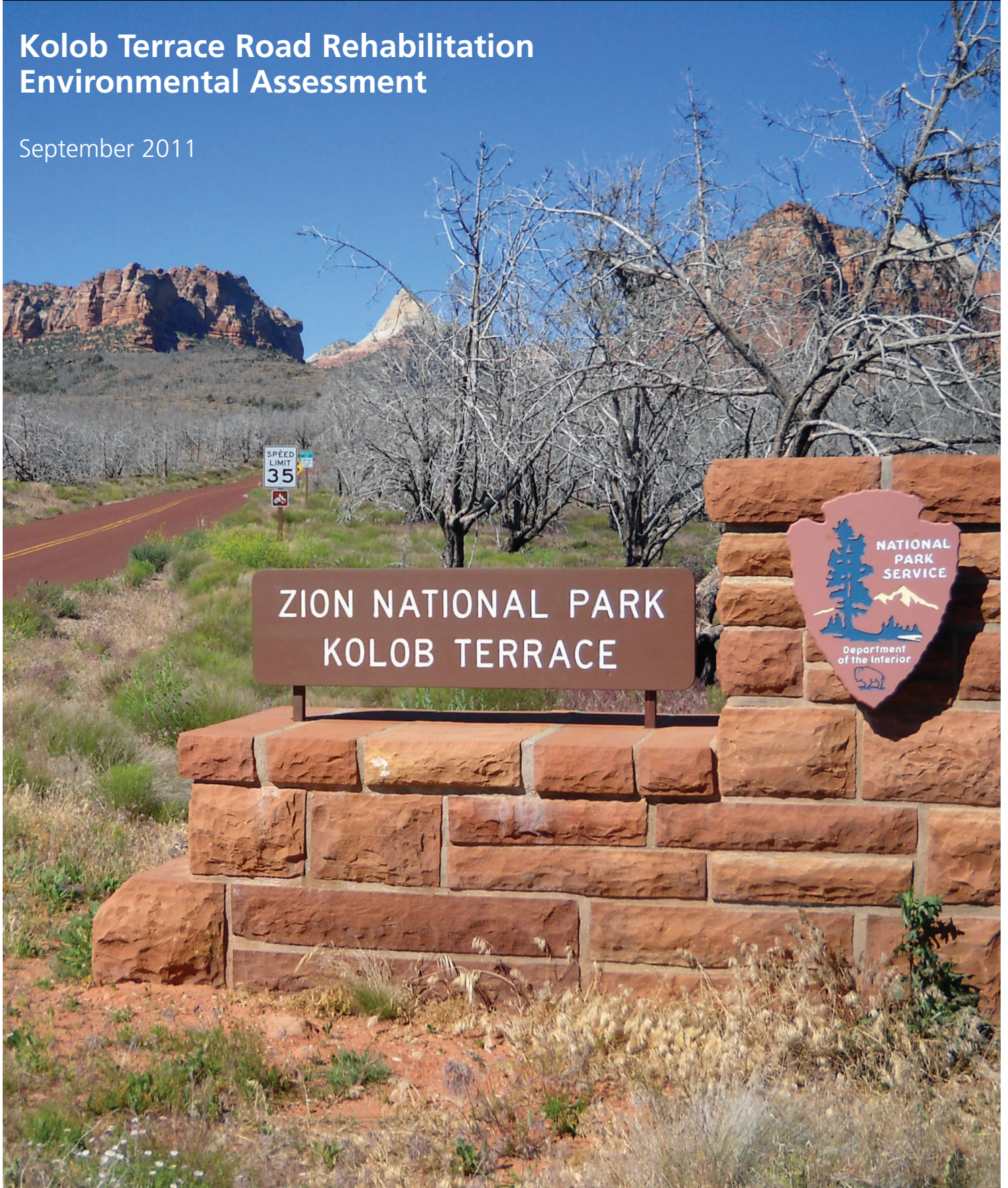




Kolob Terrace Road Rehabilitation Environmental Assessment

September 2011



Kolob Terrace Road Rehabilitation

Environmental Assessment

Summary

Zion National Park (Zion or park) proposes to rehabilitate, restore, and resurface about 9.8 miles of the Kolob Terrace Road (road). The project is divided into two sections. The first section (Zion Route 12) extends from the southern park boundary 4 miles north to where Washington County maintenance begins. The second section (Zion Route 14) extends 5.8 miles to the northern park boundary. Rehabilitation is needed because of the deteriorating condition of the road and safety concerns. The proposed rehabilitation would improve the efficiency of park operations by correcting structural deficiencies, selective widening of narrow sections, and reducing maintenance requirements. Road rehabilitation would improve public and visitor enjoyment and safety when traveling the road, while protecting park scenic, natural, and cultural resources.

This Environmental Assessment (EA) evaluates two alternatives: a no action alternative and a preferred action alternative. Under the no action alternative, the road would not be rehabilitated or improved. Zion staff would continue routine road maintenance and minor repairs, as it has in the past. The road pavement and structural integrity would continue to deteriorate and drainage problems would persist. The preferred alternative includes a number of measures to rehabilitate and improve the condition of the road. Proposed road improvements include correcting road subgrade problems, repairing and installing new drainage measures, selective widening, paving, removing and revegetating informal roadside pullouts, and installing new signs and posts.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts to Zion's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics evaluated in detail in this document are soils; vegetation; hydrology and water quality; archeological resources; visitor use and recreation experience; natural soundscape; public health, safety, and park operations; and socioeconomics. All other resource topics were dismissed because the project would result in negligible to less than minor effects. No major effects were identified as a result of this project. No adverse effects on cultural resources under Section 106 of the National Historic Preservation Act would occur. Public scoping was conducted to assist with the development of this document and comments were received and considered in the evaluation of effects.

Public Comment

If you wish to comment on this EA, you may post comments online using the National Park Service Planning, Environment and Public Comment (PEPC) website at: <http://parkplanning.nps.gov/zion> or mail comments to: Superintendent, Attn. Kolob Road EA; Zion National Park, Springdale, UT 84767.

This EA will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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Acronyms and Abbreviations

APE	Area of Potential Effect
BA	Biological Assessment
BMP	Best Management Practice
CEQ	Council of Environmental Quality
CFLHD	Central Federal Lands Highway Division
CRMP	Comprehensive River Management Plan
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GHG	Greenhouse gas
GMP	General Management Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
ORV	Outstanding Remarkable Values
PAC	Protected Activity Center (Mexican spotted owls)
PEPC	Planning, Environment and Public Comment
Road	Kolob Terrace Road
SHPO	State Historic Preservation Office
SMP	Soundscape Management Plan
UDWR	Utah Division of Wildlife Resources
UTPDES	Utah Pollutant Discharge Elimination System

ENVIRONMENTAL ASSESSMENT KOLOB TERRACE ROAD REHABILITATION ZION NATIONAL PARK

INTRODUCTION

Zion National Park (Zion or park) of the National Park Service (NPS), in cooperation with Central Federal Lands Highway Division (CFLHD) of the Federal Highway Administration (FHWA), is considering rehabilitation of 9.8 miles of Kolob Terrace Road (road). Rehabilitation is needed because of the deteriorating condition of the road and safety deficiencies. The project is divided into two sections. The first section, referred to as Kolob Terrace Road South (or Zion Route 12) extends from the southern park boundary 4 miles north to where Washington County maintenance begins (Figure 1). The second section, referred to as Kolob Terrace Road North (or Zion Route 14) extends 5.8 miles to the northern park boundary. In combination, Route 12 and Route 14 are referred to as Kolob Terrace Road. The road is in Washington, Utah (Figure 1). The project does not include the portions of Kolob Terrace Road that are maintained by Washington County.

Kolob Terrace Road begins outside of the park in the town of Virgin, Utah. The road provides access to some of the higher elevation portions of the park, as well as private land. Several popular trailheads including Hop Valley and the Subway are located off the road. The Lava Point campground, West Rim trail, and Kolob Reservoir also can be accessed via Kolob Terrace Road. The road is closed to cars at Maloney Hill in the winter.

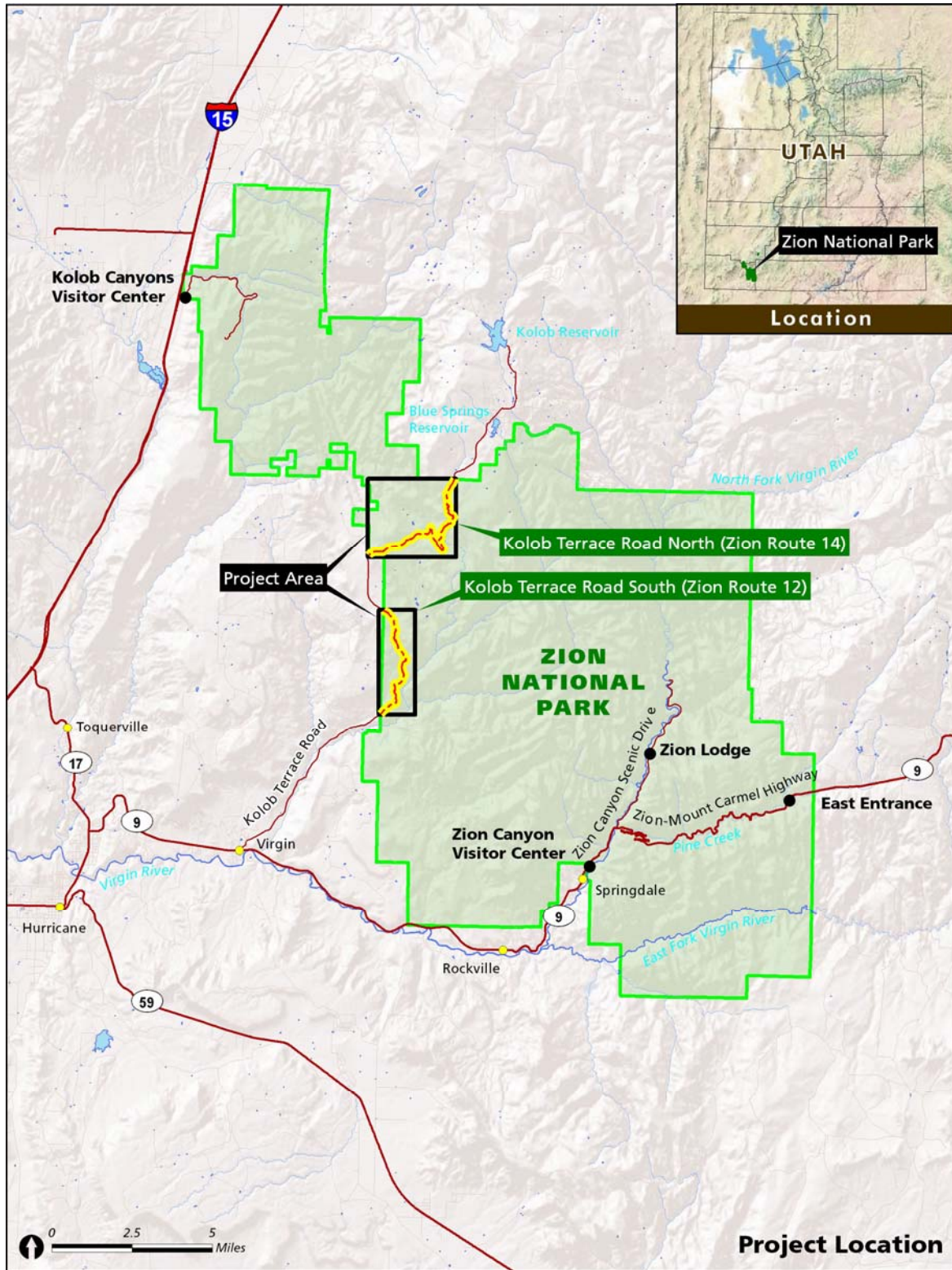
This Environmental Assessment (EA) was prepared to evaluate potential environmental, socioeconomic, and cultural resource effects from the preferred alternative to rehabilitate the Kolob Terrace Road and a no action alternative that does not rehabilitate or improve the road. The EA was prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 CFR Parts 1500-1508 and NPS Director's Order (DO) – 12 and Handbook, *Conservation Planning, Environmental Impact Analysis, and Decision-making*. The EA will determine whether significant impacts would occur as a result of the proposed project and if an environmental impact statement (EIS) or finding of no significant impact (FONSI) would be required.

PROJECT PURPOSE AND NEED

Project Purpose

The purpose of the proposed project is to rehabilitate, restore, and resurface 9.8 miles of Kolob Terrace Road located within park boundaries (Figure 1). Road improvements are needed to correct deteriorating pavement and subgrade and inadequate drainage, and take other measures to restore the condition of the road. The proposed improvements would improve traffic safety, facilitate maintenance, and provide a pleasant driving experience. The objectives of the proposed project are to:

FIGURE 1. PROJECT LOCATION



Improve the Efficiency of Park Operations

- Repair damaged and deteriorating road pavement, drainage, and other structural features
- Reduce maintenance requirements and costs due to deficiencies in the condition of the road

Provide for Visitor Enjoyment and Safety

- Improve the road condition and width to safely accommodate traffic
- Improve access and safety at pullouts
- Reduce the incidence and risk of traffic accidents
- Efficiently implement rehabilitation work while minimizing impacts to visitors and residents

Protect Park Resources

- Maintain the scenic quality of the road
- Protect park natural and cultural resources and values

Project Need

The proposed project is being considered because of the need to address deficiencies in the condition of the road and safety concerns. The current pavement is aged in many locations, which has led to surface cracks, rutting, buckling, and unraveling of the pavement edge (Figure 2). The road was built with no road base and was converted directly from a dirt road to oil and chip seal. Years of chip seal patches with no road base layer, along with increased heavy truck traffic due to housing construction on private property, have impacted the road surface to an unacceptable and potentially unsafe level. Continued crack seal, blade patches, and pothole and edge repair are not keeping up with increasing wear, and fail to protect the road from surface water runoff. Surfaces and edges are deteriorating. Large vehicles are driving on the edge of the road pavement, which threatens adjacent natural and cultural resources.

FIGURE 2. PAVEMENT CRACKING



Portions of the road are very narrow, which is a contributing factor to unraveling of the pavement edge, and is a safety concern due to large vehicles that use the road to access areas north of the park boundary. Selective widening of the travelway and road bench is needed to improve safety and reduce maintenance. A number of informal pullouts need to be closed

and rehabilitated to protect adjacent resources and improve visitor safety. Drainage improvements are needed primarily where road widening is proposed.

Approximately 30 vehicle accidents have been reported on Kolob Terrace Road in the years 1989 to 2005, 2007, and 2008 (NPS 2009). The majority of crashes were from running off the road and speed was the most common contributing element. Some accidents may be attributable to the narrow road, condition of the road surface, and poor sight distance. Additional measures such as new traffic signs, reduced speed limits in select locations, pavement striping and fog lines, road and curve widening, and other measures are needed to improve safety.

PURPOSE AND SIGNIFICANCE OF ZION NATIONAL PARK

Zion was initially established as the Mukuntuweap National Monument in 1909. In 1918, a presidential proclamation enlarged the monument and changed its name to Zion National Monument. Congress established the area as a national park in 1919. The park currently encompasses 148,733 acres.

The purposes, significance, and mission goals of Zion National Park, as outlined in the general management plan (NPS 2001), underlie how the park is managed. The purposes tell why the park was set aside as a unit in the national park system. The significance of the park addresses why the area is unique—why it is important enough to our natural and/or cultural heritage to warrant national park designation, and how it differs from other parts of the country. Zion’s mission goals articulate the ideal future conditions the Park Service is striving to attain.

The purposes of Zion National Park are to:

- Preserve the dynamic natural process of canyon formation as an extraordinary example of canyon erosion
- Preserve and protect the scenic beauty and unique geologic features: the labyrinth of remarkable canyons, volcanic phenomena, fossiliferous deposits, brilliantly colored strata, and rare sedimentation
- Preserve the archeological features that pertain to the prehistoric races of America and the ancestral Indian tribes
- Preserve the entire area intact for the purpose of scientific research and the enjoyment and enlightenment of the public
- Provide a variety of opportunities and a range of experiences, from solitude to high use, to assist visitors in learning about and enjoying park resources without degrading those resources

Zion National Park is significant for the following reasons:

- Zion’s stunning scenery features towering brilliantly colored cliffs and associated vegetation highlighted by a backdrop of contrasting bright southwestern skies.

- Zion is a geologic showcase with sheer sandstone cliffs among the highest in the world.
- The Virgin River — one of the last mostly free-flowing river systems on the Colorado Plateau — is responsible for the ongoing carving of this deeply incised landscape.
- Because of its unique geographic location and variety of life zones, Zion is home to a large assemblage of plant and animal communities.
- Zion preserves evidence of human occupation from prehistoric to modern times, including American Indian sites, remnants of Mormon homesteading, and engineering and architecture related to park establishment and early tourism.

The mission goals of Zion National Park are to:

- Provide park visitors educational and recreational opportunities that foster an appreciation of Zion and its resources
- Ensure that visitor impacts do not impair resources
- Maintain the resources, including plant and animal communities, at healthy and viable levels consistent with natural processes
- Manage cultural and physical resources to ensure long-term integrity
- Ensure that the built environment provides for safe visitor and staff uses in a sustainable and cost-effective manner
- Ensure that the park is responsive to employee needs, recognizing the contributions of each individual
- Foster mutually supportive partnerships with private and public organizations and individuals to achieve visitor use and resource protection goals

RELATED PLANNING DOCUMENTS

Zion National Park General Management Plan

The general management plan designates Kolob Terrace Road as a frontcountry low development zone (NPS 2001). If visitor numbers increase in this area in the future, actions will be taken to ensure that a rural setting is maintained. The actions proposed in this EA for the Kolob Terrace Road are consistent with the GMP direction to maintain travel and access to this section of the park. The park will continue to coordinate and cooperate with Washington County with regard to maintenance of Kolob Terrace Road.

Management Policies 2006

NPS *Management Policies 2006* provides guidance for management of all national park system units. Road systems are addressed in section 9.2.1, which states “park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience.”

The purpose of park roads is to enhance visitor experience by providing access to park facilities, resources, and recreational opportunities. Park roads are not intended to provide fast and convenient transportation, but rather to access areas of recreation while being sensitive to the natural and cultural resources in the area (section 9.2.1.1 *Management Policies*). Park roads provide access for the protection, use, and enjoyment of the resources that constitute the park.

1984 NPS Park Roads Standards

The 1984 NPS Park Roads Standards state that roads in national parks serve a distinctly different purpose from most other road and highway systems. Among all public resources, those of the national park system are distinguished by their unique natural, cultural, scenic, and recreational qualities. Park roads are to be designed with extreme care and sensitivity to provide access for the protection, use, and enjoyment of the resources that constitute the national park system.

Director's Order – 87A: Park Roads and Parkways

DO – 87A states that park roads are constructed only where necessary to provide access for the protection, use, and enjoyment of the natural, historical, cultural, and recreation resources that constitute our national park system. Park roads should enhance the visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management action needs. Park roads are designed with extreme care and sensitivity with respect to the terrain and environment through which they pass—they are laid lightly onto the land.

BACKGROUND

Kolob Terrace Road is in the northwest portion of the park and is characterized by forested hillsides, meadows, rock outcrops, and canyons. The road provides access to scenic attractions in the park and interregional connections to private property via both park and county roads. About 41,000 vehicles travel on Kolob Terrace Road annually. Improvements to the road since original construction have been limited primarily to pavement overlays and maintenance.

Kolob Terrace Road South consists of 101 curves, with 23 curves not meeting design standards for the 35-mile-per-hour (mph) speed limit. The existing paved Kolob Terrace Road South width varies from 19 to 22 feet with two 9.5- to 11-foot travel lanes and 0- to 1-foot paved shoulders. The average existing pavement width is 20 feet within this section. The existing road bench width varies from 19 to 30 feet.

Kolob Terrace Road North consists of 138 curves, with 36 curves not meeting the design criteria for the posted design speed of 35 mph. The existing paved road width varies from 18 to 22 feet with two 9- to 11-foot travel lanes and 0- to 2-foot paved shoulders. The average existing pavement width is 20 feet to the Maloney Hill switchback and 18 feet from the

Maloney Hill switchback through Black Canyon. The existing bench width varies from 18 to 35 feet.

IMPACT TOPICS RETAINED FOR FURTHER ANALYSIS

In this section and the following “Impact Topics Dismissed from Further Analysis” section, the Park Service takes a “hard look” at all potential impacts by considering the direct, indirect, and cumulative effects of the proposed action on the environment, along with connected and cumulative actions. Impacts are described in terms of context and duration. The context or extent of the impact is described as localized, parkwide, or regional. The duration of the impact is described as short-term (typically within several years of construction activity) or long-term (may extend 20 years or longer). The intensity and type of impact is described as negligible, minor, moderate, or major, and as beneficial or adverse. The Park Service equates “major” effects as “significant” effects. The identification of “major” effects would trigger the need for an EIS. Where the intensity of an impact could be described quantitatively, the numerical data are presented; however, most impact analyses are qualitative and use best professional judgment in making the assessment.

The Park Service defines “measurable” impacts as moderate or greater effects. It equates “no measurable effects” as minor or less effects. “No measurable effect” is used by the Park Service in determining if a categorical exclusion applies or if impact topics may be dismissed from further evaluation in an EA or EIS. The use of “no measurable effects” in this EA pertains to whether the Park Service dismisses an impact topic from further detailed evaluation in the EA. The reason the Park Service uses “no measurable effects” to determine whether impact topics are dismissed from further evaluation is to concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail in accordance with Council on Environmental Quality (CEQ) regulations at 1500.1(b).

Issues and impact topics for this project have been identified on the basis of federal laws, regulations, and orders; NPS *Management Policies 2006*; and NPS knowledge of resources at Zion, as well as the questions and comments brought forth during internal and external scoping. Impact topics that are carried forward for further analysis in this environmental assessment are listed below in Table 1 along with the reasons why the impact topic is further analyzed.

