

Grand Canyon

National Park Service
U.S. Department of the Interior

Grand Canyon National Park



Environmental Assessment January 2008



Greenway V Trail – Pipe Creek Vista to South Kaibab Trailhead

Grand Canyon National Park • Arizona

Environmental Assessment

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Summary

Grand Canyon National Park proposes to construct phase V (Greenway V) of the Grand Canyon Greenway between Pipe Creek Vista and the South Kaibab Trailhead, located on the South Rim of Grand Canyon National Park. Proposed actions include construction of a trail, improvements to existing overlooks and parking areas at Pipe Creek Vista, and improvements at South Kaibab Trailhead. The scope of the project also includes designation of approximately one mile of connecting trail between the South Entrance Road and the proposed Greenway V trail segment. This Environmental Assessment (EA) evaluates three alternatives for addressing the purpose and need for action, including a No Action alternative. The preferred alternative (Alternative B) includes 1) construction of a one-mile long accessible trail between Pipe Creek Vista and the South Kaibab Trailhead; 2) redesign of Pipe Creek Vista overlook and parking area to provide for pedestrian and vehicular safety; 3) improvements to the South Kaibab Trailhead area; and 4) designation of a one-mile long connector trail for multi-modal use. The primary difference between Alternatives B and C is the parking configuration at Pipe Creek Vista. Both alternatives propose to construct additional parking in the area between the two overlooks. Alternative B proposes to designate parallel parking at each overlook whereas Alternative C would eliminate all parking in these areas. The impact analysis concludes that implementation of the preferred alternative would result in beneficial impacts to visitor experience and safety, and would not have significant adverse impacts on natural and cultural resources.

Public Comment

If you wish to comment on the environmental assessment, the National Park Service 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: Greenway V, 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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Chapter 1 Project Scope

INTRODUCTION

This document's purpose is to disclose expected effects on the human environment from construction of a trail between Pipe Creek Vista and the South Kaibab Trailhead on Grand Canyon National Park's South Rim (Greenway V trail). Human environment is defined as the natural and physical environment and the relationship of people with that environment. The project area consists of National Park Service (NPS) land between the intersection of Desert View Drive and South Entrance Road and the South Kaibab Trailhead (Map 1). This includes the trail itself; Pipe Creek Vista overlook and parking areas; the South Kaibab Trailhead and parking area; and the connector trail from South Entrance Road. The proposed Greenway V trail would be approximately one-mile long and would follow an existing utility corridor through ponderosa pine forest and pinyon-juniper woodland at approximately 6,800 feet elevation. The proposed connector trail from South Entrance Road to its intersection with Greenway V would be approximately 1.2 miles long and would follow an existing utility line and dirt road.

PURPOSE OF AND NEED FOR ACTION

The purpose of the proposal is to provide for enhanced recreational opportunities through continued implementation of the greenway trail system as described in the park's 1995 General Management Plan (GMP). The GMP outlined a system of multi-use, accessible trails throughout the park that, once constructed, would encourage non-motorized modes of travel and would provide a greater opportunity for visitors to experience the park's resources. Taking action at this time would allow for a continuous accessible trail connection from other already completed phases of the Grand Canyon Greenway trail system from Grand Canyon Village, Mather Point and Pipe Creek Vista to the South Kaibab Trailhead.

The proposed project is considered an appropriate use as defined in the *2006 NPS Management Policies* because it is suited to the exceptional natural and cultural resources found in the park and fosters an understanding of and appreciation for park resources and values (NPS 2006). The construction of the Greenway V trail and improvements at Pipe Creek Vista and the South Kaibab Trailhead are further evaluated in this document for consistency with applicable regulatory measures, consistency with the park's GMP, actual and potential effects to park resources and values, total project cost, and whether the public interest will be served. If unanticipated and unacceptable impacts transpire, the Park Superintendent would reevaluate the purpose and need to further manage, limit, or discontinue the use.

Consideration of direction provided in the GMP resulted in development of project specific needs and objectives. These guide development of all action alternatives. Needs are to:

- Provide a safe, accessible hiking trail connection from Mather Point and other popular areas of Grand Canyon Village to the South Kaibab Trailhead.
- Provide a continuous pedestrian trail, linked to the existing rim trail, from lodges and restaurants in Grand Canyon Village and Canyon View Information Plaza to a primary trailhead into the canyon, the South Kaibab Trailhead.
- Establish one, easily-recognizable trail in the area between Pipe Creek Vista and the South Kaibab Trailhead to help visitors find their way between these two destinations and minimize social trailing and resource damage.

- Address vehicular and pedestrian safety concerns in the Pipe Creek Vista area created by narrow parking areas, lack of space for vehicles to back up, and lack of designated walkways.
- Improve the South Kaibab Trailhead area to provide an enhanced visitor experience.
 - Provide universal access to the trailhead; provide equal opportunities for all visitors to experience the activity at the trailhead and enjoy canyon vistas
 - Enhance interpretation of the area (such as mule operations and trail use history)
 - Create a sense of arrival and sense of place; create a welcoming experience for visitors arriving via the shuttle bus, personal vehicle, or greenway trail
 - Improve visitor facilities (water, restrooms, seating)
 - Improve shade by using existing trees
 - Improve wayfinding to the trailhead from the parking area
 - Separate NPS mule operations from visitor use areas, as feasible
 - Maintain the trailhead's rustic character, separate from the more urban setting near the parking area
- Provide a connection to the Greenway III trail coming in to the park from Tusayan and designate this as the Arizona Trail to the South Kaibab Trailhead.

This action is needed because:

- It is difficult for visitors to safely find their way to the South Kaibab Trailhead from Pipe Creek Vista. There is no designated trail between these two areas, creating confusion for visitors walking other rim trail segments or those parking at the vista and wanting to continue on to the South Kaibab Trailhead.
- There is no established connection between where the phase I (rim trail) segment of the greenway trail system ends at Pipe Creek Vista and the South Kaibab Trailhead, a popular destination. Currently, visitors must turn around and walk back to Mather Point, get on a shuttle bus and ride back to Canyon View Information Plaza, or find their way on undesignated social trails to the trailhead. These social trails are not accessible by wheelchairs.
- There is no established connection accessible to equestrians and bicyclists between the Greenway III trail segment, coming in to the park from Tusayan, and the South Kaibab Trailhead.
- The extent of social trailing is causing soil compaction, vegetation loss, and visitor confusion.
- Vehicles and pedestrians conflict in parking areas at Pipe Creek Vista. Parking is not well-defined. During the busiest seasons, vehicle congestion creates unsafe situations for pedestrians trying to access the overlooks, and vehicles backing into traffic.
- The South Kaibab Trailhead area is not universally accessible. While visitors can access the parking area, the slope is currently too steep from the parking area to the trailhead itself to meet Americans with Disabilities Act (ADA) standards. The area is a popular visitor destination, yet the site does not provide adequate site amenities (such as shelter, drinking water, and seating opportunities) or universal accessibility.

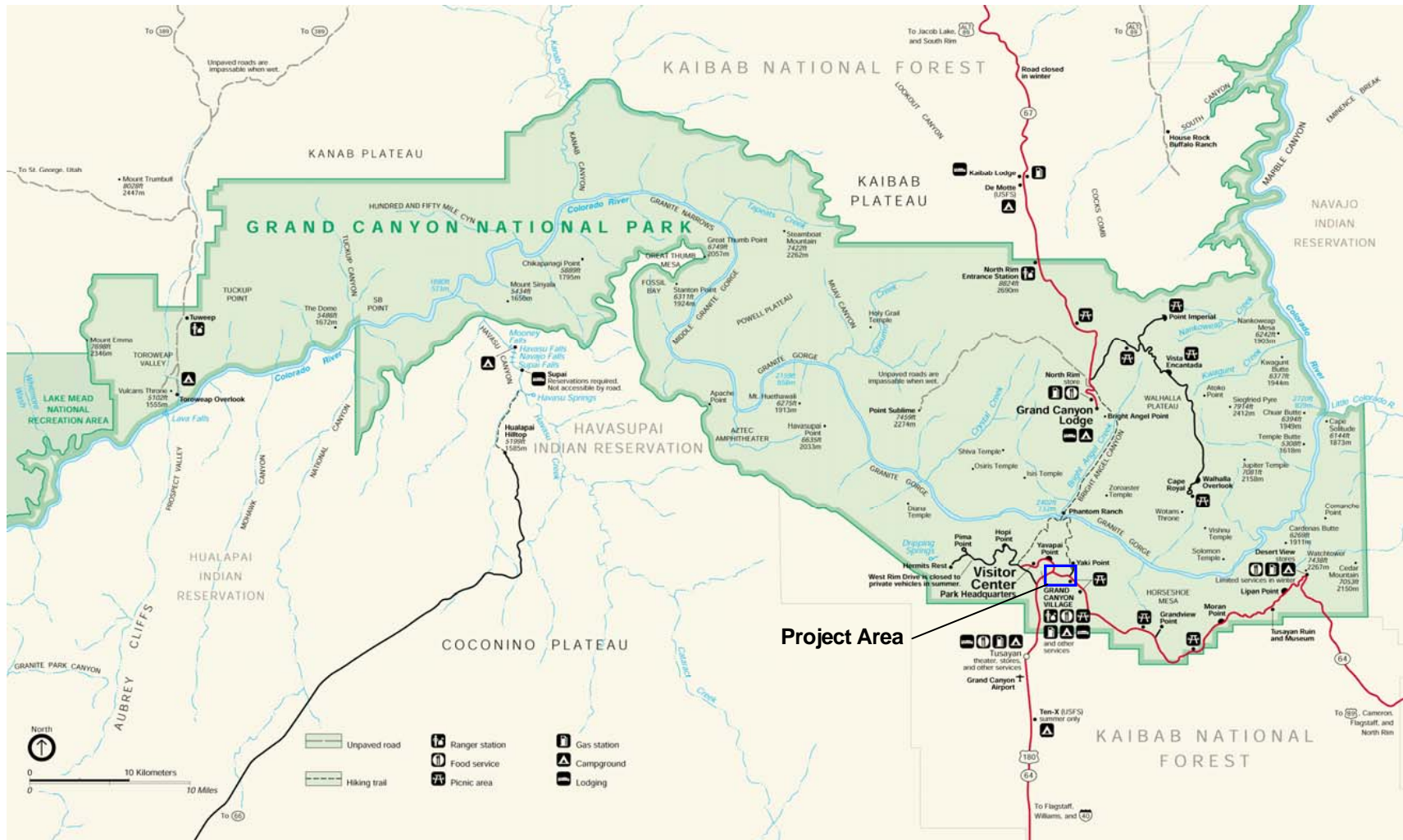
Objectives of the Action

1. Improve visitor experience between Pipe Creek Vista and the South Kaibab Trailhead.
 - a) Provide safe and universally accessible access between these two locations.
 - b) Improve safety and ease of movement for pedestrians and vehicles in Pipe Creek Vista parking areas and overlooks, while maintaining, as much as feasible, existing parking capacity.
 - c) Provide one primary access route to the trailhead from the vista.
 - d) Provide a continuous primary trail corridor from Grand Canyon Village developed areas to South Kaibab Trailhead.
2. Improve the South Kaibab Trailhead area to enhance visitor experience by providing equal opportunities for all visitors to experience the activity at the trailhead and enjoy canyon views;

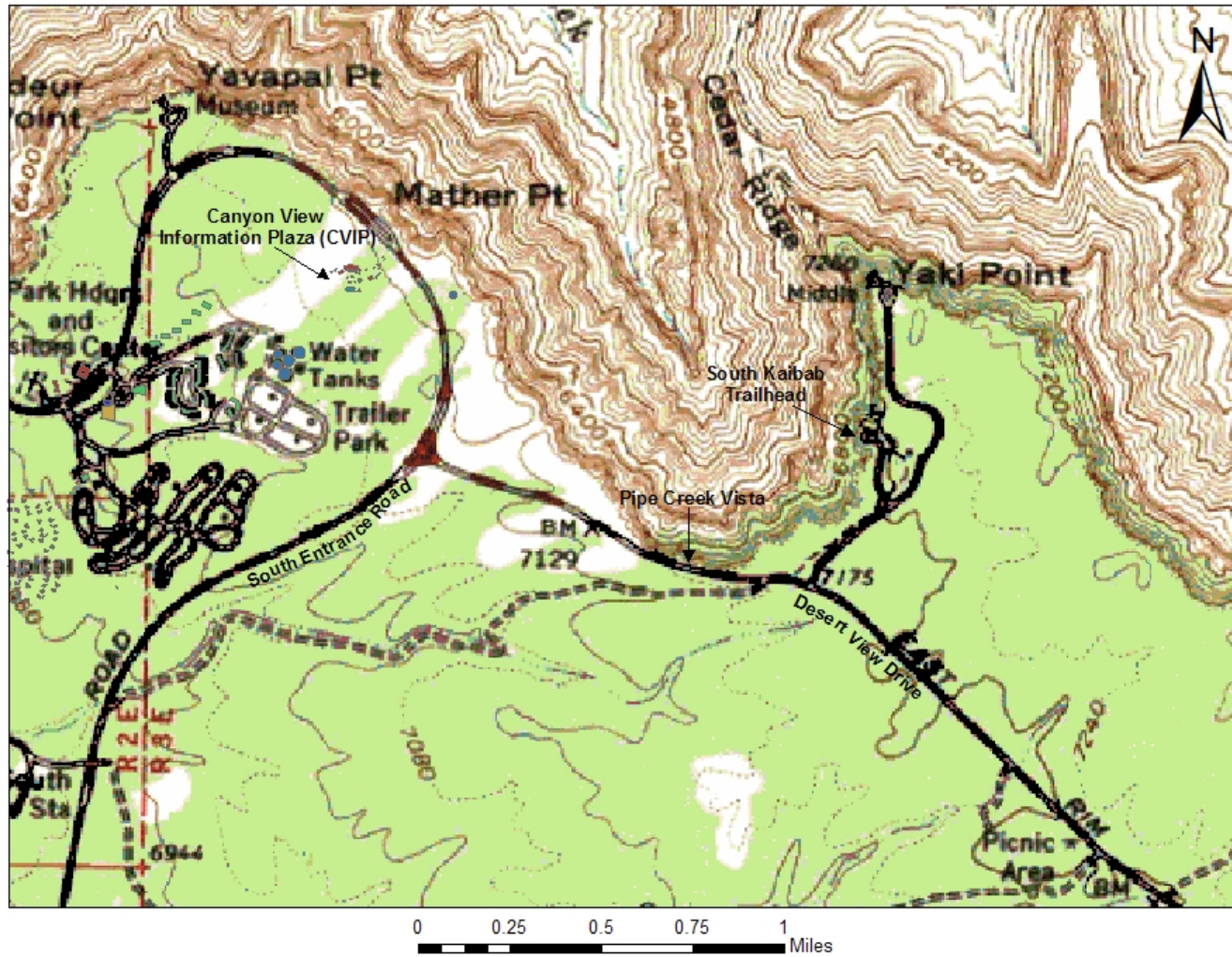
creating a welcoming experience for visitors arriving at the parking area; improving visitor facilities and wayfinding; separating visitor areas from administrative areas; and maintaining the trailhead's rustic character.

3. Improve access to the South Kaibab Trailhead from the Greenway III trail (between Tusayan and the Canyon View Information Plaza) including hikers, bicyclists, and equestrians that use this as the Arizona Trail.
4. Minimize disturbance to the natural and cultural environment and restore areas damaged by social trailing and other impacts, to the extent practical, using native species.

Map 1. Grand Canyon National Park



Map 2. Overall project area



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. *Management Policies*’ Chapter 8, Use of the Parks and Chapter 9, Park Facilities are most applicable to this project.

The park’s General Management Plan includes the following objectives (GMP, page 7-9) related to implementation of the Greenway V project:

- Provide equal access to programs, activities, experiences, and recreational opportunities for individuals with disabilities, as appropriate and consistent with the levels of development and inherent levels of access in areas within the park.
- Develop visitor use management strategies to enhance visitor experience while minimizing crowding, conflicts, and resource impacts.
- Provide visitor and employee facilities and services, as necessary and appropriate, in or adjacent to areas dedicated to those uses or in appropriate disturbed areas.
- Ensure that park developments do not adversely affect park resources and environments, except where absolutely necessary to provide reasonable visitor access and experiences.
- Identify and develop an appropriate range of visitor experiences, opportunities, and access that will accommodate a variety of visitor expectations, abilities and commitment levels.
- Provide canyon viewing opportunities, views and trails access, and interpretation and information, recognizing that these are the most important elements of the South Rim visitor experience.
- Maintain South Rim from Hermits Rest to Desert View as the focus of the majority of visitor use, including major visitor facilities and accommodations.
- 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 GMP prescribes a system of zoning to guide management and use throughout the park. The three park management zones are the Natural, Cultural, and Development Zone. The development zone includes land that will be managed to provide and maintain facilities to serve park visitors. The GMP goes on to state that “It (the development zone) will include areas where park development or intensive use may substantially alter the natural environment or the setting for culturally significant resources. Impacts associated with such development will be mitigated to the greatest extent possible. The development zone will encompass the facilities themselves and all associated lands directly modified as a result of their continuing management and use. Development zones will be restricted to the smallest area necessary to accommodate required development and use.”

Transportation Subzones connect development zones and include primarily paved road corridors to an appropriate width safe for travel. The Grand Canyon Village developed area includes the South Kaibab Trailhead. The road network from the village to the project area (South Entrance Road, Desert View Drive, and Yaki Point Road) is identified as part of the Transportation Subzone.

The GMP addresses the greenway trail system and the Greenway V segment (page 28) and states that, “Pedestrian trails along the rim will be substantially expanded. Care will be taken to avoid archeological sites

and ethnographic resources and to minimize tree removal and disturbance to other vegetation.” The GMP also states that “An improved trail from Yaki Point to Verkamp’s” would be completed.

