ENVIRONMENTAL ASSESSMENT FOR DESERT VIEW IMPROVEMENTS AND ROAD REHABILITATION, GRAND CANYON NATIONAL PARK, COCONINO COUNTY, ARIZONA

Prepared for

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CHAPTER 1 - PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

The National Park Service (NPS) proposes to redevelop Desert View as a transportation hub of the South Rim located near the east entrance to Grand Canyon National Park (the Park). Proposed activities would occur at the Desert View area and along Desert View Drive and the south entrance road of Grand Canyon National Park, Coconino County, Arizona (Figure 1). Proposed activities include realignment of Desert View Drive to move traffic away from the rim; construction of a new entrance station, parking lot, and bus transit facility; installation of additional visitor services; and rehabilitation of the south entrance road and portions of Desert View Drive. These proposed activities implement a portion of the 1995 General Management Plan (GMP) for Grand Canyon National Park and are a key element in the Park's GMP. Construction related to the realignment of Desert View Drive would begin as early as the second half of calendar year 2002. Other activities would occur within the next five years as funding is secured.

PURPOSE AND NEED

The proposed activities are part of a comprehensive effort to accommodate present and anticipated future visitation at Desert View while minimizing resource impacts and conflicts. The proposed activities are needed because the existing facilities cannot adequately accommodate existing use or any future increases in visitation. During the peak summer months, facilities at Desert View are crowded, creating an unsafe environment, degrading visitor experience, and impacting natural and cultural resources in the vicinity. Roadways also need to be maintained in or returned to a serviceable condition. The proposed activities affect visitor services at Desert View and along portions of Desert View Drive and the south entrance road, which serve Desert View visitors.

An Environmental Assessment (EA) analyzes the preferred alternative and other alternatives and their impacts on the environment. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ; 40 CFR 1508.9), the NPS's Director's Order (DO) 12 (NPS 2001a), and the National Historic Preservation Act of 1969, as amended.

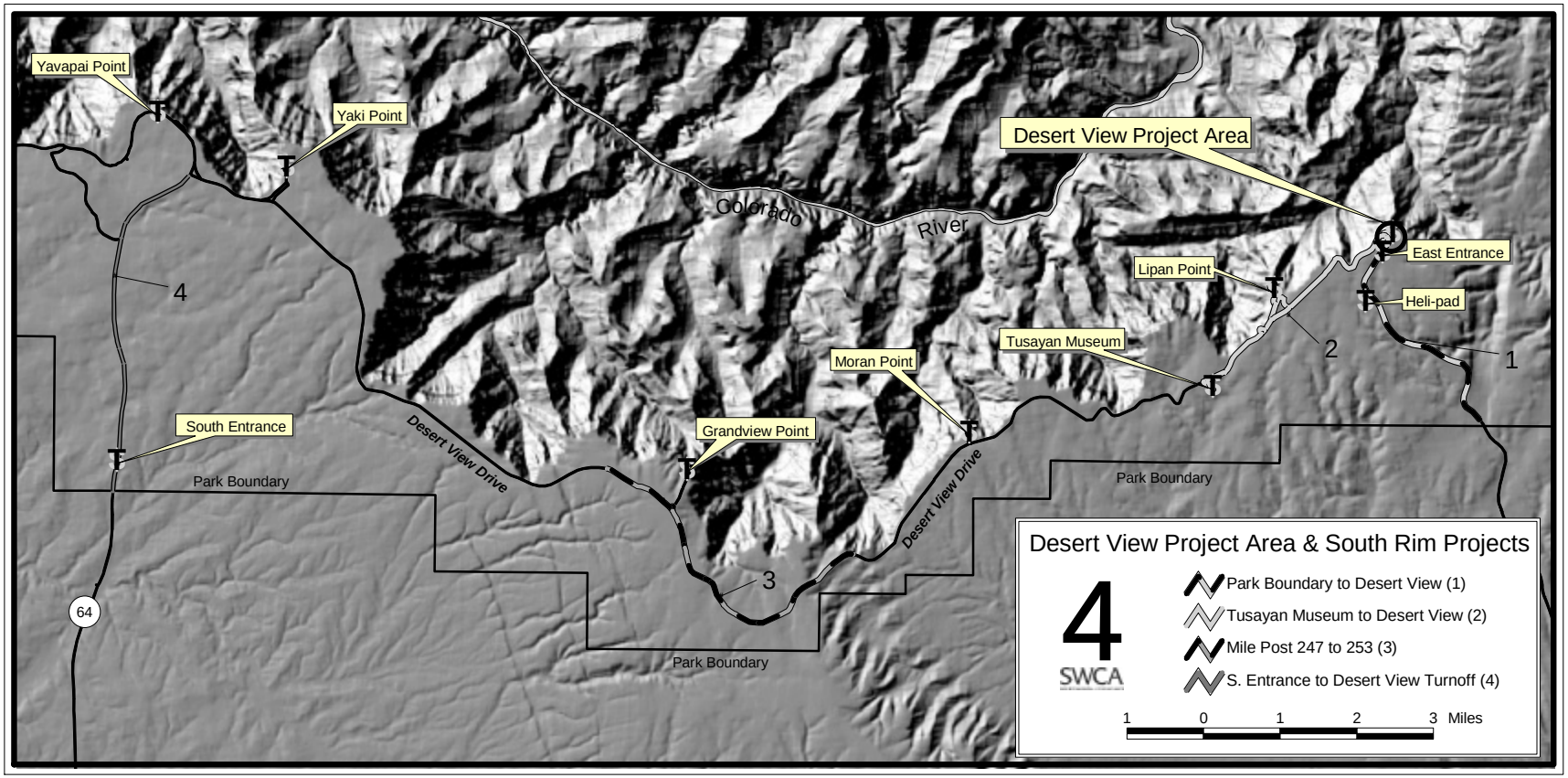

Figure 1. Desert View Project Location.

PURPOSE AND SIGNIFICANCE OF THE PARK

The purpose of Grand Canyon National Park is based on the legislation establishing the Park (Grand Canyon National Park Establishment Act, 16 U.S.C. 221 et seq.) and the legislation governing the NPS (National Park Service Organic Act, 16 U.S.C. 1-4). As stated in the GMP, the purpose of the Park is

- To preserve and protect its natural and cultural resources and ecological processes, as well as its scenic, aesthetic, and scientific values; and
- To provide opportunities for visitors to experience and understand the environmental interrelationships, resources, and values of the Grand Canyon without impairing the resources.

The values and significance of Grand Canyon National Park, as described in the GMP, include the following:

- World Heritage Site – The Grand Canyon is recognized as a place of universal value, containing superlative natural and cultural features.
- Natural Ecosystem Processes – The Park includes examples of five of the seven life zones and three of the four deserts in North America and serves as an ecological refuge. It is one of the finest examples in the world of arid-land erosion and has a diversity of geologic features and a particularly well-exposed geologic record.
- Natural Resources Research – Six research natural areas within the Park provide opportunities for nondestructive research in areas relatively uninfluenced by humans.
- Cultural Resources – Eight American Indian groups have sacred cultural ties to the Grand Canyon. Over 4,500 years of human occupation have resulted in an extensive archaeological record.
- Scenic Qualities – The Grand Canyon has internationally recognized scenic vistas, a wide variety of scenery, and excellent opportunities for night sky viewing.
- Natural Quiet and Solitude – The Grand Canyon is recognized as a place with direct access to natural quiet and solitude.
- Spiritual/Inspirational Qualities – The vast size and natural, cultural, and scenic qualities of the Grand Canyon give rise to inspirational/spiritual values and a sense of timelessness.
- Recreational Opportunities – The vast majority of the Park provides opportunities for wilderness experiences. The Park contains hundreds of miles of trails and the world's longest stretch of navigable white water.
- Potential Designations – Over 400,000 ha (1,000,000 acres) in the Park meet the criteria for wilderness designation. The Grand Canyon area could become one of the largest, primarily desert wilderness areas in the United States. The Colorado River and most of its tributaries meet the criteria for wild river designation.

SCOPING

A scoping letter (see Appendix A) for several projects, including improvements at Desert View, was sent on 8 December 2000 to the State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (USFWS), the Arizona Game and Fish Department (AGFD), eight American Indian tribes, and 325 interested members of the public and other affected agencies. Two responses, one from the Navahopi motorcoach service and one from the Hopi Tribe, were received. These responses contained the following comments:

- Navahopi encouraged the Park to construct a group picnic area somewhere along Desert View Drive.
- Navahopi encouraged the Park to increase parking facilities.
- Navahopi encouraged the Park to review the viewpoints where motorcoach operations are permitted to stop along Desert View Drive.
- Navahopi expressed the hope that reconstruction at Desert View would not infringe on the rights of motorcoach passengers to use the facility.
- The Hopi Tribe invited Park staff to make a presentation reviewing the proposed activities at a meeting of the Hopi Cultural Resources Advisory Task Team. This presentation was completed in March 2001.

A separate letter (Appendix B) was sent to the USFWS requesting a list of special status species that might occur in the vicinity of Desert View. The USFWS provided a list of special status species that might be found in Coconino County (Appendix B). No separate scoping was initiated for the road rehabilitation projects.

MANAGEMENT AND PLANNING HISTORY

Grand Canyon National Park is currently operating under the direction of the 1995 General Management Plan. This plan provides guidance for resource management, visitor use, and general development for a period of 10 to 15 years. Decisions were made in the GMP to make changes at Desert View, expanding it into a transportation hub of the South Rim with orientation and transit facilities. Decisions made in the GMP that relate to Desert View include but are not limited to:

- relocation of Desert View Drive [Desert View Drive was formerly referred to as East Rim Drive because it is the eastern portion of the Rim Drive. The road is now sometimes referred to as Desert View Drive because of confusion with the general public thinking that there is an "east rim" located within the Park, similar to the North Rim and South Rim. In this document, the name Desert View Drive is used];
- construction of a parking lot to accommodate 450 private vehicles (including RVs) and 15 buses;
- relocation of the existing entrance station;
- construction of a bus shuttle loop and transit shelter;
- construction of an orientation facility;

- conversion of the existing contact station to a visitor services/management support building;
- conversion of a historic house to a bike rental facility;
- construction of picnic areas;
- relocation of the existing Trading Post (gift shop/deli).

An Environmental Impact Statement for the GMP analyzed the environmental consequences of implementing these actions and various alternatives to these actions.

In November 1999, an interdisciplinary team from Grand Canyon National Park, Federal Highways Administration, and the NPS Denver Service Center met to conduct a value analysis study (NPS 2000) on the Desert View developments called for in the GMP. A value analysis is a structured analysis that is intended to provide an objective means of arriving at the best solution to a problem. The value analysis study sought to evaluate the functionality and cost of four conceptual alternatives for improvements at Desert View. The value analysis team evaluated the ability of each alternative to provide a simple vehicular circulation system, retain a park-like setting, concentrate the overall area of development, prevent loss of resources, provide visitor services, and protect public health and safety. The team refined the four alternatives into a new preferred alternative for improvements at Desert View based on this analysis.

This EA incorporates by reference and tiers to the *General Management Plan Environmental Impact Statement* (GMP EIS). In addition, this EA incorporates by reference the *Value Analysis Study for GRCA 228 – Desert View Road Realignment* (Value Analysis).

ISSUES AND IMPACT TOPICS

Issues

Issues and concerns affecting this proposal were identified from past NPS planning efforts and input from state and federal agencies. An interdisciplinary team consisting of cultural landscape architects, the value analysis team, and resource specialists from the NPS also identified issues. The potential issues include the conformance of this proposal with the 1995 GMP and potential impacts to natural resources, scenic values, water quality, floodplains, wetlands, air quality, prime and unique farmland, cultural resources, socioeconomic environment, land use, transportation, environmental justice, recreational values, and park operations. Once issues were identified, they were used to help formulate the alternatives and mitigation measures.

Derivation of Impact Topics

Specific impact topics related to these issues were developed for discussion focus and to allow comparison of the environmental consequences of each alternative. Impact topics were then selected for detailed analysis based on substantive issues; environmental statutes, regulations, and executive orders; and revised NPS Management Policies (NPS 2001b). A summary of the impact topics and rationale for selection/dismissal are given below.

Impact Topics Analyzed in this Document

Soils. NEPA calls for an examination of the impacts on the components of affected ecosystems. Proposed activities have the potential to impact the soil resource. Therefore, this topic will be analyzed in this document.

Visual Resources. Conserving the scenery of national parks and providing for visitor enjoyment are elemental purposes of the NPS according to the 1916 Organic Act. Proposed construction at Desert View would change the visual appearance of the area. Therefore, this topic will be analyzed in this document.

Biotic Communities. NEPA calls for an examination of the impacts on the components of affected ecosystems. The 2001 NPS Management Policies, the 1995 GMP, and other NPS and Park policies provide general direction for the protection of the abundance and diversity of the Park's naturally occurring communities. Proposed construction would involve the disturbance of vegetation communities. In addition, construction activities have the potential to increase disturbance to adjacent biotic communities. Therefore, this topic will be analyzed in this document.

Exotic Vegetation and Noxious Weeds. Executive Order 13112 mandates all federal agencies to examine the impacts of their activities on the status of invasive species. Proposed ground disturbance could create conditions favorable to exotic vegetation and noxious weeds. In addition, construction equipment could spread existing populations of exotic vegetation and noxious weeds. Therefore, this topic will be analyzed in this document.

Special Status Species (Threatened, Endangered, Candidate, and Rare Species). The 1973 Endangered Species Act (ESA), as amended, requires an examination of impacts to all federally listed threatened or endangered species. NPS policy requires examination of the impacts to state-listed threatened or endangered species and federal candidate species. In a letter dated 01 September 1999, the USFWS listed 19 endangered, threatened, or candidate species that have the potential to occur in Coconino County (see Appendix B). Research conducted by Park staff and others has indicated that three of these species, the Mexican spotted owl (*Strix occidentalis lucida*; threatened), the California condor (*Gymnogyps californianus*; experimental/nonessential) and the sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophyla*; endangered) may occur in the project vicinity and may be affected by either action alternative. AGFD also lists the Mexican spotted owl as wildlife of special concern and the sentry milk-vetch as highly safeguarded.

American peregrine falcons (*Falco peregrinus anatum*) have been removed from the federal threatened and endangered species list. 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 nationwide effort. Grand Canyon National Park has not been contacted to date on participation in this monitoring effort. Because of the size and extent of the population within the Park, participation in the monitoring program is likely. During this monitoring effort,

the Park will continue to consider peregrine falcons a species with special status. Therefore, these species will be analyzed in this document.

Visitor Experience. The 1916 NPS Organic Act and the 2001 NPS Management Policies direct national parks to provide for public enjoyment. Desert View serves as the eastern entrance to the Park and as a destination for travelers from Grand Canyon Village. Proposed activities have the potential to impact the visitor experience. Therefore, this topic will be analyzed in this document.

Cultural Resources. The 1966 National Historic Preservation Act, as amended, NEPA, the 1916 NPS Organic Act, the 2001 NPS Management Policies, other NPS guidelines, and the Native American Graves Protection and Repatriation Act of 1990 require consideration of impacts on cultural resources. Project undertakings have the potential to affect identified archaeological resources, sites of special ethnographic importance to American Indians, buildings and structures contributing to the Desert View Watchtower Historic District, and other elements that contribute to the historic cultural landscape at Desert View. Therefore, this topic will be analyzed in this document.

Park Operations. Park operations such as maintenance of buildings, roads, and grounds could be affected by the action alternatives. Therefore, this topic will be analyzed in this document.

Impact Topics Dismissed

Geology and Topography. Alteration of geologic processes and features are not proposed in any of the alternatives. No major earthmoving or blasting activities are proposed that would impact the geologic processes or features or cause substantial alteration of the topography. Therefore, this topic will not be further addressed in this document.

Prime and Unique Agricultural Land. The CEQ issued a memorandum in August 1980 directing federal agencies to analyze the effects of their actions on soils classified as prime or unique by the Natural Resource Conservation Service. The Farmland Protection Policy Act of 1981, as amended, also 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 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. The soils in the vicinity of Desert View and along the South Rim tend to be shallow and poorly developed. No prime farmland or unique agricultural lands exist within the Park; therefore, this topic will not be further addressed in this document.

Air Quality. Grand Canyon National Park is a Class 1 air quality area and receives the highest protection under the Clean Air Act of 1970, as amended. Pollution levels monitored in the Park fall below the levels established by the Environmental Protection Agency to protect human health and welfare. However, the ability to see through the air (visibility) is usually well below natural levels because of air pollution. Most of this pollution originates far outside the Park's boundaries, and arrives in the Park 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 scope of this project will not require consultation with the State of Arizona regarding air quality. Project construction at Desert View would potentially result in an increase in fugitive dust from soil exposure and disturbance. However, this effect would occur only during the construction period and would be localized. Water or dust control agents would be applied during construction as necessary to control dust. Project construction at Desert View and in road rehabilitation areas would result in increased vehicle emissions from construction equipment and traffic. Tailpipe emissions would be reduced by not idling construction equipment longer than necessary. Increased emissions would be limited to the construction period and would be localized. An asphalt or concrete batch plant may be used during construction at Desert View. This batch plant would be fueled with propane rather than diesel fuel to reduce emissions.

Vehicle traffic at Desert View is expected to increase because of increased numbers of visitors and the conversion of Desert View into a transportation hub. However, overall vehicle emissions are expected to decrease as the result of implementation of a Park-wide transit system and the overall reduction of private vehicles driving throughout the Park. Impacts to overall Park air quality and regional air quality are expected to result in no to negligible impacts. Therefore, this topic will not be further addressed in this document.

Water Resources. Under the authorization of the Clean Water Act of 1972, the Environmental Protection Agency administers programs to reduce pollution of surface waters. Surface water along the South Rim usually occurs only following severe storm events. This is because of the permeable nature of the upper sedimentary layers underlying Desert View (NPS 1995a, Roundy and Vernon 1999) and the evapotranspiration potential of the surrounding pinyon-juniper community type (Huntoon n.d.). Despite the increase of impermeable surfaces created by the proposed developments at Desert View and the slight widening of portions of Desert View Drive, the majority of water would continue to be lost through evapotranspiration or percolation. Surface runoff from the South Rim would remain associated with severe storm events.

The quality of ground and surface water would not be measurably affected by the proposed developments. Increased sedimentation from increased surface runoff and soil erosion would be minimal because of the lack of surface water runoff from Desert View and implementation of best management practices. In addition, the potential impacts of increased sedimentation would be limited to the period of construction and vegetation recovery. The primary contaminants of concern associated with parking lots and roads are oil and grease. Secondary concerns include zinc (from tires) and copper (from brake pads). These contaminants are often transported by sediments and are not a major concern because of the long distance to perennial surface water, relatively small area of asphalt (thus small contaminant source), and high permeability of the underlying substrate (increasing the likelihood of filtration).

The present domestic water supply and storage capacity are sufficient to accommodate the proposed changes at Desert View. The proposed changes would not affect the timing or quality of the water supply.

This proposal would not likely affect water quantity, timing, or quality. Therefore, this topic will not be further addressed in this document.

Floodplains. Executive Order 11988 requires federal agencies to examine potential risk and impacts of placing facilities within floodplains. Desert View is located at a topographic highpoint and thus there is no opportunity for runoff to accumulate. No floodplains exist at Desert View or along the road rehabilitation projects. Therefore, this topic will not be further addressed in this document.

Wetlands. Executive Order 11990 requires federal agencies to avoid impacts on wetlands where possible. No jurisdictional wetlands exist at or near Desert View or along the road rehabilitation projects. Therefore, this topic will not be further addressed in this document.

Special Status Species (Threatened, Endangered, Candidate, and Rare Species). The USFWS listed the following 15 special status species, in addition to the Mexican spotted owl, California Condor, and sentry milk-vetch, as having the potential to occur in Coconino County.

Brady pincushion cactus (*Pediocactus bradyi*) – endangered.
Navajo sedge (*Carex specuicola*) – threatened.
San Francisco peaks groundsel (*Senecio franciscanus*) – threatened.
Siler pincushion cactus (*Pediocactus sileri*) – threatened.
Welsh's milkweed (*Asclepias welshii*) – threatened.
Arizona bugbane (*Cimicifuga arizonica*) – candidate.
Fickeisen plains cactus (*Pediocactus peeblesianus* var, *fickeiseniae*) – candidate.
Kanab ambersnail (*Oxyloma haydeni kanabensis*) – endangered.
Black-footed ferret (*Mustela nigripes*) – endangered.
Humpback chub (*Gila cypha*) – endangered.
Razorback sucker (*Xyrauchen texanus*) – endangered.
Southwestern willow flycatcher (*Empidonax traillii extimus*) – endangered.
Little Colorado spinedace (*Lepidomeda vittata*) – threatened.
Bald eagle (*Haliaeetus leucocephalus*) – threatened.
Chiricahua leopard frog (*Rana chiricahuensis*) – threatened.

In addition to the federally listed species, the NPS must consider state-listed special status species. The following species, in addition to sentry milk-vetch, Mexican spotted owl, and American peregrine falcon, are listed by AGFD and may be affected by projects on the South Rim.

Bigelow onion (*Allium bigelovii*) – salvage restricted.
Grand Canyon primrose (*Primula specuicola*) – salvage restricted.
Grand Canyon rose (*Rosa stellata* ssp. *abyssa*) – salvage restricted.
Mogollon columbine (*Aquilegia desertorum*) – salvage restricted.
Tusayan flame flower (*Talinum validulum*) – salvage restricted.
Western fairy slipper (*Calypso bulbosa*) – salvage restricted.
Humpback chub (*Gila cypha*) – wildlife of special concern.
Northern goshawk (*Accipiter gentilis*) – wildlife of special concern.

Southwestern willow flycatcher (*Empidonax traillii extimus*) - wildlife of special concern.
Western red bat (*Lasiurus blossevillii*) – wildlife of special concern.

Tusayan flame flower has the potential to occur in the vicinity of the road rehabilitation project from the south entrance to the Desert View turn-off (D. Lutch, NPS, pers. comm., May 2002). Habitat for this plant does not exist at Desert View or along any of the other road rehabilitation project areas. Because project activities would occur only within the existing road prism, no impacts to this species are expected.

Bald eagles are known to roost regularly in the winter near Pipe Creek Vista, approximately 1.6 km (1 mile) from the intersection of the south entrance road and Desert View Drive (D. Lutch, NPS, pers. comm., May 2002). Road rehabilitation along the south entrance road should have no effect on bald eagles roosting near Pipe Creek Vista. Bald eagles are not known from Desert View or from the other road rehabilitation project areas.

Grand Canyon National Park botanists and wildlife biologists reviewed the project area and determined that habitat for the above federal and state-listed species does not exist at Desert View. This determination is based on site-specific knowledge of the area, reconnaissance of the area, knowledge of the species and habitats in question, and professional judgment. Habitat for these species, except the Tusayan flame flower and bald eagle, as discussed above, does not occur along the road rehabilitation projects on Desert View Drive or the south entrance road, and no effects to these species are anticipated. Therefore, this topic will not be further addressed in this document.

Socioeconomic Environment. The socioeconomic environment consists of local and regional businesses and residents, the local and regional economy, and park concessions. The local economy and most businesses in the surrounding communities are based on professional services, construction, tourist sales and services, and educational research. The regional economy is strongly influenced by tourist activity. The GMP EIS discussed the socioeconomic environment and impacts extensively.

None of the proposed alternatives would change local or regional land use. Park businesses would not suffer any appreciable adverse short or long-term economic impacts from any of the alternatives because traffic flow into and out of Desert View, along Desert View Drive, and on the south entrance road would be maintained. The short and long-term socioeconomic impacts of implementing any of the action alternatives would be consistent with the impacts described in the GMP EIS. Therefore, this topic will not be further addressed in this document.

Environmental Justice. Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. None of the proposed alternatives would have a disproportionately high and adverse effect on any minority or low-income population or community. This conclusion is based on the following:

- The proposed developments and actions in the alternatives would not result in any identifiable adverse human health effects. Therefore, there would be no direct,

indirect, or cumulative negative or adverse effects on any minority or low-income population or community.

- The impacts on the natural and physical environment that would occur in any of the alternatives would not noticeably and adversely affect any minority or low-income population or community.
- The alternatives would not result in any identified effects that would be specific to any minority or low-income community.
- Impacts on the socioeconomic environment from the alternatives would be minor or positive and would occur mostly within the local and regional geographic area near the Park. These impacts would not occur at one time but would be spread over a number of years, thus reducing their intensity. Also, the impacts on the socioeconomic environment would not substantively alter the physical and social structure of the nearby communities.

Therefore, this topic will not be further addressed in this document.

Soundscape. The NPS is mandated by Director's Order 47 to articulate the National Park Service's operational policies that would require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the natural functioning of many parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they sometimes impede the Service's ability to accomplish its mission.

Noise impacts from this project will last only the duration of the construction. After construction is completed, noise levels would return to their natural condition. Most construction would occur during daylight hours when roads and the associated traffic already impact the congested Desert View area, Desert View Drive, and the south entrance road. Any additional traffic will be temporary and will not affect or will negligibly affect the areas in the short term. Because this project would have no measurable effects on the soundscape, this topic will not be analyzed in this document.

CHAPTER 2 - ALTERNATIVES

The NPS has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through the sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. Each action alternative subscribes to and supports the practice of sustainable planning, design, and human use of the Desert View developed area with its associated public and administrative facilities.

This document analyzes two action alternatives and the No-Action Alternative. Analysis of the No-Action Alternative is required under NEPA (40 CFR 1502.14(d)). It provides a baseline for assessing the potential impacts of the Proposed Action. The two action alternatives are the alternative presented in the GMP (GMP Alternative) and the alternative developed by the value analysis team (Proposed Action).

ITEMS APPLICABLE TO BOTH ACTION ALTERNATIVES

The descriptions of alternatives are based on preliminary designs and best information available at the time of this writing. Specific lengths, distances, areas, and layouts used to describe the 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 compliance would be needed. Features common to both action alternatives are described below and summarized in Table 2-1.

Design. The following design criteria would be met:

- Meet as closely as possible the objectives and decisions made in the GMP,
- Utilize existing roads and disturbed areas wherever possible,
- Minimize adverse impacts to the historic district and the overall cultural landscape,
- Minimize adverse impacts to prehistoric and historic archeological sites, and
- Minimize the length of the bypass road section.

