. Typical construction equipment noise for a project like this can reach 95 dBA at 50 ft (15 m) for short periods of time (p. 3, Department of

Transportation 2006). Point source sounds typically decrease at a rate of 6 dBA per doubling of distance (p. 84, Everest 2001). Therefore, at 50 m, the maximum sound level should be reduced to 75 dBA for the time of operation and in the vicinity of the loudest equipment. Construction noise is localized, and not expected to be across the entire road corridor for the entire daytime period.

The thresholds of change for the intensity of an impact on soundscapes are defined as follows:

Negligible Existing ambient sounds dominate the project area for a majority of the day, although construction sounds may be evident in areas close to the construction site.

Minor Existing ambient sounds dominate the project area although construction sounds are noticeable and frequent.

Moderate Construction sounds can be heard for more than half of the day along throughout the project area and mask most of the existing ambient sounds.

Major Construction sounds dominate the project area for much of the day. Existing ambient sounds are completely masked except for the loudest sounds, or there are only very brief intervals where existing ambient sounds can be heard.

Duration: Short-term Impacts would occur during the construction period and would end when project implementation is complete. Long-term Impacts would occur or continue after the construction period and after the project is complete.

Nature of the Impact: Adverse Impacts could result from construction noise and increased human-generated noise. Beneficial Impacts would result from reduced vehicle noise due to less idle times.

Alternative A – No Action
Direct/Indirect Impacts. Implementation of Alternative A would not result in any changes to the way in which South Entrance Road and the South Entrance Station are used or managed. No changes in visitor use patterns or frequency of use in the area are expected with taking No Action. Therefore, since there would be no change in the expected duration, level, and affected area of human-caused sounds in the project area over the long-term, Alternative A would result in negligible long-term adverse impacts.

Cumulative Impacts. On-going activities in the South Entrance Road area result in existing ambient noise levels as measured at select sample sites in 2007 and as described above in the Affected Environment Section. Human-caused noise sources are audible for most of the day and existing human-caused noise sources in the vicinity of the road are primarily due to noise from vehicles and aircraft. While human-caused sound is prevalent in the project area during daylight hours, it is reduced during early morning and evening hours, especially during the more sensitive early morning and evening hours, overall noise exposure is expected to be less than that found in Grand Canyon Village.

In-progress and reasonably foreseeable future construction projects (Appendix D) in the area of potential effect are limited; they include Tusayan Road Improvements, actions related to implementation of the South Rim Visitor Transportation Plan, and the Moqui and Tusayan prescribed burns. Implementation of the prescribed burns would increase human-caused sounds in the project vicinity due to fire crew activity in the area, fire vehicles in the area and the potential use of aircraft to start and monitor the fire. These actions would be short-term, lasting the duration of the burn (expected for 2 – 7 days) and would be sporadic throughout the duration of the burn. Long-term changes in existing noise levels would not occur. Changes to the South Entrance Station area proposed as part of the South Rim Visitor Transportation Plan are not specifically known at this time, but may include changes in shuttle bus routes and frequencies and

tour bus operational changes which could result in long-term impacts to soundscape. However, soundscape is a resource being carefully evaluated as a part of that planning process and any proposed changes in transportation systems used to enter through the South Entrance Station as a part of the project would be considered. At this stage of planning, implementation of small changes in frequency of shuttle bus or tour bus operations as part of that process are expected to result in minor long-term changes in existing ambient sound levels in the project area.

For these reasons, implementation of Alternative A, combined with past and reasonably foreseeable future actions would result in minor long-term adverse impacts to soundscape along South Entrance Road in the vicinity of the South Entrance Station.

Impairment. Direct, indirect, and cumulative impacts to soundscape would be moderate as a result of implementing Alternative A, with short-term moderate, adverse impacts expected during the construction period. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's soundscape.

Conclusion: Alternative A would result in negligible, long-term, adverse, direct and indirect impacts, and minor long-term, adverse cumulative impacts. No impairment of soundscape would result from implementing Alternative A.

Alternative B – Preferred

Direct/Indirect Impacts. Implementation of Alternative B would not result in any changes to the way in which South Entrance Road, the entrance station or the project area are used or managed. With widening of the road 12 feet and constructing an independent bypass lane, short-term construction-related noise would occur throughout the project area, but would not result in any long-term changes in the level of existing ambient noise associated with the project area; it is expected that median daytime ambient sound levels over the long-term would remain within the current range. Short-term increases in ambient sounds levels, however, are expected due to construction equipment operating, primarily for the road construction. The type of equipment necessary for this type of work would operate in the 60-70 dBA range, with actual construction duration of approximately 2-4 months, which would be spread out over 9-12 months to minimize impacts to visitors.

Implementation of Alternative B is not expected to result in changes in visitor use patterns or frequency of use in the area; while improvements would be made to the road, these improvements are all in areas of existing use and simply provide safer and more efficient movement through the area. Minimization of social trailing could slightly decrease the area affected by human-caused sound. None of these actions, however, are expected to measurably increase or decrease the source of human-caused sounds in the project area, over the long-term. Therefore, since there would be no change in the expected duration, level, and affected area of human-caused sounds in the project area over the long-term, Alternative B would result in negligible long-term adverse impacts. Short-term, moderate, adverse impacts are expected due to increased noise during the construction period.

Cumulative Impacts. Past and reasonably foreseeable future actions are as described under Alternative A. Because direct and indirect long-term impacts from Alternative B are similar to those expected for Alternative A, cumulative impacts are the same as those described previously for Alternative A. Implementation of Alternative B, combined with past and reasonably foreseeable future actions would

result in minor short- and long-term adverse impacts to soundscape along South Entrance Road in the vicinity of the South Entrance Station.

Impairment. Direct, indirect, and cumulative impacts to soundscape would be moderate as a result of implementing Alternative B, with short-term moderate, adverse impacts expected during the construction period. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's soundscape.

Conclusion: Alternative B would result in long-term, minor, adverse, direct and indirect impacts, and short-term moderate, adverse impacts during the construction period for widening the road and constructing the bypass lane. Cumulative impacts would be minor and adverse. No impairment of soundscape would result from implementing Alternative B.

VEGETATION

Affected Environment

The major vegetation types on the South Rim are ponderosa pine forest, pinyon/juniper woodland and big sagebrush associations. In general, ponderosa pine occupies the cooler and moister sites with deeper soils above 7,000 feet. Pinyon/juniper typically inhabits drier sites with shallower soils below 7,000 feet. Sagebrush occupies the broader valley bottoms with deeper soils (GMP 1995).

The primary biotic community represented in the project area is Ponderosa Pine – Pinyon Pine – Gambel oak – Juniper Series (Warren et al. 1982). Forest and woodland species occur in uneven stands. Dwarf shrubs are prominent in the understory, with deciduous broad-leaved shrubs occurring in mesic pockets. Trees vary from 20 to 60 feet and shrubs are less than 6 feet tall. This type forms a transition from pinyon-juniper bordering lowering elevations to pure ponderosa pine dominated stands at higher elevations.

Figure 2. Typical ponderosa pine forest near the South Entrance Station, South Rim, Grand Canyon National Park, 2007.

Exotic Species

As the primary entrance to the park, the south entrance is a high priority area for exotic plant survey and treatment. Vehicles are a vector for the introduction and spread of exotic plant species. Due to the number of vehicles coming from outside the park the opportunity for introduction of these species is very high, and would likely increase with new ground disturbance in the project vicinity. In addition, construction vehicles can introduce and spread exotic plant species through ground disturbing activities. Surveys would be conducted in this area prior to project initiation and treatment with a focus on high priority species. The treatment would occur to minimize the impacts of exotic plant species. Integral design criteria (mitigation measures) have been developed to further limit the spread and introduction of these species.

Social Trailing

Foot traffic throughout the project area, specifically in the area of the proposed bypass lane, has caused soil compaction and trailing. The forested area is littered with toilet paper and has obviously been utilized as a restroom facility.

Environmental Consequences

Methodology

Baseline information used to assess impacts to vegetation is described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional information sources on vegetation used for this evaluation are as described above in the affected environment section.

Those aspects of the vegetation resource that would be affected by proposed activities include the following:

- Changes in potential for introduction and spread of exotic species
- Changes in habitat quality for native species along developed edges
- Changes in existing forest and woodland habitat area
- Loss of ponderosa pine forest or pinyon-juniper woodland

The thresholds of change for the intensity of an impact on vegetation are defined as follows:

Negligible A change to a biotic community that is not measurable or perceptible.

Minor A measurable or perceptible, small, localized change to a biotic community. The change is of little consequence.

Moderate A change to a biotic community that is measurable and of consequence but is localized.

Major A measurable change to a biotic community. The change is large and/or widespread and could have permanent consequences for the species or resource.

Nature of the Impact Adverse impacts would result from removal of native vegetation; creation of disturbed ground prone to exotic species establishment; import of exotic plant species on machinery and in fill material; removal of forest and woodland habitat and loss of ponderosa pine and pinyon-juniper.

Beneficial impacts would result from reduction of foot traffic and subsequent recruitment of native plant species into denuded areas and social trails.

Duration Short-term impacts would occur less than or equal to two-to-three years following implementation. Long-term impacts would typically occur greater than five years following implementation.

Methodology for Estimating Tree Removal The tree removal estimates were calculated onsite by park staff. Tree counts were taken separately for the bypass lane, road widening and potential third northbound lane (feeder lane). The Gambel oak trees were counted by stem and therefore may be generous estimates as each clump, made up of many stems, is likely only one individual.

Alternative A – No Action

Direct/Indirect Impacts. Vegetation in the project vicinity, primarily ponderosa pine forest (with some pockets of pinyon-juniper woodland), has been modified due to existing developments in the project area, including construction of the South Entrance Road and entrance station. This impact to vegetation is considered adverse, but site-specific and confined to existing developed areas, so constitutes a long-term but minor effect to vegetation in this area.

Ongoing exotic vegetation control programs, which include hand pulling, mechanical treatments, and a small amount of herbicide control, would continue under the No Action Alternative and have expanded in this area due to the recent ground disturbance. Because the size of the current program is limited, existing populations of exotic vegetation would continue to spread and slowly replace native vegetation. This would most likely occur along roads and utility corridors. These impacts would be negligible, adverse and long-term.