Greenway Trail

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 greenway trail system in Grand Canyon National Park was envisioned in the GMP as a means to promote and encourage non-motorized travel in the park. The concept included the planned construction of a system of high-quality interconnected trails and overlooks to accommodate people who wish to experience the park and canyon views regardless of age, ability, or recreational preference. As envisioned, it would provide visitors a continuous, eight to nine foot-wide paved trail from Hermits Rest (on the west end) to the South Kaibab Trailhead. A trail to Desert View (on the east end) was originally envisioned as well, but current plans include an eastern-most terminus at the South Kaibab Trailhead. The greenway system, as approved in the GMP and described in more detail in the 1997 Greenway Development Plan (Greenway Collaborative, et. al. 1997), has been implemented in phases. Phase I (rim trail, universally accessible and open to pedestrians), Phase II (village segment, universally accessible and open to pedestrians and bicyclists) and a portion of Phase III from the southern park boundary to CVIP (open to pedestrians, bicyclists and equestrians) have been constructed. A portion of Phase IV (North Rim) is currently under construction. A connection from Grand Canyon Village to Hermits Rest was analyzed in an environmental assessment for the rehabilitation of Hermit Road (NPS 2006c). The entire greenway system within the park is referred to as the Grand Canyon Greenway.

Arizona Trail

The Arizona Trail is an 800-mile trail that extends the entire state of Arizona from Mexico to Utah. A portion of the trail passes through Grand Canyon National Park. A previously designated trail alignment entered the park in the Grandview area and then traversed west along Desert View Drive to the South Kaibab Trailhead. The U.S. Forest Service, NPS, and the Arizona Trail Association have been working together to modify this designation so that Arizona Trail users would travel through Tusayan and continue north through the park boundary, then on to the South Kaibab Trailhead. The connector trail proposed as part of this project would connect the Greenway III segment of the greenway trail system, coming in from Tusayan to the South Kaibab Trailhead and would be signed and designated as the Arizona Trail. The South and North Kaibab Trails would provide Arizona Trail users access across Grand Canyon to the Kaibab Plateau and finally to the Utah border.

Internal Scoping

Preliminary internal scoping to identify NPS specialists’ concerns regarding Greenway V construction began in February 2005. A project-specific interdisciplinary team (IDT) was established in December 2005. Discussions occurred with the IDT to develop purpose, need, and objectives from December 2005 through May 2006. Alternatives were revised in June and July 2007. An internal review draft EA was distributed to park staff for comments in November 2007.

Public Scoping

NPS began the public scoping process in June 2006 with distribution of a general scoping letter describing several preliminary alternatives under consideration for the Greenway V project. This letter was distributed to the park’s approximately 280-person compliance mailing list, which includes state and Federal agencies and American Indian tribes, was posted on the park’s website and included in a press release. Recipients were asked to respond with any issues or concerns to the alternatives described, and whether they wished to receive a copy of the Environmental Assessment when distributed for public review. Ten letters and e-mails were received in response to the scoping letter; senders are listed below:

- State Historic Preservation Office
- Kaibab Paiute Tribe

- Pueblo of Zuni
- Seven private individuals

Responses ranged from concerns regarding bicyclist, pedestrian, and vehicle safety to natural and cultural resource protection.

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 review, NPS developed a preliminary project proposal designed to best meet the purpose, need, and objectives.

This EA has been distributed to those who responded to the public scoping effort, pertinent agencies and tribes, and local libraries. Availability of the EA for the 30-day public review was advertised via press release, publication on the park's website, and through the NPS planning, environment, and public comment (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, within an agency or department, or 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 June 2006 scoping letter. Internal, public, and other agency comments resulted in the following substantive issues:

- A vision of the GMP was to promote non-motorized means of access for visitors and that foot trails, bike paths, and public transportation would be expanded. The preliminary project proposal does not include bicycle access to the South Kaibab Trailhead.
- The preliminary project proposal would result in adverse impacts to the rim area west of Pipe Creek Vista.

Other concerns and comments brought forward (as shown in Appendix A) included such things as accessibility, safety, and impacts to natural and cultural resources.

No other significant issues not already included based on 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 impact topics and rationale for selection/dismissal are given below.

Relevant Impact Topics

Historic Structures and Cultural Landscapes – The 1966 National Historic Preservation Act (NHPA), 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 potential to affect historic structures and cultural landscapes at Pipe Creek

Vista and the South Kaibab Trailhead. Therefore, historic structures and cultural landscapes are discussed in Chapter 3.

Vegetation – Proposed construction would involve disturbance of vegetative communities and some tree removal. Potential exists to increase disturbance to adjacent biotic communities through 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 consequently disturbance of wildlife habitat. Habitat modification as well as noise and other activities associated with project implementation have potential to impact wildlife populations. Therefore, general wildlife populations are 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 potential to be affected by proposed actions. A Biological Assessment (BA) is being prepared for this project to facilitate consultation with the U.S. Fish and Wildlife Service (USFWS) and will detail the potential for effects to these species. Therefore, special status species are discussed in Chapter 3.

Visual/Scenic Quality – To conserve the scenery of national parks and provide for visitor enjoyment are elemental purposes of the NPS as identified in the 1916 Organic Act. Scenic resources are integrally tied to action objectives. Proposed project components have potential to impact the visual appearance of overlooks, parking areas, and viewpoints, and to alter viewsheds. Therefore, visual/scenic resources 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. Greenway V would provide an opportunity for visitors to get away from the more urbanized Grand Canyon Village. A primary project focus is to improve visitor safety and provide for a variety of recreational opportunities. Therefore, visitor experience is discussed in Chapter 3.

Park Operations – Park operations (including shuttle bus, mule, utility, and concessionaire operations on the road, along the trails, at Pipe Creek Vista, and the South Kaibab Trailhead, and trail maintenance) have potential to be affected by 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 (DO) #50B, #50C, #58, and #83 and their associated reference manuals.” One of the proposed project’s objectives is to address safety hazards at Pipe Creek Vista. Therefore, public health and safety are discussed in Chapter 3.

IMPACT TOPICS 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. 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 construction activities under the action alternatives and emissions from construction equipment under implementation of 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. Therefore, air quality was dismissed from further analysis.

Soundscape – The NPS is mandated to articulate operational policies that would require, to the fullest extent practicable, protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment 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 sometimes impede the service’s ability to accomplish its mission.

The South Kaibab Trailhead and Desert View Drive are identified in the GMP as part of the development zone. Recent sound data collected at South Kaibab Trailhead found an average of 35 dBA for the ambient sound level (Falzarano, pers. comm. 2007). Construction activities would generate some noise in the development zone above ambient conditions. Noise sources include vehicles, equipment, and additional people in the area conducting the work. To protect the park soundscape during project implementation, noise production will occur outside the curfew established for air tour overflights (daylight hours). For further information, see mitigation measures developed for this project. Noise impacts from this project would only last the duration of construction. All construction would occur during daylight hours when roads and associated traffic already affect the project area. Any additional traffic would only be temporary and would negligibly affect the areas in the short-term. Increased human use of this area is expected to result in a slight increase in noise between Pipe Creek Vista and the South Kaibab Trailhead; however, it is not anticipated to be significant. Therefore, this project would have no considerable effects on soundscape. Similarly, effects of past, present and foreseeable future actions on soundscape would be short-term and would not considerably affect the soundscape. Potential effects of noise on visitor

experience and special status species are addressed under those impact topics. Therefore, soundscape was dismissed from further analysis.

Archaeological Resources – Section 106 (16 U.S.C. 470f) of the National Historic Preservation Act state that, “The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or Federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.”

An archeological inventory survey was conducted in 2005 between Pipe Creek Vista and the South Kaibab Trailhead specifically to examine the proposed trail alignment. Approximately 80 acres were surveyed in and around the proposed project area. No archaeological sites near the proposed trail alignment were discovered as a result of this survey.

Direct and indirect impacts to archaeological resources are not expected from implementation of this project due to the fact that no archaeological sites have been located within project-area boundaries. Ground disturbance would occur primarily in pre-disturbed areas and in areas that have been surveyed for archaeological resources. Implementation of mitigation measures (Chapter 2, pages 21-25) would help ensure that impacts to archaeological resources do not occur. Therefore, archaeological resources were dismissed from further analysis.

Ethnographic Resources – 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 with 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 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 lines, natural landmarks, minerals, plants, animals, and water (including springs). No ethnographic resources have been specifically identified in the vicinity of Pipe Creek Vista or the South Kaibab Trailhead. All affiliated tribes have been contacted for any concerns they have with implementation of this project and no concerns related to ethnographic resources have been identified. NPS met with the Hopi Tribe, Havasupai Tribe, Navajo Nation, Hualapai Tribe, Yavapai-Apache Nation, Moapa Band of Paiute Indians, and the Kaibab Band of Paiute Indians to discuss this project and identify any concerns. If any tribe subsequently identifies the presence of any ethnographic resources within the project area, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of any ethnographic sites would not be made public. Therefore, ethnographic resources were dismissed from further analysis.

Watershed Values (Soils and Water) – The project area is located within the Bright Angel Wash watershed. There is no standing water or any major or minor drainage 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 1995b, Round and Vernon 1996) and the evapotranspiration potential of the surrounding pinyon-juniper vegetation type (Huntoon undated).

Proposed construction would involve some soil disturbance. Project components focus on construction of a trail along a previously disturbed corridor and would not result in substantial soil disturbance. However, impacts to soil and water resources could result through removal of live vegetation and erosion and/or subsurface flow to a downstream channel. Increased runoff due to paving can 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 ground disturbance proposed for this project, the fact that the area is located within the Grand Canyon Village developed zone, and adherence to mitigation measures designed to minimize potential for soil movement off-site during project implementation, overall impacts to soil and water resources would be negligible and would last only as long as the construction period. For these reasons, soil and water resources were dismissed from further analysis.

Floodplains and Wetlands – Executive Order 11988 (Floodplains) and Executive Order 11990 (Wetlands), which require Federal agencies to examine potential action impacts 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 location 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. For these reasons socioeconomic environment was dismissed from further analysis.

Wilderness Character – 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 Wilderness Act provisions. The South Kaibab Trail is part of the cross canyon corridor and although it is not within proposed wilderness it provides access to wilderness use areas. However, the proposed 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 character was dismissed from further detailed 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 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*). Sustainability objectives include designing 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 alternatives subscribe to and support 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 two action alternatives. Analysis of the No Action alternative is required under NEPA (40 CFR 1502.14(d)). It provides a baseline to assess potential impacts of action alternatives. In alternative development some actions were considered and subsequently dismissed. Descriptions of alternatives considered but dismissed from detailed study are included in this chapter. A summary table comparing alternative components is also presented at the end of this chapter.

Action alternatives are based on preliminary designs and best information available at the time of writing. Specific distances, areas, and layouts used to describe alternatives 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

As described in the Management and Planning History Section of Chapter 1, multiple meetings and discussions took place with NPS staff regarding this project. Project discussions took place as early as November 2004 and included schematic drawings of several trail options. Initial resource survey needs were identified with park staff, and a purpose and need statement developed in 2005.

From the public scoping activities, as fully described in the Management History section in Chapter 1, ten letters were received. The park service performed a content analysis on this information, information gained from internal scoping, and from scoping with other agencies. From this effort, the park service developed two action alternatives to address project objectives and substantive issues. In conjunction with the No Action alternative, the NPS believes this represents a reasonable range of alternatives that meet project objectives, resolve need, and minimize resource impacts

ALTERNATIVE DESCRIPTION

Alternatives are described below. Table 1 (page 26) summarizes primary components of each alternative, and Table 2 (page 28) summarizes expected implementation impacts.

Alternative A – No Action

This alternative would not meet the purpose and need for the project, but provides a basis for comparison with action alternatives. Alternative A would maintain existing conditions. Social trailing would continue to occur between Pipe Creek Vista and South Kaibab Trailhead, promoting further soil compaction and vegetation loss. Vehicles and pedestrians would continue to conflict in the narrow Pipe Creek Vista parking areas, creating safety concerns. Parking spaces would not be designated; inefficient area use and confusion would continue. Approximately 40-55 parking spaces would remain at Pipe Creek Vista, assuming pull-in parking at the overlooks and in the existing dirt area, and efficient use of space.

Under Alternative A, visitors would not be provided a clear, accessible route from Grand Canyon Village to the South Kaibab Trailhead. Equestrians and bicyclists would not be provided with a designated trail to the South Kaibab Trailhead from Canyon View Information Plaza or Tusayan. Conflicts would continue between the NPS mule operation and park visitors near the South Kaibab Trailhead and visitors with disabilities would not be able to access the trailhead.

Alternative B – Preferred

An approximately one-mile trail would be constructed between Pipe Creek Vista and South Kaibab Trailhead (Map 2). It would be approximately ten-feet wide, of which approximately eight feet would be paved and two feet would be unpaved for equestrian use. The trail would follow an existing utility corridor and foot path away from the rim edge to reduce the level of new ground disturbance necessary for construction. The trail would be for pedestrians, equestrians, and bicyclists for most of its length and would be universally accessible.

The trail along Pipe Creek Vista would be approximately five feet wide when adjacent to existing parking areas to minimize loss of available parking space, and would be fully accessible. Some minor modifications to the existing shuttle bus stop would be made to allow the proposed greenway trail to depart from the shuttle stop on the west end of Pipe Creek Vista and continue east. To enhance opportunities for visitors to view the canyon from Pipe Creek Vista, vegetation clearing would be conducted in some areas where trees and shrubs have grown since the original construction of facilities in this location and that now impede the view. Vegetation removal would primarily include pruning of tree limbs and shrubs. This strategic vista clearing would be carefully evaluated by park resource specialists (including vegetation staff, cultural resources staff, and a landscape architect at minimum) to select the most appropriate areas to enhance the view while also minimizing impacts to park resources.

A hardened or paved parking area would be created to accommodate 25 to 35 pull-in parking spaces in the existing dirt area between the two overlooks at Pipe Creek Vista to more safely accommodate vehicles and allow them to maneuver off Desert View Drive (Figure 1). Up to 20 parallel parking spaces, approximately ten at each overlook, would be designated in the existing paved parking areas where spaces are currently unmarked. Some vegetation removal would be necessary to provide safe sight distances for vehicles pulling out of Pipe Creek Vista parking areas. A fog line would be painted along the north side of the road to separate parking areas from the traffic lane. Alternative B would provide a total of approximately 45-55 parking spaces.

In the general area between Pipe Creek Vista and South Kaibab Trailhead, the trail would follow an existing foot path and utility corridor and would be multi-modal. Special designation by the Superintendent may be necessary to allow bicycles on the trail. Spur trails to the rim would be incorporated to provide canyon views. Minimal vegetation would be disturbed as much of the proposed alignment is already impacted. Alternative B would result in approximately three to five acres of total ground disturbance; however, only one to two acres would be new disturbance where vegetation would be removed.