Realignment of Desert View Drive. The roadway serving Desert View would be moved away from the visitor area and the rim. Approximately 1,705 lineal m (5,585 lineal feet) of asphalt roadways would be constructed or reconstructed:

- the bypass road (2 lanes with turn lanes) – 320 m (1,060 feet) long,
- secondary road to car, RV, and bus parking – 460 m (1,500 feet) long,
- secondary road to shuttle bus stop – 610 m (2,000 feet) long,
- realignment of road to maintenance area – 245 m (800 feet) long, and

- secondary road from bypass road to maintenance road – 70 m (225 feet) long.

The beginning portion of the existing road to the maintenance area would be demolished to accommodate the road realignment. The area reclaimed would be 0.3 ha (0.7 acre).

Parking Lot. A new parking lot would be constructed that would accommodate 430 cars, 22 RVs, and 15 buses. The parking lot was designed to accommodate the number of vehicles projected in the GMP for the year 2010. The parking lot would be divided into two separate areas, a car parking area covering 2.0 ha (4.9 acres) and an RV and bus parking area covering 1.0 ha (2.4 acres). The total area of asphalt would be about 2.9 ha (7.3 acres). The parking lot would be constructed in phases in one of the action alternatives.

Entrance Station. The entrance station would be relocated to an area on Arizona Highway 64 between Desert View and the Park boundary. The alternatives differ in the exact location of the entrance station. Approximately 0.6 ha (1.5 acres) would need to be cleared of vegetation to provide for the footprint of the new entrance station. The new entrance station would have two entry lanes, one exit lane, two parking spaces for employees, two booths serving the entry lanes, and a building providing restrooms and storage space. The buildings would total approximately 46 square meters (500 square feet).

The relocation of the entrance station would include the demolition of the existing entrance station booths and the associated road between the new bypass road and the road to the maintenance area. This area would be revegetated and recontoured to follow the natural slope.

Removal of Structures West of Existing Water Tank. Structures just west of the existing water tank would be relocated or demolished to accommodate the proposed parking lot. Ten non-historic trailer/RV pad sites for concessioner employees would be relocated to the NPS staff housing area. A non-historic concessionaire utility shed would be demolished and replaced with a new structure in the maintenance area. An existing building that does not contribute to the historic district would be relocated to the housing/maintenance area.

Shuttle Loop and Transit Shelter. A shuttle bus loop and transit shelter would be constructed near the east end of the existing parking lot. The bus shuttle loop and transit shelter would provide a clearly delineated, comfortable, and safe pick-up/drop-off area. The transit shelter would consist of two open-air structures with lighting, seating, and information panels. Utilities connecting the transit shelter would be underground.

Orientation Facility. Both action alternatives propose additional visitor orientation facilities but differ in the location of these facilities. These facilities would include a restroom.

Visitor Services/Management Support Building. The existing contact station (Building No. 41) would be adaptively reused as a visitor services or management support building. The existing contact station needs to be retained because it contributes to the historic setting of Desert View. Converting the contact station to other uses would entail modifications for accessibility and upgrading utilities, mechanical systems, and interior and exterior finishes.

Bike Rental Facility. Both action alternatives would include a bike rental facility, but they differ in the location of the facility.

Picnic Facilities. Both action alternatives propose to install picnic facilities, but they differ in the location of these facilities

Trading Post. Both action alternatives propose to relocate the existing gift shop/deli (Trading Post). The alternatives differ in the location of the new Trading Post and the use of the existing Trading Post building.

Existing Restroom. An existing restroom (Building No. 1410) adjacent to the General Store would be demolished.

Pedestrian Area. The existing parking lot would be converted to a pedestrian and landscape area. In addition, the existing portion of Desert View Drive between the western entrance to the parking lot and the new bypass road would be converted to a walkway/bike path. The conversion of these areas to pedestrian areas would entail the demolition of portions of the parking area, revegetation, and landscaping.

Trails. Social trails that exist along the rim in both directions from Desert View would be formalized and improved.

Utilities. In conjunction with the construction of the bypass road, existing electric and telephone overhead utility lines would be relocated underground within the existing, cleared power line corridor from Desert View to about 229 m (750 feet) southwest of the new bypass road. Electrical and telephone lines would be placed in separate conduits and buried in the same trench. Within Desert View, utilities would be relocated and connected to infrastructure as necessary. Existing utilities would be placed underground in approximately 915 m (3000 feet) of trench. The trench would be 1 meter (3 feet) wide, and the utility corridor would be 3 m (10 feet) wide to accommodate equipment and sidecast materials.

Propane Tank. An existing propane tank at the site of the proposed parking lot would be removed. Individual propane tanks would be installed adjacent to buildings requiring propane service.

Water Tank. The existing water tank and an associated utility building are within the footprint of the proposed car parking lot and would need to be relocated. A new water tank would be constructed near the existing utility corridor approximately 229 m (750 feet) south of the new road bypass. The tank would be 4.6 m (15 feet) high and 12.2 m (40 feet) in diameter. A new building containing water pumps and related utilities would be constructed adjacent to the new water tank. The existing water tank and its associated utility building would then be demolished.

Communications Mast. An existing antenna and its support buildings are within the footprint of the proposed car parking lot and would need to be relocated. A new communications mast would be constructed near the new water tower, and the existing antenna would be demolished. The existing support buildings for the antenna would be relocated to the new site. The

communications equipment provides radio communication to the main village area and requires direct line of sight to Village communications facilities. This direct sighting would determine the ultimate height of the antenna. It would be approximately 9.1 m (30 feet) in height, comparable to the height of existing power poles in the area.

Staging Area and Batch Plant. A main contractor staging area, which may include an asphalt or concrete batch plant, would be located in a previously disturbed area. The existing helibase, which is located along Desert View Drive approximately 1.5 km (0.9 mile) south of Desert View, would be offered to the contractor for this purpose (see Figure 1). Upon completion of the project, the staging area would be returned to pre-construction conditions.

Road Rehabilitation. Three sections of Desert View Drive and one section of the south entrance road would be rehabilitated (see Figure 1). Desert View Drive would be rehabilitated from milepost (MP) 247 to MP 253, from approximately 183 m (600 feet) west of the Tusayan Museum intersection to the Desert View developed area (4.8 km [3.0 miles]), and between Desert View and the eastern Park boundary (6.4 km [4.0 miles]). Approximately 1.5 km (0.9 mile) of overlook access and parking areas (Navajo Point, Lipan Point, and No Name Overlook) and the 0.5 km (0.3 mile) of the Tusayan Museum access road would also be rehabilitated. Approximately 8.2 km (5.1 miles) of the south entrance road between the Park boundary and the turn-off to Desert View would be rehabilitated.

Road rehabilitation would consist of pulverizing the existing pavement and resurfacing with new pavement. In a few locations, where the roadway is in better condition, rehabilitation would consist of spot repair followed by overlay of the existing surface. Asphalt would be placed to provide a consistent lane width of 3.4 m (11 feet) and a shoulder width of 0.6 m (2 feet), where feasible. Where 2-foot wide shoulders are not feasible, 0.3-m (1-foot) shoulders would be created. These activities may result in the widening of the road in some areas by as much as 0.6 m (2 feet). At the eastern Park boundary, the existing parking area at the entrance sign would be enlarged to accommodate six passenger vehicles and one RV or bus. The entrance sign would also be replaced. Where parking areas are rehabilitated, provisions would be made for handicapped access. All work would occur within the existing roadway prism (area disturbed by earlier roadway construction).

MITIGATION MEASURES

Mitigation measures have been designed to minimize, reduce, or eliminate impacts of the proposed activities. These mitigation measures incorporate those developed through a batch consultation with USFWS for all construction activities within the Park (NPS 2002a). The following mitigation measures would be incorporated into all action alternatives.

Contractor Orientation. Contractors working in the Park are given orientation concerning proper conduct of operations. This orientation is provided in both written form and verbally at a preconstruction meeting. This policy will continue on proposed projects. Orientation topics will include:

- Wildlife should not be approached or fed.
- Collecting of any Park resources, including plants, animals, and historic or prehistoric materials, is prohibited.
- Contractor must have a safety policy in place and follow it.
- 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 will be implemented to minimize the area affected by construction activities.

- The staging area for the construction office (a trailer), construction equipment, and material storage will be located in previously disturbed areas near the project site. All staging areas will be returned to pre-construction conditions once construction is complete. Standards for this, and methods for determining when the standards are met, will be developed in consultation with the Park Restoration Biologist.
- Construction zones will be fenced with construction tape, snow fencing, or some similar material before any construction activity. The fencing will define the construction zone and confine activity to the minimum area required for construction. All protection measures will be clearly stated in the construction specifications, and workers will be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

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

- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods will be used to minimize any potential soil erosion.
- Any trenching operations will be by rock saw, backhoe, trackhoe, and/or trencher, with excavated material side-cast for storage. After trenching is complete, bedding material will be placed and compacted in the bottom of the trench and the utility lines installed in the bedding material. Back filling and compaction will begin immediately after the utility lines are placed into the trench, and the trench surface will be returned to pre-construction contours. All trenching restoration operations will follow guidelines approved by Park staff. Compacted soils will be scarified and original contours reestablished.
- A Salvage and Revegetation Plan will be developed for the project by a landscape architect or other qualified individual, in coordination with the Park Restoration Biologist. Any revegetation efforts will use site-adapted native species and/or native seed, and Park policies regarding revegetation and site restoration will be incorporated into the plan. The plan will consider, among other things, the use of

native species, plant salvage potential, exotic vegetation and noxious weeds, and pedestrian barriers. Policy related to revegetation will be referenced in NPS Management Policies (NPS 2001; Chapter 9).

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

- Clearing of forested areas will be limited to the immediate construction zone associated with trenching and other construction. Snow fencing (nylon webbed fencing material) will surround the established construction zone to minimize damage to vegetation and other features by construction equipment and to define access to the construction site.
- Alignment of utility corridors will be located where possible through existing open clearings in forested areas. Trench locations will be placed perpendicular to roadways to create as short a duration of viewing time for visitors to the disturbed area as possible.
- Trenching for underground utilities will be limited as much as possible to a 10-foot wide fenced construction zone. Clearing of trees and understory will be feathered to blend with natural openings in the forest canopy.
- The natural landscape as a color palette for covering metal surfaces will be used to blend these manmade features into the landscape.

Exotic Vegetation and Noxious Weeds. In order to prevent the introduction and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures will be incorporated into the action alternatives.

- Existing populations of exotic vegetation at the construction site will be treated prior to construction activities.
- All construction equipment that would leave the road (e.g., bulldozers and backhoes) will be pressure washed prior to entering the Park.
- The location of the staging area for construction equipment will be Park-approved and treated for exotic vegetation.
- Parking of vehicles will be limited to existing roads or the staging area.
- Any fill, rock, or additional topsoil needed will be obtained from a Park-approved source.
- All areas disturbed by construction will be revegetated using site-adapted native seed and/or plants.
- Monitoring and follow-up treatment of exotic vegetation will occur for 2 to 3 years after construction is completed.

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

California Condor

- Prior to the start of a construction project, the Park will 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 will 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 will 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 will be cleaned up at the end of each day that work is being conducted (i.e., trash disposed of, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park condor staff will complete a site visit to the area to ensure adequate clean-up measures are taken.
- To prevent water contamination and potential poisoning of condors, a vehicle fluid-leakage and spill plan will be developed and implemented for this project. This plan will be reviewed by the Park biologist for adequacy in addressing condors.
- If a new structure occurs on the rim or above tree line in other areas, there may be a need to install condor deterrent devices on the structure. This will be evaluated on a case-by-case basis by the Park wildlife biologist.
- If non-nesting condors occur within 1 mile of the project area, blasting will be postponed until condors leave or are hazed by permitted personnel.
- If condor nesting activity is known within 1 mile of the project area, then blasting activity will be restricted during the active nesting season. The active nesting season is February 1 to September 30. These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.
- If condor nesting activity is known within 0.5 mile of the project area, then light and heavy construction in the project area will be restricted during the active nesting season. The active nesting season is February 1 to September 30. These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.

Mexican Spotted Owl (MSO)

- If a construction project occurs within a Protected Activity Center (PAC) with no known nest site, then all construction activity will be restricted to the non-breeding season (September 1 – February 28). However, if the project in a PAC is at least 0.8 km (0.5 mile) from known nest sites and the project does not include blasting, then the project can be implemented during the breeding season. The breeding season is March 1 – August 31.
- If a construction project outside of PACs occurs within 1.6 km (1 mile) of a known PAC nest or roost site, the boundary of a PAC where the nest or roost site is not known, or unsurveyed restricted, protected, or predicted MSO habitat, then all

blasting in that project area will be restricted to the non-breeding season (September 1 – February 28).

- If a construction project outside of PACs occurs within 0.8 km (0.5 mile) of a known PAC nest or roost site, the boundary of a PAC where the nest or roost site is not known, or unsurveyed restricted, protected, or predicted MSO habitat, then light and heavy construction activity (as defined in NPS 2002a) in that project area will be restricted to the non-breeding season (September 1 – February 28).

Sentry Milk-vetch

- Project areas that contain sentry milk-vetch habitat will be surveyed for that species well in advance of project implementation. These areas include the Desert View to Tusayan Museum road rehabilitation project and the Park Boundary to Desert View road rehabilitation project. The specific survey schedule will be developed in consultation with the Park biologist and will likely take place during the summer of 2002. If sentry milk-vetch is found within the project area, further Section 7 consultation will be initiated with the USFWS.

Visitor Experience. The following mitigation measures will be incorporated into the action alternatives to minimize the impacts of construction activities on the visitor experience.

- Unless otherwise approved by the Park, construction activities will not occur on Saturdays, Sundays, or holidays to minimize disruption to visitors during peak days.
- Traffic in any one direction will not be stopped for more than 15 minutes to minimize disruption to traffic flow.
- Unless otherwise approved by the Park, construction activities will be restricted to 8:00 am to 6:00 pm in the summer (May 1- September 30) and to 9:00 am to 5:00 pm during the rest of the year.

Cultural Resources. In order to minimize the impacts of construction activities on cultural resources, the following mitigation measures will be incorporated into the action alternatives.

- NPS archaeologists have completed surveys for archaeological resources within the area of proposed construction. Approved data recovery excavations of all archaeological sites identified in the project area anticipated to be impacted by project construction will be carried out prior to development activities. The NPS will consult with the Arizona State Historic Preservation Office and concerned Native American tribal officials regarding appropriate mitigation requirements. Consultation will be carried out in accordance with regulations of the Advisory Council On Historic Preservation implementing Section 106 of the National Historic Preservation Act, and the 1995 Programmatic Agreement regarding the GMP EIS for Grand Canyon National Park (NPS 1995b). Mitigation will consist of archaeological data recovery excavations in accordance with approved federal and state standards and guidelines. Archaeological monitoring during construction may also be recommended as a further mitigation measure.

- Should presently unidentified archeological resources be discovered during the course of the project, work in that location will stop until the resources are properly recorded by an NPS archeologist and evaluated under the eligibility criteria of the National Register of Historic Places. If (in consultation with the Arizona State Historic Preservation Office) the resources are determined eligible, appropriate measures will be implemented either to avoid further resource impacts or to mitigate their loss or disturbance. In compliance with the Native American Graves Protection and Repatriation Act of 1990, the NPS will also notify and consult concerned tribal representatives for the proper treatment of human remains, funerary and sacred objects should these be discovered during the course of the project.

- All undertakings affecting historic buildings and structures will be carried out in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (60 FR 35842-35844) and other applicable NPS cultural resources policies and guidelines.

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

- If the contractor chooses to locate an asphalt or concrete batch plant within the park, it will use propane, rather than diesel fuel.
- To reduce entrainment of fine particles from hauling material, sufficient freeboard will be maintained and loose material loads (aggregate, soils, etc.) will be tarped if transported across Desert View Drive (South Entrance to Desert View).
- To reduce tailpipe emissions, construction equipment will not be left idling any longer than is necessary for safety and mechanical reasons.
- To reduce construction dust in the short term, water will be applied to problem areas. Equipment will be limited to the fenced project area to minimize soil disturbance and consequent dust generation.
- Landscaping and revegetation will control long-term soil dust production. Mulch and the plants themselves will stabilize the soil and reduce wind speed/shear against the ground surface.

Water Quality. To minimize potential impacts to water quality, the following mitigation measures will be incorporated into the action alternatives.

- A storm water pollution prevention plan (SWPPP) will be developed by the contractor and approved by the Park prior to any ground-disturbing activities. All National Pollutant Discharge Elimination System (NPDES) requirements will be met.
- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods will be used to minimize any potential sediment delivery to streams.

ALTERNATIVE A – NO ACTION

The No-Action Alternative would maintain the existing condition at Desert View (Figure 2) and provides the baseline for comparison of the action alternatives. The existing 140-vehicle parking lot would remain with overflow parking continuing to occur on Desert View Drive. No bypass road would be constructed and the entrance station would remain in the same location. Visitor services would remain the same with limited orientation. No transit facilities would be provided at Desert View, requiring visitors to drive to other destination points along the South Rim. No rehabilitation of roadways and parking areas would occur along Desert View Drive or the south entrance road.

ALTERNATIVE B - GMP

Alternative B would carry out the changes to the Desert View area as outlined in the General Management Plan (see Figure 3). Many of the changes are discussed above and are applicable to both action alternatives. The following areas of the GMP are different from the Proposed Action. These differences are summarized in Table 2-1.

Parking Lot. When funding for the parking lot is secured, the entire 2.9-ha (7.3-acre) parking lot would be constructed.

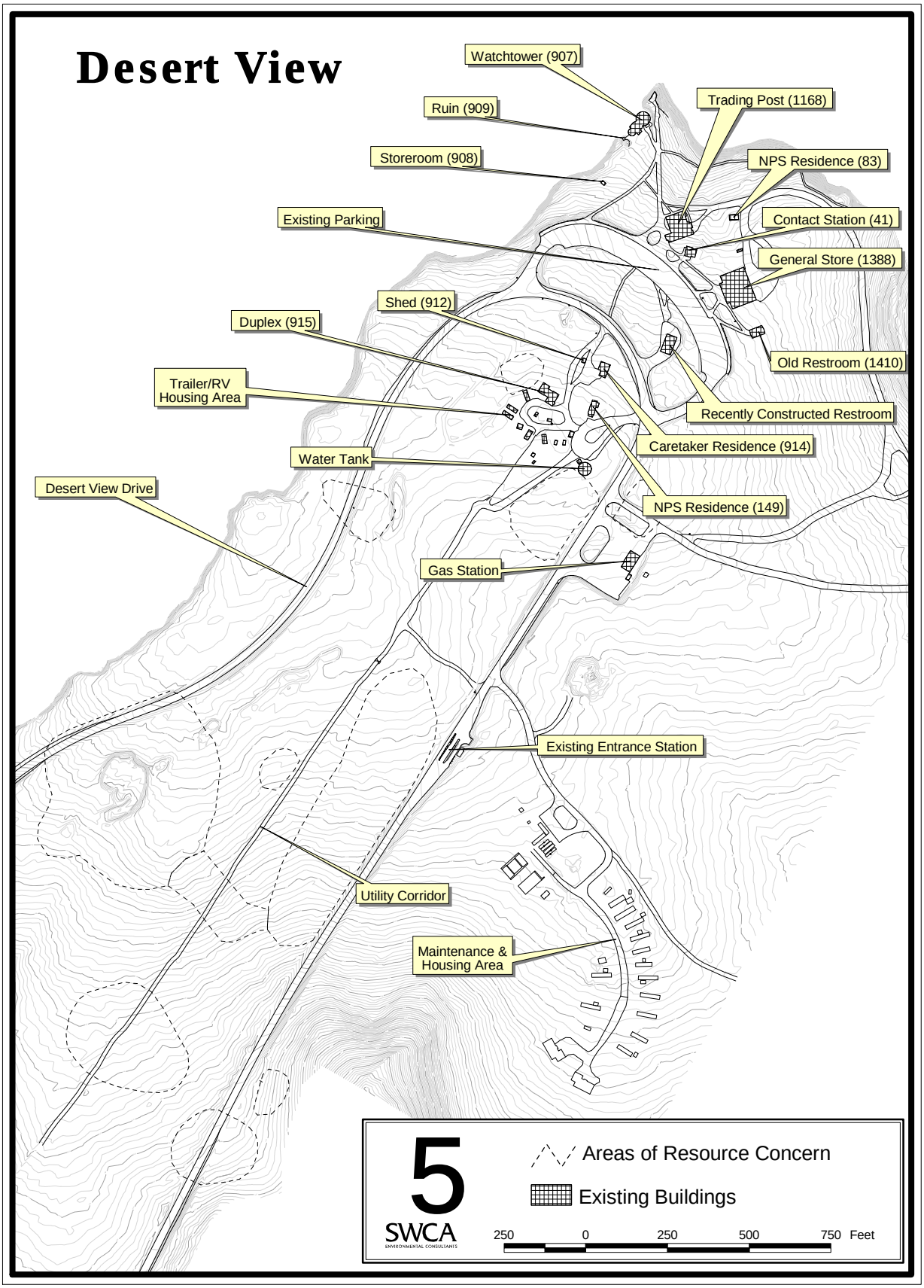

Figure 2. Existing Facilities at Desert View.

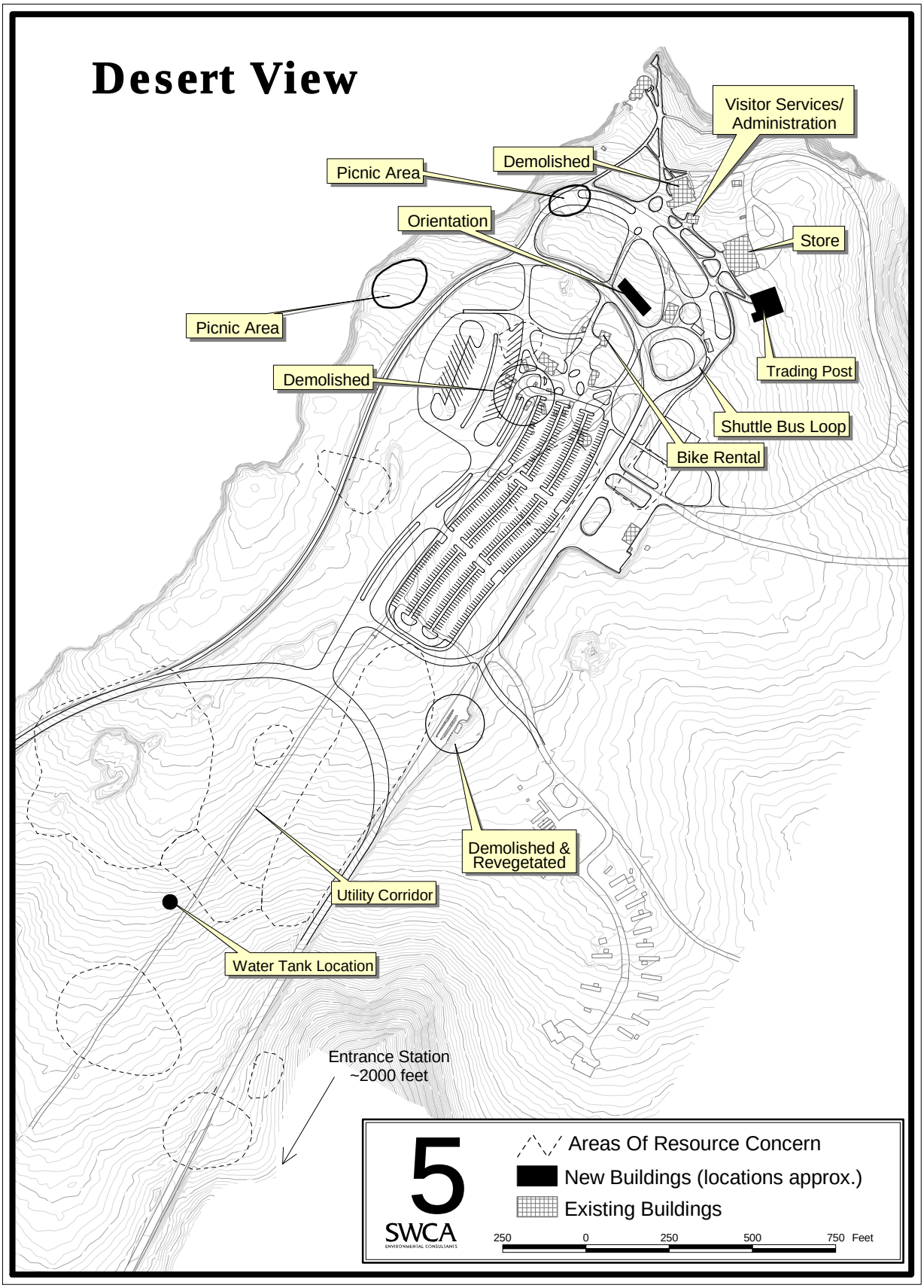

Figure 3. Improvements at Desert View under the General Management Plan.

Entrance Station. The entrance station would be relocated to an area on Arizona Highway 64 between Desert View and the Park boundary. The location of this new entrance station would be south of the road leading to the Desert View Quarry, approximately 1.2 km (0.75 mile) south of the existing entrance station. Approximately 1,200 m (3,936 feet) of new utility lines serving the new entrance station would be routed underground along the road. The trench would be 1 m (3 feet) wide, and the utility corridor would be 3 m (10 feet) wide to accommodate equipment and sidecast materials. The existing entrance station booths would be removed and the area revegetated.

Orientation Facility. A small building would be constructed for visitor orientation on the east side of the existing parking area. The building would be constructed to minimize any visual obstructions of the Watchtower and to keep the rim as the primary focus for visitors. This facility would provide general trip planning and transit information, small-scale exhibits, cooperating association book sales, phones for reservations, restrooms, and a 24-hour information kiosk.

Bike Rental Facility. A small, historic house north of the gas station would be adaptively reused as a bike rental shop.

Picnic Facilities. Two picnic areas would be constructed along the rim. The proposed picnic areas would total approximately 0.4 ha (1 acre).