TABLE 1. IMPACT TOPICS RETAINED FOR FURTHER EVALUATION AND RELEVANT LAWS, REGULATIONS, AND POLICIES

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Soils	Rehabilitation of the road, road widening, and drainage improvements would result in disturbance to soils.	NPS <i>Management Policies 2006</i>
Vegetation	Roadside vegetation disturbance and the introduction of invasive nonnative species are possible from ground-disturbing activities during road rehabilitation.	NPS Organic Act; NPS <i>Management Policies 2006</i> ; Resource Management Guidelines (NPS-77); Federal Noxious Weed Control Act; Executive Order (EO) 13112; Invasive Species (1999)

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Hydrology and Water Quality	Temporary effects on water quality are possible during construction from erosion and introduction of sediment to drainages. Proposed drainage improvements are intended to have beneficial hydrologic effects.	Clean Water Act; Fish and Wildlife Coordination Act of 1934 (PL 85-624), as amended; EO 12088; <i>NPS Management Policies 2006</i> ; NPS-77
Archeological Resources	Nineteen archeological sites are known to occur within or near the area of potential effect. These sites represent Virgin Anasazi, Southern Paiute, and historic use of the area. Eleven of these sites are currently eligible for listing in the National Register of Historic Places (NRHP).	Section 106 of the NHPA of 1966, as amended (16 USC 470, et seq. and 36 CFR 800); EO 13084 of May 14, 1998; EO 13007 of May 24, 1996; American Indian Religious Freedom Act of 1978; the Native American Graves Protection and Repatriation Act of 1990; Indian Trust Resources: Secretarial Order 3175; DO-28; <i>NPS Management Policies 2006</i>
Visitor Use and Recreation Experience	Traffic management for the road rehabilitation would impact visitor travel and the recreation experience during construction as a result of traffic delays, temporary short-term road closures, increased noise, and temporary changes in the scenic quality from construction equipment and disturbances. The proposed improvements would provide long-term benefits to the visitor experience.	<i>NPS Management Policies 2006</i>
Natural Soundscape	Noise associated with road rehabilitation, equipment operation, and truck traffic would result in a temporary increase above ambient sound levels and would temporarily exceed decibel thresholds outlined in the Zion's Soundscape Management Plan (SMP).	<i>NPS Management Policies 2006</i> ; DO-47: <i>Sound Preservation and Noise Management</i>
Wild and Scenic Rivers	Grapevine Wash is a designated scenic river for which a portion of the river buffer area overlaps a section of Kolob Terrace Road South. While no direct effects to Grapevine Wash would occur, indirect impacts to water quality are possible during proposed roadwork.	Wild and Scenic River Act; <i>NPS Management Policies 2006</i>
Public Health and Safety	Deteriorating road conditions pose a safety risk to vehicle travel and potential for accidents. The proposed improvements are designed to improve road conditions and safety.	<i>NPS Management Policies 2006</i> ; OMB Circular A-123; Federal 'Managers' Financial Integrity Act of 1982 (31 USC 3512(d)); <i>Government Performance and Results Act of 1993</i>
Park Operations	Construction activities would require temporary changes in park operations to address traffic control and keep the public informed about road conditions. Road maintenance, snow removal, and visitor safety would benefit from road rehabilitation and improvements.	<i>NPS Management Policies 2006</i>
Socioeconomics	Construction-related traffic delays would temporarily impact visitor and local resident travel. Long-term access would be improved. Construction work would provide a short-term increase in employment, and spending on goods, services, and materials.	<i>NPS Management Policies 2006</i>

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

In this section of the EA, the Park Service provides a limited evaluation and explanation as to why some impact topics are not evaluated in more detail. Impact topics were dismissed from further analysis if it was determined that the project did not have the potential to cause substantial change to these resources and values. In addition, impact topics were dismissed from further evaluation in this EA if:

- they do not exist in the analysis area, or
- they would not be affected by the proposal, or the likelihood of impacts are not reasonably expected, or
- through the application of mitigation measures, there would be minor or less effects (i.e., no measurable effects) from the proposal, and there is little controversy on the subject or reasons to otherwise include the topic.

The regulatory context and baseline conditions relevant to each impact topic were analyzed in the process of determining if a topic should be retained or dismissed from further analysis. Because there would be no effects or no measurable effects, there would either be no contribution toward cumulative effects or the contribution would be low. The following provides overview of impact topics that were considered, but ultimately dismissed along with the reasons for dismissing each topic from further analysis.

Geology

In accordance with NPS *Management Policies 2006*, the Park Service strives to preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue (NPS 2006). The formations exposed in the park were deposited as sediment in several different environments, including shallow seas, streams, and sand dunes during long periods of desert, which resulted in alternating layers of limestone, siltstone, claystone, and sandstone. Subsequent uplift and erosion led to many of the outstanding geologic formations in the park. Proposed rehabilitation and improvements to the road under the preferred alternative would not impact geologic features. No blasting, rock scaling, or other operations are planned that would disturb rock formations or geologic processes. The no action alternative would have no effect on geologic resources. Because impacts to geology from the preferred alternative and no action alternative would be negligible, this topic was dismissed from detailed discussion in this EA.

Wetlands

EO 11990, NPS *Management Policies 2006*, and DO-77-1 direct that wetlands be protected and that wetlands and wetland functions and values be preserved. These orders and policies further direct that direct or indirect impacts to wetlands be avoided whenever there are practicable alternatives. There are no wetlands in the project area (Decker 2011). Because no wetlands would be disturbed under the preferred and no action alternatives, this topic was dismissed from detailed discussion in this EA.

Fish and Wildlife

In accordance with NPS *Management Policies 2006*, the Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of animals (NPS 2006). The diverse vegetation communities within Zion support a variety of wildlife species. NPS-managed lands provide havens for wildlife because they are more protected and generally less developed than privately owned lands. Zion is home to 6 amphibian species, 28 reptile species, 79 mammal species, 289 bird species, and 7 fish species.

Wildlife habitat in the project area is predominantly pinyon/juniper woodlands along Kolob Terrace Road South and a mixture of pinyon/juniper woodlands, mountain shrub, and ponderosa pine woodlands along Kolob Terrace Road North. Common wildlife species in the pinyon/juniper woodlands include mule deer, ringtail, porcupine, gray fox, rock squirrel, canyon mouse, pinyon mouse, striped whipsnake, western whiptail, and tree lizard. Birds likely to occur in the pinyon/juniper woodlands include western scrub jay, pinyon jay, juniper titmouse, and black-throated gray warbler. Common wildlife species in the mountain shrub and ponderosa pine forests include mule deer, rock squirrel, mountain cottontail, and various lizards and snakes. Birds likely to occur in the mountain shrub and ponderosa pine forests include canyon wren, black-capped chickadee, mountain chickadee, hairy woodpecker, spotted towhee, Steller's jay, and Cooper's hawk. Four native fish species—virgin spinedace, desert sucker, speckled dace, and flannelmouth sucker—occur in streams downstream from the project area.

Construction activities would primarily be limited to the existing paved roadway and adjacent disturbed areas and, therefore, there would be negligible impacts to wildlife habitat. Human presence and construction noise would temporarily disturb and displace resident wildlife. Reduction of the speed limit from 35 mph to 30 mph in Black Canyon would be a long-term benefit to wildlife by reducing the potential for vehicle/wildlife collisions. The project would not involve night work. Construction would not occur from 7 p.m. to 7 a.m. (adjusted seasonally for day length) to minimize impacts to crepuscular and nocturnal wildlife. The construction contractor would be required to keep all garbage and food waste contained and removed daily from the work site to avoid attracting wildlife into the construction zone. Construction workers would be instructed to remove food scraps and not feed or approach wildlife. Overall, the preferred alternative would result in local short-term minor adverse effects on wildlife. Construction-related disturbance would be limited to one season; therefore, there would be no long-term adverse impacts to wildlife, but there would be long-term benefits from reducing the speed limit.

As described in the “Hydrology and Water Quality” section, potential effects to waterways near the road, as well as downstream waters, are expected to be short-term and minor from possible sediment introduction during construction. Best management practices (BMPs) would be implemented to control erosion and prevent stream sedimentation. As a result, potential effects to fish habitat and spawning would be local, short-term, negligible, and adverse. Over the long term, implementation of the preferred alternative would result in a beneficial effect on fish and other aquatic species by correcting drainage deficiencies and deteriorating road conditions that impact water quality.

There would be no impact to fish and wildlife under the no action alternative. Because impacts to wildlife under the preferred alternative would be minor or less, fish and wildlife was dismissed as an impact topic in this EA.

Special Status Species

The Endangered Species Act of 1973 (ESA) requires examination of impacts on all federally listed threatened, endangered, and candidate species. Section 7 of the ESA requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. The Fish and Wildlife Service provided a list of federally endangered and threatened species potentially found in the project area (Appendix A). In addition, the NPS *Management Policies 2006* and *DO-77: Natural Resources Management Guidelines* require the Park Service to examine the impacts on federal candidate species as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006). Special status species are listed as threatened, endangered, or candidate under the ESA; species considered sensitive by the park; species on the Utah sensitive species list (Utah DNR 2007); and species for which a conservation agreement is in place. Information on special status species in the project area was provided by park resource specialists (Crow, pers. comm. 2011; Decker, pers. comm. 2011). A list of special status species known or expected to occur in the park is provided in Appendix B.

Two federally listed species, Mexican spotted owl (*Stryx occidentalis lucida*) and California condor (*Gymnogyps californicus*), have the potential to occur in the project area. The entire park is designated critical habitat for Mexican spotted owl; however, work under the preferred alternative would be limited to existing disturbed areas along the road and would not affect Mexican spotted owl habitat. Construction would result in an increase in noise and human activity along the road corridor. No aviation activities are expected to be used during construction. The nearest Mexican spotted owl protected activity center (PAC) is more than 3 miles from the project area; therefore, no impacts from construction are expected. California condors are highly mobile and do not congregate in the park near the project area. California condors breed at Grand Canyon National Park, but no breeding has been documented at Zion. Reduction of the speed limit from 35 mph to 30 mph in Black Canyon would be a long-term benefit to wildlife by reducing the potential for collisions with vehicles. For these reasons, adverse impacts to Mexican spotted owls and California condors are expected to be negligible. If condors begin to breed at the park prior to or during construction, impacts and mitigation would be reevaluated.

A number of special status wildlife species occur in the park (Appendix B), including several that could potentially occur in the project area. Bald eagle (*Haliaeetus leucocephalus*), a recently delisted species, is considered a park resident and occurs in the project area primarily in the winter months, although no breeding has been documented in the park. Northern goshawk (*Accipiter gentilis*), a species covered by a conservation agreement, is a rare resident in the park and no breeding has been documented near the project area. Ferruginous hawk (*Buteo regalis*), a state species of concern, and Lewis' woodpecker (*Melanerpes lewis*), a state species of concern, occur in the park during migration but do not

breed in the park. Because these species are highly mobile and do not breed in or near the project area, adverse impacts from construction would be negligible.

Mountain lions (*Puma concolor*) are not a special status species, but are monitored by the park and occur in the project area. Construction activities could potentially disturb prey species and impact mountain lion foraging activities. Adverse impacts would be negligible with resource protection measures, such as avoiding work during dawn and dusk hours and educating workers about mountain lion safety and reporting are implemented. Reducing the speed limit from 35 mph to 30 mph in Black Canyon would be a long-term benefit to mountain lions by reducing the potential for collisions with vehicles.

Allen's big-eared bat (*Idionycteris phyllotis*), fringed myotis (*Myotis thysanodes*), and Townsend's big-eared bat (*Corynorhinus townsendii*), state species of concern, are present in the project area. These species feed on flying insects at night, and could be attracted to the project area if lights were used for night construction; however, no night construction is planned and, therefore, these species would not be affected by the project.

No federally listed plant species have the potential to occur in the project area. One rare plant, Higgins' penstemon (*Penstemon higginsii*), is not a special status species, but is monitored by the park and has the potential to occur in the project area. This species is considered relatively common in the Kolob Terrace area, and adverse effects from the preferred alternative are expected to be minor or less.

Overall, the effects on special status species would be local, short-term, negligible, and adverse, with a minor beneficial effect from a reduction in speed limit in several locations. The Park Service has determined the preferred alternative would have no effect on federally listed threatened or endangered species. The no action alternative would have no effect on special status species or federally listed species. Because the preferred alternative would result in short-term negligible adverse effects and the no action alternative would have no effect, special status species was dismissed as an impact topic in this EA.

Prime or Unique Farmland

In 1980, the CEQ directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, Natural Resources Conservation Service. The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to nonagricultural uses. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; and unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are no prime or unique farmlands associated with the project area; therefore, prime or unique farmland was dismissed as an impact topic in this EA.

Air Quality and Climate Change

The Clean Air Act of 1963 (42 USC 7401 et seq.) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The act establishes specific programs that provide special protection for air resources- and air quality-related values associated with national park system units. Section 118 of the Clean Air Act requires a park system unit to meet all federal, state, and local air pollution standards. Zion is a designated Class I airshed under the Clean Air Act, which prohibits significant deterioration of air quality. Earthwork and hauling material during construction would temporarily increase dust and vehicle emissions under the preferred alternative and would result in localized effects on air quality. Hydrocarbons, nitrogen oxide, and sulfur dioxide vehicle emissions would be rapidly dissipated; and visibility, deposition, and other air quality-related values are not expected to be appreciably impaired. These effects would be short-term, negligible, and adverse. Road rehabilitation would not result in an increase in traffic or vehicle emissions. Neither overall park air quality nor regional air quality would be more than negligibly affected by the short-term increase in emissions. The no action alternative would have no effect on existing air quality.

Construction activities associated with implementation of the preferred alternative would contribute to increased greenhouse gas (GHG) emissions, but such emissions would be short-term, ending with the cessation of construction. Any effects of construction-related GHG emissions on climate change would not be discernible at a regional scale, as it is not possible to meaningfully link the GHG emissions of such individual project actions to quantitative effects on regional or global climatic patterns. The preferred alternative would result in short-term negligible adverse effects to air quality during construction and it is not possible to meaningfully link the GHG emissions from the project to climate change. Because the preferred alternative would result in short-term negligible adverse effects and the no action alternative would have no effect, air quality and climate change were dismissed as impact topics in this EA.

Historic Structures

Section 106 of the NHPA of 1966, as amended (16 USC 470, et seq.) and its implementing regulations under 36 CFR 800 require all federal agencies to consider effects of federal actions on historic properties, including historic structures, eligible for or listed in the National Register. In order for a structure to be listed in the National Register, it must be associated with an important historic event, person(s), or that embodies distinctive characteristics or qualities of workmanship. Cultural resource investigations found no historic structures within the area of potential effect eligible for listing on the National Register. Because there are no historic structures in the area of potential effect that would be affected by the no action or preferred alternative, this topic was dismissed from further discussion in this EA.

Cultural Landscapes

According to the NPS DO-28: *Cultural Resource Management Guideline*, a cultural landscape is a reflection of human adaptation and use of natural resources, and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. A cultural landscape inventory has not been conducted for the project area; however, as previously described, there are no historic structures in the vicinity. Due to the absence of historic structures, which limits the potential for a landscape, cultural landscapes were dismissed as an impact topic in this EA.

Environmental Justice

Presidential EO 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. According to the Environmental Protection Agency, environmental justice is the

...fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

The goal of ‘fair treatment’ is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects, and identify alternatives that may mitigate these impacts.

Rockville, Springdale, Hurricane, Virgin, and surrounding communities contain both minority and low-income populations; however, environmental justice was dismissed as an impact topic for the following reasons:

- The park staff and planning team actively solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the preferred alternative would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse effects on any minority or low-income population.
- The impacts associated with implementation of the preferred alternative would not disproportionately affect any minority or low-income population or community.

- Implementation of the preferred alternative would not result in any identified effects that would be specific to any minority or low-income community.
- The impacts to the socioeconomic environment resulting from implementation of the preferred alternative may have short-term adverse economic effects, but over the long-term effects would be beneficial. In addition, the park staff and planning team do not anticipate the impacts on the socioeconomic environment to alter the physical and social structure of nearby communities.

Visual Resources

Visual impacts would occur during construction from the presence of construction equipment, materials, and ground disturbances. Rehabilitation of damaged sections of the existing road would improve the visual quality of the road. Any disturbances to existing structural features would be constructed with material to match the color, texture, and character of existing facilities. The long-term visual impact of the road rehabilitation and improvements would not adversely affect any viewsheds. The scenic views for which Zion is renowned would not be adversely affected by the preferred alternative. Under the no action alternative, road conditions would continue to deteriorate, which would detract from the scenic quality of the road corridor. Visual impacts from construction activities under the preferred alternative would be short-term, negligible, and localized. The long-term effect on visual quality would be beneficial under the preferred alternative, with a long-term minor adverse effect under the no action alternative; therefore, visual resources were dismissed as an impact topic in this EA.

Lightscape

In accordance with NPS *Management Policies* 2006, the Park Service strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. Zion strives to limit the use of artificial outdoor lighting to that which is necessary for building security and human safety. The park also strives to ensure that all outdoor lighting is shielded to the maximum extent possible to keep light on the intended subject and out of the night sky. No outdoor lighting is proposed as part of road improvements and no night work would occur that would affect the night sky. For these reasons, lightscape was dismissed as an impact topic in this EA.

Floodplains

EO 11988, “Floodplain Management” requires an examination of impacts to floodplains and potential risks involved in placing facilities within floodplains. NPS *Management Policies* 2006 and DO-77-2: *Floodplain Management* provides guidelines for proposed actions in floodplains. No areas of flooding have been identified in the project area (FEMA 2011). Under the preferred alternative, no proposed work activities or structures would be located in a floodplain. Because there would be no impact to floodplains under either alternative, floodplains were dismissed as an impact topic in this EA.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. The order represents a duty to carry out the mandates of the federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources in Zion National Park. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, Indian trust resources were dismissed as an impact topic in this EA.

Ethnographic Resources

The Park Service defines ethnographic resources as any “site, subsistence, or other significance in the cultural system of a group traditionally associated with it” (DO-28). Eleven affiliated American Indian tribes are traditionally associated with Zion. The tribal contacts were sent an informational letter on June 13, 2011 describing the proposed project and the Park Service’s desire to hear their comments. No scoping comments were received from American Indian tribes as of the date of this EA. This EA will also be sent to each tribe for their review and comment. If subsequent issues or concerns are identified, appropriate consultations would be undertaken. According to NPS professional staff and the general management plan (NPS 2001), to date no ethnographic resources within the park have been determined eligible for listing in the National Register. Because it is unlikely that ethnographic resources would be affected by the proposed project, and because appropriate steps would be taken to protect any ethnographic resources that are inadvertently discovered, ethnographic resources was dismissed as an impact topic in this EA.

Museum Collections

Museum collections include historic artifacts, natural specimens, and archival and manuscript material. DO-24: *Museum Collections*, requires the Park Service to consider impacts on museum collections, and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections. These collections may be threatened by fire, vandalism, natural disasters, and careless acts. The preservation of museum collections is an ongoing process of preventative conservation, supplemented by conservation treatment, when necessary. The primary goal is preservation of artifacts in the most stable condition possible to prevent damage and minimize deterioration. The proposed activities along Kolob Terrace Road would not affect the museum objects of Zion and there is no potential to add objects to the collection; therefore, museum collections were dismissed as an impact topic in this EA.

Wilderness

On March 30, 2009, President Barack Obama signed into law the Omnibus Public Land Management Act of 2009, which resulted in the designation of 124,462 acres of wilderness in Zion. Kolob Terrace Road is in an area not suitable for wilderness; however, designated wilderness or potential wilderness is on lands east of Kolob Terrace Road South and on both sides of Kolob Terrace Road North at varying distances. All proposed road rehabilitation would occur outside of wilderness boundaries and, therefore, is not subject to Wilderness Act requirements. Construction-related noise and disturbance would result in a local short-term negligible adverse effect on the natural quiet typically found in wilderness areas, but would have no long-term effect. Because of the short-term negligible adverse effects to wilderness during construction and the absence of direct adverse effects on wilderness resources and values, this topic was dismissed from further evaluation in this EA.

ALTERNATIVES

INTRODUCTION

This chapter describes the no action alternative and preferred alternative for rehabilitation of Kolob Terrace Road. The no action alternative would result in no road rehabilitation and the continuation of the present level of management, operations, and maintenance. The preferred alternative was developed to address the purpose and need for the project to rehabilitate, restore, and resurface the road, while protecting and preserving park natural and cultural resources.

The preferred alternative presents the NPS preferred management action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, cost, and other applicable factors. Other alternatives considered but eliminated from detailed analysis are discussed in this chapter. Also included in this chapter is a comparison of how well the alternatives meet the project objectives and a summary comparison of the environmental effects of each of the alternatives.

NO ACTION ALTERNATIVE

Under the no action alternative, Kolob Terrace Road would not be rehabilitated. Zion staff would continue routine road maintenance and minor repairs as it has in the past. The road pavement and structural integrity would continue to deteriorate and safety concerns would persist. The no action alternative would not correct identified structural problems or visitor safety issues associated with the width of the road and pavement conditions. No highway funds would be expended for rehabilitation; however, road maintenance costs would likely increase to address deteriorating road conditions.

The no action alternative provides a basis for comparison with the preferred alternative and the respective environmental consequences. Should the no action alternative be selected, the Park Service would respond to future needs and conditions without major actions or changes in the present course.

NPS PREFERRED ALTERNATIVE

The preferred alternative includes proposed resurfacing, restoration, rehabilitation, and associated improvements needed to address the identified deficiencies along 9.8 miles of the Kolob Terrace Road (PBS&J 2010). The proposed rehabilitation and improvements on both the north and south sections of the road would be constructed as one project (Figure 3, Figure 4). The proposed work is programmed for 2016 subject to available funds and the estimated construction cost is \$10 million. The following sections describe the proposed road rehabilitation and improvements.