Map 3. Trail alignments proposed under both Alternative B and C

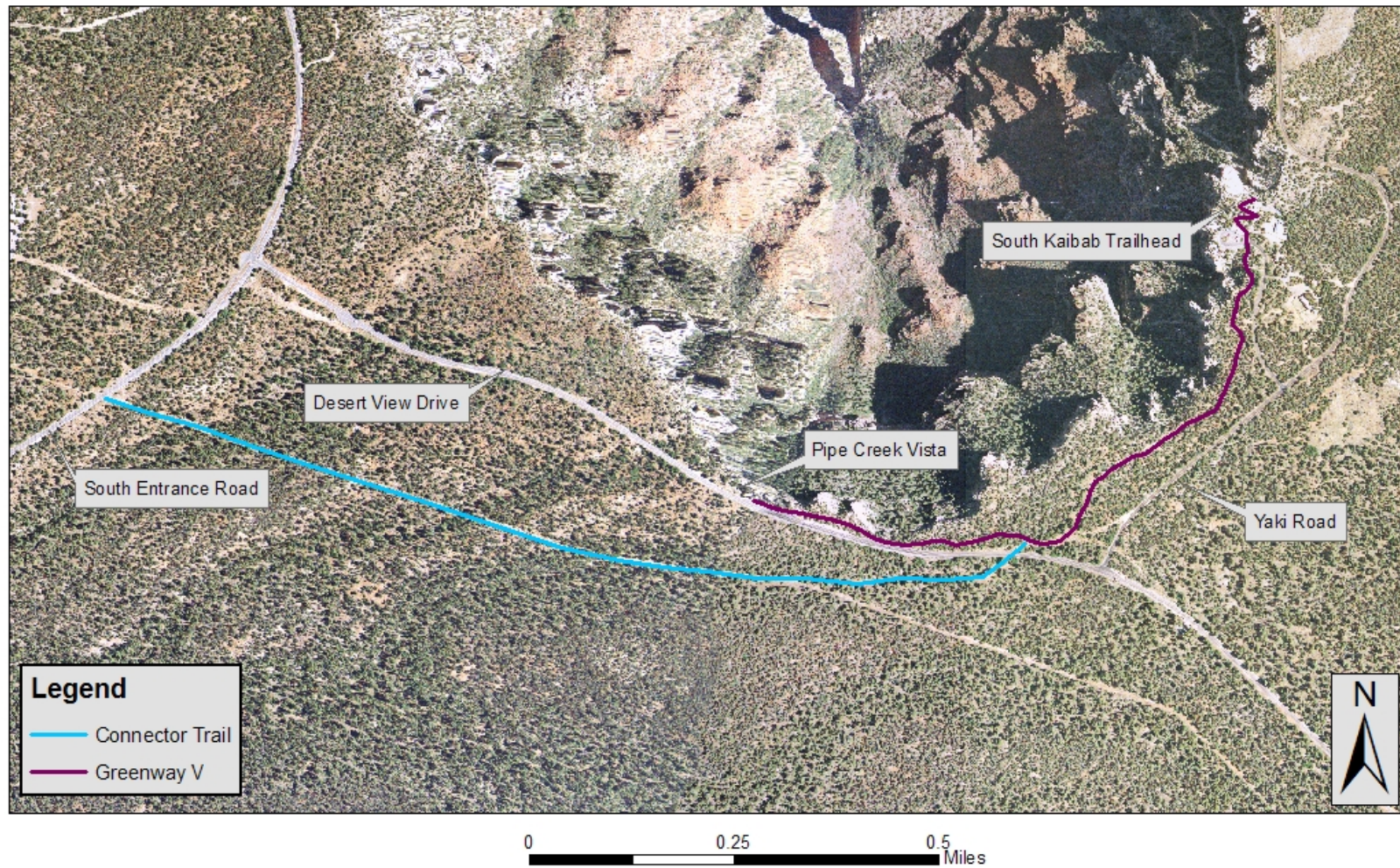
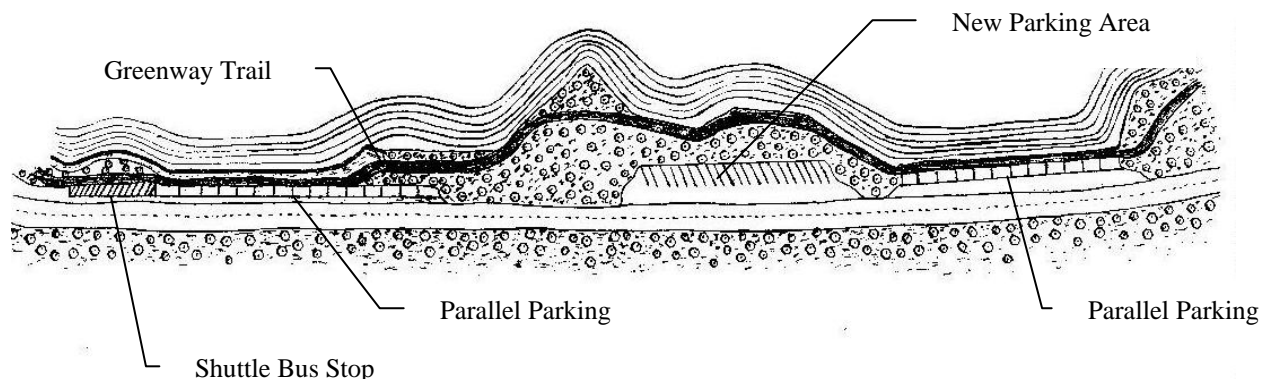
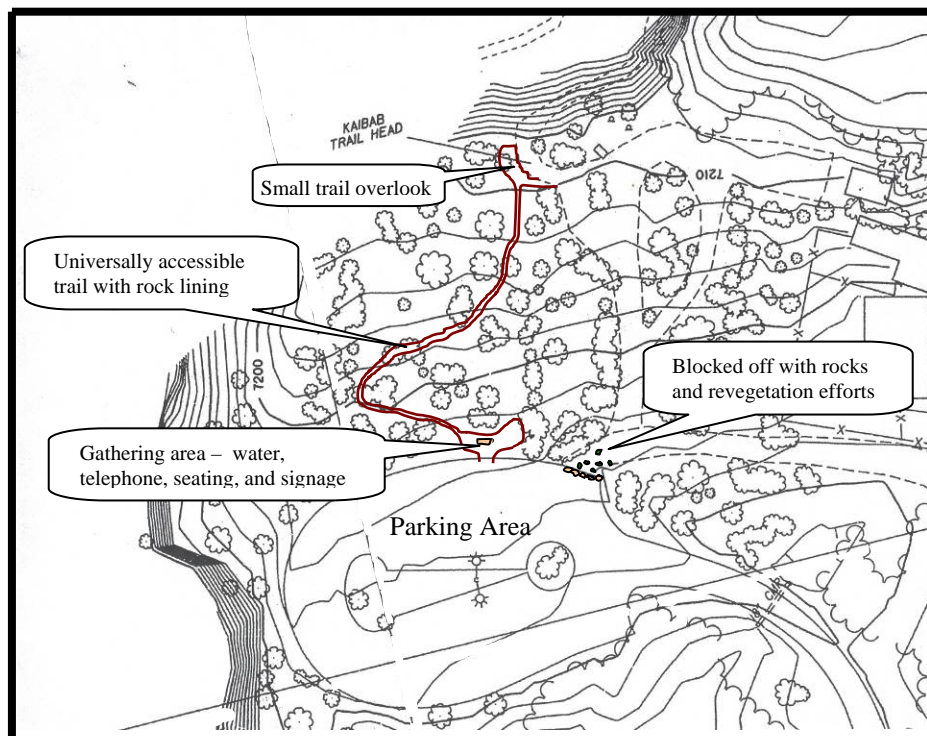


Figure 1. Pipe Creek Vista Parking Configuration Proposed Under Alternative B



In the South Kaibab Trailhead area, an accessible trail connection from the parking area to the trailhead itself would be constructed and would replace the existing dirt road access (Figure 2). A gathering area with a hardened surface would be created adjacent to the parking area and near the shuttle bus stop. The existing water fountain, signage, and telephone would be relocated to this location, and a short spur trail to a planned two-stall vault toilet (installation expected in 2008) would be created. The addition of picnic tables, relocation of dumpsters and recycle bins, and some additional seating would also be considered. The accessible trail from the gathering area to the trailhead would be approximately five-feet wide, paved and lined with rocks, taking advantage of existing grades and open areas to minimize need for tree removal and excessive switchbacks. The existing trailhead exhibit shelter would be relocated to a more suitable location either a short distance away from the trailhead to better accommodate hikers using the new accessible route, or to the gathering area.

Figure 2. South Kaibab Trailhead area and proposed improvements under Alternatives B and C

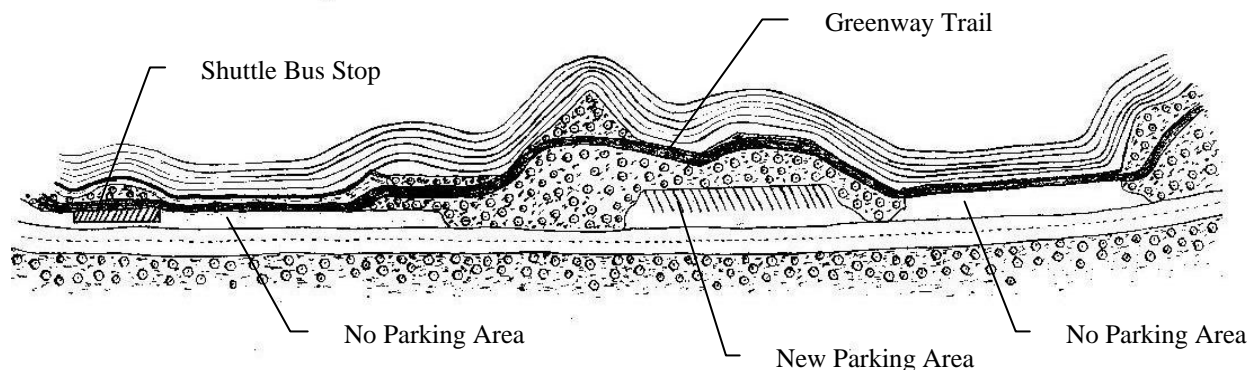


As a component of this project, NPS also intends to construct an approximately one-mile trail segment between South Entrance Road and the section described above, from Pipe Creek Vista to the South Kaibab Trailhead. The trail would connect the greenway trail system coming into the park from Tusayan to the South Kaibab Trailhead. This section would also provide a connection from CVIP to the South Kaibab Trailhead. Pedestrians, equestrians, and bicyclists would be accommodated by this trail section. This trail would be approximately ten-feet wide, of which approximately eight feet would be paved and two feet would be unpaved for equestrian use. The trail would follow the utility corridor for most of its length and would deviate from the utility corridor on its east end to follow an existing dirt road to Desert View Drive just east of Pipe Creek Vista. The trail would cross Desert View Drive and follow an existing path to merge with the Greenway V trail to South Kaibab Trailhead. This connector trail, merged with the Greenway V trail, to the South Kaibab Trailhead would be designated as part of the Arizona Trail and would connect the Arizona Trail on Forest Service land near Tusayan to the South Kaibab Trail—its continuation across Grand Canyon.

Alternative C – Reconfigured Parking at Pipe Creek Vista

The one-mile greenway trail from Pipe Creek Vista to the South Kaibab Trailhead would be constructed as described in Alternative B. The connector trail designation and improvements to the South Kaibab Trailhead would also be completed as described above. This alternative differs from Alternative B in configuration of parking at Pipe Creek Vista (Figure 3).

Figure 3. Pipe Creek Vista Parking Configuration Proposed Under Alternative C



This alternative would eliminate parallel parking at overlooks at Pipe Creek Vista. In the dirt area between the two overlooks, pull-in parking would be created as described in Alternative B. This would off-set loss of parking in other areas. As in Alternative B, these parking spaces would be designated to be safely accessed by vehicles without pulling into the roadway. Alternative C would provide a total of approximately 25-35 parking spaces. To discourage unsafe parking in narrower areas bordered by the greenway, appropriate barriers (rocks, landscaped islands, temporary barricades) would be installed.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED STUDY

A number of alternatives were developed based on 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.
6. The alternative must not result in unacceptable impacts.

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

Preliminary Design Options

In December 2004 Greenways Inc., a contracted design consultant, surveyed the project area and developed three preliminary parking options for Pipe Creek Vista that would accommodate a ten-foot-wide trail through the overlooks. Each option varied by number of parking spaces and shuttle bus stop location. Option 1 proposed parallel parking along the entire length of Pipe Creek Vista and moved the shuttle bus stop to the west end of the dirt area between overlooks. Option 2 eliminated parallel parking at both overlooks and proposed 20 new spaces in the dirt area between overlooks. This option recommended that the shuttle bus stop be moved to the east end of Pipe Creek Vista. Option 3 was a combination of Options 1 and 2 and proposed parallel parking at each overlook, addition of 26 spaces in the dirt area between overlooks, and placement of the bus stop at the far eastern end of Pipe Creek Vista. Option 1 would reduce the number of parking spaces considerably, and therefore does not meet project objectives. Option 2 would also eliminate parking, and the proposal to move the bus stop would not be cost effective. Option 3 is very similar to the preferred alternative, but differs in bus stop location. Again, it would not be cost effective to move the bus stop from its current location. Option 3 was used as a basis for the preferred alternative. For these reasons this alternative was dismissed from further consideration.

Road Shoulder Widening

Widening of Desert View Drive in the vicinity of Pipe Creek Vista was considered. Increased road width would provide enough room for a multi-modal greenway trail and safe pull-in parking along the entire length of Pipe Creek Vista. Although this alternative would have fulfilled the purpose and need for action, it would not have been economically feasible at this time. Additionally, road widening would have resulted in greater impacts to soils, vegetation, and possibly cultural resources. For these reasons this alternative was dismissed from further consideration.

Other Trail Surfaces and Widths

Based on comments received during internal and public scoping, NPS considered various trail surfaces and widths to meet project objectives. An unpaved trail was considered, but would require constant maintenance to provide a universally accessible surface. Use of dead timbers for a trail surface was also considered, but would have maintenance needs similar to an unpaved trail and would not consistently provide a universally accessible path. In addition, NPS explored various widths of trail between five and

ten feet. A minimum of eight feet was selected to provide adequate width for multi-modal use, and an unpaved shoulder for equestrian use was incorporated into the preferred alternative. The eight-foot paved trail was finally selected for the preferred alternative and included a two-foot unpaved equestrian shoulder. These recommended widths address Americans with Disabilities Act requirements for wheelchairs on trails (a minimum width of five feet is recommended to provide 30 inches for side-by-side wheelchairs). NPS has discretion in how to implement American Association of State Highway and Transportation Officials (AASHTO) guidelines, depending on a variety of factors, including potential for impacts to natural and cultural resources. While the proposed greenway trail will be a two-directional, shared-use path, NPS believes that this trail segment will not receive high use levels requiring a ten-foot-wide or greater trail. NPS is obligated to consider effects of proposed actions on natural and cultural resources, and consistency with other greenway trails existing and planned in other park areas. In this case, NPS proposes to keep the width of the new trail to a minimum to avoid unnecessary resource impacts while still meeting the intent of AASHTO recommendations. For these reasons, other trail surfaces and widths were dismissed from further consideration.

Trail Along Canyon Rim

NPS initially explored an option to construct the trail closer to the rim between Pipe Creek Vista and the South Kaibab Trailhead. This option was dismissed due to anticipated extensive vegetation removal and wildlife disturbance.

IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying criteria suggested in the National Environmental Policy Act of 1969 which guides the Council on Environmental Quality (CEQ). 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 and C would result in approximately one to two acres of new ground disturbance requiring vegetation removal. While Alternative C would meet the intent of many project objectives, Alternative B satisfies the objectives and provides more parking and access to visitors. The preferred alternative 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 are common to all action alternatives, would be followed during implementation, and are analyzed as part of the action alternatives. If there are integral design features necessary for an individual alternative, these are listed in the description for that alternative. These actions were developed to lessen the action alternatives' adverse effects, in combination with foreseeable future actions, and have proven 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 would 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 would be addressed, including relevant mitigation measures listed below.

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

- Staging areas for a construction office (trailer), construction equipment, and material storage would either be located in previously disturbed areas near project sites (such as at existing overlook parking areas) 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 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 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.
- Grading and trenching operations would be by backhoe, track hoe, Pionjar, ditch digger and/or trencher, with excavated material side-cast for storage. Any 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 Vegetation Program Manager 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 2006a; 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 action alternatives:

- The park's Vegetation Program Manager would provide input on salvage potential and tree avoidance at project sites where necessary and 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 the park.
- Staging area locations for construction equipment would be park-approved. If determined by Vegetation Program Manager to be necessary, exotic vegetation would be treated prior to beginning of construction.
- Vehicle parking would be limited to existing roads or the staging area.
- Pruning necessary for this project and for any future periodic maintenance adjacent to overlooks and trails 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 nitrophillic 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 competition between native and exotic species.
- Existing vegetation in the area would be maintained and enhanced, to the extent practical.
- Vegetation surveys would be completed at Pipe Creek Vista prior to construction of a parking area between the overlooks.

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 construction, the park would contact personnel monitoring California condor locations and movement within the park to determine the locations and status of condors in or near the project area.
- If a condor occurs at the construction site, construction would cease until it leaves on its own or until permitted personnel employ techniques that result in the individual condor leaving the area.
- 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 day work is conducted (i.e., trash disposed of, scrap materials picked up) to minimize likelihood of condors visiting the site. Park condor staff would complete a site visit to the area to ensure adequate clean-up measures are taken.

- To prevent water contamination and potential condors poisoning, the park-approved vehicle fluid-leakage and spill plan would be adhered to for this project. This plan would be reviewed by the park's Wildlife Biologist to ensure adequacy in condor protection for this project.
- If non-nesting condors occur within one mile of the project area, and blasting is necessary for this project, blasting would be postponed until condors leave or are hazed by permitted personnel.
- If condor nesting activity is known within one mile of the project area, and blasting is necessary for this project, blasting would be restricted during the active nesting season, if viable nests persist. The active nesting season is February 1 to October 15, or until young are fully fledged. These dates may be modified based on the most current information, in consultation with the park's Wildlife Biologist and the USFWS.
- If condor nesting activity is known within 0.5 miles of the project area, then light and heavy construction in the project area would be restricted during the active nesting season, if viable nests persist. The active nesting season is February 1 to October 15, or until young are fully fledged. These dates may be modified based on the most current information, in consultation with the park's Wildlife Biologist and the USFWS.

Mexican Spotted Owl (MSO)

- Any heavy construction required for this project, as defined in the Batch Consultation (NPS 2002a) would be restricted to the non-breeding season (September 1 through February 28). This includes rock excavation including trenching, when these activities require use of hoe-rams, rock saws, hammer hoes, rippers on bulldozers, or track hoes with hydraulic hammers. Light construction activity (as defined in the Batch Consultation and including essentially all other types of typical construction actions) can proceed with no breeding-season restrictions because the project area is greater than 0.5 miles from the nearest known MSO roost.
- If blasting is necessary for this project, it would be restricted to the non-breeding season (September 1 through February 28).
- Prior to the project's start, the park's Wildlife Biologist would be contacted for any new information related to MSO or their status near the project area.
- Since the project is expected to be phased in over time as funding becomes available, the project manager will contact the Wildlife Biologist prior to any initiation of another phase to ensure the most current information regarding MSO is considered.

Deer Goldenbush (*Ericameria arizonica*)

- The known population would be marked by the park's vegetation staff and temporarily fenced with orange construction fencing during any construction activity to protect it from disturbance.

Zone-tailed Hawk

- If a construction project occurs within 0.25 miles of the known nest site at Pipe Creek, then use of heavy machinery including hoe-rams, rock saws, hammer hoes, rippers on bulldozers, or track hoes with hydraulic hammers will be restricted to the non-breeding season (April 1-August 15).

Soundscapes and Wilderness To minimize construction impacts on soundscapes and wilderness, 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 topic in this section*).
- To reduce noise, construction equipment would not be left idling any longer than is necessary for safety and mechanical reasons, and no construction would occur at night.

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

- If previously unknown archeological resources are discovered during the project, a park archeologist would be contacted immediately. All work in the immediate vicinity of the discovery would be halted until the resources could be identified, documented, and an appropriate mitigation strategy developed, if necessary, in accordance with 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 archeological or historic property. Workers would also be informed of correct procedures if previously unknown resources were uncovered during construction activities.
- 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 archeological resource disturbance. If sites selected for these activities change during later design phases for implementation of any alternative, additional archeological surveys would be conducted.
- Disturbance to cultural resources and features associated with the cultural landscape in the project area would be minimized, paying particular attention to historic features associated with Pipe Creek Vista and South Kaibab Trailhead and its parking area.

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

- Natural, muted colors that replicate existing location hues would be used to blend any built materials into the landscape. Materials and their colors (for example, concrete braking pads and pedestrian surfaces at overlooks) would be carefully evaluated to ensure they are appropriate.
- Minimize use of rock trail lining during construction and consider its use only when necessary to provide structural side walls to support the trail where the terrain requires it and for safety reasons.

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

- Unless otherwise approved by the park, operation of heavy construction equipment would be restricted to dawn to dusk, year-round.
- 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. This may take the form of an informational brochure or flyer distributed at the gate and sent to those with reservations at park facilities, postings on the park's website, press releases, and/or other methods. The purpose would be to minimize potential for negative impacts to visitor experience during implementation of this project and other planned projects during the same construction season.

