



National Park Service
U.S. Department of the Interior
Glen Canyon National Recreation Area
Page, Arizona

Lakeshore Drive / Wahweap Boulevard Rehabilitation Environmental Assessment

March 2015



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SUMMARY

The National Park Service is requesting public comment on the Lakeshore Drive / Wahweap Boulevard Rehabilitation Environmental Assessment.

This environmental assessment has been prepared to disclose and analyze the environmental consequences of rehabilitating, restoring, and resurfacing Lakeshore Drive, Wahweap Boulevard, and Wahweap Marina Drive in Glen Canyon National Recreation Area, located north of Glen Canyon Dam near Page, Arizona.

Per National Park Service *Management Policies 2006*, park roads will be well-constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience (NPS 2006, Sec. 9.2.1.1). This project is intended to rehabilitate the roadway pavement and adjacent drainage and safety structures. The need for action stems from normal wear, recurring roadway washouts, erosion of the road prism and roadside drainages, soil impingement upon guardrails that reduces function due to reduced height clearance, narrow pavement width resulting in concerns related to oversized vessel transport, significant soil deposition on the roadway during storm events and subsequent road closures, and current wearing surfaces unsuitable for high-speed travel.

This environmental assessment evaluates two alternatives: the No-Action Alternative and the Preferred Alternative, Rehabilitation.

PUBLIC COMMENT

This notice is an opportunity for the public to identify any issues or concerns they may have regarding this project.

If you wish to comment on this environmental assessment, you may post comments online at <http://parkplanning.nps.gov/> or mail comments to the following address:

Lakeshore Drive / Wahweap Boulevard Rehabilitation EA
Glen Canyon NRA
P.O. Box 1507
Page, AZ 86040

or fax to (928) 608-6259.

The formal public review period for this environmental assessment will be 30 days.

Please be aware that your entire comment, including your personal identifying information, such as address, phone number, etc., may be publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

Encompassing over 1.2 million acres, Glen Canyon National Recreation Area stretches more than 185 miles from Lees Ferry in Arizona to the Orange Cliffs of southern Utah. Managed by the National Park Service, the national recreation area was established in 1972 “to provide for public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto... and to preserve scenic, scientific, and historic features contributing to public enjoyment of the area” (Public Law 92- 593, 92nd Congress, S. 27, October 27, 1972). Glen Canyon National Recreation Area recreational opportunities include river running, boating, sport fishing, backcountry hiking, and wildlife viewing. Its canyons provide habitat for over 1300 species of plants, birds, fish, reptiles, and mammals.

This environmental assessment has been prepared to disclose and analyze the environmental consequences of the National Park Service rehabilitating, restoring, and resurfacing of Lakeshore Drive, Wahweap Boulevard, and Wahweap Marina Drive in the national recreation area under the Federal Highway Administration (FHWA) Resurfacing, Restoration, and Rehabilitation (3R) Program,. This project is planned in two phases. Phase I would initially resurface, restore, and rehabilitate approximately 5.75 miles of Lakeshore Drive, 2.58 miles of Wahweap Boulevard, and 0.3 mile of Wahweap Marina Drive in Glen Canyon National Recreation Area (figure 1). Phase II of the project would include additional stretches of Wahweap Boulevard stretching toward the North Entrance Station. This assessment is a site-specific analysis of potential impacts that could result from the implementation of the entire project as the preferred alternative or the no-action alternative. This assessment assists Glen Canyon National Recreation Area in project planning and ensuring compliance with the National Environmental Policy Act of 1969, and in making a determination as to whether any “significant” impacts could result from the analyzed actions. “Significance” is defined by the Act and is found in Title 40, Part 1508.27 of the Code of Federal Regulations (40 CFR 1508.27). An environmental assessment provides evidence for determining whether to prepare an environmental impact statement or a finding of no significant impact. If the decision makers determine that this project has “significant” impacts following the analysis in the environmental assessment, then an environmental impact statement would be prepared for the project. If not, a decision document may be signed to select an alternative, whether the preferred alternative or the no-action alternative. For the National Park Service, a finding of no significant impact (FONSI) would constitute the decision document for the selected alternative if no significant impacts are identified.

The project would include replacement of damaged concrete and asphalt curb, installation of concrete curb in new locations to address roadway drainage issues, improvement of drainage structures and existing ditches, improvement of pullouts, removal of existing guardrail, installation of new guardrail, pulverization of existing asphalt surface, new asphalt pavement, constructing wider turn radii at the intersection of Lakeshore Drive with Wahweap Boulevard and other minor improvements. The project is located north of Glen Canyon Dam near Page, Arizona. The majority of this project is located in Coconino County, Arizona, with a small portion located in Kane County, Utah.



PURPOSE OF AND NEED FOR THE REHABILITATION PROJECT

This project is intended to rehabilitate the asphalt pavement and adjacent drainage and safety structures. The asphalt has deteriorated due to normal wear and requires work beyond routine maintenance. Drainage structures have severely eroded and present new roadside hazards in several locations. The need for action stems from recurring roadway washouts, erosion of the road prism and roadside drainages, soil impingement upon W-beam guardrail that reduces safety function due to reduced height clearance, narrow pavement width resulting in concerns related to oversized vessel transport, significant soil deposition on the roadway during storm events and subsequent road closures, and current wearing surfaces that may not be suitable for high-speed travel (figures 2-5).



FIGURE 2. EROSION ALONG EDGE OF LAKESHORE DRIVE.



FIGURE 3. INFORMAL PULLOUT AND LARGE DIRT PILE ALONG LAKESHORE DRIVE.

Due to the weight and width of oversized vehicles that frequently use these roads, such as large trailers carrying boats, the safety concerns in need of addressing include roadway and surface wear, crowding of the opposite lane and the shoulder, and insufficient width to accommodate other motorists, pedestrians, and bicyclists.



FIGURE 4. EXPOSED CULVERT AND EROSIONAL FEATURE ALONG LAKESHORE DRIVE.



FIGURE 5. CLIFF FACE ALONG LAKESHORE DRIVE THAT WOULD BE SUBJECT TO SCALING.

Maintenance is a vital part of management in most national park system units. The preferred alternative is consistent with the national recreation area's general management plan and other related park plans.

Consistent with current NPS and FHWA recommended road management, improving road conditions to good or excellent condition while protecting human safety and the environment by reconstructing drainage features and implementing appropriate pavement design would enhance the infrastructure of Glen Canyon National Recreation Area. This elevated condition can be maintained by scheduled cyclic maintenance.

In summary, the objectives of the project are to:

- implement the project while minimizing potential for adverse impacts to park resources and values to the greatest extent practicable;
- rehabilitate the two-lane entrance roads, Lakeshore Drive and Wahweap Boulevard, as well as Wahweap Marina Drive;
- pulverize and recycle existing pavement;
- provide a consistent paved width of 32 feet on Lakeshore Drive and Wahweap Boulevard, consisting of 12-foot lanes and 4-foot shoulders;
- rebuild short segments of severely settled roadway and regrade roadside ditches to drain more effectively;
- rehabilitate and upgrade roadway drainage structures including cross drains, overside- and down-drains, roadway curb, and catch basins;
- incorporate inlet, outlet, downstream erosion protection, and toe-of-fill stabilization;
- reconstruct several cross culverts to fit the roadway prism and protect downstream drainages to prevent erosion;
- relocate or protect hazardous features such as depressed inlets and earthen berms (the majority of drainage work is along Lakeshore Drive);
- rebuild the intersection of Lakeshore Drive and Wahweap Boulevard with concrete to provide safer turning radii and prevent rutting;
- rehabilitate pavement and drainage of existing scenic turnouts and parking areas;
- close several informal turnouts on Wahweap Boulevard;
- formalize and sign two turnouts along Lakeshore Drive to provide safe scenic viewing;
- close informal turnouts that are not appropriately designed; and
- provide for a safe and positive visitor experience.

APPLICABLE LAWS, NATIONAL PARK SERVICE POLICY, AND PARK PLANS

The Lakeshore Drive / Wahweap Boulevard Rehabilitation Project would be governed or guided by applicable laws, plans, and policies or the implementation of actions by the National Park Service or other applicable entities. These laws, plans, and policies are listed in table 1.

TABLE 1. APPLICABLE LAWS, NATIONAL PARK SERVICE POLICY, AND PARK PLANS

Glen Canyon National Recreation Area
Glen Canyon National Recreation Area General Management Plan, 1979
Wahweap Development Concept Plan, 2003
National Park Service Policy
National Park Service Management Policies 2006
National Park Service Director's Order 87A: Park Road Standards (NPS 1984)
Resurfacing, Restoration and Rehabilitation (3-R) (23 United States Code 109)
Laws
National Park Service Organic Act (16 United States Code 1 et seq. [1988], August 25, 1916)
National Environmental Policy Act (42 United States Code 4341 et seq.)
Clean Water Act (33 United States Code 1241 et seq.)
National Historic Preservation Act (1966 as amended) (16 United States Code 470)

PUBLIC SCOPING PROCESS

Public scoping comments were analyzed to assist in developing a range of reasonable and feasible project alternatives that meet the purpose and need and in analyzing the potential environmental impacts of each alternative in the environmental assessment. Scoping letters were mailed to all potentially affected private parties and public agencies and a scoping meeting was held at Glen Canyon National Recreation Area headquarters on June 10, 2014. A 30-day public scoping period for the Lakeshore Drive / Wahweap Boulevard Rehabilitation Project was conducted from May 27 through June 25, 2014. During the scoping period, Glen Canyon National Recreation Area received four comment correspondences and comments from one attendee at the June 10 public meeting. Comments largely concerned traffic and access issues during construction, as well as interest in wider lanes for pedestrian safety and bicycle use. All comments, substantive or nonsubstantive, received during the scoping period have been duly considered and are now part of the administrative record for this project.

During both internal and external scoping, comments and concerns were used to identify specific resources and values that may be important to consider for this project. These included geology and soils, visitor use and experience (including public health and safety), night sky, soundscapes, and park operations.

IMPACT TOPICS

This section describes resources and other concerns (impact topics) that could be affected by the proposed action. Scoping; federal laws, regulations, and orders; NPS guidance documents; and park service personnel knowledge of Glen Canyon National Recreation Area resources all helped to determine the impact topics for this project. Justifications are provided regarding why there was no need to examine some impact topics in detail. Other impact topics were identified as requiring further analysis, as presented in “Chapter 3: Affected Environment and Environmental Consequences” of this environmental assessment.

The intensity and type of effect on these impact topics are described as negligible, minor, moderate, or major, and as beneficial or adverse. The National Park Service equates major effects as significant effects. The identification of major effects would trigger the need for an environmental impact statement. Where the intensity of an impact could be described quantitatively, numerical data are presented; however, most impact analyses are qualitative and use best professional judgment in making the assessment. The National Park Service defines “measurable” impacts as moderate or greater effects. It equates “no measurable effects” as minor or less effects. In order to determine if a categorical exclusion applies or if impact topics may be dismissed from further analysis in an environmental assessment or environmental impact statement, the National Park Service uses the “no measurable effect” judgment.

In this environmental assessment, an impact topic for which “no measurable effects” applies has been dismissed from further detailed analysis. The National Park Service uses “no measurable effects” to determine whether impact topics are dismissed from further evaluation so it can concentrate on the issues that are truly important to the action in question, rather than amassing needless detail. This approach complies with Council on Environmental Quality regulations at 40 *Code of Federal Regulations* 1500.1(b).

Impact Topics Selected for Detailed Analysis

Five impact topics were retained for full analysis:

- geology and soils
- visitor use and experience (including public health and safety)
- park operations
- night sky
- soundscapes

These impact topics are presented in Chapter 3.

Impact Topics Dismissed From Further Analysis

The National Park Service provides a limited evaluation and explanation for impact topics that are dismissed from detailed consideration and are not evaluated in more detail. Impact topics are dismissed from further analysis in this environmental assessment if:

- they do not exist in the analysis area; or
- the preferred alternative would not affect them, or the likelihood of impacts are not reasonably expected; or
- there would be minor or negligible effects (no measurable effects) through the application of best management practices from the preferred alternative, and there is little controversy on the subject or reasons to otherwise include the topic.

Internal and external scoping identified several impact topics that did not warrant further analysis. These topics and their rationale for dismissal are as follows:

Vegetation. The project area is in the Colorado Plateau physiographic region, and vegetation within the project area is consistent with the Great Basin Desertscrub Biotic Community (Brown 1994). Project area vegetation includes blackbrush (*Coleogyne ramosissima*), green brittlebush (*Encelia frutescens*), four-wing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), ephedra (*Ephedra torreyana*), broom snakeweed (*Gutierrezia sarothrae*), desert trumpet (*Eriogonum inflatum*), sand sagebrush (*Artemisia filifolia*), and various perennial bunchgrasses. Many portions of the project area are bare rock or are unvegetated soil.

Arid conditions, absence of soil, and past roadside maintenance activities all contribute to a low percentage (estimated at 5 to 15%) of vegetative ground cover within the project area on the road shoulders, drainage channels, and construction corridor. Where culverts would be replaced and where pullouts would be obliterated a native seed mix would be used for revegetation. Invasive species would be monitored post-construction. Though vegetation would be affected by road and drainage channel rehabilitation, adverse effects would be no greater than minor. Therefore, this topic was dismissed from further analysis.

Wildlife. Fauna most commonly associated with the project area include terrestrial wildlife such as mule deer (*Odocoileus hemionus*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), numerous rodents, and various bird and reptile species.

The preferred alternative would occur in a zone of the national recreation area where human presence and vehicle use is constant. Therefore, construction equipment and road rehabilitation activities would not have unusual or exceptional effects on terrestrial or avian wildlife species. Wildlife was dismissed as a topic in this environmental assessment because potential adverse effects would be no greater than minor.

Special Status Species. In order to comply with the Endangered Species Act (ESA) of 1973, the National Park Service is responsible for protecting federally listed, candidate, and proposed species and their designated critical habitats. The National Park Service also is sensitive to species of concern that have been identified by the state of Arizona or the Navajo Nation. Collectively, these are referred to as “special status species.”

There were a total of 13 species identified on the official species lists generated by the U.S. Fish and Wildlife Service (USFWS) Utah and Arizona Ecological Services Field Offices (ESFO) with potential habitat within the project area (USFWS 2014a and USFWS 2014b). Species identified by the official species list from the USFWS Arizona ESFO include California condor (*Gymnogyps californianus*), Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), razorback sucker (*Xyrauchen texanus*), roundtail chub (*Gila robusta*), Welsh's milkweed (*Asclepias welshii*), black-footed ferret (*Mustela nigripes*), and northern Mexican gartersnake (*Thamnophis eques megalops*). Species identified by the official species list from the USFWS Utah ESFO include California condor, greater sage-grouse (*Centrocercus urophasianus*), Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, Jones cycladenia (*Cycladenia humilis* var. *jonesii*), Siler pincushion cactus (*Pediocactus sileri*), and Utah prairie dog (*Cynomys parvidens*). Appendix A contains a comprehensive list of all special status species along with habitat requirements and an explanation as to why the species was not analyzed further. There are no critical habitats within the project area.

Following a comprehensive review, none of the federally listed species or habitat for these species was identified as occurring within the project area. There is however a remote chance that a California condor, sometimes seen below Glen Canyon Dam, could fly over the project area. The California condor is federally listed as endangered; however, the reintroduced population in northern Arizona is considered a nonessential experimental population. For a 10(j) experimental population, a “nonessential” designation indicates that the experimental population is not essential for the continued existence of the species (USFWS 1996). Water, trash, or food scraps have the potential to attract avian scavengers such as condors. Therefore, condor-specific conservation/best management practices would be implemented in association with project construction activities (see table 4). Proper implementation of these measures would ensure a result of no effect to the California condor by the proposed project.