Trading Post. The Watchtower, which would primarily be a rest and interpretive area, would offer very limited food and drink service and a small gift shop. The Trading Post would be moved to a new building southeast of the General Store (Building No. 1388), either in the existing parking lot or in adjacent disturbed areas. The existing Trading Post building (No. 1168) would be demolished.

Tram. No tram is proposed under the GMP.

Store. The General Store would remain in its current location in Building No. 1388.

Heli-pad. The existing heli-pad, which is off Desert View Drive approximately 1.5 km (0.9 mile) south of Desert View, would remain in use. No heli-pad would exist at Desert View.

ALTERNATIVE C – PROPOSED ACTION

Alternative C was designed by the value analysis team as a refinement of the plans outlined in the GMP. The majority of the proposed changes at Desert View are discussed above and are applicable to both action alternatives. The following areas of the Proposed Action are different from the GMP. These differences are summarized in Table 2-1, and this alternative is shown in Figure 4.

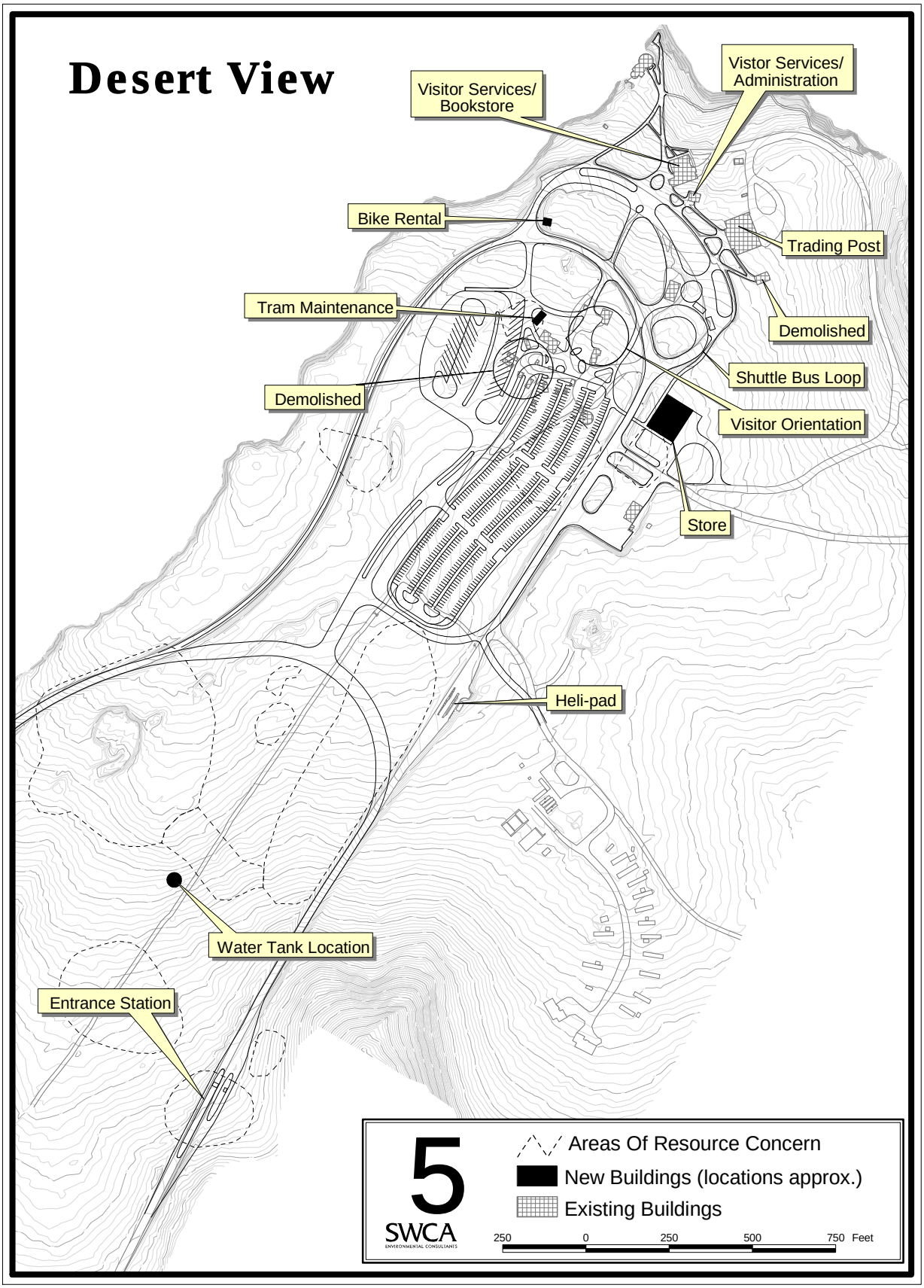

Figure 4. Improvements at Desert View under the Proposed Action.

Parking Lot. The bus and RV parking area and approximately two-thirds (1.3 ha [3.3 acres]) of the passenger car parking area would be constructed initially. If the parking lot proves to be inadequate to accommodate future visitation at Desert View, the remainder of the lot would be constructed when needed.

Entrance Station. The proposed entrance station would be located approximately 0.4 km (0.25 mile) south of the existing entrance station. Utilities for the entrance station would be located underground and would connect to the new water tank and adjacent utilities north of the proposed location for the entrance station. These utilities would include electricity, communications/data, and water lines. Utilities would be installed in approximately 305 m (1,000 feet) of trench. The trench would be 1 meter (3 feet) wide, and the utility corridor would be 3 m (10 feet) wide to accommodate equipment and sidecast materials. Where the utility corridor passes through wooded areas, the route of the trench would be designed to avoid trees and eliminate sight lines. An approximately 2,840-liter (750-gallon) septic tank and an approximately 18.6-square-meter (200-square-foot) leach field would serve the restroom facilities at the entrance station. A propane tank would be located near the entrance station and underground lines would provide propane to the buildings.

Orientation Facility. Space surrounding three existing structures at the north end of the proposed parking area would be converted to an orientation plaza with 24-hour information and interpretive kiosks. The existing structures would be adaptively reused for administrative/management support and possibly restrooms. Alternatively, a new restroom may be constructed nearby. One of the existing structures that would be adaptively reused is a historic house that needs to be retained because it contributes to the historic setting of Desert View. Converting these structures to visitor or administrative/management facilities would entail modifications for accessibility, upgrade of utilities, and upgrade of interior and exterior finishes. Utilities would be rerouted underground. The existing Trading Post would also be converted to visitor services and a Grand Canyon Association (GCA) bookstore. The existing contact station would be adaptively reused for visitor services or administrative support.

Bike Rental Facility. A bike rental facility would be provided at Desert View. An existing building would be adaptively reused as the bike rental facility, or a new facility would be constructed at the current intersection of Desert View Road and the west exit of the current parking lot. The facility would consist of a building and open-air structures. Utilities would be connected to the bike rental facility and could include electricity, communications/data, water, and sewer.

Picnic Facilities. Picnic tables would be dispersed throughout the pedestrian area between the new parking lot and the Watchtower.

Trading Post. The proposed action alternative would relocate the gift shop/deli to the facility that currently houses the General Store. A new building would be constructed to house the store, and the existing Trading Post building would be converted to visitor services and a GCA bookstore.

Tram. A small, electric tram would traverse a one-way loop around the perimeter of the parking lot and to stops near the transit shelter and the walkway to the Watchtower. The path for the tram would be approximately 12 feet wide to accommodate both the tram and pedestrians safely. The tram would accommodate approximately 12 passengers. A maintenance building for the tram would be needed. A new building would be constructed in the vicinity of the new bus parking (see Figure 4) and would occupy approximately 49 square meters (525 square feet), one of the existing buildings (Building No. 915) would be adaptively reused for tram maintenance, or Building No. 915 would be replaced with a building of similar footprint and size that would be used for tram maintenance.

Store. A new building would be constructed between the proposed shuttle bus loop and the existing gas station to house the General Store. A service road would be constructed extending from the existing service road behind DNPS to the new building. Walkways would be constructed from the transit and pedestrian area to the new building. Utilities would be connected to the new store and could include electricity, communications/data, water, and sewer.

Heli-pad. The location of the existing entrance station booths would be converted to a helicopter landing pad. This heli-pad would be used only for emergencies

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Four additional alternatives, which considered various configurations of the parking lot and roads at Desert View, were eliminated from detailed study because they did not meet the purpose and need of accommodating visitor use safely while minimizing resource conflicts. These alternatives were dismissed because of the large area affected, loss of a park-like atmosphere, potential hazards associated with the proximity of vehicle and pedestrian traffic to the gas station, and confusing traffic patterns.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ. The CEQ provides direction that "[t]he environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101:"

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;

- 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;
- Achieve a balance between population and resource use that will permit high standard of living and a wide sharing of life's amenities; and
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depleted resources.

NPS policy requires identification of an environmentally preferred alternative. Alternative C is the environmentally preferred alternative for the following reasons:

- The action alternatives (Alternatives B and C) would provide safer and more aesthetically pleasing conditions for visitors to Desert View than would Alternative A.
- Alternative C would allow visitors using the widest variety of modes of transportation (bicycles, passenger vehicles, buses, RVs) to use Desert View with the fewest conflicts.
- Alternative C would result in greater visitor safety at the entrance station than would Alternative B.
- Alternative C would produce fewer undesirable consequences (garbage thrown over the rim) than would Alternative B.
- Alternative C would provide the greatest safety to visitors through the existence of an electric tram and a nearby heli-pad.
- Alternative C makes more use of existing buildings, adaptively reusing more of the buildings and calling for less new construction than Alternative B.
- Alternative C is more flexible than Alternative B because it proposes to construct the parking lot in phases. If additional parking is not needed after the initial construction, it will not be built.

ALTERNATIVES AND PROJECT OBJECTIVES

The objectives of the action are described in Chapter 1 and summarized here: 1) Accommodate present and anticipated future visitation at Desert View while minimizing resource impacts and conflicts; 2) Alleviate problems with existing conditions – facilities at Desert View are crowded, creating an unsafe environment, degrading visitor experience, and impacting natural and cultural resources in the vicinity; and 3) Return roadways to or maintain roadways in a serviceable condition.

The proposed action clearly addresses each of these objectives. Table 2-1 displays alternative components and compares the ability of the alternatives to meet the project objectives. Table 2-2 is a comparative summary of the environmental impacts among the no-action and action alternatives.

Table 2-1. Summary of Alternative Components.

Component	No Action	General Management Plan	Proposed Action
Realignment of Desert View Drive	The existing roadway would remain in use.	The roadway would be moved away from the rim.	Same as GMP
Parking Lot	The existing parking lot, which accommodates 140 vehicles, would remain in use.	A new parking lot would be constructed and would accommodate 430 cars, 22 RVs, and 15 buses.	A new parking lot would be constructed and would accommodate approximately 287 cars, 22 RVs, and 15 buses. An additional 143 passenger car spaces would be constructed if needed by future visitation.
Entrance Station	The existing entrance station would remain in use.	The entrance station would be relocated along Arizona Hwy 64 approximately 1.2 km (0.75 mile) south of the existing entrance station.	The entrance station would be relocated along Arizona Hwy 64 approximately 0.4 km (0.25 mile) south of the existing entrance station.
Removal of Structures West of Existing Water Tank	No structures would be removed.	Structures located in the area of the proposed parking lot would be demolished or relocated.	Same as GMP
Shuttle Loop and Transit Shelter	No shuttle loop or transit shelter would be constructed.	A shuttle bus loop and transit shelter would be constructed near the east end of the existing parking lot.	Same as GMP
Orientation Facility	Existing facilities would be maintained.	A new orientation facility, including restrooms, would be constructed on the east side of existing parking area.	Several existing structures would be adaptively reused for visitor services and/or administrative support. Adaptive reuses may include restroom facilities or a new restroom may be constructed nearby. An orientation plaza with interpretive kiosks would be created in the vicinity of the existing structures.
Visitor Services / Management Support Building	Existing facilities would be maintained.	The existing contact station would be converted to a visitor services or management support building.	Same as GMP.
Bike Rental Facility	No bike rental facility would exist.	A historic house north of the gas station would be converted to a bike rental facility.	A new bike rental facility would be constructed at the current intersection of Desert View Road and the west exit of the parking lot, or an existing building would be adaptively reused as a bicycle rental facility.
Picnic Facilities	No picnic facilities would exist.	Two picnic areas would be constructed along the rim.	Dispersed picnic facilities would be installed throughout the plaza / pedestrian area, away from the rim.
Trading Post	The existing Trading Post would remain in use.	The Watchtower would offer limited food and drink service and a small gift shop. A new building to house the Trading Post would be constructed southeast of the General Store. The existing Trading Post would be demolished.	A new building would be constructed for the General Store, and the Trading Post would be moved to the existing General Store building. The existing Trading Post would be converted to a visitor service center and GCA bookstore.

Table 2-1. Summary of Alternative Components.

Component	No Action	General Management Plan	Proposed Action
Existing Restroom	Existing restrooms would remain in use.	An existing restroom adjacent to the General Store would be demolished.	Same as GMP
Pedestrian Area	No pedestrian area would exist.	The existing parking lot would be converted to a pedestrian and landscape area.	Same as GMP
Trails	Existing trails would not be improved.	Existing social trails along the rim in both directions from Desert View would be formalized and improved.	Same as GMP
Utilities	Utility lines would remain overhead.	Existing electric and telephone overhead utility lines would be relocated underground.	Same as GMP
Propane Tank	The existing propane tank would remain in use.	An existing propane tank would be removed and replaced with individual tanks adjacent to buildings requiring propane service.	Same as GMP
Water Tank	Existing water tank would remain in use.	A new water tank and associated buildings would be constructed south of the road bypass. The old water tank and associated buildings would be destroyed.	Same as GMP
Communications Mast	The existing antenna would remain in use.	A new communications mast would be constructed near the new water tower. The existing antenna would be demolished.	Same as GMP
Staging Area and Batch Plant	No staging area or batch plant would exist.	A staging area, possibly including a concrete or asphalt batch plant, would be located in a previously disturbed area.	Same as GMP
Road Rehabilitation	No road improvements would be made.	Four segments of road totaling approximately 28.8 km (18 miles) would be resurfaced.	Same as GMP
Tram	No tram would be used.	No tram would be used.	An electric tram would ferry visitors from the parking lot to the shuttle bus stop and the pedestrian area. A small maintenance building would be constructed for the tram or an existing building would be adaptively reused for tram maintenance.
General Store	The General Store would remain in its current location.	The General Store would remain in its current location.	A new building to house the General Store would be constructed between the proposed shuttle bus loop and the existing gas station.
Heli-pad	No heli-pad would exist at Desert View. The existing heli-pad off Desert View Drive approximately 1.5 km (0.9 mile) south of Desert View would remain in use.	No heli-pad would exist at Desert View. The existing heli-pad off Desert View Drive approximately 1.5 km (0.9 mile) south of Desert View would remain in use.	A heli-pad would be constructed at the site of the existing entrance station. This heli-pad would be used only for emergencies. The existing heli-pad off Desert View Drive approximately 1.5 km (0.9 mile) south of Desert View would remain in use.

Table 2-1. Summary of Alternative Components.

Component	No Action	General Management Plan	Proposed Action
Accomplishment of Project Objectives	Does not accomplish project objectives.	Accomplishes all project objectives.	Accomplishes all project objectives.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	General Management Plan	Proposed Action
Soils	Construction of existing facilities has resulted in minor, long-term, adverse, site-specific, direct impacts to the soil resource through compaction and displacement. Cumulative impacts may be minor, adverse, site-specific, and long-term; and negligible, beneficial, local, and long-term. Adverse, cumulative impacts would consist of compaction and displacement on approximately 38 ha (95 acres).	Impacts would consist of compaction and displacement of 6.3 ha (15.8 acres) of soil at Desert View and a possible reduction in the creation of social trails. These impacts would be minor, adverse, long-term, and site-specific and negligible, long-term, local, and beneficial. Cumulative impacts would include compaction and displacement of approximately 45 ha (110 acres) of soil in the vicinity of Desert View and a possible decrease in the creation of social trails. Cumulative impacts would be similar to direct and indirect impacts.	Direct impacts would consist of compaction and displacement of 5.7 ha (14.3 acres) of soil at Desert View and a possible reduction in the creation of social trails. An additional 0.6 ha (1.5 acres) may be affected if future visitation requires additional parking. These impacts would be minor, adverse, long-term, and site-specific and negligible, long-term, local, and beneficial. Cumulative impacts would include compaction and displacement of approximately 45 ha (110 acres) of soil in the vicinity of Desert View and a possible decrease in the creation of social trails. Cumulative impacts would be similar to direct and indirect impacts.
Visual Resources	Existing conditions have resulted in moderate, adverse, site-specific, long-term impacts to the visual resource. No additional impacts to visual resources would result from the No-Action Alternative. Cumulative impacts would be adverse, moderate, site-specific, and long-term.	Direct impacts would be minor, long-term, adverse, and site-specific and moderate, long-term, beneficial, and site-specific. Beneficial impacts would include greater visual organization. Cumulative impacts would be minor, adverse, site-specific, and long-term.	Same as GMP.
Biotic Communities	Existing conditions have resulted in minor, adverse, site-specific, long-term impacts to biotic communities, including the loss of approximately 30 ha (75 acres) of juniper/big sagebrush/pinyon pine habitat. Indirect impacts would be minor, site-specific, long-term changes as the result of natural maturing of the vegetative community. These impacts may be both adverse and beneficial. Cumulative impacts would be negligible or minor, local, and long-term and may consist of both adverse and beneficial effects. These impacts would include the loss of about 38 ha (95 acres) of juniper/big sagebrush/pinyon pine habitat and a decrease in the formation of social trails.	Direct impacts would include the loss of 6.3 ha (15.8 acres) of juniper/big sagebrush/pinyon pine habitat. Cumulative impacts would include the loss of about 45 ha (110 acres) of this habitat. Direct and cumulative impacts to the biotic community would be adverse, long-term, local or site-specific, and minor or negligible because of the existing degraded condition of the impacted habitat and the ubiquity of this community type. Cumulative impacts may also consist of beneficial, local, negligible, long-term effects.	Direct impacts would include the loss of 5.7 ha (14.3 acres) of juniper/big sagebrush/pinyon pine habitat. An additional 0.6 ha (1.5 acres) may be lost if future visitation requires additional parking. Cumulative impacts would include the loss of about 45 ha (110 acres) of this habitat. Direct and cumulative impacts to the biotic community would be adverse, long-term, local or site-specific, and minor or negligible because of the existing degraded condition of the impacted habitat and the ubiquity of this community type. Cumulative impacts may also consist of beneficial, local, negligible, long-term effects.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	General Management Plan	Proposed Action
Exotic Vegetation and Noxious Weeds	Impacts would be adverse, minor, local, and long-term and would include the continued spread of existing populations of exotic vegetation. Past, present, and foreseeable future projects would result in the disturbance of about 38 ha (95 acres) of ground in the Desert View area. This would increase the potential for the introduction of exotic vegetation. Mitigation measures implemented for all construction projects would ensure that adverse cumulativeimpacts would be minor, local, and long-term.	Approximately 6.3 ha (15.8 acres) of ground would be disturbed at Desert View. This would increase the potential for the introduction of exotic vegetation. Road rehabilitation in previously disturbed areas would have the potential to spread populations of exotic vegetation. Cumulative impacts would include disturbance of approximately 45 ha (110 acres). Mitigation measures implemented for all construction projects would ensure that adverse impacts on exotic vegetation would be long-term, minor, and local.	Approximately 5.7 ha (14.3 acres) of ground would be disturbed at Desert View. An additional 0.6 ha (1.5 acres) may be disturbed in the future if increased visitation requires additional parking. Ground disturbance would increase the potential for the introduction of exotic vegetation. Road rehabilitation in previously disturbed areas would have the potential to spread populations of exotic vegetation. Cumulative impacts would include disturbance of approximately 45 ha (110 acres). Mitigation measures implemented for all construction projects would ensure that adverse impacts on exotic vegetation would be long-term, minor, and local.
Special Status Species – Mexican Spotted Owl	The No-Action Alternative would have negligible, adverse, long-term, local effects on potential foraging habitat for the spotted owl. Cumulative impacts would include the loss of about 38 ha (95 acres) of low-quality foraging habitat. These adverse impacts would be negligible, local, and long-term. Noise disturbance to nesting and roosting areas would be minor to moderate, adverse, local, and short- and long-term and would be reduced by seasonal restrictions on construction within 0.8 km (0.5 mile) of occupied or unsurveyed habitat.	No direct impacts would occur to nesting or roosting habitat. About 6.3 ha (15.8 acres) of low-quality foraging habitat would be removed. Cumulative impacts would include the loss of 45 ha (110 acres) of low-quality foraging habitat. These adverse impacts would be negligible, local, and long-term. Noise disturbance to nesting and roosting areas would be minor to moderate, adverse, local, and short- and long-term and would be reduced by seasonal restrictions on construction within 0.8 km (0.5 mile) of occupied or unsurveyed habitat.	No direct impacts would occur to nesting or roosting habitat. About 5.7 ha (14.3 acres) of low-quality foraging habitat would be removed. An additional 0.6 ha (1.5 acres) may be removed in the future if increased visitation requires additional parking. Cumulative impacts would include the loss of 45 ha (110 acres) of low-quality foraging habitat. These adverse impacts would be negligible, local, and long-term. Noise disturbance to nesting and roosting areas would be minor to moderate, adverse, local, and short- and long-term and would be reduced by seasonal restrictions on construction within 0.8 km (0.5 mile) of occupied or unsurveyed habitat.
Special Status Species – California Condor	Adverse impacts of Alternative A on the California condor would be negligible, short- and long-term, and local. Cumulative impacts would be adverse, local, negligible, and short- and long-term and would consist of increased possibilities of condor/human interactions.	No direct or indirect impacts to nesting, roosting, or foraging habitat are expected. Construction would cause a short-term increase in the likelihood of human/condor interactions. Cumulative impacts would consist of both long and short-term increases in the likelihood of human/condor interactions. All adverse impacts would be negligible and local because of standard mitigation measures employed with all construction projects.	Same as GMP

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	General Management Plan	Proposed Action
Special Status Species – American Peregrine Falcon	Impacts of Alternative A on the American peregrine falcon would be adverse, negligible, local, and long-term. Cumulative impacts would be adverse, local, long-term, and minor to moderate and would consist of possible noise disturbance in nesting and roosting habitat and the loss of about 38 ha (95 acres) of habitat for prey species.	No direct impacts are expected. Indirect impacts would be adverse, long-term, local, and negligible and would consist of the removal of about 6.3 ha (15.8 acres) of habitat for prey species. Adverse cumulative impacts would be short- and long-term and local and would consist of possible minor to moderate noise disturbance in nesting and roosting habitat and the negligible loss of about 45 ha (110 acres) of habitat for prey species.	No direct impacts are expected. Indirect impacts would be adverse, long-term, local, and negligible and would consist of the removal of about 5.7 ha (14.3 acres) of habitat for prey species. An additional 0.6 ha (1.5 acres) may be removed in the future if increased visitation requires additional parking. Adverse cumulative impacts would be short- and long-term and local and would consist of possible minor to moderate noise disturbance in nesting and roosting habitat and the negligible loss of about 45 ha (110 acres) of habitat for prey species.
Special Status Species – Sentry Milk-vetch	The continuation of current Park activities and policies at Desert View may have minor to moderate, adverse, site-specific, long-term effects on the sentry milk-vetch. Adverse cumulative impacts from foreseeable future development would be long-term, site-specific, and negligible because surveys for sentry milk-vetch would be completed in all project areas prior to construction. There may also be minor, beneficial, local, long-term, cumulative impacts because of reduced foot traffic in potential habitat.	Alternative B would result in road rehabilitation and trail improvements in potential habitat for the sentry milk-vetch. Pre-construction surveys for sentry milk-vetch would ensure that adverse direct impacts would be negligible, site-specific, and long-term. Indirect impacts of trail improvement could include a minor, long-term, beneficial, local impact of less foot traffic in potential habitat. Adverse cumulative impacts would be long-term, site-specific, and negligible because surveys for sentry milk-vetch would always be completed prior to construction.	Same as GMP
Visitor Experience	Existing conditions would remain and impacts would be moderate, long-term, local, and both adverse and beneficial. Desert View would continue to provide visitor services, but conditions would remain crowded and unsafe during peak visitation. Cumulative impacts would be beneficial, minor, local, and long-term and would include improved transportation services.	Alternative B would have moderate, beneficial, long-term, local effects on the visitor experience by providing adequate, safe parking and improving the visitor services at Desert View. There would also be minor, adverse, short-term, local effects caused by traffic delays and minor, adverse, long-term, local effects caused by an unsafe entrance station, the long walk from the parking lot to the rim, conflicts between pedestrians and bicyclists, and trash thrown over the rim. Cumulative impacts from foreseeable future actions would be minor, beneficial, local, and long-term and would include reduced traffic along the South Rim.	Alternative C would have moderate, beneficial, long-term, local effects on the visitor experience by providing adequate, safe parking and improving the visitor services at Desert View. There would also be minor, adverse, short-term, local effects caused by traffic delays. Cumulative impacts from foreseeable future actions would be minor, beneficial, local, and long-term and would include reduced traffic along the South Rim.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	General Management Plan	Proposed Action
Cultural Resources	The No-Action Alternative would have adverse and beneficial, site-specific, long-term, moderate impacts to cultural resources. Increasing visitor use poses a risk that cultural resources and qualities contributing to the historic landscape may be disturbed or diminished. Cumulative impacts to the historic district would be moderate, adverse, long-term, and site-specific. Appropriate mitigation would ensure that cumulative impacts on archaeological resources would be minor.	This alternative would have long-term, moderate, beneficial, site-specific impacts on the Desert View Watchtower Historic District by removing non-contributing buildings, adaptively reusing and rehabilitating contributing buildings, and providing a landscaped buffer area enhancing the setting of the Watchtower. Although historic circulation patterns would be altered, the spatial orientation of the site would remain largely intact, and adverse impacts on the cultural landscape would be minor, site-specific, and long-term. There would be no impacts to known ethnographic resources and mitigation would ensure that adverse impacts to archaeological resources are minor, site-specific, and long-term.	This alternative would have long-term, moderate, beneficial, site-specific impacts on the Desert View Watchtower Historic District by removing non-contributing buildings, adaptively reusing and rehabilitating contributing buildings, and providing a landscaped buffer area enhancing the setting of the Watchtower. This alternative would adaptively reuse more buildings than Alternative C. Although historic circulation patterns would be altered, the spatial orientation of the site would remain largely intact, and adverse impacts on the cultural landscape would be minor, site-specific, and long-term. There would be no impacts to known ethnographic resources and mitigation would ensure that adverse impacts to archaeological resources are minor, site-specific, and long-term.
Park Operations	Alternative A would have minor, local, long-term, adverse effects on park operations. Cumulative impacts would be minor to moderate, local, long-term, and both beneficial and adverse. Indirect impacts would include the increased maintenance required for aging buildings. Cumulative impacts would include maintenance for an increased number of facilities and decreased maintenance as the result of improvements to the wastewater treatment plant.	Alternative B would directly affect park operations by adding new facilities and replacing existing facilities with in-kind new facilities. Cumulative impacts would include maintenance for an increased number of facilities and decreased maintenance as the result of improvements to the wastewater treatment plant. Direct and cumulative effects would be long-term, moderate, local, and both beneficial and adverse.	Alternative C would directly affect park operations by adding new facilities and replacing existing facilities with in-kind new facilities. Cumulative impacts would include maintenance for an increased number of facilities and decreased maintenance as the result of improvements to the wastewater treatment plant. Direct and cumulative effects would be long-term, moderate, local, and both beneficial and adverse.