No new vegetation would be disturbed. Therefore, implementation of Alternative A would result in negligible impacts to vegetation.

Cumulative Impacts. Past development has resulted in soil compaction and displacement and vegetation removal within the project area, with little new development planned in the foreseeable future. While some projects are planned, implementation would result in minimal vegetation removal or ground disturbance, except for approximately 1,300 acres of prescribed burns, as described in Appendix D. Prescribed burning is designed to reduce fuel accumulation and restore fire to the ecosystem in order to reduce the risk of large-scale unwanted wildfire. Broadcast prescribed burning is the primary tool used outside of developed areas to reduce fuel accumulations. Although prescribed burning results in changes to the vegetative composition of stands treated, these changes are typically limited to the understory and are short-term changes. Prescribed fire would not result in changes to the overall vegetation type or stand composition. For these reasons, prescribed fire would not result in substantial changes in the long-term use of these areas by wildlife and are designed to provide for the natural inherent variability in these stands. The majority of the surrounding area would remain essentially undisturbed ponderosa pine forest.

The construction of existing roads and buildings in the project vicinity has resulted in the presence of exotic vegetation in these areas. Ground has been disturbed for the construction of existing visitor services, roads, and utilities. The recent construction of an additional lane at the entrance station and associated trenching has disturbed soils, impacting previously landscaped areas and inviting establishment of exotic plant species.

Combining taking no action at this time with existing and future development would result in limited disturbance in the project area. The additional acres of estimated development within the project area, in the foreseeable future, are a relatively small amount and do not change the percentage of development

within the area as a whole. The majority of the acreage planned for disturbance in the future is derived from fire activities; prescribed fire and wildland urban interface (WUI) treatments and these actions are planned with the objectives of improving forest and woodland conditions and minimizing the likelihood of wildfire in these areas. Cumulative impacts would include decreased wildlife security, disturbance to adjacent habitat, and fragmentation. However, this disturbance of vegetation and wildlife habitat through planned projects and associated tree removal would occur nearby the existing developed area of the South Rim where development already exists and visitation levels are high in peak season. These local, short- and long-term, adverse impacts would be minor because of the widespread availability of ponderosa pine habitat within the project area.

Impairment. Adverse impacts to vegetation under Alternative A would be cumulative, and minor to moderate. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's vegetation resources.

Conclusion: The No Action Alternative would result in no additional direct or indirect adverse impacts to vegetation, but cumulative impacts are expected to be minor to moderate and there would be no impairment of vegetation.

Alternative B - Preferred

Direct/Indirect Impacts. Implementing Alternative B including widening South Entrance Road approximately 12 feet and construction of a 12 foot wide bypass lane (plus two, two-foot wide shoulders), would result in approximately 5 to 6 acres of vegetation disturbance. Based on the methods described in the Vegetation Methodology section above, the project area is classified as ponderosa pine forest. Within this area adjacent to the roadway and along the bypass lane alignment, up to approximately 2,000-2,500 trees of all size classes, would be removed within these 5 to 6 acres. Along the bypass alignment, approximately 1,250 trees would be removed, of the 1,250 about 750 would be oak stems and the remainder would be a mixture of ponderosa, pinyon and juniper. For the road widening, approximately 750 trees would be removed, of the 750 about 165 would be oaks and the rest ponderosa, pinyon and juniper. Finally, for the potential third northbound lane, approximately 500 trees would be removed, mostly small ponderosa pines. The impact of this removal would be minimized by salvaging as many suitable grasses, forbs, shrubs and small trees as possible for use in revegetating disturbed areas in the project area following construction, other disturbed areas throughout the park, as needed, and by minimizing the amount of vegetation removal along the road corridor as much as practical. This would be achieved during later design phases when slopes adjacent to the roadway are designed. The estimate of 2,000 to 2,500 trees is based on gradual slopes away from the road. Based on more detailed survey efforts during later design phases steeper side slopes may be used to minimize the width of vegetation removal adjacent to the widened road. Construction along the road edge would increase the potential for spread of exotic species and changes in habitat quality for native species along developed edges, but these impacts can be minimized through implementation of mitigation measures (as described at the end of Chapter 2).

There is a possibility that construction activities and trenching under this alternative could damage tree root systems in the area. Root damage can sometimes result in tree mortality within a 5-10 year period. This would create the potential for hazard trees adjacent to the project area over time and the need for them to be removed in the future. All improvements would occur with the objective of minimizing tree removal and damage as much as possible.

An increase in the amount of disturbed ground and import of fill material would increase the potential for the spread and introduction of exotic vegetation. Mitigation measures such as pressure washing of

ground-disturbing equipment and inspection and approval of fill material sources would substantially reduce the risk of introducing a new exotic species. Post-construction revegetation, treatment, and monitoring would also reduce the risk of spreading exotic populations and introducing new species.

Construction of the bypass lane would minimize foot traffic in the area and decrease social trailing by limiting privacy in this wooded area. People would likely utilize the portable restroom in the park sign parking lot instead of wandering into the woods. A decrease in trailing and litter would have minor, beneficial, long-term impacts.

The use of identified staging areas have no potential for impacts to vegetation as these sites are already disturbed and mitigation measures are in place to minimize any off-site impacts. Salvage and revegetation components of the action alternative can be ground-disturbing but are not expected to result in any additional impacts beyond those described for construction actions. Since the vegetation selected for salvage would have been lost during construction no additional vegetation removal outside of the project footprint would result from these actions. Salvage and then revegetation actions are designed to minimize the impacts of construction activities by replanting disturbed sites. While short-term impacts during the use of salvage and revegetation are possible (use of a backhoe and other equipment off established roads) these impacts are negligible over the long-term.

For these reasons, Alternative B would result in minor, adverse, direct and indirect, short-term and long-term and minor, beneficial, long-term impacts to vegetation.

Cumulative Impacts. Implementing Alternative B would result in an additional four acres of new ground disturbance. Foreseeable future projects (Appendix D) would result in approximately 2 acres of additional development. Combining the estimated 5 to 6 acres of new disturbance to past and future developments would result in minimal disturbance, and not appreciably or measurably changing the percentage of the project area developed, as a whole, when compared to the existing condition. Combining this with the past and planned fire activities would result in disturbance to approximately 1,300 acres. The majority of these acres are from fire activities that do not represent a loss of vegetation and are occurring in and around the existing developed area of Grand Canyon Village, and would be staggered through time. Therefore, Alternative B would result in moderate, adverse, cumulative impacts to vegetation.

Impairment. Direct and indirect adverse impacts under Alternative B would be minor and cumulative impacts would be adverse and moderate. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's vegetation resources.

Conclusion: Implementation of Alternative B would result in minor, adverse, short- and long-term, direct and indirect and minor, beneficial, long-term impacts. Cumulative impacts would be moderate and adverse and there would be no impairment of vegetation.

GENERAL WILDLIFE

Affected Environment

Mammals typically associated with the ponderosa pine forest and pinyon/juniper woodland vegetation include species such as elk, mule deer, ground squirrels, Abert's squirrels, deer mice and several bats. Birds include black-throated gray warbler, gray flycatcher, stellar's jay, pinyon jay, western tanager and

pygmy nuthatch. Reptiles include western rattlesnake, short-horned lizard and mountain skink (Brown 1994).

Those species that are not considered special status species, but for which there is interest and concern for their populations on the South Rim, are listed in Table 4 and discussed briefly below. This list was developed based on input from biologists from the park, Arizona Game and Fish Department (AGFD), and U.S. Fish and Wildlife Service (USFWS).

Table 4. Wildlife Species of Interest, South Rim.

Common Name	Scientific Name
Mule deer	*Odocoileus hemionus*
Mountain lion	*Felis concolor*
Rocky Mountain elk	*Cervus elaphus nelsoni*
Breeding birds	Various species, see below

The project area is habitat suitable for all of these species. Mule deer occupy a variety of habitats, but tend to avoid large openings and mature forest with a closed canopy. Mule deer depend on highly digestible, succulent forage and prefer forbs, new shoots and fruits of shrubs, if available (Hoffmeister 1986). South Rim provides winter and summer range for mule deer, and they have been observed often in the project area.

Mountain lions occur throughout Arizona with home ranges varying in size from 25- to 100-square miles, depending on gender, time of year and prey availability. They prey mostly on mule deer and elk. Mountain lions occur on both North and South Rim, but population estimates are not available. Park mountain lion studies were initiated in 2000 and are on-going, recording information on use areas and behavior. One radio-collared female and one radio-collared male mountain lion presently utilize the entrance station area as part of their home ranges.

Elk occur throughout northern and eastern Arizona. Resident elk herds occur on South Rim, occupying ponderosa pine and pinyon-juniper woodland habitat, as well as residential areas of Grand Canyon Village. Elk prefer grasses, sedges and forbs but will also browse on shrubs (such as mountain mahogany and cliff rose) and needles of various conifers and oaks (Hoffmeister 1986). Elk are commonly seen in the project area year-round.

Breeding Birds The Arizona Working Group of Partners in Flight developed a Bird Conservation Plan (Latta et al. 1999) as part of a national effort to address concern for the future of migratory and resident birds. The Conservation Plan lists priority bird species by habitat type and identifies management actions that will benefit those species. The Conservation Plan identifies four priority species in this habitat type: northern goshawk, olive-sided flycatcher, cordilleran flycatcher and purple martin. Three of the priority birds selected in the pine habitat require snags as a critical component of their habitat structure. Managing for snag recruitment trees, creating snags, and promoting longevity of existing snags is recommended for three species (olive-sided flycatcher, cordilleran flycatcher and purple martin). All four species require older, taller trees for nesting, foraging, perching and roosting. Promoting larger and older live trees is also recommended for all pine priority species.

Environmental Consequences

Methodology
Baseline information used to assess impacts to general wildlife populations is described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources

and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional wildlife information sources used for this evaluation are as described above in the affected environment section.

The thresholds of change for the intensity of an impact on general wildlife populations are defined as follows:

Negligible Impacts to wildlife and/or habitat would not be perceptible or measurable; Impacts would not be of any measurable or perceptible consequence to wildlife populations or the ecosystems supporting them.