Lists of special status species from the Arizona Game and Fish Department and Utah Department of Natural Resources Division of Wildlife Services were also consulted for potential species occurrences or habitat in or near the project area. Several species from these lists were identified as having the potential to occur in the project area and include common chuckwalla (*Sauromalus ater*), burrowing owl (*Athene cunicularia*), bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus anatum*), and kit fox (*Vulpes macrotis*). Although the potential for these species to occur in this historically heavily disturbed project area is limited due to the constant presence of people, implementation of wildlife best management practices as presented in table 4 would ensure that these species and their potential habitat remain unaffected during and after project implementation. In addition, analysis of these species is not required under the Endangered Species Act. In summary, the proposed road rehabilitation would have no effect on any special status species and this topic was dismissed from further analysis.

Hydrology. Several intermittent washes run toward Lake Powell, generally perpendicular to Lakeshore Drive. These washes are typically dry, but flow during rain events with high run-off and show evidence of heavy erosion. These washes sometimes include rocky pools and other catchments that can hold water after the washes have stopped flowing.

The Colorado River and therefore Lake Powell is hydraulically linked to the alluvial groundwater near the surface within Glen Canyon National Recreation Area. However, groundwater flow and dynamics in the project area would not be affected.

The Colorado River flows in a generally southwest direction from its headwaters in Colorado over 1,450 miles towards the Gulf of California. The nature of the Colorado River near the project area is dominated by Lake Powell and the Glen Canyon Dam. Originally, the Colorado River was a large, sediment-laden desert waterway, but the dam has altered the river's temperature, sediment load, and hydrograph. Public Law 93-493 allocates Glen Canyon National Recreation Area 260 acre-feet of water from the Colorado River annually. Currently, about 15% of this allocation is used. The National Park Service plans to acquire non-potable water from a well near the Stateline boat ramp. There would be no adverse impacts to hydrology; therefore this topic was dismissed from further analysis.

Water Quality. Mass wasting events and erosion of drainage ditches contribute to minor sedimentation within the ephemeral drainages along Lakeshore Drive, which empty into Lake Powell. Negligible adverse impacts to water quality in some of these drainages could occur as culverts are cleaned or replaced. Negligible to minor beneficial impacts to water quality would occur under the preferred alternative, as improved drainage would reduce erosion and sedimentation into Lake Powell. However, because these effects are likely immeasurable, this impact topic has been dismissed from further analysis.

Wetlands and Floodplains. According to Section 404 of the Clean Water Act, a wetland is defined as: "Those areas that are inundated or saturated by surface or groundwater (hydrology) at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation (hydrophytes) typically adapted for life in saturated soil conditions (hydric soils). Wetlands generally include swamps, marshes, bogs, and similar areas (40 Code of Federal Regulations 232.2(r))." Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers regulates wetlands that exhibit all three characteristics (hydrology, hydrophytes, and hydric soils, as described above), which are termed "jurisdictional wetlands" as a subset of "waters of the United States." Both deep-water aquatic habitats (such as Lake Powell) and special aquatic sites, including wetlands are considered "Waters of the United States" (USACE 1987). Wetland impacts were considered as required by Executive Order 11990 ("Protection of Wetlands") and NPS Director's Order 77-1: Wetland Protection. Floodplains were also considered as required under Executive Order 11988 ("Floodplain Management") and NPS Director's Order 77-2: Floodplain Management. There are no wetlands or floodplains within the project area. Negligible to minor adverse impacts to intermittent washes would occur along Lakeshore Drive during culvert replacement. A Clean Water Act Section 404 Nationwide Permit would be required through the U.S. Army Corps of Engineers. However because of the limited impacts, this topic was dismissed from further analysis in this environmental assessment.

Wild and Scenic Rivers. There are no designated Wild and Scenic Rivers within or near the project area. Therefore, this topic was dismissed from further analysis.

Air Quality. Glen Canyon National Recreation Area is classified as a Class II airshed under the Clean Air Act (42 USC 7401 et seq.). This air quality classification is aimed at protecting national parks and wilderness areas from air quality degradation. The Clean Air Act gives federal land managers the responsibility of protecting air quality and related values, including visibility, plants, animals, soils, water quality, cultural resources, and public health from adverse air pollution impacts.

Air pollution in the project area would be minimized through the use of best management practices. Construction activities, including equipment operation and the hauling of material, could result in short-term increases of vehicle exhaust and emissions, as well as inhalable particulate matter. Water would be applied to exposed soils during construction to control dust. Hydrocarbons, nitrogen oxides, and sulfur dioxide emissions,

and any airborne particulates created by dust plumes, would be rapidly dissipated. A local, short-term, negligible degradation of air quality could occur during construction activities, but no measurable effects outside the immediate construction area are anticipated. These potentially minor adverse effects on air quality would be short-term, lasting only as long as construction takes place, and air quality change would not be detectable at a regional scale. No measurable change in emissions would occur after construction. Therefore, air quality was dismissed from further analysis in this environmental assessment.

Cultural Resources. Glen Canyon National Recreation Area initially consulted with affiliated tribes and received responses from the Hopi and Navajo (HCPO 2014 and NNHPD 2014).

Archaeological Resources – Human occupation in the region spans the last 10,000 years. Sites recorded during the current project that include diagnostic cultural material are affiliated with the prehistoric Archaic and Basketmaker II through Pueblo III periods. The cultural resources inventory resulted in the redocumentation of six previously recorded sites. Of these, five are located outside the construction/disturbance limits. Therefore, none of these sites would be impacted by infrastructure improvements. One site is slightly within the proposed construction/disturbance limits. However, this site is recommended not eligible for inclusion on the National Register of Historic Places. Therefore, this topic was dismissed from further analysis.

Prehistoric and Historic Structure – There are no pre-historic or historic structures in the project area. Therefore, this topic was dismissed from further analysis.

Cultural Landscapes – According to the National Park Service, a cultural landscape is defined as a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or something exhibiting cultural or aesthetic values. These special places, such as historic buildings and districts, reveal aspects of our country's origins and development through their form and features and the ways they were used (NPS 2011). A cultural landscape inventory identifies and documents a historic landscape's location, size, physical development, condition, landscape characteristics, and character-defining features. There are no identified cultural landscapes in the project area. Therefore, this topic was dismissed from further analysis.

Ethnographic Resources – Ethnographic resources are landscapes, objects, plants and animals, or sites and structures that are important to a people's sense of purpose or way of life. Ethnographic resources heighten awareness to the sense of history and to the modern-day life of park and recreation area neighbors and others associated with these resources. There are no identified ethnographic resources in the project area. Therefore, this topic was dismissed from further analysis.

Museum Objects – The museum collections at Glen Canyon National Recreation Area would not be affected by the proposed project. Therefore, this topic was dismissed from further analysis.

Indian Trust Resources – There are no Indian Trust Resources at Glen Canyon National Recreation Area. Therefore, this topic was dismissed from further analysis.

Scenic Resources. Sweeping views of Lake Powell, the Colorado River corridor, Glen Canyon Dam, and the surrounding exposed rock formations are visible along the entire length of Lakeshore Drive and on portions of Wahweap Boulevard. Therefore, both of these roadways provide important access to several viewpoints and visitor pullout areas for scenic resources in the project area.

Some unofficial gravel/dirt pullouts along Lakeshore Drive would be closed from public use during project construction activities, and a few would be developed or improved in order to enhance the available scenic pullouts within the project area.

The National Park Service strives to preserve, to the greatest extent possible, the natural landscapes of parks and recreation areas. Although there would be a temporary closure of the scenic viewpoints along the project area, the scenic integrity of the project area would be maintained. Therefore, because the preferred alternative would have at most a minor, short-term, adverse effect on scenic resources, this impact topic was dismissed from further analysis.

Environmental Justice. Under the Presidential Executive Order 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” all federal agencies are required 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.

As defined by 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’ must be implemented and means that no group of people, including a racial, ethnic, or socioeconomic group, should be forced to bear a disproportionate share of the 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.

Page, Arizona and other nearby small communities including Wahweap Marina, Greenhaven Development, and Big Water 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 included 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 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 economic impacts resulting from implementation of the preferred alternative may be short-term and adverse, but the long-term effects would be beneficial. In addition, the park staff and planning team do not anticipate that the impacts on the socioeconomic environment would alter the physical and social structure of nearby communities.

Prime and Unique Farmlands. As required by the Council of Environmental Quality in a memorandum from August 1980, all federal agencies are required to analyze the effects of their actions on soils classified as prime or unique by the Natural Resources Conservation Service. In order to comply with the Farmland Protection Policy Act of 1981, as amended, federal agencies are required to consider adverse effects to prime and unique farmlands that would result in conversion of prime and unique farmland to non-agricultural uses. Unique farmland is described as land producing specialty crops such as fruits, vegetables, and nuts, and prime farmland is defined as land particularly producing general crops as common foods, forage, fiber, and oil seed. Unique or prime farmland status requires that the land is available for farming uses (Council on Environmental Quality 1980).

The lands associated with the preferred alternative are not, and in the future would not be, available for farming uses because they are entirely inside Glen Canyon National Recreation Area. No prime and unique farmlands are identified near the project area in Coconino County, Arizona (NRCS 2014). Therefore, this impact topic was dismissed from further analysis.

Wilderness. The project area is not within designated, proposed, or potential wilderness as defined under the Wilderness Act of 1964. Therefore, this impact topic was dismissed from further analysis.

Ecologically Critical Areas. There are no ecologically critical areas within or near the project area. Therefore, this topic was dismissed from further analysis.

Unique Natural Areas. There are no unique natural areas within or near the project area. Therefore, this topic was dismissed from further analysis.

Climate Change. Though some negligible to minor, site-specific adverse impacts to air quality are anticipated, no measurable change in emissions would occur after construction. There would be no impact in regards to climate change under the considered alternatives; therefore this topic was dismissed from further analysis.

CHAPTER 2: ALTERNATIVES

ALTERNATIVE 1 – NO-ACTION ALTERNATIVE

Under Alternative 1: No-Action Alternative, the existing roadways would not be improved, nor would erosion control or safety improvements occur. Conditions under this alternative serve as a baseline from which impacts from other alternatives can be analyzed. Because no rehabilitation would occur, there would be no improvements to the condition of the road or drainage structures and potential safety issues would not be addressed. The existing paved turnouts would remain paved and those that are unpaved would remain unpaved.

Under alternative 1, however, routine maintenance actions would occur as needed. These include unpaved road grading, shaping, and repair; paved road asphalt patching, crack sealing, and application of slurry or chip-seal treatments; ditch and culvert cleaning and repair; vegetation maintenance; striping; and sign replacement.

ALTERNATIVE 2 – REHABILITATION (PREFERRED ALTERNATIVE)

Phase I

Under Alternative 2: Preferred Alternative, Phase I of the rehabilitation of Lakeshore Drive and Wahweap Boulevard would improve drainage, add a dedicated exit lane at the South Entrance fee station area, clearly define appropriate pullouts and prevent or discourage use of informal pullouts, and provide safer turning radii at the 4-way intersection of Lakeshore Drive and Wahweap Boulevard.

The preferred alternative would include replacing curbs and gutters that are in poor condition and adjusting manhole lids to match the grade and road surface to avoid manholes becoming covered, lost, or filled with sand and water.

Under Phase I, Lakeshore Drive would be closed to the public for approximately 6 months during construction. This would separate large vehicle and boat traffic from construction traffic and allow for replacement of several deep culverts. The closure would be scheduled between late fall and spring, at times when visitation to the national recreation area is typically low. Paving would be completed in the spring and the entire Phase I portion of the project would be completed before Memorial Day weekend. Traffic would be re-routed to the North Entrance at Wahweap Boulevard while construction is occurring on Lakeshore Drive. There would be 15- to 20-minute maximum delays on open park roads during construction.

Most construction vehicles would park in existing pullouts and disturbed areas as determined by Glen Canyon National Recreation Area.

Water for construction would be non-potable water from sources within Glen Canyon National Recreation Area. The project would need a minimum of 1,000,000 gallons of water for dust abatement and surface compaction.

Drainage improvements would include grading slopes for water flow off the roadway and mitigation of downslope sand and mud flows during storms so that they are dispersed on the edge of the roadways. A

primary problem is drainage on Lakeshore Drive; there is an issue with the quantity of sediment that is deposited within the existing culverts, as they are commonly clogged reducing their effectiveness. Larger culverts would be installed. Revetment mattresses and rip rap would be placed in appropriate drainages and culverts would be cleaned or in some cases replaced. Rock scaling along cliffs would occur in some stretches to prevent hazardous rock fall. Pullouts would be formalized.

The 4-way intersection of Lakeshore Drive and Wahweap Boulevard would be replaced with concrete instead of asphalt to avoid “rutting” in the heat under the stress of large vehicles. The intersection island would be smaller and the width of the lanes would be widened on the outside toward the ranger station. This design would account for 115-foot trailers to further prevent turning vehicles from passing into the oncoming lane.

An additional exit lane would be created at the South Entrance to improve traffic flow.

Speed limit and pullout location signage would be more appropriately placed. All guardrail, regulatory signs, and pavement markings would be replaced with new materials that meet current safety standards.

Phase II

Under Alternative 2: Preferred Alternative, Phase II would include further rehabilitation of Wahweap Boulevard stretching toward the North Entrance Station. The emphasis would be improvements to the deteriorating asphalt concrete road surface and ancillary drainage features; however, there are no major drainage structures along the route as compared to Lakeshore Drive. The existing configuration of Wahweap Boulevard is 2.4 miles long with 24-foot-wide asphalt pavement. Traffic volumes are high and the existing pavement is generally in poor condition. The route was chip sealed in 2010. The proposed typical section would consist of two 12-foot lanes with 4-foot paved shoulders on either side for a paved width of 32 feet. Shoulder widening would be required but would fit within the existing roadway bench. The roadway bench is defined as the existing roadway, informal earth shoulders, foreslopes, ditches, and backslopes, an approximate width of 80 feet. An additional entrance lane is proposed at the North Entrance Fee Station. An alternative alignment for Wahweap Boulevard near its intersection with Lakeshore Drive would remove existing S-curves at the approach to the intersection.

Under Phase II, Wahweap Boulevard would be closed to the public for approximately 4 months during construction. This would separate the large vehicle and boat traffic from the construction traffic. The closure would be scheduled between late fall and spring, at times when visitation to the national recreation area is typically low. Visitors would use Lakeshore Drive for access to the Wahweap area.

Drainage issues, including erosion from culverts and sheet flow, along the route would be addressed. Ponding of runoff would also be corrected through ditch line improvements. Existing culverts, concrete and asphalt curb, and drop inlets would be replaced, as needed, to address drainage and runoff. Outlet protection and slope protection would be installed to reduce erosion. Formal pullouts would be rehabilitated in-kind, with informal pullouts either paved to become formal or obliterated.

Types of work under Phase II would include pulverizing existing pavement, grading and earthwork, aggregate base, asphalt curb, concrete curb, utility relocations, temporary and permanent erosion control, drainage improvements, ditch grading, slope protection, culvert replacement, and seeding and mulching.