CHAPTER 3 - AFFECTED ENVIRONMENT

Grand Canyon National Park encompasses 480,000 ha (1.2 million acres) in northern Arizona. Desert View is located within the southeastern portion of the Park along the south rim of the Grand Canyon about 53 km (33 miles) northwest of Cameron, Arizona. Desert View serves as the east entrance to the Park and is the first development that visitors encounter when entering the Park from the east. Desert View Drive runs from the eastern Park boundary northwest to Desert View and then generally west to Grand Canyon Village. Elevation of the project area varies from 6,700 feet at the south entrance to approximately 7,400 feet between MP 247 and MP 253 along Desert View Drive and at Desert View.

SOILS

Desert View, Desert View Drive, and the south entrance road are on the Coconino Plateau, which is capped by the Kaibab Formation. The Kaibab Formation is a Permian age marine deposit and consists of the Harrisburg and the Fossil Mountain members. In the vicinity of the South Rim, the Kaibab Formation consists of sandstones, redbeds, chert, dolomite, and some limestone (NRCS 2000). Soils at Desert View and along the South Rim tend to be shallow, poorly developed, and stable and are generally characterized by high infiltration capacity, low moisture holding capacity, and low soil fertility (NPS 1995a). Existing development in the vicinity of Desert View has resulted in the compaction and/or displacement of approximately 30 ha (75 acres) of soil.

VISUAL RESOURCES

Visual character of the landscape beyond the rim at Desert View is typical of the Kaibab Plateau, a rolling plateau of Great Basin conifer woodland occasionally cut by shallow, dry drainages. These drainages are ephemeral streams that tend to expose rock outcrops, which exhibit desert varnish, a visual feature unique to the region. The spatial qualities of the Desert View area are defined by open woodland of mature pinyon and juniper trees averaging 6.1 to 9.1 m (20 to 30 feet) in height scattered across the landscape to the edge of the rim. The visual quality would be considered moderately high, based on the degree of topographic relief and landform diversity, without any disturbance. However, the Desert View project area has been impacted by roads, buildings, and other uses that have created areas of disturbance within the open woodland. Overhead utilities, parking areas, and a variety of buildings of divergent architectural styles have been introduced into the landscape. The visual quality of the area now would be considered urbanized, with moderately low to low visual quality. The exception would be the Watchtower, a visual and historic landmark, and the views from the rim into the Grand Canyon.

BIOTIC COMMUNITIES

The major vegetation types along the South Rim of the Grand Canyon are Great Basin conifer woodland and Rocky Mountain conifer forest. The primary vegetation type in the vicinity of Desert View is Great Basin conifer woodland, dominated by juniper (*Juniperus osteosperma*), big sagebrush (*Artemisia tridentata*), and pinyon pine (*Pinus edulis*). Total cover is generally 20 to 50 percent and the diversity of understory species is very low. Typical understory species include blue grama (*Bouteloua gracilis*), bluegrass (*Poa* sp.), snakeweed (*Gutierrezia* sp.), prickly pear (*Opuntia* sp.), and rabbitbrush (*Chrysothamnus* sp). The vegetation community between MP 247 and MP 253 of Desert View Drive and along the south entrance road is a mixture of Rocky Mountain conifer forest, dominated by ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*), and Great Basin conifer woodland.

A wide variety of wildlife species use the vegetation communities along the South Rim. Common birds include Steller's jay (*Cyanocitta stelleri*), pinyon jay (*Gymnorhinus cyanocephalus*), raven (*Corvus corax*), violet-green swallow (*Tachycineta thalassina*), white-throated swift (*Aeronautes saxatalis*), hairy woodpecker (*Picoides villosus*), Lewis's woodpecker (*Melanerpes lewis*), rock wren (*Salpinctes obsoletus*), plain titmouse (*Parus inornatus*), several nuthatch species (*Sitta* spp.), mountain bluebird (*Sialia currucoides*), western bluebird (*S. mexicana*), mountain chickadee (*Parus gambeli*), common bushtit (*Psaltriparus minimus*), black-chinned hummingbird (*Archilochus alexandri*) and broad-tailed hummingbird (*Selasphorus platycercus*). Raptors include red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipiter striatus*), long-eared owl (*Asio otus*), and great horned owl (*Bubo virginianus*). Small mammals include the Abert squirrel (*Sciurus aberti*), rock squirrel (*Spermophilus variegatus*), golden-mantled ground squirrel (*Spermophilus lateralis*), pocket gopher (*Thomomys bottae*), striped skunk (*Mephitis mephitis*), deer mouse (*Peromyscus maniculatus*), pinyon mouse (*P. truei*), and voles (*Microtus* spp.). Large mammals frequently observed are mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), and coyote (*Canis latrans*). Other mammal species that are seen less frequently include mountain lion (*Felis concolor*), gray fox (*Urocyron cinereoargenteus*), Mexican long-tongued bat (*Choeronycteris mexicana*), and spotted bat (*Euderma maculatum*) (E. Leslie, NPS, pers. comm., June 2002).

Approximately 30 ha (75 acres) of juniper/big sagebrush/pinyon pine habitat have been lost at Desert View as the result of existing development. This loss of habitat and disturbance from existing developments, roads, and human use of the area have degraded the biotic community in the immediate vicinity of Desert View.

EXOTIC VEGETATION AND NOXIOUS WEEDS

Almost 160 exotic plant species are known to exist in the South Rim area of Grand Canyon National Park. Of these approximately 160 exotic plant species, ten are listed on the Arizona Department of Agriculture's noxious weed list. These species and their listed status are:

Chondrilla juncea - rush skeletonweed - prohibited,
Aegilops cylindrica - jointed goatgrass - restricted,

Alhagi camelorum - camelthorn - restricted,
Cardiara draba - white top - restricted,
Centaurea maculosa - spotted knapweed - restricted,
Linaria dalmatica - dalmation toadflax - restricted,
Onopardum acenthium - scotch thistle - restricted,
Cenchrus incertus - field sandbur - regulated,
Convolvulus arvensis - field bindweed - regulated,
Tribulus terrestris - puncture vine - regulated.

The majority of the exotic plant species that exist on the South Rim are not known to occur at Desert View, and exotic vegetation is not considered to be a major problem at Desert View. However, there is the potential that exotic vegetation could become a major problem at Desert View because of ground disturbance and increased risk of spread of noxious weeds. The majority of the exotics found at Desert View occur in previously disturbed areas and along roads. The main exotic species of concern at Desert View are Scotch thistle, Russian knapweed (*Acroptilon repens*), diffuse knapweed (*Centaurea diffusa*), and spotted knapweed. Table 3-1 lists the exotic species of concern along the road rehabilitation areas on the south entrance road and Desert View Drive.

Table 3-1. Exotic plant species of concern along south entrance road and Desert View Drive.

Scientific Name	Common Name	Present on Site	Within 50 m of Site
Top 5 high priority species			
Acroptilon repens	Russian knapweed		X
Cardaria draba	Whitetop, hoary cress		
Conium maculatum	Poison hemlock		
Linaria dalmatica	Dalmatian toadflax	X	X
Onopardum acanthium	Scotch thistle	X	X
Additional species of concern			
Aegilops cylindrica	Jointed goatgrass	X	X
Agrostis stolonifera	Redtop, bentgrass		
Bromus tectorum	Cheatgrass	X	X
Bromus inermis	Smooth brome	X	X
Centaurea maculosa	Spotted knapweed	X	X
Centaurea diffusa	Diffuse knapweed	X	X
Centaurea virgata	Squarrose knapweed		
Chondrilla juncea	Rush skeletonweed		
Conyza canadensis	Horseweed		
Convolvulus arvensis	Field bindweed	X	X
Dactylis glomerata	Orchardgrass		
Elymus repens	Quackgrass		
Erodium cicutarium	Filaree	X	X
Hordeum murinum	Rabbit barley		
Marrubium vulgare	Horehound	X	X

Table 3-1. Exotic plant species of concern along south entrance road and Desert View Drive.

Scientific Name	Common Name	Present on Site	Within 50 m of Site
Poa pratensis	Kentucky bluegrass		
Salvia aethiopis	Mediterranean sage	X	X
Sonchus asper	Spiny sow-thistle		
Sorghum halapense	Johnson grass		
Tribulus terrestris	Puncturevine		
Species not yet documented on South Rim, but spreading on surrounding lands			
Alhagi maurorum	Camelthorn		
Centaurea solstitilis	Yellow star thistle		
Cynoglossum officinale	Houndstongue		

SPECIAL STATUS SPECIES

Mexican Spotted Owl

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 the availability and quality of diverse habitats. Spotted owls typically forage at night, although diurnal foraging has also been observed.

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, in prep.). 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. The second year of surveys for these same areas will be completed in 2002.

Critical habitat for MSO was designated in 2001 and includes most of the Park except the South Rim. 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 size and extent of the MSO population at Grand Canyon is currently unknown. However, survey results suggest that MSO occupy the rugged canyonland terrain within the Grand Canyon. Detections of MSO indicate they are utilizing small stringers of Douglas-fir trees below the rim (D. Spotskey, NPS, pers. com., May 23, 2000). No MSO are known from the plateau areas of the Park.

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. Provisional Protected Activity Centers (PACs) have been designated for known MSO locations in the Park as of 2001. 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.

Potential habitat for spotted owls exists below the rim within 0.8 km (0.5 mile) of Desert View. Surveys in 2001 did not detect owls in this area. A second year of surveys is ongoing in 2002.

Portions of Desert View Drive are within 0.8 km (0.5 mile) of occupied or unsurveyed MSO habitat. Desert View Drive from 4.6 km (3.0 miles) from the eastern Park boundary to Tusayan museum is within 0.5 miles of potential MSO habitat. This area was surveyed in 2001, and no owls were found. A second year of surveys is ongoing in 2002. Almost the entire length of Desert View Drive between MP 247 and MP 253 is within 0.4 km (0.25 mile) of the provisional

Sinking Ship PAC. The portion of the south entrance road within approximately 0.3 km (0.2 mile) of the intersection with Desert View Drive is within 0.8 km (0.5 mile) of a provisional owl PAC. No other portions of the road rehabilitation projects are within 0.8 km (0.5 mile) of occupied or potential spotted owl habitat.

California Condor

The California condor (*Gymnogyps californianus*) 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 Vermilion 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 Vermilion 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 the management of the condors and other activities. Within Grand Canyon National Park, the condor has the full protection of a threatened species (NPS 1991).

The current (as of May 2002) population of free-flying condors in Arizona totaled 29. All of the California condors in northern Arizona are fitted with radio transmitters that allow field biologists to monitor the condors' movements. Condors have been observed as far west as the Virgin Mountains near Mesquite, Nevada; south to the San Francisco Peaks outside of Flagstaff, Arizona; north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah; and east to Mesa Verde, Colorado and the Four Corners region (Peregrine Fund 2000). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, and the Village to Hermits Rest. Single condors and groups of condors have been observed at Desert View multiple times.

Nesting habitat for California condors includes various types of rock formations such as crevices, overhung ledges, and potholes. Potential nesting habitat exists throughout the Park. One nesting attempt was documented in the Marble Canyon area in 2001. Two nest sites on the South Rim, one on The Battleship and one on Dana Butte, were initiated in 2002. Both nest sites failed. It is unclear whether condors would select nesting areas in close proximity to developed portions of the Park such as Desert View.

Most California condor foraging occurs in open terrain. 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 (61 FR 54043-54060).

American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) was listed as endangered in 1970. On August 25, 1999, the USFWS removed the peregrine falcon from the federal list of endangered and threatened wildlife due to its recovery. The principal cause of the peregrine's decline was chlorinated pesticides, especially DDT and its metabolite DDE, which accumulated in peregrines as a result of feeding on contaminated prey. This interfered with calcium metabolism and caused a decline in reproductive success as the result of thin eggshells.

The population of peregrine falcons in Arizona is steadily increasing. In 1991, the peregrine falcon population in the Rocky Mountain/Southwest region was 367 known pairs; in 1998, the number of pairs had increased to 535. In Arizona, the known number of peregrine falcon pairs was 159 in 1999 (64 FR 46542-46558).

Peregrine falcons generally nest on cliffs near water. However, river cutbanks, trees, and manmade structures have been used as nesting habitat (USFWS 2000). Peregrine falcons feed primarily on other birds such as songbirds, shorebirds, and waterfowl. The usual method of obtaining prey is by attacking flying birds from above or chasing them from behind.

A peregrine eyrie is located at Desert View below the rim. This pair has been known to occupy this area since 1988 and appears to be habituated to humans. This area of the Grand Canyon is difficult to access because of steep, rugged terrain and the lack of trails. The majority of Grand Canyon visitors would never access this portion of the Park. No peregrine eyries are known from within 0.8 km (0.5 mile) of any of the road rehabilitation projects.

Sentry Milk-vetch

The sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophyla*) is a long-lived mat-forming dwarf plant with a thick taproot. The short, creeping stems have compound leaves. Whitish or pale purple flowers appear from late April to early May, with seed set in late May to June. The plant grows in crevices and depressions with shallow soils, appearing to prefer unshaded, well-drained soils or limestone pavement in pinyon-juniper woodlands. Soil types, such as limestone, that retain water are critical to the growth and development of seeds. Flowers are susceptible to low temperature conditions such as frost, freezing rain, or snow. These conditions often occur simultaneously with flowering (AGFD 2000). Seeds are so small that they are not dispersed by wind or rodents but instead fall in the mat of the plant. Therefore, the population does not spread and remains isolated. This species is endemic to Grand Canyon National Park, and occurs at elevations between 7,000 and 7,100 feet on Kaibab limestone. This species can be easily confused with *A. calycosus*, a species that is much more common in the surrounding habitat.

Sentry milk-vetch was listed in 1990 as endangered, without critical habitat. A final recovery plan was released in 1994. This species is known to occur at two locations on the South Rim and one location on the North Rim of Grand Canyon. Results of population monitoring at one location have indicated substantial damage to mature plants and seedlings, likely as a result of trampling by foot traffic. Surveys of other areas with potential habitat for sentry milk-vetch in the Park are not complete. Other areas that have been identified as potential habitat include

portions of the Western Rim (Mimbreno to Mescalero, Mescalero to Jicarilla, Jicarilla to Piute, and Piute to Havasupai Point) and portions of the Eastern Rim (Buggeln to Moran, Moran to Zuni, Zuni to roadway, Papago to Lipan, Lipan to Desert View, and Desert View to Comanche Point) (N. Brian, NPS, pers. comm., February 2001). Desert View Drive from Tusayan Museum to Desert View is within potential habitat for sentry milk-vetch. Potential habitat also exists along Desert View Drive from approximately 2.8 to 4.5 km (1.8 to 2.8 miles) south of Desert View. There is no potential habitat for sentry milk-vetch along the south entrance road.

VISITOR EXPERIENCE

Desert View is located on Arizona Route 64 and serves as the east entrance to Grand Canyon National Park. For visitors utilizing the east entrance, Desert View offers the first stop for information, restrooms, water, food, souvenirs, and gasoline. In 2001, approximately 572,000 visitors entered the Park at the east entrance. About 90% of the visitors arrived in passenger cars and 10% by bus (NPS 2002b).

Desert View offers splendid views of the Painted Desert and the Little Colorado River gorge area. The Watchtower at Desert View is a major attraction and is designated a National Historic Landmark. Views from the Watchtower also take in existing facilities including the 140-vehicle parking lot, a gas station, the General Store, the Trading Post, a small NPS contact station, and a restroom. A campground, housing area, maintenance facility, and wastewater treatment facility are outside the core visitor area.

The current road alignment directs all visitors using the east entrance through the developed area of Desert View. The existing parking lot was constructed in the 1950s and was designed to accommodate 500,000 annual visitors. During the peak summer months, extreme congestion and overloading of the parking lot occur. Because of the limited parking facilities, visitors are forced to park on the shoulder of the entrance road and walk along the road, creating an unsafe condition.

A small contact station is located in a former restroom building between the General Store and the Trading Post. It contains an information desk, publications sales area, and a small lobby. About 70% of the visitors who use the information center have just entered the Park, and the remainder have journeyed from Grand Canyon Village. Most questions at the information desk relate to trip planning. However, few visitors stop at the contact station before heading to the Watchtower because of its low visibility and poor location (NPS 1995a).

Visitor experience is currently degraded by the proximity of the parking lot and Trading Post to the Watchtower and the rim. The sights, sounds, and smells of vehicles using the parking lot and bypass road impact visitors in the vicinity of the Watchtower. The Trading Post is located near the center of the northern perimeter of the parking lot. This structure along with the General Store dominates the entrance to the Watchtower and creates a gift shop atmosphere at Desert View.

Desert View Drive and the south entrance road are in need of rehabilitation to accommodate increased traffic safely. Portions of Desert View Drive have an inconsistent width, and resurfacing is needed. Road rehabilitation would improve safety for visitors on the South Rim.

CULTURAL RESOURCES

Cultural History Overview

Prehistory. Recent archaeological evidence has placed the earliest known cultural activity in the Grand Canyon area to about 8500 BC. This coincides with the Late Paleo-Indian period (ca. 9000-7000 BC), characterized by small groups of nomadic hunters who subsisted primarily on large Pleistocene mammals ("mega-fauna"). The Archaic period (ca. 7000-500 BC) followed next with highly mobile groups of hunters and gatherers dispersed over wide geographic areas. Archaic period sites found throughout the Canyon typically consist of lithic scatters, camp sites, chip stone reduction areas, limited activity areas, rock art panels, caves, and rock shelters.

Between ca. 500 BC and AD 1540, ancestral Puebloan people settled along the inner Canyon and on the North and South Rims. Cultural remains identified from the Basketmaker II & III periods (while rare in the Grand Canyon area) are indicative of semi-mobile hunting and gathering subsistence strategies. Hearths, limited activity areas, and pithouses with dispersed artifact scatters have been identified from these periods. Archaeological evidence indicates the emergence of a more sedentary and agriculturally centered culture during the later Pueblo I period (ca. AD 800-1000) and Pueblo II period (ca. AD 1000-1150). Among the archaeological resources identified with these later periods are pithouses, aboveground masonry structures (for habitation and grain storage), kivas, and agricultural features (terraces, garden plots, and check dams). Most of the Puebloan people abandoned the canyon sometime after AD 1170, with only remnant populations remaining.

Cohonina people were also present in the Grand Canyon at approximately the same time as their Puebloan neighbors. Although archaeological information regarding Cohonina activities in the Canyon is currently limited, mounting evidence suggests that they possessed a complex culture that involved foraging in the vicinity of the Canyon during the summer season. They wintered near Mt. Sitgreaves, where identified sites include pithouses, masonry room blocks, walled compounds, interior hearths, and storage areas.

Historic Period. Protohistoric and historic Native American occupation and use of the Grand Canyon area spans the period between approximately AD 1540 and 1950. The Havasupai and Hualapai were among the groups occupying the Canyon during this period. Until the late nineteenth century, the Havasupai traditionally spent their winters on the plateau of the South Rim, relocating below the rim to Cataract (Havasu) Canyon during the spring and summer months to grow crops. Historical accounts document ancestral Navajo interactions with the Havasupai during the 1600s. By the mid nineteenth century, the Navajo made extensive use of Canyon resources for subsistence and religious purposes, and continued to graze sheep, goats and horses in the vicinity into the 1930s and 40s. The Hopi, Southern Paiute, and Zuni have also at various times either occupied the Grand Canyon, procured and utilized Canyon resources,

and/or traded with the Havasupai and other groups. The Grand Canyon figures prominently in the origin/religious beliefs and ceremonial practices of these people. Traditional Hopi and Zuni beliefs hold the Grand Canyon as the sacred place from which their ancestors emerged to the present world.

The first historic Euro-American contact with the Grand Canyon and its indigenous Puebloan people began between 1540 and 1542 with the Spanish expedition led by Francisco Vásquez de Coronado. The Canyon was initially considered an impassable barrier, and the Spaniards did not revisit it for another 200 years. During the nineteenth century, trappers and United States surveyors and military expeditions passed through the area. Some sheep ranching and mining took place in the latter part of the century. However, more economically viable ranching, tourism, and lumbering operations emerged around the beginning of the twentieth century, facilitated by completion of rail transportation to the South Rim in 1901. Environmental degradation from overgrazing and lumbering led to the establishment of the Grand Canyon Forest Reserve in 1893. Efforts to provide further protection eventually resulted in the establishment of Grand Canyon National Park in 1919.

Desert View. Around 1914, as part of its tourism promotional efforts, the Atchison, Topeka & Santa Fe Railway improved an old section of stagecoach road from El Tovar to Grandview Point and Hance's Ranch. They constructed an additional eight miles of new road to Navajo Point, which the railway began to publicize as "Painted Desert View" and eventually "Desert View." A tent camp provided overnight tourist accommodations for visitors transported by horse-drawn carriage to the site. Later, in the early 1930s, the Atchison, Topeka & Santa Fe constructed permanent facilities at Desert View for the use of its long-time business partner, the Fred Harvey Company. The location then served as a rest stop for tourists brought to the area on day trips via Fred Harvey Co. touring cars and buses departing from Grand Canyon Village, 25 miles to the west.

The 70-foot tall Desert View Watchtower, designed by renowned architect Mary Colter, became the area's defining landmark. Built in 1932 as a souvenir/gift shop, lounge, and Canyon viewing structure, the Watchtower incorporated design elements recalling prehistoric Puebloan ruins. The Watchtower was also intended to harmonize with the cultural and natural environment, and in that respect also reflected the prevailing design principals of the NPS's rustic architectural style utilized throughout the National Park system during that period.

In the 1930s, the NPS extended the road from Desert View eastward to Cameron, Arizona where it connected with Highway 89. Desert View then became the eastern entrance to Grand Canyon National Park. A stone entrance station was built in 1934 (razed in 1962), and a ranger residence was built in 1936 and is still extant.

Desert View Watchtower Historic District

The Desert View Watchtower Historic District was listed on the National Register of Historic Places in 1995. The district's period of significance spans the years between 1930 and 1941. Buildings identified as contributing to the district consist of the following:

- *Desert View Watchtower (Building No. 907)* – The reinforced concrete building with exterior stone veneer consists of three principal sections: a lounge/gift shop modeled after an above-ground, single-story kiva; a five-story circular tower; and a connecting section with restrooms. A sand painting on the second floor of the tower and other wall paintings were created by noted Hopi artist Fred Kabotie. Mary Colter drew inspiration for the Watchtower's design from a number of Southwestern prehistoric sites including Cliff Palace at Mesa Verde, Hovenweep, Pueblo Bonito at Chaco Canyon, and Wupatki. The result was a "re-creation" (Colter's term) of diverse prehistoric design elements indigenous to the greater Southwest. Together with three other buildings designed by Mary Colter at Grand Canyon (Hopi House, the Lookout, and Hermit's Rest), the Watchtower is also recognized for exceptional national importance by its designation as a National Historic Landmark

- "*The Ruin" (Building No. 909)* – A stone building constructed in 1932 immediately west of the Watchtower that serves as a storage facility. It was also designed by Mary Colter and was intended to appear as a prehistoric ruin.

- *Store Room (Building No. 908)* – A small concrete building with stone veneer built in 1941 by the Atchison, Topeka and Santa Fe Railway. It has projecting log vigas and a parapet roof.

- *Comfort Station/Visitor Contact Station (Building No. 41)* – A concrete building with rubble stone veneer and parapet roof; also built by the railway in 1941. The NPS converted the building to a visitor contact station in the 1980s; the interior was substantially altered but the exterior retains historic integrity.

- *Fred Harvey Caretaker's Residence (Building No. 914)* – A log/wood frame building with a hipped-roof built in 1930 by the railway to serve as a temporary lounge for Fred Harvey Co. patrons. It was moved from the Canyon rim to its current location in 1934 and remodeled to serve as a caretaker's residence. It is the oldest extant building at Desert View.

- *Shed (Building No. 912)* – A small wood shed with lap siding and gable roof near the caretaker's residence.

- *NPS Residence (Building No. 83)* – A wood frame building built in 1936 with stone foundation, lap siding, gable roof, and native stone chimney. It is located east of the comfort station. The building incorporates NPS rustic design elements.

There are also several other buildings within the district boundaries that do not contribute to the district's historical significance. These include the Fred Harvey deli/gift shop (Trading Post; Building No. 1168), which was built in 1955 and modified in 1966; the General Store (Building No. 1388) built in 1983; two comfort stations (one built in1984 and the other in 2000), and two residential buildings (Building Nos. 149 and 915) near the caretaker's residence.