Minor Impacts to wildlife and/or habitat would be perceptible or measurable, but the severity and timing of changes to parameter measurements would not be expected to be outside the natural variability and would not be expected to have effects on wildlife populations or ecosystems. Population numbers, population structure, genetic variability and other demographic factors for species might have slight changes but characteristics would remain stable. Key ecosystem processes might have slight disruptions that are within natural variability, and habitat for all species would remain functional.

Moderate Breeding animals of concern are present and would be impacted; animals are present during particularly vulnerable life stages. Impacts to wildlife and/or habitat would be perceptible and measurable and the severity and timing of changes to parameter measurements would be expected to be sometimes outside of the natural variability, and changes within the natural variability might be long-term or permanent. Population numbers, population structure, genetic variability, and other demographic factors for species would have measurable changes creating declines, which could be from displacement, but would be expected to rebound to pre-impact numbers. No species would be at risk of being extirpated from the park, key ecosystem processes might have slight disruptions that would be outside natural variability (but would be expected to return to natural variability) and habitat for all species would remain functional.

Major Impacts to wildlife and/or habitat would be perceptible and measurable, and the severity and timing of changes to parameter measurements would be outside of the natural variability for long time periods, and changes within the natural variability might be long-term or permanent. Population numbers, population structure, genetic variability, and other demographic factors for species might have large, short-term declines with long-term population numbers considerably depressed. In extreme cases, species might be extirpated from the park, key ecosystem processes like nutrient cycling might be disrupted, or habitat for any species may be rendered not functional.

Nature of the Impact Adverse impacts would result from those actions that result in habitat loss, mortality, displacement of individuals due to human-caused disturbance (like construction noise), or habitat fragmentation.

Duration Short-term impacts would result in less than or equal to five years following implementation and long-term impacts would result greater than five years following implementation.

Alternative A – No Action

Direct/Indirect Impacts. The No Action alternative would maintain the project area in its current state and would continue to provide habitat in the project area for many wildlife species. The project area provides high-quality habitat for many species due to the lack of development to the east and west of South Entrance Road and the large expanse of ponderosa pine and pinyon-juniper woodland habitat with

little fragmentation. Without a change in vegetation or human use in the project area, wildlife populations would generally remain the same. Continued use of existing developments (road and other developments such as the South Entrance Station) would not impact any sensitive wildlife habitat requirements such as nesting and/or roosting sites, key foraging areas, key calving or fawning areas, or primary wildlife travel corridors. Selection of the No Action alternative would therefore have negligible, local, long-term adverse impacts to general wildlife populations and species of interest listed above.

Cumulative Impacts. As described in the vegetation section of this Chapter, modification of habitat in the project vicinity has occurred as a result of past and present activities and modification would result from implementation of future projects. In the project area, past development has been quite minimal and some new development is planned through the South Rim Visitor Transportation Plan. Much of the area surrounding the entrance station is essentially undisturbed wildlife habitat within the natural zone east and west of the South Entrance Road in the vicinity of the entrance station and would continue to provide high quality habitat for a variety of wildlife species. Prescribed burning that is planned, while it can result in short-term displacement or injury to wildlife, would not result in long-term adverse impacts, as the fire is intended to improve forest conditions and return the natural variability of these ecosystems, all benefits to native wildlife populations.

Effects of the planned prescribed burns and WUI treatments are as described under the vegetation cumulative impacts section of Alternative A. These efforts, while they typically can result in short-term disturbance to wildlife due to reduced cover, changes in foraging habitat and direct disturbance during the activity, are typically beneficial to the quality of the area as wildlife habitat over the long term. They provide structural and species diversity, with the intent of reducing large-scale wildfire and attempt to introduce the natural variability in these stands.

Impairment. Direct, indirect, and cumulative impacts to the wildlife resource would be negligible to minor as a result of implementing Alternative A. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife or park values.

Conclusion: Alternative A would result in long-term, negligible, adverse, direct and indirect impacts to general wildlife populations and minor adverse cumulative impacts. No impairment of wildlife resources would result from implementing Alternative A.

Alternative B – Preferred

Direct/Indirect Impacts. Implementing Alternative B, widening South Entrance Road 12 feet and constructing a bypass lane would result in approximately 5 to 6 acres of vegetation disturbance. Based on the methods described in the Vegetation Methodology section above, the project area is classified as ponderosa pine and pinyon-juniper woodland. Within this area adjacent to the roadway, up to approximately 2,000 – 2,500 trees of all size classes would be removed within these 5 to 6 acres along the road. Tree removal would occur in existing developed areas of the South Rim and would not occur in areas of continuous, undisturbed forest. Compared to the availability of ponderosa pine and pinyon-juniper woodland on the South Rim, and the concentration of this tree removal adjacent to the existing road and other developed areas along the roadway, these impacts to wildlife habitat are lessened. These areas are currently on the edge of developed and undisturbed land and are used as such by wildlife populations. Widening the road and adding an independent bypass lane creates a wider disturbed corridor where the current road edge would no longer be available and would create a new edge further from the road. This represents a loss of habitat for a variety of species. Due to the calculated acreage of the habitat

loss, it is likely that direct mortality to mammalian prey species could result and multiple bird territories would be lost.

A review of avifauna studies of pinyon-juniper woodland in northern Arizona, Utah and Colorado indicate that there are between 60 and 190 bird territories per 40 hectares in this habitat type (Dickson and Ward 2000; Larue 1994; O'Meara et al.; 1981 Balda and Masters 1980; Masters 1979; Grue 1977). Larue (1994) determined that the number of territories on Black Mesa Arizona was positively correlated with the increasing density of the pinyon-juniper stand. As the pinyon-juniper vegetation type along the South Entrance Road corridor is relatively undisturbed and quite dense, the higher estimates for avifauna territories are probably more applicable to this area and are estimated to be between 150 and 190 per 40 hectares, or between 1.5 and 2 territories per acre. Therefore, removal of 5 to 6 acres of this habitat type for this alternative will probably result in the permanent destruction of between 7.5 and 12 bird territories and a degradation of a similar number of territories which will now be closer to the disturbed area.

There are relatively few studies which provide absolute density estimates for small mammals in the pinyon-juniper habitat type. Wide fluctuations in numbers have been consistently noted and are most often correlated with precipitation. In general, the studies show densities in normal years of between 10 and 30 small mammals per acre in this habitat type. Preliminary analysis of data collected in Grand Canyon suggests that the approximate density in ponderosa pine habitat is on the order of 10 to 20 small mammals per acre (Lawes and Ward 2006). Therefore, removal of 5 to 6 acres of this habitat type will result in destruction of habitat supporting between 50 and 120 small mammals.

It is obvious that small mammal and bird species have smaller home ranges and more limited habitat requirements than larger species, such as deer, elk, big horn sheep, mountain lion and raptors and therefore, have a higher potential to be directly impacted during construction activities and direct removal of existing habitat. However, while short-term losses are expected, wildlife populations are not expected to be substantially impacted adversely in the long-term due to the availability of adjacent undisturbed habitat, species mobility and the implementation of mitigation measures to reduce the spread of exotic species, revegetate disturbed areas, reduce runoff and create vehicle fuel leakage and spill plans.

In addition to loss of habitat, impacts of implementing the action alternative would include decreased wildlife security and increased disturbance to adjacent habitat. However, these adverse, long-term, local impacts would be minor because they would occur in areas currently degraded because of high disturbance levels from existing developments, roads, utility corridors, and human use. Mitigation measures developed for minimizing impacts to soils and vegetation from soil erosion, loss of trees, replanting areas with native species, etc., as described in Chapter 2, would also aide in minimizing the indirect impacts of actions on the quality of wildlife habitat.

However, short-term impacts are possible due to the construction activity required under Alternative B to widen the road and construct a bypass lane. This would disturb existing vegetation and therefore result in long-term changes to wildlife habitat. In addition, short-term disturbance due to increased noise levels and activity in the project area from construction activities would result. These would be short-term, lasting only the duration of the construction period, but could result in changes in the way that species use the area and alterations in their patterns of use. No sensitive nesting, fawning or calving areas are documented in the vicinity of the project, but it is possible that adverse impacts could result. These impacts are considered minor due to the concentration of the activities along the existing disturbed road corridor and the availability of similar habitats nearby.

The use of staging areas identified have no potential for impacts to wildlife, beyond those described as part of construction activity noise disturbance, as these sites are already disturbed and mitigation measures are in place to minimize any off-site impacts. Salvage and revegetation components of the

action alternatives can be ground-disturbing but are not expected to result in any additional impacts beyond those described for construction actions. Since the trees selected for salvage would have been lost during construction no additional tree removal would result outside of the project footprint from these actions. Salvage and then revegetation actions are designed to minimize the impacts of construction activities by replanting disturbed sites and providing wildlife habitat in the future. While short-term impacts during the use of salvage and revegetation are possible (use of a backhoe and other equipment off established roads) these impacts are negligible over the long-term.

For these reasons, Alternative B would result in minor, adverse, long-term direct and indirect impacts and moderate, adverse short-term impacts to wildlife.

Cumulative Impacts. As described in the vegetation section of this Chapter, modification of habitat in the project area has occurred as a result of past and present activities and modification would result from implementation of future projects. Areas to the east and west of the project area provide essentially undisturbed wildlife habitat within the natural zone and would continue to provide high quality habitat for a variety of wildlife species, even with the implementation of Alternative B. Since actions are confined to the road corridor and adjacent developed areas, long-term impacts to wildlife are reduced and no fragmentation would occur. Prescribed burning that is planned, while it can result in short-term displacement or injury to wildlife, would not result in long-term adverse impacts, as the fire is intended to improve forest conditions and return the natural variability of these ecosystems, all benefits to native wildlife populations.

Effects of past and planned fire activities on wildlife are as described for Alternative A and would not result in long-term adverse impacts.

Impairment. Direct and indirect adverse impacts to wildlife under Alternative B would result in minor long-term impacts and moderate short-term impacts, and cumulative impacts that would be adverse and minor to moderate. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's wildlife resources.

Conclusion: Alternative B would result in minor, adverse, long-term, direct and indirect impacts to wildlife and short-term moderate adverse impacts during the construction period. Cumulative impacts would be adverse and minor to moderate and there would be no impairment of wildlife resources.