Speed limit and pullout location signage would be more appropriately placed. All guardrail, regulatory signs, and pavement markings would be replaced with new materials that meet current safety standards along stretches of Wahweap Boulevard heading toward the North Entrance Station under Phase II of the project. Potential disturbance in the project area that includes staging areas and other areas for temporary and routine maintenance presented in table 2.

TABLE 2. POTENTIAL NEW PERMANENT AND TEMPORARY IMPACTS IN SQUARE FEET AND ACRES

Portion of Project Area	Permanent Square Feet	Permanent Acres	Temporary Square Feet	Temporary Acres
Wahweap Boulevard	227,000	5.2	723,000	16.6
Lakeshore Drive to 4-way intersection	189,000	4.3	104,5000	24.0
Lakeshore Drive from 4-way intersection to Stateline Drive	34,000	0.8	862,000	19.8
Wahweap Marina Boulevard	17,000	0.4	61,000	1.4
Total Area (Project Area)	467,000	10.73	2,692,000	61.8

Anticipated construction equipment, work item, and method are presented in table 3.

TABLE 3. ANTICIPATED CONSTRUCTION EQUIPMENT

Work Item	Construction Equipment	Construction Method
Construction Survey	Level, rod, total station, stakes	2 or 3 man crew hand placing stakes offset from the roadway
Mobilization of construction equipment and set up of temporary traffic control measures	Heavy construction equipment, low boy delivery trucks, fork lifts, post hole diggers, mobile offices, diesel engine vehicles, survey equipment	Mechanical off-loading of equipment and mobile office, post hole diggers for sign posts, forklift unloading of concrete barrier, hand placement of cones, drums, and signs, barricades
Placement of temporary erosion control, clearing existing vegetation	Trench diggers, Bobcats, excavators, motor graders, water trucks, steel wheel compactors, bull dozers	Bobcats and trench diggers to place silt fence sediment control, motor graders and bulldozers for clearing and stockpiling topsoil and grubbing any oversized vegetation or rocks
Set up of temporary lightning system (if night work was to occur)	Gas powered generators, light towers, vehicle lights, lighted drums	Set up of multiple light towers and gas powered generators around the 4-way intersection or other project areas, vehicle mounted flashing lights, flashing beacons placed on drums and barriers

Work Item	Construction Equipment	Construction Method
Grading, culvert replacement, slope scaling	Motor graders, bull dozers, excavators, loaders, water trucks, steel wheel compactors, concrete trucks, laborers	Earth moving and compaction along grade raise locations, the 4-way intersection, and formalizing pullouts; large excavators and bulldozers and rollers removing and replacing deep culverts, placing concrete headwalls, placing riprap and erosion protection, slope scaling, and miscellaneous items; hydraulic truck mounted post driving equipment placing guardrail posts, laborers using hand tools to set and fasten new guardrail to posts
Guardrail Replacement	Laborers with mechanical tools, large diesel engine post driving equipment, fork lifts, low boys	Laborers using hand tools to remove and set new rail and end sections; fork lifts to load and unload new and old rail from low boys; hydraulic truck mounted post driving equipment placing new posts
Road Rehabilitation and asphalt removal	Motor graders, water trucks, steel wheel compactors, excavators, road reclaimer, haul trucks, asphalt pavers, laborers, milling machine, concrete trucks and pumps	Road reclaimer to pulverize the existing asphalt, excavators removing and replacing gates, curb, and other roadside features, asphalt milling machine to remove asphalt at the 4-way intersection and in between existing curbed areas; motor graders, water trucks, and compactors finishing the pulverized asphalt base haul trucks transporting aggregate and asphalt to the park, asphalt pavers and compactors placing new asphalt; concrete trucks delivering concrete to pump trucks to place new concrete pavement, curb, and sidewalk at the 4-way intersections
Placement of Permanent signing and traffic control	Post hole diggers, paint truck	Post hole diggers to place new sign posts, paint truck placing permanent striping and symbols
Demobilization of the construction equipment	Haul trucks, back hoe, motor grader	Removal of equipment via loading low boys, removal of the temporary office trailer, site cleanup with hand tools and backhoe and motor grader

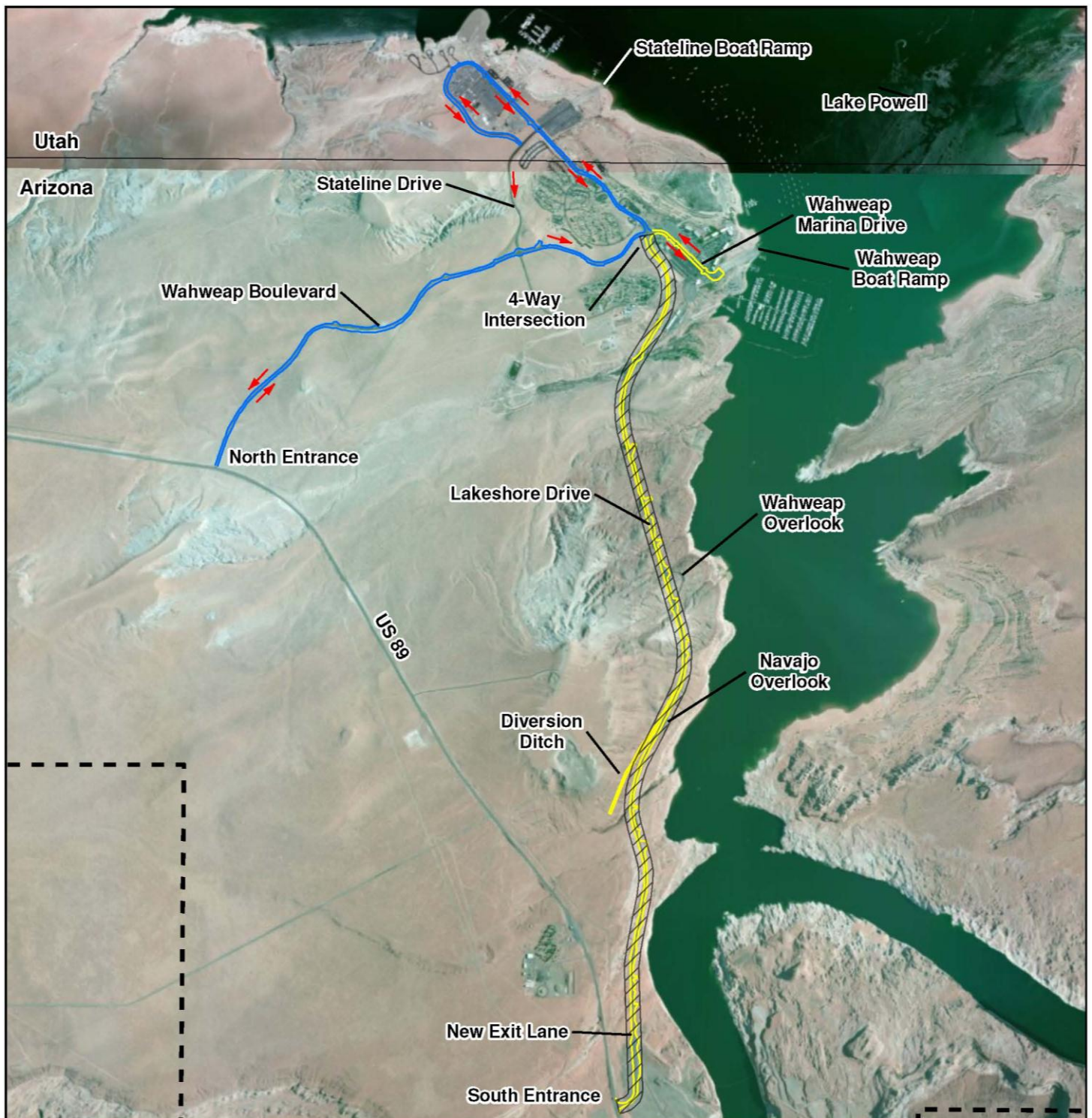


FIGURE 6. PROPOSED PROJECT PHASING INCLUDING PHASE I ROAD CLOSURE

0 0.5 1 Mile

0 0.5 1 Kilometer



Legend

Project boundary

Phase I Phase II

GLCA boundary

Closure Winter/Spring 2015/2016

Detour one-way traffic

Detour two-way traffic



Best Management Practices

Best management practices can be defined as practices or a combination of practices that are part of the project design and are determined to be an effective and practicable means of mitigating impacts.

Construction Projects. Contractors would be given orientation concerning proper conduct of operations. This orientation is provided in both written form and verbally at a preconstruction meeting. Orientation topics include the following:

- Wildlife should not be approached or fed.
- Collection of park resources, including plants, animals, and historic or prehistoric materials, is prohibited.
- Contractor must have a safety policy in place and follow it.
- A vehicle fuel leakage and spill plan would be developed and implemented.

Limitation of Area Affected. The following best management practices would be implemented to minimize the area affected by construction activities:

- The staging area for the construction office, construction equipment, and materials storage would be located in previously disturbed area or within the limits of construction. All staging areas would be returned to pre-construction condition once construction is complete.
- Construction zones would be limited to the minimum area requirements and defined prior to any construction activity. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting any operations beyond defined construction zone.
- The amount of ground disturbance for activities not directly related to construction, such as staging and stockpiling areas, would be minimized. All staging and stockpiling areas would be returned to pre-construction conditions following construction.
- Parking of construction vehicles would be limited to designated staging areas or existing roads and parking lots.

Erosion Prevention. To minimize soil erosion, the following best management practices would be incorporated into the action alternative:

- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods would be used to minimize any potential erosion during construction.
- Construction or maintenance earthwork would incorporate stockpile stabilization. Contouring and erosion control devices such as rip rap would be incorporated into drainage design to prevent soil erosion.
- The project area and adjacent staging areas would be restored to approximate original site conditions (including any identified re-vegetation actions, soil and rock arrangement) upon completion of the project.

Storm Water Controls. To minimize potential impacts to water quality, the following best management practices would be incorporated into the action alternative:

- A storm water pollution prevention plan would be developed prior to any ground-disturbing activities. All National Pollutant Discharge Eliminations System permitting requirements would be met.
- Standard erosion control measures such as rip rap, detention basins, and pollutant separator devices or equivalent control methods would be used to minimize any potential sediment or pollutants to streams and lakes.
- In accordance with Section 401 and 404 of the Clean Water Act, all United States Army Corps of Engineers (USACE) and Arizona Department of Environmental Quality (ADEQ) permits, certifications, or waivers must be obtained prior to the start of work. In addition, all additional best management practices identified by the USACE and ADEQ must be implemented and followed during project implementation.

Cultural Resources Impacts. To minimize potential impacts to cultural resources, the following best management practices would be incorporated into the action alternative:

- In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, all work would stop and the contractor would contact the FHWA Contracting Officer Representative (COR) who would then contact the NPS Project Manager. The NPS Project Manager would consult the NPS Archaeologist to ensure steps are taken to comply with the provisions outlined in the Native American Graves Protection and Repatriation Act.
- All contractors and subcontractors would be informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. They would be instructed regarding procedures to follow in case previously unknown archeological resources are uncovered during construction.
- Monitoring would occur for previously unidentified archeological resources by having a professionally qualified archeologist on site during all project activities that could include subsurface disturbance to areas determined to be sensitive and/or to possess the potential for presence of intact subsurface archeological remains, as identified by the NPS Archaeologist.
- If access outside the construction limits is required, the contractor would submit a plan to the FHWA COR who would then contact the NPS Project Manager. The plans would detail how the access would be provided, including typical sections for temporary access roads and limits of disturbance. This plan would be submitted to and approved by the NPS Project Manager before any work can begin at the site. The NPS Project Manager would coordinate with the NPS Archaeologist and Planning and Compliance Office prior to providing approval to the FHWA COR. All areas would be restored to pre-construction conditions as approved by the NPS Project Manager.
- In the event of the discovery of unanticipated cultural resources, work in the immediate area would halt and the contractor would contact the FHWA COR who would then contact the NPS Project Manager. The NPS Project Manager would consult with the NPS Archeologist and work would not resume until the NPS Archeologist gives approval to resume.

Special Status Species Protection. To protect any unknown or undiscovered threatened, endangered, or special status species, construction contracts would include provisions for the discovery of such. These provisions would require the cessation of construction activities until park staff evaluate the project impact on the discovery and would allow modification of the contract for any protection measures determined necessary to protect the discovery.

The California condor was identified as a species with the potential to occur within the project area. The proximity to the Vermillion Cliffs indicates a slight chance that a condor could forage in or near the project area. In order to avoid any effects to this experimental/non-essential population of condor, specific best management practices adapted from the USFWS California Condor Recovery Plan (USFWS 1996) are as follows:

- All project workers would be advised of the possibility of the occurrence of California condors in the project area. All construction workers and supervisors would be instructed to avoid interaction with condors should they occur or settle at the construct site.
- To prevent water contamination and potential poisoning of condors, fluid leakage and spill plans would be developed and implemented and would define how each hazardous substance would be treated in case of a leakage or spill.
- Open water sources would be covered when not in use (e.g. ‘pumpkin’ inflatable water storage tanks) to reduce the likelihood of condors drowning.
- The National Park Service would educate recreation area visitors to avoid interacting with condors and to immediately inform appropriate personnel when condors occur there.
- Specific protective measures provided by the U.S. Fish and Wildlife Service would be incorporated into contract language that would require the contractor and Park Service personnel to comply with the protective measures proposed.
- The contractor would immediately contact the FHWA COR who would then contact the NPS Project Manager if condor(s) occur or settle at the project area. The NPS Project Manager would immediately consult with the appropriate NPS Science and Resource Management staff to address a condor occurrence.
- To avoid injury both to condors and to personnel, project workers would not haze condors.
- Any project activity that may cause imminent harm to condors would be temporarily suspended until permitted personnel could assess the situation and determine the correct course of action.
- The construction site would be cleaned up at the end of each day (for example, trash removed, scrap materials picked up) to minimize the likelihood of condors visiting the site.
- If a condor occurs at the project site, only permitted personnel would employ appropriate techniques to cause the condor to leave the site.

Best management practices for other special status species are as follows:

- Include contract provisions that require a stop in construction activities if a special status species is discovered in the project area, until recreation area staff-evaluate the situation. This would allow modification for any protection measures determined necessary to protect the species.

- Construction zones would be limited to the minimum area requirements and defined prior to any construction activity.
- The contractor must immediately dispose of any dead animals found within the construction limits by placing the carcass in the nearest available dumpster. If any dead animals are observed outside the construction limits, the contractor would inform the FHWA COR who would then contact the NPS Project Manager for removal of any dead animals found outside the construction limits and within 500 feet of the construction zone. All carcasses removed from the construction area would be placed in the nearest available dumpster. Park staff would empty the dumpsters on a regular basis so roosting by condors is not encouraged from odor coming from the dumpsters.

Vegetation and Invasive Species Impacts. The following best management practices would be incorporated into the action alternative to minimize impacts of construction activities on the natural vegetation:

- Actions as identified in an NPS- approved re-vegetation plan would be completed to restore areas affected by construction related activities. Only NPS- approved native plant species and seed mixtures would be used.
- Native landscape restoration and plantings would be developed for construction projects by a landscape architect or other qualified individual in coordination with the approved park approved native plant list and seedling specifications.
- All vehicles, tools, and equipment used to implement the project would be cleaned prior to entering the park to ensure they do not introduce or spread non-native species.
- Soil and fill material must be clean, weed/seed free, and from a source approved by the National Park Service.