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

- NPS, concessionaires, other park employees, and residents would receive public notification on project implementation and road delays or road closures, as appropriate.
- NPS would work with Arizona Public Service on utility line access needs, including trail surface.

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 greenway trail is guided by the GMP vision and the purpose and need for action developed specifically for this project. Specific objectives for the planning effort include:

Objectives of the Action

1. Improve visitor experience between Pipe Creek Vista and South Kaibab Trailhead by:
 - a) Providing safe and universally accessible access for visitors between these two locations.
 - b) Improving safety and ease of movement of pedestrians and vehicles in the Pipe Creek Vista parking areas and overlooks, while maintaining, as much as feasible, existing parking capacity.
 - c) Providing one primary access route to the trailhead from the vista.
 - d) Providing a continuous primary trail corridor from Grand Canyon Village developed area to the South Kaibab Trailhead.
2. Improve the South Kaibab Trailhead area to enhance visitor experience by providing equal opportunities for all visitors to experience the activity at the trailhead and enjoy canyon views, creating a welcoming experience for visitors arriving at the parking area, improving visitor facilities and wayfinding, separating visitor areas from administrative areas, and maintaining the trailhead's rustic character.
3. Improve access to the South Kaibab Trailhead for future users of the Greenway III trail (trail segment currently under construction between Tusayan and Canyon View Information Plaza) including hikers, bicyclists, and equestrians that use this as the Arizona Trail.
4. Minimize disturbance to the natural and cultural environment and restore areas damaged by social trailing and other impacts, to the extent practical, using native species.

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, Greenway V, Grand Canyon National Park

Components	Alternative A No Action	Alternative B Preferred	Alternative C Reconfigured Parking at Pipe Creek
Trail Width (approximate)	No trail constructed	10 feet (8 feet paved, 2 feet unpaved) 5 feet at Pipe Creek Vista	10 feet (8 feet paved, 2 feet unpaved) 8 feet at Pipe Creek Vista
Greenway Trail Length	No trail constructed	Approximately 1 mile	Same as Alternative B
Connector Trail Length	No trail designated	Approximately 1.2 miles	Same as Alternative B
Number of Parking Spaces at Pipe Creek Vista	40-55 spaces, which reflects the approximate number of spaces based on current, unmarked parking and assumes pull-in parking at the overlooks	45-55 with parallel parking at each overlook and 25-35 new spaces designated in the current dirt area between overlooks	25-35 new spaces designated in the current dirt area between overlooks. Parallel parking would be eliminated under this alternative
Size of Parking Area between Overlooks at Pipe Creek Vista	Would remain an existing dirt and vegetated area that could accommodate some parking	300 feet x 30 feet parking area would be hardened or paved	300 feet x 30 feet parking area would be hardened or paved
South Kaibab Trailhead Improvements	None	Visitor amenities including water, wayfinding and seating would be moved to a central location; administrative functions would be separated from visitor use areas; and the trailhead area would be fully accessible	Same as Alternative B
Pedestrians Accommodated?	No	Yes	Yes
Bicyclists Accommodated?	No	Yes	Yes
Equestrians Accommodated?	No	Yes	Yes
Visitors with Disabilities Accommodated?	No	Yes	Yes
Total Disturbance (approximate, in acres)	0	3-5	Same as Alternative B
New ground disturbance (approximate, in acres)	0	1-2	Same as Alternative B
Total width of disturbance for greenway trail construction (disturbance limits)	0	14' maximum	Same as Alternative B

Components	Alternative A No Action	Alternative B Preferred	Alternative C Reconfigured Parking at Pipe Creek
How Alternatives Meet Project Objectives			
Objective 1 Improve visitor experience between Pipe Creek Vista and South Kaibab Trailhead	A trail would not be constructed between Pipe Creek and South Kaibab Trailhead; therefore Objective 1 would not be met	An accessible trail would be constructed between Pipe Creek Vista and South Kaibab Trailhead; therefore Objective 1 would be met	Same as Alternative B
Objective 1a Provide safe and universally accessible access for visitors between these two locations	A trail would not be constructed between Pipe Creek and South Kaibab Trailhead; therefore Objective 1a would not be met	An accessible trail would be constructed between Pipe Creek Vista and South Kaibab Trailhead, improving visitor access and recreational opportunities in this area; therefore Objective 1a would be met	Same as Alternative B
Objective 1b Improve safety and ease of movement of pedestrians and vehicles in the Pipe Creek Vista area, while maintaining existing parking capacity	No changes would be made to the Pipe Creek Vista parking; therefore Objective 1b would not be met	A pedestrian trail would be constructed along the rim at Pipe Creek Vista, and parallel parking spaces would be designated at the overlooks. Additional parking would be constructed in the island between overlooks; therefore Objective 1b would be met	A pedestrian trail would be constructed along the rim at Pipe Creek Vista, and parallel parking spaces would be eliminated at the overlooks. Parking would be constructed in the area between overlooks; however, an overall loss of parking would result. Therefore Objective 1b would not be met
Objective 1c Provide one primary access route to the trailhead from the vista	A trail would not be constructed between Pipe Creek and South Kaibab Trailhead and a multitude of social trails would remain; therefore Objective 1a would not be met	An accessible trail would be constructed between Pipe Creek Vista and South Kaibab Trailhead; therefore Objective 1c would be met	Same as Alternative B
Objective 1d Provide a continuous primary trail corridor from the developed areas of Grand Canyon Village to the South Kaibab Trailhead	A trail would not be constructed between Pipe Creek and South Kaibab Trailhead; therefore Objective 1a would not be met	An accessible trail would be constructed between Pipe Creek Vista and South Kaibab Trailhead. This section of trail would connect to an existing trail and continue to Grand Canyon Village; therefore Objective 1d would be met	Same as Alternative B
Objective 2 Improve the South Kaibab Trailhead area to enhance visitor experience	No improvements would be completed in the South Kaibab Trailhead area; therefore, Objective 2 would not be met	In addition to the accessible trail to the trailhead, an area would be designated to provide all visitor amenities in one location, including water, a pay phone, seating, and interpretive information	Same as Alternative B

Components	Alternative A No Action	Alternative B Preferred	Alternative C Reconfigured Parking at Pipe Creek
Objective 3 Improve access to South Kaibab Trailhead for future users of the Greenway III trail including hikers, bicyclists, and equestrians that use this as the Arizona Trail	Access to South Kaibab Trail would not be improved; therefore, Objective 3 would not be met	A connector trail would be designated along a utility line and old road bed from the Greenway III alignment at South Entrance Road. This section of trail would be designated as the Arizona Trail and would be multi-modal. Objective 3 would be met under this alternative.	Same as Alternative B
Objective 4 Minimize disturbance to the natural and cultural environment and restore areas damaged by social trailing and other impacts, to the extent practical, using native species	Under the No Action alternative, disturbance would be minimized; however, social trailing would continue. Objective 4 would be partially met under this alternative	The trails would follow existing disturbed corridors as much as possible, and a revegetation plan would be completed for the project; therefore Objective 4 would be met	Same as Alternative B
Overall Fulfillment of Objectives	Does not meet all project objectives	Meets all project objectives	Meets all project objectives, except Objective 1b. Parking would be reduced due to the elimination of parallel parking at Pipe Creek Vista

Table 2. Comparative Summary of Environmental Impacts

Impact Topic	Alternative A No Action	Alternative B Preferred	Alternative C Reconfigured Parking at Pipe Creek	Cumulative Impacts of Preferred Alternative
Historic Structures and Cultural Landscapes	No direct impacts anticipated. Although indirect impacts are possible, none have been identified. No additional impacts, over current condition would result.	Minor, long-term, adverse impacts from addition of non-contributing features to the historic and cultural landscape. Minor, long-term, beneficial impacts would result from relocation of non-historic features from trailhead area.	Same as Alternative B.	Moderate, long-term and adverse impacts.

Impact Topic	Alternative A No Action	Alternative B Preferred	Alternative C Reconfigured Parking at Pipe Creek	Cumulative Impacts of Preferred Alternative
Vegetation	Negligible, long-term adverse impacts would result through continued social trailing in the project area.	Minor, long-term, adverse impacts from 1-2 acres of new ground disturbance for trail and parking construction and minimal vegetation clearing for sight distances. Minor, long-term, beneficial impacts from decreased social trailing.	Same as Alternative B.	Moderate, long-term adverse impacts.
General Wildlife	Negligible, local, long-term, adverse impacts would continue due to human use in the area.	Minor to moderate, long-term, adverse, direct and indirect impacts through new disturbance of 1-2 acres and increased visitor use. Short-term, moderate, adverse impacts during construction.	Same as Alternative B.	Minor to moderate, long-term, adverse impacts.
Special Status Species	Negligible, local, long-term, adverse impacts would continue due to human use in the area.	Negligible to minor, short- and long-term, direct and indirect, adverse impacts due to trail construction and increased human use. Minor, beneficial, short-term impacts to deer goldenbush from protection of the plants during construction.	Same as Alternative B.	Minor, long-term, adverse impacts.
Visual and Scenic Quality	No impacts beyond current condition would result through implementation of Alternative A.	Moderate, long-term adverse impacts would result through construction of a parking area at Pipe Creek Vista and the change from rural character of existing area. Improvements to South Kaibab Trailhead would result in minor, long-term beneficial impacts.	Same as Alternative B and some additional beneficial impacts to visual and scenic quality from elimination of parallel parking at Pipe Creek Vista overlooks.	Moderate, long-term adverse impacts.

Impact Topic	Alternative A No Action	Alternative B Preferred	Alternative C Reconfigured Parking at Pipe Creek	Cumulative Impacts of Preferred Alternative
		Moderate, short-term adverse impacts expected during construction.		
Visitor Experience	Minor, long-term, adverse impacts due to lack of access to South Kaibab Trailhead for pedestrians, bicyclists, and equestrians; unsafe and unidentified parking at Pipe Creek Vista; conflicting use at South Kaibab Trailhead.	Moderate, long-term, direct, beneficial impacts from trail construction, improvements to parking at Pipe Creek Vista and improvements at South Kaibab Trailhead. Minor, short-term impacts during construction.	Same as Alternative B and a very minimal reduction in beneficial impacts due to a decrease in parking at Pipe Creek Vista.	Moderate, long-term, beneficial impacts.
Park Operations	Negligible, long-term, adverse impacts from continued conflicts at South Kaibab Trailhead, on Yaki Road and near Pipe Creek Vista.	Minor, long-term, beneficial impacts due to safe and efficient bus and mule operations; reduced conflicts on Yaki Road, at South Kaibab Trailhead and near Pipe Creek Vista.	Same as Alternative B.	Minor to moderate, long-term, beneficial impacts.
Public Health and Safety	Minor to moderate, adverse, long-term impacts from continued conflicts on Yaki Road and unsafe parking at Pipe Creek Vista.	Moderate, long-term, beneficial impacts from improved parking at Pipe Creek and designation of a pedestrian path at this location, and short-term, minor adverse impacts during construction.	Same as Alternative B but beneficial safety impacts greater due to elimination of parallel parking at Pipe Creek Vista.	Moderate, long-term, beneficial impacts.

Chapter 3 – Affected Environment and Environmental Consequences

INTRODUCTION

This chapter describes present conditions (i.e. affected environment) within the project area, and changes (i.e. environmental consequences) expected from implementation of an action alternative or the No Action alternative 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 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 a 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. Primary vegetation communities are pinyon-juniper woodland and ponderosa pine forest. The project area spans the area from the intersection of Desert View Drive and South Entrance Road to the South Kaibab Trailhead.

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 summarized in the 1995 General Management Plan and associated Environmental Impact Statement 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.

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 South Rim are those projects related to visitor services or construction completed in the last several years or recently 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 Pipe Creek Vista or South Kaibab Trailhead or were linked in some way with operations or activities taking place in the proposed project and include:

Greenway Trail – Phase III (Greenway III) – When complete this approximately seven-mile segment of greenway trail will provide a pedestrian/bicycle/equestrian trail from the community of Tusayan to Canyon View Information Plaza in Grand Canyon National Park. This trail will provide an alternative option for nonmotorized access into the park (NPS 2000). The trail will be designated as the Arizona Trail into the park for hikers, cyclists, and equestrians. Once incorporated into the park's overall trail system it will be routinely patrolled by park rangers. Construction began on a small section of this trail near Canyon View Information Plaza, but has stalled due to a lack of funds. Construction will resume through implementation of the South Rim Visitor Transportation Plan. New ground disturbance is estimated at approximately four acres.

South Rim Viewpoint Rehabilitation – This project addresses the need for maintenance and rehabilitation of approximately 14 viewpoints along Hermit Road and five viewpoints along Desert View Drive, including Pipe Creek Vista. Lack of consistent maintenance combined with heavy visitor use has resulted in deterioration of masonry structures, surface tread, and fencing at these viewpoints. This project will repair and repoint historic walls; reset loose railing stanchions and footings; tighten or replace screws and brackets on railing stanchions; repair, replace, or remove chain link fencing; stabilize historic and modern rock retaining walls and trail liners; remove vegetation affecting historic features and visitor safety; repair asphalt; and remove graffiti. Implementation was initiated and is expected to continue through 2008. The work at Pipe Creek was completed in 2006 and included wall repair and graffiti removal. No new ground disturbance will result.

Foreseeable future actions related to visitor services and construction are 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, and include:

Bright Angel Trailhead Area Design Plan – This project would rehabilitate the Bright Angel Trailhead area historic landscape used by nearly four million visitors a year. The preliminary proposal includes construction of a new restroom and development of a plaza near the primary trailhead. Project objectives include enhancing the area's wayfinding and site amenities, improving paths and connecting trails, eliminating rim edge vehicle parking to provide enhanced pedestrian circulation, and creating a sense of place—an area visitors will immediately recognize as the Bright Angel Trailhead. The EA is in progress (NPS 2007c). The Bright Angel Trailhead area includes a portion of the rim trail that continues east to Pipe Creek Vista, a distance of about four miles. The project area is on already disturbed land, and only minimal new ground disturbance would result.

Hermit Road Rehabilitation – This seven-mile, narrow, historic roadway connecting Grand Canyon Village to Hermits Rest will be widened and rehabilitated to accommodate current levels of shuttle bus and tour bus traffic. This project also includes repair and upgrades to multiple overlook parking areas and construction of an approximately three-mile multi-modal greenway trail between the Abyss (a popular overlook) and Hermits Rest (NPS 2006c). Implementation will begin in April 2008.

South Rim Visitor Transportation Plan – 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 South Rim visitation levels, facilitate enhanced visitor experiences, and protect park resources. Alternatives under consideration include new parking areas near Canyon View Information Plaza and outside the park north of Tusayan; expanded shuttle bus transit from Tusayan to CVIP; expanded shuttle bus transit within the Village and to Hermits Rest; and improvements at South Entrance Station to reduce wait times, such as additional vehicle lanes and tour bus parking/management. The EA (NPS 2007d, in prep.) is expected to be completed by winter 2007/2008, and, if approved, implementation would

occur from 2008 to 2012. Aspects of the plan relevant to the Greenway V trail include shuttle bus operations at Pipe Creek Vista and South Kaibab Trailhead, and parking for day hikers in Grand Canyon Village.

A cumulative impact analysis was conducted for the full GMP implementation 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 park resources would be protected and preserved and some historic buildings would be rehabilitated and restored. Cumulative effects to park visitor experience under GMP implementation were expected to be positive overall as the result of additional food service, accommodations, and contributions to regional and national efforts to expand informational resources, expand interpretive and educational opportunities, and disperse area tourism. 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 more specific to impact topics pertaining to the Greenway V trail is needed.

Impairment

In addition to determining the environmental consequences for implementation of the alternatives, National Park Service policy (*Management Policies 2006*) 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 minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill park purposes, as long as the impact does not constitute impairment of affected resources and values. Although Congress has given the National Park Service 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. 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 opportunities that otherwise would be present for 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 park management, visitor activities, or activities undertaken by concessionaires, contractors, and others that operate in the park. Potential for impairment is considered for each applicable resource for each alternative in this chapter. A statement summarizing results of this evaluation is included in the conclusion for each applicable resource in this chapter.

Unacceptable Impacts

In addition to impairment, unacceptable impacts are also considered in the analysis of alternatives. Although an action may not result in impairment, it could be determined unacceptable within the park's environment (NPS 2006a). Park managers are tasked with determining whether the associated impacts of a project on park resources and values are acceptable. In its role as steward of park resources, the National Park Service must ensure that allowed park uses would not cause impairment of, or unacceptable impacts on, park resources and values.

Human activities within a park have some effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be prohibited. Therefore, as defined in the *2006 NPS Management Policies*, unacceptable impacts are impacts that, individually or cumulatively, would

- be inconsistent with a park's purposes or values, or
- impede attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with park programs or activities, or an appropriate use, or the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park, NPS concessioner or contractor operations or services.

Unacceptable impacts may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. Direct, indirect, and cumulative impacts to all relevant impact topics analyzed in this chapter were reviewed in context with the criteria of unacceptable impacts above to determine if the potential for unacceptable impact exists. Because there would be no adverse impacts that are inconsistent with park purposes or values or that would prevent attainment of desired future conditions for park resources, create an unsafe or unhealthful environment, diminish opportunities for current or future enjoyment of the park, or unreasonably interfere with park programs or activities, concessioner or contractor operations, there would be no unacceptable impacts to park resources or values. The result of this evaluation is given in the conclusion statement for each applicable impact topic for each alternative.

CULTURAL RESOURCES

HISTORIC STRUCTURES AND CULTURAL LANDSCAPES

Affected Environment

Historic Structures

Pipe Creek Vista Overlook

Historic dry-laid parapet walls were built at Pipe Creek Overlook by the road contractor between 1927 and 1929. The walls were reworked with mortar (wet-laid) by the Civilian Conservation Corps (CCC) in the 1930s (NPS 1994). The walls were then repointed in 2006 and graffiti was removed as part of the park's South Rim Viewpoints project.

CCC walls reflect a transition between the earlier type dry rubble masonry (little of which exists along Desert View Drive) and NPS cement masonry styles that emerged in the 1950s. CCC walls are usually built of roughly-cut limestone—well-mortared, nicely pointed (shadowed), and durable. Most walls at scenic points along Desert View Drive can be attributed to the CCC; most curbs to the NPS.