SPECIAL STATUS SPECIES

Affected Environment

Table 5 includes a list of threatened, endangered, proposed and species of concern pertinent to the South Entrance Road Improvements project, based on known occurrences or habitat preferences. Of the ten Federally listed wildlife and plant species known to occur or likely to occur in Grand Canyon National Park, three may occur in or near the project area. Occurrence potential for these species in the project area is included in Table 5 below. Detailed descriptions of special status species, including a brief species description, habitat requirements, legal status and data sources used for the analysis is included in Appendix C.

The list in Table 5 was developed from personal knowledge of the area by park biologists, park records, the AGFD Heritage Nongame Data Management System database (2003), and AGFD and USFWS biologists.

Table 5. Special status species known to occur, or having the potential to occur, in the vicinity of the South Entrance Station, South Rim, Grand Canyon National Park.

Species	Scientific Name	Status	Occurrence in Project Area
California Condor	*Gymnogyps californicus*	T*, WC	Foraging and roosting potential
Navajo Mexican vole	*Microtus mexicanus navajo*	WC	Habitat potential exists throughout project area. Surveys have been completed and found approximately ½ mile from the proposed bypass lane location.
Northern Goshawk	*Accipiter gentilis*	WC	Foraging and nesting potential throughout the project area. Surveys have been completed and no nests were found.
Tusayan flameflower	*Phemeranthus validulum* E. L. Green	PSC	Habitat potential exists throughout project area

Key: *T=Federally listed as threatened under the Endangered Species Act (ESA); T*=Federally listed as an experimental non-essential population in Arizona, but in national parks the species is considered Federally listed as threatened under ESA; WC=Wildlife species of special concern in Arizona (AFGD, 1996); PSC=Plant species of special concern*

Environmental Consequences

Methodology

Baseline information used to assess impacts to special status species is described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park is summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional special status species information sources used for this evaluation are described in the affected environment section.

The thresholds of change for the intensity of an impact on special status species are defined as follows:

Negligible Special status species would not be affected, or the effects would be at or below the level of detection. A negligible effect would equate with a "no effect" determination under section 7 of the Endangered Species Act regulations for threatened or endangered species

Minor Impacts to special status species would be perceptible or measurable, but the severity and timing of changes to parameter measurements are not expected to be outside natural variability and are not expected to have effects on populations of special status species. Impacts would be outside critical periods. A minor effect would equate with a determination of "likely to adversely affect" or "not likely to adversely affect" under section 7 of the Endangered Species Act regulations for threatened or endangered species.

Moderate Impacts to special status species would be perceptible and measurable, and the severity and timing of changes to parameter measurements are expected to be sometimes outside natural variability, and changes within natural variability might be long term. Populations of special status species might have small to moderate declines, but they are expected to rebound to pre-impact numbers. No species would be at risk of being extirpated from the park. Some impacts might occur during key time periods. A moderate effect would in most cases equate with a determination of "likely to adversely effect" under section 7 of the Endangered Species Act regulations for threatened or endangered species.

Major Impacts to special status species would be measurable, and the severity and timing of changes to parameter measurements are expected to be outside natural variability for long periods of time or even be permanent; changes within natural variability might be long term or permanent. Populations of special status species might have large declines, with population numbers significantly depressed. In extreme cases, a species might be at risk of being extirpated from the park, key ecosystem processes like nutrient cycling might be disrupted, or habitat for any species might be rendered not functional. Substantive impacts would occur during key time periods. Impacts would be long term to permanent. A major effect would equate with an "adverse affect with/without a jeopardy opinion" under section 7 of the Endangered Species Act regulations.

Nature of the Impact Adverse impacts would result from those actions that increase the possibility for "take" under ESA (harm, harass, etc.) for listed species, result in habitat loss, mortality, displacement of individuals due to human-caused disturbance (like construction noise) or habitat fragmentation. Beneficial impacts would result in a decrease in take or result in habitat improvement.

Duration Short-term impacts would generally occur within a year or less following implementation. Long-term impacts would result greater than a year following implementation.

Alternative A – No Action

Direct/Indirect Impacts. The No Action alternative would maintain the project area in its current state and would continue to provide habitat in the project area for many wildlife species, although habitat quality in the immediate area would remain relatively low due to the existing level of development and human activity. Without a change in vegetation or human use in the project area, special status populations would generally remain the same. Selection of the No Action alternative would not affect special status species in the project vicinity, or their habitat, beyond the on-going impacts of habitat degradation from visitation and human activity that have been occurring in this area for many years. Impacts specific to each species are included below.

California Condor: Existing developments at the South Rim create year-round human presence in the project vicinity. Human presence creates the possibility for condor/human interactions. Condors are monitored daily via radio telemetry, and any condors that land in the project area now are hazed by permitted park employees to ensure condors do not become habituated to humans. Current park policies and activities would be continued under Alternative A, and adverse impacts to condors would be negligible, long-term, and local. No vegetation manipulation is proposed under Alternative A and there would be no disturbance to any potential nesting, roosting or foraging areas for condors as a result of this alternative. Therefore, the No Action Alternative would have no additional effects on California condors.

Navajo Mexican Vole: Suitable habitat for this species includes grassy areas, usually adjacent to ponderosa pine forests, but sometimes as low as juniper-woodland or stands of sagebrush, or as high as spruce-fir (Kime 1994). Trapping studies were conducted in 2006 (Lawes and Ward 2006), for the Transportation Plan, and located the species within ½ mile of the project. However, no ground disturbance is proposed under Alternative A and therefore would have no additional effects on the Navajo Mexican vole.

Northern Goshawk: Goshawks primarily occupy ponderosa pine forests on the South Rim. Suitable nesting and foraging habitat exists in the project area's ponderosa pine forest, but no nest sites are known within 1 mile of the project area. Existing developments along South Entrance Road near the South Entrance Station have resulted in the removal or modification of potential foraging and to a limited extent, nesting habitat for the northern goshawk. Human activity at the South Rim also reduces the suitability of the area for nesting and foraging by goshawks. Existing development and

human activity could have adverse, local, long-term impacts to goshawks but this is expected to be negligible to minor. No additional habitat would be modified under the No Action Alternative. Therefore, this alternative would not have any additional effects on northern goshawks.

Tusayan Flame Flower: Flame flower is not known to occur in the project area, but will be surveyed prior to project implementation. Alternative A does not propose any ground disturbance and therefore would have no effect on flame flower or any potential habitat.

Cumulative Impacts. As described in the vegetation section of this Chapter, modification of habitat in the project area has occurred as a result of past and present activities and modification would result from implementation of future projects. Areas east and west of the South Entrance Road provide essentially undisturbed wildlife habitat within the natural zone and would continue to provide high quality habitat for goshawks and Tusayan flame flower, and foraging habitat for condors. Prescribed burning that is planned, while it can result in short-term displacement or injury to these species would not result in long-term adverse impacts, as the fire is intended to improve forest conditions and return the natural variability of these ecosystems, all benefits to special status species. Few of the recently implemented or in-progress projects in the project area required tree removal, those projects are listed and described in the vegetation section under Alternative A. This disturbance to vegetation and wildlife habitat through planned projects and associated tree removal would occur within the existing developed area of the South Rim where development already exists and visitation levels are high during peak season.

Prior to the implementation of any prescribed burn or other fire or construction action, special status species are considered and impacts evaluated. As necessary, modifications to the proposal would occur to minimize the potential for impact (for instance, distance to nearest known goshawk, nest or known occurrences for flame flower would be used in the evaluation of a planned project and protective measures taken to avoid impacts). Goshawks and Tusayan flame flower have a high potential for impact due to potential habitat in future projects areas, but this would be minimized through the careful planning for special status species, as mentioned above. For these reasons, implementation of Alternative A would result in adverse, minor impacts to special status species.

Impairment. Direct, indirect, and cumulative impacts to the special status species would be negligible to minor as a result of implementing Alternative A. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's special status species.

Conclusion: Alternative A would result in negligible impacts to special status species, short-term and minor adverse cumulative impacts. No impairment of special status species would result from implementing Alternative A.

Alternative B - Preferred

Direct/Indirect Impacts. Implementing Alternative B and widening South Entrance Road 12 feet would result in approximately 5 to 6 acres of vegetation disturbance along the road edge, with up to approximately 2,000 – 2,500 trees of all size classes being removed. This represents a loss of habitat for a variety of species; potential impacts to special status species are discussed below. The use of staging areas identified have no potential for impacts to special status species, beyond those described as part of construction activity noise disturbance, as these sites are already disturbed and mitigation measures are in place to minimize any off-site impacts. Salvage and revegetation components of the action alternatives

can be ground-disturbing but are not expected to result in any additional impacts beyond those described for construction actions.

California Condor: There is no suitable nesting or roosting habitat within the project area for condors. It is possible that the area is used as foraging habitat but the suitability of the area for this use would remain unchanged if Alternative B were implemented. Therefore, actions proposed under Alternative B with the potential for impact to condors are limited to the potential to attract condors due to increased activity, equipment and human presence in the area during construction. Mitigation measures have been developed to minimize the likelihood of impacts to condors during construction activities (Chapter 2). There are no active condor nests within 0.5 miles of the project area. Therefore, Alternative B would result in negligible to minor adverse impacts to California condors.

Navajo Mexican Vole: As described in Alternative A, the trapping studies were conducted in 2006 (Lawes and Ward) and located this species within ½ mile of the project. However, surveys found no presence of the Navajo Mexican vole at a sample site directly along the alignment of the bypass lane. Road widening and construction of a bypass lane will remove potential habitat for this species. Implementation of Alternative B would result in negligible to minor adverse impacts to the Navajo Mexican vole.

Northern Goshawk: While there is potential nesting habitat for goshawks in the project area, current surveys have revealed that there are no known nest sites within 1 mile of the project area. Vegetation disturbance estimated for Alternative B would primarily be ponderosa pine, pinyon and juniper and associated shrubs, however, Alternative B would not result in substantial loss of ponderosa pine, a preferred species for goshawk nesting. While it is possible that tree removal could impact the suitability of the area for foraging or affect prey species habitat, this is minimized by the fact that this habitat is already adjacent to the roadway and does not provide high-quality habitat due to the proximity to the noisy roadway. However, as described under general wildlife, mammalian prey species and breeding birds would be lost with the level of tree removal expected under Alternative B. For these reasons, goshawk foraging potential would be adversely impacted. Noise associated with construction actions is not expected to disturb breeding activities for goshawks due to known nest sites being greater than 1 mile from the project area. Therefore, this alternative would result in minor adverse short-term impacts to goshawks due to a reduction in prey species and foraging habitat quality.