Visitor Impacts. The following best management practices would be incorporated into the action alternative to minimize impacts of construction activities on visitor experience:

- The Park may consider restricting construction activities during peak use days such as holidays and some weekends during the business times of the year to minimize disruption to visitors.
- Traffic in any one direction would not be stopped for more than 20 minutes to minimize disruption to traffic flow.
- Unless otherwise approved by the park, operation of heavy construction equipment would be restricted to 6:00 am to 10:00 pm in accordance to established park quiet hours.
- Information regarding implementation of this project would be shared with the public upon their entry into the park during construction periods. This may take the form of an informational brochure distributed at fee stations or mailed to reservation-holders, postings on the park's website, and/or other methods.
- A public information program to warn of temporary closures, delays, and road hazards during construction would be implemented. This program would help convey appropriate messages to the public and aid in mitigating potential impacts on visitors' expectations and experiences
- The Public Information Officer would be provided with the project schedule as soon as it is known and would be provided periodic updates of project work.

- Visitors would be routed away from construction activities, when feasible.
- Should immediate access not be able to be provided to emergency vehicles at any time in the work zone, this would be communicated to Visitor and Resource Protection Division as early as possible.
- The safety plan and safety record of contractor would be reviewed by NPS Safety Office prior to construction.
- A copy of a Traffic Management Plan would be submitted for review and approval prior to the commencement of work activities. This plan would address location of warning signs, type of signs, placement of flaggers, placement of cones/fencing, barricades, duration of anticipated delays, use of pilot cars, etc. This plan would address vehicle and pedestrian traffic within the construction zone.

Area Operations Impacts. The following best management practices would be incorporated into the action alternative to minimize impacts of construction activities on area operations:

- Construction related fill material, including asphalt millings and clean dirt/rocks, would remain property of the National Park Service and would be stored in the "boneyard" near the North Entrance station.
- Project implementation would be coordinated with park staff to ensure that impacts to park visitors, concessioners, and permit holders are avoided or minimized to the greatest extent possible. Area staff would be notified in advance of project implementation to ensure implementation does not result in unexpected impacts to other park operations.
- The park Public Information Officer would be notified at least one month in advance of scheduled work and/or when start date has been established by contract, so that a news release may be prepared and sent to the public.
- Hard hats, safety vests, eye protection and other personal protective gear, as needed, would be worn by employees at all times when within construction zone.
- All construction generated debris shall be removed from the park to an approved landfill or recycled, as appropriate.
- Any park infrastructure impacted during construction, including but not limited to paved and unpaved roadways, walkways, turf, would be restored to pre-construction conditions upon completion of the project.
- Inspect equipment for leaks of oil, fuels, or hydraulic fluids before and during use to prevent soil and water contamination. Contractors would be required to have and implement a plan to promptly clean up any leakage or accidental spills from equipment, such as hydraulic fluid, oil, fuel, or antifreeze.
- To the extent practical, work would be scheduled to avoid construction activity and construction related delays during peak visitation times. Weekend work (Friday through Sunday), holiday work, or night work would not be allowed unless authorized in writing by the park Superintendent.
- The project would include a pre-construction meeting and a final inspection meeting, in addition to regularly scheduled project meetings and site visits.

Air Quality Impacts. Air quality impacts of the action alternative are expected to be temporary and localized. To minimize these impacts, the following practices would be implemented:

- Dust containment, in accordance with NPS, state, and local regulations, would be achieved. This would include, but is not limited to physical barrier containment and/or water sprinkling dust controls.
- To reduce entrainment of fine particles from hauling materials, sufficient freeboard would be maintained and loose material loads (aggregate, soils, etc.) would be tarped.
- To reduce tailpipe emissions, construction equipment would not be left idling any longer than is necessary for safety and mechanical reasons.
- To reduce construction dust in the short term, water would be applied to problem areas. Equipment would be limited to the defined construction area to minimize soil disturbance and consequent dust generation.
- Landscaping and revegetation would control long-term soil dust production. Mulch and the plants themselves would stabilize the soil and reduce wind speed/shear against the ground surface.

Night Sky Impacts. Night sky impacts of the action alternative are expected to be temporary and local. To minimize these impacts, the following practices would be implemented:

- Construction methods would be chosen based on effective night lighting that reduces and/or eliminates any additional light pollution.
- To reduce light pollution, lights would be used only where and when it is needed within the project area, lamps would be shielded and directed downward, lights with warmer colors and high energy efficiency would be selected, and only the minimum amount of light necessary for safe activity would be used.

Soundscape Impacts. Soundscape impacts of the action alternative are expected to be temporary and local. To minimize these impacts, the following practices would be implemented:

- To reduce construction noise, quieter machinery, vehicles, and equipment would be used in addition to quiet pavement technology when/where possible.
- Timing and placement of noise generating activities would be chosen carefully in order to reduce impact on noise-sensitive park resources.
- Designs and construction methods that do not create excessive noise during project construction would be chosen and implemented.

ALTERNATIVES SUMMARY

TABLE 4. CAPACITY FOR ALTERNATIVES TO MEET PROJECT OBJECTIVES

Project Objectives	Alternative 1 meets Objectives?	Alternative 2 meets Objectives?
Improve roadways surfaces and signage to enhance the visitor use and experience	No. The roadway surface would remain in need of repair and signage would not be improved.	Yes. The roadway surface and signage would be improved.
Replace or improve drainage features when necessary to reduce erosion and improve drainage and safety	No. Drainage would remain poor in several areas and erosion would continue.	Yes. Drainage would be improved and erosion would be reduced considerably.
Better define pullouts along roadsides to enhance the visitor use and experience	No. Numerous informal pullouts would remain.	Yes. Pullouts would be formalized and would be better signed.
Install concrete and construct wider turn lanes at the 4-way intersection to improve operations and safety associated with oversized vehicles	No. The 4-way intersection's pavement and narrow lanes would remain.	Yes. The 4-way intersection's pavement would be replaced by concrete and the lanes widened.
Construct a dedicated exit lane at the South Entrance on Lakeshore Drive to improve traffic flow	No. Flow of exiting traffic at the South Entrance Station would not be improved.	Yes. A dedicated lane would be constructed improving traffic flow.
Create consistent lane widths and shoulder widths along Lakeshore Drive and Wahweap Boulevard in order to improve driver/pedestrian expectations along the routes	No. Lane widths and shoulders would remain narrow.	Yes. Two 12-foot lanes with 4-foot paved shoulders on either side would be established on the routes.

ALTERNATIVES CONSIDERED BUT DISMISSED

Under the National Environmental Policy Act, an alternative may be eliminated from detailed study for the following reasons [40 Code of Federal Regulations 1504.14(a)]:

- technical or economic infeasibility;
- inability to meet project objectives or resolve need for the project;
- duplication of other less environmentally damaging alternatives;
- conflicts with and up-to-date valid plan, statement of purpose and significance, or other policy; and therefore, would require a major change in that plan or policy to implement; and
- environmental impacts too great.

Because the FHWA Resurfacing, Restoration, and Rehabilitation (3R) Program projects are limited in the types of activities they fund, only other minor alternative subcomponents were considered in the development of the preferred alternative. The following alternative component or variations were considered during the design phase of the project but were rejected due to one or more of the aforementioned reasons:

- The national recreation area considered realigning the exit lane at the South Entrance nearer a rock outcrop at the junction of HWY 89 and Lakeshore Drive, sometimes referred to as “the beehive.”
- The national recreation area considered extending the length of the South Entrance.
- The national recreation area considered placing rip-rap along the furrow ditch west of Lakeshore Drive.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

In accordance with Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making and Council on Environmental Quality requirements, the National Park Service is required to identify the "environmentally preferred alternative" in all environmental documents. The environmentally preferred alternative is determined by applying the criteria suggested by the Council on Environmental Quality, which provides direction that the "environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101."

Generally, these criteria result in the environmentally preferable alternative as the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (46 Federal Register 18026-46 Federal Register 18038). Upon implementation of alternative 2, visitors would find a consistent width road with a smooth surface and well-defined turnouts. Alternative 1 would result in ongoing deterioration of the roadway, including its culverts and other features.

The alternative that best meets the environmentally preferred criteria is alternative 2. Analysis of resource and visitor impacts and best management practices as noted indicate that alternative 2 achieves the greatest balance between the need for repairing the road to improve visitor use and experience and park operations and preserving the road corridor's natural and cultural resources. Alternative 1 would result in continued adverse impacts on visitor use and experience and does not best meet the criteria. Upon full consideration of the elements of Section 101 of the National Environmental Policy Act, alternative 2 represents the Environmentally Preferable Alternative for the Lakeshore Drive and Wahweap Boulevard Rehabilitation Project. Alternative 2 best protects, preserves, and enhances historic, cultural, and natural resources. Table 5 presents a comparative summary of the impacts that would result from alternative 1 and alternative 2.

TABLE 5. COMPARATIVE SUMMARY OF THE IMPACTS OF THE CONSIDERED ALTERNATIVES

Impact Topic	Alternative 1: No-action	Alternative 2: Rehabilitation (Preferred Alternative)
Geology and Soils	There would be site-specific, long-term, minor, adverse impacts on geology and site-specific, long-term, moderate, adverse impacts on soils from increased erosion.	There would be local and site-specific, short-term, minor-to-moderate adverse impacts on geology and soils from bedrock excavation and soil disturbance and compaction during rehabilitation. However, following the completion of the project there would be local and site-specific, long-term, moderate beneficial impact on geology from soils from enhanced erosion control.
Visitor Use and Experience	Failure to correct deficiencies along Wahweap Boulevard and Lakeshore Drive would have local, moderate, long-term, adverse impacts on visitor use and experience and public health and safety and would result in an increase in vehicle or pedestrian accident risk potential.	Impacts on visitor use and experience would be local, short-term, moderate, and adverse during rehabilitation. However, there would be local, long-term, moderate, beneficial impacts on visitor use and experience, including public health and safety, following project completion.
Night Sky	There would be continued local, short-term, minor, adverse impacts on night sky viewing for recreation area visitors, residents, and/or contractors in the vicinity.	There would be local, short-term, minor to moderate, adverse impacts on night sky viewing for recreation area visitors, residents, and contractors in the vicinity of rehabilitation activities. This alternative is not expected to have a long-term impact on night skies along Wahweap Boulevard and Lakeshore Drive in Glen Canyon National Recreation Area following project completion.
Soundscape	There would be site-specific, short-term, minor, adverse impacts on recreation area visitors, residents, and/or contractors in the vicinity of ongoing maintenance activities.	There would be local, short-term, moderate, adverse impacts on recreation area visitors, residents, and contractors in the vicinity of rehabilitation activities. This alternative is not expected to have a long-term impact on ambient noise levels along Wahweap Boulevard and Lakeshore Drive in Glen Canyon National Recreation Area following project completion.
Area Operations	There would be local, moderate, short- and long-term, adverse impacts on area operations as maintenance needs would continue.	The closure of Lakeshore Drive and rerouting of traffic to Wahweap Boulevard would disrupt normal area operations, resulting in a local, short-term, moderate, adverse impact. The proposed improvements would result in less maintenance and emergency repairs in the project area, resulting in a local, long-term, moderate, beneficial impact on recreation area operations.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter presents the affected environment and potential environmental consequences of implementation of either alternative 1 or alternative 2 of the Lakeshore Drive / Wahweap Boulevard Rehabilitation Project. Under Alternative 1: No-action Alternative the project corridor would remain as is with routine road maintenance, but no planned pavement resurfacing, lane widening, new culvert installation, etc. Under Alternative 2: Rehabilitation (Preferred Alternative), improvements to Lakeshore Drive and Wahweap Boulevard would include improving roadway surfaces and signs, replacing or improving culverts where necessary to reduce erosion and improve drainage, better defining pullouts along roadsides, constructing a dedicated exit lane at the South Entrance on Lakeshore Drive to improve traffic flow, and creating wider lanes and shoulders on Lakeshore Drive and Wahweap Boulevard to better accommodate large vehicles, trailers, pedestrians, and bicyclists.

Impact Topics

Potential impacts on the natural, cultural, and sociocultural environment that could result from the project alternatives as defined in chapter 2 of this environmental assessment were assessed. Anticipated or potential impacts on geology and soils, area operations, visitor use and experience (including public health and safety), night sky, and soundscape were deemed to be minor to moderate and thus these five topics were fully analyzed.

Impact Analysis Methodology

In accordance with the National Environmental Policy Act of 1969, the National Park Service is required to prepare an environmental document that discloses any environmental impacts of the proposed action, alternatives to that action, and any adverse impacts that cannot be avoided should the proposed action be approved. Environmental documents are required to discuss and determine that status of impacts based on type, context, duration, and intensity. In addition, the NPS *Management Policies 2006* (NPS 2006) and *Director's Order-12: Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2001) documents require that National Environmental Policy Act environmental compliance documents also include the potential environmental consequences to specific park resources and determine if the proposed actions would impair park resources. This section contains the methods and/or criteria used to analyze the potential impacts for specific resource topics in relation to the preferred alternative and no-action alternative.

Context, duration, intensity, and type were considered in the analysis of the impacts for each impact topic that could result from the implementation of the alternatives. The impact analyses were based on a qualitative assessment of each resource topic unless otherwise stated.

Context. “Context” defines the affected area or location in which an impact would occur, and may include site-specific, local, regional, or broader characteristics. For example, “site-specific” could refer to a culvert being replaced along Lakeshore Drive; “regional” could refer to impacts on air quality that would extend beyond the immediate project area.

Duration. “Duration” refers to the length of time an impact would occur, and can be described as either short-term or long-term:

Short-term – Impacts on a resource are usually limited to the time period during project construction, and would dissipate following construction completion. The resource would generally resume its previous condition following a short-term impact, and may vary according to context. For example, “short-term” may refer to a few days of culvert work at a specific site, or up to six months of rehabilitation activities along the entire length of a road.

Long-term – Impacts on a resource are not limited to the time period during project construction and may last beyond project completion, for many years, or be considered permanent. In addition, long-term impacts may not attain the condition that existed prior to project initiation for a longer period of time.

Intensity. “Intensity”, usually categorized as negligible, minor, moderate, or major, is used to define the level or degree of an impact’s severity. Definitions of each intensity level are included for each resource topic in this environmental assessment due to variability from one topic to another; however, a general idea of each level is provided:

Negligible – Impacts on the quality or quantity of a resource would be slight or imperceptible.

Minor – Impacts on the quality or quantity of a resource would only be very slightly detectible or affect a relatively small area, and would have no effect on the surrounding area.

Moderate – Impacts on the quality or quantity of a resource would be noticeable. Changes to local processes would occur but would be of limited extent.

Major – Impacts on the quality or quantity of a resource would be significant or cover a relatively large area. Landscape-level changes would be expected.

Type. The “Impact type” determines whether an impact is beneficial or adverse in regards to the impact topic:

Beneficial – An impact of this type would cause a positive change in the existing condition or instigate a trend toward a desired condition for the resource topic. The definition of “beneficial” may vary by resource topic; therefore a separate discussion is provided for each resource topic.

Adverse – An impact of this type would cause a change that detracts from the existing condition or instigate a trend away from a desired condition for the resource topic. The definition of “adverse” may vary by resource topic; therefore a separate discussion is provided for each resource topic.

Cumulative Impacts. The CEQ regulations which implement the National Environmental Policy Act (NEPA) require assessment of cumulative impacts in the decision-making process for federal projects. 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 non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no action and preferred alternatives.