FIGURE 3. PROJECT AREA — KOLOB TERRACE ROAD SOUTH (ZION ROUTE 14)

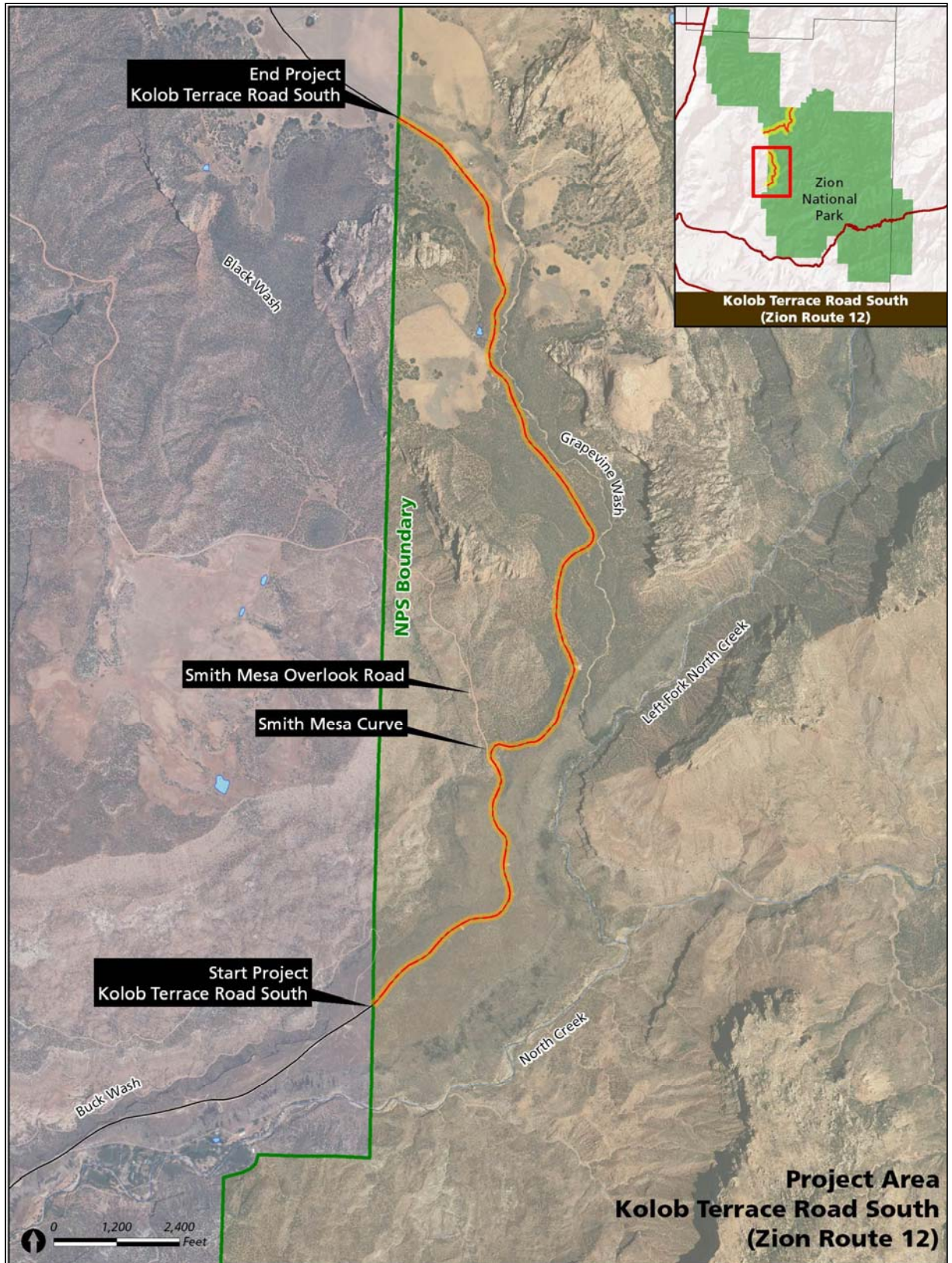
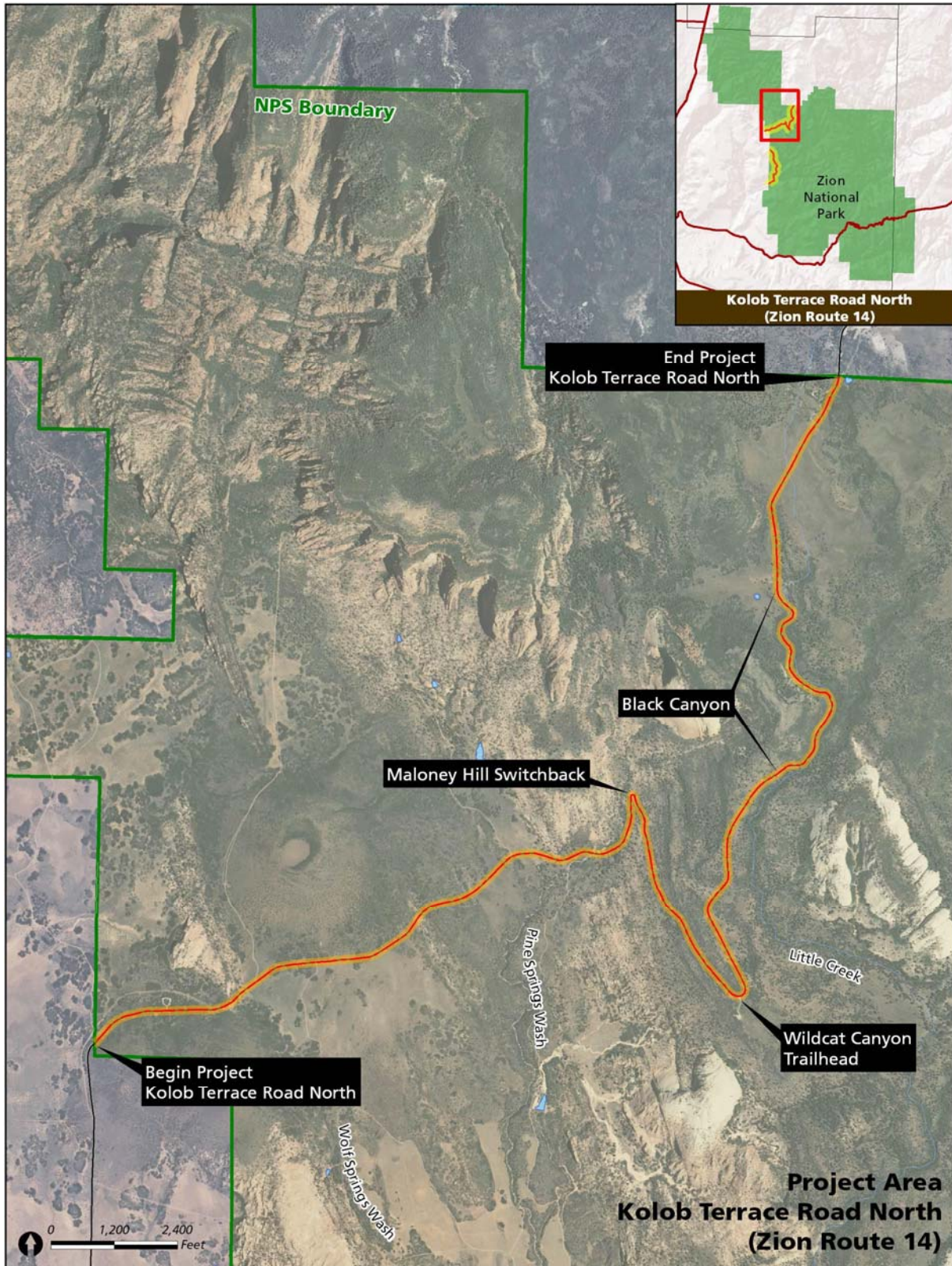
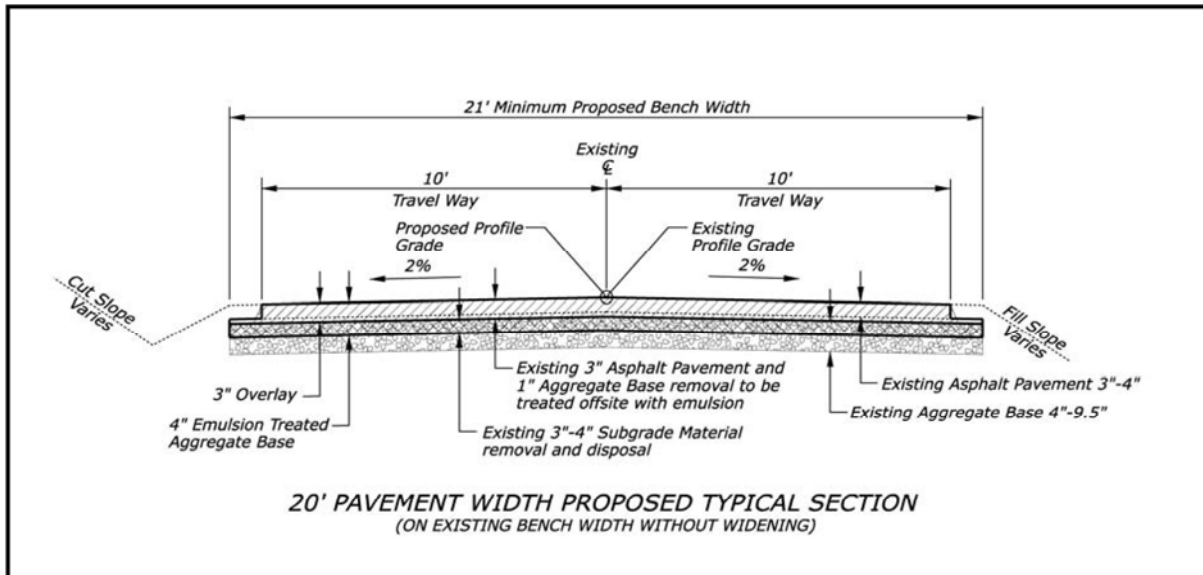


FIGURE 4. PROJECT AREA — KOLOB TERRACE ROAD NORTH (ZION ROUTE 12)



slope could be used to increase the bench width in narrow areas of the Black Canyon section. Slope protection rockery would be used to stabilize the slope and prevent further erosion in a few locations where shallow slump failures of the slope above the road have occurred. It is anticipated that all work could be constructed within 10 feet of the existing edge of pavement.

FIGURE 6. PROPOSED TYPICAL SECTION—20-FOOT PAVEMENT WIDTH ON EXISTING BENCH WITHOUT WIDENING



Four segments of the road were given further consideration for additional improvements to address existing safety concerns. Specific details for these locations are described below.

Smith Mesa Curve. Several improvements are proposed for this curve near the turnoff to the Smith Mesa Curve due to the number of accidents recorded at this location (Figure 7). The turnoff to the mesa is at the south end of the curve and the sight distance is limited, particularly for southbound vehicles on Kolob Terrace Road. Proposed improvements for this site include widening the curve on the inside edge of the pavement and making a horizontal alignment shift toward the outside edge of pavement. Additional improvements may include reflective delineators or warning signs on the outside edge of the curve and adding advanced intersection warning signs. Advisory lower speed limit signs of 20 to 25 mph would be added.

FIGURE 7. SMITH MESA CURVE



Maloney Hill Switchback. The Maloney Hill Switchback is an extremely sharp curve that has experienced a concentration of vehicles running off the road and head-on collisions (Figure 8). Large vehicles often cross the centerline to navigate the curve and there is a steep drop off on the inside of the curve and a dirt pullout on the outside of the curve. Proposed measures to improve the safety of this curve include shifting the road alignment and widening the curve using the existing pullout on the outside of the curve. The work would require minor excavation, boulder removal, and drainage improvements. The posted speed limit for the curve would remain at 5 mph.

FIGURE 8. MALONEY HILL SWITCHBACK



Wildcat Canyon Trailhead Switchback. This switchback also has safety concerns because of the sharp curve. Sight distance to the trailhead access is limited and, therefore, vehicles turning in or out of the trailhead access road are not seen by other motorists on Kolob Terrace Road. The proposed improvements to the switchback include curve widening, a graded ditch along the inside edge of pavement, and vegetation clearing for sight distance. Additional signs would be used to indicate the speed limit and alert motorists of the trailhead access.

FIGURE 9. BLACK CANYON



Black Canyon. The Black Canyon area is a safety concern because of the number of accidents. This stretch of road contains 37 curves, 19 of which do not meet the 35 mph design criteria. Road fill slopes are steep and there are locations where large boulders and heavy vegetation near the road limits sight distance (Figure 9). Proposed improvements include striping the edge of the road, adding curve warning signs with advisory speed limits, and reducing the posted speed limit to 25 mph for curves not meeting the standard design criteria. Edge striping would better delineate the narrow pavement width and help drivers avoid the adjacent steep fill slopes. Roadside vegetation and boulder removal would improve sight distance on sharp curves and reduce the risk of accidents.

Pavement Considerations

Much of the existing Kolob Terrace Road pavement is in poor condition with block cracking, edge cracking, and isolated pavement failures. Prior to repaving, several isolated sections of the road would require improvements to the subgrade in locations where the existing soil has become soft and lost compaction or severe subgrade failure has occurred. In areas with shallow subgrade issues, the subgrade would be removed and replaced to a depth of about 6 inches, while a few short sections with deeper subgrade failure would require pavement removal and subgrade excavation and replacement to a depth of approximately 1.5 feet prior to repaving.

One of the considerations for pavement design is not to raise the pavement elevation, which can lead to narrowing of the road. For this reason, the proposed pavement option is to remove the existing 3 inches of asphalt, 1 inch of base material, and about 3 to 4 inches of subgrade material. The 3 inches of asphalt and 1 inch of base would be hauled to an off-site plant for emulsion treatment and then hauled back to the site for placement as base material. The road would then be overlaid with 3 to 4 inches of new hot asphalt pavement. This treatment would not raise the road gradient and would minimize the loss of any road width. Typical road sections are shown in Figure 5 and Figure 6. An emulsion treatment plant would need to be established at a location outside of park boundaries as described below. Red chips would be used as a construction seal for new pavement about one year following completion of paving.

Rehabilitation work would require disturbance of about 5.5 acres outside of the existing pavement. This includes 2.3 acres of new pavement for road widening, paving four pullouts, and adding paved aprons to parking areas, pullouts, and road intersections. The remaining 3.2 acres would be temporarily disturbed during construction and reclaimed following completion of road rehabilitation.

Removal of the existing asphalt and transport to the emulsion plant for treatment prior to use in repavement would require more haul truck use than normal overlay projects. Haul trucks also would be needed for removal and off-site disposal of the subgrade. Approximately 1,057 haul trucks would be needed for work on the Kolob Terrace Road South section and about 1,471 trucks for Kolob Terrace Road North, for a total of 2,528 trips.

Washington County currently has restrictions on the types of vehicles that are allowed on county portions of Kolob Terrace Road between April 20 and June 30 to prevent road damage during snowmelt. The park is currently evaluating similar load and seasonal road restrictions, which would be implemented as a separate management action regardless of the proposed rehabilitation project.

Drainage

Drainage issues were identified for the Maloney Hill Switchback to Wildcat Canyon Trailhead Switchback associated with proposed road widening. The existing culverts in this area are undersized and need to be replaced with larger culverts, and additional culverts need to be installed. Additional relief culverts would be added to divert drainage under the road.

Road widening also would require upgrades to roadside ditches at select locations. Three types of ditches may be used depending on the site-specific conditions and the space available. The options include a paved ditch with a curb, a paved curved ditch, or a V-shaped paved ditch. The extent and width of the ditch would vary with location.

Improvements in subsurface drainage are needed to control seepage at one location on the Kolob Terrace North Road. Proposed improvements at this location include placing a layer of free-draining aggregate at least 18 inches thick between the bedrock and the asphalt road. Transverse drains also would be installed through the aggregate to convey seepage away from the road to prevent frost heaving, softening of the subgrade, and pavement deterioration.

Pullouts and Parking

There are 61 existing pullouts along the Kolob Terrace Road in the park. A number of the pullouts present a safety concern. The park proposes to remove approximately 16 of the existing gravel pullouts and any other informal dirt pullouts. These areas would be reclaimed or blocked to prevent parking. Some pullouts would be paved and others would remain gravel with an approximate 2-foot paved apron. The entry to parking areas and side roads also would receive a paved apron. The existing pullout at the base of Maloney Hill and the beginning of Black Canyon would be paved to facilitate a turn-around by vehicles pulling snowmobile trailers. No new pullouts are proposed because of the potential for resource impacts and/or safety concerns.

Traffic Control and Scheduling

Vehicle access along Kolob Terrace Road is an important component of the visitor experience at the park, and the road is also an important route for residents to reach their homes and property. Thus, Kolob Terrace Road would remain open during construction work subject to periodic traffic delays. Cold, snowy, and icy conditions during the winter months limit the construction season to the period between March and October, which coincides with peak visitor and public traffic. Potential effects on wildlife along the road are also a consideration in scheduling construction work. Temporary road closures and traffic delays would be required to efficiently implement road repairs because of the nature of needed work and the narrowness of Kolob Terrace Road in many locations. All of these factors contribute to the need for development of a traffic management plan that maintains a reasonable level of visitor access while allowing road improvements to be completed as quickly, safely, and efficiently as possible.

Roadwork would be conducted during daylight hours on Mondays through Thursdays. No construction activity would occur at night or in the dawn and dusk periods to avoid impacts to wildlife that are most active during those times of day. Thus, construction would typically occur between 7 a.m. and 7 p.m., although times would be adjusted seasonally according to day length by the park biologist. Work would require closure of at least one lane, and at times, both lanes would need to be temporarily closed. Traffic control requirements would be dictated by the type of repairs being conducted and would vary with each of the specific work elements from milling, pulverization, subgrade replacement,

drainage improvements, paving, and other actions. Single-lane alternating one-way travel with traffic delays of up to 30 minutes could occur anytime between 7 a.m. and 7 p.m. and up to 3-hour traffic delays could occur between 10 a.m. and 5 p.m. to facilitate construction. Flagmen, pilot cars, or signal lights would be used to control traffic through the one-lane section. For narrow sections of the road, two-lane closure would be required.

The park would implement a number of steps to provide timely and accurate information to park visitors during road rehabilitation to maintain a quality visitor experience. Both the park and the local communities would participate in providing clear and concise information on the status of rehabilitation work and any temporary traffic delays or suspensions. To facilitate visitor planning, the status of roadwork and traffic delays would be advertised two weeks in advance and updated daily. The status of road construction and travel restrictions would be communicated via a number of outlets: the park website, newspaper, and radio; at entrance stations, visitor centers, and kiosks; and through news releases, local newspapers, variable message signs, media outlets, postings in local businesses, and other locations.

Staging Areas

Temporary staging areas for equipment and supplies during construction would use previously disturbed sites, such as pullouts or gravel pits. Trailhead parking areas would remain open and would not be used as construction staging areas.

Emulsion Plant

The emulsion plant needed for treatment and recycling of asphalt would be outside of the park boundary. Typically, the construction contractor would be responsible for securing a site for this temporary facility. It is anticipated that the emulsion plant would be south of the park boundary along Kolob Terrace Road on previously disturbed lands. Approximately 2 acres are needed for the emulsion plant. All applicable BMPs and resource protection measures listed in Table 2 would be applied at the emulsion plant site. The Park Service would address any further compliance requirements for this site prior to construction.

Sustainability

The Park Service 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 native 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 sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The preferred alternative subscribes to and supports the practice of sustainable planning, design, and use of Kolob Terrace Road by limiting and mitigating resource impacts and promoting conservation principles by recycling pavement materials.

RESOURCE PROTECTION MEASURES

To prevent and minimize potential adverse impacts associated with the preferred alternative, BMPs and resource protection measures would be implemented during construction and post-construction phases of the project (Table 2).

TABLE 2. RESOURCE PROTECTION MEASURES

Resource Area	Mitigation
General Considerations	<p>All resource protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone identified by the FHWA and park. Disturbances would be limited to roadsides, culvert areas, and other areas inside the designated construction limits. No machinery or equipment would access areas outside the construction limits.</p> <p>Construction equipment staging would occur in the road for active work areas or at designated pullouts. Off-site equipment and vehicle parking would be limited to designated staging areas.</p> <p>Contractors would be required to properly maintain construction equipment (i.e., mufflers and brakes) to minimize noise. Construction vehicle engines would not be allowed to idle for extended periods.</p> <p>Material and equipment hauling would comply with all legal load restrictions. Load restrictions on park roads are identical to state load restrictions with such additional regulations as may be imposed by the park superintendent.</p> <p>Water sprinkling would be used as needed to reduce fugitive dust in work zones.</p> <p>All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion.</p>
Vegetation	<p>All disturbed ground would be reclaimed using appropriate BMPs that include reseeding with native plant species. Erosion-control measures would be left in place at the completion of construction, after which time the park would be responsible for maintenance and removal once vegetation is established.</p> <p>Temporary barriers would be provided to protect existing trees, plants, and root zones. Trees or other plants would not be removed, injured, or destroyed without prior approval.</p> <p>To prevent the introduction of, and minimize the spread of, nonnative vegetation and noxious weeds, the following measures would be implemented during construction:</p> <ul style="list-style-type: none"> • Soil disturbance would be minimized. • All construction equipment would be pressure washed and/or steam cleaned before entering the park to ensure that all equipment, machinery, rocks, gravel, and other materials are cleaned and weed free. • All haul trucks bringing fill materials from outside the park would be covered to prevent seed transport. • Vehicle and equipment parking would be limited to within construction limits or approved staging areas. • Staging areas outside the park would be surveyed for noxious weeds and treated appropriately prior to use. • All fill, rock, and additional topsoil would be obtained from stockpiles from previous projects or excess material from this project, if possible; and if not possible, then weed-free fill, rock, or additional topsoil would be obtained from sources outside the park. NPS personnel would certify that the source is weed free. • Monitoring and follow-up treatment of exotic vegetation would occur after project activities are completed.