Tusayan Flame Flower: Flame flower is not known to occur in the project area, but will be surveyed prior to project implementation. If this species is found within the project area and would have the potential to be impacted through the implementation of Alternative B, an action plan would be completed to protect the species. The action plan, if necessary, may include salvage of the plants. For these reasons, Alternative B could result in minor to moderate beneficial, long-term impacts to the flame flower if found in the project area.

Cumulative Impacts. Combining Alternative B to past, current and foreseeable future actions would result in impacts to special status species similar to those described for Alternative A. No special status species occur in project areas for Alternative B that cannot be avoided. Prior to the implementation of any future prescribed burn or other fire or construction action, special status species are considered and impacts evaluated. As necessary, modifications to the proposal would occur to minimize the potential for impact (for instance, distance to nearest known goshawk nest or known occurrences for flame flower would be used in the evaluation of a planned project and protective measures taken to avoid impacts). None of these actions are expected to affect California condors as there is no suitable habitat in the area nor is the area likely to be used for foraging. Goshawks and Tusayan flame flower have a greater potential for impact due to potential habitat in future projects areas, but this would be minimized through the

careful planning for special status species, as mentioned above. For these reasons, implementation of Alternative B would result in adverse, minor cumulative impacts to special status species.

Impairment. Direct, indirect, and cumulative impacts to special status species would be negligible to minor as a result of implementing Alternative B. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's special status species.

Conclusion: Implementation of Alternative B would result in both short-and long-term direct and indirect, adverse impacts that range from negligible to minor and minor to moderate, beneficial, long-term impacts. Cumulative impacts would be minor and adverse. No impairment of special status species would result from implementing Alternative B.

SOCIAL RESOURCES

VISITOR EXPERIENCE

Affected Environment

During 2005, the South Rim of Grand Canyon National Park received more than four million visitors. About 84 percent of these visitors (slightly more than 3.4 million) entered through the south entrance to the park. July was the peak visitation month for 2005 with 404,300 visitors arriving through the south entrance.

On a typically busy summer weekend day approximately 4,800 visitor vehicles enter the South Rim through the south entrance. During peak periods, up to 550 vehicles per hour come through the south entrance. A traffic engineering study (Upchurch, 2005) concluded that, in 2005, there were about 515 hours of the year experiencing congestion at the south entrance. The study also concluded that about 157 days each year have one or more hours with congestion. One-mile long waiting lines at the South Entrance Station are not unusual and such lines create up to a 40-minute waiting time to enter the park resulting in safety hazards, visitor frustration and a poor visitor experience. Waiting lines occasionally extend through the gateway community of Tusayan.

Visitation to Grand Canyon National Park and the South Rim grew rapidly during the 1980s and early 1990s. Visitation more than doubled from 1984 to 1993, reaching a peak of about 4.9 million. Visitation has fluctuated since that time and even decreased after Sept. 11, 2001, however, it is again on the rise. Meanwhile, facilities for visitors remained essentially unchanged, resulting in crowding and congestion.

Environmental Consequences

Methodology

Baseline information used to assess impacts to visitor experience is described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional visitor experience information sources used for this evaluation are as described above in the affected environment section.

Proposed activities have potential to impact visitor experience through access and quality of movement through the entrance station. Reduced wait times enable visitors to more fully enjoy the variety of activities available in the Park.

The thresholds of change for the intensity of an impact on visitor experience are defined as follows:

Negligible Visitors would likely be unaware of any effects associated with alternative implementation.

Minor Change in visitor use and/or experience would be slight but detectable, would affect few visitors and would not appreciably limit or enhance experiences identified as fundamental to the park's purpose and significance.

Moderate Some characteristics of visitor use and/or experience would change, and many visitors would likely be aware of effects associated with alternative implementation; some changes to experiences identified as fundamental to the park's purpose and significance would be apparent.

Major Multiple characteristics of visitor experience would change, including experiences identified as fundamental to park purpose or significance; most visitors would be aware of effects associated with alternative implementation.

Duration Short-term during construction period. Long-term after construction complete.

Alternative A – No Action
Direct/Indirect Impacts. Under the No Action Alternative, no substantial changes would occur to the South Entrance Road and a bypass lane would not be constructed. No other improvements to address road capacity and wait times at the entrance station would be made, so that existing inefficiencies in these areas would not be corrected.

Therefore, continuation of existing conditions under Alternative A would change the long-term ability for visitors to enter the park safely and efficiently. Alternative A would result in moderate, long-term adverse impacts to visitor experience at the South Entrance Station.

Cumulative Impacts: Many of the recently implemented and in-progress projects (Appendix D) improve visitor experience on the South Rim, such as the improved entrance station and Hermit Road rehabilitation. Improved visitor facilities along shuttle bus routes and completion of greenway trail segments (like Greenway III) improve experiences park-wide for visitors. Future actions such as the South Rim Transportation Plan would also benefit visitor experience on the South Rim. Implementation of these planned projects without taking action at this time to improve the experience of visitors at the South Entrance Station would result in long-term cumulative adverse impacts to visitors by allowing inadequate road capacity to remain the same, but these would be minor, as many other improvements in other areas of the South Rim would be implemented and would benefit visitors.

Conclusion: Implementation of Alternative A would result in moderate, long-term adverse impacts to visitor experience at the South Entrance Station. Cumulative impacts would be minor and adverse.

Alternative B - Preferred
Direct/Indirect Impacts. Alternative B improves the existing situation for visitors entering the park through the south entrance. Entering the park is often the first experience visitors will have at the Grand Canyon. The widening of South Entrance Road, south of the entrance station, to provide up to two additional northbound lanes and the construction of an independent bypass lane would reduce wait times. These improvements would alleviate traffic congestion and frustration created by long wait times.

Therefore, implementation of Alternative B would result in long-term, moderate, beneficial impacts to visitor experience; and short-term, minor adverse impacts during the construction period.

Cumulative Impacts: Many of the recently implemented and in-progress projects (Appendix D) improve visitor experience on the South Rim, such as the improved entrance station and Hermit Road rehabilitation. Improved visitor facilities along shuttle bus routes and completion of greenway trail segments (like Greenway III) improve experiences park-wide for visitors. Future actions such as the South Rim Visitor Transportation Plan would also benefit visitor experience on the South Rim. Implementation of these planned projects, combined with the implementation of Alternative B would result in long-term cumulative beneficial impacts to visitors by improving visitor access and the quality of their experiences throughout the South Rim. These beneficial impacts would be moderate and long-term.

Conclusion: Implementation of Alternative B would result in long-term, moderate, beneficial impacts to visitor experience, by road widening and construction of a bypass lane. Short-term adverse impacts resulting from construction activities would be minor. Cumulative impacts would be moderate and beneficial.

PARK OPERATIONS

Affected Environment

Park operations refer to the adequacy of staffing levels and the quality and effectiveness of park infrastructure in protecting and preserving vital resources and providing for effective visitor experience. Infrastructure facilities include roads providing access to and within the park (both administrative and visitor use), housing for staff required to work and live in the park, visitor orientation facilities (visitor centers, developed and interpreted sites and other interpretive features), administrative buildings (park staff office and workspace), management-support facilities (garages, shops, storage buildings and yards used to house and store maintenance equipment, tools and materials) and utilities such as phones, sewer, water and electric. For this project, infrastructure with potential to be affected includes the road itself and the South Entrance Station.

The Grand Canyon National Park superintendent is ultimately responsible for park operations management. In 2003, the park employed 462 full-time staff (NPS 2006c) to manage operations including visitor services and facilities, resource management and preservation, planning and environmental compliance, emergency medical services, law enforcement, search and rescue operations, fire center operations, air operations, facilities management and maintenance and administrative duties. The divisions with responsibility over the South Entrance Road and entrance station are the Facilities Management Division (road maintenance); Visitor and Resource Protection (visitor safety, fee collection); Visitor Education and Interpretation (wayfinding and educational materials); Science Center (resource protection) and Concessions Management (administration of contracts with concessionaires and transportation partners).

It is anticipated that, initially, those who will be eligible to use the bypass lane will include NPS shuttlebuses between Tusayan and CVIP, Park residents, NPS and concessionaire employees, NPS vehicles, concessionaire vehicles, emergency vehicles (such as NPS law enforcement and ambulance from Tusayan), and select commercial vehicles that repeatedly use the entrance station (FedEx and UPS delivery, food deliveries, etc.).

Environmental Consequences

Methodology

Baseline information used to assess impacts to park operations is described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional park operations information sources used for this evaluation are as described above in the affected environment section.

The thresholds of change for the intensity of an impact on park operations are defined as follows:

Negligible A change in operations that is not measurable or perceptible.

Minor A change in operations that is slight and localized with few measurable consequences.

Moderate Readily apparent changes to park operations with measurable consequences.

Major A severely adverse or exceptionally beneficial change in park operations.

Duration Short-term during construction period. Long-term after construction complete.

Alternative A – No Action
Direct/Indirect Impacts. Under the No Action Alternative, no substantial changes would occur to the South Entrance Road and a bypass lane would not be constructed. No other improvements to address road capacity and wait times at the entrance station would be made, so that existing inefficiencies in these areas would not be corrected.

Therefore, continuation of existing conditions under Alternative A would require more fee collection staff to direct traffic and give information to visitors in queue. Alternative A would result in minor, long-term adverse impacts to park operations at the South Entrance Station.

Cumulative Impacts. Combining implementation of past, present and reasonably foreseeable future actions with implementation of Alternative A would result in adverse impacts to park operations. The benefits of improved park facilities that have resulted from past and current actions as well as those planned would likely outweigh the long-term adverse impact of implementation of the No Action alternative. These cumulative impacts to park operations would be minor and adverse.