The National Register of Historic Places registration form for the Desert View Watchtower Historic District indicates that the district boundary was drawn to exclude most of the non-contributing buildings and structures. However, the registration form also suggests that the entire Desert View area (all of the development at the end of Desert View Drive) has the potential for significance as a cultural landscape. To this end, the registration form recommended that landscape elements such as the roads, walkways, and overlooks be further evaluated.

Cultural Landscape Resources

In 2001, a draft Cultural Landscape Inventory report (CLI) and a draft Cultural Landscape Treatment Recommendations report (CLTR) were prepared for Desert View (OCULUS 2001a, 2001b). The purposes of the reports are to identify, document, analyze, and evaluate contributing and non-contributing cultural landscape characteristics within the cultural landscape; to record other cultural landscape information; and to serve as supporting documents for this EA and implementation of the GMP.

The *Cultural Landscapes Inventory Professional Procedures Guide* 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 (Page 2001:1).

Although the draft CLI recognizes the potential of ethnographic and archaeological resources as they relate to the cultural landscape of Desert View, OCULUS (2001a) determined the landscape's primary period of significance to be from 1914 to 1942. Features established at Desert View during this time period (including the Desert View Watchtower and other buildings discussed above) are of national importance because they convey the landscape's recreational heritage and its association with early development of the National Park System (OCULUS 2001a). However, given that the larger landscape includes additional cultural resources and preserved natural areas associated with the period of significance, the CLTR recommends expanding the size of the Desert View Watchtower Historic District to encompass all areas between the rim and the limits of the employee housing area to the south and the campground and treatment plant to the east (OCULUS 2001b). The CLTR also recommends that any planned and potential improvements take into account these additional resources and features so that the integrity of the cultural landscapes is not diminished by project undertakings (OCULUS 2001). The cultural landscape is potentially eligible for listing on the National Register of Historic Places and is analyzed as such.

In addition to the seven buildings identified as contributing to the Desert View Watchtower Historic District, the CLTR recommends that the following resources be considered as contributing to the integrity of the greater historic landscape. The resources are grouped into "Landscape Character Areas" that reflect the evolution of such things as spatial organization, circulation patterns, vegetation patterns, and the development of visitor services and management facilities over time.

- **NPS Residence (Building No. 149).** The National Register of Historic Places registration form for the Desert View Watchtower Historic District determined this building to be a non-contributing element of the historic district. The CLTR, on the other hand, recommends Building No. 149 be considered as a contributing element of the cultural landscape. This recommendation is not based on the building possessing important architectural attributes but, rather, because it is part of a cluster of buildings (including Building Nos. 912, 914, and 915) that define the historic character of the landscape in the Historic Residences Landscape Character Area.

- **Indian Employee Quarters (Building No. 915).** The National Register of Historic Places registration form for the Desert View Watchtower Historic District determined this building to be a non-contributing element of the historic district. The CLTR, on the other hand, recommends Building No. 915 be considered as a contributing element of the cultural landscape. This recommendation is not based on the building possessing important architectural attributes but, rather, because it is part of a cluster of buildings (including Building Nos. 149, 912, and 914) that define the historic character of the landscape in the Historic Residences Landscape Character Area.

- **Water Supply Reservoir (Cistern).** This structure, located in the Parking Lot Landscape Character Area, is a cistern that was part of a former water supply system installed in the late 1920s. The structure is largely subterranean, but extends partially above ground at the edge of the north shoulder of Desert View Drive.

- **Rim Trail.** A historic trail with intact stone edging and drainage features along the edge of the canyon rim north of the Watchtower, within the South Rim/Watchtower Landscape Character Area.

- **Walkways.** Access walkways that connect the parking and visitor services areas to the Watchtower. Portions of the walkway routes may date to the 1940s or earlier. The walkways are within the South Rim/Watchtower Landscape Character Area.

- **Road to CCC Camp Site.** This unpaved access road connects the site of the Civilian Conservation Corps (CCC) camp (part of the CCC Camp Site Landscape Character Area) with the visitor services and Watchtower areas. The access road traverses the northeastern portion of the South Rim/Watchtower Landscape Character Area.

- **Parking Lot Area.** This area includes the existing parking lot, connecting access drives to Desert View Drive, and pedestrian systems (all within the Parking Lot Landscape Character Area). The parking lot includes an expansion area on the east end and a reconstructed section on the west that was originally developed in the early 1940s. The parking lot area was re-designed in the 1960s, but the re-design maintained the overall design character established in the 1940s.

- **Desert View Drive/East Entrance Road.** Desert View Drive (access to Desert View) and its environs represent a historic road corridor dating to the early twentieth century. The road has undergone periods of expansion and reconstruction since its original establishment.

- **Unpaved Drive Remnants.** This is an unimproved path in the Historic Residences Landscape Character Area that provides access between the historic residences area (vicinity of Building Nos. 149, 912, 914, and 915) and the parking lot and the Watchtower area.

- **Road to Cedar Mountain.** This is an unpaved road, evident on 1930s maps of the area, that runs along the northern margin of the park employee housing area (Employee/Staff Housing Landscape Character Area), beginning at the maintenance area (Maintenance Landscape Character Area) and extending eastward to Cedar Mountain. The road passes through the Forest Landscape Character Area.

- **Borrow Pits/Quarries.** Several borrow pits and rock quarrying areas, some of which date to the early twentieth century, exist along Desert View Drive in the vicinity of Desert View. These features have their own Landscape Character Area designation.

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 nine American Indian groups: Havasupai, Hopi, Hualapai, Kaibab Band of Paiute Indians, Navajo, Paiute Indian Tribe of Utah, White Mountain Apache, San Juan Southern Paiute, and Pueblo of Zuni.

The Grand Canyon has long been of importance to native cultures and figures prominently in the origin/religious beliefs and ceremonial practices of many groups. For example, traditional Hopi and Zuni beliefs hold the Grand Canyon as the sacred place from which their ancestors emerged to the present world. Furthermore, ethnographic resources important to Native Americans may be present in the vicinity of Desert View; both the Navajo and Hopi were known to use the Desert View Point area in historic times, prior to the construction of the Watchtower (Jan Balsom, NPS, pers. comm., June 2002). However, no ethnographic resources are known to exist within the area proposed for development.

Copies of the Desert View EA will be forwarded to each affiliated tribe for review and comment. If the tribes subsequently identify the presence of additional ethnographic resources within the project construction area, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of any ethnographic sites would not be made public.

Archaeological Resources

NPS archaeologists have conducted multiple reconnaissance surveys of the Desert View area, Desert View Drive, and the south entrance road. Sites were identified with cultural material indicating both prehistoric and historic period activities. No sites were identified along the road rehabilitation projects. The following 11 sites were identified within or adjacent to the area of proposed development at Desert View:

- *AZ C:13:246* – A light to moderately dense scatter of ceramic sherds and flaked stone, and ground stone artifacts associated with several rock alignments and thermal features.

- *AZ C:13:249* – A dispersed, but discrete, sherd and lithic scatter associated with a small rock-lined hearth.

- *AZ C:13:420* – A concentration of prehistoric ceramics, flaked stone, and ground stone artifacts.

- *AZ C:13:422* – A concentration of prehistoric ceramics, flaked stone, and ground stone.

- *AZ C:13:423* – A lithic scatter consisting of flaked stone, two projectile point fragments, and one biface fragment.

- *AZ C:13:545* – A mixed concentration of prehistoric and historic period artifacts.

- *AZ C:13:546* – A dispersed scatter of historic trash, with one small concentration of artifacts near the northeast corner of the site.

- *AZ C:13:547* – A mixed scatter consisting of historic period trash associated with three borrow pits, another historic period trash concentration, and two prehistoric artifacts.

- *AZ C:13:548* – A concentration of historic cans and a few glass fragments associated with a rock ring (hearth) constructed of 18 unshaped stones.

- *AZ C:13:549* – Nine overlapping rock piles and two depressions with historic period trash. Two burned areas were also identified with charcoal, glass, ceramic, and metal fragments.

- *AZ C:13:550* – A mixed scatter of artifacts including a 1928 NPS survey datum, historical period artifacts, two prehistoric artifacts, three rock piles of limestone and chert, and a circular depression.

NPS archaeologists will or already have conducted data recovery investigations of the threatened sites prior to construction activities to mitigate impacts. The investigations are intended to further assess the significance of the sites in accordance with National Register eligibility criteria and to address research questions regarding prehistoric and historic period activities and occupation within the project area. All of the sites are currently considered eligible for the National Register as contributing to the Park's multiple property nomination for archaeological resources.

PARK OPERATIONS

Park operations refer to the adequacy of staffing levels and the quality and effectiveness of the park infrastructure in protecting and preserving vital resources and providing for an effective visitor experience. Infrastructure facilities include the roads that are used to provide 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 (office and workspace for park staff), 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.

Infrastructure facilities that would be affected by the action alternatives include the following: Desert View Drive and the south entrance road; and visitor orientation facilities, administrative and management support facilities, visitor services facilities, parking and transit services, and utilities at Desert View. Activities that require Park personnel and would be affected by the action alternatives include the following: upkeep of grounds; upkeep of roadways and walkways; plowing of roads, parking lots, and pedestrian walkways following snowfall; upkeep of restrooms and utilities; maintenance of trailer sites and three residences; and staffing and maintenance of the visitor contact station, entrance station, General Store, Trading Post, and related buildings.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This section describes the environmental consequences associated with the alternatives. It is organized by impact topics, which distill the issues and concerns into distinct topics for discussion and analysis. These topics focus on the presentation of environmental consequences and allow a standardized comparison between alternatives based on the most relevant topics. NEPA requires consideration of context, intensity, and duration of impacts; indirect impacts; cumulative impacts; and measures to mitigate for impacts. NPS policy also requires that "impairment" of resources be evaluated in all environmental documents.

METHODOLOGY

Potential impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), duration (short-term, lasting less than 5 years, or long-term, lasting more than 5 years), and intensity (negligible, minor, moderate, or major). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

Soils

All available information on soil resources was compiled. Where possible, map locations of sensitive resources were compared with locations of proposed developments and modifications of existing facilities. The thresholds of change for the intensity of an impact are defined as follows:

Negligible – a change to the soil resource that is not measurable or perceptible.

Minor – a measurable or perceptible, small, localized change to the soil resource that would be of little consequence.

Moderate – a change to that soil resource that is measurable but localized and would be of consequence.

Major – a measurable change to the soil resource that is large and/or widespread and could have permanent consequences for the resource.

Visual Resources

All available information on visual resources was compiled. Effects of the action alternatives on visual resources at Desert View were evaluated via on-site visits. The thresholds of change for the intensity of an impact are defined as follows:

Negligible – a change in visual quality that is barely detectable.

Minor – a change in visual quality that is slight but detectable and would be noticed by some visitors.

Moderate – a change in visual quality that is readily apparent and would be noticed by many visitors.

Major – an extreme change in visual quality that would be noticed by the majority of visitors.

Biotic Communities

All available information on known natural resources was compiled. Where possible, map locations of sensitive resources were compared with locations of proposed developments and modifications of existing facilities. The thresholds of change for the intensity of an impact are defined as follows:

Negligible – a change to a biotic resource or to a population or individuals of a species that is not measurable or perceptible.

Minor – a measurable or perceptible, small, localized change to a biotic resource or to a population or individuals of a species. The change would be of little consequence.

Moderate – a change to a population or individuals of a species or resource that is measurable and of consequence but is localized.

Major – a measurable change to a biotic resource or to a population or individuals of a species. The change would be large and/or widespread and could have permanent consequences for the species or resource.

Exotic Vegetation and Noxious Weeds

All available information on known exotic vegetation and noxious weeds was compiled. Where possible, map locations of noxious weeds were compared with locations of proposed developments and modifications of existing facilities. The thresholds of change for the intensity of an impact are defined as follows:

Negligible – a change in the distribution or density of noxious weeds or exotic vegetation that is not measurable or perceptible.

Minor – a measurable or perceptible, small, localized change in the distribution or density of noxious weeds or exotic vegetation. The change would be of little consequence.

Moderate – a change in the distribution or density of noxious weeds or exotic vegetation that is readily measurable and of consequence but is localized.

Major – a large and/or widespread change in the distribution or density of noxious weeds or exotic vegetation.

Special Status Species (Threatened, Endangered, Candidate, and Rare Species)

Information on possible threatened, endangered, candidate species and species of special concern was gathered from USFWS and AGFD. Information from prior research at Grand Canyon National Park was also incorporated. Map locations of habitat associated with special status species were compared with locations of proposed developments and modifications of existing facilities. Known impacts caused by road and trail construction and visitor use were also considered. The thresholds of change for the intensity of an impact are defined as follows:

Negligible – a change to a population or individuals of a species or to designated critical habitat that would not be measurable or perceptible.

Minor –a measurable, small, localized change to a population or individuals of a species or to designated critical habitat. The change would be of little consequence.

Moderate – a change to a population or individuals of a species or to designated critical habitat. The change would be measurable, localized, and of consequence.

Major – a measurable and large and/or widespread change to a population or individuals of a species or to designated critical habitat.

Visitor Experience

Observation of visitation patterns and assessment of what is available to visitors under current management were used to estimate the effects of the actions in the various alternatives. The impact on the ability of the visitor to experience the full range of Park resources was analyzed by examining resources mentioned in the Park significance statement. The thresholds of change for the intensity of an impact are defined as follows:

Negligible – the impact is barely detectable, and/or will affect few visitors.

Minor – the impact is slight but detectable, and/or will affect some visitors.

Moderate – the impact is readily apparent and/or will affect many visitors.

Major – the impact is severely adverse or exceptionally beneficial and/or will affect the majority of visitors.

Cultural Resources

In this EA, impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above. These impact analyses are intended to comply with the requirements of NEPA. A separate document has been prepared to comply with Section 106 of

the National Historic Preservation Act and has been submitted to the SHPO. CEQ regulations and the NPS's Conservation Planning, Environmental Impact Analysis and Decision-making (DO-12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor).

Archaeological Resources. The definitions for levels of impacts to archaeological resources are as follows:

Negligible – impact is barely measurable and has no perceptible consequences, either adverse or beneficial, to archaeological resources.

Minor – disturbance of the site(s) is confined to a small area with little, if any, loss of important information (adverse); or, a site is preserved in its natural state (beneficial).

Moderate – disturbance of the site(s) would not result in a substantial loss of important information (adverse); or, the site is stabilized (beneficial).

Major – disturbance of the site(s) is substantial and results in the loss of most or all of the site and its potential to yield important information (adverse); or, active intervention is undertaken to preserve the site (beneficial).

Historic Structures. The definitions for levels of impacts to historic structures or buildings are as follows:

Negligible – impact is barely measurable and has no perceptible consequences, either adverse or beneficial, to historic structures.

Minor – the character-defining feature(s) of a structure listed on or eligible for the National Register would not be affected (adverse); or, stabilization/preservation of the character-defining feature(s) in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to maintain the existing integrity of a structure (beneficial).

Moderate – the character-defining feature(s) of the structure would be altered but the integrity of the resource would not be affected to the extent that its National Register eligibility is jeopardized (adverse); or, rehabilitation of a structure in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to make possible a compatible use of the property while preserving its character-defining features (beneficial).

Major – the character-defining feature(s) of the structure would be altered and the integrity of the resource would be affected to the extent that its National Register eligibility is jeopardized (adverse); or, restoration in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict the form, features, and character of a structure as it appeared during its period of significance (beneficial).

Cultural Landscapes. The definitions for levels of impacts to cultural landscapes are as follows:

Negligible – impact is barely measurable and has no perceptible consequences, either adverse or beneficial, to cultural landscapes.

Minor – the character-defining feature(s) of a cultural landscape listed on or eligible for the National Register would not be affected (adverse); or, character-defining features are preserved in accordance with the Secretary of the Interior's standards to maintain existing integrity of the cultural landscape (beneficial).

Moderate – the character-defining feature(s) of the cultural landscape would be altered but the integrity of the resource would not be affected to the extent that its National Register eligibility is jeopardized (adverse); or, a landscape or its features are rehabilitated in accordance with the Secretary of the Interior's standards to make possible a compatible use of the landscape while preserving its character-defining features (beneficial).

Major – the character-defining feature(s) of the cultural landscape would be altered and the integrity of the resource would be affected to the extent that its National Register eligibility is jeopardized (adverse); or, a landscape or its features are restored in accordance with the Secretary of the Interior's standards to accurately depict the landscape as it appeared during its period of significance (beneficial).

Park Operations

Impacts to park operations focuses on (1) employee and visitor health and safety, (2) ability to protect and preserve resources, (3) staff size, whether staffing needs to be increased or decreased, (4) existing and needed facilities, (5) communication (e.g., telephones, radio, computers, etc.), and (6) appropriate utilities (sewer, electric, water). Park staff knowledge was used to evaluate the impacts of each alternative and is based on the current description of park operations presented in the Affected Environment section of this document. Definitions for levels of impacts to park operations efficiency are as follows:

Negligible – a change in operations that is not measurable or perceptible.

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

Moderate – readily apparent changes to park operations with measurable consequences.

Major – a severely adverse or exceptionally beneficial change in park operations.

Cumulative Impacts

Cumulative impact is defined as the impact on the environment that 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 projects within Desert View and the surrounding area.

For this analysis, foreseeable future actions were considered to be actions that currently have funding or for which funding is being sought and that could occur within the next five years. Five years was selected as the period for foreseeable future actions because many of the actions identified in the GMP are likely to either be planned or implemented by that time. The area of impact was chosen to be the South Rim area from the eastern Park entrance, west along Desert View Drive past Desert View to the intersection with the south entrance road, and south along the south entrance road to the Park boundary. This area was chosen because of the potential for impacts of multiple actions on park operations, visitor experience, and cultural and natural resources in this highly-used area.

Desert View. The projects that are in or near the Desert View area and are included in the cumulative impact analysis for each impact topic are listed below.

Emergency Management Services (EMS) Storage Facility. An EMS storage facility will be constructed within the maintenance and staff housing area of Desert View. The EMS storage facility will be located in a previously disturbed area.

Wastewater Treatment Facility. The existing wastewater treatment facility will be upgraded to meet increased demand. This project will be initiated in the next five years.

Employee Housing. Approximately 70 housing units have been proposed to replace substandard housing and meet additional housing needs. These housing units would be constructed within the maintenance and staff housing area. This project will be initiated in the next five years.

Employee Laundry and Lounge. A laundry and lounge facility would be constructed in the vicinity of the new employee housing. This project will be initiated in the next five years.

Management Support Facilities. A new maintenance building for Grand Canyon National Park Lodge operations and a new ranger operations and maintenance facility have been proposed to replace substandard management support facilities. These facilities would be constructed in the vicinity of the existing management support facilities. This project will be initiated in the next five years.

Campground. An expansion of the existing campground from 50 sites to 100 sites has been proposed. The campground is approximately 0.4 km (0.25 mile) east of Desert View. The planning and analysis for this facility have not yet begun but may commence within the next five years.

Grand Canyon Village. The projects that are in or near the Grand Canyon Village area and are included in the cumulative impact analysis for each impact topic are listed below.

Greenway. A trail system for bicyclists and pedestrians is proposed to promote alternative modes of transportation, provide efficient movement of visitors between major points of interest, and maintain a quality visitor experience. The trail system would extend from Grand Canyon Village east to Yaki Point. The portion of the trail between Grand Canyon Village and Pipe Creek Vista has already been graded. Preliminary plans for the trail between Pipe Creek Vista and Yaki point propose that the greenway trail follow a combination of existing social trails and utility corridors.

Transit System. A transit system is proposed to be developed between Tusayan and the Mather Point transit center. This system would be part of a park-wide transit system that would include a fleet of buses that would transport visitors between destination points along the South Rim. The transit system would utilize the existing roadways. The planning and analysis for the transit system is ongoing. It is not known how much of the proposed work would take place within the next five years.

Impairment

In addition to determining the environmental consequences of the preferred and other alternatives, NPS policy (NPS 2001) requires analysis of potential effects to determine whether or not actions would impair Park resources.

The fundamental purpose of the national park system, established in the Organic Act and reaffirmed by the General Authorities Act, as amended, is to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values, unless a particular law directly and specifically provides otherwise. Impairment is an impact so severe that, in the professional judgment of a responsible NPS manager, it would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values, and would violate the 1916 NPS Organic Act. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment if it affects a resource or value whose conservation is:

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

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

ALTERNATIVE A – NO ACTION

Soils

Direct/Indirect Impacts. About 30 ha (75 acres) within a 1.6-kilometer (1-mile) radius of Desert View are currently impacted by existing developments, roads, or utility corridors. Soils in the affected areas have been compacted and/or displaced. Types of detrimental impacts resulting from compaction include reduced water infiltration, reduced soil porosity, reduced water holding capacity, reduced aeration of the soil, increased surface runoff, and increased soil erosion (except those areas that are paved). The adverse impact of compaction in the Desert View area is long-term and site-specific and is negligible because of the coarse, sandy nature and high infiltration properties of the soils. Types of detrimental impacts resulting from displacement include removal of the nutrient surface layer and soil profile depletion. The impact of soil displacement is long-term and site-specific and is minor because of the limited area affected.

The continuation of current Park policies and activities would maintain the current soil conditions and may result in additional areas of compaction if existing facilities cannot accommodate increasing visitor foot traffic. This adverse impact would be negligible, long-term, and local. No construction activities or road rehabilitation are proposed under Alternative A and no additional soil displacement would occur under this alternative.

Cumulative Impacts. Construction of existing developments, roads, and utility corridors has resulted in minor, long-term, site-specific, adverse impacts to the soil resource as described above. The foreseeable future developments in the Desert View area probably would not affect more than 8 ha (20 acres) of ground. Therefore, the total cumulative impact to the soil resource for this alternative would be about 38 ha (95 acres). This is about 3 percent of the area considered in the soil analysis for Desert View, which includes the area within a 1.6-kilometer (1-mile) radius of Desert View. This impact would be minor, long-term, site-specific, and adverse.

The transit system is not expected to affect soil resources because it will use existing roadways. Preliminary plans for the greenway trail propose that it follow existing social trails and utility corridors where soils have already been impacted. The greenway trail may result in a decrease in the formation of new social trails in the area. The greenway would therefore result in negligible, adverse, site-specific, long-term impacts and may result in negligible, beneficial, local, long-term impacts to the soil resource.

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

Conclusion. The No-Action Alternative would have minor, long-term, adverse, site-specific impacts to the soil resource. Cumulative impacts may be minor, adverse, site-specific, and long-term; and negligible, beneficial, local, and long-term.

Visual Resources

Direct/Indirect Impacts. Construction of existing development, roads, and utility corridors has resulted in impacts to the visual resources through alteration of the forest canopy and creation of visual clutter. Types of impacts resulting from existing development include visual clutter from overhead power lines and other utilities and alteration of the natural landscape for parking areas, buildings, and roadways. These impacts are moderate, adverse, site-specific, and long-term. Continuation of current Park policies under the No-Action Alternative would maintain the current condition of visual resources. No construction activities are proposed under Alternative A, and no additional impacts to visual resources would occur if this alternative were implemented.

Cumulative Impacts. Construction of existing developments, roads, and utility corridors has resulted in moderate, long-term, site-specific, adverse impacts to the visual resource as described above. The majority of the foreseeable future projects in the Desert View area are not expected to affect the visual resource because visitors would not interface with the new developments. This would include the wastewater treatment facility, employee housing, employee laundry/lounge, and management support facilities. The expansion of the campground at Desert View would not affect the surrounding visual quality but may have minor, adverse, site-specific, long-term impacts on the appearance of the campground itself. Likewise, construction of the greenway trail would affect only visitors using the trail, and effects would be minor, adverse, site-specific, and long-term. The transit system is not expected to affect visual resources because existing roadways would be used. The cumulative effect of past, present, and foreseeable future activities would be moderate, adverse, site-specific, and long-term.

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

Conclusion. Existing conditions have resulted in moderate, adverse, site-specific, long-term impacts to the visual resource. No additional impacts to visual resources would result from the No-Action Alternative. Cumulative impacts would be adverse, moderate, site-specific, and long-term.

Biotic Communities

Direct/Indirect Impacts. Approximately 30 ha (75 acres) of juniper/big sagebrush/pinyon pine habitat have been lost to existing developments, roads, and utility corridors. This impact to

biotic communities is adverse, site-specific, minor, and long-term. No vegetation manipulation or construction activities are proposed under Alternative A, and this alternative would result in no additional direct effects to the biotic community. Continuation of current Park policies under the No-Action Alternative would have the indirect effect of the continued maturing of the juniper-pinyon woodland surrounding Desert View. This would result in decreased understory diversity and richness (Bunting et al. 1999), increased risk of crown fire due to increased canopy closure, and increased frequency of snag habitat, which would increase perch sites and habitat for snag-dependent birds. These effects are minor, site-specific, and long-term and may be both adverse and beneficial.

Cumulative Impacts. In addition to the approximately 30 ha (75 acres) of habitat that have been impacted as described above, loss of approximately 8 ha (20 acres) of juniper/big sagebrush/pinyon pine community type would occur as the result of foreseeable future developments in and around Desert View. This loss would be site-specific and long-term and would be minor because of the ubiquity of this community type in the South Rim area. Cumulative impacts would also include decreased wildlife security, increased disturbance to adjacent habitat, and increased fragmentation in the vicinity of Desert View. These local, long-term, adverse impacts would be negligible because they would occur in areas currently degraded by high disturbance levels from existing developments, roads, utility corridors, and human use.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. This would ensure that the habitat type and function of the ecosystem below the wastewater treatment facility would not change.

The transit system is not expected to impact the biotic community because it would use the existing roadway. The greenway trail is proposed to follow existing social trails and utility corridors and would result in a negligible loss of habitat. The greenway trail would result in increased human disturbance to adjacent habitat but may also result in a decrease in the formation of new social trails. These impacts would be local and long-term and would be negligible because they would occur in areas currently degraded by disturbance from existing trails, utility corridors, and human use.

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

Conclusion. Existing conditions have resulted in minor, adverse, site-specific, long-term impacts to biotic communities. Indirect impacts would be minor, site-specific, long-term changes as the result of natural maturing of the vegetative community. These impacts may be both adverse and beneficial. Cumulative impacts would be negligible or minor, local, and long-term and may consist of both adverse and beneficial effects.