Resource Area	Mitigation
Water Quality and Soils	<p>Erosion-control BMPs for drainage and sediment control, as identified and used by the FHWA and Park Service, would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. These practices may include, but are not limited to, silt fencing, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas to minimize sedimentation and turbidity impacts as a result of construction activities. The placement and specific measures used would be dictated to a large degree by the steep topography immediately adjacent to the road in some portions of the project. Silt fencing fabric would be inspected daily during project work and weekly after project completion, until removed. Accumulated sediments would be removed when the fabric is estimated to be approximately 75% full. Silt removal would be accomplished in such a way as to avoid introduction into any flowing water bodies.</p> <p>Regular site inspections would be conducted to ensure that erosion-control measures are properly installed and functioning effectively. Erosion-control measures would be left in place at the completion of construction, after which time the park would be responsible for maintenance and removal once vegetation is established.</p> <p>The operation of ground-disturbing equipment would be temporarily suspended during large precipitation events to reduce the production of sediment that may be transported to streams.</p> <p>A storm water pollution prevention plan would be developed and approved by the park and submitted to the Utah Division of Water Quality prior to commencing any near-water activities.</p> <p>All equipment would be maintained in a clean and well-functioning state to avoid or minimize contamination from fluids and fuels. Prior to starting work each day, all machinery would be inspected for leaks (e.g., fuel, oil, and hydraulic fluid) and all necessary repairs would be made before the commencement of work.</p> <p>A hazardous spill plan would be required from the contractor prior to the start of construction stating what actions would be taken in the case of a spill and preventive measures to be implemented. Hazardous spill clean-up materials would be on-site at all times. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery (e.g., fuel, oil, and hydraulic fluid) used in project implementation.</p>
Wildlife	<p>No construction activities would occur at night or during the dawn to dusk periods to minimize impacts to wildlife that are most active during these times. The specific hours designated for roadwork would be adjusted by the park biologist seasonally for varying day lengths, but would typically be between 7 a.m. and 7 p.m.</p> <p>The construction contractor would be required to keep all garbage and food waste contained and removed daily from the work site to avoid attracting wildlife into the construction zone. Construction workers would be instructed to remove food scraps and to not feed or approach wildlife.</p>
Visitor Experience, Public Health, Safety, and Park Operations	<p>Visitors would be informed in advance of construction activities via a number of outlets including the park website, newspaper, radio, at entrance stations, variable message signs, visitor centers, kiosks, shuttle drivers, and at other nearby national parks. In addition, information on construction would be publicized in news releases, local newspapers, media outlets, postings in local businesses, visitor bureaus, chambers of commerce, and travel- and tourism-related businesses.</p> <p>Roadwork would generally be limited to Monday to Thursday to minimize impacts to visitors and local residents that travel the road on the weekends. No construction would occur between 7 p.m. and 7 a.m. Traffic delays during construction would be kept to a minimum, but travel would be subject to alternating one-way traffic with delays up to 30 minutes between 7 a.m. and 7 p.m. and up to 3-hour road closures between 10 a.m. and 5 p.m.</p> <p>To facilitate visitor planning, the status of roadwork and traffic delays would be posted two weeks in advance and would be updated daily.</p> <p>The Zion public information officer would coordinate with the contractor on the construction schedule and update visitors and information sources periodically on construction work to inform visitors of project status and access.</p> <p>Provisions for emergency vehicle access through construction zones would be developed.</p>

Resource Area	Mitigation
<p>Cultural Resources</p>	<p>Archeological resources in the vicinity of the project area would be identified and delineated for avoidance prior to project work.</p> <p>The park would continue to coordinate with the state historic preservation office (SHPO) throughout the course of the project to protect and mitigate cultural resources affected by the preferred alternative.</p> <p>Should any archeological resources be uncovered during construction, work would be halted in the area and the park archeologist, SHPO, and appropriate American Indian tribes would be contacted for further consultation.</p> <p>Park cultural resources staff would be available during construction to advise or take appropriate actions should any archeological resources be uncovered during construction. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.</p> <p>The Park Service would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. Contractors and subcontractors also would be instructed on procedures to follow in case previously unknown archeological resources are uncovered during construction.</p> <p>Equipment and material staging areas would avoid known archeological resources.</p>

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Resurface Existing Road

Minor improvements to the surface of the road, such as milling and overlay or chip and seal, would not address the underlying structural, geotechnical, and drainage issues contributing to the deteriorating condition of the road. Maintenance costs would increase in the long term if structural and drainage deficiencies are not corrected. Resurfacing would not address the need to widen sections of the road to improve safety. Resurfacing options were eliminated because they would not meet the project purpose and need.

Widen Kolob Terrace Road North to a Consistent 22-Foot Pavement Width or Wider

Widening the Kolob Terrace Road North to a 22-foot pavement width through the Maloney Hill and Black Canyon areas was considered. Retaining walls, horizontal alignment shifts, and cut/fill slope adjustments would be needed to create a bench suitable for a wider road through this narrow section of road. Implementing these measures would require substantial earthwork, disturbance to environmental resources, and visual quality impacts. Additional widening beyond 22 feet was not considered elsewhere on the road because of the potential for resource impacts and changes to the character of the road. This alternative was excluded from further consideration because of the adverse impact to natural and scenic resources.

Addition of a Bike Lane

There is insufficient space within the existing road bench to widen the road to accommodate a bike lane. Substantial earthwork, retaining walls, and adverse impacts to natural and cultural resources would be required to construct a bike lane. For these reasons, this alternative was excluded from further consideration in the EA.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally preferable alternative is the alternative “that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative.”

The preferred alternative, rehabilitation of Kolob Terrace Road, is the environmentally preferable alternative for several reasons: 1) it would best preserve the natural and cultural features along the road because it implements structural improvements that would provide long-term protection of environmental and cultural resources adjacent to the road; 2) drainage improvements would reduce the potential for erosion and impacts to water quality and cultural resources; 3) it supports sustainable design concepts and energy efficiency by providing for the reuse of existing asphalt. For these reasons, the preferred alternative causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources, thereby making it the environmentally preferable alternative.

By contrast, the no action alternative is not the environmentally preferable alternative because, although there would be no construction or ground disturbing activities that would damage previously undisturbed elements of the biological and physical environment 1) it would not protect park natural and cultural resources, as the road would continue to deteriorate without rehabilitation; 2) inadequate drainage could lead to erosion and impacts to water quality, natural resources, and cultural resources; and 3) continued high maintenance requirements would not be energy efficient.

ALTERNATIVES COMPARISON TABLE

A comparison of the alternatives and the degree to which each alternative fulfills the needs and objectives of the proposed project is summarized in Table 3.

TABLE 3. ALTERNATIVES COMPARISON

No Action Alternative	Preferred Alternative Rehabilitate Kolob Terrace Road
<p>Under the no action alternative, the Park Service would not implement road rehabilitation or improvements. Routine road maintenance would continue, but the road pavement and structural integrity would continue to deteriorate. There would be no improvements to the width of the road, surface pavement, subgrade, drainage, or pullouts. New road signs would not be installed.</p>	<p>Under the preferred alternative, the Park Service would implement the rehabilitation repairs and improvements necessary to restore the condition of the road. The proposed improvements would repair damaged areas of road subgrade, widen select sections of the road and curves, improve drainage, repave the entire road, eliminate unnecessary informal pullouts, and add replace road signs.</p>
<p>Meets Objectives?</p>	
<p>The no action alternative does not fulfill the project objectives. Visitor enjoyment and safety concerns would not be addressed because problems associated with narrow sections of road, the condition of the road surface, drainage, and pullouts would not be addressed. Travel safety concerns would remain. The efficiency of park operations would not be improved and maintenance requirements and costs would increase. Park natural and cultural resources and the scenic quality of the road would be compromised by deteriorating road conditions.</p>	<p>The preferred alternative fulfills the project objectives by implementing needed road repairs and improvements. Visitor enjoyment and safety would benefit from measures to improve the condition of the road surface and widen narrow sections. Road upgrades would make travel by vehicles easier and safer. The efficiency and cost of park operations would improve from better road conditions and reduced maintenance requirements. Park natural and cultural resources would be protected by drainage improvements and other structural repairs. Road repairs and improvements would be implemented in a manner to minimize adverse effects on plants and wildlife and to protect cultural resource values. The preferred alternative would meet project objectives.</p>

IMPACT SUMMARY

A summary of potential environmental effects for the alternatives is presented in Table 4.

TABLE 4. IMPACT SUMMARY TABLE

Impact Topic	No Action Alternative	Preferred Alternative Rehabilitate Kolob Terrace Road
<p>Soils</p>	<p>The no action alternative would have local long-term minor adverse effects on soils from deterioration of the road and drainage problems that generate erosion.</p>	<p>The preferred alternative would have local short-term minor adverse effects on soil resources during construction from road widening, drainage improvements, grading, and other soil disturbances adjacent to the road. The proposed road rehabilitation would have a long-term minor benefit on soils by stabilizing the road surface, correcting drainage deficiencies that cause erosion, and removing approximately 16 existing pullouts.</p>
<p>Vegetation</p>	<p>The no action alternative would have local long-term negligible adverse effects on vegetation adjacent to the road from erosion and drainage problems.</p>	<p>The preferred alternative would have local long-term minor adverse effects on vegetation from road rehabilitation disturbances that permanently and temporarily affect vegetation adjacent to the road. Weed establishment in areas of disturbed soil is also possible, but would be minimized with weed-control BMPs.</p>

Impact Topic	No Action Alternative	Preferred Alternative Rehabilitate Kolob Terrace Road
		Improvements to drainage, reductions in erosion, and removal and revegetation of approximately 16 gravel pullouts would have a long-term minor beneficial effect on vegetation.
Hydrology and Water Quality	The no action alternative would result in local long-term negligible adverse effects on hydrology and water quality from ongoing drainage and erosion problems associated with the deteriorating condition of the road.	The preferred alternative would have local short-term minor adverse effects on hydrology and water quality during construction from surface disturbances that may generate erosion and increased sediment runoff, but the local long-term effects would be minor and beneficial as a result of improvements in drainage and the condition of the road surface. There would be a negligible increase in impervious area from widening the road in select locations and paving four pullouts.
Archeological Resources	Archeological resources would not be affected under the no action alternative.	Archeological resources would have a local long-term negligible adverse effect under the preferred alternative.
Visitor Use and Recreation Experience	The no action alternative would have local long-term minor adverse effects on visitor use and recreation experience from ongoing deterioration of the road and structural features that contribute to the quality of the visitor experience and that provide access to recreation resources. Although the road would remain open to visitor access, as road conditions deteriorate, periodic maintenance projects would require traffic delays at random times and locations, which would inconvenience visitors.	Traffic delays and suspensions would inconvenience visitors traveling along the road during construction. In response to construction activities, some visitors may avoid the park, visit other portions of the park, or choose an alternate route for travel to the Kolob Reservoir area when traffic is suspended along the road. The park would inform visitors in advance of construction via a number of sources so they can best plan their schedule and activities and minimize impacts. The effect on visitor use and recreation experience would be short-term, moderate, and adverse at the local and parkwide level during construction. The preferred alternative would provide long-term moderate beneficial effects on the quality of the visitor experience following construction by improving the quality and condition of the road.
Natural Soundscape	The no action alternative would have a local long-term minor adverse impact on the natural soundscape along Kolob Terrace Road from traffic.	The preferred alternative would result in local short-term moderate adverse effects on the soundscape in the vicinity of the road from construction activity and traffic, but would have no long-term adverse effects. The park's SMP thresholds would be exceeded in the daytime during construction. A slight reduction in noise levels is possible along the road from smoother pavement and reducing the posted speed limit from 35 mph to 30 mph in the Black Canyon Area.

Impact Topic	No Action Alternative	Preferred Alternative Rehabilitate Kolob Terrace Road
Wild and Scenic Rivers	The no action alternative would have no effect on Grapevine Wash, a designated scenic river near Kolob Terrace Road, and no cumulative effect.	The preferred alternative would have a local short-term negligible adverse effect on ORVs, free-flowing conditions, and water quality of Grapevine Wash from erosion and runoff during construction.
Public Health, Safety, and Park Operations	The no action alternative would result in local long-term moderate adverse effects on public health, safety, and park operations by not addressing safety issues and needed road repairs. The potential for accidents would be similar to existing conditions and may increase as the road continues to deteriorate and the need for maintenance increases.	Proposed rehabilitation and improvements would address safety and maintenance concerns associated with the road. Widening narrow sections, structural repairs, new pavement, and drainage work would improve safety and driving conditions and reduce maintenance requirements. Construction work and traffic delays would cause a disruption in normal traffic patterns, parking, and visitor activities in the park and place a greater demand on park staff. The preferred alternative would result in local and parkwide short-term moderate adverse effects on park operations during construction. Completion of the proposed road improvements would result in local long-term moderate beneficial effects on public health, safety, and park operations by improvements to the structural features of the road and safety measures that reduce the potential for accidents.
Socioeconomics	The no action alternative would have regional long-term minor adverse effects on the economy from deteriorating road conditions that affect visitor access and tourist-related spending in gateway communities for commercial shuttle and guide activities and for a local business located along the road. Deteriorating road conditions would also adversely affect access to private lands and residents. Without road rehabilitation, road maintenance costs would increase.	The preferred alternative would have regional short-term moderate beneficial effects on the economy from construction-related spending and employment. Traffic delays would deter some visitors from coming to the park and could inconvenience or require rescheduling of shuttle and guide services, resulting in regional short-term minor adverse economic impacts. While some park visitors and residents may be inconvenienced during construction, no substantial change in visitor attendance is anticipated. All of the park campgrounds and attractions along Kolob Terrace Road, Zion Canyon Scenic Drive, Kolob Canyon, and Zion–Mt. Carmel Highway would remain open and accessible. Long-term socioeconomic effects would be beneficial to regional businesses from improvements to the quality of the visitor experience along the road.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section provides a description of the resources potentially impacted by the alternatives and the likely environmental consequences. It is organized by impact topics that were derived from internal park and external public scoping. Impacts are evaluated based on context, duration, intensity, and whether they are direct, indirect, or cumulative. More detailed information on resources in Zion may be found in the general management plan (2001).

GENERAL METHODS

This section contains the environmental impacts, including direct and indirect effects, and their significance for each alternative. The analysis is based on the assumption that the mitigation measures identified in the “Resource Protection Measures” section of this EA would be implemented for the preferred alternative. Overall, the Park Service based these impact analyses and conclusions on the review of existing literature and park studies, information provided by experts within the park and other agencies, professional judgment and park staff insights, and public input.

The following terms are used in the discussion of environmental consequences to assess the impact intensity threshold and the nature of impacts associated with each alternative:

Type: Impacts can be beneficial or adverse.

Context: Context is the setting within which an impact would occur, such as local (in the project area along the Kolob Terrace Road), parkwide (in Zion), or regional (Washington County and southwest Utah).

Impact Intensity: Impact intensity is defined individually for each impact topic. There may be no impact, or impacts may be negligible, minor, moderate, or major.

Duration: Duration of impact is analyzed independently for each resource because impact duration is dependent on the resource being analyzed. Depending on the resource, impacts may last for the construction period, a single year or growing season, or longer. For purposes of this analysis, impact duration is described as short-term or long-term.

Direct and Indirect Impacts: Effects can be direct, indirect, or cumulative. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later or farther away, but are still reasonably foreseeable. Direct and indirect impacts are considered in this analysis, but are not specified in the narratives.

Threshold for Impact Analysis: The duration and intensity of effects vary by resource. Therefore, the definitions for each impact topic are described separately. These definitions were formulated through the review of existing laws, policies, and guidelines; and with assistance from park staff and regional NPS and Washington office NPS specialists. Impact intensity thresholds for negligible, minor, moderate, and major adverse effects are defined in a table for each resource topic.

CUMULATIVE EFFECTS

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. The CEQ regulations that implement NEPA require assessment of cumulative impacts in the decision-making process for federal projects.

Methods for Assessing Cumulative Effects

Cumulative impacts were determined by combining the impacts of the preferred or no action alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects near Zion or the surrounding region that might contribute to cumulative impacts. The geographic scope of the analysis includes actions in the Kolob Terrace Road corridor, as well as other actions in the park or surrounding lands where overlapping resource impacts are possible. The temporal scope includes projects within a range of approximately 10 years.

Past, present, and reasonably foreseeable actions were then assessed in conjunction with the impacts of the alternatives to determine if they would have any added adverse or beneficial effects on a particular natural resource, park operation, or visitor use. The impact of reasonably foreseeable actions would vary for each of the resources. Cumulative effects are considered for each alternative and are presented in the environmental consequences discussion for each impact topic.

Past Actions

Past actions include activities that influenced and affected the current conditions of the environment near the project area. Kolob Terrace Road has not had any recent substantial rehabilitation work other than periodic maintenance, repairs, and overlays by the Park Service and Washington County. Construction of second homes on private land near Kolob Reservoir has increased traffic and contributed to the deterioration of the road from the transport of construction materials, concrete, and other supplies. Construction of a new water pipeline from Crystal Creek to Kolob Reservoir by the Washington County Water Conservancy District in 2010 also contributed to the deterioration of Kolob Terrace Road from use of large heavy trucks for the transport of materials. A large wildfire in 2006 on lands bordering Kolob Terrace Road South did not affect the road, but substantially changed the

character of the adjacent vegetation community, including the loss of pinyon pine and juniper trees.

Current and Future Actions

Continued growth and development of private land north of the park near Kolob Reservoir is anticipated in the future. This includes additional traffic by summer residents, as well as truck traffic delivering construction supplies. The park anticipates additional prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 depending on weather conditions. The park expects to complete rehabilitation work on the Zion–Mt. Carmel Highway in 2011 and, thus, this work would be completed prior to the start of work on Kolob Terrace Road. No other reasonably foreseeable actions were identified near the project area that would potentially contribute to cumulative effects.

SOILS

Affected Environment

Most of the soils in the park and in the project area are young, very well drained, easily eroded, and low in fertility (NRCS 2011). Rock and stony rock lands are present in half of the 36 soil complexes that occur in the park. More than 80% of the soils in the park have low productivity or high erosion potential. Soils in the project area include fine sandy loam, gravelly loam, cobbly loam, and very cobbly clay loam (NRCS 2011). These soils range from deep and well-drained sandy loams to shallow soils containing an abundance of gravel, cobbles, and rock.

Zion also contains notable amounts of biological soil crusts where the soil surface is bound together by a community of algae, fungi, lichen, and other microorganisms. Detailed surveys of the distribution of biological soil crusts in Zion are not available; however, these crusts are typically associated with open canopies and sandy soil usually found in pinyon/juniper woodlands and desert-shrub communities. The potential for biological soils crusts in the project area is limited because most of the cut and fill slopes adjacent to the road have been previously disturbed.

Impact Intensity Threshold

Available information on potentially impacted soils in the project area was compiled. Potential impacts from the alternatives were based on professional judgment and experience with similar actions. The threshold of change for the intensity of an impact on soils is defined in Table 5.

TABLE 5. SOIL IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Adverse: The effects of the action on soils would be below or at a very low level of detection. Any effects on productivity or erosion potential would be slight. Beneficial: The action would slightly improve soil conditions, productivity, or reduce erosion.
Minor	Adverse: The effects of the action on soils would be detectable. The action would change a soil's profile in a relatively small area, but would not appreciably increase the potential for erosion of additional soil. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful. Beneficial: The action would noticeably improve soil conditions, productivity, or reduce erosion.
Moderate	Adverse: The action would result in a change in quantity or alteration of the topsoil, overall biological productivity, or the potential for erosion to remove small quantities of soil. Changes to localized ecological processes would be limited. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful. Beneficial: The action would substantially improve soil conditions, productivity, or reduce erosion.
Major	Adverse: The action would result in a change in the potential for erosion to remove large quantities of soil or in alterations to topsoil and overall biological productivity in a relatively large area. Key ecological processes would be altered, and landscape-level changes would be expected. Mitigation measures to offset adverse effects would be necessary, extensive, and their success could not be guaranteed. Beneficial: The action would exceptionally improve soil conditions, productivity, or reduction in erosion.

Short-term impact—recovers in less than three years

Long-term impact—takes more than three years to recover

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. No disturbance to soil resources would occur because there would be no construction-related actions. Deterioration of the pavement edges and erosion of the road shoulder or fill slopes in some locations would continue, which would result in erosion and soil loss. Vehicles would continue to occasionally drive off the road edges, resulting in damage to soils. Existing areas of poor drainage along the road would not be corrected, potentially resulting in erosion. Although the productivity of soils adjacent to the road is generally poor, these continued impacts to soils would be local, long-term, minor, and adverse.

Cumulative Impacts. Past actions, such as road construction, repairs, and maintenance have impacted soil resources from excavation, erosion, and a loss in soil productivity. Traffic related to past and ongoing construction of second homes near Kolob Reservoir has contributed to road deterioration and associated impacts to soils. A large wildfire in 2006 on lands bordering Kolob Terrace Road South likely resulted in a temporary increase in soil erosion. Planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 would result in a temporary increase in soil erosion, but the long-term effects would be beneficial from maintenance of native plant communities. Rehabilitation of the Zion–Mt. Carmel Highway in 2011 would result in temporary disturbances to soils. The combined effects of past, present, and reasonably foreseeable actions on soils would be local, long-term, minor, and adverse. The overall cumulative effects to soils from the no action alternative in combination with past, present, and reasonably

foreseeable future actions would be local, long-term, minor, and adverse, with a relatively small adverse contribution from the no action alternative.

Conclusion. The no action alternative would have local long-term minor adverse effects on soils from deterioration of the road and drainage problems that generate erosion. Cumulative effects would be local, long-term, minor, and adverse.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. Road rehabilitation activities such as excavating, road widening, grading, and paving would occur primarily within areas of existing disturbance. Drainage improvements and culvert replacements would result in disturbances to soils in ditches and embankments. Soil disturbance outside of the existing paved surface on adjacent cut and fill slopes would be limited to about 5.5 acres, of which 2.3 acres would be new pavement and 3.2 acres would be temporarily disturbed during construction. Soil material exposed during construction would be subject to erosion until stabilized or revegetated. Impacts to soils during construction would be local, short-term, minor, and adverse. Proposed drainage improvements and correction of deteriorating road pavement would reduce the potential for long-term erosion and soil loss. Repairing existing road conditions that currently generate erosion would result in a local long-term minor beneficial effect on soil resources. Closing and revegetating approximately 16 pullouts along the road would reduce the potential for future erosion and restore soil productivity. Planned use of temporary and permanent erosion-control BMPs and revegetation of temporarily disturbed areas would reduce the potential for erosion and soil loss. Overall, the preferred alternative would result in local long-term minor beneficial effects on soil resources.