Conclusion: Implementation of Alternative A would result in minor, adverse, long-term impacts to park operations. Cumulative impacts would be adverse, minor and long-term.

Alternative B - Preferred
Direct/Indirect Impacts. Widening the South Entrance Road 12 feet and constructing a bypass lane would result in beneficial impacts to park operations. The increased road capacity and enhanced movement through the entrance station area would minimize a need for park employees to direct traffic. Frequent users of the entrance station, including transit vehicles, employees and residents, would be able to move quickly through the entrance station. The automated gate system along the bypass lane would not require staffing. The new bypass lane would require some additional road maintenance (plowing, sweeping, ditch cleaning, and longer term pavement care), although this minor impact to park operations is expected to be outweighed by the beneficial impacts.

For these reasons, the long-term impacts to park operations from implementing Alternative B would be beneficial, and minor to moderate. Short-term impacts during construction would be minor to moderate and adverse.

Cumulative Impacts. Combining implementation of past, present and reasonably foreseeable future actions with implementation of Alternative B would result in beneficial impacts to park operations. The benefits of improved park facilities that have resulted from past and current actions, as well as those planned, in combination with improvements in the vicinity of the South Entrance Station would improve park operations. This cumulative impact to park operations would be minor to moderate and beneficial.

Conclusion: Implementation of Alternative B would result in minor to moderate, long-term beneficial impacts to park operations. Short-term impacts during the construction period would be minor to moderate and adverse. Cumulative impacts would be minor to moderate and beneficial.

PUBLIC HEALTH AND SAFETY

The safety of the public and employees is a focal point of the proposed road widening and bypass lane. NPS recognizes the insufficient capacity of the road (and thus unsafe nature) as a driving force in initiating road improvements including the construction of a bypass lane.

On a typically busy summer weekend day approximately 4,800 visitor vehicles enter the South Rim through the South Entrance Station. During peak periods, up to 550 vehicles per hour come through the south entrance. In 2005, there were about 515 hours of the year experiencing congestion at the entrance and the study also concluded that about 157 days each year have one or more hours with congestion. One-mile long waiting lines are not uncommon and such lines create 40-minute waits or longer. This can result in safety hazards, visitor frustration and a poor visitor experience.

The extended wait times create safety concerns including pedestrian and vehicle conflicts, increased potential for collisions, and conflicts between vehicles in queue and vehicles attempting to access commercial businesses in Tusayan. Fee management employees stand in and walk through traffic to provide information to visitors and direct traffic when the entrance station is at its busiest. This results in increased safety risks for park staff. In addition, visitors sometimes leave their vehicles while waiting in line and create further pedestrian-vehicle conflicts. Based on staff accounts, accidents are mostly likely to occur and have occurred between the park sign parking lot and the entrance station. The bottleneck of one approach lane separates into five lanes and drivers are anxious to pass through the entrance station.

<u>Environmental Consequences</u>

Methodology
Baseline information used to assess impacts to visitor experience is described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies and professional judgment. Detailed information on natural and cultural resources in Grand Canyon National Park summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional visitor experience information sources used for this evaluation are as described above in the affected environment section.

Proposed activities have potential to impact visitor experience through the visitors' potential for vehicle/pedestrian collisions and vehicle/vehicle collisions

The thresholds of change for the intensity of an impact on public health and safety are defined as follows:

Negligible No measurable change in public health and safety.

Minor Change in public health and safety would be slight but detectable.

Moderate There would be readily identifiable changes in public health and safety.

Major There would be clear and widespread changes throughout the project area regarding public health and safety.

Duration Short-term during construction period. Long-term after construction complete.

Nature of Impact Beneficial reduction in safety concerns for visitors and park employees. Adverse increase in safety concerns for visitors and park employees.

Alternative A – No Action
Direct/Indirect Impacts. Under the No Action Alternative, existing facilities would remain in place, in essentially their current condition. The South Entrance Road would not be widened and a bypass lane would not be constructed. Visitor use assistants would continue to direct traffic and conflict with vehicles entering the park. Long waits at the entrance station would continue.

Therefore, continuation of existing conditions under Alternative A would not change the current public health and safety concerns and would not change the existing level of vehicle/pedestrian, vehicle/bicycle, or vehicle/vehicle collisions. Alternative A would result in minor to moderate, long-term adverse impacts to public health and safety.

Cumulative Impacts: Many of the recently implemented and in-progress projects (Appendix D) improve public health and safety on the South Rim. Many upcoming projects improve public health and safety on the South Rim, such as the Hermit Road rehabilitation project. Other future actions such as the South Rim Visitor Transportation Plan would also benefit public health and safety on the South Rim. Implementation of these planned projects without taking action at this time to improve the safety of visitors and employees at the South Entrance Station would result in long-term cumulative adverse impacts to health and safety by allowing inadequate services to continue, but these would be minor, as many other improvements in other areas of the South Rim would be implemented and would increase safety.

Conclusion: Implementation of Alternative A would result in minor to moderate, long-term adverse impacts to public health and safety at the South Entrance Station. Cumulative impacts would be minor and adverse.

Alternative B - Preferred
Direct/Indirect Impacts. Alternative B would construct a bypass lane and widen the South Entrance Road south of the entrance station. These improvements would eliminate the need for fee staff to direct traffic, and would provide a safer work environment. In addition, the improvements would lessen wait times and visitors would be less likely to exit their cars, eliminating a safety concern with pedestrians and vehicles in the roadway. However, road widening and construction of a bypass lane could pose short-term safety concerns with visitors including visitor exposure to loud construction noise and to the construction site in general and traffic delays.

Therefore implementation of Alternative B would result in long-term, moderate beneficial and short-term, minor adverse impacts to public health and safety.

Cumulative Impacts: Many of the recently implemented and in-progress projects (Appendix D) improve public health and safety on the South Rim. Many upcoming projects improve public health and safety on the South Rim, such as the Hermit Road rehabilitation project. Other future actions such as the South Rim Transportation Plan would also benefit public health and safety on the South Rim. Implementation of these planned projects, combined with the implementation of Alternative B would result in long-term

cumulative beneficial impacts to safety. These beneficial impacts would be minor to moderate and long-term.

Conclusion: Implementation of Alternative B would result in long-term, moderate, beneficial impacts to public health and safety by widening the road and construction of a bypass lane. Short-term impacts resulting from construction would be minor and adverse. Cumulative impacts would be minor to moderate and beneficial.

Chapter 4 Consultation and Coordination

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Agency Consultation & Public Involvement

NPS began the public scoping process in May 2007 with the distribution of a general scoping letter describing several preliminary alternatives under consideration for South Entrance Road improvements. This letter was distributed to the park's approximately 600-person transportation plan mailing list, which includes state and Federal agencies and Native American tribes, was posted on the park's website and was included in a press release. Recipients were asked to respond with issues or concerns with the alternatives described, and with whether they wished to receive a copy of the Environmental Assessment when distributed for public review. The eight (8) letters and e-mails received are briefly described in Chapter 1.

NPS used this scoping response, in combination with other input from the project IDT and other NPS staff to re-evaluate the project's purpose, need and objectives. Based on this, NPS developed a preliminary project proposal designed to best meet the purpose and need for taking action and the specific project objectives identified.

State Historic Preservation Office NPS initiated consultation with SHPO and requested comments on several preliminary alternatives under consideration in March 2006, in a letter distributed during the public scoping period for the larger Transportation Plan. In response, SHPO sent a letter dated April 25 commenting on the preliminary alternatives. After the road widening and bypass lane was taken out of the larger Transportation Plan, NPS sent a letter dated 27 June 2007 describing the proposed project and how the park planned to fulfill Section 106 requirements. The combined EA/AEF was completed for the proposed road improvements project and sent to SHPO for review on 19 July 2007.

Native American Tribes NPS initiated consultation with all affiliated tribes (Havasupai, Hopi, Hualapai, Kaibab Band of Paiute Indians, Navajo, Paiute Indian Tribe of Utah, White Mountain Apache, Yavapai Apache, San Juan Southern Paiute, and Pueblo of Zuni) and requested comments on several preliminary alternatives in March 2006 in a letter distributed during the initial public scoping period for the larger Transportation Plan. After the road widening and bypass lane was taken out of the larger Transportation Plan, NPS sent another letter to the tribes dated 27 June 2007 describing the proposed project. During the public scoping effort in June 2007, NPS received one response from the Navajo Nation asking the park to encourage visitors to enter through the east entrance to the park. This comment will be addressed in the larger Transportation Plan as this road improvements project will simply address safety issues and long waits at the South Entrance Station. The NPS also discussed this project at a pan tribal meeting on 11 July 2007. A copy of the EA/AEF was distributed to all affiliated tribes for their review and comment.

Arizona Department of Transportation NPS contacted ADOT in May 2007 to discuss the proposed project and determine whether the ADOT would be interested in becoming a cooperating agency. ADOT requested to become a cooperating agency because of the proposed road widening in the ADOT easement. In June 2007 a project agreement was signed by both parties. The project agreement identifies the NPS as the lead agency and as the agency responsible for the NEPA and NHPA for the project; ADOT is identified as a cooperating agency that will provide input and review. In a meeting on 5 June 2007, ADOT asked that NPS consider Section 4(f) in the EA. After consultation with NPS regional staff and review of Section 4(f), the NPS responded to ADOT's request in a letter dated 18 July 2007 stating that there are no Section 4(f) resources in the project area.

U.S. Fish and Wildlife Service In the initial scoping for the Transportation Plan, in March 2006, NPS requested comments on several preliminary alternatives and a list of Federally listed species in the project area. A newsletter with updated information on the Transportation Plan was also sent to USFWS in August 2006. The NPS met with the USFWS in April, July and October 2006 and again in June 2007 to discuss the project further. A biological assessment will be prepared for the larger Transportation Plan. After the road widening and bypass lane was taken out of the larger Transportation Plan, NPS contacted USFWS by phone on 22 June 2007 to give an update on the project. Since no Federally listed species would be affected by the project, formal consultation with USFWS was not required. A copy of the EA/AEF was sent to USFWS.