Desert View Drive (East Rim Drive)

Desert View Drive is significant as an early and continuing example of the cooperative agreement between the National Park Service and Bureau of Public Roads (BPR), now the Federal Highway Administration, to build quality automotive roads within the national parks. It is one of five Grand Canyon roads surveyed, designed, and supervised by BPR engineers and NPS landscape architects in the years 1924-31. Although many of its original associated structures have been lost, it retains a number of masonry walls and curbs that date to construction in 1927-31 and to the CCC of the 1930s (NPS 1994).

South Kaibab Trailhead

Yaki Point, near the trailhead, is the staging area for mule trains that use South Kaibab Trail to pack supplies to Phantom Ranch and NPS facilities in the Inner Canyon. Yaki Point buildings were built by both Fred Harvey and the National Park Service in 1926-29. They are closely associated with the construction of, and operations along, the South Kaibab Trail and are included in the nomination to the national register of historic places (NPS 2002c).

The South Kaibab Trail nomination lists the following buildings as contributing:

- Fred Harvey Mule Barn (Building 1094) built in 1929
- Barn Cistern
- Fred Harvey Residence (Building 1095) built in 1926
- Shed (Building 1096)
- Residence Cistern
- Shed (Building 1097)
- NPS Residence (Building 84) built in 1927
- NPS Garage (Building 221) built in 1929

Noncontributing resources include:

- NPS Mule Shed (#89)
- NPS Hay Barn
- Stone Wall
- Water Catchment System
- Corrals

These buildings are all located southeast of the South Kaibab Trailhead within an approximate 15-acre area shaped like an inverted triangle.

Cultural Landscapes

The *Cultural Landscapes Inventory Professional Procedures Guide* (Page 2001) prepared by the NPS defines cultural landscapes as “settings that human beings have created in the natural world. They reveal fundamental ties between people and land—ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Cultural landscapes are intertwined patterns of things both natural and constructed—plants and fences, watercourses, and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares. They are special places—expressions of human manipulation and adaptation of the land.”

Neither a Cultural Landscape Report nor Inventory has been completed for the project area, Pipe Creek Vista to South Kaibab Trailhead.

Environmental Consequences

Methodology

Baseline information used to assess impacts to historic structures and cultural landscapes 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 summarized in the 1995 GMP and EIS was specifically referenced for information on affected resources in the project area. Additional information sources on historic structures and cultural landscapes used for this evaluation are as described above in the affected environment section.

The thresholds of change for the intensity of an impact on historic resources and cultural landscapes are defined as follows:

Negligible Impacts would be at the lowest levels of detection with neither adverse nor beneficial consequences; 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*" or "*no adverse effect*."

Minor Adverse Impacts would be detectable but would not diminish the overall integrity of the resource. Impacts such as feature degradation or displacement could occur and would be measurable, but would be localized and would not result in changes to defining elements. They would not affect or jeopardize defining features or characteristics of a historic structure or a character-defining pattern or feature of a landscape listed in or eligible for listing on the Register or aspects of integrity that contribute to eligibility for the National Register. The determination of effect for Section 106 would be "*no adverse effect*."

Beneficial Historic structures and features will be stabilized and preserved in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Preservation of landscape patterns and features is in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. For purposes of Section 106, the determination of effect would be "*no adverse effect*."

Moderate Adverse Disturbance of a site or sites would result in the loss of overall integrity and detection of measurable changes to character-defining elements and would contribute to increased instability of historic structures and features. For cultural landscapes, impacts would alter a character-defining pattern(s) or feature(s) of the cultural landscape, but would not diminish the integrity of the landscape to the extent that its National Register eligibility was jeopardized. Moderate effects would jeopardize a structure's National Register eligibility. The determination of effect for Section 106 would be "*adverse effect*." It may 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 Effects would include increasing the stability of a structure or historic feature, maintaining the setting of the structure, or rehabilitating a landscape or its patterns or features. A structure, historic feature or landscape will be maintained and restored in accordance with the *Secretary of the Interior's*

Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes. The determination of effect for Section 106 would be “no adverse effect.”

Major Adverse Disturbance of a site would result in the loss of overall integrity and significant change to character-defining elements or would alter a character-defining pattern or feature of a landscape (including the proliferation of non-native plant species that may threaten the integrity of setting and traditional vegetative resources) 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, and an increase in exposure or vulnerability to natural elements (e.g. fire, flood, wind). The determination of effect for Section 106 would be “adverse effect.” 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 An historic structure or feature or a landscape’s patterns or features will be maintained and restored in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. Beneficial effects could include maintaining native or culturally significant vegetation. The determination of effect for Section 106 would be “no adverse effect.”

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).

Alternative A – No Action

Direct/Indirect Impacts The No Action alternative would have no direct effect on identified cultural resources in the project area from Pipe Creek Vista to the South Kaibab Trailhead. Historic structures and cultural landscapes at Pipe Creek Vista and the South Kaibab Trailhead would not be affected. No trail construction or improvements to parking areas, overlooks or trailhead would be completed under the No Action alternative.

Alternative A would not create any additional impacts over what has occurred. Therefore, there will be no change to defining features or characteristics that contribute to National Register eligibility. Although it is possible that some indirect impacts to these sites may be ongoing related to existing use, these impacts have not been documented. For these reasons, implementation of Alternative A would have no additional effects on identified historic structures and cultural landscapes within the project area.

Cumulative Impact: Historic structures and cultural landscapes on South Rim have sustained previous impacts as the result of modifications to some historic resources. Modern buildings have also intruded on the historic setting and adversely impacted structures and districts. Furthermore, previous deterioration of some buildings as a result of natural weathering and use has compromised defining architectural characteristics. These past impacts are moderate, adverse, local, and long-term. Most recently implemented, in-progress and foreseeable future projects with potential to affect historic structures have been discussed with the State Historic Preservation Officer (SHPO). Consultation with the park’s cultural resource staff and historical architect and consultation with the SHPO as the basis for future projects would ensure that any adverse effects of future projects on historic structures would be negligible to minor. Therefore, adverse cumulative effects would be moderate, local, and long-term.

Conclusion Implementation of the No Action alternative would result in negligible impacts to historic structures and cultural landscapes. Cumulative impacts for these resources would be adverse and moderate. No impairment of or unacceptable impacts to historic structures or cultural landscapes would result.

Alternative B – Preferred

Direct/Indirect Impacts Overlook improvements proposed at Pipe Creek Vista would not result in substantial changes to configuration or area use. Existing historic stone walls and curbing would not be affected. Construction of other improvements, including installation of a walkway adjacent to existing stone walls, would add non-contributing features to the historic and cultural landscape, but would only impact a small area of the wall. Other improvements, such as replacement of concrete and paved surfaces are consistent with the historic use as a visitor use area and would benefit the continued preservation of the area. The type and amount of site furnishings selected would be carefully evaluated by cultural resource specialists to make sure they are consistent with the cultural landscape. These changes are expected to have long-term, adverse impacts to the area's historic structures and cultural landscape.

Improvements to the South Kaibab Trailhead area, including relocation of the telephone, interpretive signs, and water faucet would remove non-historic features from the trailhead and locate them closer to the parking area. These changes are expected to have long-term, minor, beneficial impacts to the area's cultural landscape.

Historic structures at Pipe Creek Vista and South Kaibab Trailhead would be protected to the greatest extent possible under existing NPS policies and the availability of park staff and other support personnel to carry out maintenance. Implementation of Alternative B would result in minor, long-term, direct and indirect adverse impacts.

Cumulative Impacts Implementation of Alternative B combined with past, present, and reasonably foreseeable future actions would result in moderate impacts. Trail construction and other actions under Alternative B would result in minor adverse and minor beneficial impacts to historic resources and cultural landscapes. Careful planning, review by SHPO, and involvement during design would ensure impacts are lessened. Similar planning and review would occur for other projects to ensure that any cumulative adverse impacts are minimized. For these reasons, cumulative impacts from implementation of Alternative B would be moderate, long-term and adverse.

Conclusion Implementation of Alternative B would result in long-and short-term, minor, adverse direct and indirect impacts due to the addition of non-contributing features to the historic and cultural landscape. Minor, beneficial impacts would also result from relocating non-contributing features away from the South Kaibab Trailhead. Cumulative impacts would be adverse and moderate. No impairment of or unacceptable impacts to historic structures or cultural landscapes would result.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impacts Implementation of Alternative C, including trail construction and overlook and trailhead improvements would result in similar impacts to those described for Alternative B. The primary difference between Alternative B and C is configuration of parking at Pipe Creek Vista. Implementation of Alternative C would result in minor, adverse, long-term impacts to historic structures and cultural landscapes.

Cumulative Impacts Implementation of Alternative C combined with past, present, and reasonably foreseeable future actions would result in moderate impacts. Trail construction and other actions under Alternative B would result in minor adverse and minor beneficial impacts to historic resources and cultural landscapes. Careful planning, review by SHPO, and involvement during design would ensure

impacts are lessened. Similar planning and review would occur for other projects to ensure any cumulative adverse impacts are minimized. For these reasons, cumulative impacts from implementation of Alternative B would be moderate, long-term and adverse.

Conclusion Implementation of Alternative C would result in long-term minor, adverse, direct and indirect impacts to historic structures, and cumulative impacts that would be adverse and moderate. No impairment of or unacceptable impacts to historic structures or cultural landscapes would result.

NATURAL RESOURCES

VEGETATION

Affected Environment

The major South Rim vegetation types are ponderosa pine forest, pinyon/juniper woodland, and big sagebrush associations. In general, ponderosa pine occupies 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 broader valley bottoms with deeper soils (GMP 1995).

The project area lies within both the ponderosa pine woodland and the pinyon-juniper woodland. Warren et al. (1982) characterized the project area as the Juniper-Big Sagebrush-Pinyon series on the north end and Ponderosa Pine—Pinyon Pine—Gambel Oak—Juniper series on the south end. A section of the connector trail between South Entrance Road and the Greenway V alignment also passes through some Ponderosa Pine—Gambel Oak—Big Sagebrush series.



Figure 4. Typical Vegetation along Proposed Greenway V Alignment, South Rim, Grand Canyon National Park, 2007.

Cryptobiotic Soils Cryptogammic soils and lichen between the proposed Greenway V alignment and the rim were found in a vegetation survey conducted in August 2007 (NPS 2007a). These living soil crusts are a rare and important natural park resource. They aid in erosion control, water and nutrient absorption,

and contribute to soil nitrogen and organic matter. Once lost to disturbance, they may never fully recover. Under the best circumstances, a thin veneer of cryptobiotic soil may return in five to seven years following disturbance. Damage done to crusts, and the accompanying loss of soil nutrients, is repaired slowly over up to 50 years of cyanobacterial growth. Lichens and mosses may take even longer to recover. The trail does not run directly through these areas.

Exotic Species Ten species of exotic plants were found along the proposed Greenway V alignment, with most species concentrated in drainages below the South Kaibab Trailhead mule barns. The main species of concern for the Vegetation Program are horehound (*Marrubium vulgare*) and smooth brome (*Bromus inermis*). Nine exotic species were found along the proposed connector trail alignment with most concentrated along the middle part of the trail. The main species of concern along this alignment is horehound. Other invasive species found in this survey are either less invasive or common in the park.

Special status plant species are discussed later in this Chapter.

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.

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 a 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; removal of woodland habitat and loss of pinyon-juniper. Beneficial impacts would result from revegetation of social trailing and denuded areas with native species.

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 Vegetation Survey Qualified personnel walked in a line 12-feet wide, three people across along the proposed Greenway V and connector trail alignments and visually surveyed 100% of the vegetation throughout. The crew also surveyed vegetation adjacent to the rim throughout the proposed

project area. Personnel looked for rare and exotic plants, hazard trees and potential salvage, and listed every plant species within 100% of the survey area along Greenway V and the connector trail. Rare plant species are discussed in the special status species section of this chapter.

Alternative A – No Action

Direct/Indirect Impacts Alternative A does not propose any construction or ground disturbance and would not result in any vegetation disturbance beyond current condition. Some social trailing has occurred in the Pipe Creek Vista vicinity and near South Kaibab Trailhead and would continue under Alternative A. Therefore, implementation of Alternative A would result in negligible, short-and long-term adverse impacts to vegetation.

Cumulative Impacts Past development has resulted in soil compaction and displacement and vegetation removal within the project area, with no new development planned in the foreseeable future. While some projects are planned none would result in vegetation removal or ground disturbance as described in the Cumulative Impacts section at the beginning of Chapter 3. No development is planned for the project area in the foreseeable future. These local, short- and long-term, adverse impacts would be negligible due to widespread availability of pinyon-juniper woodland and ponderosa pine habitat within and adjacent to the project area.

For these reasons, implementation of the No Action alternative combined with past, present, and planned activities within the project area would result in negligible, long-term adverse impacts to vegetation.

Conclusion The No Action alternative would result in negligible direct and indirect adverse impacts to vegetation due to continued social trailing in the area. Cumulative impacts are expected to be negligible. No impairment of or unacceptable impacts to vegetation would result.

Alternative B – Preferred

Direct/Indirect Impacts Implementation of Alternative B including construction of the Greenway V trail from Pipe Creek Vista to South Kaibab trailhead, construction of additional parking at Pipe Creek Vista, and vegetation removal for safe sight distances would result in approximately one to two acres of vegetation disturbance. Very minimal vegetation disturbance, if any, is anticipated along the connector trail, from South Entrance Road to the Greenway V alignment, because it follows an existing utility corridor and road bed. Based on methods described in the section above, the project area is classified as pinyon-juniper woodland and ponderosa pine forest. Within this area along the trail alignment, trees of all size classes would be removed within one to two acres. The impact of this removal would be minimized by salvaging as many suitable grasses, forbs, shrubs, and small trees as possible for use in revegetation of disturbed areas in the project area following construction or other disturbed areas throughout the park as needed. Construction and ground disturbance would increase potential for spread of exotic species and changes in habitat quality for native species along developed edges, but these impacts would be minimized through implementation of mitigation measures (as described at the end of Chapter 2).

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

An increase in amount of disturbed ground and import of fill material would increase potential for 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.

Trail construction would concentrate foot traffic in the area and decrease social trailing. A decrease in trailing would have minor, beneficial, long-term impacts.

Use of identified staging areas has no potential for impacts to vegetation as these sites are already disturbed and mitigation measures are in place to minimize 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. While short-term impacts during 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- and long-term impacts and minor, beneficial, long-term impacts to vegetation.

Cumulative Impacts Implementation of Alternative B would result in an additional one to two acres of new ground disturbance. Foreseeable future projects would not result in any additional development. The estimated one to two acres of new disturbance combined with past and future developments would result in minimal disturbance, and would not appreciably or measurably change the percentage of the project area developed as a whole. Therefore, Alternative B would result in minor, adverse, cumulative impacts to vegetation.

Conclusion Alternative B would result in minor, adverse, long-term, direct and indirect impacts to vegetation due to one to two acres of new ground disturbance for trail and parking area construction, sight distance clearing, and potential introduction or spread of exotic plant species. Minor, long-term, beneficial impacts would result from designation of one trail between Pipe Creek Vista and South Kaibab Trailhead and reduction of social trails in the area. Cumulative impacts would be minor and adverse based on past developments. No impairment of or unacceptable impacts to vegetation would result.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impacts Impacts to vegetation would be the same as Alternative B. No additional vegetation disturbance would result in elimination of parallel parking at Pipe Creek Vista. Therefore, Alternative C would result in minor, adverse, direct and indirect, short- and long-term impacts and minor, beneficial, long-term impacts to vegetation as described for Alternative B.

Cumulative Impacts Cumulative impacts of implementing Alternative C are the same as Alternative B. Therefore, cumulative impacts to vegetation would be minor and adverse.

Conclusion Alternative C would result in minor, adverse, long-term, direct and indirect impacts to vegetation due to one to two acres of new ground disturbance for trail and parking area construction, sight distance clearing, and potential introduction or spread of exotic plant species. Minor, long-term, beneficial impacts would result from designation of one trail between Pipe Creek Vista and South Kaibab Trailhead and reduction of social trails in the area. Cumulative impacts would be minor and adverse based on past developments and past and planned prescribed burns. No impairment of or unacceptable impacts to vegetation would result.

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 the black-throated gray warbler, gray flycatcher, stellar's jay, pinyon jay, western tanager and pygmy nuthatch. Reptiles include the 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 are designated officially by the Park as Species of Management Concern (SOMC). SOMC which may occur near the project area are listed in Table 3 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 3. Wildlife Species of Management Concern, South Rim.

Common Name	Scientific Name
Desert bighorn sheep	<i>Ovis canadensis</i>
Mountain lion	<i>Felis concolor</i>
Rocky Mountain elk	<i>Cervus elaphus nelsoni</i>
Mexican vole	<i>Microtus mexicanus Navaho</i>
Northern goshawk	<i>Accipiter gentilis</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Peregrine falcon	<i>Falco peregrinus</i>
Breeding birds	Various species, see below

The project area is habitat suitable for all of these species.

Desert bighorn sheep are infrequently sighted in the area and are generally observed below the rim near Yaki Point.

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 the 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.

Elk occur throughout northern and eastern Arizona. Resident elk herds occur on the 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.

The Mexican vole is primarily found well south of the project area and is dependant on grassy understory in the Ponderosa pine vegetation type. As the project takes place in areas dominated by pinyon/juniper the species is unlikely to be found in the areas to be disturbed by this project.

The Northern goshawk utilizes the project area for foraging, but all nests located by surveys are greater than one mile from the project area.

Bald eagles have historically been observed roosting in snags near Pipe Creek overlook, but their presence has not been noted in the area for over two years.

There is a peregrine falcon eyrie directly below Yaki Point which has been occupied for at least the past three years. This species tolerates noise disturbance well and the restrictions imposed for Mexican spotted owls will also protect this species during the breeding season.

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 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 described above in the affected environment section.

Thresholds of change for intensity of an impact on general wildlife populations are defined as:

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 supporting ecosystems.