Exotic Vegetation and Noxious Weeds

Direct/Indirect Impacts. The construction of Desert View Drive, the south entrance road, and existing developments at Desert View has resulted in the presence of some exotic vegetation in these areas. Approximately 30 ha (75 acres) of ground in the vicinity of Desert View have been disturbed for the construction of existing developments, roads, and utility corridors. Ongoing exotic vegetation control programs, which include hand pulling, mechanical treatments, and a small amount of herbicide control, would continue under the No-Action Alternative. Because the size of the current program is limited, existing populations of exotic vegetation would continue to slowly spread and replace native vegetation. This would most likely occur along roads and utility corridors. These impacts would be minor, adverse, local, and long-term. This alternative would not implement any new ground-disturbing activities and thus would not make any new areas susceptible to invasion by exotic vegetation.

Cumulative Impacts. Past development has affected exotic vegetation in the project area as described above. Proposed foreseeable future developments would disturb an additional 8 ha (20 acres) in the vicinity of Desert View. Exotic vegetation and noxious weeds generally invade disturbed sites, and thus future developments would increase the potential for spread or introduction of exotic vegetation and noxious weeds. Project-specific mitigation measures would be implemented for these future projects to reduce the potential for spread or introduction of exotic vegetation; thus, cumulative impacts would be minor, adverse, local, and long-term.

Conclusion. Direct, indirect, and cumulative impacts would be adverse, minor, local, and long-term and would include the continued spread of existing populations and increase in risk of spread or introduction of exotic vegetation.

Special Status Species

Mexican Spotted Owl

Direct/Indirect Impacts. The construction of existing developments at Desert View has affected approximately 30 ha (75 acres) of juniper/big sagebrush/pinyon pine habitat that is potential foraging habitat for the spotted owl. Ongoing activities at Desert View create year-round disturbance in the vicinity. This disturbance has decreased the quality of habitat in and around Desert View for MSO and would continue under the No-Action Alternative. These local, adverse, long-term impacts are negligible because no roosting or nesting habitat is present at Desert View and the amount foraging habitat affected is negligible compared the amount of available habitat. No vegetation manipulation or construction activities are proposed under Alternative A, and no new sources of disturbance would be introduced. Therefore, impacts of the continuation of current Park policies on MSO would be adverse, negligible, local, and long-term.

Cumulative Impacts. Past development has affected MSO habitat in the project area as described above. Foreseeable future developments in the vicinity of Desert View would affect spotted owl habitat through loss of 8 ha (20 acres) of potential foraging habitat and increased disturbance during construction. The loss of foraging habitat would have negligible, long-term, local effects

on the spotted owl because the amount of foraging habitat lost would be negligible relative to the amount of available habitat and because foraging habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. Noise disturbance during construction would be minimized by limiting construction to the non-breeding season and would be local, short-term, adverse, and negligible.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would therefore not change the quality of habitat for prey species of the spotted owl.

The proposed transit system would use existing roadways and would not result in the loss of any habitat or disturbance to roosting or nesting areas. The greenway trail is proposed to follow existing trails and utility corridors and would result in a negligible loss of potential foraging habitat. Construction of the greenway within 0.8 km (0.5 mile) of any MSO PACs would be restricted to outside the MSO breeding season to minimize noise disturbance from construction. Noise disturbance from construction would, therefore, be an adverse, minor, local, short-term impact. Use of the greenway trail by pedestrians and bicyclists may result in increased noise disturbance to nesting and roosting habitat below the rim. These adverse effects would be local and long-term and would probably be minor to moderate.

Conclusion. The No-Action Alternative would have negligible, adverse, long-term, local effects on potential foraging habitat for the spotted owl. Foraging habitat that may be lost is of marginal quality. Increased noise disturbance from foreseeable future actions may have local, short- and long-term, minor to moderate, adverse effects on spotted owls. Mitigation measures would be taken to limit disturbance from construction activities. The No-Action Alternative may affect, but is not likely to adversely affect, the Mexican spotted owl or its habitat.

California Condor

Direct/Indirect Impacts. Existing developments at Desert View create year-round human presence in the vicinity of Desert View. Human presence creates the possibility for condor/human interactions. Condors are monitored daily via radio telemetry, and any condors that land in the developed area of Desert View 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, short- and long-term, and local. No vegetation manipulation or construction activities are proposed under Alternative A. No California condor habitat would be impacted, and no new sources of disturbance would be introduced with this alternative.

Cumulative Impacts. Existing development at Desert View has affected condors as described above. Foreseeable future developments at Desert View would be primarily contained to existing developed areas and would have negligible, short- and long-term, local impacts on condor habitat and exposure of condors to humans. Construction activities may attract condors and increase the potential for condor/human interactions. Mitigation measures (described in the Biological Assessment for the Parkwide Construction Program (NPS 2002a)) included in this document would reduce the potential for detrimental interactions between condors and humans.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would not change the quality of habitat for prey species of the California condor.

The proposed transit system would use existing roadways and would not affect condor habitat or result in any increased likelihood of interactions between condors and humans. The greenway trail is proposed to follow existing social trails and utility corridors and would not affect condor roosting or nesting habitat. Construction activities may attract condors and increase the potential for condor/human interactions. Use of the greenway trail could concentrate hikers and bikers above potential nesting and roosting habitat and could result in an increased likelihood of contact between condors and humans. Condors are monitored daily via radio telemetry, and this monitoring should reveal any conflicts between trail users and condors. Condors interacting with humans would be hazed by permitted Park employees to ensure condors do not become habituated to humans. Any adverse effects would be local and short- and long-term and would probably be negligible.

Conclusion. Adverse impacts of Alternative A on the California condor would be negligible, short- and long-term, and local. Cumulative impacts would be adverse, negligible, and short- and long-term. Alternative A may affect, but is not likely to adversely affect, the California condor.

American Peregrine Falcon

Direct/Indirect Impacts. The construction of existing developments at Desert View has affected approximately 30 ha (75 acres) of potential peregrine foraging habitat. This local, adverse, long-term impact is negligible because the amount foraging habitat affected is negligible compared the amount of available habitat. Ongoing activities at Desert View create year-round disturbance in the vicinity, but this continual disturbance appears not to be affecting a pair of peregrines below the rim at Desert View. It is likely these birds have become habituated to the disturbance. No vegetation manipulation or construction activities are proposed under Alternative A, and no new sources of disturbance would be introduced. Therefore, impacts of the continuation of current Park policies on peregrine falcons would be adverse, negligible, local, and long-term.

Cumulative Impacts. An additional 8 ha (20 acres) of potential foraging habitat would be affected at Desert View by foreseeable future developments. The incremental development of Desert View is unlikely to affect peregrine falcons directly because the peregrines nesting below Desert View appear to be habituated to the ongoing disturbance at Desert View. None of the foreseeable future developments would affect nesting habitat below the rim or increase use of the area below the rim. The majority of the developments would occur in existing disturbed areas and would not measurably change prey base populations. Any adverse impacts of developments at Desert View would therefore be negligible, local, and long-term.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is

naturally available. These pulsed releases would not change the quality of habitat for prey species of the peregrine falcon.

The proposed transit system would use existing roadways and would not result in the loss of any habitat or disturbance to roosting or nesting areas. The greenway trail is proposed to follow existing trails and utility corridors and would result in a negligible loss of potential foraging habitat. Use of the greenway trail may result in increased noise disturbance to nesting and roosting habitat below the rim. These adverse effects would be local and long-term and would probably be minor to moderate.

Conclusion. Impacts of Alternative A on the American peregrine falcon would be adverse, negligible, local, and long-term. Cumulative impacts would be adverse, local, long-term, and minor to moderate. Alternative A may affect, but is unlikely to adversely affect, the American peregrine falcon.

Sentry Milk-vetch

Direct/Indirect Impacts. None of the existing developments at Desert View are within potential habitat for the sentry milk-vetch. Social trails in the vicinity of Desert View exist in potential habitat for the sentry milk-vetch, and the continued use of these trails or creation of new trails may have minor to moderate, adverse, site-specific, long-term effects on the sentry milk-vetch.

Cumulative Impacts. The only foreseeable future action that could occur in habitat suitable for sentry milk-vetch is the greenway trail. Surveys for sentry milk-vetch would be completed prior to any construction. If sentry milk-vetch were present, consultation with the USFWS would be initiated. Consultation should result in negligible, adverse, site-specific, long-term impacts to sentry milk-vetch. Construction of the greenway trail may also have minor, beneficial, local, long-term impacts on the sentry milk-vetch by reducing the creation of new social trails.

Conclusion. The continuation of current Park activities and policies at Desert View may have minor to moderate, adverse, site-specific, long-term effects on the sentry milk-vetch. Adverse cumulative impacts would be negligible, site-specific, and long-term. There may also be minor, beneficial, local, long-term, cumulative impacts. Alternative A may affect, but is unlikely to adversely affect, the sentry milk-vetch.

Impairment. Adverse direct, indirect, and cumulative effects of the No-Action Alternative on special status species would negligible to moderate. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Visitor Experience

Direct/Indirect Impacts. There are no actions proposed under this alternative, and existing conditions would remain the same. Desert View currently provides visitor services including

viewing areas, interpretation, restrooms, and the opportunity to purchase supplies. Desert View would remain congested, however, and all visitors utilizing the east entrance would need to drive through Desert View. The Watchtower area would remain dominated by the Trading Post and parking lot. Indirect impacts would include worsening of the crowded, unsafe conditions experienced by visitors to Desert View during peak visitation. The impacts on visitor experience of continuing the existing Park actions and policies would, therefore, be moderate, long-term, local, and both adverse and beneficial.

Cumulative Impacts. The majority of the foreseeable future developments at Desert View would not affect the visitor experience because visitors would generally not interface with the new developments. This would include the wastewater treatment facility, employee housing, employee laundry/lounge, and management support facilities. However, the proposed campground expansion would enhance the visitor experience by increasing visitor convenience and decreasing visitor frustrations if they are searching for such facilities. The greenway trail and transit system would provide alternate means of transportation and reduce traffic congestion and associated air pollution between destination sites along the South Rim. These impacts would be beneficial, minor, local, and long-term.

Conclusion. Under the No-Action Alternative, existing conditions would remain and impacts would be moderate, long-term, local, and both adverse and beneficial. Cumulative impacts would be beneficial, minor, local, and long-term and would include improved transportation services.

Cultural Resources

Direct/Indirect Impacts. Under the No-Action Alternative, the cultural landscape, including the historic buildings and structures of the Desert View Watchtower Historic District, 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 ongoing preservation, maintenance, and any necessary rehabilitation. Archaeological and ethnographic resources would be preserved and protected in situ, or appropriate data recovery would be carried out as necessary to mitigate potential effects resulting from routine operations and visitor use impacts. These effects would be beneficial, moderate, long-term, and site-specific.

Increasing visitation without a corresponding increase in the Park's ability to effectively monitor resource conditions or to impart the importance of protecting resources (and enforce penalties for disturbance) may result in a greater likelihood for visitors to remove artifacts from archaeological sites and degrade ethnographic resources. These impacts could be moderate, adverse, long-term, and site-specific.

Cumulative Impacts. The Desert View Watchtower Historic District has sustained previous impacts. Modern buildings (e.g., the comfort stations) have intruded on the historic setting of the cultural landscape and have had minor, site-specific, long-term, adverse effects on the cultural landscape. Previous deterioration of the Watchtower as a result of natural weathering and visitor use impacts has led to concerted restoration efforts over the last few years to preserve the building's defining architectural character. In conjunction with these and other past threats

to the integrity of buildings and other landscape features, increasing visitor use would likely continue to present a potential for character-defining qualities of the historic buildings and important landscape characteristics to be diminished over time. Cumulative impacts to the historic district are, therefore, moderate, adverse, long-term, and site-specific.

Foreseeable future developments in the Desert View area would result in the loss or disturbance of some archaeological sites. These losses, in conjunction with previous losses from development and prevailing threats to finite numbers of archaeological resources throughout the region, would diminish the overall understanding of Grand Canyon's cultural history, particularly with regard to prehistoric Ancestral Puebloan people and historic period activity during the late nineteenth and early twentieth centuries. Archaeological data recovery, carried out prior to the proposed activities, would assist in mitigating these effects by permitting the controlled collection and analysis of cultural materials and would ensure that adverse, long-term impacts to archaeological resources as the result of future development would be minor and site-specific. Future developments in the Desert View area are outside the Desert View Watchtower Historic District and are not expected to affect historic structures.

The transit system would use the existing roadway and would not affect cultural resources. Any areas proposed for the greenway trail would be surveyed prior to construction. Data recovery would be carried out at any archaeological sites to ensure that adverse, long-term impacts would be minor and site-specific.

Impairment. The No-Action Alternative would have adverse and beneficial, moderate impacts to cultural resources. Cumulative impacts to the historic district would be moderate and adverse, and cumulative effects to archaeological resources would be minor and adverse. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion. The No-Action Alternative would have adverse and beneficial, site-specific, long-term, moderate impacts to cultural resources. Cumulative impacts to the historic district would be moderate, adverse, long-term, and site-specific; and cumulative effects to archaeological resources would be minor, adverse, long-term, and site-specific.

Park Operations

Direct/Indirect Impacts. Under the No-Action Alternative, maintenance of the current facilities would continue. Indirect impacts would include the increased maintenance required as the existing buildings age. This impact would be minor, local, long-term, and adverse.

Cumulative Impacts. The construction of housing units and other facilities in the Desert View housing area and the campground expansion could have moderate, adverse, local, long-term impacts on park operations by increasing the area and number of structures that need to be

maintained. Upgrades to the wastewater treatment plant should have a local, long-term, moderate, beneficial impact on park operations because the new facility would be more cost effective and would not require staff time for pumping and hauling wastewater.

The greenway trail and transit system would affect park operations by increasing the number of facilities and areas that must be maintained. These alternative transportation methods should, however, help relieve traffic congestion along the South Rim and would assist in providing an effective visitor experience. These impacts would be minor, local, long-term, and both beneficial and adverse.

Conclusion. Alternative A would have minor, local, long-term, adverse effects on park operations. Cumulative impacts would be minor to moderate, local, long-term, and both beneficial and adverse.

ALTERNATIVE B – GMP

Soils

Direct/Indirect Impacts. Implementing this alternative would directly impact about 6.3 ha (15.8 acres) of soil at Desert View. This would result in some compaction and displacement. Impacts associated with compaction include reduced water infiltration, reduced soil porosity, reduced water holding capacity, reduced aeration of the soil, increased surface runoff, and increased soil erosion. The adverse impact of compaction in the Desert View area would be long-term and site-specific and would be negligible because of the coarse, sandy nature and high infiltration properties of the soils. In addition, the majority of the area impacted would be paved and thus permeability of the soil would become irrelevant. Impacts associated with displacement include removal of the nutrient surface layer and soil profile depletion. These impacts would be adverse, minor, site-specific, and long-term. Formalization of social trails in the Desert View area may reduce the creation of new social trails, thereby reducing impacts to the soil resource. This impact would be negligible, beneficial, local, and long-term. Road rehabilitation projects would occur within the existing road prism and would have no additional impact to soils.

Cumulative Impacts. About 30 ha (75 acres) within a 1.6-kilometer (1-mile) radius of Desert View have been impacted from existing developments, roads, or utility corridors. The foreseeable future developments probably would not affect more than 8 ha (20 acres) of ground. Therefore, the total cumulative impact to the soil resource for this alternative would be about 45 ha (110 acres). This is about 3 percent of the area considered in the soil analysis, which includes the Desert View area and the area within a 1.6-kilometer (1-mile) radius of Desert View. This impact would be adverse, minor, long-term, and site-specific.

The transit system is not expected to affect soil resources because it would use existing roadways. Preliminary plans for the greenway trail propose that it follow existing social trails and utility corridors where soils have already been impacted. The greenway trail may result in a decrease in the formation of new social trails in the area. The greenway would therefore result in

negligible, adverse, site-specific, long-term impacts and may result in negligible, beneficial, local, long-term impacts to the soil resource.

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

Conclusion. Implementing this alternative would result in minor, long-term, site-specific, adverse impacts and negligible, beneficial, local, long-term impacts to the soil resource. Cumulative impacts would be similar to direct and indirect impacts.

Visual Resources

Direct/Indirect Impacts. Construction activities proposed under Alternative B would result in disturbance to 1,200 lineal meters (3,936 lineal feet) for underground trenching in addition to the approximately 6.3 ha (15.8 acres) of juniper/big sagebrush/pinyon pine that would be cleared under this alternative. This would constitute an alteration of the existing forest canopy and some disturbance within an existing cleared powerline corridor and along an existing road. Use of existing clearings within the forest canopy, use of natural landscape for a color palette, and revegetation with native materials would integrate the manmade features into the landscape. The majority of the cleared area would become roads, cleared shoulders, parking lots, buildings, or small landscaped islands, some of which would be revegetated with native plants. This would not be considered a change to existing visual quality because of the presence of existing development, which has already altered the natural landscape.

The water tank and associated communications equipment would be relocated to an area approximately 229 m (750 feet) south of the proposed bypass, out of the Desert View visitor area. The existing mature pinyon-juniper forest would screen the tank and pumphouse, and most visitors would not notice these structures. A communications satellite dish and tower would project above the water tank in a line of sight with the Main Village communications equipment. Visitors approaching Desert View on Desert View Drive, particularly eastbound traffic, may see glimpses of the communications equipment. This would be a minor, adverse, site-specific, long-term impact.

In addition to the water tank and communications tower being removed from the visitor area, the most visible existing power and telephone lines would be placed underground, out of the visitors' view. Existing mobile homes would be relocated or replaced with new housing farther from the visitor area. Although a large parking area with landscaped islands would be built in place of these features, this exchange of development types would provide a greater amount of visual organization, compared with the existing haphazard development pattern and proliferation of utility lines. This would be a moderate, beneficial, site-specific, long-term impact.

Cumulative Impacts. Construction of existing development, roads, and utility corridors has resulted in moderate, adverse, site-specific, long-term impacts to the visual resources through alteration of the natural landscape and creation of visual clutter. The majority of the foreseeable future developments at Desert View would not affect visual quality because visitors would not interface with the new developments. This would include the wastewater treatment facility, employee housing, employee laundry/lounge, and management support facilities. The expansion of the campground at Desert View would not affect the surrounding visual quality but may have minor, adverse, site-specific, long-term impacts on the appearance of the campground itself. Likewise, construction of the greenway trail would affect only visitors using the trail, and effects would be minor, adverse, site-specific, and long-term. The transit system is not expected to affect visual resources because existing roadways would be used.

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

Conclusion. Direct impacts would be minor, long-term, adverse, and site-specific and moderate, long-term, beneficial, and site-specific. Cumulative impacts would be minor, adverse, site-specific, and long-term.

Biotic Communities

Direct/Indirect Impacts. Approximately 6.3 ha (15.8 acres) of juniper/big sagebrush/pinyon pine habitat would be cleared under this alternative. This would constitute a long-term loss of habitat because the majority of the cleared area would become roads, cleared shoulders, parking lots, small landscaped islands, or buildings. However, this would not be considered an irreversible loss of habitat because the habitat could be reclaimed by destroying the developments and restoring the site. Loss of habitat would be a minor, adverse, site-specific, long-term effect to the biotic community. The road rehabilitation projects would occur only within the existing road prism and would not result in the loss of any habitat.

Loss of habitat would likely have a negligible, adverse, local, short- and long-term effect on wildlife populations. A direct loss of some individuals would occur during construction activities. However, the majority of small mammals, birds, and reptiles that are currently utilizing the habitat that is proposed for clearing would be displaced to adjacent habitat.

In addition to loss of habitat, impacts of implementing this alternative would include decreased wildlife security, increased disturbance to adjacent habitat, and increased fragmentation. However, these adverse, long-term, local impacts would be negligible because they would occur in areas currently degraded due to high disturbance levels from existing developments, roads, utility corridors, and human use.

Cumulative Impacts. The impacts of past, present, and foreseeable future actions to biotic communities would be similar to those described above for direct/indirect impacts. Within a 1.6-kilometer (1-mile) radius of Desert View, about 30 ha (75 acres) of habitat have been removed for existing developments, roads, and utility corridors. Probably less than 8 ha (20 acres) of habitat would be lost after implementing all foreseeable future actions. The cumulative loss of habitat would be about 45 ha (110 acres). This habitat loss would be minor because of the ubiquity of this community type in the South Rim area. Approximately 27,500 ha (68,000 acres) of juniper/big sagebrush/pinyon pine community type are present just within Grand Canyon National Park.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. This would ensure that the habitat type and function of the ecosystem below the wastewater treatment facility would not change.

The transit system is not expected to impact the biotic community because it would use the existing roadway. The greenway trail is proposed to follow existing social trails and utility corridors and would result in a negligible, site-specific, long-term loss of habitat. The greenway trail would result in increased human disturbance to adjacent habitat but may also result in a decrease in the formation of new social trails and disturbance to additional areas. These impacts would be local, long-term, and negligible because they would occur in areas currently degraded by disturbance from existing trails, utility corridors, and human use.

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

Conclusion. About 6.3 ha (15.8 acres) of juniper/big sagebrush/pinyon pine habitat would be directly lost for the long term under this alternative. Direct and cumulative impacts to the biotic community would be adverse, long-term, local or site-specific, and negligible or minor because of the existing degraded condition of the impacted habitat and the ubiquity of this community type. Cumulative impacts may also consist of beneficial, local, negligible, long-term effects.

Exotic Vegetation and Noxious Weeds

Direct/Indirect Impacts. Approximately 6.3 ha (15.8 acres) of ground would be disturbed at Desert View under Alternative B. An increase in the amount of disturbed ground would increase the potential for the spread or introduction of exotic vegetation. No new ground would be disturbed for the road rehabilitation projects, but construction vehicles would be working in previously disturbed areas and could spread exotic vegetation from these areas. Prevention and mitigation measures implemented with this alternative would reduce the risk of spread and introduction of exotic species. For instance, pressure washing of ground-disturbing equipment

would substantially reduce the risk of introducing a new exotic species. Post-construction revegetation, monitoring, and treatment would substantially reduce the risk of spreading existing populations and introducing new species. Overall impacts of this alternative would be adverse, minor, local, and long-term.

Cumulative Impacts. About 30 ha (75 acres) of ground have been disturbed in the vicinity of Desert View for existing developments, roads, and utility corridors. This ground disturbance has allowed the establishment of some exotic vegetation, which is treated under the ongoing exotic vegetation control program at Grand Canyon National Park. Probably less than 8 ha (20 acres) of additional ground would be disturbed during implementation of all foreseeable future actions, and approximately 6.3 ha (15.8 acres) would be disturbed under Alternative B. However, the majority of the disturbed areas would not be subject to potential exotic vegetation invasion because they would be covered by impervious surfaces or buildings. In addition, preventative and mitigation measures associated with all the development projects would substantially reduce the risk of spread or introduction. Cumulative impacts would be adverse, minor, local, and long-term.

Conclusion. This alternative would have direct and cumulative, long-term, minor, adverse, local impacts on exotic vegetation. Prevention and mitigation measures associated with all construction projects should be sufficient to ensure exotic vegetation does not become a major concern at Desert View.

Special Status Species

Mexican Spotted Owl

Direct/Indirect Impacts. Alternative B would not result in any impacts to nesting or roosting habitat. If nesting or roosting habitat were present in the vicinity of Desert View, it would be located below the rim. No vegetation manipulation would occur below the rim and no activities related to increasing visitor use of the area below the rim are proposed. The road rehabilitation projects would remain in the existing road prism and would not affect any habitat.

This alternative could affect MSO through impacts to foraging areas and prey and through increased disturbance. This alternative proposes to remove 6.3 ha (15.8 acres) of potential foraging habitat at Desert View. The potential foraging habitat that would be lost is of marginal quality because of high disturbance levels from existing developments, roads, and human use. In addition, relative to the amount of available foraging habitat, the amount lost would be negligible. The loss of foraging habitat could result in a limited amount of prey base mortality. Woodrats, mice, and voles could be killed during excavation activities. However, the majority of prey utilizing the habitat proposed for removal would be displaced to adjacent habitat and not killed. In addition, the change in prey base would be a negligible impact because only a small area would be affected relative to available habitat for prey species. Therefore, loss of foraging habitat would have negligible, adverse, local, long-term effects on the spotted owl.

Spotted owls could be disturbed by the noise and activity associated with construction at Desert View and road rehabilitation sites. Desert View Drive between MP 247 and MP 253 is within 0.4 km (0.25 mile) of a proposed PAC, and the portion of the south entrance road within

approximately 0.32 km (0.2 mile) of the intersection with Desert View Drive is within 0.8 km (0.5 mile) of a proposed PAC. Roadwork in these areas would be restricted to the non-breeding season, in accordance with mitigation measures developed through a batch consultation with the USFWS (NPS 2002a). Desert View and Desert View Drive from 4.6 km (3.0 miles) north of the eastern Park boundary to Tusayan museum are within 0.8 km (0.5 mile) of potential MSO habitat. A second year of surveys for MSO in these areas will be completed in 2002. After surveys are complete, conservation measures developed in the batch consultation will be revisited for applicability to this project. Additional consultation with USFWS will be initiated if necessary. Mitigation measures and any additional consultation would ensure that adverse noise impacts to MSO would be minor, local, and short-term.

Cumulative Impacts. Ongoing activities at Desert View create year-round disturbance in the vicinity. This continual disturbance has decreased the quality of habitat in and around Desert View for MSO. Foreseeable future developments in the vicinity of Desert View would affect spotted owl habitat through the loss of potential foraging habitat and increased disturbance during construction. However, the loss of foraging habitat is unlikely to affect the spotted owl because foraging habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. In addition, relative to the amount of available foraging habitat, the 45 ha (110 acres) affected by past, present, and future development would be negligible. Therefore, loss of foraging habitat would have negligible, adverse, local, long-term effects on the spotted owl.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would therefore not change the quality of habitat for prey species of the spotted owl.

The proposed transit system would use existing roadways and would not result in the loss of any habitat or disturbance to roosting or nesting areas. The greenway trail is proposed to follow existing trails and utility corridors and would result in a negligible loss of potential foraging habitat. Construction of the greenway within 0.8 km (0.5 mile) of any MSO PACs would be restricted to outside the MSO breeding season to minimize noise disturbance from construction. Noise disturbance from construction would, therefore, be an adverse, minor, local, short-term impact. Use of the greenway trail may result in increased noise disturbance to nesting and roosting habitat below the rim. These adverse effects would be local and long-term and would be minor to moderate.