EA/AEF Review

A printed copy of the EA/AEF will be sent to those persons who responded to the scoping efforts and to those that specifically requested a copy. A printed copy of the EA/AEF will also be sent to affiliated tribes, ADOT, FHWA, and USFWS. A press release will announce the availability of the EA/AEF during the public review period, along with a brief project description. The EA/AEF will be posted on the park's website and to the planning, environment and public comment (PEPC) NPS site, where the public can make comments via the website.

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APPENDIX A

2006 Management Policies Excerpts Pertaining to the South Entrance Road Improvements

Applicable Management Policies (Park Facilities, Chapter 9, page 124):
"Support facilities necessary to house, transport, inform, and serve visitors and staff require proper planning, design, programming, construction, operation, and maintenance."

Applicable Management Policies (Park Facilities, Chapter 9, page 135):
"Entrance and fee collection stations will be harmonious with the park environment, and these stations should reflect the architectural character of the park. Entrance and fee collection stations should (1) reasonably accommodate the average peak season visitor traffic, (2) incorporate best available technology, and (3) use best management practices to minimize delays—thus reducing vehicle emissions at the entrance station and enhancing the visitor experience."

Grand Canyon General Management Plan (1995) Excerpts Pertaining to the South Entrance Road Improvements

Applicable GMP South Rim Vision Statements (GMP, page 5):

- The South Rim should accommodate large numbers of visitors, but dense crowds and related conflicts and resource impacts should be minimized.

Applicable GMP Objectives, Facility Design (GMP, page 8):

- Ensure that park developments do not adversely affect park resources and environments, except where absolutely necessary to provide reasonable visitor access and experiences.

Applicable GMP South Rim Management Objectives (GMP, page 9):

- Identify and develop an appropriate range of visitor experiences, opportunities, and access that will accommodate a variety of visitor expectations, abilities and commitment levels.
- Develop and promote use of foot trails, bicycle paths, and public transportation to provide convenient and efficient movement of visitors, employees and residents within Grand Canyon Village and between major points of interest.

The South Entrance Road is identified as part of the Transportation Subzone in the GMP (description, GMP, page 16) and is described as:

- *Transportation Subzones* connect development zones and include primarily paved road corridors and rail corridors to a width appropriate for safe travel.
    - The South Entrance Road links the south entrance and the Grand Canyon Village developed area, plus the following corridors: Rowe Well Road, the old entrance roadbed west of the existing entrance road, and the existing railroad corridor along Bright Angel Wash.
    - Areas outside of this defined area, between the Village and the park boundary are identified as Nonwilderness Areas within the Natural Zone (GMP, page 14):
        - …Development within the natural zone will be limited to dispersed recreational and essential management facilities that have no adverse effect on scenic quality and natural processes and that are essential for management, use, and appreciation of natural resources.

APPENDIX B

Public Scoping Summary of Comments Identified within Submissions to the May 2007 South Entrance Road Improvements Scoping Letter

Concerns/Comments	NPS Response
Bypass Lane Users	
Allow commercial (CUA) vehicles to use the bypass lane.	This EA/AEF will not determine the specific users of the bypass lane, but this comment will be considered in future decisions regarding use of the lane. The park will assess the use and determine the users of the bypass lane after construction and implementation. The goal is to facilitate the movement of vehicles through the entrance station area and the park will make decisions based on the most efficient and effective use of the lane.
Allow pass holders and visitors with pre-paid entrance fees to use the bypass lane.	See response above
Bypass Lane Alignment	
Start the bypass lane at least as far south as the Tusayan Ranger Station access road	The NPS did consider an alternative to start the bypass lane as far south as the access road to the Tusayan Ranger Station, see Alternative Considered But Dismissed. To limit disturbance to vegetation and habitat, the preferred alternative would start the bypass lane further north, but also includes an option to construct a third northbound lane that could essentially serve as a feeder to the bypass lane.
Road Widening	
Construct a third northbound lane upon initial project implementation	This EA/AEF analyzes a third northbound lane, however, with the recent improvements to the South Entrance Station, a third lane will not be necessary immediately to provide efficient operation. To limit disturbance to vegetation and wildlife habitat, the NPS does not intend to construct the third northbound lane unless determined necessary at some future point in time.
Extend third northbound lane at least as far south as the access road to the Tusayan Ranger Station	See above response

Public Scoping Summary of Comments Identified within Submissions to the March 2006 Transportation Plan Scoping Newsletter (Note: Responses to Transportation Planning)

Concerns/Comments	NPS Response
South Entrance Station	
Rework the South Entrance Station to significantly improve traffic flow and visitor servicing. Add more traffic lanes from Tusayan to the Entrance Station and provide automated (bypass) lanes for locals, tour buses, vendors and shuttle buses. Add capacity at the entrance station through the addition of stacked kiosks and/or additional lanes with kiosks.	Each of the draft alternatives addresses traffic management strategies for the South Entrance Station including the addition of lanes and development of access strategies. As a separate action, Grand Canyon National Park intends to implement some short term measures, such as stacked lanes or an additional lane, to reduce wait times at the entrance station within the next year. We will continue to evaluate these actions to determine if they should be retained as part of the

Concerns/Comments	NPS Response
	longer term solutions.
Provide a bypass (northbound) lane on the east side of Hwy 64.	The Park Centered Alternative considers a bypass lane east of Hwy 64.
Increase remote sales of park passes. Encourage all gateway community businesses to sell park passes. Provide a means for visitors to purchase park passes online.	Increasing remote sales will be considered within the alternatives. Sales of passes via the internet will be considered; this may be dependent on NPS national policies for pass sales.
Reduce park pass fees for those who take shuttle buses into the park, or for those who enter through Desert View.	During the refinement stage of alternatives development, use of incentives will be considered. Use of financial incentives would require legislation, and although not impossible to do, this approach has not been very successful at other national parks. Use of non-financial incentives will also be considered.
Move entrance station north near Center Road or to Canyon View Information Plaza.	The NPS assumes this suggestion was made as a means to alleviate visitor queuing extending south into Tusayan during peak times. The preliminary alternatives propose solutions for alleviating queuing without having to build a new fee collection station. However, the advantages and disadvantages of moving the entrance station will be considered as another possible approach during the alternatives refinement stage.
Plan Coordination: Issue Consistent or Addressed with Other Plans	
Coordinate planning with ADOT and their improvements in Tusayan.	The NPS is coordinating with the Arizona Department of Transportation (ADOT) on Tusayan developments and is consulting with ADOT throughout the planning process.

APPENDIX C

Wildlife and Plant Species of Special Concern Species Descriptions

California Condor – Threatened – California condors (*Gymnogyps californianus*) are large birds that reach sexual maturity by five to six years of age. They are strict scavengers and rely on finding their food visually, often by investigating the activity of ravens, coyotes, eagles, and other scavengers. Without the guidance of their parents, young inexperienced juveniles may also investigate human activity. As young condors learn and mature this human-directed curiosity diminishes.

The California condor was listed as an endangered species in March 1967. In 1996, the USFWS established a nonessential, experimental population of California condors in northern Arizona. In December 1996 the first condors were released in the Vermillion Cliffs area of Coconino County, Arizona, approximately 48 km (30 miles) north of Grand Canyon National Park. Subsequent releases have occurred in May 1997, November 1997, November 1998, December 1999, February 2002 and December 2002 in the same vicinity and in the Hurricane Cliff area, which is about 96 km (60 miles) west of Vermillion Cliffs. By declaring the population "nonessential, experimental," the USFWS can treat this population as threatened and develop management regulations less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between management of condors and other activities. Within Grand Canyon National Park, the condor has the full protection of a threatened species.

Nesting habitat for California condors includes various types of rock formations such as crevices, overhung ledges, and potholes. Most California condor foraging occurs in open meadows and throughout the forested areas of the rims. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Roost sites include cliffs and tall trees, including snags.

Data Sources. As of April 2006, the population of free-flying condors in Arizona totaled 58. All of the California condors in northern Arizona are fitted with radio transmitters that allow field biologists to monitor the condors' movements. Condors have been observed as far west as the Virgin Mountains near Mesquite, Nevada; south to the San Francisco Peaks outside of Flagstaff, Arizona; north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah; and east to Mesa Verde, Colorado and the Four Corners region (Peregrine Fund 2000). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, and the Village to Hermits Rest. The North Kaibab National Forest is also used frequently for perching, roosting and foraging. Potential nesting habitat exists throughout the park. One nesting attempt was documented in the Marble Canyon area in 2001. Two nest sites on the South Rim, one on The Battleship and one on Dana Butte, were initiated in 2002. Both nest sites failed. In 2003, a condor chick hatched in the Salt Creek drainage area, the first condor born in the wild since reintroduction efforts began. In 2005, the Salt Creek nest was active again as was the Vermillion Cliffs nest. A new nest in the King's canyon area of the Kaibab National Forest failed. In 2006, all three nest attempts in Northern Arizona failed.

Threats. The main reason for the decline of condors was an unsustainable mortality rate of free-flying birds combined with a naturally low reproductive rate. Most deaths in recent years have been related to human activity. Shootings, poisonings, lead poisoning and power line collisions are considered the condor's major threats.

Navajo Mexican Vole – Species of Concern – The Navajo Mexican vole is listed as a sensitive species with the Forest Service. This small mouse-sized mammal appears to be ecologically and genetically isolated from other populations of its genus, *Microtus*. Their range includes northern Arizona and southern Utah. Habitat for this species includes prostrate thickets of a variety of shrubs that provide dense cover, in areas of high litter and bare ground. Also dry, grassy areas, usually adjacent to ponderosa pine forests, but sometimes as low as juniper woodland or stand of sagebrush, or as high as spruce-fir (Kime 1994)

Northern Goshawk – Species of Concern - The northern goshawk is holarctic in distribution, occupying boreal and temperate forests of North America, Europe and Asia (63 FR 35183-35184). It is the largest of the three *Accipiter* species present in North America. There is considerable debate regarding North American subspecies of the northern goshawk. *A. g. atricapillus* is recognized worldwide as occurring over much of Alaska, Canada and forested regions of the western and eastern United States. Two other subspecies are variously recognized: *A. g. laingi*, which occurs on islands off the Canadian Pacific Coast; and *A. g. apache*, which occurs in mountains of the southwestern United States. The USFWS does not currently recognize the *apache* subspecies (63 FR 35183-35184).