Minor Impacts to wildlife and/or habitat would be perceptible or measurable, but severity and timing of changes to parameter measurements would not be expected to be outside 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 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 severity and timing of changes to parameter measurements would be expected to be sometimes outside natural variability, and changes within 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, severity and timing of changes to parameter measurements would be outside natural variability for long time periods, and

changes within 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. Long-term impacts would result in 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 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 south of Pipe Creek Vista and South Kaibab Trailhead, and the large expanse of pinyon-juniper woodland and ponderosa pine forest 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 (social trails and other developments such as Pipe Creek Vista and South Kaibab Trailhead) 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, habitat modification 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 no new development is planned. Much of the adjacent area is essentially undisturbed wildlife habitat within the natural zone east and south of Pipe Creek Vista and South Kaibab Trailhead, and would continue to provide high quality habitat for a variety of wildlife species. For these reasons, cumulative impacts would be minor, adverse, and long-term.

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 or unacceptable impacts to wildlife would result.

Alternative B – Preferred

Direct/Indirect Impacts Implementation of Alternative B including construction of the Greenway V trail segment and improvements to Pipe Creek Vista and South Kaibab Trailhead would result in approximately one to two acres of new vegetation disturbance. Based on methods described in the Vegetation Methodology section above, the project area is classified as pinyon-juniper woodland and ponderosa pine forest. Within this area, approximately one to two acres of new ground disturbance, including vegetation removal, would result. Vegetation removal would occur in existing South Rim developed areas and would not occur in areas of continuous, undisturbed forest. Compared to the availability of ponderosa pine forest and pinyon-juniper woodland on South Rim, and concentration of this tree removal adjacent to the existing road and other developed areas, 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. Trail construction creates a wider disturbed corridor, in some sections, where the utility line is now. This represents a loss of habitat for a variety of species. Due to the

calculated acreage of habitat loss, it is likely that direct mortality to mammalian prey species could result, and multiple bird territories would be lost. Other sections of trail would not exceed the existing disturbed corridor, along the Greenway V and connector trail.

A review of avifauna studies of pinyon-juniper woodland in northern Arizona, Utah, and Colorado indicate 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 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, and are estimated to be between 150 and 190 per 40 hectares, or between 1.5 and 2 territories per acre. Therefore, removal of one to two acres of this habitat type for this alternative will probably result in permanent destruction of between two and four bird territories, and 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, 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 one to two acres of this habitat type will result in destruction of habitat supporting between 10 and 40 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, bighorn 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 availability of adjacent undisturbed habitat, species mobility, and implementation of mitigation measures to reduce spread of exotic species, revegetate disturbed areas, reduce runoff, and create vehicle fuel leakage and spill plans.

In addition to loss of habitat, impacts from implementation of the action alternatives would include decreased wildlife security and increased disturbance to adjacent habitat. These adverse, long-term, local impacts would be minor to moderate because they would occur in areas currently degraded because of high disturbance levels from existing developments, roads, utility corridors, and human use. Mitigation measures have been developed to minimize impacts to soils and vegetation from soil erosion, loss of trees, replanting areas with native species, etc., and would also minimize indirect impacts to quality of wildlife habitat.

However, short-term impacts are possible due to construction activity required under Alternative B to construct the Greenway V trail segment. 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 would result. These would be short-term, lasting only the duration of the construction period, but could result in changes to the way species use the area and could alter use patterns. No sensitive nesting, fawning, or calving areas are documented in the project vicinity, but it is possible that adverse impacts could result. These impacts are considered minor due to the concentration of activities along existing disturbed road and utility corridors and availability of similar habitats nearby.

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 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 from these actions outside the project footprint. While short-term impacts during 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 to moderate, 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, habitat modification 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 south 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 Alternative B implementation. Since actions are confined to the road corridor and adjacent developed areas, long-term impacts to wildlife are reduced, and no fragmentation would occur. Cumulative impacts from all past, present, and future projects would be minor to moderate, adverse, and long-term.

Conclusion Alternative B would result in minor to moderate, adverse, long-term, direct and indirect impacts to wildlife due to habitat disturbance and increased human use of the area, and short-term moderate adverse impacts during the construction period. Cumulative impacts would be adverse and minor to moderate. No impairment of or unacceptable impacts to wildlife would result.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impact: Implementation of Alternative C would have the same impacts to wildlife as Alternative B. No additional construction or ground disturbance would occur under Alternative C. Therefore, Alternative C would result in minor to moderate, adverse, long-term, direct and indirect impacts and moderate, adverse, short-term impacts to wildlife.

Cumulative Impacts Cumulative impacts for Alternative C would be the same as Alternative B. Cumulative impacts would be minor, adverse, and long-term.

Conclusion Alternative C would result in minor to moderate, adverse, long-term, direct and indirect impacts to wildlife due to habitat disturbance and increase human use in the area, and short-term moderate, adverse impacts during the construction period. Cumulative impacts would be adverse and minor to moderate. No impairment of or unacceptable impacts to wildlife would result.

SPECIAL STATUS SPECIES

Affected Environment

Table 4 includes a list of threatened, endangered, proposed, and species of concern pertinent to the Greenway V project, based on known occurrences or habitat preferences. In-depth discussion of Federally listed species issues in the analysis area is the subject of a separate biological assessment. Of the ten Federally listed wildlife and plant species known to occur or likely to occur in Grand Canyon National Park, three occur in or near the project area. Occurrence potential for these species in the project area is included in Table 4. 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 B.

The list in Table 4 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 4. Special status species known to occur, or having potential to occur, in the vicinity of Pipe Creek Vista and the South Kaibab Trailhead, South Rim, Grand Canyon National Park.

Species	Scientific Name	Status	Occurrence in Project Area
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T, WC ¹	Confirmed protected activity center below the rim in vicinity of project area
California Condor	<i>Gymnogyps californicus</i>	T*, WC	Foraging potential; no known nest sites in vicinity of project area
Peregrine Falcon	<i>Falco peregrinus anatum</i>	delisted	Foraging potential; Nearest known eyrie is associated with Yaki Point, greater than 0.5 miles from project area
Zone-tailed Hawk	<i>Buteo albonotatus</i>	SC	A nest site has been confirmed below the canyon rim near project area
Deer Goldenbush	<i>Ericameria arizonica</i>	SC	Habitat potential exists throughout project area; one area specifically identified for avoidance

Tusayan flameflower is a rare plant in Grand Canyon National Park and a former Federal Species of Special Concern. It is also considered an indicator species for habitat for park sentry milk-vetch. Crews specifically surveyed for this species because of its rarity in the park, and known proximity of populations at Mather Point and east of Yaki Point, and no plants were found (NPS 2007a).

Sentry milk-vetch is the park's only Federally-listed endangered plant species. In a recent survey conducted by the park's vegetation crew, no Tusayan flameflower or sentry milk-vetch was found along the proposed Greenway V trail alignment, on the adjacent rim areas, or along the connector trail alignment. Areas of habitat for these species does exist between the rim and the proposed Greenway V trail alignment, but are not considered likely reintroduction sites for sentry milk-vetch because of high visitor use in the area.

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 as 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.

¹ **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; E=Federally listed as endangered under the ESA; WC=Wildlife species of special concern in Arizona (AGFD, 1996); SC=Species of Concern. Some information showing vulnerability or threat, but not enough to support listing under ESA. These species are former USFWS Category 1, 2, and 3 species (Note: the Southwest Region of the USFWS no longer maintains a list of these Category 1, 2 and 3 species)

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

Negligible Special status species would not be affected, or 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 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 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 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 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 ongoing impacts from visitation and human activity that have been occurring in this area for many years. Impacts specific to each species are included below.

Mexican Spotted Owl Ongoing activities along Desert View Drive and at South Kaibab Trailhead create daily disturbance during peak season. This disturbance has decreased quality of habitat in and around the project area for MSO and would continue under the No Action alternative. Although there is roosting, nesting, and foraging habitat below the rim in close proximity to the project area, it is not

possible to determine extent of current traffic or hiker impacts to MSO as no information is currently available concerning MSO occupation of this area prior to road construction.

No vegetation removal would occur under Alternative A, and no new sources of habitat disturbance would be introduced. There is, however, one established protected activity center (PAC) within 0.5 miles of the project area. Therefore, adverse impacts to MSO from implementation of Alternative A would be negligible.

California Condor Existing developments on South Rim, along Desert View Drive, and at South Kaibab Trailhead create year-round human presence. 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 or construction 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.

Peregrine Falcon Construction of existing developments along Desert View Drive, at South Kaibab Trailhead, and on South Rim has affected potential habitat for peregrine prey. Noise from year-round activities on South Rim has potential to affect peregrines, but seems not to be a substantial adverse impact due to the observation that many nearby areas of high-use visitor activity are continually occupied and produce young. No foraging habitat or nesting/roosting habitat would be removed as a result of Alternative A. Therefore, implementation of the No Action alternative would be adverse, negligible to minor, local, and long-term.

Zone-tailed Hawk: This species has consistently produced young from the nest near Pipe Creek Overlook for at least the past 10 years and therefore has clearly adapted to the current circumstances.

Deer Goldenbush Construction of existing developments on South Rim has potentially affected this recently-named park endemic shrub. No construction would occur under Alternative A and would have no additional effect on deer goldenbush.

Cumulative Impacts As described in the vegetation section of this Chapter, habitat modification in the project vicinity has occurred as a result of past and present activities, and modification would result from implementation of future projects. Much of these areas provide essentially undisturbed wildlife habitat in the natural zone north and south of Desert View Drive and would continue to provide high quality habitat for deer goldenbush and foraging habitat for peregrines and condors. Few of the recently implemented or in-progress projects require tree removal, except for a few projects as 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 in the existing South Rim developed area where development already exists and visitation levels are high during peak season. For these reasons, implementation of Alternative A would result in negligible, adverse impacts to special status species.

Conclusion Alternative A would result in long-term, negligible, adverse, direct and indirect impacts to special status species due to current human use in the project area and negligible adverse cumulative impacts. No impairment of or unacceptable impacts to special status species would result.

Alternative B – Preferred

Direct/Indirect Impacts Implementation of Alternative B would result in approximately one to two acres of vegetation disturbance along the trail alignment, with removal of trees of all size classes. This

represents a loss of habitat for a variety of species; potential impacts to special status species are discussed below. Other aspects of Alternative B (improvements to Pipe Creek Vista and South Kaibab Trailhead) would result in some new ground disturbance, although tree removal would be minimal. All project components are small in scale, localized, and would occur in or adjacent to existing developments. For these reasons, adverse impacts to special status species are minimized. If any impacts are expected from these actions, they are discussed below for each individual species. Use of identified staging areas 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. Action alternative salvage and revegetation components can be ground-disturbing, but are not expected to result in any additional impacts beyond those described for construction actions.

Mexican Spotted Owl There is a confirmed PAC below the rim near the project area. Nesting and roosting habitat would remain unchanged as no vegetation manipulation would occur below the rim. Foraging habitat may be affected; however, MSO have rarely been detected above the canyon rim by park survey crews. Since little vegetation would be disturbed as a result of this project and because most recreational use would be limited to daylight hours, impacts to foraging potential are expected to be minimal. As fully analyzed in the Biological Assessment for this project (NPS 2007b, in prep), noise disturbance to MSO from construction activities is expected to be minimal since the project area is greater than 0.5 miles from known roost sites for this MSO.

For these reasons, implementation of Alternative B would result in short-term, negligible to minor, direct and indirect, adverse impacts to MSO, minimized through implementation of mitigation measures. Therefore, actions proposed under Alternative B with potential for MSO impact are limited to short-term noise disturbance to known PACs during construction. This impact is minimized because PAC nest/roost sites are greater than 0.5 miles from the project area. For these reasons, implementation of Alternative B would result in negligible to minor adverse impacts to MSO.

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 area suitability for this use would remain unchanged if Alternative B were implemented. Therefore, actions proposed under Alternative B with potential to impact condors are limited to short-term noise disturbance to possible nest sites during construction, and 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.

Peregrine Falcon There is a peregrine falcon eyrie directly below the project area at Yaki Point. However, this species has exhibited considerable tolerance to human disturbance and mitigation measures designed to protect the Mexican spotted owl will also ensure that this eyrie continues to be productive. Therefore, implementation of Alternative B would result in negligible to minor adverse impacts to peregrine falcons.

Zone-tailed Hawk The northern most known nest in Arizona for the zone-tailed hawk is located just below Pipe Creek Vista. The project could affect nesting, roosting and foraging habitat of this species, but the mitigation measures previously mentioned would confine the impacts to a negligible to minor adverse level.

Deer Goldenbush Implementation of Alternative B has been carefully designed to avoid adverse impacts to this sensitive plant species. Any potential/suitable habitat would be avoided during trail

construction. By avoiding the known population and fencing it if necessary, the likelihood of inadvertent trampling or habitat disturbance is minimized. The project area has been surveyed for other occurrences of this species and no other locations have been found besides those mapped and slated for avoidance. For these reasons, Alternative B would result in minor beneficial, long-term impacts to deer goldenbush, enhanced by protection of the population along the connector trail.

Cumulative Impacts Alternative B combined with 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 the project area that cannot be avoided under Alternative B. Therefore, implementation of Alternative B would result in adverse, minor, cumulative impacts to 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 due to loss of one to two acres of native vegetation. Cumulative impacts would be minor. No impairment of or unacceptable impacts to special status species would result.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impacts Impacts to special status species under Alternative C are the same as Alternative B. No additional construction or vegetation disturbance would occur in implementation of Alternative C.

Cumulative Impacts Implementation of Alternative C combined with past, current, and foreseeable future actions would result in the same impacts to special status species as those for Alternative B. No special status species occur in project areas for Alternative C that cannot be avoided. Implementation of Alternative C would result in adverse, minor impacts to special status species.

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

VISUAL/SCENIC RESOURCES

Affected Environment

Conserving national park scenery and providing for visitor enjoyment are elemental purposes of the NPS according to the 1916 Organic Act. Grand Canyon was designated a national park in 1919 and a World Heritage Site in 1979, in large part because of its “exceptional natural beauty” and its “aesthetic importance” (World Heritage Committee 2004). Best known of the park’s scenic qualities are the expansive views of Grand Canyon from the rims. On clear days, a deeply eroded landscape of canyons, buttes, and cliffs may be visible for 160 miles or more from many overlooks on both North and South Rims. The Colorado River, flowing a mile below in the Inner gorge, can be glimpsed from vantage points. For South Rim visitors looking directly across the canyon, the high, forested Kaibab Plateau can be seen on North Rim, over ten miles away.

Fencing

At South Kaibab Trailhead, log post-and-rail fencing was constructed in 1999 to minimize social trailing after revegetation in the area. This fencing was not part of the existing landscape character when the trailhead, parking area, and associated buildings were constructed. It introduces materials and structures in the landscape that are not indicative of a natural landscape. Therefore, it creates a minor adverse impact on the visual/scenic resources at this location. Cumulatively, introduction of fencing in areas of South Rim has created an adverse effect on visual and scenic resources. Fencing as a tool should only be used when other types of barriers for limiting access will not meet the desired objective. Fencing to limit the

extent of parking and minimize social trailing through vegetated areas west of Mather Point along South Entrance Road is example of this type of impact. Whenever possible, fencing has been removed when no longer necessary (e.g. along a segment of greenway trail across from Park Headquarters).

Methodology

Baseline information used to assess impacts to visual 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 visual 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 visual resources information sources used for this evaluation are as described above in the affected environment section.

Proposed activities have potential to impact visual resources through alteration of road corridor, overlook and adjacent view landscape character. Magnitude is based on amount of change to these elements and their relative value.

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

Negligible Retains landscape character and adjacent views.

Minor Most of the original landscape character is retained with small elements altered. Adjacent views are generally retained with a few views partially retained.

Moderate Some modification of the original landscape character is evident. Most of the adjacent views have been altered; however, most partially retain original views.

Major Modifies original landscape character to a degree where no retention is achieved and most of the original adjacent views are not maintained.

Nature of the Impact Beneficial impacts retain and/or enhance original landscape character; improve and manage adjacent views to retain their function. Adverse impacts alter or modify landscape character and/or adjacent views.

Duration Short-term impacts would be short-lived or temporary due to construction activities and revegetation efforts. Long-term impacts would be permanent and continual.

Alternative A – No Action

Direct/Indirect Impacts No trail construction or improvement to overlooks or parking areas are proposed under Alternative A. No change in visual resources will occur; therefore, implementation of the No Action alternative would not result in any impacts above current condition.

Cumulative Impacts Past actions and ongoing actions on South Rim have affected scenic quality of surrounding areas, particularly in Grand Canyon Village and associated developments where buildings, roads, trails, and other facilities have removed native vegetation and, in some cases, impeded canyon views and vistas. No changes are proposed for the project area. For these reasons, combining implementation of Alternative A with past, ongoing, and foreseeable future actions would result in minor adverse impacts.

Conclusion The No Action alternative would result in no additional long-term, direct or indirect, adverse impacts to visual resources. Cumulative impacts would be adverse and minor. No impairment of or unacceptable impacts to visual or scenic resources would result.

Alternative B – Preferred

Direct/Indirect Impacts Alternative B includes several components with potential to impact visual resources. The primary ones are overall trail construction, addition of parking at Pipe Creek Vista in the existing dirt area between overlooks, and improvements to the South Kaibab Trailhead. The existing rural character of the dirt area at Pipe Creek Vista would be altered, and a parking area would be constructed which would result in moderate, long-term adverse impacts. Improvements in the South Kaibab Trailhead area would improve the area's visual quality by moving site amenities to a central location and constructing a trail from the parking area to replace the existing dirt road access. Impacts of these improvements are expected to be beneficial, long term, and minor. During trail construction, short-term moderate adverse impacts are expected. Therefore, Alternative B would result in moderate, short- and long-term adverse and minor, long-term beneficial impacts to visual resources. These impacts would be lessened over the long term by natural establishment and revegetation efforts along disturbed trail edges, and implementation of mitigation measures.

Cumulative Impacts Effects of past actions, ongoing actions, and foreseeable future actions are the same as described for Alternative A. Combining these impacts with implementation of Alternative B would result in moderate, adverse impacts to visual resources in the project area from Pipe Creek Vista to South Kaibab Trailhead. This is because no other projects would alter the existing landscape character.