Conclusion. Alternative B would result in negligible, long-term, local, adverse impacts to spotted owl foraging habitat and minor to moderate, short- and long-term, local, adverse impacts from noise disturbance. Alternative B may affect, but is not likely to adversely affect, the Mexican spotted owl.

California Condor

Direct/Indirect Impacts. Alternative B would not result in any impacts to nesting or roosting habitat for the California condor because all such habitat occurs below the rim. No vegetation manipulation would occur below the rim and no activities related to increasing visitor use of the

area below the rim are proposed. The road rehabilitation projects would remain within the existing road prism and would not affect any habitat. Foraging habitat would not be affected because this alternative would not change the availability of food sources for condors.

This alternative could affect California condors through increased contact with humans during construction. Condors may be attracted by construction activities, and condor contact with humans would be of concern if visitors harass the birds or if the birds become habituated to humans. Mitigation measures to cease construction activities if condors are present would reduce disturbance from construction activities on the birds. Hazing by permitted Park employees would ensure condors do not become habituated to humans. Therefore, adverse impacts to condors would be short-term, local, and negligible.

Cumulative Impacts. Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would not change the quality of habitat for prey species of the California condor.

The proposed transit system would use existing roadways and would not affect condor habitat or result in any increased likelihood of interactions between condors and humans. The greenway trail is proposed to follow existing social trails and utility corridors and would not affect condor roosting or nesting habitat. Construction activities may attract condors and increase the potential for condor/human interactions. Use of the greenway trail could concentrate hikers and bikers above potential nesting and roosting habitat and could result in an increased likelihood of contact between condors and humans. Condors are monitored daily via radio telemetry, and this monitoring should reveal any conflicts between trail users and condors. Condors interacting with humans would be hazed by permitted Park employees to ensure condors do not become habituated to humans. Any adverse effects would be local and short- and long-term and would probably be negligible.

Conclusion. Alternative B could have adverse, negligible, local, short-term impacts to condors. The cumulative impacts would be adverse, local, negligible, and both short-and long-term. Alternative B may affect, but is unlikely to adversely affect, the California condor.

American Peregrine Falcon

Direct/Indirect Impacts. No nesting habitat would be affected by Alternative B because all potential nesting habitat occurs below the rim. Disturbance to peregrine falcons as the result of increased activity at Desert View is not a major concern. The pair of falcons in the Desert View vicinity appears to be habituated to human activity as evidenced by their continued presence near Desert View. No peregrine eyries are known from within 0.8 km (0.5 mile) of road rehabilitation sites, and no disturbance to peregrines is expected from these projects. No direct effects on peregrine falcons are expected under Alternative B.

This alternative proposes to remove 6.3 ha (15.8 acres) of potential habitat for peregrine falcon prey. However, this loss of habitat would unlikely affect peregrine falcons because the change in prey base would be negligible given the small area being affected relative to the available potential habitat for the prey base. The majority of the prey base utilizing the habitat proposed

for removal would be displaced to adjacent habitat. Indirect effects on peregrine falcons under Alternative B would be adverse, long-term, local, and negligible.

Cumulative Impacts. The incremental development of Desert View is unlikely to affect peregrine falcons directly because the peregrines nesting below Desert View appear to be habituated to the ongoing disturbance at Desert View. None of the foreseeable future developments would affect nesting habitat below the rim or increase use of the area below the rim. The majority of the developments would occur in existing disturbed areas and would not measurably change prey base populations. Relative to the amount of available foraging habitat, the 45 ha (110 acres) affected by past, present, and future development at Desert View would be negligible. Any adverse impacts of developments at Desert View would therefore be negligible, local, and long-term.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would not change the quality of habitat for prey species of the peregrine falcon.

The proposed transit system would use existing roadways and would not result in the loss of any habitat or disturbance to roosting or nesting areas. The greenway trail is proposed to follow existing trails and utility corridors and would result in a negligible loss of potential foraging habitat. Construction and use of the greenway trail may result in increased noise disturbance to nesting and roosting habitat below the rim. These adverse effects would be local and short- and long-term and would probably be minor to moderate.

Conclusion. Alternative B could have negligible, adverse, local, long-term impacts on peregrine falcons. The cumulative adverse effects would be local and short- and long-term and would probably be minor to moderate. Alternative B may affect, but is unlikely to adversely affect, the American peregrine falcon.

Sentry Milk-vetch

Direct/Indirect Impacts. Road rehabilitation along Desert View Drive from Tusayan Museum to Desert View and from approximately 2.8 to 3.5 miles south of Desert View would be within potential habitat for the sentry milk-vetch. Trail improvements around Desert View would also be in potential habitat. No other areas at Desert View or along the road rehabilitation areas would be within potential habitat for the sentry milk-vetch. All areas of potential habitat would be surveyed prior to any construction, and consultation with USFWS would be initiated if sentry milk-vetch were found. Adverse impacts to sentry milk-vetch should therefore be negligible, site-specific, and long-term. Formalization of trails around Desert View may result in visitors adhering more strictly to the trails. This would reduce foot traffic in potential habitat for the sentry milk-vetch and could have a minor, long-term, beneficial, local effect on sentry milk-vetch.

Cumulative Impacts. The only foreseeable future action that could occur in habitat suitable for sentry milk-vetch is the greenway trail. Surveys for sentry milk-vetch would be completed prior to any construction. If sentry milk-vetch were present, consultation with the USFWS would be

initiated. Consultation should result in negligible, adverse, site-specific, long-term impacts to sentry milk-vetch. Construction of the greenway trail may also have minor, beneficial, local, long-term impacts on the sentry milk-vetch by reducing the creation of new social trails.

Conclusion. Alternative B could have negligible, long-term, site-specific, adverse effects and minor, long-term, beneficial, local effects on the sentry milk-vetch. Adverse cumulative impacts would be negligible, site-specific, and long-term. There may also be beneficial, local, long-term, minor cumulative effects. Alternative B may affect, but is not likely to adversely affect, the sentry milk-vetch.

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

Visitor Experience

Direct/Indirect Impacts. Construction of the bypass road would allow visitors not stopping at Desert View to bypass the area efficiently. The configuration of the parking lots and secondary roads for this alternative would create four decisions for visitors wanting to park. As visitors travel along Desert View Drive, the first decision point would be whether to take the only entry road into Desert View or not. Then visitors would travel down the entry road and need to make three decisions at road intersections: 1) road to the gas station, campground, and shuttle loop, 2) road to car parking lot, and 3) road the RV/bus parking lot. The bus and RV parking are separated from car parking areas, and all parking is separated from the bus shuttle, gas station, and campground traffic. This configuration was determined in the value analysis to be the easiest for visitors to negotiate. In addition, this alternative provides minimal conflict between visitor traffic and emergency response vehicles.

The entrance station would be located approximately 1.2 km (0.75 mile) south of the existing entrance station. The road grade in this area is too steep to support a safe entrance station.

The proximity of the car parking area to the shuttle and rim areas would be about 90 m (300 feet) and 245 m (800 feet), respectively. The proximity of the bus parking area to the rim would be 120 to 245 m (400 to 800 feet). The most remote car parking would be approximately 335 m (1,100 feet) from the shuttle and 488 m (1,600 feet) from the rim. The walk from the more distant parts of the car parking lot may be difficult for elderly or physically impaired visitors to manage.

This alternative proposes to relocate the water tank to the south of the new bypass road. The tank would not be visible above the vegetation and would not degrade the visual quality of the site. The communications mast would also be relocated adjacent to the water tank. The antenna would be visible and would be the same height as the nearby utility poles. These structures

would be located on the far side of Desert View Drive from the parking lot and the rim and would not detract from the visual appearance of the rim area.

The removal of employee housing at the new parking lot site would reduce intrusions of visitors on off-duty employees and would also enhance visual quality at Desert View.

As visitors leave the parking area, they would have a clear view of the Watchtower. The pedestrian area (old parking lot) would open up the overlook area and provide space for a more natural viewing experience. Removal of the existing Trading Post would enhance the historic atmosphere of the Watchtower area and would create open space along the rim for viewing the Watchtower.

Two picnic areas would be developed along the rim to the west of the Watchtower. These picnic areas would provide visitors an opportunity to relax and picnic on the rim with a view of the Canyon. Proximity of the picnic areas to the rim may also result in trash being thrown over the rim.

The new orientation center would be located between the new transit center and the Watchtower. The centralized location of the orientation center would cause more visitors to stop at the center and increase the opportunity for increasing visitors' understanding and appreciation of the Park and its resources. In addition, visitors would benefit by having the opportunity to obtain backcountry use permits, reservations, and/or other information as appropriate.

An existing historic house at the north end of the new parking lot would be converted to a bike rental facility. The rental facility would be between the parking lot and the orientation center, General Store, and Trading Post, and would be highly visible and conveniently located for visitors arriving by passenger vehicle or shuttle bus. Placing the rental facility in this location may cause conflicts between pedestrians and bicyclists in the new pedestrian plaza.

The Trading Post would be relocated to a new building adjacent to the General Store. This would create a visitor services complex adjacent to the shuttle loop that would include gift shop, food service, grocery store, transit shelter, restrooms, and orientation center. This visitor services complex would be set back far enough from the rim to retain the natural and historic setting at the overlook area.

Realignment of the road at Desert View and rehabilitation of other portions of Desert View Drive and the south entrance road may cause a short-term inconvenience to visitors through short delays in traffic. This inconvenience would be minimized by not stopping traffic in any one direction for more than 15 minutes at a time and not constructing on weekends or holidays. In the long term, road realignment and rehabilitation would improve convenience, comfort, and safety for visitors at the South Rim.

Fully implementing this alternative would convert Desert View into a transportation hub of the South Rim. Visitors utilizing the east entrance would park at Desert View and use the Park transit system to travel to other destination points. This would reduce the overall traffic in the Park, which would reduce visitor frustration and increase the overall enjoyment of Park visitors.

Overall, Alternative B would have moderate, beneficial, long-term, local effects on the visitor experience by providing adequate, safe parking and improving the visitor services at Desert View. There would also be minor, adverse, short-term, local effects caused by traffic delays and minor, adverse, long-term, local effects caused by an unsafe entrance station, the long walk from the parking lot to the rim, conflicts between pedestrians and bicyclists, and trash thrown over the rim.

Cumulative Impacts. The majority of the foreseeable future developments at Desert View would not affect the visitor experience because visitors would generally not interface with the new developments. This would include the wastewater treatment facility, employee housing, employee laundry/lounge and management support facilities. However, the proposed campground expansion would enhance the visitor experience by increasing visitor convenience and decreasing visitor frustrations if they are searching for such facilities. The greenway trail and transit system would provide alternate means of transportation and reduce traffic congestion and associated air pollution between destination sites along the South Rim. These impacts would be beneficial, minor, local, and long-term.

Conclusion. Alternative B would have moderate, beneficial, long-term, local effects on the visitor experience. There would also be minor, adverse, local, short- and long-term effects. Impacts from foreseeable future actions would be minor, beneficial, local, and long-term and would include reduced traffic along the South Rim.

Cultural Resources

Direct/Indirect Impacts. Construction of the bypass road and new parking area and trenching for the placement of utilities would occur within identified archaeological sites and would have direct impacts on identified archaeological resources. The NPS would consult with the Arizona State Historic Preservation Office and concerned Native American tribal officials regarding appropriate measures to mitigate these impacts and ensure that adverse, long-term impacts would be minor and site-specific.

Construction of a new entrance station and demolition of the existing entrance station booths would be expected to have no impacts on historic properties. The existing entrance station was built in 1964 and is not considered eligible for the National Register. Elimination of a section of existing access road leading to the maintenance area would alter patterns of historic vehicle circulation but would not substantially diminish the historic setting or overall circulation pattern through the historic landscape. This would be a minor, adverse, site-specific, long-term impact.

An existing water tank and associated utility building, an antenna, a propane tank, ten trailer homes/pads, and two other buildings would be removed to accommodate the parking area. The existing Trading Post building (No. 1168) and an existing restroom (Building No. 1410) adjacent to the General Store (Building No. 1388) would also be removed. These facilities are identified as non-contributing to the historic district. Their removal would enhance the setting of the historic district and would have a minor, beneficial, site-specific, long-term effect.

Construction of new facilities (i.e., shuttle loop and transit shelter, orientation facility, picnic areas, new gift shop/deli, water tank and pump house, communications mast, and propane tanks) would be sensitively designed to harmonize with the setting of the historic district and the overall historic landscape and would have negligible, adverse, site-specific, long-term impacts on the historic landscape.

Conversion of the historic caretaker's residence (Building No. 914) to a bike rental facility and conversion of the existing comfort station/visitor contact station (Building No. 41) to a visitor services/management support building would not affect character-defining features of the buildings provided that rehabilitation is carried out in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Preservation of defining architectural features while allowing compatible use of the building would constitute a moderate, beneficial, site-specific, long-term impact.

Removal of the existing parking lot and conversion of the area to a landscaped, pedestrian-use area would alter patterns of historic vehicle circulation through the landscape but would not affect the historic setting or overall circulation pattern through the historic landscape. These impacts would be minor, adverse, site-specific, and long-term. The pedestrian area would buffer the most sensitive portion of the historic district (the area in proximity to the Watchtower) from vehicle congestion and noise currently accompanying use of the existing lot and would have a minor, beneficial, long-term, site-specific effect on the historic district. The proposed expanded parking area would be located farther to the west, away from the core of the historic district.

Formalizing and improving existing social trails along the rim would have no direct effect on cultural resources and may have indirect, beneficial, minor, local, long-term effects on existing resources by preventing the creation of other social trails in sensitive areas.

Resurfacing four segments of road for a total of approximately 28.8 km (18 miles) would have no effect on the historical cultural landscape or other cultural resources in the area because the resurfacing will be confined to the existing road prism.

Ethnographic resources important to Native Americans exist in the vicinity of Desert View. However, none are known to exist within the area proposed for development. Consultation with Native American tribal communities would continue to take place to determine whether any previously unknown ethnographic sites would be disturbed by the proposed development activities. Measures to mitigate the impact of the proposed work would be taken as necessary.

Cumulative Effects. The Desert View Watchtower Historic District has sustained previous impacts. Modern buildings (e.g., the comfort stations) have intruded on the historic setting of the cultural landscape and have had minor, site-specific, long-term, adverse effects on the cultural landscape. Previous deterioration of the Watchtower as a result of natural weathering and visitor use impacts has led to concerted restoration efforts over the last few years to preserve the building's defining architectural character. Effects of Alternative B on the historic district would be moderately beneficial, as described above, and would countervail past impacts to the historic district.

The transportation features at Desert View have undergone considerable change over the years, with the trend of moving circulation and parking facilities away from the rim. Actions proposed under this alternative are consistent with this trend and would have minor, adverse, site-specific, long-term impacts on the historic landscape, as described above.

Foreseeable future developments in the Desert View area would result in the loss or disturbance of some archaeological sites. These losses, in conjunction with previous losses and prevailing threats to finite numbers of archaeological resources throughout the region, would diminish the overall understanding of Grand Canyon's cultural history, particularly with regard to prehistoric Ancestral Puebloan people and historic period activity during the late nineteenth and early twentieth centuries. Archaeological data recovery, carried out prior to the proposed activities, would assist in mitigating these effects by permitting the controlled collection and analysis of cultural materials and would ensure that adverse, long-term impacts to archaeological resources would be minor and site-specific. Future developments in the Desert View area are outside the Desert View Watchtower Historic District and are not expected to affect historic structures.

The transit system would use the existing roadway and would not affect cultural resources. Any areas proposed for the greenway trail would be surveyed prior to construction. Data recovery would be carried out at any archaeological sites to ensure that adverse, long-term impacts would be minor and site-specific.

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

Conclusion. Implementation of this alternative would have long-term, moderate, beneficial, site-specific impacts on the Desert View Watchtower Historic District by removing non-contributing buildings, adaptively using and rehabilitating other contributing buildings, and removing the existing parking area to provide a landscaped buffer area enhancing the setting of the Watchtower. Although historic circulation patterns would be altered to facilitate the proposed site design configuration, the spatial orientation of the site would remain largely intact, and adverse impacts on the cultural landscape would be minor, site-specific, and long-term.

There would be no impacts to known ethnographic resources. Archaeological sites identified in the project area would be directly affected by construction activities. Archaeological data recovery would ensure that adverse impacts are minor, site-specific, and long-term.

Park Operations

Direct/Indirect Impacts. Alternative B would result in the expansion of certain facilities at Desert View (e.g., parking lot, restrooms, visitor orientation facilities); in-kind replacement of certain existing facilities (e.g., Trading Post, entrance station, water tank, communications mast); the addition of new facilities (e.g., bike rental facilities, picnic facilities, shuttle bus loop); and

the removal of old facilities (e.g., restroom and housing units). The expansion of existing facilities and addition of new facilities would affect park operations by expanding the areas that require maintenance. The replacement of old facilities with similar, new facilities would reduce the amount of effort required to maintain and repair those facilities. The removal of facilities would also reduce the amount of effort required to maintain Desert View. Therefore, effects of this alternative on park operations would be moderate, local, long-term, and both adverse and beneficial.

The realignment of Desert View Drive, road rehabilitation, and addition of transit facilities to Desert View should improve the ability of the Park to provide visitors with safe, comfortable, and convenient transportation during peak visitation. Changes in the visitor services available at Desert View should also enhance the ability of visitors to understand and appreciate the resources of the South Rim. These changes would constitute a moderate, beneficial, local, long-term change in park operations.

Cumulative Impacts. The construction of housing units and other facilities in the Desert View housing area and the campground expansion could have long-term, moderate, local, adverse impacts on park operations by increasing the number of structures and areas that need to be maintained. Upgrades to the wastewater treatment plant should have a long-term, moderate, beneficial, local impact on park operations because the new facility would be more cost effective and would not require staff time for pumping and hauling wastewater.

The greenway trail and transit system would affect park operations by increasing the number of facilities and area that must be maintained. These alternative transportation methods should, however, help relieve traffic congestion along the South Rim and enhance the ability of the Park to provide for visitor enjoyment. Effects of the greenway trail and transit system would therefore be moderate, local, long-term, and both beneficial and adverse.

Conclusion. Alternative B would have moderate, long-term, local, beneficial and adverse impacts to park operations.

ALTERNATIVE C – PROPOSED ACTION

Soils

Direct/Indirect Impacts. Approximately 5.7 ha (14.3 acres) of soil at Desert View would be impacted under this alternative. An additional 0.6 ha (1.5 acres) would be affected if future visitation requires additional parking. This would result in some compaction and displacement. Impacts associated with compaction include reduced water infiltration, reduced soil porosity, reduced water holding capacity, reduced aeration of the soil, increased surface runoff, and increased soil erosion. The adverse impact of compaction in the Desert View area would be long-term and site-specific and would be negligible because of the coarse, sandy nature and high infiltration properties of the soils. In addition, the majority of the area impacted would be paved and thus permeability of the soil would become irrelevant. Impacts associated with displacement include removal of the nutrient surface layer and soil profile depletion. These impacts would be

adverse, minor, site-specific, and long-term. Formalization of social trails in the Desert View area may reduce the creation of new social trails, thereby reducing impacts to the soil resource. This impact would be negligible, beneficial, local, and long-term. Road rehabilitation projects would occur within the existing road prism and would have no additional impact to soils.

Cumulative Impacts. About 30 ha (75 acres) within a 1.6-kilometer (1-mile) radius of Desert View have been impacted from existing developments, roads, or utility corridors. The foreseeable future developments probably would not affect more than 8 ha (20 acres) of ground. Therefore, the total cumulative impact to the soil resource for this alternative would be about 45 ha (110 acres). This is about 3 percent of the area considered in the soil analysis, which includes the Desert View area and the area within a 1.6-kilometer (1-mile) radius of Desert View.

The transit system is not expected to affect soil resources because it will use existing roadways. Preliminary plans for the greenway trail propose that it follow existing social trails and utility corridors where soils have already been impacted. The greenway trail may result in a decrease in the formation of new social trails in the area. The greenway would therefore result in negligible, adverse, site-specific, long-term impacts and may result in negligible, beneficial, local, long-term impacts to the soil resource.

Impairment. The Proposed Action would have minor, long-term impacts to the soil resource through compaction and displacement. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion. Implementing this alternative would result in minor, long-term, site-specific, adverse impacts and negligible, beneficial, local, long-term impacts to the soil resource. Cumulative impacts would be similar to direct and indirect impacts.

Visual Resources

Direct/Indirect Impacts. Construction activities proposed under Alternative C would result in disturbance to 400 lineal meters (1,312 lineal feet) for underground trenching in addition to the approximately 6.3 ha (15.8 acres) of juniper/big sagebrush/pinyon pine that would be cleared under this alternative. This would constitute an alteration of the existing forest canopy and some disturbance within an existing cleared powerline corridor. Use of existing clearings within the forest canopy, use of natural landscape for a color palette, and revegetation with native materials would integrate the manmade features into the landscape. The majority of the cleared area would become roads, cleared shoulders, parking lots, buildings, or small landscaped islands, some of which would be revegetated with native plants. This would not be considered a change to existing visual quality because of the presence of existing development, which has already altered the natural landscape.

The water tank and associated communications equipment would be relocated to an area approximately 229 m (750 feet) south of the proposed bypass, out of the Desert View visitor area. This location would require removal of a few mature trees and extension of water and communication lines through the forest to the new entrance station. The utility trenches would be field-located through existing clearings to the entrance station. A short distance of the trench may be visible to more aware visitors but would be located out of the cone of vision for visitors traveling along Desert View Drive. The existing mature pinyon-juniper forest would screen the tank and pumphouse, and most visitors would not notice these structures. A communications satellite dish and tower would project above the water tank in a line of sight with the Main Village communications equipment. Visitors approaching Desert View on Desert View Drive, particularly eastbound traffic, may see the communications equipment. This would be a minor, adverse, site-specific, long-term impact.

In addition to the water tank and communications tower being removed from the visitor area, the most visible existing power and telephone lines would be placed underground, out of the visitors' view. Existing mobile homes would be relocated or replaced with new housing farther from the visitor area. Although a large parking area with landscaped islands would be built in place of these features, this exchange of development types would provide a greater amount of visual organization, compared with the existing haphazard development pattern and proliferation of utility lines. This would be a moderate, beneficial, site-specific, long-term impact.

Cumulative Impacts. Construction of existing development, roads, and utility corridors has resulted in moderate, adverse, site-specific, long-term impacts to the visual resources through alteration of the natural landscape and creation of visual clutter. The majority of the foreseeable future developments at Desert View would not affect visual quality because visitors would not interface with the new developments. This would include the wastewater treatment facility, employee housing, employee laundry/lounge, and management support facilities. The expansion of the campground at Desert View would not affect the surrounding visual quality but may have minor, adverse, site-specific, long-term impacts on the appearance of the campground itself. Likewise, construction of the greenway trail would affect only visitors using the trail, and effects would be minor, adverse, site-specific, and long-term. The transit system is not expected to affect visual resources because existing roadways would be used.

Impairment. The Proposed Action would result in minor, adverse changes to the existing visual quality. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion. Direct impacts would be minor, long-term, adverse, and site-specific and moderate, long-term, beneficial, and site-specific. Direct impacts would include greater visual organization. Cumulative impacts would be minor, adverse, site-specific, and long-term.

Biotic Communities

Direct/Indirect Impacts. Approximately 5.7 ha (14.3 acres) of juniper/big sagebrush/pinyon pine habitat would be cleared under this alternative. An additional 0.6 ha (1.5 acres) would be cleared if future visitation requires additional parking. This would constitute a long-term loss of habitat because the majority of the cleared area would become roads, cleared shoulders, parking lots, small landscaped islands, or buildings. However, this would not be considered an irreversible loss of habitat because the habitat could be reclaimed by destroying the developments and restoring the site. The road rehabilitation projects would occur only within the existing road prism and would not result in the loss of any habitat.

Loss of habitat would likely have a negligible affect on wildlife populations. A direct loss of some individuals would occur during construction activities. However, the majority of small mammals, birds, and reptiles that are currently utilizing the habitat that is proposed for clearing would be displaced to adjacent habitat.

In addition to loss of habitat, impacts of implementing this alternative would include decreased wildlife security, increased disturbance to adjacent habitat, and increased fragmentation. However, these impacts would be negligible because they would occur in areas currently degraded due to high disturbance levels from existing developments, roads, utility corridors, and human use.

Cumulative Impacts. The impacts of past, present, and foreseeable future actions to biotic communities would be similar to those described above for direct/indirect impacts. Within a 1.6-kilometer (1-mile) radius of Desert View, about 30 ha (75 acres) of habitat have been removed for existing developments, roads, and utility corridors. Probably less than 8 ha (20 acres) of habitat would be lost after implementing all foreseeable future actions. The cumulative loss of habitat would be about 45 ha (110 acres). This habitat loss would be minor because of the ubiquity of this community type in the South Rim area. Approximately 27,500 ha (68,000 acres) of juniper/big sagebrush/pinyon pine community type are present just within Grand Canyon National Park.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. This would ensure that the habitat type and function of the ecosystem below the wastewater treatment facility would not change. Impacts to the biotic community from the greenway trail and the mass transit system cannot be evaluated because preliminary plans for these projects have not yet been developed.

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

Conclusion. About 6.3 ha (15.8 acres) of juniper/big sagebrush/pinyon pine habitat would be directly lost for the long term under this alternative. Direct and cumulative impacts to the biotic community would be adverse, long-term, local or site-specific, and minor or negligible because of the existing degraded condition of the impacted habitat and the ubiquity of this community type.

Exotic Vegetation and Noxious Weeds

Direct/Indirect Impacts. Approximately 5.7 ha (14.3 acres) of ground would be disturbed at Desert View under Alternative C. An additional 0.6 ha (1.5 acres) would be disturbed if future visitation requires additional parking. An increase in the amount of disturbed ground would increase the potential for spread or introduction of exotic vegetation. No new ground would be disturbed for the road rehabilitation projects, but construction vehicles would be working in previously disturbed areas and could spread exotic vegetation from these areas. Prevention and mitigation measures implemented with this alternative would reduce the risk of spread and introduction of exotic species. For instance, pressure washing of ground disturbing equipment would substantially reduce the risk of introducing a new exotic species. Post-construction revegetation, monitoring, and treatment would substantially reduce the risk of spreading existing populations and introducing new species. Overall impacts of this alternative would be adverse, minor, local, and long-term.