Cumulative Impacts. Past actions, such as road construction, repairs, and maintenance have impacted soil resources from excavation, erosion, and a loss in soil productivity. Traffic related to past and ongoing construction of second homes near Kolob Reservoir has contributed to road deterioration and associated impacts to soils. A large wildfire in 2006 on lands bordering Kolob Terrace Road South likely resulted in a temporary increase in soil erosion. Planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 would result in a temporary increase in soil erosion, but the long-term effects would be beneficial from maintenance of native plant communities. Rehabilitation of the Zion–Mt. Carmel Highway in 2011 would result in temporary disturbances to soils similar to those expected for the preferred alternative. The combined effects of past, present, and reasonably foreseeable future projects on soil resources would be local, long-term, minor, and adverse. The overall cumulative impacts to soil resources from the preferred alternative in combination with past, present, and reasonably foreseeable future actions would be local, long-term, minor, and adverse, with a minor beneficial contribution from the preferred alternative. The 5.5 acres of new soil disturbance and the erosion-control benefits from the preferred alternative would be a relatively small contribution to the overall cumulative impact.

Conclusion. The preferred alternative would have local short-term minor adverse effects on soil resources during construction from road widening, drainage improvements, grading, and other soil disturbances adjacent to the road. The proposed road rehabilitation would

have a long-term minor benefit on soils by stabilizing the road surface, correcting drainage deficiencies that cause erosion, and removing approximately 16 existing pullouts. Cumulative effects would be local, long-term, minor, and adverse, with a long-term minor beneficial contribution from the preferred alternative.

VEGETATION

Affected Environment

Vegetation communities in Zion range from the northern Mojave Desert and Great Basin plant communities to southern Rocky Mountain plant communities (NPS 2004). Vegetation communities at the elevations present in the project area (approximately 4,400 to 7,650 feet) include pinyon/juniper woodlands, ponderosa pine woodlands, and mountain shrublands. In the southern portion of the project area, vegetation is comprised primarily of pinyon/juniper woodlands and a few areas of shrublands. A fire in 2006 burned the majority of the pinyon pine and juniper trees along the southern most section of the road. The vegetation in the area now is mostly non-native annual grasses. In the northern portion of the project area, vegetation is comprised of mountain shrublands, pinyon/juniper woodlands, and ponderosa pine woodlands. Vegetation in shrublands in the park typically includes big sagebrush, rabbitbrush, scrub oak, and Utah serviceberry. Common species in the pinyon/juniper woodlands includes juniper, pinyon pine, big sagebrush, and Gambel oak. Mountain shrublands in the park can include species such as black sagebrush, greenleaf Manzanita, Gambel oak, Utah serviceberry, and quaking aspen. Vegetation in ponderosa pine woodlands in the park includes ponderosa pine, greenleaf Manzanita, and Gambel oak.

Roadside fill material on shoulders and cut and fill slopes are often sparsely vegetated and frequently support nonnative weed species. Invasive nonnative plants in the project area include cheatgrass, smooth brome, mullein, scotch thistle, and bull thistle (Decker 2011). Russian thistle also occurs in the lower elevations of the project area, and a population of spotted knapweed has been documented in the project area and is monitored by the park.

Impact Intensity Threshold

Predictions about impacts were based on the expected disturbance to vegetation communities and professional judgment and experience with previous projects. The thresholds of change for the intensity of impacts on vegetation are defined in Table 6.

TABLE 6. VEGETATION IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	<p>Adverse: The effects on vegetation (individuals or communities) would not be measurable. The abundance or distribution of individuals would not be affected or would be slightly affected. The effects would be on a small scale and no species of special concern would be affected. Ecological processes and biological productivity would not be affected.</p> <p>Beneficial: The action would slightly improve the condition, abundance, or distribution of individual plant species and communities in the project area.</p>
Minor	<p>Adverse: The action would not necessarily decrease or increase the project area's overall biological productivity. The alternative would affect the abundance or distribution of individuals in a localized area, but would not affect the viability of local or regional populations or communities. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, would be required and would be effective. Mitigation may be needed to offset adverse effects, would be relatively simple to implement, and would likely be successful.</p> <p>Beneficial: The action would noticeably improve the condition, abundance, or distribution of individual plant species and communities in the project area.</p>
Moderate	<p>Adverse: The action would result in effects on some individual native plants and would also affect a sizeable segment of the species' population over a relatively large area. Permanent impacts would occur to native vegetation, but in a relatively small area. Some special status species would also be affected. Mitigation measures would be necessary to offset adverse effects and would likely be successful.</p> <p>Beneficial: The action would substantially improve the condition, abundance, or distribution of individual plant species and communities in the project area.</p>
Major	<p>Adverse: The action would have considerable effects on native plant populations, including special status species, and would affect a relatively large area within and outside the park. Extensive mitigation measures to offset the adverse effects would be required; success of the mitigation measures would not be guaranteed.</p> <p>Beneficial: The action would extensively improve the condition, abundance, or distribution of individual plant species and communities in the project area.</p>

Short-term impact—recovers in less than one year

Long-term impact—takes more than one year to recover

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. There would be no project-related ground disturbance with the potential to adversely impact vegetation. Vegetation adjacent to the existing road would continue to be affected by erosion of fill slopes from improper drainage and sediment deposition. The no action alternative would not involve land-disturbing activities that would likely increase the number and distribution of exotic or noxious weeds. Vegetation effects would be local, long-term, negligible, and adverse.

Cumulative Impacts. Past actions, such as road construction and maintenance activities, have resulted in vegetation clearing and introduction of invasive exotic plants. A large wildfire in 2006 on lands bordering Kolob Terrace Road South resulted in changes in the vegetation community and eliminated pinyon pine and juniper trees. Planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 would result in changes in vegetation composition and density. Rehabilitation of the Zion–Mt. Carmel Highway in 2011 would result in temporary disturbances to vegetation and the potential for weed introduction. The combined effects of past, present, and reasonably foreseeable actions on vegetation would be local, long-term, minor, and adverse. The overall cumulative impacts to vegetation from the no action alternative in combination with past,

present, and reasonably foreseeable future actions would be local, long-term, minor, and adverse. Impacts to vegetation from the no action alternative would be a relatively small contribution to the overall cumulative impact.

Conclusion. The no action alternative would have local long-term negligible adverse effects on vegetation adjacent to the road from erosion and drainage problems. Cumulative effects would be local, long-term, minor, and adverse.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. Road rehabilitation would occur primarily within the existing disturbed road bench, but incidental effects on vegetation adjacent to road cut and fill slopes would occur from road widening, installing culverts and drainage improvements, and grading at existing culverts. Road rehabilitation work would result in about 5.5 acres of disturbance outside of existing pavement. Of this, 2.3 acres would be new pavement and 3.2 acres would be temporarily disturbed and revegetated or stabilized as appropriate. Impacts to vegetation would be less than 5.5 acres, since the disturbance area bordering the road includes unvegetated road shoulders, ditches, and gravel pullouts. Construction activities would be confined to the smallest area necessary to complete the work and all areas of disturbed vegetation would be reseeded with native vegetation following construction. Sixteen of the 61 existing gravel pullouts would be removed, revegetated, and blocked off. Infestation and spread of invasive exotic plants is possible. Weeds frequently invade disturbed ground where they are easily established and outcompete native species if left unchecked. Implementation of weed-control BMPs would minimize the potential for weed establishment and long-term impacts. Revegetation of disturbed areas is expected to take more than one year because of the low soil fertility and water holding capacity of the soils. Overall, the preferred alternative would have local long-term minor adverse effects from permanent and temporary disturbance to vegetation adjacent to the road.

Cumulative Impacts. Past actions, such as road construction and maintenance activities, have resulted in vegetation clearing and introduction of invasive exotic plants. A large wildfire in 2006 on lands bordering Kolob Terrace Road South resulted in changes in the vegetation community and eliminated pinyon pine and juniper trees. Planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 would result in changes in vegetation composition and density. Rehabilitation of the Zion–Mt. Carmel Highway in 2011 would result in temporary disturbances to vegetation and the potential for weed introduction. The combined effects of past, present, and reasonably foreseeable actions on vegetation would be local, long-term, minor, and adverse. The overall cumulative impacts to vegetation from the preferred alternative in combination with past, present, and reasonably foreseeable future actions would be local, long-term, minor, and adverse. The new vegetation disturbance from the preferred alternative would be a relatively moderate contribution to the overall cumulative impacts.

Conclusion. The preferred alternative would have local long-term minor adverse effects on vegetation from road rehabilitation disturbances that permanently and temporarily affect vegetation adjacent to the road. Weed establishment in areas of disturbed soil is also possible,

but would be minimized with weed-control BMPs. Improvements to drainage, reductions in erosion, and removal and revegetation of approximately 16 gravel pullouts would have a long-term minor beneficial effect on vegetation. Cumulative effects would be local, long-term, minor, and adverse.

HYDROLOGY AND WATER QUALITY

Affected Environment

Zion National Park is entirely within the Virgin River basin and its two primary tributaries, the north fork and the east fork. Several streams occur in or near the project area: Grapevine Wash, Wolf Springs Wash, Pine Spring Wash, and Little Creek. Grapevine Wash is parallel to the Kolob Terrace Road South. Kolob Terrace Road North crosses Pine Creek Wash. The headwaters of Wolf Spring Wash are just south of the project area. Little Creek flows parallel to Kolob Terrace Road North. All of these drainages flow south toward the north fork of the Virgin River.

Sediment and turbidity are the primary water quality issues in the rivers and streams within the park. Most streams in the park have relatively low levels of sediment during low flow, while high flows result in large increases in sediment and turbidity. Most sediment movement originates from natural sources and occurs during spring runoff or during brief runoff events following summer thunderstorms. The total sediment transport in the north fork of the Virgin River is estimated to be 200,000 tons/year (NPS 2001). The presence of fecal bacteria also is a concern within the park. Bacteria levels have occasionally exceeded the standard for full body contact recreation. The presence of dissolved metals in excess of drinking water standards has rarely occurred in the park.

Impact Intensity Threshold

Available information on hydrology and water quality in the project area was compiled. Potential impacts from the alternatives are based on professional judgment, experience with similar actions, and project disturbance. The thresholds of change for the intensity of an impact on hydrology and water quality are defined in Table 7.

TABLE 7. HYDROLOGY AND WATER QUALITY IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Adverse: The action would change a hydrologic resource, but the change would be so small that it would not be of measurable or perceptible consequence. Beneficial: The action would slightly improve water quality and natural hydrologic flow or patterns, or would reduce features that impede water quality or natural surface water flow or patterns in the project area.
Minor	Adverse: The action would change a hydrologic resource, but the change would be small, localized, and of little consequence. Beneficial: The action would noticeably improve water quality and natural hydrologic flow or patterns, or would reduce features that impede water quality or natural surface water flow or patterns in the project area.

Impact Intensity	Intensity Description
Moderate	<p>Adverse: The action would change a hydrologic resource; the change would be measurable and of consequence.</p> <p>Beneficial: The action would substantially improve water quality and natural hydrologic flow or patterns, or would reduce features that impede water quality or natural surface water flow or patterns in the project area.</p>
Major	<p>Adverse: The action would noticeably change a hydrologic resource; the change would be measurable and result in a severely adverse or major beneficial impact with regional consequences.</p> <p>Beneficial: The action would exceptionally improve water quality and natural hydrologic flow or patterns, or would reduce features that impede water quality or natural surface water flow or patterns in the project area.</p>

Short-term impact—following project completion, recovers in less than one year

Long-term impact—following project completion, takes more than one year to recover

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. The no action alternative would not result in new disturbances that would impact water resources. Road drainage problems would persist, which would lead to erosion and soil transport into Grapevine Wash, Wolf Springs Wash, Pine Spring Wash, and Little Creek. Hydrologic and water quality effects of the no action alternative would be local, long-term, negligible, and adverse.

Cumulative Impacts. Original construction of the road has modified the natural drainage patterns of ephemeral washes and seeps. Road drainage structures currently route runoff, snowmelt, and seep discharges to natural drainages via ditches, inlets, and culverts. The existing asphalt road adds impervious surface, which increases runoff during precipitation events. A large wildfire in 2006 on lands bordering Kolob Terrace Road South likely had adverse impacts to water quality by temporarily removing surface cover and increasing runoff and the concentration of nutrients in runoff. Similarly, planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 also may temporarily affect water quality by removing surface cover and increasing runoff. Drainage work on the Zion–Mt. Carmel Highway may result in temporary minor increases in erosion and sediment contribution to streams tributary to the Virgin River downstream of the park. The combined effects of past, present, and reasonably foreseeable actions on water quality would be local, long-term, minor, and adverse. The overall cumulative effects to water quality from the no action alternative in combination with past, present, and reasonably foreseeable future actions would be local, long-term, minor, and adverse, with a negligible adverse contribution from the no action alternative.

Conclusion. The no action alternative would result in local long-term negligible adverse effects on hydrology and water quality from ongoing drainage and erosion problems associated with the deteriorating condition of the road. Cumulative effects would be local, long-term, minor, and adverse.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. Proposed road rehabilitation involving excavating, grading, and exposing soil material would increase the potential for erosion until vegetation is established, paving is completed, drainage work is installed, and other stabilization work is finished. The transport of sediment to Grapevine Wash, Wolf Springs Wash, Pine Spring Wash, Little Creek, or other ephemeral drainages is possible during construction, although soil- and erosion-control BMPs would be used to contain and control erosion. No measurable effects on water quality would occur because of the use of BMPs and because any sediment contributions to these mostly ephemeral streams would be very minor in relation to the supply of sediment and erosion naturally occurring in this watershed. The road is generally not close to these streams and, therefore, minor amounts of soil movement are unlikely to reach the streams. There would be a negligible increase in impervious area from widening the road by 2 to 4 feet in select locations and paving four pullouts. Removing and revegetating approximately 16 gravel pullouts would result in a slight decrease in impervious area. The proposed drainage improvements would better collect and dissipate runoff and reduce the potential for erosion and stream sedimentation. Local short-term minor adverse effects on hydrology and water quality are possible during construction, but local long-term effects would be minor and beneficial as a result of improvements in drainage and the condition of the road surface.

Cumulative Impacts. Original construction of the road has modified the natural drainage patterns of ephemeral washes and seeps. Road drainage structures currently route runoff, snowmelt, and seep discharges to natural drainages via ditches, inlets, and culverts. The existing asphalt road adds impervious surface, which increases runoff during precipitation events. A large wildfire in 2006 on lands bordering Kolob Terrace Road South likely had adverse impacts to water quality by temporarily removing surface cover and increasing runoff and the concentration of nutrients in runoff. Similarly, planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 also may temporarily affect water quality by removing surface cover and increasing runoff. Drainage work on the Zion–Mt. Carmel Highway may result in temporary minor increases in erosion and sediment contribution to streams tributary to the Virgin River downstream of the park. Past, present, and reasonably foreseeable future actions would have a local long-term minor adverse impact on water resources.

As described above, implementation of the preferred alternative would result in both short-term minor adverse impacts and long-term minor beneficial impacts to hydrology and water quality. The impacts of the preferred alternative in combination with the local long-term adverse impacts of other past, present, and reasonably foreseeable future actions would result in local long-term minor adverse cumulative effects. The beneficial effects of the preferred alternative would be a relatively small component of the cumulative impacts.

Conclusion. The preferred alternative would have local short-term minor adverse effects on hydrology and water quality during construction from surface disturbances that may generate erosion and increased sediment runoff, but the local long-term effects would be minor and beneficial as a result of improvements in drainage and the condition of the road surface. There would be a negligible increase in impervious area from widening the road in

select locations and paving four pullouts. Cumulative effects would be local, long-term, minor, and adverse.

ARCHEOLOGICAL RESOURCES

Affected Environment

The upper and lower Kolob Plateau has been occupied for at least the last two thousand years and likely much longer, based on Archaic period projectile points found in the area. The primary prehistoric period of occupation is the post-A.D. 1000 Virgin Anasazi identified by the North Creek ceramic type and the Southern Paiute identified by a distinctive brownware ceramic type. Historic use of the project area is primarily ranching, which is still practiced by several families with in-holdings.

Thirteen cultural resource surveys have completely inventoried archeological resources for the 9.8-mile road segment proposed for rehabilitation. Based on the results of previous cultural resource surveys, 18 archeological sites have been identified in the vicinity of the project area. Examinations of the archeological site maps that accompany the individual site records indicate that 13 of these sites overlap the 10-meter area of potential effect (APE) from road rehabilitation work. Because all 13 sites intersect the existing road, these sites may have been impacted to an unknown degree during the original construction of Kolob Terrace Road.

Many of the affected sites are multicomponent sites (archeological sites with both prehistoric and historic remains), of which the prehistoric portion is the significant component. Except for the documented historic road segments that intersect Kolob Terrace Road, the remaining historic archeological remains are attributable to the historic use of the road (roadside trash) and historic ranching that has occurred throughout the area. The prehistoric archeological components all consist of artifact scatters absent of architectural remains. Those sites listed as eligible for the National Register exhibit diverse artifact assemblages and/or have the potential for buried cultural deposits.

Impact Intensity Threshold

Section 106 of the NHPA of 1966, as amended (16 USC 470, et seq.) and its implementing regulations under 36 CFR 800 require all federal agencies to consider the effects of federal actions on cultural properties eligible for or listed in the National Register. In order for an archeological site to be listed in the National Register, it must be associated with an important historic event, person(s), or that embodies distinctive characteristics or qualities of workmanship. The thresholds of change for the intensity of an impact on archeological sites are defined in Table 8.

TABLE 8. ARCHEOLOGICAL SITES IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Impacts would be at the lowest level of detection with neither adverse nor beneficial consequences. The determination of effect would be no adverse effect.
Minor	Adverse: Alteration of an archeological site would not diminish the overall integrity of the resource. The determination of effect would be no adverse effect. Monitoring may be required if a proposed activity occurs near an archeological site. Beneficial: The action would maintain and preserve a site(s). For purposes of Section 106, the determination of effect would be no adverse effect.
Moderate	Adverse: Alteration of an archeological site would diminish the overall integrity of the resource. The determination of effect would be adverse effect. A memorandum of agreement is executed among the Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation. Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of the impact under NEPA from moderate to minor. Beneficial: The action would stabilize a site(s). For purposes of Section 106, the determination of effect would be no adverse effect.
Major	Adverse: Alteration of an archeological site would diminish the overall integrity of the resource. The determination of effect for would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed on and the Park Service and applicable state or tribal historic preservation officer and/or Advisory Council on Historic Preservation are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b). Beneficial: The action would preserve a site(s) through active intervention. For purposes of Section 106, the determination of effect would be no adverse effect.

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. Known archeological sites in the APE along the road would not be affected under the no action alternative because there would be no new disturbances. Future deterioration of the road could lead to erosion and/or drainage issues that could adversely affect one archeological site near the road. Potential effects would be local, long-term, minor, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects, such as road construction and maintenance activities, would have a local long-term minor adverse effect on archeological resources. Prescribed burning could damage archeological sites, but significant resources are avoided through monitoring or flagging to minimize the potential for adverse impacts. Rehabilitation of the Zion–Mt. Carmel Highway in 2011 is expected to avoid archeological sites. Because the no action alternative would not impact archeological sites, ongoing maintenance activities would have a negligible effect on cultural resources since any effect to cultural resources has already occurred.

Conclusions. Archeological resources would not be affected under the no action alternative and there would be no cumulative impacts.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. All known archeological sites would be avoided during construction activities. No activity that would have the potential to impact

archeological sites would take place outside of the previously disturbed road corridor. Monitoring may be necessary should the project design include disturbance near a known archeological site, and the site would be delineated prior to construction. As currently designed, no impacts would occur to archeological sites.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects, such as road construction and maintenance activities, would have a local long-term negligible adverse effect on archeological resources. Prescribed burning could damage archeological sites, but significant resources are avoided through monitoring or flagging to minimize the potential for adverse impacts. Rehabilitation of the Zion–Mt. Carmel Highway in 2011 is expected to avoid archeological sites. Because the preferred alternative would not impact archeological sites, there would be no cumulative impacts.

Conclusions. Archeological resources would have a local long-term negligible adverse effect under the preferred alternative. Cumulative effects would be local, long-term, negligible, and adverse.

VISITOR USE AND RECREATION EXPERIENCE

Affected Environment

Zion hosted almost 2.7 million visitors in 2010, with most visitors coming between March and October (NPS 2011). Peak summer visitor use reaches about 360,000 visitors per month from June to August. Kolob Terrace Road is one of the less visited areas within the park, with less than 4% of total visitors traveling the road (about 97,000 visitors in 41,000 vehicles in 2010). Most traffic on the road occurs from May through September. Kolob Terrace Road is plowed in the winter to the base of Maloney Hill. Above Maloney Hill the road is closed to automobile traffic during the winter. Snowmobiles are allowed on the road above Maloney Hill so private landowners can access their land during the winter.

Recreational activities in Zion include hiking, rock climbing, canyoneering, bird watching, and sightseeing. Trailheads along Kolob Terrace Road provide access to the Hop Valley, the Subway, the Right Fork of North Creek, and Wildcat Canyon trails. The road also provides access to the Lava Point campground. Visitors along the road enjoy the scenic views and stop at pullouts for sightseeing, photography, and wildlife viewing. Several tour operators use Kolob Terrace Road to provide shuttle service and guided visitor trips in the park and other public lands. A discussion on these operations is included in the “Socioeconomics” section.