Conclusion Alternative B would result in moderate, long-term, adverse impacts to visual resources due to construction of additional parking at Pipe Creek Vista, and would also result in minor, long-term beneficial impacts due to site improvements at the South Kaibab Trailhead. Adverse impacts would be lessened by implementation of mitigation measures. In addition, short-term impacts are expected to be adverse and moderate during the construction period. Cumulative impacts would be adverse and moderate. No impairment of or unacceptable impacts to visual or scenic resources would result.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impacts Implementation of Alternative C would result in similar impacts to those described for Alternative B. Parallel parking at Pipe Creek Vista overlooks would be eliminated and therefore would impact visual resources. Fewer vehicles would be visible on the rim at these overlooks, and vehicles traveling past Pipe Creek Vista on Desert View Drive would have an unimpeded view of the canyon at this location. This impact is expected to be long-term, minor, and beneficial.

Cumulative Impacts Effects of past actions, ongoing actions, and foreseeable future actions are the same as described for Alternative A. Combining these impacts with implementation of Alternative C would result in moderate, adverse impacts to visual resources from Pipe Creek Vista to the South Kaibab Trailhead. This is because no other projects would alter the existing landscape character.

Conclusion Alternative C would result in long-term, moderate, adverse impacts to visual resources due to construction of a parking area at Pipe Creek Vista, and minor beneficial impacts from improvements to the South Kaibab Trailhead area and elimination of parallel parking at Pipe Creek Vista. Adverse impacts would be lessened by implementation of mitigation measures. Short-term impacts are expected to be adverse and moderate during the construction period. Cumulative impacts would be adverse and moderate. No impairment of or unacceptable impacts to visual or scenic resources would result.

SOCIAL RESOURCES

VISITOR EXPERIENCE

Affected Environment

In 2004, South Rim received more than four million visitors. Most of these visitors viewed the park from rim overlooks, and a significant portion day hiked into the canyon (Backlund, et. al. 2005).

Visitor Access

Visitors currently have access to the Pipe Creek Vista overlooks by various travel modes. A section of fully accessible greenway trail approaches Pipe Creek from the west. This section is not available to bicyclists due to safety concerns; vehicles and bicycles have access via Desert View Drive. A free shuttle bus service is provided by the park to and from this location. However, access to the South Kaibab Trailhead is currently by shuttle bus, foot, or bicycle via the road. The combined use on the Yaki Road to the trailhead creates safety concerns and diminishes visitor experience for pedestrians and bicyclists.

Between Pipe Creek Vista and the South Kaibab Trailhead, a series of social trails, an exiting foot path, and a utility line provide a way for visitors to get from one location to the other. The paths are currently rugged and not fully accessible.

The South Kaibab Trail is popular with both day and overnight hikers. In a study conducted between May and October 2004, day hiker counts averaged between 302 and 567 per day. Access to the trail from the shuttle bus stop and parking lot is along a dirt road which is also used by NPS and concessions personnel and vehicles which could diminish visitor experience and cause safety concerns.

A utility line and an old roadbed provide an alignment for the proposed connector trail from the South Entrance Road to the Greenway V alignment. Currently the alignment is not used by visitors, but is proposed to accommodate pedestrians, bicyclists, and equestrians.

Visitor Facilities

The South Kaibab Trailhead area provides restrooms, seating, interpretive signs, drinking water, and a pay phone for visitors. These amenities are not centrally located and instead are spread out across the trailhead area. In addition, this is an administrative use area for the NPS and concessions mule operations. Mules and visitors are often in conflict at the trailhead because hikers congregate at the top of the trail where mules exit the canyon. Vehicles pulling trailers use in this area as well which creates further conflict with pedestrians and vehicles. Pipe Creek does not have any visitor facilities.

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.

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

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, affect few visitors, and 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.

Nature of Impact Beneficial impacts would enhance visitor experience. Adverse impacts would diminish visitor experience.

Duration Short-term impacts would occur during construction period. Long-term impacts would continue after construction is complete.

Alternative A – No Action

Direct/Indirect Impacts Under the No Action alternative, existing facilities would remain in place in their current condition. No changes would occur to Pipe Creek Vista or the South Kaibab Trailhead. A trail would not be constructed between Pipe Creek Vista and South Kaibab Trailhead; no designated route would be available for pedestrians, bicyclists, or equestrians from Tusayan, Grand Canyon Village, or Canyon View Information Plaza to South Kaibab Trailhead; the trail from the parking area to South Kaibab Trailhead would not be universally accessible; administrative mule operations would continue to conflict with visitor use; and undefined, inefficient parking areas would remain unchanged at Pipe Creek Vista. These deficiencies would result in minor, adverse, long-term impacts to visitor experience.

Cumulative Impacts Many recently implemented and in-progress projects improve South Rim visitor experience such as improved restroom facilities at the South Kaibab Trailhead, and the South Rim viewpoint rehabilitation. Completion of other greenway trail segments (like Greenway III) improves visitor experiences parkwide. Future actions such as the South Rim Visitor Transportation Plan, Hermit Road Rehabilitation, and Bright Angel Trailhead Area Design Plan would benefit South Rim visitor experience by providing more varied experiences for all user groups (pedestrians, bicyclists, shuttle bus, and tour bus riders). Implementation of these planned projects, without taking action at this time to improve experience and safety of visitors at Pipe Creek Vista and South Kaibab Trailhead, would result in long-term cumulative adverse impacts to visitors by allowing inadequate services and safety concerns. These would be minor, as many improvements in other South Rim areas would be implemented and benefit visitors.

Conclusion Implementation of Alternative A would result in minor, long-term, adverse impacts to visitor experience. Cumulative impacts would be minor and beneficial.

Alternative B – Preferred

Direct/Indirect Impacts Alternative B would improve visitor opportunities in this area to experience the natural and cultural resources near Pipe Creek Vista and South Kaibab Trailhead, access to and quality of movement through the area, and access to high-quality recreation opportunities. These improvements

would occur as changes to the South Kaibab Trailhead, Pipe Creek Vista overlooks and parking areas, and new trail construction. Trail construction is designed to provide a universally accessible trail between Pipe Creek Vista and the South Kaibab Trailhead. Designation of a connector trail from South Entrance Road and the Greenway III alignment to the South Kaibab Trailhead will accommodate bicyclists and equestrians, and will serve as the Arizona Trail. Trailhead improvements will centrally locate visitor services and separate visitors from administrative functions. Finally, improvements at Pipe Creek Vista will provide a safe, accessible path for pedestrians and safe parking throughout the area. Alternative B would construct a parking area in the existing dirt area between overlooks at Pipe Creek Vista and would provide approximately 25-35 designated parking spaces. Impacts to visitor experience are expected to be moderate, long-term, and beneficial.

Cumulative Impacts Many recently implemented and in-progress projects improve South Rim visitor experience, such as South Rim viewpoint rehabilitation and installation of restrooms at the South Kaibab Trailhead. Completion of other greenway trail segments (like Greenway III) improve pedestrian and bicyclist experiences parkwide. Future actions such as the South Rim Visitor Transportation Plan, Bright Angel Trailhead Area Design Plan, and Hermit Road Rehabilitation would all benefit visitor South Rim experience by providing more varied experiences for all user groups (pedestrians, bicyclists, shuttle bus, and tour bus riders). Implementation of these planned projects, combined with implementation of Alternative B would result in long-term cumulative beneficial impacts to visitors by improving access and quality of experiences throughout South Rim. These beneficial impacts would be moderate and long-term.

Conclusion Alternative B implementation would result in long-term moderate beneficial impacts to visitor experience through construction of a universally accessible and multi-modal trail from Pipe Creek Vista to the South Kaibab Trailhead, improvements to visitor facilities at the South Kaibab Trailhead, and improvements at Pipe Creek Vista. Short-term adverse impacts resulting from trail and parking area construction would be moderate and adverse. Cumulative impacts would be moderate and beneficial.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impacts Alternative C is similar to Alternative B in all aspects except for parking configuration at Pipe Creek Vista. Parallel parking at Pipe Creek Vista overlooks would be eliminated, resulting in a decrease of approximately 20 parking spaces (parallel spaces proposed in Alternative B). The other aspects of Alternative C (trail construction, trailhead improvements, and construction of parking in the dirt area between overlooks at Pipe Creek) are the same as for Alternative B. Therefore, impacts to visitor experience are expected to be moderate and beneficial although slightly less beneficial than Alternative B due to a reduction in parking spaces.

Cumulative Impacts Cumulative impacts are the same as Alternative B. Implementation of planned projects, combined with implementation of Alternative C would result in long-term, cumulative, beneficial impacts to visitors by improving visitor access and quality of experiences throughout South Rim. These beneficial impacts would be moderate and long-term. Completion of other segments of the greenway trail, in combination with construction of a greenway segment would enhance opportunities for non-vehicular access, as envisioned in the 1995 GMP.

Conclusion Implementation of Alternative C would result in long-term, moderate, beneficial impacts to visitor experience with a slightly decreased impact when compared to Alternative B because of a decrease in parking opportunities at Pipe Creek Vista. Short-term adverse impacts would result during construction and would be minor. Cumulative impacts would be moderate and beneficial.

PARK OPERATIONS

Affected Environment

Park operations refer to adequacy of staffing levels and 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 proposed trail alignments, Pipe Creek Vista overlook and parking areas, and the South Kaibab Trailhead area.

The Grand Canyon National Park Superintendent is ultimately responsible for park operations management. In 2003, the park employed 462 full-time staff (NPS 2006b) 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 Pipe Creek Vista, the Greenway V trail segment, the South Kaibab Trailhead area, and the connector trail are the Facilities Management Division (road, trail, and restroom maintenance), Visitor and Resource Protection (visitor safety), Visitor Education and Interpretation (wayfinding and interpretive programs), Science Center (resource protection), and Concessions Management (administration of contracts with concessionaires and transportation partners).

Both NPS and concessions mule operations use the South Kaibab trail and trailhead. This administrative use conflicts with visitors at the trailhead in particular. Trucks pulling trailers and mules are often in this area and congestion poses a safety concern and can limit efficiency in which operations can occur.

A free shuttle bus is provided to both Pipe Creek Vista and the South Kaibab trailhead. Buses use Yaki Road to access the Kaibab trailhead where there are often pedestrians and bicyclists.

Paul Revere Transportation is currently under contract with the park to operate the shuttle bus system, including the South Kaibab Trailhead Route. Xanterra Parks and Resorts is the current concessionaire under park contract to operate bus tours on Yaki Road and mule rides that exit the canyon via the South Kaibab Trailhead.

Arizona Public Service (APS) provides electric service to South Rim and maintains associated utility corridors. The proposed connector trail would follow a utility corridor for most of its length from the South Entrance Road east and parallel to Desert View Drive. In addition, a portion of the Greenway V alignment from Pipe Creek Vista to the South Kaibab Trailhead would follow a power line. APS would need vehicle and equipment access to these utility corridors.

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:

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 impacts occur during construction period. Long-term impacts continue after construction is complete.

Alternative A – No Action

Direct/Indirect Impacts No improvements or construction would result under Alternative A. No change to current operation would be necessary. Under the No Action alternative, no substantial changes would occur at Pipe Creek Vista or the South Kaibab Trailhead, and a trail would not be constructed. No improvements to address visitor safety at Pipe Creek Vista or visitor experience in these areas would be made, so existing inefficiencies would not be corrected. Therefore, no change in park operations would result. Alternative A would result in negligible, long-term, adverse impacts to park operations at the South Entrance Station.

Cumulative Impacts Implementation of Alternative A combined with past, present, and reasonably foreseeable future actions would result in beneficial impacts to park operations. Projects that benefit park operations include the Hermit Road Rehabilitation Project and the South Rim Visitor Transportation Plan. Benefits of improved park facilities resulting from past and current actions as well as those planned would likely outweigh the long-term adverse impact of implementing the No Action alternative. These cumulative impacts to park operations would be minor to moderate and beneficial.

Conclusion Implementation of Alternative A would result in negligible, adverse, long-term impacts to park operations because administrative mule operations would continue to conflict with visitors at the South Kaibab Trailhead and pedestrians and bicyclists would continue to conflict with administrative and shuttle bus traffic to the South Kaibab Trailhead.

Alternative B – Preferred

Direct/Indirect Impacts Construction of the Greenway V trail, designation of the connector trail, and other improvements to overlooks and trailhead to improve safety and accessibility would result in beneficial impacts to park operations. There would be a change in operations at the South Kaibab Trailhead and a separation of administrative use and mule operations from visitors. The footpath to the South Kaibab Trail would be located to the west of the existing dirt road used to access the trail. Vehicles pulling trailers would no longer conflict with pedestrians. Therefore these changes would result in a more efficient and safe operation. Buses would have less pedestrians and bicycles to conflict with on the road to the South Kaibab Trailhead which would increase efficiency. Operational efficiency is expected to improve with implementation of Alternative B over the existing condition. The power lines that exist along sections of proposed trail, both the connector and Greenway V, would be accessed by APS when necessary. Large equipment and vehicles would drive on the paved trails and could damage the pavement if not reinforced

for these types of vehicles. Design of these trails would take this into consideration; however, it is not expected to have an adverse impact on park operations. For these reasons, long-term impacts to park operations from implementing Alternative B would be beneficial and minor.

Cumulative Impacts Implementation of Alternative B combined with past, present, and reasonably foreseeable future actions would result in beneficial impacts to park operations. Benefits of improved park facilities resulting from past and current actions as well as those planned, in combination with improvements at the South Kaibab Trailhead, Pipe Creek Vista, and proposed trail alignments as part of this alternative, 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, long-term, beneficial impacts to park operations. Construction of the Greenway V trail and designation of the connector trail would provide for separation of bicyclists and pedestrians from the roadway, which would provide enhanced safety and efficiency for shuttle, tour bus, and mule operations. However, the additional 2.2 miles of trail and parking area at Pipe Creek Vista would require additional long-term maintenance. Short-term impacts during the construction period would be adverse. Cumulative impacts would be minor to moderate and beneficial.

Alternative C – Reconfigured Parking at Pipe Creek

Direct/Indirect Impacts Implementation of Alternative C and reduced parking at Pipe Creek Vista would have similar impacts to those identified for Alternative B. Elimination of parallel parking would have some additional beneficial impacts to park operations due to increased safety at the overlooks and along Desert View Drive.

Cumulative Impacts Implementation of Alternative C combined with past, present, and reasonably foreseeable future actions would result in beneficial impacts to park operations. Benefits of improved park facilities resulting from past and current actions as well as those planned, in combination with improvements at the South Kaibab trailhead and Pipe Creek Vista, including the greenway trail and connector trail, as part of this alternative, would improve park operations. This cumulative impact to park operations would be minor to moderate and beneficial.

Conclusion Implementation of Alternative C would result in minor, long-term, beneficial impacts to park operations. Improvements and elimination of parallel parking at Pipe Creek Vista would result in improved safety conditions. Other project aspects would be similar to Alternative B. Short-term adverse impacts during the construction period would be minor. Cumulative impacts would be minor to moderate and beneficial.

PUBLIC HEALTH AND SAFETY

Affected Environment

Public and employee safety is a focal point of the proposed parking improvements at Pipe Creek Vista. NPS recognizes the parking areas' insufficient capacity to accommodate safe pull-in parking. The unsafe nature of the current parking configuration also creates a safety hazard for vehicles on Desert View Drive. Poor visibility for cars pulling out of Pipe Creek Vista can result in traffic congestion and accidents (Peccia 1995).

Construction of the Greenway V trail and connector trail also addresses potential safety concerns with pedestrians, bicycles, and buses on the road. Pedestrians, bicyclists, shuttle and tour buses share Yaki Point Road to the South Kaibab Trailhead or Yaki Point and can create conflicts and safety concerns.

Environmental Consequences

Methodology

Baseline information used to assess impacts to public health and safety 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 public health and safety 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 public health and safety are defined as:

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 impacts occur during construction period. Long-term impacts continue after construction is complete.

Nature of Impact Beneficial impacts reduce safety concerns for visitors and park employees. Adverse impacts increase 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 Pipe Creek Vista overlooks and parking areas would not be formalized, and a parking area between the overlooks would not be constructed. Vehicle traffic and congestion would continue in this location. Therefore, safety concerns at Pipe Creek Vista and along Yaki Road would continue. Alternative A would result in minor to moderate, long-term, adverse impacts to public health and safety.

Cumulative Impacts Many recently implemented and in-progress projects improve public health and safety on South Rim. Many upcoming projects improve public health and safety on South Rim, such as the Hermit Road Rehabilitation Project. Other future actions such as the South Rim Visitor Transportation Plan would also benefit South Rim public health and safety. Implementation of these planned projects without taking action at this time to improve the safety of visitors and employees at Pipe Creek Vista 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 improvements in other South Rim areas 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 Pipe Creek Vista and along Yaki Road because current safety concerns would not be addressed. Cumulative impacts would be minor and adverse.

Alternative B - Preferred

Direct/Indirect Impacts Alternative B would construct a section of greenway trail between Pipe Creek Vista and the South Kaibab Trailhead, designate a connector trail from South Entrance Road to Greenway V, complete improvements to Pipe Creek parking areas, and improve the South Kaibab Trailhead area. Trail construction would provide an alternate pedestrian and bicycle route to South Kaibab Trailhead.

Construction of pull-in parking at Pipe Creek Vista would provide safe parking for vista visitors. Improvements to the South Kaibab Trailhead and separation of mule and pedestrian traffic would increase area safety. However, trail construction, new parking at Pipe Creek Vista, and improvements at the South Kaibab Trailhead could pose short-term safety concerns including traffic delays and exposure to loud construction noise and to the construction site in general.

Additional measures to improve Pipe Creek Vista safety would include marking the fog line at the overlooks, and select vegetation clearing for safe sight distances. Currently, the fog line is not marked at the overlooks and a clear marker is needed to separate parking areas from the traffic lanes. Designation of a five-foot wide trail along the rim in this area as proposed in Alternative B, parallel parking would be designated, and a fog line would be even more important to allow visitors to exit their cars safely without intrusion into the traffic lane on Desert View Drive. Minimal vegetation would be removed to provide safe sight distances for vehicles pulling in and out of Pipe Creek Vista.