Cumulative Impacts. About 30 ha (75 acres) of ground have been disturbed in the vicinity of Desert View for existing developments, roads, and utility corridors. This ground disturbance has allowed the establishment of some exotic vegetation, which is treated under the ongoing exotic vegetation control program at Grand Canyon National Park. Probably less than 8 ha (20 acres) of additional ground would be disturbed during implementation of all foreseeable future actions, and approximately 6.3 ha (15.8 acres) would be disturbed under Alternative B. However, the majority of the disturbed areas would not be subject to potential exotic vegetation invasion because they would be covered by impervious surfaces or buildings. In addition, preventative and mitigation measures associated with all the development projects would substantially reduce the risk of spread or introduction. Cumulative impacts would be adverse, minor, local, and long-term.

Conclusion. This alternative would have direct and cumulative, long-term, minor, adverse, local impacts on exotic vegetation. Prevention and mitigation measures associated with all construction projects should be sufficient to ensure exotic vegetation does not become a major concern at Desert View.

Special Status Species

Mexican Spotted Owl

Direct/Indirect Impacts. Alternative C would not result in any impacts to nesting or roosting habitat. If nesting or roosting habitat were present in the vicinity of Desert View, it would be located below the rim. No vegetation manipulation would occur below the rim and no activities

related to increasing visitor use of the area below the rim are proposed. The road rehabilitation projects would remain in the existing road prism and would not affect any habitat.

This alternative could affect MSO through impacts to foraging areas and prey and through increased disturbance. This alternative proposes to remove 5.7 ha (14.3 acres) of potential foraging habitat at Desert View. An additional 0.6 ha (1.5 acres) would be removed if future visitation requires additional parking. The potential foraging habitat that would be lost is of marginal quality because of high disturbance levels from existing developments, roads, and human use. In addition, relative to the amount of available foraging habitat, the amount lost would be negligible. The loss of foraging habitat could result in a limited amount of prey base mortality. Woodrats, mice, and voles could be killed during excavation activities. However, the majority of prey utilizing the habitat proposed for removal would be displaced to adjacent habitat and not killed. In addition, the change in prey base would be a negligible impact because only a small area would be affected relative to available habitat for prey species. Therefore, loss of foraging habitat would have negligible, adverse, local, long-term effects on the spotted owl.

Spotted owls could be disturbed by the noise and activity associated with construction at Desert View and road rehabilitation sites. Desert View Drive between MP 247 and MP 253 is within 0.4 km (0.25 mile) of a proposed PAC, and the portion of the south entrance road within approximately 0.32 km (0.2 mile) of the intersection with Desert View Drive is within 0.8 km (0.5 mile) of a proposed PAC. Roadwork in these areas would be restricted to the non-breeding season, in accordance with mitigation measures developed through a batch consultation with the USFWS (NPS 2002a). Desert View and Desert View Drive from 4.6 km (3.0 miles) north of the eastern Park boundary to Tusayan museum are within 0.8 km (0.5 mile) of potential MSO habitat. A second year of surveys for MSO in these areas will be completed in 2002. After surveys are complete, conservation measures developed in the batch consultation will be revisited for applicability to this project. Additional consultation with USFWS will be initiated if necessary. Mitigation measures and any additional consultation would ensure that adverse noise impacts to MSO would be minor, local, and short-term.

The presence of a heli-pad at Desert View is unlikely to affect MSO. The heli-pad would be used only for emergencies, perhaps twice a year. Flights would arrive from and depart in the direction of Grand Canyon Village and would not go below the rim (M. Minton, NPS, pers. comm., July 2002).

Cumulative Impacts. Ongoing activities at Desert View create year-round disturbance in the vicinity. This continual disturbance has decreased the quality of habitat in and around Desert View for MSO. Foreseeable future developments in the vicinity of Desert View would affect spotted owl habitat through the loss of potential foraging habitat and increased disturbance during construction. However, the loss of foraging habitat is unlikely to affect the spotted owl because foraging habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. In addition, relative to the amount of available foraging habitat, the 45 ha (110 acres) affected by past, present, and future development would be negligible.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would therefore not change the quality of habitat for prey species of the spotted owl.

The proposed transit system would use existing roadways and would not result in the loss of any habitat or disturbance to roosting or nesting areas. The greenway trail is proposed to follow existing trails and utility corridors and would result in a negligible loss of potential foraging habitat. Construction of the greenway within 0.8 km (0.5 mile) of any MSO PACs would be restricted to outside the MSO breeding season to minimize noise disturbance from construction. Noise disturbance from construction would, therefore, be an adverse, minor, local, short-term impact. Use of the greenway trail may result in increased noise disturbance to nesting and roosting habitat below the rim. These adverse effects would be local and long-term and would probably be minor to moderate.

Conclusion. Alternative C would result in negligible, long-term, local, adverse impacts to spotted owl foraging habitat and minor to moderate, short- and long-term, local, adverse impacts from noise disturbance. Alternative C may affect, but is not likely to adversely affect, the Mexican spotted owl.

California Condor

All impacts to the California condor under the Proposed Action Alternative would be the same as under Alternative B.

Direct/Indirect Impacts. Alternative C would not result in any impacts to nesting or roosting habitat for the California condor because all such habitat occurs below the rim. No vegetation manipulation would occur below the rim and no activities related to increasing visitor use of the area below the rim are proposed. The road rehabilitation projects would remain on the existing road prism and would not affect any habitat. Foraging habitat would not be affected because this alternative would not change the availability of food sources for condors.

This alternative could affect California condors through increased contact with humans during construction. Condors may be attracted by construction activities, and condor contact with humans would be of concern if visitors harass the birds or if the birds become habituated to humans. Mitigation measures to cease construction activities if condors are present would reduce disturbance from construction activities on the birds. Hazing by permitted Park employees would ensure condors do not become habituated to humans. Therefore, adverse impacts to condors would be short-term, local, and negligible.

Cumulative Impacts. Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would not change the quality of habitat for prey species of the California condor.

The proposed transit system would use existing roadways and would not affect condor habitat or result in any increased likelihood of interactions between condors and humans. The greenway

trail is proposed to follow existing social trails and utility corridors and would not affect condor roosting or nesting habitat. Construction activities may attract condors and increase the potential for condor/human interactions. Use of the greenway trail could concentrate hikers and bikers above potential nesting and roosting habitat and could result in an increased likelihood of contact between condors and humans. Condors are monitored daily via radio telemetry, and this monitoring should reveal any conflicts between trail users and condors. Condors interacting with humans would be hazed by permitted Park employees to ensure condors do not become habituated to humans. Any adverse effects would be local and short- and long-term and would probably be negligible.

Conclusion. Alternative C could have adverse, negligible, local, short-term impacts to condors. The cumulative impacts would be adverse, local, negligible, and both short-and long-term. Alternative C may affect, but is unlikely to adversely affect, the California condor.

American Peregrine Falcon

Direct/Indirect Impacts. No nesting habitat would be affected by Alternative C because all potential nesting habitat occurs below the rim. Disturbance to peregrine falcons as the result of increased activity at Desert View is not a major concern. The pair of falcons in the Desert View vicinity appears to be habituated to human activity as evidenced by their continued presence near Desert View. No peregrine eyries are known from within 0.8 km (0.5 mile) of road rehabilitation sites, and no disturbance to peregrines is expected from these projects. No direct effects on peregrine falcons are expected under Alternative C.

The presence of a heli-pad at Desert View is unlikely to affect peregrine falcons. The heli-pad would be used only for emergencies, perhaps twice a year. Flights would arrive from and depart in the direction of Grand Canyon Village and would not go below the rim (M. Minton, NPS, pers. comm., July 2002).

Alternative C proposes to remove 5.7 ha (14.3 acres) of potential foraging habitat at Desert View. An additional 0.6 ha (1.5 acres) would be removed if future visitation requires additional parking. However, this loss of habitat would unlikely affect peregrine falcons because the change in prey base would be negligible given the small area being affected relative to the available potential habitat for the prey base. The majority of the prey base utilizing the habitat proposed for removal would be displaced to adjacent habitat. Indirect effects on peregrine falcons under Alternative C would be long-term and negligible.

Cumulative Impacts. The incremental development of Desert View is unlikely to affect peregrine falcons directly because the peregrines nesting below Desert View appear to be habituated to the ongoing disturbance at Desert View. None of the foreseeable future developments would affect nesting habitat below the rim or increase use of the area below the rim. The majority of the developments would occur in existing disturbed areas and would not measurably change prey base populations. Relative to the amount of available foraging habitat, the 45 ha (110 acres) affected by past, present, and future development at Desert View would be negligible. Any adverse impacts of developments at Desert View would therefore be negligible, local, and long-term.

Improvements at the Desert View wastewater treatment plant will result in a pulsed release of surface water into a rock-filled channel during monsoons and winter, when free water is naturally available. These pulsed releases would not change the quality of habitat for prey species of the peregrine falcon.

The proposed transit system would use existing roadways and would not result in the loss of any habitat or disturbance to roosting or nesting areas. The greenway trail is proposed to follow existing trails and utility corridors and would result in a negligible loss of potential foraging habitat. Construction and use of the greenway trail may result in increased noise disturbance to nesting and roosting habitat below the rim. These adverse effects would be local and short- and long-term and would probably be minor to moderate.

Conclusion. Alternative C could have negligible, adverse, local, long-term impacts on peregrine falcons. The cumulative adverse effects would be local and short- and long-term and would probably be minor to moderate. Alternative C may affect, but is unlikely to adversely affect, the American peregrine falcon.

Sentry Milk-vetch

All impacts to the sentry milk-vetch under the Proposed Action Alternative would be the same as under Alternative B.

Direct/Indirect Impacts. Road rehabilitation along Desert View Drive from Tusayan Museum to Desert View and from approximately 2.8 to 3.5 miles south of Desert View would be within potential habitat for the sentry milk-vetch. Trail improvements around Desert View would also be in potential habitat. No other areas at Desert View or along the road rehabilitation areas would be within potential habitat for the sentry milk-vetch. All areas of potential habitat would be surveyed prior to any construction, and consultation with USFWS would be initiated if sentry milk-vetch were found. Adverse impacts to sentry milk-vetch should therefore be negligible, site-specific, and long-term. Formalization of trails around Desert View may result in visitors adhering more strictly to the trails. This would reduce foot traffic in potential habitat for the sentry milk-vetch and could have a minor, long-term, beneficial, local effect on sentry milk-vetch.

Cumulative Impacts. The only foreseeable future action that could occur in habitat suitable for sentry milk-vetch is the greenway trail. Surveys for sentry milk-vetch would be completed prior to any construction. If sentry milk-vetch were present, consultation with the USFWS would be initiated. Consultation should result in negligible, adverse, site-specific, long-term impacts to sentry milk-vetch. Construction of the greenway trail may also have minor, beneficial, local, long-term impacts on the sentry milk-vetch by reducing the creation of new social trails.

Conclusion. Alternative C could have negligible, long-term, site-specific, adverse effects and minor, long-term, beneficial, local effects on the sentry milk-vetch. Adverse cumulative impacts would be negligible, site-specific, and long-term. There may also be beneficial, local, long-term, minor cumulative effects. Alternative C may affect, but is not likely to adversely affect, the sentry milk-vetch.

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

Visitor Experience

Direct/Indirect Impacts. Construction of the bypass road would allow visitors not stopping at Desert View to bypass the area efficiently. The configuration of the parking lots and secondary roads for this alternative would create four decisions for visitors wanting to park. As visitors travel along Desert View Drive, the first decision point would be whether to take the only entry road into Desert View or not. Then visitors would travel down the entry road and need to make three decisions at road intersections: 1) road to the gas station, campground, and shuttle loop, 2) road to car parking lot, and 3) road the RV/bus parking lot. The bus and RV parking are separated from car parking areas, and all parking is separated from the bus shuttle, gas station, and campground traffic. This configuration was determined in the value analysis to be the easiest for visitors to negotiate. In addition, this alternative provides minimal conflict between visitor traffic and emergency response vehicles. A heli-pad at the site of the current entrance station would provide faster access to care for visitors experiencing medical emergencies.

The proximity of the car parking area to the shuttle and rim areas would be about 90 m (300 feet) and 245 m (800 feet), respectively. The proximity of the bus parking area to the rim would be 120 to 245 m (400 to 800 feet). The most remote car parking would be approximately 335 m (1,100 feet) from the shuttle and 488 m (1,600 feet) from the rim. An electric tram would ferry visitors from the parking lot to the shuttle stop and the pedestrian area and would make it easier for elderly or physically disabled visitors to access the Watchtower area and transportation to other parts of the South Rim.

The new entrance station would be approximately 0.4 km (0.25 mile) south of the existing entrance station. The road grade in this area is relatively flat and would safely accommodate the entrance station.

This alternative proposes to relocate the water tank to the south of the new bypass road. The tank would not be visible above the vegetation and would not degrade the visual quality of the site. The communications mast would also be relocated adjacent to the water tank. The antenna would be visible and would be the same height as the nearby utility poles. These structures would be located on the far side of Desert View Drive from the parking lot and the rim and would not detract from the visual appearance of the rim area.

The removal of employee housing at the new parking lot site would reduce intrusions of visitors on off-duty employees and would also enhance visual quality at Desert View.

As visitors leave the parking area, they would have a clear view of the Watchtower. The pedestrian area (old parking lot) and interspersed picnic areas would open up the overlook area and provide space for picnicking and a more natural viewing experience. Placement of the picnic areas away from the rim would reduce the amount of trash being thrown over the rim and would improve the experience of visitors looking over the rim.

The orientation plaza would be prominently located between the car parking lot and bus shuttle area. The centralized location of the orientation plaza would cause more visitors to stop at the plaza and increase the opportunity for increasing visitors' understanding and appreciation of the Park and its resources.

A bike rental facility would be constructed near the west end of the existing parking lot or an existing building would be adaptively reused as a bicycle rental facility. Placing the rental facility at the west end of the existing parking lot would minimize the conflicts between bicyclist and pedestrian traffic.

The Trading Post would be relocated to the existing building that houses the General Store, and the store would be housed in a new building near the bus shuttle loop. This would create a visitor services complex surrounding the shuttle loop that would include gift shop, food service, grocery store, transit shelter, restrooms, and orientation center. This visitor services complex would be set back far enough from the rim to retain the natural and historic setting at the overlook area.

Realignment of the road at Desert View and rehabilitation of other portions of Desert View Drive and the south entrance road may cause a short-term inconvenience to visitors through short delays in traffic. The effects of construction would be minimized by not stopping traffic in any one direction for more than 15 minutes at a time and not constructing on weekends or holidays. In the long term, road realignment and rehabilitation would improve convenience, comfort, and safety for visitors at the South Rim.

Fully implementing this alternative would convert Desert View into a transportation hub of the South Rim. Visitors utilizing the east entrance would park at Desert View and use the Park transit system to travel to other destination points. This would reduce the overall traffic in the Park, which would reduce visitor frustration and increase the overall enjoyment of Park visitors.

Overall, Alternative B would have moderate, beneficial, long-term, local effects on the visitor experience. There would also be minor, adverse, short-term, local effects caused by traffic delays.

Cumulative Impacts. The majority of the foreseeable future developments at Desert View would not affect the visitor experience because visitors would generally not interface with the new developments. This would include the wastewater treatment facility, employee housing, employee laundry/lounge and management support facilities. However, the proposed campground expansion would enhance the visitor experience by increasing visitor convenience and decreasing visitor frustrations if they are searching for such facilities. The greenway trail and transit system would provide alternate means of transportation and reduce traffic congestion

and associated air pollution between destination sites along the South Rim. These impacts would be beneficial, minor, local, and long-term.

Conclusion. Alternative C could result in minor, short-term impacts to the visitor experience by causing traffic delays but would have moderate, long-term impacts such as reducing traffic congestion and parking problems and providing a more open and natural overlook area, a full range of visitor services in a central location, and an efficient transit system.

Cultural Resources

Direct/Indirect Impacts. Construction of the bypass road and new parking area and trenching for the placement of utilities would occur within identified archaeological sites and would have direct impacts on identified archaeological resources. The NPS would consult with the Arizona State Historic Preservation Office and concerned Native American tribal officials regarding appropriate measures to mitigate these impacts and ensure that adverse, long-term impacts would be minor and site-specific.

Construction of a new entrance station and demolition of the existing entrance station booths would be expected to have no impacts on historic properties. The existing entrance station was built in 1964 and is not considered eligible for the National Register. Construction of a heli-pad at the site of the existing entrance station booths would have no effect on cultural resources. Elimination of a section of existing access road leading to the maintenance area would have minor, long-term impacts to the cultural landscape. Elimination of the road would alter patterns of historic vehicle circulation but would not substantially diminish the historic setting or overall circulation pattern through the historic landscape. This would be a minor, adverse, site-specific, long-term impact.

An existing water tank and associated utility building, an antenna, a propane tank, ten trailer homes/pads, and two other buildings would be removed to accommodate the parking area. An existing restroom (Building No. 1410) adjacent to the General Store building (No. 1388) would also be removed. These facilities are identified as non-contributing to the historic district. Their removal would enhance the setting of the historic district and would have a minor, beneficial, site-specific, long-term effect.

The existing Trading Post would be moved to the existing General Store building (No. 1388) and the old Trading Post building (No. 1168) would be used to house a visitor service center and NPS bookstore. Conversion of these facilities to new uses would have no effect on the historic landscape.

Construction of new facilities (i.e., shuttle loop and transit shelter, bike rental facility, picnic areas, General Store, tram and associated maintenance building, water tank and pump house, communications mast, and propane tanks) would be sensitively designed to harmonize with the potentially-eligible cultural landscape and the listed National Register Historic District and would have negligible, adverse, site-specific, long-term impacts on the historic landscape.

Two existing structures (Building Nos. 915 and 914) at the north end of the proposed parking area may be adaptively reused for other functions, including possible restroom facilities, orientation facilities, and/or administrative support. These two buildings need to be retained because they contribute to the historic district at Desert View. The existing comfort station/visitor contact station (Building No. 41) would be converted to a visitor services/management support building. Adaptive reuse of these buildings would not affect character-defining features of the buildings provided that rehabilitation is carried out in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Preservation of defining architectural features while allowing compatible use of the building would constitute a moderate, beneficial, site-specific, long-term impact.

A fourth building (Building No. 149) at the north end of the proposed parking area may also be adaptively reused as a tram maintenance building, or it may be replaced if rehabilitation is determined to be unfeasible. Building No. 149 was not included in the historic district, but is part of a cluster of buildings that define the historic character of the landscape in that particular area (OCULUS 2001). Building No. 149 would be retained until a condition assessment is prepared to determine the feasibility of preserving and rehabilitating the building. If preservation and rehabilitation are not possible, Building No. 149 may be replaced with a building of similar size and massing. This would help maintain the building cluster that defines the historic character of the landscape in that area of Desert View, and would constitute a minor, beneficial, site-specific, long-term effect.

Removal of the existing parking lot and conversion of the area to a landscaped, pedestrian-use area would alter patterns of historic vehicle circulation through the landscape but would not affect the historic setting or overall circulation pattern through the historic landscape. These impacts would be minor, adverse, site-specific, and long-term. The pedestrian area would buffer the most sensitive portion of the historic district (the area in proximity to the Watchtower) from vehicle congestion and noise currently accompanying use of the existing lot and would have a minor, beneficial, long-term, site-specific effect on the historic district. The proposed expanded parking area would be located farther to the west, away from the core of the historic district.

Formalizing and improving existing social trails along the rim would have no direct effect on cultural resources and may have indirect, beneficial, minor, local, long-term effects on existing resources by preventing the creation of other social trails in sensitive areas.

Resurfacing four segments of road for a total of approximately 28.8 km (18 miles) would have no effect on the historical cultural landscape or other cultural resources in the area because the resurfacing will be confined to the existing road prism.

Ethnographic resources important to Native Americans exist in the vicinity of Desert View. However, none are known to exist within the area proposed for development. Consultation with Native American tribal communities would continue to take place to determine whether any previously unknown ethnographic sites would be disturbed by the proposed development activities. Measures to mitigate the impact of the proposed work would be taken as necessary.

Cumulative Effects. The Desert View Watchtower Historic District has sustained previous impacts. Modern buildings (e.g., the comfort stations) have also intruded on the historic setting of the cultural landscape and have had minor, site-specific, long-term, adverse effects on the cultural landscape. Previous deterioration of the Watchtower as a result of natural weathering and visitor use impacts has led to concerted restoration efforts over the last few years to preserve the building's defining architectural character. Effects of Alternative B on the historic district would be moderately beneficial, as described above, and would countervail past impacts to the historic district.

The transportation features at Desert View have undergone considerable change over the years, with the trend of moving circulation and parking facilities away from the rim. Actions proposed under this alternative are consistent with this trend and would have minor, adverse, site-specific, long-term impacts on the historic landscape, as described above.

Foreseeable future developments in the Desert View area would result in the loss or disturbance of some archaeological sites. These losses, in conjunction with previous losses and prevailing threats to finite numbers of archaeological resources throughout the region, would diminish the overall understanding of Grand Canyon's cultural history, particularly with regard to prehistoric Ancestral Puebloan people and historic period activity during the late nineteenth and early twentieth centuries. Archaeological data recovery, carried out prior to the proposed activities, would assist in mitigating these effects by permitting the controlled collection and analysis of cultural materials and would ensure that adverse, long-term impacts to archaeological resources would be minor and site-specific. Future developments in the Desert View area are outside the Desert View Watchtower Historic District and are not expected to affect historic structures.

The transit system would use the existing roadway and would not affect cultural resources. Any areas proposed for the greenway trail would be surveyed prior to construction. Data recovery would be carried out at any archaeological sites to ensure that adverse, long-term impacts would be minor and site-specific.

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

Conclusion. Implementation of this alternative would have long-term, moderate, beneficial, site-specific impacts on the Desert View Watchtower Historic District by removing non-contributing buildings, adaptively using and rehabilitating other contributing buildings, and removing the existing parking area to provide a landscaped buffer area enhancing the setting of the Watchtower. This alternative would adaptively reuse more existing buildings than Alternative B. Although historic circulation patterns would be altered to facilitate the proposed site design configuration, the spatial orientation of the site would remain largely intact, and adverse impacts on the cultural landscape would be minor, site-specific, and long-term.

There would be no impacts to known ethnographic resources. Archaeological sites identified in the project area would be directly affected by construction activities. Archaeological data recovery would ensure that impacts are minor.

Park Operations

Direct/Indirect Impacts. Alternative C would result in the expansion of certain facilities at Desert View (e.g., parking lot, restrooms, visitor orientation facilities); in-kind replacement of certain existing facilities (e.g., General Store, entrance station, water tank, communications mast); the addition of new facilities (e.g., bike rental facilities, picnic facilities, shuttle bus loop); and the removal of old facilities (e.g., restroom and housing units). The expansion of existing facilities and addition of new facilities would affect park operations by expanding the areas that require maintenance. The replacement of old facilities with similar, new facilities would reduce the amount of effort required to maintain and repair those facilities. The removal of facilities would also reduce the amount of effort required to maintain Desert View. Therefore, effects of this alternative on park operations would be moderate, local, long-term, and both adverse and beneficial.

The realignment of Desert View Drive, road rehabilitation, and addition of transit facilities to Desert View should improve the ability of the Park to provide visitors with safe, comfortable, and convenient transportation during peak visitation. Changes in the visitor services available at Desert View should also enhance the ability of visitors to understand and appreciate the resources of the South Rim. These changes would constitute a moderate, beneficial, local, long-term change in park operations.

Cumulative Impacts. The construction of housing units and other facilities in the Desert View housing area and the campground expansion could have long-term, moderate, local, adverse impacts on park operations by increasing the number of structures and areas that need to be maintained. Upgrades to the wastewater treatment plant should have a long-term, moderate, beneficial, local impact on park operations because the new facility would be more cost effective and would not require staff time for pumping and hauling wastewater.

The greenway trail and transit system would affect park operations by increasing the number of facilities and area that must be maintained. These alternative transportation methods should, however, help relieve traffic congestion along the South Rim and enhance the ability of the Park to provide for visitor enjoyment. Effects of the greenway trail and transit system would therefore be moderate, local, long-term, and both beneficial and adverse.

Conclusion. Alternative C would have moderate, long-term, local, beneficial and adverse impacts to park operations.

CHAPTER 5 – CONSULTATION AND COORDINATION

CONSULTATION

The following organizations and agencies were contacted for information or assisted in identifying important issues, developing alternatives, or analyzing impacts.

Arizona Department of Environmental Quality

The NPS contacted the Arizona Department of Environmental Quality (ADEQ) to informally discuss water quality concerns associated with parking lots.

Arizona Game and Fish Department

The NPS contacted the AGFD to discuss state-listed endangered, threatened, and species of concern. A list of species of concern was obtained from AGFD.

Public Involvement

Public involvement is described in the Scoping section of Chapter 1 of this document.

State Historic Preservation Office

The NPS sent a scoping letter on 8 December 2000 to the State Historic Preservation Office (SHPO).

Tribal Groups

The NPS sent a scoping letter on 8 December 2000 to eight tribal groups.

U.S. Fish and Wildlife Service

The NPS contacted the USFWS to discuss listed endangered, threatened, and species of concern. The USFWS provided a list of species of concern through a letter dated September 17, 1999. The NPS has initiated consultation with the USFWS for this project. NPS has prepared a biological assessment that addresses multiple construction projects as part of a "batch" consultation effort with the USFWS. The proposed action described in this EA is included as part of this batch consultation. The NPS transmitted this batch biological assessment to USFWS on 10 June 2002 requesting their concurrence on the NPS's determination that the proposed actions may affect, but are not likely to adversely affect, the Mexican spotted owl, California condor, sentry milk-vetch, and bald eagle. Concurrence from USFWS on these determinations is still pending.

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