Impact Intensity Threshold

NPS *Management Policies 2006* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the Park Service is committed to providing appropriate high-quality opportunities for visitors to enjoy the parks. Part of the purpose of Zion is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the park’s management goals is

to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.

Public scoping input and observation of visitation patterns, combined with assessment of amenities available to visitors under current park management, were used to estimate the effects of the alternatives. Impacts on the ability of visitors to experience a full range of park resources was analyzed by examining resources and objectives presented in the park significance statements, as derived from its enabling legislation. The potential for change in visitor experience proposed by the alternatives was evaluated by identifying projected increases or decreases in access and other visitor uses, and determining whether or how these projected changes would affect the desired visitor experience, to what degree, and for how long. The thresholds of change for the intensity of an impact to visitor experience and recreation resources are described in Table 9.

TABLE 9. VISITOR USE AND RECREATION EXPERIENCE IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	<p>Adverse: Changes in visitor use and recreation experience would be below or at an imperceptible level of detection. The visitor would not likely be aware of the effects associated with the action.</p> <p>Beneficial: The action would slightly improve or increase visitor use opportunities and/or experience or would reduce features that impede visitor use and/or experience in the project area.</p>
Minor	<p>Adverse: Changes in visitor use and recreation experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the action, but the effects would be slight.</p> <p>Beneficial: The action would noticeably improve or increase visitor use opportunities and/or experience or would reduce features that impede visitor use and/or experience in the project area.</p>
Moderate	<p>Adverse: Changes in visitor use and recreation experience would be readily apparent. The visitor would be aware of the effects associated with the action and would likely express an opinion about the changes.</p> <p>Beneficial: The action would substantially improve or increase visitor use opportunities and/or experience or would reduce features that impede visitor use and/or experience in the project area.</p>
Major	<p>Adverse: Changes in visitor use and recreation experience would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the action and would likely express a strong opinion about the changes.</p> <p>Beneficial: The action would exceptionally improve or increase visitor use opportunities and/or experience or would reduce features that impede visitor use and/or experience in the project area.</p>

Short-term impact—occurs only during project construction

Long-term impact—continues after project construction

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. There would be no change in the fundamental nature and quality of the visitor experience or recreational opportunities along the road under the no action alternative. The road would remain open and visitors would continue to have access to park resources. As road conditions continue to deteriorate, periodic maintenance projects would require traffic delays at random times and locations, which would inconvenience visitors. Road conditions would deteriorate to the point that the

quality of the visitor experience is diminished from a visibly damaged road or deterioration of other structural features. Driving and other recreational experiences would decline due to the poor condition of the road surface. The potential for road closures would increase. Effects on visitor use and recreation experience under the no action alternative would be local, long-term, minor, and adverse.

Cumulative Impacts. Past and ongoing road maintenance and other improvement projects have allowed visitors to continue to access and enjoy the Kolob Terrace area of the park. The past use of the road by heavy trucks transporting materials for construction of second homes on private land near Kolob Reservoir and for a water pipeline from Crystal Creek to Kolob Reservoir, as well as additional traffic by summer residents, has contributed to the deterioration of the road and increased traffic, which has adversely affected the visitor experience. Continued growth and development on private land north of the park would add to traffic on the road. Planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 would result in smoke and temporary visibility issues along the road that would affect visitor access or activities. Past, present, and reasonably foreseeable future projects, including park efforts to maintain the road would have a parkwide long-term minor beneficial effects on visitor use and recreation experience. The overall cumulative effects to visitor use and recreation experience from the no action alternative in combination with past, present, and reasonably foreseeable future actions would remain parkwide, long-term, minor, and beneficial, but the no action alternative would contribute a noticeable adverse effect.

Conclusion. The no action alternative would have local long-term minor adverse effects on visitor use and recreation experience from ongoing deterioration of the road and structural features that contribute to the quality of the visitor experience and that provide access to recreation resources. Although the road would remain open to visitor access, as road conditions deteriorate, periodic maintenance projects would require traffic delays at random times and locations, which would inconvenience visitors. Cumulative effects would be parkwide, long-term, minor, and beneficial because of other transportation improvements in the park.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. The visitor experience and access to recreation resources would be impacted by construction activities required to rehabilitate the road. At times, traffic delays and suspensions would inconvenience visitors traveling along the road, but road improvements would also improve the quality of the visitor experience over the long term.

Planned roadwork on Kolob Terrace Road is programmed for 2016, if funding is available. Construction work would occur primarily between March and October because of snow conditions in the winter. During this period, temporary traffic delays of up to 30 minutes would occur from 7 a.m. to 7 p.m. and up to 3 hours from 10 a.m. to 5 p.m. from Monday through Thursday.

Construction work would cause some visitors to avoid traveling Kolob Terrace Road during periods when traffic is suspended. Visitors traveling through the park via the road to the Kolob Reservoir area may decide to travel the unpaved road approaching the reservoir from the north from Cedar City. Day use visitors in Zion may choose to visit other areas of the park, including destinations along the Zion Canyon Scenic Drive, Kolob Canyon, or the Zion–Mt. Carmel Highway, which may result in increased visitor use and crowding at these locations. Increased crowding at other locations in the park would be minor because Kolob Terrace is one of the least visited areas in the park.

As described in Table 2, the park would implement a number of measures to reduce visitor impacts and maintain the quality of the visitor experience and access to recreation resources during construction. Visitors would be informed in advance of construction via a number of sources so they can best plan their schedule and activities. Traffic delays would be kept to a minimum. Improvements to the pullout at the base of Maloney Hill would facilitate vehicles with snowmobile trailers turning around and reduce congestion in the winter.

Short-term moderate adverse effects on the quality of the visitor experience would occur at the local and parkwide level during periods of construction. While construction activities and traffic delays would temporarily inconvenience visitors, substantial changes in the number of visitors to the park are not expected. Over the long term, the proposed improvements to the condition of the road would provide a moderate beneficial effect on the quality of the visitor experience and ensure protection of the road's structural features for visitor enjoyment and safe travel for many years.

Cumulative Impacts. Past and ongoing road maintenance and other improvement projects have allowed visitors to continue to access and enjoy the Kolob Terrace area of the park. Past use of the road by heavy trucks transporting materials for construction of second homes on private land near Kolob Reservoir and for a water pipeline from Crystal Creek to Kolob Reservoir, as well as additional traffic by summer residents, has contributed to deterioration of the road and increased traffic, which has adversely affected the visitor experience. Continued growth and development on private land north of the park would add to traffic on the road. Planned future prescribed burning on the north side of Pine Valley Peak and in the Pocket Mesa area in 2011 would result in smoke and temporary visibility issues along the road that would affect visitor access or activities. Overall, past, present, and reasonably foreseeable future projects would have a long-term minor beneficial effect on visitor use and recreation experience. The overall cumulative impacts to visitor use and recreation experience from the preferred alternative in combination with past, present, and reasonably foreseeable future actions would be local to parkwide, minor, and beneficial, with a substantial beneficial contribution from the preferred alternative.

Conclusion. Traffic delays and suspensions would inconvenience visitors traveling along the road during construction. In response to construction activities, some visitors may avoid the park, visit other portions of the park, or choose an alternate route for travel to the Kolob Reservoir area when traffic is suspended along the road. The park would inform visitors in advance of construction via a number of sources so they can best plan their schedule and activities and minimize impacts. The effect on visitor use and recreation experience would be short-term, moderate, and adverse at the local and parkwide level during construction. The preferred alternative would provide long-term moderate beneficial effects on the quality of

the visitor experience following construction by improving the quality and condition of the road. Cumulative impacts would be local to parkwide, long-term, minor, and beneficial.

NATURAL SOUNDSCAPES

Affected Environment

An important part of the NPS mission is preservation of natural soundscapes associated with national park units as indicated in NPS *Management Policies 2006* and DO-47: *Sound Preservation and Noise Management*. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all natural sounds within the park, together with the physical capacity for transmitting natural sound through air, water, or solid material. Acceptable frequencies, magnitudes, and durations of human-caused sound varies among national park system units, as well as potentially throughout each park unit, but are generally greater in developed areas and less in undeveloped areas. Zion strives to preserve the natural soundscape associated with the physical and biological resources of the park.

Zion developed a Soundscape Management Plan (SMP) to protect sound resources in the park (NPS 2010). The SMP identifies a frontcountry zone and a wilderness zone for the purposes of soundscape management. Kolob Terrace Road is within the frontcountry zone, which has the following management objectives:

- Natural sounds are audible and discernable, with common noise intrusions by visitors and park operations that are concentrated at locations near roads and heavily developed areas.
- Active intensive management is used to maximize noise-free intervals and limit the intensity and duration of noise intrusions.
- Noise levels that interfere with general conversation rarely occur and are of limited duration except when caused by emergency services; search and rescue operations (sirens and search and rescue aircraft); and park operations (road repairs, grounds, and building maintenance).
- Sound levels that interfere with interpretive programs do not occur except when caused by emergency services and search and rescue operations (sirens and search and rescue aircraft).
- Sound levels that exceed thresholds for sleep interruption rarely occur.
- Noise levels at common rock climbing areas should not interfere with effective communication among climbers.
- Noise levels that mask important auditory signals for wildlife should be uncommon and should be limited to locations near roads and heavily developed areas.
- Noise levels that affect wildlife behavior, distribution and numbers should be uncommon and should be limited to locations near roads and heavily developed areas.

The natural soundscape along the road is influenced primarily by vehicle traffic. About 41,000 vehicles traveled the road in 2010. Park operations, maintenance, and administration activities also contribute to the traffic and noise generated along the road. Studies conducted for the SMP measured ambient sound levels in A-weighted decibels, the sum of sound energy across the range of human hearing adjusted to account for the human inability to hear well at very low or very high frequencies. The median existing ambient sound level in the frontcountry zone in the park ranges from 39 to 43 dBA during the day and 40 to 43 dBA during the night (NPS 2010). The median existing ambient sound level in the wilderness zone near the project area ranges from 26 to 37 dBA during the day and from 20 to 38 dBA during the night.

The SMP establishes the following standards for the frontcountry zone:

Daytime Hours (one hour after sunrise to one hour prior to sunset):

- The hourly percent time audible (the amount of time that a sound is audible to an animal with normal hearing) is less than 50% for 60% of the day. The hourly percent time audible never exceeds 65%.
- The hourly change in exposure is less than or equal to 3 dBA for 40% of the day and does not exceed 6 dBA for 90%.
- Human-caused sound events never exceed 60 dBA.
- The daily maximum noise-free interval is at least 19 minutes (over a 12-hour period).
- The daily median noise-free interval is at least 4 minutes (over a 12-hour period).
- Human-caused sound levels are less than or equal to 60 dBA for more than 5% of the 12-hour period.
- Human-caused sound levels are less than or equal to 52 dBA for more than 5% of the 12-hour period in areas where interpretive programs are conducted. The number of events above 52 dBA does not exceed two per hour.

Impact Intensity Threshold

The methodology used to assess noise impacts is consistent with NPS *Management Policies 2006* and DO-47: *Soundscape Preservation and Noise Management*. Soundscape impacts were evaluated based on anticipated noise levels generated by construction activities in relation to the park's SMP (NPS 2010). The thresholds of change for the intensity of an impact to the soundscape are described in Table 10.

TABLE 10. SOUNDSCAPE IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Adverse: The natural sound environment would not be affected, or the effects would be at or below the level of detection and the changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience. Beneficial: The action would only slightly improve the natural soundscape below the level of detection.
Minor	Adverse: The effects on the natural sound environment would be detectable, although the effects would be localized, small, and of little consequence to the visitor experience. Effects would not exceed thresholds established in the park’s SMP. Mitigation measures, if needed to offset adverse effects, would be simple and successful. Beneficial: The action would noticeably improve the natural soundscape from a reduction in human-caused noise.
Moderate	Adverse: The effects on the natural sound environment would be readily detectable with consequences at the local level. Effects would exceed thresholds established in the park’s SMP. Mitigation measures would be minimal, but would not eliminate adverse effects. Beneficial: The action would substantially improve the natural soundscape from a reduction in human-caused noise.
Major	Adverse: The effects on the natural sound environment would be obvious and would have substantial consequences to the visitor experience or to biological resources in the region. The effects would exceed thresholds established in the park’s SMP. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. Beneficial: The action would exceptionally improve the natural soundscape from a reduction in human-caused noise. Visitors would almost always have the opportunity to experience the natural soundscape free from human-caused noise.

Short-term impact—effects lasting for the duration of the construction period

Long-term impact—effects lasting longer than the duration of the construction period

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. The soundscape along Kolob Terrace Road would continue to be affected by park visitor traffic, local residents, trucks, and construction-related deliveries to private land north of the park boundary. Periodic road maintenance and minor repairs by the park and Washington County would continue to be conducted when necessary, and the noise associated with these operations would likely involve trucks, graders, backhoes, and other equipment. Snowmobile use north of Mahoney Hill Road would continue to affect the natural soundscape during the winter. Under the no action alternative, there would be a local long-term minor adverse impact on the natural soundscape from traffic along Kolob Terrace Road.

Cumulative Impacts. Past actions along the road, including periodic maintenance, repairs, and overlays, have introduced temporary elevated noise levels during construction activities. Ongoing large truck traffic associated with private construction projects north of the park also have contributed to elevated noise levels along the road. Current and future vehicle and large truck traffic through the park is expected to continue and contribute to the ambient noise levels along Kolob Terrace Road. Overall past, current, or reasonably foreseeable future actions would result in local short- to long-term minor adverse impacts on the natural soundscape. The overall cumulative impact to the natural soundscape from the no action alternative in combination with past, current, or reasonably foreseeable future actions would be local, long-term, minor, and adverse. The noise associated with the no action alternative is the primary component of cumulative impacts to the natural soundscape.

Conclusions. The no action alternative would have a local long-term minor adverse impact on the natural soundscape along Kolob Terrace Road from traffic. Cumulative effects would be local, long-term, minor, and adverse.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. Rehabilitation activities would result in temporarily elevated noise levels along the road. Equipment that would generate noise includes graders, trucks, backhoes, and other smaller pieces of equipment or machinery. No blasting is anticipated. While most of the noise would occur within the road corridor, truck traffic delivering supplies, asphalt, and removing excavated material would increase traffic-related noise along roads leading to the construction area. The increased noise would include additional traffic along the section of road between Kolob Terrace Road North and South, and the section of the road between the Kolob Terrace entrance to the park and the town of Virgin. In addition, haul trucks would periodically travel to staging areas and emulsion plant. Construction traffic would generally be limited to daylight hours from Monday to Thursday and would be limited to daylight hours generally between 7 a.m. and 7 p.m., adjusted seasonally for day length. There would be no night construction.

The project includes construction activities that generate considerably more noise disturbance than existing conditions. For example, equipment such as large trucks, road graders, and backhoes typically generate about 80 to 90 decibels of noise at a distance of 50 feet. Noise levels during construction would range up to 70 to 90 decibels or more, temporarily exceeding the thresholds established for the frontcountry zone in the SMP.

Effects on the existing soundscape from work activities under the preferred alternative would be local, short-term, moderate, and adverse. Over the long term, a slight reduction in noise levels is possible along the road from a smoother pavement surface and reducing the posted speed limit from 35 mph to 30 mph in Black Canyon. There would be no long-term adverse effects on the soundscape following construction activities because none of the road improvements would increase traffic capacity.

Cumulative Impacts. Past actions along the road, including periodic maintenance, repairs, and overlays, have introduced temporary elevated noise levels during construction activities. Ongoing large truck traffic associated with private construction projects north of the park also have contributed to elevated noise levels along the road. Current and future vehicle and large truck traffic through the park is expected to continue and contribute to the ambient noise levels along Kolob Terrace Road. Overall past, current, or reasonably foreseeable future actions would result in local short-term to long-term minor adverse impacts on the natural soundscape. The overall cumulative impact to the natural soundscape from the preferred alternative in combination with past, current, or reasonably foreseeable future actions would be local, short-term to long-term, moderate, and adverse. The increased noise associated with the preferred alternative would be a relatively large short-term contribution to cumulative impacts.

Conclusions. The preferred alternative would result in local short-term moderate adverse effects on the soundscape in the vicinity of the road from construction activity and

traffic, but would have no long-term adverse effects. The park's SMP thresholds would be exceeded in the daytime during construction. A slight reduction in noise levels is possible along the road from smoother pavement and reducing the posted speed limit from 35 mph to 30 mph in the Black Canyon Area. Cumulative effects would be local, short-term to long-term, moderate, and adverse.

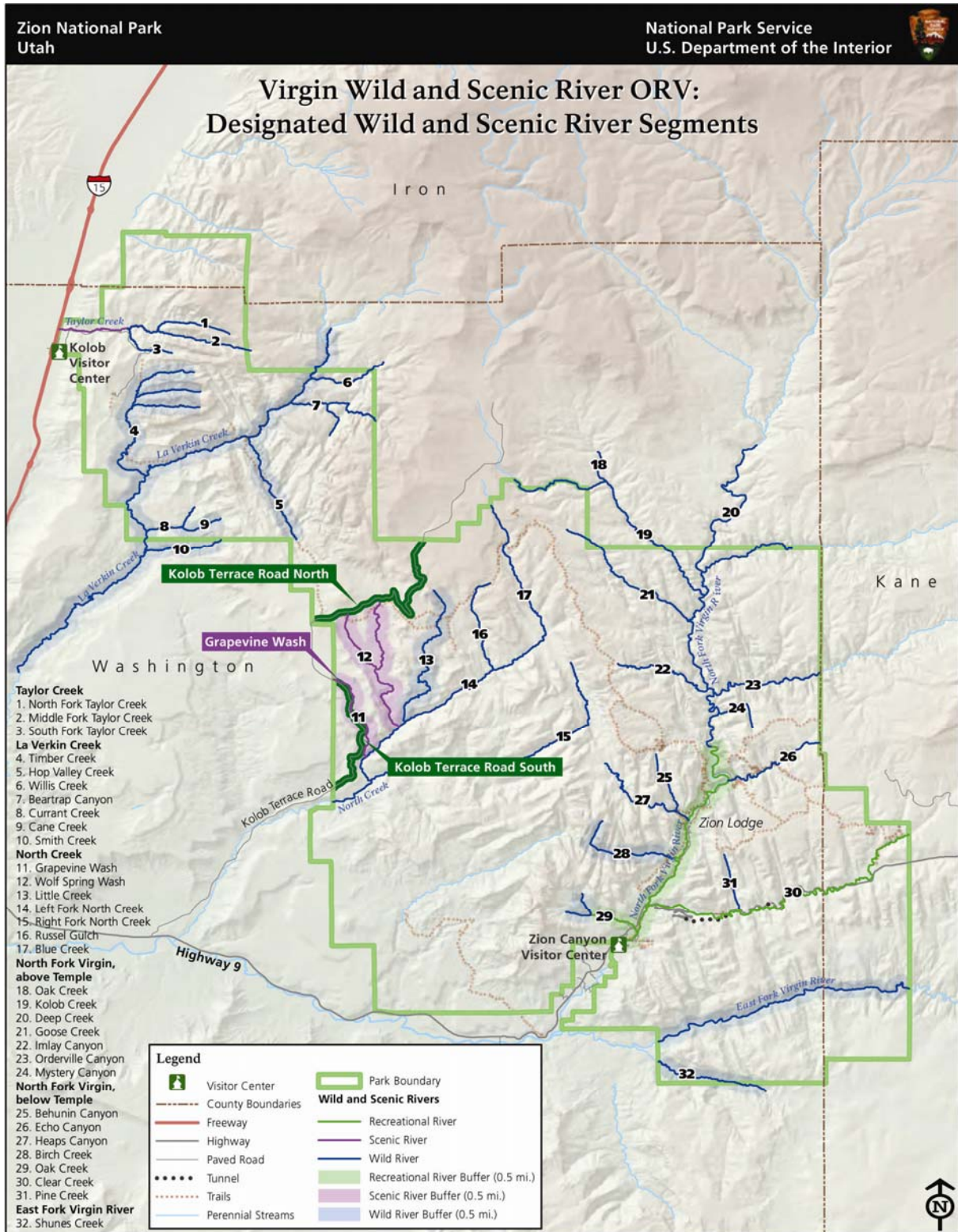
WILD AND SCENIC RIVERS

Affected Environment

The Omnibus Public Land Management Act of 2009 (Public Law 111-11) designated approximately 165.5 miles of the Virgin River and tributaries of the Virgin River across federal land within Zion National Park and adjacent Bureau of Land Management Wilderness as part of the National Wild and Scenic River System. The legislation identified a preliminary boundary for each river segment. The 2.6-mile segment of Grapevine Wash from the Lower Kolob Plateau to the junction with the Left fork of North Creek and a 0.25-mile boundary on either side of the channel was designated as a scenic river (Figure 10). Grapevine Wash parallels an approximate 2-mile section of Kolob Terrace Road South and falls within the 0.25-mile scenic river boundary. Grapevine Wash is typically dry except following large precipitation events. The Wild and Scenic River designation protects the outstandingly remarkable values (ORV) for which the river was designed, the free-flowing condition, and water quality.

The park is currently preparing a Comprehensive River Management Plan (CRMP) for the protection of river values, development of lands and facilities, identifying user capacities, and other management practices necessary or desirable to achieve the purposes of the act for all of the designated wild and scenic rivers in the park. Developing an outstandingly remarkable values statement is the first step in developing a CRMP. Outstandingly remarkable values are river-related, contribute to the function of the ecosystem, and/or owe their location or existence to the river; they are the reason the river rises to the level of national significance and protection. Grapevine Wash is a designated scenic river with preliminary ORV associated with wildlife since the entire park is designated critical habitat for the Mexican spotted owl. There are no spotted owl protected activity centers in the project area or along Grapevine Wash. Through the CRMP process the park will refine the boundaries of the river segments; which will be the area necessary to protect the ORVs, free-flowing condition and water quality.