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 recently implemented and in-progress projects identified at the beginning of this chapter, improve South Rim public health and safety. Many upcoming projects improve South Rim public health and safety, such as the Hermit Road Rehabilitation Project. Other future actions such as the South Rim Visitor Transportation Plan would also benefit South Rim public health and safety. Planned project implementation, combined with Alternative B implementation would result in long-term cumulative beneficial impacts to safety. These beneficial impacts would be moderate and long-term.

Conclusion Implementation of Alternative B would result in long-term, moderate, beneficial impacts to public health and safety from improved parking at Pipe Creek Vista, separation of pedestrians and bicyclists from Yaki Road, and separation of mule operations at the South Kaibab Trailhead from visitor foot traffic. Short-term impacts from construction and would be minor and adverse. Cumulative impacts would be minor to moderate and beneficial.

Alternative C – Reconfigured parking at Pipe Creek

Direct/Indirect Impacts Alternative C differs from Alternative B in Pipe Creek Vista parking configuration. Alternative C would eliminate parallel parking from both Pipe Creek overlooks to further address area safety concerns. Implementation of this alternative would also include all other actions as described in Alternative B including trail construction, new parking at Pipe Creek Vista, and South Kaibab Trailhead improvements. Therefore Alternative C implementation would result in long-term, moderate beneficial and short-term, minor adverse impacts during construction to public health and safety.

Cumulative Impacts Many recently implemented and in-progress projects improve South Rim public health and safety. Many upcoming projects improve South Rim public health and safety, such as the Hermit Road Rehabilitation Project. Other future actions such as the South Rim Visitor Transportation Plan would also benefit South Rim public health and safety. Implementation of these planned projects, combined with Alternative C implementation 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 C would result in long-term, moderate, beneficial impacts to public health and safety through construction of pull-in parking at Pipe Creek Vista, and elimination of parallel parking at this location. Short-term impacts resulting from trail construction, new parking in the island between overlooks at Pipe Creek, and improvements at South Kaibab Trailhead would be minor and adverse. Cumulative impacts would be moderate and beneficial.

Chapter 4 Consultation and Coordination

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Agency Consultation and Public Involvement

NPS began the public scoping process in June 2006 with distribution of a general scoping letter describing preliminary alternatives under consideration for Greenway V construction. This letter was distributed to the park's approximately 280-person compliance mailing list, which includes state and

Federal agencies and affiliated American Indian 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 ten 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, and input on the framework for consultation under Section 106 of NHPA in June 2006, in a letter distributed during the first public scoping period. In response, SHPO sent a letter dated June 30, 2006 and stated that they would look forward to reviewing the EA as part of Section 106 consultation. In a phone conversation on August 29, 2007, the SHPO's office stated that they would prefer a separate assessment of effect (AEF) for the project. The AEF is being prepared for this project and will be sent to the SHPO for review and comment.

Native American Tribes NPS initiated consultation with all affiliated American Indian tribes (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) and requested comments on several preliminary alternatives in June 2006 in a letter distributed during the public scoping period. During a tribal consultation meeting with the Hopi Tribe in October 2006, the tribe expressed their preference that the trail not be paved and that another type of hardened surface could be appropriate. The justification was that the project area is not within the developed area. NPS met with the Navajo Tribe in October 2006 as well and did not receive any comments. At a meeting in April 2007, the Havasupai Tribe expressed concerns over a need for new restrooms at the South Kaibab Trailhead. At a pan tribal meeting in July 2007, the Moapa Band of Paiute Indians expressed concerns with paving the trail and asked if a walkway could be constructed of dead timber. A copy of the EA was distributed to all affiliated tribes for their review and comment.

U.S. Fish and Wildlife Service NPS requested comments on preliminary alternatives, and a list of Federally listed species in the project area in June 2006, in a letter distributed during the first public scoping period. NPS met with USFWS in February, April, July, and October 2006 to discuss this and other projects. This project was specifically excluded from the Batch biological assessment because of its proximity to a Mexican spotted owl protected activity center. Comments from these meetings included 1) consider Mexican spotted owl, California condor, and Sentry milk-vetch in the Biological Assessment; 2) moving the trail farther from the rim is good for MSO; and 3) address possible effects of noise disturbance and increased use to Mexican spotted owl. A draft BA specific to this project is being prepared and will be sent to USFWS for their concurrence.

EA Review

A printed copy of the EA will be sent to those persons who responded to scoping efforts and to those who specifically requested a copy. A printed copy of the EA will also be sent to affiliated American Indian tribes, Xanterra Parks and Resorts, Paul Revere Transportation, APS, and USFWS. A press release will announce EA availability during the public review period, along with a brief project description. The EA will be posted on the park's website and to the NPS PEPC site, where the public can make comments via the website.

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APPENDIX A

Public Scoping Summary of Comments in Response to Greenway V Scoping Letter (June 2006)

Concerns/Comments	NPS Response
Greenway Trail Concept	
I support rim-top hiking and bicycle trails to allow for non-vehicular access to South Rim sites; these provide for an enhanced visitor experience.	Part of the purpose and need for the project.
Bicycle Use	
The current greenway from Mather Point to Pipe Springs was initially open to bicycles; now it is not. I suggest that this section, and the one proposed, be open to bicycles, in the spirit of the greenway concept already promoted by the park (pedestrian AND bicycle paths).	At the present time, GRCA does not allow bicycles on trails near the rim due to safety concerns. However, the Greenway V trail would be accessible to bikes for its length, except for the Pipe Creek Vista area. As stated in the document, special designation by the Superintendent may be necessary to allow bicycle use along Greenway V.
Open the section of rim trail east of Yavapai Point to bicyclists; we have not observed much traffic on this section nor features along the trail that would be difficult or dangerous to negotiate on a bicycle.	As stated above, GRCA does not allow bicycles on trails near the rim due to safety concerns. To consider opening the section of rim trail between Yavapai Observation Station and Mather Point is outside the scope of this project. However, GRCA continues to consider ways to improve bicycle access throughout the South Rim area. Continued implementation of the greenway trail system is analyzed as part of the South Rim Visitor Transportation Plan / Environmental Assessment, expected to be released for public comment in February 2008.
Pipe Creek Vista	
This parking area is very dangerous due to poor design.	Agreed. Addressing safety issues is part of the purpose and need for the project.
Improvements to the parking area may result in more hikers going to the South Kaibab Trailhead and parking their vehicles here, as now happens at the Yaki Point picnic area.	It is not the park's intent to create a satellite parking lot for South Kaibab Trailhead hikers, although we recognize it may be used by hikers. Hiker parking is being addressed in the South Rim Visitor Transportation Plan (EA currently in progress) and may be located near Canyon View Information Plaza.
Resource Impacts	
Are there any archeological sites or historic areas within the proposed Greenway path? Please address these concerns.	Surveys have been conducted and no archaeological sites have been located within the proposed trail alignments. Cultural resources protection is integral to the project, and impact potential is fully evaluated in this EA and the assessment of effect for this project.
Implementing this project will ruin the ambience of the rim west of Pipe Creek; leave the rim as it is.	The EA evaluates all predicted project impacts on park resources, including visitor experience, visual/scenic resources, and natural and cultural resources. NPS believes that the project would improve the rim experience by creating one clearly defined and accessible trail (and minimizing the existing level of social trailing) using existing disturbed corridors. NPS has no plans at this time

Concerns/Comments	NPS Response
	to construct any additional trails along the rim east of the South Kaibab Trailhead.
South Kaibab Trailhead Area	
Move the mule corrals and out buildings away from the rim and the proposed greenway trail to minimize the impact these sights and smells have on visitors.	Moving these historic structures and the current NPS mule operation is outside the scope of this project. The NPS believes NPS operations, historic area uses, and recreational visitor opportunities, can be accommodated with implementation of proposed improvements.
Accessibility	
I hope the entire trail route will be paved and made wheelchair accessible.	This is part of the purpose and need for the project.

APPENDIX B

Wildlife and Plant Species of Special Concern Species Descriptions

Mexican Spotted Owl – Threatened – The Mexican spotted owl (MSO; *Strix occidentalis lucida*) was listed as a threatened species in March 1993, and a recovery plan was issued in 1995. MSO typically breed and roost in deep canyon or diverse forested habitats. They are associated with late seral forests and are generally found in habitat that includes mixed-conifer and pine-oak forests, riparian madrean woodland, and sandstone canyonlands (USFWS 1995). However, MSO have been found in relatively open shrub and woodland vegetation communities in arid canyonland habitat (Willey 1995). Nesting habitat is typically in areas with complex forest structure or rocky canyons containing mature or old-growth stands that are uneven-aged and multi-storied with high canopy closure. MSO usually nest in abandoned stick nests or in cavities in trees or cliffs. Tree nests can be on platforms such as old raptor nests or witches' brooms formed by dwarf mistletoe (*Arceuthobium* sp.) or in cavities formed by broken-off branches or tree tops. Nests in rock canyon areas are usually in cavities in the rocks or in caves (Ganey and Dick 1995).

The diet of the MSO varies depending on location and habitat. Generally it consists of small and medium-sized mammals such as peromyscid mice, voles (*Microtus* spp.), pocket gophers (*Thomomys* spp.), ground squirrels (*Spermophilus* spp.), and woodrats (*Neotoma* spp.). Woodrats are the most common and important prey item range-wide, as measured in frequency in the owls' diet and in biomass consumed (Ward and Block 1995). Other animals that may occasionally be consumed include small birds (usually Passeriformes), lizards (*Sceloporus* spp.), bats (Chiroptera), beetles (Coleoptera), and rabbits (*Sylvilagus* spp.). MSO use a wider variety of forest conditions when foraging than when nesting or roosting, and a diverse prey base is dependant on availability and quality of diverse habitats. Spotted owls typically forage at night, although diurnal foraging has also been observed.

Data Sources: The presence of MSO within Grand Canyon National Park was confirmed in 1992 through field surveys of approximately 2,430 ha (6,000 acres) of suitable habitat on the North and South Rims. Additional MSO surveys occurred in 1994 and 1995 along the South Rim and in 1998 and 1999 along the North Rim. These surveys did not detect any spotted owls. In 1999, additional surveys were conducted in side canyon habitat along the Colorado River corridor and responses were received at six locations. Surveys continued along the river corridor in 2001, with new owls located (Willey and Ward, 2002). An extensive owl survey was initiated in 2001 with crews surveying the inner canyon and river corridor, owl habitat below the North and South Rims, and portions of the North and South Rim plateaus. A second year of surveys for these same areas was completed in 2002. Surveys continued along the South Rim, in some areas in the inner canyon, and on the plateaus of the North Rim in 2003 - 2007. Surveys within the project area were conducted using the most recent FWS monitoring protocol and identified one MSO PAC below the canyon rim near the project area: the Pipe Spring PAC. The Pipe Spring PAC was first located in 2006 and a male and a female were located in 2007. Three roost sites have been determined for the Pipe Springs PAC. While the precise location of the nest site is unknown, it is suspected within a maximum of 10 meters of the central roost site. All three known roost sites and the nest site are located on the eastern wall of Pipe Creek Canyon (Ward and Goates 2007). The ½ mile buffer around the roosts and nest site do not intersect with the project area.

Owl habitat in Grand Canyon National Park is cool canyon habitat defined as areas with low thermal intensity, short thermal duration, and steep slopes (Spotskey and Willey 2000). Predicted habitat has been spatially defined through a geographic information system (GIS) model and may or may not

include forested habitat; i.e., the coolness and short thermal duration may be a result of vertical rock faces, cliff walls, and aspect and not necessarily because an area has dense vegetative canopy cover.

The Park falls within the Colorado Plateau Recovery Unit. The Mexican Spotted Owl Recovery Plan (USFWS 1995) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. Protected habitat in the Colorado Plateau Recovery Unit includes any PACs, designated wilderness areas, and any mixed conifer forests on slopes over 40%. Restricted habitat in the Colorado Plateau Recovery Unit includes mixed conifer forests or riparian habitats that have primary constituent elements. Primary constituent elements in these habitat types include high basal area of trees, uneven-aged structure, and high snag basal area. Primary constituent elements in canyon habitat include cooler and more humid conditions than in the surrounding area; clumps or stringers of trees; canyon walls with crevices, ledges or caves; high percent cover of ground litter or woody debris; and riparian or woody vegetation.

As of 2007, 41 Protected Activity Centers (PACs) have been designated for known MSO locations in the Park; one of which occurs in the vicinity of the Pipe Creek Vista. Critical habitat for MSO was designated in 2000 and includes most of the Park (where primary constituent elements exist) except the South Rim.

Threats. The primary threats cited for the owl in most Recovery Units include large-scale catastrophic wildfire and timber harvest. Potential threats cited specifically for the Colorado Plateau Recovery Unit focus more on recreational impacts, road building, and overgrazing.

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 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, and February 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 regulations for management of the population that are less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between management of the 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. California condor foraging occurs in both open terrain and forested areas. 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 2007, the population of free-flying condors in Arizona totaled 60. 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 River and

west and south as Lake Havasu; south to the San Francisco Peaks outside 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 2005). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on South Rim, and the Village to Hermits Rest. 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 a second on Dana Butte, were initiated in 2002. Both nest sites failed. In 2003 one young was produced from the Salt Creek nest, but the Battleship nest failed. In 2004 nestlings were fledged from the Battleship nest and a nest on the Vermillion Cliffs. 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. As of September 2007, condors were nesting in the Deer Creek/Thunder River area and the Vermillion Cliffs area and both nests had confirmed nestlings. The Greenway V trail project area is over 4 air miles from the nearest known nesting attempt (Dana Butte) in Grand Canyon.

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.

Peregrine Falcon (Species of Concern – Delisted) – In the southwest region, peregrines persist mainly on mountain cliffs and river gorges. Eyries exist on dominant cliffs that generally exceed 200 feet in height; nests are usually situated on open ledges. Peregrines formerly nested in nearly all plant communities of the region. Prey abundance and diversity provided by these situations is probably a major factor in eyrie selection. Nest sites are often adjacent to water courses and impoundments due to abundance of avian prey. Peregrines may travel up to 17 miles from nesting cliffs to hunting areas. Preferred hunting habitats include cropland, meadows, river bottoms, marshes, and lakes. Prey species may include, but are not limited to, blackbirds, jays, doves, shorebirds, and smaller songbirds. As of 1993, breeding was documented at more than 180 sites in Arizona.

Data Sources. Extensive surveys have been conducted over the years in Grand Canyon National Park by park biologists and U.S. Geological Survey/Biological Resources Division personnel. Grand Canyon provides excellent cliff nesting habitat for peregrines and numerous eyries have been documented within the park. In a Draft Addendum to the Recovery Plan, the Fish and Wildlife Service recommended delisting of the southwestern regional population because the recovery goals outlined in the 1984 Plan have been met. A monitoring program is being developed by the U.S. Fish and Wildlife Service to guide monitoring activities following delisting. An initial goal of monitoring at least 25 peregrine territories in the Colorado Plateau and adjacent low desert regions is part of this nation-wide effort. Grand Canyon National Park will have two to four territories monitored during this effort. Peregrine eyries are known from below the canyon rim at Pima Point, Hopi Point Grandeur Point and Yaki Point All territories were active in 2006.

Threats Previous peregrine population declines coincided with increasing use of DDT, but other limiting factors included availability of cliffs and prey that limit breeding falcon distribution or numbers, competition for nesting cliffs with other raptors, and possible predation to eggs and young. Peregrine eyries occur throughout the canyon from remote river locations to cliffs bordering Grand Canyon Village on South Rim.

Zone-tailed Hawk (Species of Concern) – Zone-tailed hawks are medium-sized hawks found from the southwestern United States to Central and South America, using riparian forest and woodlands, desert uplands and mixed-conifer forests. Breeding populations have been documented in Arizona, New

Mexico, and Texas with some strays reported in California and Nevada. Preferred southwest habitats include deep, rough, and rocky wooded canyons and tree-lined rivers. Preferred foraging habitat includes open spaces in sparse forests or desert grasslands. Zone-tailed hawks feed primarily on small birds, lizards, and small mammals, and occasionally on fish and large insects. Prey exposed and conditioned to turkey vultures is likely prey of the zone-tailed hawk, since zone-tails look quite similar to turkey vultures when in flight. Nests are typically large and loosely constructed of sticks 25 to 100-feet above the ground, and are reused year to year. Nests are typically at the top of a tree or on a cliff. The hawks are migratory and move from U.S. ranges south in winter.

Data Sources The first zone-tailed hawk nest in Grand Canyon National Park was discovered in 2000 by park biologists. This notable observation confirmed an range extension for this species in Arizona. This is the only known park breeding location for zone-tailed hawks and is the furthest north of any known Arizona breeding areas. For this reason, zone-tailed hawks are considered a park species of special concern. The nest has been monitored regularly since its discovery and was confirmed active in 2007. Zone-tailed hawks do not have any other special designation or protection in Arizona and their population in Arizona is presumed stable.

Deer goldenbush – Species of Special Concern - Deer goldenbush (*Ericameria arizonica*) is a recently-named endemic shrub previously included in the taxon *Haplopappus cervinus*. It bears yellow flowers from September through October, and occurs on limestone substrates, often near the canyon rim. Recent park surveys have located individuals along South Rim near Mather Point, Maricopa Point, Pipe Creek Vista, and South Kaibab Trailhead. This species has not been thoroughly surveyed (Roberts et al. 2005), and its rarity is unknown.

List of Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AEF	Assessment of Effect
AGFD	Arizona Game and Fish Department
APS	Arizona Public Service
BA	Biological Assessment
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CVIP	Canyon View Information Plaza
dBA	A-weighted decibel. Unit of sound weighted for human sensitivity in particular frequencies
DDT	Dichlorodiphenyltrichloroethane
DO	Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
GIS	Geographic Information System
GMP	General Management Plan
GRCA	Grand Canyon
IDT	Interdisciplinary Team
MOA	Memorandum of Agreement
MSO	Mexican Spotted Owl
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
PAC	Protected Activity Centers
PEPC	Planning, Environment and Public Comment
SHPO	State Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service