Cumulative impacts were determined by combining the impacts of the preferred alternative with other past, present, and reasonably foreseeable future actions. Therefore, it is necessary to identify other past, ongoing, or reasonably foreseeable future projects at Glen Canyon National Recreation Area and, if applicable, the surrounding region. Because the scope of this project is relatively small, the geographic and temporal scope of the cumulative analysis is similarly small. Previously completed, current, and reasonably foreseeable future actions or projects in the vicinity of the Lakeshore Drive / Wahweap Boulevard Rehabilitation Project comprise the cumulative impacts scenario and include the following:

- restoration and development projects related to the Wahweap Development Concept Plan (NPS 2003)
- recent relocation of utilities along Wahweap Boulevard
- the proposed Lake Powell to Cameron water pipeline
- the proposed Lake Powell to southwestern Utah water pipeline
- telecommunication line upgrades
- replacement of utilities
- facility repairs
- ongoing livestock grazing
- ongoing road maintenance
- other South Entrance Station improvements
- future pedestrian/bicycle links
- proposed Rim Trail from Page to Lakeshore Drive

Conclusion. A conclusion, stating the context, intensity, duration, and type of impact and any other relevant considerations for each impact topic is presented in this section and is included for each of the proposed alternatives.

GEOLOGY AND SOILS

Affected Environment

The project area lies within the Kaiparowits Plateau-Escalante Benches section of the Colorado Plateau physiographic province (Stokes 1986). The Colorado Plateau Province centers on the Four Corners and includes portions of Utah, Colorado, New Mexico, and Arizona. The Kaiparowits Plateau-Escalante Benches section is a large, and in many locations, extremely rugged landscape located between the Grand Staircase section to the west and Circle Cliffs-Teasdale Anticlines section to the east.

Specifically within the project area, geology along Lakeshore Drive consists of colorful shale and sandstone with shallow and moderately deep alluvial and aeolian sand deposits overlying bedrock (figure 7). Topography drops sharply toward the east and Lake Powell. Wahweap Boulevard trends across a series of low ridges with relatively gentle slopes. Cut banks and deflated basins indicate at least several feet of aeolian sand in places (figure 8).

The project area includes four dominant soil types derived from the ancient sedimentary rocks of the Colorado Plateau (NRCS 2014). General physical characteristics of these are summarized in table 6.



FIGURE 7. EXPOSED SHALE AND SANDSTONE BEDROCK OUTCROPS ALONG LAKESHORE DRIVE.



FIGURE 8. AEOLIAN SAND DEPOSITS ALONG WAHWEAP BOULEVARD.

TABLE 6. DOMINANT SOIL TYPES IN THE PROJECT AREA

Soil Type	Soil Characteristics	General Project Location
Farb-Pagina-Rock outcrop complex	Slope: 4 to 20 percent Depth to restrictive feature: 5 to 19 inches to lithic bedrock Natural drainage class: Somewhat excessively drained Frequency of flooding: None Frequency of ponding: None	In limited areas along Wahweap Boulevard and along the majority of the northern half of Lakeshore Drive

Soil Type	Soil Characteristics	General Project Location
Needle-Sheppard complex	Slope: 2 to 12 percent Depth to restrictive feature: 10 to 17 inches to lithic bedrock Natural drainage class: Excessively drained Frequency of flooding: None Frequency of ponding: None	Only found along the very southernmost portion of Lakeshore Drive
Pagina-Denazar complex	Slope: 2 to 14 percent Depth to restrictive feature: 26 to 38 inches to paralithic bedrock Natural drainage class: Somewhat excessively drained Frequency of flooding: None Frequency of ponding: None	Along the majority of Wahweap Boulevard and in a few areas along Lakeshore Drive
Rock outcrop-Needle complex	Slope: 2 to 30 percent Depth to restrictive feature: 4 to 12 inches to lithic bedrock Natural drainage class: Excessively drained Frequency of flooding: None Frequency of ponding: None	Only found along the southern half of Lakeshore Drive

Source: Natural Resource Conservation Service, 2014.

The steep and rocky slopes along Lakeshore Drive present a geologic hazard as the slopes are susceptible to erosion and occasional falling boulders from cliff sides (figure 9). Other steep slopes along the road are susceptible to rock fall. Soils of the region are primarily derived from underlying shale and sandstone bedrock and are generally of similar chemical and mineralogical composition. In addition, soil erosion is currently of concern along some stretches of Lakeshore Drive where heavy rain events channel water along and through culverts under the roadbed, undermining the road shoulders and eroding existing ditches.

Informal parking areas or pullouts along Lakeshore Drive can result in overland flow, eroding adjacent slopes. Current automobile and pedestrian traffic along many informal turnouts has caused soil compaction due to the thin layer of soil and hard underlying shale and sandstone rock and bedrock. Compaction reduces the ability of surface water to infiltrate the soil and increases surface runoff, eroding the thin layer of soil and creating small gullies.



FIGURE 9. STEEP TOPOGRAPHY AND EPHEMERAL WASHES ARE COMMON ON THE EAST SIDE OF LAKESHORE DRIVE.

Environmental Consequences

The area considered for the impacts analysis of the proposed action includes the Wahweap Marina Drive, Wahweap Boulevard, and Lakeshore Drive road corridors. The geology and soils analysis was based on a qualitative assessment of generalized geologic unit and soil types. Quantitative analysis was conducted to determine the amount of soil to be removed in major excavation and fill areas. Geology and soil impact types include those resulting from slope scaling, drainage structure improvements, soil removal, profile mixing, compaction, erosion contamination, and restoration.

Context. “Context” defines the affected area or location in which an impact would occur, and may include site-specific, local, regional, or broader characteristics. For example, “site-specific” could refer to excavation for a culvert being replaced along Lakeshore Drive; “local” could refer to impacts from soil compaction extending throughout the project area.

Duration. The following duration definitions were used to evaluate the potential impacts on geology and soils:

Short-term – Impacts on geology and soils would last less than one year following construction completion is required for soils/geologic conditions to recover.

Long-term – Impacts on geology and soils would last one or more years following construction completion is required for soils/geologic conditions to recover.

Intensity. The following impact intensities were used to evaluate the potential impacts on geology and soils:

Negligible – Impacts on geology and soils, such as excavation of bedrock or removal of topsoil, would not occur or would not be measurable, and impacts on productivity or an increased threat of erosion would be very slight or imperceptible.

Minor – Impacts on geology and soils, such as excavation of bedrock or removal of topsoil, would occur or would slightly modify the profile of the soil or geology. A minor impact would be barely measureable or perceptible and would not threaten the soil/geologic condition in the area surrounding the project.

Moderate – Impacts on geology and soils would be readily apparent and would modify the quantity or quality of the topsoil, productivity, or increase the threat of erosion. Local ecological processes may be modified as a result, and the necessary best management practices would be incorporated.

Major – Impacts on geology and soils would be readily apparent and would substantially change the soil or geologic characteristics of the area and increase the threat of erosion and/or would modify the topsoil and productivity in a relatively large area. Significant ecological processes may be modified, and larger, landscape-level changes could be expected. Best management practices would be heavily utilized to offset adverse impacts and success would not be guaranteed.

Type. Impacts that would be beneficial in nature would protect soils from erosion or would restore natural geologic conditions; negative impacts would degrade natural geologic conditions and deteriorate chemical or physical properties of soils or result in the loss or temporary removal of soils.

Alternative 1: No-action Alternative

Under alternative 1, drainages along Lakeshore Drive and Wahweap Boulevard would continue to be subject to severe erosion and the road corridors would require more involved maintenance during and after storm flow events. Soils affected by erosional and fill-related disturbances would be limited to the immediate area. In specific locations with high erosion potential such as beneath the many existing inadequate culverts along the steep east side of Lakeshore Drive, alternative 1 would result in site-specific, long-term, moderate, adverse impacts on soils.

Compaction of soils along the road edge would continue where vehicles use informal unpaved turnouts. Routine maintenance would include activities such as shoulder work and ditch maintenance, but under this alternative these activities would occur more often as compared to alternative 2. These activities would likely result in some soil mixing, removal, movement, and/or backfill. In the event of road or slope failure, soils would be disturbed and erosion and sedimentation would occur and could affect areas downslope.

Under alternative 1 there would be site-specific, long-term, minor adverse impacts on geology from increased erosion.

Cumulative Impacts. Other past and present actions that affect soils, including activities that involve compaction, soil mixing, and soil loss, are considered under cumulative impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan (NPS 2003) could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. These projects have and could in the future contribute to both beneficial and adverse impacts on soils and geology. Site excavation, mixing of soil strata, and/or placement or removal of fill has and would likely result from these projects. The impacts of these other actions on soils and geology could range from negligible to major on a site-by-site basis, but disturbed areas represent a very small part of Glen Canyon National Recreation Area. Alternative 1 would contribute a local, negligible-to-minor, long-term, adverse cumulative impact on geology and soils.

Conclusion. Under alternative 1 there would be site-specific, long-term, minor, adverse impacts on geology and site-specific, long-term, moderate, adverse impacts on soils from increased erosion.

Alternative 2: Rehabilitation (Preferred Alternative)

Under alternative 2, most of the disturbance-related activities would be restricted to the existing road corridor and in the area already affected by the original road construction. The geology and soils of the project area would be affected in many areas along Wahweap Boulevard and Lakeshore Drive where scaling, obliteration, paving, excavation, and/or filling are proposed.

Impacts on geology would occur where disturbance during construction would affect the local shale and sandstone bedrock. Rock scaling along cliffs on Lakeshore Drive and excavation of bedrock in drainages or as part of construction of the new exit lane would result in site-specific, long-term, moderate adverse impacts on geology.

The greatest degree of impact on soils would occur in limited areas not previously disturbed by construction, such as the area proposed for the new exit lane, and could include activities such as excavation and grading, soil mixing, movement, and replacement, and any activity that would affect the area's soil profiles. Additional impacts would occur on soils in areas previously disturbed by construction and are subject to compaction and disturbance by previous road-related development activities such as maintenance and original construction (figure 10). Local soil compaction would likely temporarily decrease soil permeability, modify soil moisture content, and decrease water storage capacity. A negligible to minor, short-term adverse impact on soils would result due to planned scarifying (ripping of soils to decrease compaction) during restoration in areas where compaction occurred. Best management practices proposed for this project, described in Chapter 2: Alternatives, would be effective in minimizing soil impacts. Lakeshore Drive and Wahweap Boulevard would be widened to a consistent width of 32 feet and a dedicated exit lane at the south entrance on Lakeshore Drive constructed; therefore, there would be an increase in surface area covered by impermeable materials.



FIGURE 10. EXISTING SOIL DISTURBANCE ALONG THE DRAINAGE DITCH ABOVE LAKESHORE DRIVE.

Table 7 presents the estimated disturbed area and the total area of construction by segment under alternative 2. Table 8 presents the total estimated earthwork by segment, including construction areas, new landscaping berms, and maintenance excavation areas.

TABLE 7. POTENTIAL NEW PERMANENT AND TEMPORARY SOIL IMPACTS IN SQUARE FEET AND ACRES

Portion of Project Area	Permanent Square Feet	Permanent Acres	Temporary Square Feet	Temporary Acres
Wahweap Boulevard	227,000	5.2	723,000	16.6
Lakeshore Drive to 4-way intersection	189,000	4.3	104,5000	24.0
Lakeshore Drive from 4-way intersection to Stateline Drive	34,000	0.8	862,000	19.8
Wahweap Marina Boulevard	17,000	0.4	61,000	1.4
Total Area (Project Area)	467,000	10.73	2,692,000	61.8

TABLE 8. ESTIMATED EARTHWORK UNDER ALTERNATIVE 2: PREFERRED ALTERNATIVE

Location	Excavation	Embankment
Wahweap Boulevard	0 cubic yards	2,500 cubic yards
Lakeshore Drive to intersection	14,000 cubic yards	5,000 cubic yards
Lakeshore Drive intersection to Stateline Drive*	0 cubic yards	0 cubic yards
Wahweap Marina Boulevard	0 cubic yards	0 cubic yards
4 Culvert fill locations	0 cubic yards	1,400 cubic yards
TOTAL	14,000	8,900

Note: *Parking areas on Lakeshore Drive intersection to State Line (1A) for staging and State Line Road detour route area included.

Cumulative Impacts. Other past, present, and future actions that affect soils, including activities that involve compaction, soil mixing, and soil loss, were considered under cumulative impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan (NPS 2003) could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. These projects have and could contribute in the future to both beneficial and adverse impacts on soils and geology. Site excavation, mixing of soil strata, and/or placement or removal of fill has and would likely result from these projects. The impacts of these other actions on soils and geology could range from negligible to substantial on a site-by-site basis, but disturbed areas represent a very small part of Glen Canyon National Recreation Area.

Conclusion. Alternative 2 would likely result in local and site-specific, short-term, minor-to-moderate adverse impacts on geology and soils from bedrock excavation and soil disturbance and compaction during rehabilitation. However, following the completion of the project there would be local and site-specific, long-term, moderate beneficial impact on geology from soils from enhanced erosion control.

VISITOR USE AND EXPERIENCE

Affected Environment

Lakeshore Drive is a scenic road and the primary access road for visitors and commercial operators wishing to reach Wahweap Marina and Lake Powell (figure 11). Thousands of visitors use the road every year, some arriving in large RVs (figure 12). Commercial Use Authorizations allow commercial operators to drive large trucks with trailers carrying large boats along Lakeshore Drive (figure 13).

Many informal and formal pullouts exist along Lakeshore Drive offering views of Lake Powell and the colorful bedrock mesas and cliffs of the this part of the Colorado Plateau. Formal parking areas are usually clearly delineated, are generally paved, and are striped for ease of visitor use. Informal pullouts have been



FIGURE 11. VIEW OF LAKE POWELL ABOVE A DESIGNATED SCENIC PULLOUT ALONG LAKESHORE DRIVE.



FIGURE 12. LARGE RECREATIONAL VEHICLES ARE COMMON ALONG BOTH LAKESHORE DRIVE AND WAHWEAP BOULEVARD.

created over time by visitors who pull off and park along roadsides for viewing opportunities or to hike or walk. Based on visitor behavior, informal parking areas can change in size and form, and are not well delineated. Currently, no distinction or restrictive actions have been taken at roadside parking areas and turnouts along Lakeshore Drive. Some parking areas would be graveled or paved to formalize their use and reduce existing adverse impacts, such as safety and erosion concerns. Some turnouts would be blocked off and restored to natural conditions to encourage safety and eliminate any resource concerns (e.g., a turnout located along a low visibility curve or one that is near a crumbling escarpment).

The National Park Service desires to enhance public health and safety along Wahweap Boulevard and Lakeshore Drive. Pedestrian safety at the South Entrance, vehicle turnouts and roadside parking, road width and surface quality, and roadside erosion would all be improved under the proposed plan.

Lakeshore Drive. Lakeshore Drive offers boat access to Lake Powell at the Wahweap Marina. In addition, bicyclists, runners, and hikers use the fairly narrow shoulders of the road to exercise and recreate. The width of the road in some locations may be a concern for anyone traveling on the shoulders of the road. The road width is not consistent throughout the length of the roadway and large, wide vehicles towing trailers are common. These wider vehicles often drive very near the centerline of the road or even cross it causing a hazard for oncoming drivers.

The Wahweap Development Concept Plan (NPS 2003) guides improvements to pullouts and parking areas in the project area. The potential safety risks are both to the individuals within the turnouts, as well as for through-traffic along Lakeshore Drive, especially when vehicles have not adequately pulled off the road.