FIGURE 10. DESIGNATED WILD AND SCENIC RIVER SEGMENTS IN ZION NATIONAL PARK



Produced by: NPS Denver Service Center Planning Division
September 2010

Impact Intensity Threshold

Wild and scenic rivers are an important component of the landscape at Zion. Potential impacts from the alternatives on water quality, the free-flowing condition, and the ORVs of wild and scenic rivers in the project area are based on the anticipated effect of the alternatives on these values and resources. The thresholds of change for the intensity of an impact to wild and scenic rivers are described in Table 11.

TABLE 11. WILD AND SCENIC RIVERS IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Adverse: The effects of the action would not be detectable to most visitors and would have no discernible effect on the river’s ORVs, free-flowing condition or water quality. Beneficial: The action would slightly improve the conditions and attributes that contribute to the river’s ORVs, free-flowing condition or water quality.
Minor	Adverse: The effects of the action would be slightly detectable to some visitors, but are not expected to have an overall effect on the river’s ORVs, free-flowing condition or water quality. Beneficial: The action would noticeably improve the conditions and attributes that contribute to the river’s ORVs, free-flowing condition or water quality.
Moderate	Adverse: The effects of the action would be clearly detectable by many visitors and could have an appreciable effect on the river’s ORVs, free-flowing condition or water quality. Beneficial: The action would substantially improve the conditions and attributes that contribute to the river’s ORVs, free-flowing condition or water quality.
Major	Adverse: The action would have a substantial and noticeable effect on most visitors or the river’s ORVs, free-flowing condition or water quality. Beneficial: The action would exceptionally improve the conditions and attributes that contribute to the river’s ORVs, free-flowing condition or water quality.

Short-term impact—the Wild and Scenic River would recover in less than two years

Long-term impact—the Wild and Scenic River would take more than two years to recover

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. The no action alternative would have no effect on the status of Grapevine Wash as a scenic river or its ORV, free-flowing condition, or water quality. Kolob Terrace Road would remain within the 0.25-mile boundary area of Grapevine Wash, but continued use of the road would not adversely affect the river’s ORV, free-flowing condition, or water quality.

Cumulative Impacts. The no action alternative would have no impact on wild and scenic rivers and, therefore, would not contribute to the effects of other actions. Consequently, there would be no cumulative impacts to wild and scenic rivers under the no action alternative.

Conclusion. The no action alternative would have no effect on Grapevine Wash, a designated scenic river near Kolob Terrace Road and would have no cumulative effect.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. Proposed road rehabilitation and improvements to Kolob Terrace Road South would occur within portions of the 0.25-mile

boundary area for the Grapevine Wash scenic river. Approximately 2 miles of the proposed road improvements would occur within the scenic river boundary. Roadwork would be limited to the existing road bench and there would be no direct impact to the river channel. Construction-related disturbances have the potential for generating erosion from ground disturbance, some of which could reach Grapevine Wash. However, use of erosion-control BMPs and the existing vegetated lands between the road and the wash would minimize the likelihood of sediment reaching the channel. The preferred alternative would have a local short-term negligible adverse effect on the ORVs, free-flowing condition, or water quality for Grapevine Wash from the possible introduction of sediment during construction. The “Hydrology and Water Quality” section provides additional discussion on the effects to water quality from the preferred alternative.

Cumulative Impacts. Grapevine Wash is in a natural undisturbed area, but has likely been affected in the past by land management practices, such as livestock grazing, prior to acquisition by the Park Service. Kolob Terrace Road also contributes stormwater runoff, some of which may reach the wash. No reasonably foreseeable actions were identified that would contribute to cumulative effects. Past and present actions in the Grapevine Wash watershed have had a local long-term negligible effect on the recently designated scenic river. The preferred alternative in combination with past and present actions would have local long-term negligible adverse effects on the ORVs, free-flowing condition or water quality for Grapevine Wash, with a slight short-term negligible adverse contribution from the preferred alternative.

Conclusion. The preferred alternative would have a local short-term negligible adverse effect on ORVs, free-flowing conditions, and water quality of Grapevine Wash from erosion and runoff during construction. Cumulative effects would be local, short-term, negligible, and adverse.

PUBLIC HEALTH, SAFETY, AND PARK OPERATIONS

Affected Environment

Park staff are responsible for the day-to-day maintenance of the portions of Kolob Terrace Road within the park and other park facilities to provide a safe environment for park visitors. Portions of the road outside the park are maintained by Washington County. Ongoing road maintenance includes patching, striping, and shoulder work (e.g., vegetation and rock clearing), and culvert and ditch maintenance. Snowplowing and application of traction sand allows the road to remain open throughout the winter to the base of Maloney Hill. Park staff use the road to access portions of the park for visitor services, maintenance, law enforcement, search and rescue, resource management, and emergency vehicle access.

The road provides access to private property north of the park where second home developments are increasing. An increase in development north of the park has led to an increase in construction and commercial vehicle use of the road. The existing road is narrow, and use of the road by these larger vehicles has resulted in accidents. Approximately 30 vehicle accidents have been reported on Kolob Terrace Road in the years 1989 to 2005, 2007, and 2008 (NPS 2009). The majority of crashes were from running off the road and speed was

the most common contributing element. Thirty-eight percent of the reported crashes occurred in the switchback area between Maloney Hill and the Wildcat Canyon Trailhead. Traffic accidents have resulted in both personal injury and damage to vehicles. The winter road closure at the base of Maloney Hill is the site of additional safety concerns because private property owners with snowmobiles and trailers park on the side of the road, which restricts the width of the travel lane.

Impact Intensity Threshold

Public health and safety refers to the ability of the Park Service to provide a healthy and safe environment for visitors and park staff, to protect human life, and to provide for injury-free visits and appropriate responses when accidents and injuries occur. Park operations refer to the ability of park staff to maintain park infrastructure, protect and preserve vital resources, and provide for a high-quality safe visitor experience. Facilities included in the analysis are the road, trailheads, pullouts, and parking areas. The thresholds of change for the intensity of an impact to public health, safety, and park operations use are described in Table 12.

TABLE 12. PUBLIC HEALTH, SAFETY, AND PARK OPERATIONS IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Adverse: The effects would be at low levels of detection and would not have appreciable effects on public health, safety, and park operations. Beneficial: The action would slightly improve the quality of park roads and the ability of park staff to maintain and protect park infrastructure, resources, and public health.
Minor	Adverse: The effects would be detectable and would be of a magnitude that would not have appreciable effects on public health, safety, and park operations. If mitigation is needed to offset adverse effects, it would be simple and likely successful. Beneficial: The action would noticeably improve the quality of park roads and the ability of park staff to maintain and protect park infrastructure, resources, and public health.
Moderate	Adverse: The effects would be readily apparent and would result in a change in public health, safety, and park operations that would be noticeable to park staff and the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful. Beneficial: The action would substantially improve the quality of park roads and the ability of park staff to maintain and protect park infrastructure, resources, and public health.
Major	Adverse: The effects would be readily apparent; would result in a substantial change in public health, safety, and park operations in a manner noticeable to staff and the public; and would be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed and extensive, and success could not be guaranteed. Beneficial: The action would exceptionally improve the quality of park roads and the ability of park staff to maintain and protect park infrastructure, resources, and public health.

Short-term impact—effects lasting for the duration of the construction period
 Long-term impact—effects continuing after the construction period

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. The park would continue with ongoing maintenance and administrative operations under the no action alternative. Maintenance work would likely increase as the condition of the road deteriorates. Maintenance concerns associated with deteriorating road pavement and subgrade and inadequate drainage would

not be addressed. Existing safety issues with the narrowness of the road and visitor safety at informal pullouts would not be addressed. The potential for accidents would be similar to existing conditions and may increase as the road continues to deteriorate. Under the no action alternative, there would be local long-term moderate adverse effects on public health, safety, and park operations.

Cumulative Impacts. Past and ongoing maintenance and repair of Kolob Terrace Road, and other park facilities along the road corridor, have been implemented to improve public safety and park operations. Development and anticipated future growth on private lands north of the park have and would continue to result in increased traffic on the road, greater potential for accidents, and additional road damage. Rehabilitation of the Zion–Mt. Carmel Highway in the southeast part of the park would improve the safety and travel conditions for visitors and improve park operations. Past, present, and reasonably foreseeable future projects would have local long-term minor adverse effects on public health, safety, and park operations. Cumulative effects would be local, long-term, minor, and adverse, with a noticeable adverse contribution from the no action alternative.

Conclusion. The no action alternative would result in local long-term moderate adverse effects on public health, safety, and park operations by not addressing safety issues and needed road repairs. The potential for accidents would be similar to existing conditions and may increase as the road continues to deteriorate and the need for maintenance increases. Cumulative effects would be local, long-term, minor, and adverse, with a moderate adverse contribution.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. Proposed rehabilitation and improvements would address safety and maintenance concerns associated with the road. Improvements to road pavement and drainage would improve safety and driving conditions. Road widening in select locations, including the Black Canyon section, would improve safety by reducing the potential for traffic accidents. Road realignments and widening at Smith Mesa Curve, the Maloney Hill Switchback, and Wildcat Canyon Switchback also would improve safety. Park operations would be improved by implementing road repairs that reduce the need for continual maintenance. The service life of the road, pullouts, culverts, and other structural features would be extended by several decades.

Additional demands would be placed on park staff during construction to coordinate traffic and construction activities. Construction work and traffic delays would cause a disruption in normal traffic patterns, parking, and visitor activities in the Kolob Terrace portion of the park. As previously discussed, the park would take special measures to notify visitors and other stakeholders of the status of the road and potential traffic delays.

The preferred alternative would have local and parkwide short-term moderate adverse impacts to park operations during construction. Traffic-control measures would be implemented to protect visitors. Upon completion of construction work, local long-term moderate beneficial effects on public health, safety, and park operations are expected from road improvements.

Cumulative Impacts. Past and ongoing maintenance and repair of Kolob Terrace Road, and other park facilities along the road corridor, have been implemented to improve public safety and park operations. Development and anticipated future growth on private lands north of the park have and would continue to result in increased traffic on the road, greater potential for accidents, and additional road damage. Rehabilitation of the Zion–Mt. Carmel Highway in the southeast part of the park would improve the safety and travel conditions for visitors and improve park operations. Past, present, and reasonably foreseeable future projects would have local long-term minor adverse effects on public health, safety, and park operations. Cumulative effects would be local, long-term, moderate, and beneficial. The preferred alternative would contribute short-term adverse and long-term beneficial effects.

Conclusion. Proposed rehabilitation and improvements would address safety and maintenance concerns associated with the road. Widening narrow sections, structural repairs, new pavement, and drainage work would improve safety and driving conditions and reduce maintenance requirements. Construction work and traffic delays would cause a disruption in normal traffic patterns, parking, and visitor activities in the park and place a greater demand on park staff. The preferred alternative would result in local and parkwide short-term moderate adverse effects on park operations during construction. Completion of the proposed road improvements would result in local long-term moderate beneficial effects on public health, safety, and park operations by improvements to the structural features of the road and safety measures that reduce the potential for accidents. Cumulative effects would be local, long-term, moderate, and beneficial.

SOCIOECONOMICS

Affected Environment

Zion is primarily within Washington and Kane counties, Utah. Rockville and Springdale are the closest gateway communities that provide visitor services for those entering the park through the south entrance. Other Washington County communities that provide tourism-related services include Hurricane, LaVerkin, Virgin, and St. George. Although more distant from Zion, the communities of Oderville, Kanab, and Glendale also provide visitor services to travelers using the east entrance to Zion. The park is one of the main tourist attractions in the region. A study to evaluate the effect of visitor spending on the local economy as a result of tourism generated by the park determined that visitor spending in 2006 that was directly attributable to the park was \$99 million (Stynes 2008). Direct and secondary effects related to tourism-related spending attributable to park visitation creates about 2,100 jobs, with \$49 million in labor income and \$72 million in total value added to the local economy.

The area north of the park, near Kolob Reservoir, is relatively well developed with houses and log cabins, many used only as summer homes. Kolob Terrace Road is the primary access to this area for summer residents. As described previously, the road is closed in the winter above Maloney Hill to all traffic except for snowmobiles.

Several commercial outfitters, including Zion Adventure Company and Zion Rock and Mountain Guides, provide shuttle service for tourists via Kolob Terrace Road for access into the park. Outfitters also operate bike tours and provide guided trips on other public lands

that require access along Kolob Terrace Road. Most of the shuttle service occurs in the early morning, but trips can occur throughout the day depending on visitor requests. No commercial businesses are on private land in the Kolob Reservoir area, but the Center for True North, a spiritual retreat, is on a private in-holding along Kolob Terrace Road South.

Some individuals use their private property in the vicinity of Kolob Reservoir to graze their livestock. Since this area is snowed-in in the winter months these lands are only used for summer grazing. Livestock are trucked to the Kolob Reservoir area in May and June and taken back to the lower elevation pastures before the snow falls in October or November. These individuals use the Kolob Terrace Road to truck their livestock back and forth from summer to winter pastures.

Impact Intensity Threshold

Socioeconomic issues were identified through the scoping process. Concerns covered by this section include effects on the economic contribution of Zion to the local economies in the gateway communities and the potential effects associated with rehabilitating or not rehabilitating the road. The thresholds of change for the intensity of impacts to socioeconomics are described in Table 13.

TABLE 13. SOCIOECONOMICS IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Adverse: No effects would occur or the effects on socioeconomic conditions would be below the level of detection. Beneficial: The action would slightly improve socioeconomic conditions of local businesses and the community.
Minor	Adverse: The effects on socioeconomic conditions would be detectable. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful. Beneficial: The action would noticeably improve socioeconomic conditions of local businesses and the community.
Moderate	Adverse: The effects on socioeconomic conditions would be readily apparent. Any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful. Beneficial: The action would substantially improve socioeconomic conditions of local businesses and the community.
Major	Adverse: The effects on socioeconomic conditions would be readily apparent and would cause substantial changes to socioeconomic conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and success could not be guaranteed. Beneficial: The action would exceptionally improve socioeconomic conditions of local businesses and the community.

Short-term impact—effects lasting for the duration of the construction period

Long-term impact—effects lasting longer than the duration of the construction period

Environmental Consequences

No Action Alternative

Direct and Indirect Impacts of the Alternative. Under the no action alternative, the road would remain open to traffic and there would be no disruption in travel for visitors or residents. The cost to maintain the road would increase over time as the road continues to

deteriorate, and failure to address damaged substrate, deteriorating pavement, and drainage issues would require more extensive repairs at a greater cost than addressing problems in the near term. Although immediate impacts to tourism, tourist-related spending, and local residents are unlikely, deteriorating road conditions would affect visitor attendance, commercial shuttle and guide services, access to a local business, and would eventually affect residents traveling to summer homes north of the park. Thus, failure to implement needed road repairs under the no action alternative would have regional long-term minor adverse socioeconomic effects from increased maintenance costs and a potential decrease in tourism-related spending should road access deter visitors. Deteriorating road conditions would also adversely affect access to private residences and lands along the road and north of the park.

Cumulative Impacts. Past roadwork in Zion and other improvements to park facilities and infrastructure have resulted in short-term construction-related spending and long-term improvements that maintain the park as a popular tourist destination. Past and ongoing construction of second homes on private land near Kolob Reservoir has resulted in short-term increases in construction-related spending that have contributed to the local economy. Past, present, and reasonably foreseeable future projects would have regional long-term beneficial effects on socioeconomics. Cumulative effects would be local, long-term, and moderately beneficial, with a relatively small adverse contribution from the no action alternative.

Conclusion. The no action alternative would have regional long-term minor adverse effects on the economy from deteriorating road conditions that affect visitor access and tourist-related spending in gateway communities, for commercial shuttle and guide activities, and for a local business located along the road. Deteriorating road conditions would also adversely affect access to private lands and residents. Without road rehabilitation, road maintenance costs would increase. Cumulative effects would be local, long-term, and moderately beneficial.

Preferred Alternative—Rehabilitate Road

Direct and Indirect Impacts of the Alternative. The preferred alternative would improve access to the park and would improve the overall quality of the visitor experience, which is beneficial to the regional economy. Access to homes north of the park would be improved for summer residents. Construction work would provide a short-term minor benefit to the economy through increases in employment opportunities and local spending on goods, services, and materials.

Implementation of the preferred alternative would result in construction-related spending of about \$10 million. Construction expenditures would be used for labor, supplies, equipment, and other services. Labor is likely to come from local communities in Washington and Kane counties. Secondary economic effects from construction-related spending also would generate economic benefits to the region. Construction-related spending would result in short-term moderate beneficial effects on the regional economy.

Construction activity and traffic delays would deter some visitors from traveling on Kolob Terrace Road. In 2010, less than 4% of park visitors drove on Kolob Terrace Road

(NPS 2010). Local residents traveling to summer homes north of the park also would be inconvenienced by construction activities and traffic delays. Shuttle and guide service operations along Kolob Terrace Road would be disrupted by construction delays. Half-hour delays between 7 a.m. and 7 p.m. with alternating one-way traffic would result in an inconvenience to visitors using the shuttle and guide service. Longer traffic delays of up to three hours between 10 a.m. and 5 p.m. could adversely affect shuttle and guide services, although outfitters may be able to adjust their operations to avoid traffic delays. It is anticipated that shuttle and guide service operations would be disrupted about one day per week during construction.

As described in Table 2—Resource Protection Measures—Visitor Experience, the park would implement a number of actions to minimize impacts to park visitors, commercial shuttle and guide services, a local business, and residents during construction. Chief among these measures would be clearly and accurately communicating to the public and local businesses the status of construction work and the timing of traffic delays or suspensions. While some park visitors and residents may be inconvenienced during construction, no substantial change in visitor attendance is anticipated. All of the park campgrounds, trails, and attractions along Kolob Terrace Road, as well as other park roads including Zion Canyon Scenic Drive, Kolob Canyon, and Zion–Mt. Carmel Highway would remain open and accessible. The preferred alternative would have a regional short-term minor adverse effect on the economy from construction-related traffic delays that affect visitor travel to the park, commercial shuttle and guide services, access to a local business located along Kolob Terrace Road South, and resident access to private property. Over the long term, road improvements would provide beneficial economic effects on regional businesses from road improvements that increase the quality of the visitor experience and improve access for residents.

Cumulative Impacts. Past roadwork in Zion and other improvements to park facilities and infrastructure have resulted in short-term construction-related spending and long-term improvements that maintain the park as a popular tourist destination. Past and ongoing construction of second homes on private land near Kolob Reservoir has resulted in short-term increases in construction-related spending that have contributed to the local economy. Past, present, and reasonably foreseeable future projects would have regional long-term beneficial effects on socioeconomics. Cumulative effects would be regional, long-term, moderate and beneficial, with a small beneficial contribution from the preferred alternative.

Conclusion. The preferred alternative would have regional short-term moderate beneficial effects on the economy from construction-related spending and employment. Traffic delays would deter some visitors from coming to the park and could inconvenience or require rescheduling of shuttle and guide services, resulting in regional short-term minor adverse economic impacts. While some park visitors and residents may be inconvenienced during construction, no substantial change in visitor attendance is anticipated. All of the park campgrounds and attractions along Kolob Terrace Road, Zion Canyon Scenic Drive, Kolob Canyon, and Zion–Mt. Carmel Highway would remain open and accessible. Long-term socioeconomic effects would be beneficial to regional businesses from improvements to the quality of the visitor experience along the road. Cumulative effects would be regional, long-term, and moderately beneficial.

CONSULTATION AND COORDINATION

INTERNAL SCOPING

Internal scoping was conducted by an interdisciplinary team of professionals from Zion National Park, DSC staff, Federal Highways, and consulting engineers. Team members met multiple times in 2010 and 2011 to discuss the purpose and need for the project, various alternatives, potential environmental impacts, reasonably foreseeable actions that may have a cumulative effect, and possible resource protection measures.

EXTERNAL SCOPING

Scoping is an early and open process to determine the breadth of issues and alternatives to be addressed in an environmental assessment. Zion initiated external public scoping with a press release on June 13, 2011 to provide the public and interested parties an opportunity to comment on the proposed project (Appendix A). The park also sent letters to 500 interested individuals; organizations; federal, state, county, and local governments; and American Indian tribes traditionally associated with the park describing the project and asking for comments. In addition, the scoping letter was sent to the Utah State Historic Preservation Office and the Fish and Wildlife Service. Additional information on consultation with federal and state agencies and American Indian tribes is found in the “Consultation and Coordination” section. The park met with Kolob Fire Committee and local residents at the annual fire meeting held on July 1, 2011. Park staff provided background information on the proposed project and answered questions about the road improvements being considered and traffic delays that would be needed to implement repairs. The park encouraged attendees at the meeting to provide scoping comments on the plans to rehabilitate the road.

The park received 14 scoping comments during the 30-day comment period that ended July 18, 2011. Comments included seven from individuals; two from Zion Adventure Company, a local outfitting business; and comments from the Five County Association of Governments; the Kolob Fire Committee; the Fish and Wildlife Service; the Advisory Council on Historic Preservation; and the State of Utah Public Lands Policy Coordination (Appendix A). Overall, the commenters acknowledged the need for road improvements and supported the proposed project, but several concerns were expressed in scoping comments, including:

- The public, including a number of private land owners with homes in the Kolob Terrace area north of the park, favor the planned improvements to the condition and safety of the road. Comments expressed concern about preserving the natural beauty of the area and limiting road width to less than 25 feet. The need for traffic delays was acknowledged, but there was a request that the park provide clear signage and information of any traffic delays or temporary closures and that the road remain open to traffic after 5 p.m. One comment expressed concern that the existing early spring restrictions on large commercial trucks be extended to other large vehicles based on weight, length, and class. Another comment suggested

widening Maloney Hill and Black Canyon by additional slope cuts on the inside of the road.