Northern goshawks generally nest in stands of mature trees with a dense canopy. In the Southwest, goshawks most frequently occupy three forest types: ponderosa pine; mixed species (primarily Douglas fir and white fir); and Englemann spruce–sub alpine fir (*Abies lasiocarpa*). Nest sites are typically located on northerly slopes (Reynolds et al. 1992).

Although goshawks typically nest in stands of mature trees, they are forest generalists and use a variety of forest ages and types to meet their life history requirements (Reynolds et al. 1992, 63 FR 35183-35184). Various studies have shown that the mean size of a goshawk home range is around 5,000 acres (Reynolds et al. 1992), and these home ranges generally contain a mosaic of forest conditions. Goshawks prey opportunistically on a variety of small to mid-sized mammalian and avian species such as squirrels (Sciuridae), blue grouse (*Dendragapus obscurus*), rabbits, woodrats, doves (*Zenaida* spp.), jays (*Cyanocitta* spp.) and woodpeckers (*Picoides* spp.). Foraging habitat is probably as closely related to prey availability as to habitat structure or composition. Many prey species use snags, downed logs, woody debris, large trees, openings and herbaceous and woody understories. Because goshawks are visually limited in habitats with dense understories, an open understory enhances detection and capture of prey (Reynolds et al. 1992).

Data Sources. Goshawk surveys have been conducted in Grand Canyon National Park. South Rim surveys were conducted regularly in 1991, 1992 and 1994-1996. Sporadic surveys also occurred in 1999 and 2000, and several nests were found. Surveys have also occurred on the North Rim, most recently in 2002 in areas affected by the Outlet Fire. Surveys continued in 2003 in areas on both the North and South Rims. The primary habitat for goshawks within the park is in the mixed conifer and ponderosa pine habitat on the North Rim. There are approximately ten known goshawks territories in the vicinity of the North Rim developed area, two of which are within the Bright Angel peninsula watershed. This is a small proportion of the over 100 territories on the North Kaibab Plateau. As of 2006, there are no known goshawk nest areas within the vicinity of the project area; most nest sites and territories are greater than one mile south of Hermit Road.

Threats. There is a concern that populations and reproduction of the goshawk are declining in the western United States. These declines may be associated with forest changes caused by timber harvesting, but fire suppression, livestock grazing, drought and toxic chemicals may also be involved (Reynolds et. al 1992).

Tusayan Flame Flower - Species of Special Concern – This perennial herb is endemic to Coconino and Yavapai counties in Arizona and is known from Yaki Point west to Horsethief Tank on the Coconino Plateau, on the South Rim of the park. It occupies rocky, limestone soils in shallow depressions, rocky ridge tops and bedrock outcrops in open, sunny areas in pinyon-juniper woodland.

APPENDIX D

Recently Completed, In-Progress and Foreseeable Future Actions

South Entrance Road Improvements

Recently Completed or In-Progress Projects

Desert View Improvements and Road Rehabilitation – As part of this project, a new entrance station is located approximately 0.4 km (0.25 miles) south of the existing entrance station. The new entrance has two entry lanes, one exit lane, two parking spaces for employees, two booths serving the entry lanes, and a building providing restrooms and storage space. The buildings total approximately 46 square meters (500 square feet). Approximately 0.6 ha (1.5 acres) were cleared of vegetation to provide for the footprint of the new entrance station. The relocation of the entrance station includes the demolition of the existing entrance station booths and the associated road between the new bypass road and the road to the maintenance area. This area will be revegetated and recontoured to follow the natural slope.

Fire Management Activities – The Tusayan prescribed burn unit is scheduled to burn before October 2007. This unit is 584 acres and on a 7-8 year burn cycle. The entire burn area is located on Park Service land. This burn will focus on reducing fuel accumulations in this area south of Grand Canyon Village, creating defensible space near the Wildland Urban Interface around the village. Because prescribed burns are designed to improve forest conditions and do not result in a net loss of habitat, the treatment acreages are not considered ground disturbance and are not factored into the total amount of disturbance estimated for the project area.

Greenway Trail – Phase III – This approximately seven-mile segment of the greenway trail would provide a pedestrian/bicycle/equestrian trail from the future Grand Canyon Transit Center in Tusayan (located near the park boundary) to Canyon View Information Plaza (the new orientation/transportation hub) within Grand Canyon National Park. This trail would provide an alternative means for nonmotorized access into the park. It would also provide a separated experience from the existing road and vehicles entering the park. The trail would be ten-feet wide with a hardened surface and a stabilized shoulder made from a mix of aggregate and topsoil. An area 12 to 14 feet wide would be temporarily disturbed during construction. Design and construction would promote sustainability where possible and would strive to minimize impacts on the land. The trail would provide a possible extension of the Arizona Trail into the park for hikers, cyclists and equestrian users. The trail would become part of the park's overall trail system and would be included in routine patrols by park rangers. Construction on portions of this trail has begun. New ground disturbance is estimated at approximately four acres.

Hermit Road Rehabilitation – The purpose of the Hermit Road Rehabilitation is to address various safety concerns, the historic integrity of the road and to provide recreational opportunities. Project components include 1) widening the road from its current width of 18-20 feet to a uniform width of 24 feet; 2) constructing an approximately three-mile long greenway trail from The Abyss to Hermits Rest on the road's north side; 3) minimal improvements to the unpaved rim trail between Powell Point and The Abyss; 4) rehabilitation of the historic paved West Rim Trail between Grand Canyon Village and Maricopa Point; 5) constructing a connecting trail around the Orphan Mine area between Maricopa Point and Powell Point; and 6) making improvements for safety and accessibility at ten of the overlooks and parking areas along Hermit Road. A FONSI was completed for this project in May 2007 and project implementation is expected in 2008. New ground disturbance is estimated at approximately 11 acres.

South Entrance Station Short-Term Improvements – The short-term improvements included the construction of a fifth entrance lane and the addition of three pre-fabricated kiosks. The project was implemented to address an immediate need to alleviate crowding and congestion at the South Entrance Station. A CE was completed for the project in May 2006 and the project was implemented in May 2007.

Approximately 12 trees were removed and less than one acre of new ground disturbance was needed to complete the project.

Foreseeable Future Actions

Highway 64 Restriping – ADOT would restripe Highway 64 between the community of Tusayan and the park boundary to provide two northbound lanes and one southbound lane. The increased capacity of two northbound lanes would alleviate congestion and crowding at the South Entrance Station.

Kaibab Forest Plan Revision – The National Forest Management Act (NFMA) requires every national forest to have a land and resource management plan, commonly called a Forest Plan, which describes how the National Forest will be managed over the next 10 to 15 years. These plans are programmatic in nature and their management direction is broad in scope and provides for integrated multiple use and sustained yield of goods and services from the Forest in a way that maximizes net public benefits in an environmentally sound manner.

The current Kaibab National Forest Plan was implemented in 1987 under the 1982 "planning rule," which outlined the process of developing and amending forest plans nationwide. In 2005, however, that planning rule was updated and mandated that all forest plans must undergo a comprehensive evaluation every three to five years, making them much more adaptable to changing conditions and new information.

The revised Kaibab Plan will maintain those portions of the existing plan that are working, incorporate new information, and add new elements to areas in need of improvements. The Kaibab's revised Forest Plan will have five main components:

Desired Conditions — what people want the Kaibab National Forest to look like, and what they want it to provide. These conditions must contribute to ecological, social, and economic sustainability.

- Objectives — descriptions of programs, projects and on-the-ground activities to achieve desired conditions.
- Guidelines — rules that guide management actions, protect resources and help achieve desired conditions.
- Suitability of Areas — an assessment of where uses can occur including roads, livestock grazing, timber harvest, and utility corridors.
- Special Areas — an assessment of areas for special designations such as Wilderness, Research Natural Areas, Botanical Areas, or Wild and Scenic Rivers.

The plan revision process is scheduled to take approximately three years, with a final plan being ratified in 2009.

Fire Management Activities – The 744 acre Moqui prescribed burn unit is on a 7-8 year rotation and therefore is likely to be treated with fire again in 2009. This burn area is adjacent to the South Entrance Station and reaches from the landfill road south to the park boundary on the east side of the highway. Actions would be similar to those described under past actions above. However, because the same unit is being treated again under a similar prescription with the intent of mimicking a natural fire regime, these acres again are not included in the total amount of disturbance estimated for the project area

South Rim Visitor Transportation Plan / EA – The purpose of the South Rim Visitor Transportation Plan is to provide a transportation system that addresses the park’s most pressing transportation issues through the year 2020. The plan would accommodate current and anticipated levels of visitation to South Rim, facilitate enhanced visitor experiences and protect park resources. Alternatives under consideration

may include new parking areas near Canyon View Information Plaza (CVIP), or outside of the park north of Tusayan; initiation of shuttle bus transit from Tusayan to CVIP; expanded shuttle bus transit within the Village and to Hermits Rest; improvements at the South Entrance Station to reduce wait times, such as additional vehicle lanes; and improvements to tour bus parking/management. The EA is expected to be completed by fall 2007, with implementation occurring from 2008-2012. Estimates for new ground disturbance are difficult to make at this time, but for purposes of this analysis, approximately 20-30 acres of new ground disturbance would result.

Tusayan Multi-Use Path Enhancement – This ADOT project would install new and improve existing paths adjacent to Highway 64 in the community of Tusayan. The 2-mile path, along either side of the road, would be meandering and multi-use and could include design for associated shuttle bus stops.

Tusayan Road Improvements – ADOT is working with the community of Tusayan to develop road improvements for increased safety and movement along Highway 64. Actions may include the installation of roundabouts, construction of a median and installation of crosswalks.

List of Abbreviations and Acronyms

ADA	Americans with Disabilities Act
ADOT	Arizona Department of Transportation
AGFD	Arizona Game and Fish Department
BA	Biological Assessment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CVIP	Canyon View Information Plaza
CWA	Clean Water Act
dBA	Decibels Adjusted
DO	Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FR	Federal Register
GMP	General Management Plan
GRCA	Grand Canyon
IDT	Interdisciplinary Team
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRCS	Natural Resources Conservation Service
PEPC	Planning, Environment and Public Comment
SHPO	State Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
WUI	Wildland Urban Interface