FIGURE 13: TRUCKS CARRYING VERY LARGE BOATS, SUCH AS THESE HOUSE BOATS ON LAKE POWELL, ON TRAILERS APPROACHING 100 FEET IN LENGTH PERIODICALLY TRAVEL LAKESHORE DRIVE.

Wahweap Boulevard. Wahweap Boulevard is heavily used offering access to Wahweap Marina and Lake Powell from Highway 89 to the west (figures 14 and 15). The road width is not consistent throughout the length of the roadway and is quite narrow at times. Large vehicles such as recreational vehicles and vehicles pulling boats on trailers are common and have some difficulty negotiating the curves in the road toward the Wahweap Boulevard / Lakeshore Drive intersection. These wider vehicles often drive very near the centerline of the road or even cross it creating a safety hazard for oncoming drivers.

Traffic video data was collected to assess traffic volumes on roadways and at intersections and to understand vehicular turning movements. Traffic count tube data was also collected daily for 6 months from June to December 2014. This unpublished data was used by the National Park Service to evaluate the on and off seasons and to assess vehicle volumes and types of vehicles for a longer period. All of this traffic data was collected to determine vehicle types and volumes for peak seasonal events, typical daily volumes during the peak season, and to verify pavement design and vehicle turning movements.

Traffic volume was recorded between 5:00 a.m. and 10:00 p.m. In summary, the Wahweap Boulevard/ Lakeshore Drive intersection had the highest hourly volume of 217 vehicles on Wahweap Boulevard westbound. The second highest count was 185 vehicles on Lakeshore Drive northbound, followed by 132 vehicles using Lakeshore Drive southbound, and 73 vehicles on Wahweap Boulevard eastbound. Additionally, the Lakeshore Drive Entrance Station had the highest hourly volume of 181 vehicles while the Wahweap Boulevard Entrance Station had a highest hourly volume of 82 vehicles.



FIGURE 14. WAHWEAP MARINA FROM WAHWEAP BOULEVARD.



FIGURE 15. LOOKING EAST ALONG WAHWEAP BOULEVARD. NOTE THE VERY LIMITED SHOULDER.

Environmental Consequences

Impacts on visitor use and experience, including public health and safety, were assessed in terms of context, duration, intensity, and type as follows:

Context. “Context” defines the affected area or location in which an impact would occur, and may include site-specific, local, regional, or broader characteristics. For example, “site-specific” could refer to a new scenic pullout along Lakeshore Drive; “local” could refer to impacts from improved roadway conditions throughout the project area.

Duration. The following duration definitions were used to evaluate the potential impacts on visitor use and experience:

Short-term – Impacts on visitor use and experience would be limited to the time period during project construction, and would dissipate following construction completion.

Long-term – Impacts on visitor use and experience would not be limited to the time period during project construction and may last beyond project completion.

Intensity. The following definitions of impact intensity were used in the analysis of impacts on visitor use and experience:

Negligible – Impacts on visitor use and experience would be slight or imperceptible.

Minor – Impacts on visitor use and experience would only be very slightly detectible or affect a relatively small portion of the Wahweap area, and would have no effect on the surrounding area. Best Management practices would be used if needed, and would be relatively simple and likely successful.

Moderate – Impacts on visitor use and experience would be noticeable. Changes to local processes would occur but would be of limited extent. Changes in rates of accidents or injuries may be measured. Best management practices would be incorporated and, if well-planned, would likely be successful.

Major – Impacts on visitor use and experience would be significant or be apparent throughout a relatively large area. Impacts could lead to changes in the rate of mortality. Best management practices would be heavily employed, and are not guaranteed to be effective.

Type. Impacts that would be beneficial in nature include those that would reduce the potential for vehicle or pedestrian accidents and improve visitor experience within the recreation area. Negative impacts would increase the potential for accidents and deteriorate the visitor experience within the recreation area.

Alternative 1: No-action Alternative

Implementation of alternative 1 would result in continued narrow road widths, poorly delineated turnouts, diminished road surface quality, and susceptibility to erosion. Because no rehabilitation or comprehensive resurfacing would take place, inconsistent lane widths, undulations, degraded road shoulders, and poor drainage outlets would continue to pose risks to automobile, bus, truck, and large recreational vehicle traffic using Wahweap Boulevard and Lakeshore Drive as well as bicyclists and pedestrians. Over time, deteriorating driving conditions and road features would likely continue. Under alternative 1, a postponement in correcting deficiencies along Wahweap Boulevard and Lakeshore Drive would have local, moderate, long-term, adverse impacts on visitor use and experience, including public health and safety, and could result in an increase in vehicle or pedestrian accident risk potential.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from

Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. Future actions or plans to upgrade the infrastructure in or near the project area would have the potential to impact visitor use and experience and public health and safety. Over time, new facilities could continue to be added or old facilities improved, resulting in negligible to minor adverse and beneficial cumulative impacts. These infrastructure upgrades could include plans to upgrade or replace septic and sewage systems, upgrade a campground waterline, upgrade resort facilities, or replace housing utilities. Actions that provide potable water, uninterrupted electrical service, and sanitary disposal of wastewater would all have a long-term beneficial impact on visitor use and experience and public health and safety. Under alternative 1, there would be a continued local, long-term, minor-to-moderate, adverse cumulative impact to visitor use and experience as deterioration of the infrastructure in the project area would continue.

Conclusion. Under alternative 1, a postponement in correcting deficiencies along Wahweap Boulevard and Lakeshore Drive would have local, moderate, long-term, adverse impacts on visitor use and experience and public health and safety and could result in an increase in vehicle or pedestrian accident risk potential.

Alternative 2: Rehabilitation (Preferred Alternative)

The proposed rehabilitation and road improvements along Wahweap Boulevard and Lakeshore Drive would address various public and health and safety issues including several brought up during the project's scoping process. Paved shoulders would be consistent the length of Lakeshore Drive and Wahweap Boulevard. Deceleration lanes for the Wahweap and Navajo overlooks would be longer increasing traffic safety. During rehabilitation Phase I, Lakeshore Drive would be completely closed to visitor travel and visitors in vehicles would likely be delayed along sections of Wahweap Boulevard and near the intersection of Wahweap Boulevard and Lakeshore Drive. During rehabilitation Phase II, Wahweap Boulevard would be completely closed to visitor travel and visitors would use Lakeshore Drive for Wahweap access. Local access to concessioner housing and the maintenance area would continue throughout construction. Advisory signs would be installed to alert drivers of the temporary road delays and closures during various rehabilitation activities, and traffic control personnel would be present to direct the flow of traffic during construction. During project construction, the Wahweap boat ramp would be closed for a period of time and visitors would be required to use the Stateline boat ramp. This project construction is estimated to be up to 10 months including both phases, but may change due to weather or other unforeseen elements. The Wahweap boat ramp would be opened once Wahweap Marina Drive has been rehabilitated. Impacts on visitor use and experience would be local, short-term, moderate, and adverse during rehabilitation.

Under the proposed rehabilitation action, all signs, delineators, and guardrails would be improved to match current standards. Also, the project would result in consistent paved shoulder widths, widening of both Lakeshore Drive and Wahweap Boulevard and the turn lanes at the 4-way intersection of Wahweap Boulevard and Lakeshore Drive, and rebuilding of the outlet slopes of several culverts that are currently roadside hazards.

Beneficial impacts to visitor use and experience and public health and safety would occur under alternative 2 following project completion. Visitor use and experience along Lakeshore Drive, Wahweap Boulevard, and Wahweap Marina Drive would be improved by actions that would include widening the radii of curves, consistent paved shoulder widths of four feet, widening of turn lanes at the 4-way intersection of Wahweap

Boulevard and Lakeshore Drive, a new dedicated exit lane, and rebuilding the outlet slopes of several culverts that are currently roadside hazards. All signs, delineators, and guardrails would be improved to match current standards. Also, the project would result in measures to reduce erosion along Lakeshore Drive would improve the stability of the roadway. Drainage improvements would substantially reduce erosion and flows that currently inundate portions of Lakeshore Drive or leave hazardous sediment deposits. In addition, the re-designed intersection of Wahweap Boulevard and Lakeshore Drive and a more convenient Wahweap boat ramp. New pavement would result in a smoother and more uniform travel surface for vehicles, which would improve visitor use and experience including public health and safety for visitors and employees. As a result, under alternative 2 there would be local, long-term, moderate, beneficial impacts on visitor use and experience including public health and safety.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. Future actions or plans to upgrade the infrastructure in or near the project area would have the potential to beneficially impact visitor use and experience and public health and safety. Over time, new facilities could continue to be added or old facilities improved, resulting in local, long-term, minor, beneficial cumulative impacts. These infrastructure upgrades could include plans to upgrade or replace septic and sewage systems, upgrade a campground waterline, upgrade resort facilities, or replace housing utilities.

Actions that provide potable water, uninterrupted electrical service, and sanitary disposal of wastewater would all have a long-term beneficial impact on visitor use and experience and public health and safety. Alternative 2 would contribute a local, long-term, minor-to-moderate, beneficial cumulative impact on visitor use and experience and public health and safety.

Conclusion. Impacts on visitor use and experience would be local, short-term, moderate, and adverse during rehabilitation. However, there would be local, long-term, moderate, beneficial impacts on visitor use and experience, including public health and safety, following project completion.

NIGHT SKY

Affected Environment

In accordance with NPS *Management Policies 2006*, the National Park Service strives to protect, maintain, or restore the natural and cultural lightscapes and photic environment (NPS 2006, Sec. 4.10). The National Park Service refers to *lightscape* as the perception (aesthetic and/or experiential) of the light environment with a national park or recreation area that is essential to visitor experience and cultural resources, and *natural lightscape* as the “resources and values that exist in the absence of human caused light at night” (NPS 2015f). Light pollution is defined as an “introduction of artificial light, either directly or indirectly into the natural environment” from man-made sources that is “undesirable” and may degrade the utility, function, biota, or aesthetics of the surrounding environment. According to the National Park Service, there are two primary

types of light pollution: *glare* or the direct shining of bright light that makes seeing difficult, and *sky glow* or the brightening of the night sky from human-caused light (NPS 2015d).

Overall, night skies for viewing in the recreation area are of high quality due to the open landscape, limited population centers with outdoor electrical lighting, low humidity, and generally clear air (figure 16; NPS 2015e). The Navajo Generating Station, located southeast of the project area, and natural particulate matter from the arid landscape can occasionally diminish night sky quality. Near the project area light pollution is most noticeable near Page, Arizona, where numerous residences and businesses are lit well into or throughout the night. Within Glen Canyon National Recreation Area and near the project area, light pollution is most noticeable near the Wahweap Marina, where there is a concentration of park visitors and amenities and higher vehicle traffic. Directly in proportion to the quantity of cars, trucks, campers, and boat trailers that travel Wahweap Boulevard and Lakeshore Drive, light pollution can change dramatically throughout the year. Generally, light pollution levels are lower during the winter than during the busy summer months when most recreationalists are enjoying the warm temperatures and water-related activities. Due to the open landscape and generally good night sky visibility surrounding the project area, light can be noticeable for a long distance from the roads and the marina; however, light from motor vehicles, recreating visitors, and facilities is greatest immediately adjacent to recreation area facilities, resorts, campgrounds, and roadways.



FIGURE 16. LAKE POWELL AT SUNSET.

Other sources of light pollution within the southern portion of Glen Canyon National Recreation Area include vehicles along Highway 89, the Navajo Generating Station, residences and businesses in Page, Arizona, and construction sites that require night-time work and subsequent lighting. Light pollution from these sources often varies by season and by proximity to the source of the light.

Environmental Consequences

Context, duration, intensity, and type of impact were assessed in relation to night skies. Local impacts are considered to be those that occur in the immediate vicinity of the activity area or a nearby area that would be indirectly affected by the rehabilitation project.

Context. “Context” defines the affected area or location in which an impact would occur, and may include site-specific, local, regional, or broader characteristics. For example, “site-specific” could refer to impacts from night construction at the 4-way intersection of Lakeshore Drive and Wahweap Boulevard; “local” could refer to impacts throughout the project area.

Intensity. The following impact intensities were used to evaluate the potential impacts on night skies:

Negligible – The impact on night skies would not be perceptible.

Minor – The impact on night skies would be perceptible, but not likely to substantially increase light pollution through glare or light trespass. An increase in sky glow is not anticipated.

Moderate – The impact on night skies would be easily perceptible and would likely result in some light pollution through an increase in glare and light trespass. A slight increase in sky glow is possible.

Major – The impact on night skies would be very perceptible and would likely result in substantial light pollution through glare, light trespass and sky glow.

Duration. The following duration definitions were used to evaluate the potential impacts on night skies:

Short-term – Impacts on night skies would last only as long as construction is occurring.

Long-term – Impacts on night skies would last for a period of time after construction is complete.

Type. Impacts that would be beneficial in nature would include those that would improve the visibility of night skies; negative impacts would decrease the visibility of night skies.

Alternative 1: No-action Alternative

Under alternative 1, light pollution and night lighting in the project area would not change. Night lighting along the roads would remain as several scattered street lights located along both Wahweap Boulevard and Lakeshore Drive. As a result, alternative 1 would be expected to have continued local, short-term, minor, adverse impacts on recreation area visitors, residents, and/or contractors in the vicinity.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. Cumulative impacts on night skies are based on the analysis of past, present, and reasonably foreseeable future actions in Glen Canyon National Recreation Area in combination with potential impacts of alternative 1. The Wahweap Development Concept Plan (NPS 2003) establishes the long-term guidance for protecting water quality, free-flowing condition, and unique values for the Wahweap portion of the recreation area. The protection of natural resources and maintenance of visitor intensive uses under these plans would have beneficial impacts on the night sky environment. Under alternative 1, there would be a net local, long-term, negligible cumulative adverse impact on night skies in Glen Canyon National Recreation Area.

Conclusion. Alternative 1 would be expected to have continued local, short-term, minor, adverse impacts on night sky viewing for recreation area visitors, residents, and/or contractors in the vicinity.

Alternative 2: Rehabilitation (Preferred Alternative)

In accordance with NPS *Management Policies 2006*, the National Park Service strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light (NPS 2006). Night sky is an important natural resource for Glen Canyon National Recreation area. An increase in light pollution due to heavy equipment, vehicular traffic, and construction crews working at night during the rehabilitation project would impact night sky viewing in the project area. Best management practices would be implemented to minimize these effects. Alternative 2 would require construction crews to set up multiple light towers and gas powered generators or other equipment to perform various rehabilitation activities. In addition, vehicle-mounted flashing lights and flashing beacons placed on drums and barriers would be present during project-related activities.

The intensity and duration of the light pollution would vary depending on a number of factors including the number and type of equipment in operation, usage rates, the type of lighting, and proximity of the construction site to light-sensitive areas. Where and when activity levels are the greatest and nearest to the sources of light, light pollution from the construction site and equipment would be the greatest. The planned, new safety features would not have lighted or blinking features that could potentially affect night sky qualities. Construction lighting would be visible from the City of Page, park housing areas, and visitor use areas periodically during project implementation.