- The Kolob Fire Committee would like to see that adequate clear zones are used including improvements at Smith Mesa Corner and numerous locations in Black Canyon. A better crown on the road and drainage improvements are suggested, as well as a road width minimum of 24 feet, plus 2-foot-wide shoulders. They request that the turnaround before Black Canyon be increased in size and paved to allow for loading of snowmobiles at the bottom of Maloney Hill. The Kolob Fire Committee also would like to see the addition of several pullouts and adjustment to cattle guards.
- The Zion Adventure Company, which operates guided trips and shuttle service in the park and other public lands, expressed concern about traffic delays longer than 30 minutes that could negatively impact their business. In addition, they would like any widening to be within the existing road footprint to maintain the backcountry-byway character and natural features. They also are concerned that road structural and drainage repairs are made, rather than just repaving and that the work is performed by a qualified contractor.
- The Five County Association of Governments requested coordination with the park for proposed road improvements and consideration of how to best accommodate bicycles and pedestrians.
- The Fish and Wildlife Service provided information on threatened and endangered species of concern that could occur in the project area.
- The Advisory Council on Historic Preservation had no comments at this time, but requests notification should the undertaking adversely affect historic properties and require preparation of a Programmatic Agreement.
- The State of Utah, Public Lands Policy Coordination indicated that the project would be subject to state air quality rules because of the potential for generating fugitive dust during construction. Thus, appropriate measures should be taken to minimize fugitive dust.

Internal and external scoping comments were considered in the choice of impact topics and were used in the development and evaluation of alternatives discussed in this EA. Scoping issues or impact topics that were considered, but not evaluated further, are discussed below in “Impact Topics Dismissed from Further Analysis.” The public, agencies, and American Indian groups traditionally associated with the lands of Zion will also have an opportunity to review and comment on this EA.

AGENCY CONSULTATION

Compliance with Section 106 of the NHPA is not being subsumed under NEPA, but is being conducted separately through ongoing consultation with the Utah SHPO, who was notified of the proposed project by letter on June 13, 2011. A consultation letter, with the park’s assessment of effects, was sent to the Utah SHPO requesting an eligibility and effects

concurrence. The Advisory Council on Historic Preservation had no comments at this time, but requests notification should the undertaking adversely affect historic properties.

In accordance with the Endangered Species Act, the Park Service contacted the Fish and Wildlife Service by letter on June 13, 2011 to solicit input on threatened, endangered, and species of concern for the proposed project. A copy of the EA will be sent to the Fish and Wildlife Service for review along with a request for their concurrence with the park's determination of no effect on federally listed species.

The Utah Division of Wildlife Resources was contacted by letter on June 14, 2011 asking for information on and potential effects to special status plant and animal species in the area. No comments were received as of the date of the EA. A copy of this EA will be sent to the Utah Division of Wildlife Resources for review and comment.

AMERICAN INDIAN CONSULTATION

The park contacted 11 American Indian tribes, including the Navajo Nation, Kaibab Band of Paiute Indians, Las Vegas Paiute Tribe, Paiute Indian Tribe of Utah, Moapa Band Paiute Tribe, Shivwits Paiute Band, Skull Valley Goshute Tribe, Goshute Indian Tribe, Pueblo of Zuni, Hopi Tribe, and Northern Ute Tribe on June 13, 2011 informing them of the proposed project and soliciting comments. Information from the tribes also was requested to determine if any ethnographic resources are in the project area and if the tribe wanted to be involved in the environmental compliance process. The park has not received any written comments as of the date of this EA. American Indian groups traditionally associated with the lands of the park also will have an opportunity to review and comment on this EA.

ENVIRONMENTAL ASSESSMENT REVIEW AND LIST OF RECIPIENTS

This EA will be released for a 30-day public comment period. To inform the public of the availability of the EA, the Park Service will publish and distribute a letter to various agencies, tribes, and members of the public on the park's mailing list and issue a press release. Copies of the EA will be provided to interested individuals, upon request. Copies of the EA will also be available for review on the Internet at <http://parkplanning.nps.gov/zion>.

During the public comment period, the public is encouraged to submit their comments to the NPS address provided on the cover page at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed prior to the release of a decision document. The Park Service will issue responses to substantive comments received during the public comment period and will make appropriate changes to this EA, as needed.

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Dave Hesker, Graphic Designer
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COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

The Park Service and Federal Highways would comply with all applicable federal and state regulations when implementing the preferred alternative to rehabilitate the road. Permitting and regulatory requirements for the preferred alternative are listed in Table 14.

TABLE 14. ENVIRONMENTAL COMPLIANCE REQUIREMENTS

Agency	Statute, Regulation, or Order	Purpose	Project Application
Federal			
National Park Service	National Environmental Policy Act	Applies to federal actions that may significantly affect the quality of the environment.	Environmental review of proposed action and decision to prepare a FONSI or EIS.
	National Historic Preservation Act, Section 106	Protection of historic and cultural resources.	The park is consulting with the SHPO and American Indian tribes to address potential effects and mitigation for cultural resources.
	EO 11990, "Protection of Wetlands"	Requires avoidance of adverse wetland impacts where practicable and mitigation, if necessary.	No wetland impacts were identified.
	EO 11988, "Floodplain Management"	Requires avoidance of adverse floodplain impacts where practicable and mitigation, if necessary.	No floodplains present.
	NPS DO-77-2: <i>Floodplain Management</i>	Protection of natural resources and floodplains.	No floodplains present.
U.S. Army Corps of Engineers	Clean Water Act – Section 404 Permit to discharge dredge and fill material	Authorizes placement of fill or dredge material in waters of the U.S. including wetlands.	No wetland impacts were identified.
U.S. Fish and Wildlife Service	Endangered Species Act	Protection of federally listed threatened or endangered species.	The park consulted with the Fish and Wildlife Service as part of the NEPA process.
State of Utah			
Utah Division of Water Quality	Utah Pollutant Discharge Elimination System (UPDES) Storm Water General Permit for Construction Activities	Erosion control and protection of water quality.	A storm water pollution prevention plan would be developed prior to grading and surface disturbances.
	UPDES General Permit for construction dewatering	Water quality protection associated with discharge of intercepted ground water.	A permit application would be submitted if excavation activities anticipate the interception and discharge of ground water.
Utah Department of Environmental Quality, Division of Air Quality	Air Quality Rule R307-205-5 for Fugitive Dust	Applies to construction disturbances greater than ¼ acre.	A permit/approval order is not required by the Air Quality Board, but the park would take steps to minimize fugitive dust.

REFERENCES

- Crow, C. 2011. Personal communication between C. Crow (Zion National Park Wildlife Biologist) and Steve Butler (ERO Resources Corporation). March 22.
- Decker, C. 2011. Personal communication between C. Decker (Zion National Park Vegetation Program Manager) and Steve Butler (ERO Resources Corporation). May 5.
- Federal Emergency Management Agency (FEMA). 2011. Available at: <http://gis1.msc.fema.gov/Website/newstore/Viewer.htm>. Last accessed: March 1, 2011.
- NPS (National Park Service)
- 1984. Park Road Standards. U.S. Department of the Interior. National Park Service.
 - 2001. Zion National Park General Management Plan.
 - 2004. Zion National Park Fire Management Plan Environmental Assessment.
 - 2006. National Park Service Management Policies.
 - 2009. Zion Accident Database. Available from Craig Thexton, Park Ranger. February 18.
 - 2010. Soundscape Management Plan and Environmental Assessment, Zion National Park. September.
 - 2011. Public Use Statistics Office: Monthly Public Use Report, Zion National Park. Available at: <http://www.nature.nps.gov/stats/viewReport.cfm>. Last accessed: March 4, 2011.
- Natural Resource Conservation Service (NRCS). 2011. Web Soil Survey. Available at: <http://websoilsurvey.nrcs.usda.gov/app>. Last accessed: March 3, 2011.
- PBS&J. 2010. Federal Highway Administration Central Federal Lands Highway Division, Draft Preliminary Design Study Report. Zion National Park FHWA Project UT PRA ZION 12(1) & 14(1) Kolob Terrace Road. March.
- Stynes, D.J. 2008. Impacts of Visitor Spending on the Local Economy: Zion NP, 2006. Dept. of Community, Agriculture, Recreation and Resource Studies, Michigan State University. September.
- Utah Department of Natural Resources (Utah DNR). 2007. Utah Sensitive Species List. Last revised: December 14.
- Yeh and Associates. 2008. Final Geotechnical Report, Zion–Mt. Carmel Highway Switchbacks, Landslide, Zion National Park, Utah. UT PRA ZION 99(1). Prepared for Federal Highway Administration, Central Federal Lands Highway Division, Lakewood, CO. May 6.

APPENDIXES

Appendix A — Scoping Notice

Appendix B — Special Status Species Potentially Occurring in the Project Area

APPENDIX A

Scoping Announcement

Public Scoping Notice



United States Department of the Interior

NATIONAL PARK SERVICE
Zion National Park
Springdale, Utah 84767



IN REPLY REFER TO: L7617

June 13, 2011

Subject: Kolob Terrace Road Rehabilitation

Reference: Request for Comments on Proposal (Scoping Comments)

Dear Interested Party:

Zion National Park (ZION or park) is beginning an environmental assessment to evaluate the potential impacts from the proposed resurfacing and rehabilitation of 9.8 miles of the Kolob Terrace Road. The project is divided into two sections (see attached figure). The first section, referred to as Kolob Terrace Road South or Zion Route 12, extends from the southern park boundary 4 miles north to where Washington County maintenance begins. The second section, referred to as Kolob Terrace Road North or Zion Route 14, extends 5.8 miles within the park boundary. The road provides access to some of the higher elevation portions of the park, as well as private land.

The proposed project is not a major road replacement with associated re-routing, etc. The proposed project is being considered to address deficiencies in the condition of the road and safety concerns. The current pavement is aged in many locations, which has led to surface cracks, rutting, buckling, and unraveling of the pavement edge. Years of chip-seal patches with no road base layer, along with increased heavy truck traffic due to housing construction on private property, have impacted the road surface to an unacceptable and potentially unsafe level. Continued crack seal, blade patches, and pothole and edge repair are not keeping up with increasing wear, and fail to protect it from surface water runoff. Some vehicles are driving outside of the road pavement, which is causing damage to park natural and cultural resources. Portions of the road are very narrow, which is a contributing factor to unraveling of the pavement edge and a safety concern due to large vehicles that use the road to access areas north of the park boundary.

The width of the Kolob Terrace Road is currently from 19 to 22 feet. Improving the safety and maintenance of Kolob Terrace Road requires increasing the width of the road to the extent practical. A 22-foot pavement width with no grade change is proposed for the south section of the road. However, because of the narrow road bench from the base of Maloney Hill through the Black Canyon to the northern end of the project, the park is proposing to maintain a 20-foot pavement width for this section. In addition, a number of site-specific repairs are proposed to address subgrade failure, drainage improvements, poor sight distance, and closure or improvement of several informal pullouts. Curve widening and other improvements are proposed for the Smith



Mesa Overlook, Maloney Hill Switchback, and Wildcat Canyon Trailhead Switchback. The proposed project would be completed as soon as funding becomes available, and construction is expected to take one year.

The National Park Service encourages public participation throughout the National Environmental Policy Act (NEPA) process. There will be two opportunities to comment formally on the project—once during initial project scoping and again following release of the environmental assessment. The park is currently in the scoping phase of the proposed project and invites the public to submit written suggestions, comments, and concerns regarding the project.

If you wish to provide information for the environmental assessment, we encourage you to submit comments online at <http://parkplanning.nps.gov/zion>, and select the link for Kolob Terrace Road Rehabilitation. Comments may also be mailed to:

Zion National Park
Kolob Terrace Road Rehabilitation
Springdale, UT 84767

Please submit all comments before July 18, 2011.

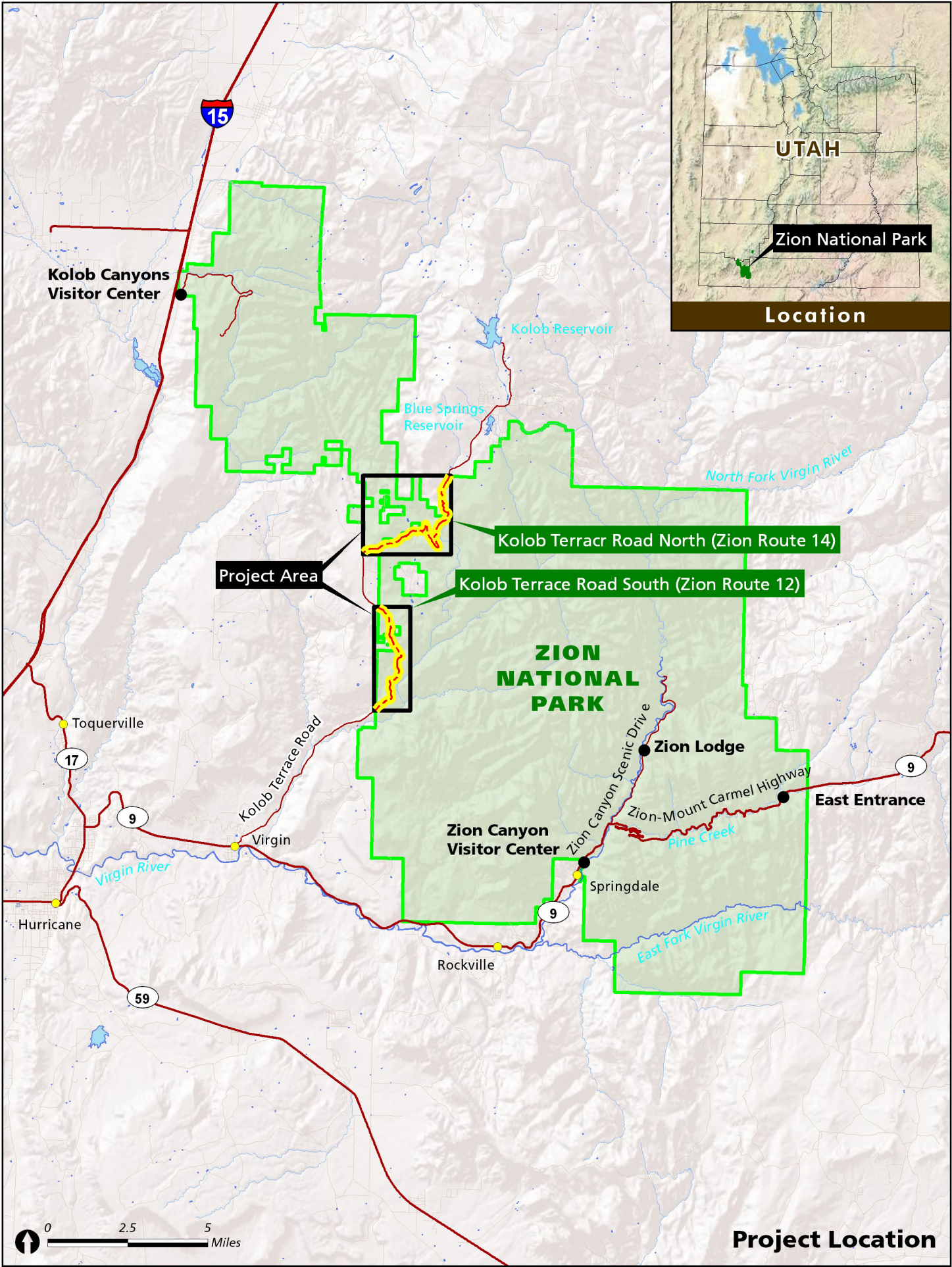
Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to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

We appreciate your input on this project. If you have any questions, please contact Kezia Nielsen, Environmental Protection Specialist, at kezia_nielsen@nps.gov or (435) 772-0211.

Sincerely,

Jock F. Whitworth
Superintendent





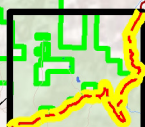
Kolob Canyons Visitor Center

15

Kolob Reservoir

Blue Springs Reservoir

North Fork Virgin River



Kolob Terrace Road North (Zion Route 14)

Project Area

Kolob Terrace Road South (Zion Route 12)

ZION NATIONAL PARK

Toquerville

17

9

Kolob Terrace Road

Virgin

Zion Canyon Scenic Drive

Zion Lodge

Zion-Mount Carmel Highway

East Entrance

9

Pine Creek

Zion Canyon Visitor Center

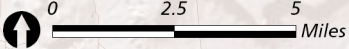
Springdale

Hurricane

59

Rockville

East Fork Virgin River



Project Location

APPENDIX B

Special Status Species Potentially Occurring in the Project Area

FEDERALLY LISTED THREATENED, ENDANGERED, AND CANDIDATE SPECIES, ZION NATIONAL PARK

Common Name	Scientific Name	Federal Status	Found in Kolob Terrace Project Area?*
California condor	<i>Gymnogyps californianus</i>	Endangered	Yes
Desert tortoise	<i>Gopherus agassizii</i>	Threatened	No
Gierisch mallow	<i>Sphaeralcea gierischii</i>	Candidate	No
Las Vegas buckwheat	<i>Eriogonum corymbosum nilesii</i>	Candidate	No
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	Yes [Entire park is critical habitat]
Shivwits milkvetch	<i>Astragalus ampullarioides</i>	Endangered	No
Silver pincushion cactus	<i>Pediocactus sileri</i>	Threatened	No
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Endangered	No
Virgin River chub	<i>Gila seminude</i>	Endangered	No
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	Candidate	No
Woundfin	<i>Plagopterus argentissimus</i>	Endangered	No

SENSITIVE WILDLIFE SPECIES, ZION NATIONAL PARK

Common Name	Scientific Name	Sensitivity Status	Found in Kolob Terrace Project Area?*
Allen's big-eared bat	<i>Idionycteris phyllotis</i>	SOC	Yes
American white pelican	<i>Pelecanus erythrorhynchos</i>	SOC	No
Arizona toad	<i>Bufo microscaphus</i>	SOC	No
Bald eagle	<i>Haliaeetus leucocephalus</i>	RD	Yes
Big free-tailed bat	<i>Nyctinomops macrotis</i>	SOC	No
Black swift	<i>Cypseloides niger</i>	SOC	No
Bluehead sucker	<i>Catostomus discobolus</i>	CA	No
Bonneville cutthroat trout	<i>Oncorhynchus clarkii utah</i>	CA	No
Burrowing owl	<i>Athene cunicularia</i>	SOC	No
Colorado cutthroat trout	<i>Oncorhynchus clarkii pleuriticus</i>	CA	No
Common chuckwalla	<i>Sauromalus ater</i>	SOC	No
Desert sucker	<i>Catostomus clarkii</i>	SOC	No
Ferruginous hawk	<i>Buteo regalis</i>	SOC	Yes
Flannelmouth sucker	<i>Catostomus latipinnis</i>	CA	No
Fringed myotis	<i>Myotis thysanodes</i>	SOC	Yes
Gila monster	<i>Heloderma suspectum</i>	SOC	No
Kit fox	<i>Vulpes macrotis</i>	SOC	No
Lewis' woodpecker	<i>Melanerpes lewis</i>	SOC	Yes
Long-billed curlew	<i>Numenius americanus</i>	SOC	No
Mountain lion	<i>Puma concolor</i>	P	Yes
Northern goshawk	<i>Accipiter gentilis</i>	CA	No
Peregrine falcon	<i>Falco peregrinus anatum</i>	P	No
Short-eared owl	<i>Asio flammeus</i>	SOC	No
Spotted bat	<i>Euderma maculatum</i>	SOC	No

APPENDIXES

Common Name	Scientific Name	Sensitivity Status	Found in Kolob Terrace Project Area?*
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SOC	Yes
Virgin River spinedace	<i>Lepidomeda mollispinis mollispinis</i>	CA	No
Western banded gecko	<i>Coleonyx variegatus</i>	SOC	No
Western red bat	<i>Lasiurus blossevillii</i>	SOC	No
Zebra-tailed lizard	<i>Callisaurus draconoides</i>	SOC	No

CA = Conservation agreement, SOC = State species of concern, RD = recently delisted from federally threatened, P = monitored by the park.

*Based on potential to occur in pinyon/juniper or ponderosa woodland habitat.

SENSITIVE PLANT SPECIES BY HABITAT TYPE IN ZION NATIONAL PARK

Habitat	Common Name	Scientific Name	Potentially Found in Kolob Terrace Project Area?*
Ponderosa pine forest understory or pinyon pine understory	Clark's lomatium	<i>Lomatium graveolens</i> var. <i>clarkii</i>	No
	Zion penstemon	<i>Penstemon humilus</i> var. <i>obtusifolia</i>	No
	Higgin's penstemon	<i>Penstemon leonardii</i> var. <i>higginsii</i>	Yes
	Charleston's violet	<i>Viola charlestonensis</i>	No
	Bog violet	<i>Viola clauseniana</i>	No
Dry meadows	Religious daisy	<i>Erigeron religiosus</i>	No
Exposed limestone	Panguitch buckwheat	<i>Eriogonum panguinense</i>	No
	Charleston's violet	<i>Viola charlestonensis</i>	No
Chinle and Moenkopi Formations (barren badlands)	Springdale buckwheat	<i>Eriogonum corymbosum</i> var. <i>matthewsiae</i>	No
	Chia	<i>Salvia columbariae</i> var. <i>argentea</i>	No
Sandstone soils and crevices	Zion draba	<i>Draba asperella</i>	No
	Canaan daisy	<i>Erigeron canaani</i>	No
	James' buckwheat	<i>Eriogonum jamesii</i>	No
	Zion buckwheat	<i>Eriogonum racemosum</i> var. <i>zionis</i>	No
	Jones' goldenaster	<i>Heterotheca jonesii</i>	No
	Zion penstemon	<i>Penstemon humilus</i> var. <i>obtusifolia</i>	No
	Utah spikemoss	<i>Selaginella utahensis</i>	No
Ruth's sphaeromeria	<i>Sphaeromeria ruthiae</i>	No	
Hanging garden or wetland	Foster's columbine	<i>Aquilegia formosa</i> var. <i>fosteri</i>	No
	Black spleenwort	<i>Asplenium adiantum-nigrum</i>	No
	Hays' sedge	<i>Carex haysii</i>	No
	Zion daisy	<i>Erigeron sionis</i>	No
	Cliff jamesia	<i>Jamesia americana</i>	No
	Charleston's violet	<i>Viola charlestonensis</i>	No



As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

National Park Service
U.S. Department of the Interior



Zion National Park
Springdale, UT 84767-1099