Construction-generated light pollution would be short-term, lasting only as long as the construction activity occurs. While some nocturnal insectivorous wildlife species benefit from foraging on insects that are attracted to light, other wildlife such as fox, deer, rodents, and some nocturnal birds would likely avoid foraging in the area during short-term construction. Construction lighting would be present for a short duration and would be focused towards a specific area, resulting in a short-term, site-specific, negligible to minor adverse impact. However, best management practices, described in Chapter 2: Alternatives, would be employed during construction to minimize light pollution and the impact it could have within the Glen Canyon National Recreation Area. In general, alternative 2 would likely result in local, short-term, minor to moderate, adverse impacts on night sky viewing for recreation area visitors, residents, and contractors in the vicinity of maintenance activities. This alternative is not expected to have a long-term impact on night skies along Wahweap Boulevard and Lakeshore Drive in Glen Canyon National Recreation Area following project completion. As stated in NPS *Management Policies 2006*, the National Park Service would minimize light that emanates from park facilities, and also seek the cooperation of park visitors, neighbors, and local government agencies to prevent or minimize the intrusion of artificial light into the night scene of the ecosystems of parks (NPS 2006, Sec. 4.10).

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. Cumulative impacts on night skies are based on the analysis of past, present, and reasonably foreseeable future actions in Glen Canyon National Recreation Area in combination with potential impacts of alternative 2. The Wahweap Development Concept Plan (NPS 2003) establishes the long-term guidance for protecting water quality, free-flowing condition, and unique values for the Wahweap portion of the recreation area. The protection of natural resources and maintenance of visitor-intensive uses under this plan in addition

to the lightscape goals and strategies within NPS *Management Policies 2006* would have beneficial impacts on night skies because they both strive for the protection and enhancement of natural resources and naturally dark night skies, ensuring that significant light pollution is not introduced.

Reasonably foreseeable future actions proposed for Wahweap Boulevard and Lakeshore Drive could have beneficial or adverse impacts on night skies. Reasonably foreseeable future NPS projects are not anticipated to have a net adverse or beneficial effect on night skies except for site-specific, short-term, negligible adverse cumulative impact during construction.

Conclusion. Alternative 2 would likely result in local, short-term, minor to moderate, adverse impacts on night sky viewing for recreation area visitors, residents, and contractors in the vicinity of rehabilitation activities. This alternative is not expected to have a long-term impact on night skies along Wahweap Boulevard and Lakeshore Drive in Glen Canyon National Recreation Area following project completion.

SOUNDSCAPE

Affected Environment

In accordance with NPS *Management Policies 2006*, the National Park Service strives to protect, maintain, or restore the natural and cultural soundscapes and acoustic resources (NPS 2006, Secs. 4.9 & 5.3.1.7). By NPS definition, an *acoustical environment* is “the combination of all the acoustic resources [physical sound sources] within a given area.” These include natural sounds and human-caused sounds – as modified by the environment. As a component of the acoustic environment, a *soundscape* is defined as “the human perception of physical sound resources” (NPS 2015b). A *cultural soundscape* is a soundscape with “...appropriate transmission of cultural and historic sounds that are fundamental components of the park’s purposes and values for which the parks were established” (NPS 2015c). According to the National Park Service, a *noise* can be defined as sound that is unwanted, either because of its adverse impacts on humans and wildlife, or its interference with the perception or detection of other sound relating to cultural and historic resources (NPS 2015a). Whether a noise is considered unpleasant to humans depends on the individual listening to the sound and what the individual is doing when the sound is heard (e.g., working, recreating, resting, or sleeping).

Within Glen Canyon National Recreation Area, motor vehicle noise is most noticeable along Lakeshore Drive, where there is a concentration of park visitors, vehicle traffic is heavy, and the topography places visitors in proximity to the road.

Directly in proportion to the level of use (i.e., the quantity of cars, trucks, campers, and boat trailers that travel Wahweap Boulevard and Lakeshore Drive), the existing acoustic environment changes dramatically throughout the year. Generally, noise levels are lower during the winter than during the busy summer months when most recreationalists are enjoying the warm temperatures and water-related activities. The acoustic environment which includes wind, temperature, humidity, topography, and rain can affect the detection of noise. Due to the open landscape and generally low background sound levels surrounding the project area, noise and other physical sound sources can be audible for a long distance from the roads; however, noise from motor vehicles is loudest immediately adjacent to the roadways and the facilities at Wahweap Marina.

Other mechanical sources of noise within Glen Canyon National Recreation Area include construction equipment, generators, radios, and park maintenance equipment. Noise from these sources often varies by season and by proximity to the source of the sound.

Environmental Consequences

Context, duration, intensity, and type of impact were assessed in relation to soundscape. Local impacts are considered to be those that occur in the immediate vicinity of the activity area or a nearby area that would be indirectly affected by the rehabilitation project.

Context. “Context” defines the affected area or location in which an impact would occur, and may include site-specific, local, regional, or broader characteristics. For example, “site-specific” could refer to noise from equipment as a culvert is being replaced along Lakeshore Drive; “local” could refer to impacts on the soundscape that occur throughout the project area.

Duration. The following duration definitions were used to evaluate the potential impacts on soundscape:

Short-term – Impacts on the soundscape would only last as long as construction is occurring.

Long-term – Impacts on the soundscape would last for a time after construction is complete.

Intensity. The following impact intensities were used to evaluate the potential impacts on soundscape:

Negligible – Impacts on the soundscape would not be perceptible.

Minor – Impacts on the soundscape would be perceptible, but not likely to cause noise that is of substantial annoyance to recreation area visitors or residents. It is unlikely that the acoustic environment or cultural soundscape would be modified.

Moderate – Impacts on the soundscape would be easily perceptible and would likely cause noise that is annoying to some recreation area visitors or residents. The acoustic environment and cultural soundscape would potentially be modified.

Major – Impacts on the soundscape would be very perceptible and would likely cause noise that is of substantial annoyance to most recreation area visitors and residents. The acoustic environment and cultural soundscape would likely be modified.

Type. Adverse impacts would result in higher levels of noise, and beneficial impacts are those that would result in lower levels of noise.

Alternative 1: No-action Alternative

Under alternative 1, routine use of, maintenance of, and noise currently associated with maintenance of Wahweap Boulevard and Lakeshore Drive would not change. Periodic use of heavy-duty equipment along the

roadways for routine maintenance activities could generate substantial noise. The volume and duration of the noise would vary depending on a number of factors including the number and type of equipment in operation, usage rates, the level of background noise, and proximity of the construction site to sensitive areas. As a result, alternative 1 would be expected to have site-specific, short-term, minor, adverse impacts on recreation area visitors, residents, and/or contractors in the vicinity of ongoing maintenance activities.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. Cumulative impacts on the soundscape environment are based on the analysis of past, present, and reasonably foreseeable future actions in Glen Canyon National Recreation Area in combination with potential impacts of alternative 1. The Wahweap Development Concept Plan (NPS 2003) establishes the long-term guidance for protecting water quality, free-flowing condition, and unique values for the Wahweap portion of the recreation area. Under alternative 1, there would be a local, long-term, negligible, adverse cumulative impact on noise in Glen Canyon National Recreation Area.

Conclusion. Alternative 1 would be expected to have site-specific, short-term, minor, adverse impacts on recreation area visitors, residents, and/or contractors in the vicinity of ongoing maintenance activities.

Alternative 2: Rehabilitation (Preferred Alternative)

An important part of the NPS mission is preservation of natural and cultural soundscapes associated with national park units, in accordance with NPS *Management Policies 2006* (NPS 2006) and *Director's Order #47, Sound Preservation and Noise Management* (NPS 2000). An increase in noise due to heavy equipment, vehicular traffic, and construction crews during this rehabilitation project would be likely impact the soundscape and acoustic environment.

Alternative 2 would require heavy-duty construction equipment to perform the various rehabilitation activities associated with this project. The volume and duration of the noise would vary depending on a number of factors including the number and type of equipment in operation, usage rates, the level of background noise, and proximity of the construction site to sensitive areas. Where and when activity levels are the greatest and nearest to the sources of noise, noise levels from motor vehicles would be loudest.

Coyotes, birds, bighorn sheep, mule deer, and foxes would likely avoid the area during short-term construction. Wildlife species in the area are likely habituated to road noise along Lakeshore Drive and Wahweap Boulevard, and though noise may increase for the purpose of this project, it would occur for a short duration only. Wherever possible, projects are designed to restore to the baseline condition within those park soundscapes that have become degraded by unnatural sounds (noise), and to protect natural soundscapes from unacceptable impacts per NPS *Management Policies 2006* (NPS 2006, Sec. 4.9). Alternative 2 is not expected to have a long-term impact on ambient noise levels nor a negative effect on soundscape resources.

For typically short bursts over the duration of the project, some construction equipment and activities can produce sounds in excess of 100 dB. These noises would be perceived as 16 or more times as loud as a typical vehicle. A list of equipment and the respective noise levels associated with each that would likely be used for project construction activities is presented in table 9.

TABLE 9. EQUIPMENT THAT COULD BE USED IN THE PROJECT AREA UNDER THE PREFERRED ALTERNATIVE

Equipment Type	Decibel Level (max at peak level)*	Comparative To
Rubber-tired back hoes	80	Garbage disposal
Auger	85	Diesel truck at 50 ft., jet aircraft at 1,500 ft. overhead
Small drill/auger machine	80	Garbage disposal
Dozer	85	Diesel truck at 50 ft., jet aircraft at 1,500 ft. overhead
Grader	85	Diesel truck at 50 ft., jet aircraft at 1,500 ft. overhead
Ready-mix concrete trucks	85	Diesel truck at 50 ft., jet aircraft at 1,500 ft. overhead
8-10 Yd. dump trucks	84	Gas lawn mower at 3 ft.
½ and ¾ ton pickup trucks	55	Office noise, large electrical transformers at 100 ft.

Source: U.S. Department of Transportation Federal Highway Administration website.

Construction-generated noises would be short-term, lasting only as long as the construction activity occurs. However, best management practices, described in Chapter 2: Alternatives, would be employed during construction to minimize noise. In general, alternative 2 would likely result in local, short-term, moderate, adverse soundscape impacts on recreation area visitors, residents, and contractors in the vicinity of rehabilitation activities. This alternative is not expected to have a long-term impact on the acoustic environment of along Wahweap Boulevard and Lakeshore Drive in Glen Canyon National Recreation Area following project completion.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. Cumulative impacts on the acoustic environment are based on the analysis of past, present, and reasonably foreseeable future actions in Glen Canyon National Recreation Area in combination with potential impacts of alternative 2. The Wahweap Development Concept Plan (NPS 2003) establishes long-term guidance for protecting water quality, free-flowing condition, and unique values for the Wahweap portion of the recreation area. The protection of natural resources and maintenance of visitor-intensive uses under these plans would have beneficial impacts on the natural and cultural acoustic environment. Under alternative 2 there would be local, short-term, negligible, adverse cumulative impacts on the soundscape of Glen Canyon National Recreation Area.

Conclusion. Alternative 2 would likely result in local, short-term, moderate, adverse impacts on the soundscape for recreation area visitors, residents, and contractors in the vicinity of rehabilitation activities. This alternative is not expected to have a long-term impact on the acoustic environment along Wahweap Boulevard and Lakeshore Drive in Glen Canyon National Recreation Area following project completion.

AREA OPERATIONS

Affected Environment

Glen Canyon National Recreation Area operations include visitor and resource protection, interpretation and visitor education, natural and cultural resources management, business management, and facilities management.

Facilities operations in the project area center on maintenance of park infrastructure, which includes roads, trails, buildings, housing units, water, wastewater, and electrical utility systems. A large part of the Glen Canyon National Recreation Area budget covers road maintenance operations, for example cleaning debris off the road following monsoon rain events and grading and maintaining drainage features. Area operations depend on uninterrupted use of the Lakeshore Drive and Wahweap Boulevard to allow staff to provide visitor service and resource protection.

Lakeshore Drive and Wahweap Boulevard are subject to routine operation and maintenance activities which are performed in accordance with established Glen Canyon National Recreation Area schedules. Additional maintenance occurs seasonally and when necessary on drainage and water collection features, road embankments, road shoulders and unofficial pullouts, and drainage ditches and culverts. Slurry seal or chip seal is applied as needed and includes the placement of liquid asphalts with aggregate or chip seal coat to seal crack and prevent water entry and related damage to base course materials; correct minor surface depressions to seal asphalt surfaces; to resort skid resistance and to retard further surface deterioration.

Environmental Consequences

The ability of the recreation area staff to carry out its daily activities to protect and preserve resources is addressed in this impact analysis. It also focusses the effectiveness and efficiency with which staff can successfully perform such tasks. Recreation area staff, especially those in facilities and maintenance roles, provided information about operations in the project area.

Context. “Context” defines the affected area or location in which an impact would occur, and may include site-specific, local, regional, or broader characteristics. For example, “site-specific” could refer to improved efficiencies in road maintenance at locations with improved drainage features; “local” could refer to improved road conditions, and in turn less frequent maintenance, within the project area.

Duration. The following duration definitions were used to evaluate the potential impacts on area operations:

Short-term – Impacts on Glen Canyon National Recreation Area would be limited to the time period during project construction, and would dissipate following construction completion.

Long-term – Impacts on Glen Canyon National Recreation Area would not be limited to the time period during project construction and may last beyond project completion.

Intensity. The following definitions of impact intensity are used in the analysis of impacts on area operations:

Negligible – Impacts on Glen Canyon National Recreation Area operations and management would be either non-detectable or only barely detectable to park staff.

Minor – Impacts on Glen Canyon National Recreation Area operations and management would be minor and slightly noticeable to park staff.

Moderate – Impacts on Glen Canyon National Recreation Area operations and management would be noticeably apparent to park staff.

Major – Impacts on Glen Canyon National Recreation Area operations and management would be substantial, widespread, and obvious to park staff and visitors.

Type. Impacts that would be beneficial in nature would include those that would improve the efficiency of national recreation area operations; negative impacts would decrease the efficiency of national recreation area operations.

Alternative 1: No-action Alternative

Under alternative 1, Lakeshore Drive and Wahweap Boulevard would remain in their current conditions, and would require continuation of routine and emergency maintenance activities in the project area. Inadequate drainage systems and erosion would continue to pose problems along Lakeshore Drive in various locations. Cracking, shoulder deterioration, and undulations in the pavement resulting from age and wear would also continue to require maintenance and repair by recreation area staff. At the various washes along Lakeshore Drive, current drainage conditions would likely persist, requiring short-term road closures. As a result, alternative 1 would have local, moderate, short- and long-term, adverse impacts on area operations from persistent or deteriorating roadway maintenance issues.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. A number of development projects would enhance the efficiency of area operations but the efforts needed to maintain Lakeshore Drive and Wahweap Boulevard would likely increase, with periodic and cyclic maintenance needs. Other infrastructure upgrades could include plans to upgrade or replace septic and sewage systems, upgrade a campground waterline, upgrade resort facilities, or replace housing utilities. Actions that provide potable water, uninterrupted electrical service, and sanitary disposal of wastewater would

all have a long-term beneficial impact on the recreation area operations. Because Wahweap Boulevard and Lakeshore Drive would continue to deteriorate if not rehabilitated, alternative 1 would result in a local, long-term, minor-to-moderate adverse impact on recreation area operations.

Conclusion. Alternative 1 would have local, moderate, short- and long-term, adverse impacts on area operations as maintenance needs would continue to drain area resources and staff time.

Alternative 2: Rehabilitation (Preferred Alternative)

The legislation establishing the park and NPS *Management Policies 2006* (NPS 2006) establish the larger context for analyzing the impact of each alternative on area operations and management. The NPS policies provide service-wide guidelines and mandates for the preservation, management, and use of park resources and facilities. The closures of Lakeshore Drive and Wahweap Boulevard under phases I and II would disrupt normal area operations including visitor and resource protection, interpretation and visitor education, natural and cultural resources management, business management, and facilities management, resulting in a local, short-term, moderate, adverse impact.

The roadway resurfacing and drainage design improvements under alternative 2 would result in long-term improvements in recreation area operations in the project area. In addition, annual maintenance and emergency repair costs of the roadways would be greatly reduced. Wider lanes would accommodate large vehicles, improving safety and pedestrians and bicyclists. New culverts and inlets would be easier to clean and would need to be cleaned less often, drainage ditches would be easier to grade and maintain, and the pavement surface would be level (without cracks and undulations). These upgraded features would improve facilities staff productivity and availability as maintenance on road failures would likely be reduced. These improvements would result in local, long-term, moderate, beneficial impacts on area operations.

Drainage improvements including drainage ditch reinforcement and construction, erosion control features, improved culvert design and placement, and other drainage improvements would reduce the potential for major erosion, washout, or sediment overflow on Lakeshore Drive. In addition, these improvements would also lower future long-term costs associated for maintenance and emergency repairs, resulting in a long-term, minor-to-moderate beneficial impact on recreation area operations.

Cumulative Impacts. Telecommunication line upgrades, replacement of utilities, facility repairs, livestock grazing, road maintenance, South Entrance Station improvements, pedestrian/bicycle links, the Rim Trail from Page to Lakeshore Drive, and other restoration and development projects related to the Wahweap Development Concept Plan could occur within the park and project vicinity. Other projects include the relocation of utilities on Wahweap Boulevard and in the future the proposed development of the Lake Powell to southwestern Utah water pipeline. A number of development projects would enhance the efficiency of the area operations, but the efforts needed to maintain Lakeshore Drive and Wahweap Boulevard would remain the same or increase, with periodic and cyclic maintenance needs. Infrastructure upgrades could include plans to upgrade or replace septic and sewage systems, upgrade a campground waterline, upgrade resort facilities, or replace housing utilities. Actions that provide potable water, uninterrupted electrical service, and sanitary disposal of wastewater would all have a long-term beneficial impact on the recreation area operations. Though future rehabilitation may be necessary, alternative 2 would result in a local, moderate beneficial cumulative impact on area operations as these resources could be channeled to other park operations.

Conclusion. The closure of Lakeshore Drive and rerouting of traffic to Wahweap Boulevard would disrupt normal area operations, resulting in a local, short-term, moderate, adverse impact. The proposed improvements would result in lower future costs for maintenance and emergency repairs in the project area, resulting in a local, long-term, moderate, beneficial impact on recreation area operations.

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CHAPTER 4: CONSULTATION AND COORDINATION

INTERNAL SCOPING

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Internal scoping was conducted by an interdisciplinary team of professionals from Glen Canyon National Recreation Area. Interdisciplinary team members met to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and best management practices. The team also gathered background information and discussed public outreach for the project. Over the course of the project, team members have conducted numerous individual site visits to view and evaluate the proposed construction site.

EXTERNAL SCOPING

External scoping was initiated with the distribution of a scoping letter to inform the public of the proposed Lakeshore Drive / Wahweap Boulevard Rehabilitation Project, and to generate input on the preparation of this environmental assessment. Scoping letters were mailed to all applicable private parties and public agencies and a scoping meeting was held at Glen Canyon National Recreation Area headquarters on June 10, 2014. A press release was also sent to local news organizations. In addition, the scoping letter was posted on the NPS Planning, Environment, and Public Comment (PEPC) website.

During the 30-day scoping period from May 27 through June 25, 2014, Glen Canyon National Recreation Area received four comment correspondences and comments from one attendee at the June 10 public meeting. Comments largely concerned traffic and access issues during construction and interest in wider lanes for pedestrian safety and bicycle use. All comments, substantive or nonsubstantive, received during the scoping period have been duly considered and are now part of the administrative record for this project.

AGENCY CONSULTATION

Endangered Species Act

In accordance with the Endangered Species Act, the National Park Service contacted the USFWS with regards to federally listed special status species. The USFWS provided the project with two current official species lists from the Arizona and Utah Ecological Services Field Offices, on November 12, 2014, which were used in preparation of this environmental assessment (USFWS 2014a and USFWS 2014b).

In accordance with NPS policy and with regards to state-listed species of concern, species lists were obtained from the Arizona Game and Fish Department (AGFD) and Utah Department of Natural Resources Division of Wildlife Services (UDNR) online mapping databases (AGFD 2014 and UDNR 2014).

The Special Status Species Analysis for all federal and state-listed species is presented in appendix A.

Section 106 of the National Historic Preservation Act

In accordance with §106 of the National Historic Preservation Act, the National Park Service provided the Arizona and Utah State Historic Preservation Offices (SHPOs) an opportunity to comment on the effects of this project with regards to historic properties. The National Park service submitted a determination of “no adverse effect” to the SHPOs and is awaiting concurrence.

NATIVE AMERICAN CONSULTATION

The National Park Service contacted culturally affiliated tribes at the beginning of the project to determine if there were any ethnographic resources in the project area and to invite their comments as part of the environmental compliance process. The Hopi and Navajo responded with comments that were considered during this process.

ENVIRONMENTAL ASSESSMENT REVIEW

This environmental assessment is subject to a 30-day public review period. To inform the public of the availability of the environmental assessment, the National Park Service will publish and distribute a letter to various agencies, tribes, and Glen Canyon National Recreation Area’s mailing list as well as place a notice in the local newspaper. The document will be available for review on the PEPC website at <http://parkplanning.nps.gov/glca-wahweaproads> and at the Glen Canyon National Recreation Area visitor center. Copies of the environmental assessment will be provided to interested individuals, upon request.

During the 30-day public review period, the public is encouraged to submit their written comments to the National Park Service, as described in the instructions 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 National Park Service will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the environmental assessment, as needed.

LIST OF PREPARERS

The following persons listed in table 10 assisted with the preparation of the environmental assessment.

TABLE 10. LIST OF PREPARERS

Name	Title	Project Contribution
National Park Service, Denver Service Center		
Steven Culver	Natural Resources Compliance Specialist	Contracting Officer’s Representative
Richard Boston	Cultural Resources Compliance Specialist (retired)	Contracting Officer’s Representative

Name	Title	Project Contribution
National Park Service, Glen Canyon National Recreation Area		
Carl Elleard	Professional Engineer	Design Project Manager
Teresa Tucker	Chief of Planning and Compliance	NEPA Compliance Review
Rosemary Sucec	Chief of Cultural Resources	NHPA Section 106 Review
John Spence	Biologist	Biological Resources Review
Erin Janicki	Environmental Compliance Specialist	NEPA Compliance Review
Louis (Ted) Neff	Archaeologist	NHPA Section 106 Review
Federal Highway Administration, Central Federal Lands		
Anthony Galardi	Professional Engineer	Project Engineer
EnviroSystems Management, Inc. (compliance contractor)		
Stephanie Treptow	President	Principal-in-Charge
Keith Pohs	Natural Resources Program Director	Project Manager/Writer-Editor
Jean Marie Rieck	Biologist/Environmental Planner	Biological Resources and Technical Writing
Linette King	NEPA Specialist	NEPA Compliance
Josh Whiting	Senior Archaeologist	Cultural Resources
Christine Markussen	Senior GIS Specialist	GIS
Travis Ellison	GIS Specialist	GIS
HDR Inc. (design contractor)		
Darin Lockhart	Professional Engineer	Project Engineer

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CHAPTER 5: REFERENCES

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Hopi Cultural Preservation Office (HCPO)

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APPENDIX A: SPECIAL STATUS SPECIES INITIAL ANALYSIS

Table A1 indicates whether species from the official USFWS species lists (USFWS 2014a and USFWS 2014b) are known or expected to occur within the project area. Table A1 also addresses whether suitable habitat is present, and if so, why the species was excluded from further analysis. Special status species identified by the AGFD and UDNR that are not federally listed and may occur within the project area are also addressed (AGFD 2014 and UDNR 2014).

TABLE A1. SPECIAL STATUS SPECIES INITIAL ANALYSIS

Common name	Scientific name	Status ¹	Potential to Occur	Reason for Dismissal ²	Habitat Requirements
Fish					
Razorback sucker	<i>Xyrauchen texanus</i>	E	No	Habitat not present	This species is found in larger rivers and various habitats from large river channels to slow backwaters of large/medium streams. They prefer depths of over a meter and sand, mud, or gravel substrates (AGFD 2002e).
Roundtail chub	<i>Gila robusta</i>	C; CS	No	Habitat not present	This species occupies cool-warm mid-elevation streams and rivers in pools up to 6.6' deep near riffles. Prefers cover of boulders and submerged trees/ branches (AGFD 2002d).
Humpback chub	<i>Gila cypha</i>	E	No	Habitat not present	This species prefers deep, swift, canyon-bound portions of the mainstem and larger tributaries of the Colorado River. It can be found in eddies and sheltered habitats near shore during high-spring flows (USFWS 2002b).
Bonytail	<i>Gila elegans</i>	E	No	Habitat not present	This species historically occupied warm-water reaches of larger rivers in the western United States and Mexico, but due to stream flow regulation and habitat modification, it has been extirpated from most of the Colorado River. It can still be found in mainstem rivers in pools and eddies (USFWS 2002a).
Bluehead sucker	<i>Catostomus discobolus</i>	CS	No	Habitat not present	This species occupies aquatic environments with fast flowing water in the higher reaches of mountain rivers (UDNR 2011).

Common name	Scientific name	Status ¹	Potential to Occur	Reason for Dismissal ²	Habitat Requirements
Flannelmouth sucker	<i>Catostomus latipinnis</i>	CS	No	Habitat not present	This species spawns in streams over gravelly areas and at other times of the year, are primarily found in large rivers, where they occupy deep pools of slow-flowing, low gradient reaches (UDNR 2011).
Reptiles and Amphibians					
Northern Mexican gartersnake	<i>Thamnophis eques megalops</i>	PT	No	Habitat not present	This species is found in streams or densely-vegetated riparian habitat surrounding tanks, cienegas, and streams in open valley floors; not found in steep mountain or canyon stream habitat types (AGFD 2012).
Common chuckwalla	<i>Sauromalus ater</i>	SPC	Yes	Not likely to adversely impact	This species is found in desert communities of creosote-bursage, blackbrush, and/or saltbush, and is restricted to rocky hillsides, rock outcrops or lava beds (UDNR 2011).
Birds					
California condor (10(j) area)	<i>Gymnogyps californianus</i>	E, Exp/ Non-E	Extremely Rare chance	Limited potential to enter the project area.	This species can be found in northern Arizona and southern Utah along the Colorado River corridor and in/near Glen Canyon National Recreation Area and Grand Canyon National Park, and as scavengers, can travel great distances in search of opportune food or water sources (USFWS 1996).
Greater sage-grouse	<i>Centrocercus urophasianus</i>	C	No	Habitat not present	This species is primarily found in sagebrush plains, foothills, and mountain valleys where sagebrush is the dominant vegetation type, and a productive understory of grasses and forbs are readily available (UDNR 2011).
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T	No	Habitat not present	This species is found in cool microclimates of canyons and dense forests that are characterized by multi-layered structure of mixed-conifer or pine/oak forest (AGFD 2005g).

Common name	Scientific name	Status ¹	Potential to Occur	Reason for Dismissal ²	Habitat Requirements
Burrowing owl	<i>Athene cunicularia</i>	SPC	Yes	Not likely to adversely impact	This species is found in open, well-drained deserts, prairies, grasslands, and agricultural lands (AGFD 2001a).
Golden eagle	<i>Aquila chrysaetos</i>	BGA	No	Habitat not present	This species is found in forests, woodlands, open grasslands, any habitat during migration, and nests in rocky ledges or tall trees (AGFD 2002a).
Bald eagle - winter population	<i>Haliaeetus leucocephalus</i>	BGA, SC; WSC	Yes	Not likely to adversely impact	This species is found in large trees or cliffs near water with abundant prey, and mainly feeds on fish but also waterfowl, small mammals, and carrion. A winter population exists near the project area (AGFD 2011b).
American peregrine falcon	<i>Falco peregrinus anatum</i>	SC; WSC	Yes	Not likely to adversely impact	This species is found in habitats with abundant prey adjacent to steep cliffs where they nest; they prey on birds in riparian areas, woodlands, and other habitats (AGFD 2002c).
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E	No	Habitat not present	This species is a migratory riparian obligate and prefers densely foliated areas in most types of riparian vegetation communities along wider rivers and streams (AGFD 2002b).
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	PT	No	Habitat not present	This species is found in narrow streamside riparian groves, and larger mesquite bosques with dense understory foliage for migrating and breeding are preferred (AGFD 2011a).
Mammals					
Kit fox	<i>Vulpes macrotis</i>	SPC	Yes	Not likely to adversely impact	This species occupies arid and semi-arid habitats that provide favorable combinations of low predator numbers, sufficient prey, and soils suitable for denning (UDNR 2011).
Black-footed ferret	<i>Mustela nigripes</i>	Exp/ Non-E	No	Habitat not present	This species is found primarily in the Aubrey Valley of Coconino County, Arizona, and requires arid prairies with large prairie dog colonies for food and burrows (AGFD 2001b).

Common name	Scientific name	Status ¹	Potential to Occur	Reason for Dismissal ²	Habitat Requirements
Utah prairie dog	<i>Cynomys parvidens</i>	T	No	Outside known population distribution	This species is generally associated well-drained soils in southwestern Utah where they need to be able to burrow to at least 1 m in depth for protection from predators and environmental and temperature extremes (UDNR 2011).
Plants					
Welsh's milkweed	<i>Asclepias welshii</i>	T	No	Outside known elevation range	This species is primarily found on unstable sands and sand dunes adjacent to sagebrush, juniper and ponderosa pine communities primarily from 1,700 to 1,900 m in elevation (Tilley et al. 2010a).
Jones cycladenia	<i>Cycladenia humilis</i> var. <i>jonesii</i>	T	No	Outside known population distribution	The species can be found in Eriogonum-Ephedra, mixed desert shrub, and scattered pinyon-juniper communities, at elevations ranging from 1,219 to 2,075 m. (Tilley et al. 2010b).
Siler pincushion cactus	<i>Pediocactus</i> (= <i>echinocactus</i> = <i>utahia</i>) <i>sileri</i>	T	No	Outside known population distribution	This species grows primarily gypsiferous clay and sandy soils of the Moenkopi Formation, and habitat is characterized by desert scrub vegetation at elevations between 850-1,650 m on all aspects of the hills and on slopes (UDNR 2011 and USFWS 2002c).

¹Status Codes:

E = Federally listed endangered (USFWS)

T = Federally listed threatened (USFWS)

PT = Federally listed proposed threatened (USFWS)

C = Candidate for federal listing (USFWS)

Exp/Non-E = Federally listed Experimental Population, Non-Essential (USFWS)

BGA = Bald and Golden Eagle Protection Act

SC = Species of Concern (USFWS)

WSC = Wildlife of Special Concern (Arizona)

SPC = Wildlife species of concern (Utah)

CS = Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing (Utah)

²Reason for Dismissal:

ESA = Endangered Species Act

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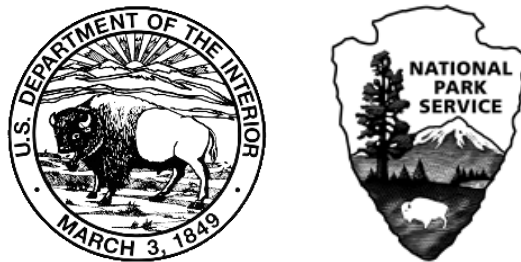
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