

Lake Mead National Recreation Area

National Park Service
U.S. Department of the Interior

Lake Mead National Recreation Area
Nevada and Arizona



Environmental Assessment

Replace Water Distribution Systems and Sewer
Collection Systems Parkwide

September 2005



ENVIRONMENTAL ASSESSMENT

Replace Water Distribution Systems and Sewer Collection Systems Parkwide

Prepared For:
National Park Service



Prepared By:
engineering-environmental Management, Inc.



LAKE MEAD NATIONAL RECREATION AREA

Nevada and Arizona

U.S. Department of the Interior, National Park Service
Environmental Assessment:
Replace Water Distribution Systems and Sewer Collection Systems Parkwide
Lake Mead National Recreation Area
Mohave County, Arizona and Clark County, Nevada

Summary

The National Park Service is considering rehabilitating the water distribution and wastewater collection systems in eight developed areas of Lake Mead National Recreation Area (NRA): Boulder Beach, Callville Bay, Cottonwood Cove, Echo Bay, Katherine Landing, Las Vegas Bay, Overton Beach, and Temple Bar. Katherine Landing, and Temple Bar are in Mohave County, Arizona; the other six sites are in Clark County, Nevada.

This action is needed because of numerous safety and operational issues with the water distribution and wastewater collection systems. The water distribution systems are old and deteriorated, fail on a regular basis, do not provide adequately for fire safety, do not comply with fire and plumbing codes, and are currently operating out of compliance with the regulations governing public water systems for the state of Nevada. The water distribution systems suffer from pipe breaks, dead ends, low or excessively high pressure zones, nonworking valves, and other major system impairments. Throughout the NRA, the wastewater systems are in an advanced stage of deterioration and suffer from severely corroded pipes, failing manholes, and leakage of raw sewage. As a result of these extensive problems with the wastewater systems throughout the NRA, the NRA is not in compliance with state and federal water pollution control requirements.

This environmental assessment examines in detail two alternatives: no action and the National Park Service preferred alternative. Under the preferred alternative, the aging and deteriorating water system would be upgraded, replacing existing lines and adding new lines; increasing system efficiencies and adding water meters to manage water usage; providing additional water storage to meet demands and to provide an adequate supply for fire fighting; increasing and replacing fire hydrants for adequate fire fighting; adding backflow prevention devices to meet code requirements; and, replacing existing flood irrigation with drip irrigation to promote water conservation. The preferred alternative would also include upgrades to the aging and deteriorating wastewater collection system including replacing pipelines, adding and replacing manholes, realigning certain portions of the lines to enhance gravity flow, increasing the capacity of certain lines, and other changes to improve the operational efficiency and reliability of the wastewater collection system.

The preferred alternative would have no or negligible impacts to air quality, wetlands, floodplains, ecologically critical areas, wild and scenic rivers and other unique natural areas, geology and geologic hazards, cultural resources, prime and unique farmland, socioeconomics, land use, environmental justice, Indian trust resources, scenic resources, lightscapes, or natural soundscapes.

The preferred alternative would contribute short-term, negligible, adverse impacts to water quality, health and safety, and soils; short-term, negligible to minor, adverse impacts to cultural landscapes; short-term, minor, adverse impacts to vegetation, wildlife, and visitor experience. There would be long-term, negligible to minor, adverse impacts to historic structures and districts; long-term, negligible, beneficial impacts to soils and wildlife; long-term, minor, beneficial impacts to vegetation and visitor experience; long-term, moderate, beneficial impacts to health and safety and NRA operations.

Impacts to the threatened desert tortoise would be short term, minor, and adverse, and long term, negligible, and beneficial. Impacts to the endangered razorback sucker and bonytail chub would be short term, minor, and adverse, and long term, minor, and beneficial. There would be no adverse impacts to critical habitat for the razorback sucker or bonytail chub from the preferred alternative.

Notes to Reviewers and Respondents

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Comments should be postmarked by no later than October 17, 2005. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their name and home address from the record, which we will honor to the extent allowable by law. *If you want us to withhold your name and address, you must state this prominently at the beginning of your comment.* We will make all submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please address comments to: Lake Mead National Recreation Area; Attn: Compliance Office, Re: Replace Water Distribution Systems and Sewer Collection Systems Parkwide Environmental Assessment, 601 Nevada Way; Boulder City, NV 89005

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ACRONYMS AND ABBREVIATIONS

| | |
|-------|---|
| CFR | Code of Federal Regulations |
| cm | Centimeter |
| DWMA | Desert Wildlife Management Area |
| °F | Degrees Fahrenheit |
| GMP | General Management Plan |
| NDEP | Nevada Division of Environmental Protection |
| NEPA | National Environmental Policy Act of 1969 |
| NPS | National Park Service |
| NRA | National Recreation Area |
| NRHP | National Register of Historic Places |
| SHPO | State Historic Preservation Office |
| USC | United States Code |
| USFWS | U.S. Fish and Wildlife Service |

INTRODUCTION

PURPOSE AND NEED

The National Park Service (NPS) is considering rehabilitating the water distribution and wastewater collection systems of Lake Mead National Recreation Area (NRA) in eight developed areas: Boulder Beach, Callville Bay, Cottonwood Cove, Echo Bay, Katherine Landing, Las Vegas Bay, Overton Beach, and Temple Bar. Katherine Landing and Temple Bar are in Mohave County, Arizona; the other six sites are in Clark County, Nevada (figure 1).

Major components of water distribution work include replacing aged and deteriorated mains, replacing aged and inoperable main-line valves and adding additional valving; upgrading the size of existing mains to meet code requirements; the addition of new mains to create loops that increase system efficiency and reliability and reduce outages, and additional fire hydrants to meet code requirements; additional metering to better manage water usage; additional water storage to meet flow demand requirements; adding and upgrading backflow prevention devices to meet current code requirements; and replacing existing campground surface flood irrigation systems with subsurface drip irrigation systems.

Improvements of the wastewater collection systems would include replacing aged and deteriorated force mains; replacing or rehabilitating deteriorated manholes; replacing deteriorated manhole frames and covers; replacing or relining existing deteriorated gravity sewerlines; providing odor control for vented sewer gases at selected locations; realigning selected sections of existing gravity sewerlines; increasing the capacity of selected gravity lines; and providing other miscellaneous upgrades to improve the reliability and efficiency of the wastewater collection system.

This action is needed because of numerous safety and operational issues:

1. The water distribution systems are old and deteriorated, fail on a regular basis, do not provide adequately for fire safety, do not comply with fire and plumbing codes, and are currently operating out of compliance with the Regulations Governing Public Water Systems for the State of Nevada.
2. The water distribution systems suffer from pipe breaks, dead ends, low or excessively high pressure zones, nonworking valves, and other major system impairments.
3. Hydro-flushing and videotaping of all wastewater collection systems parkwide has confirmed that these systems are in an advanced stage of deterioration and suffer from severely corroded pipes, failing manholes, and leakage of raw sewage throughout the NRA.
4. As a result of these extensive problems with the wastewater systems throughout the NRA, the NRA is not in compliance with state and federal water pollution control requirements.

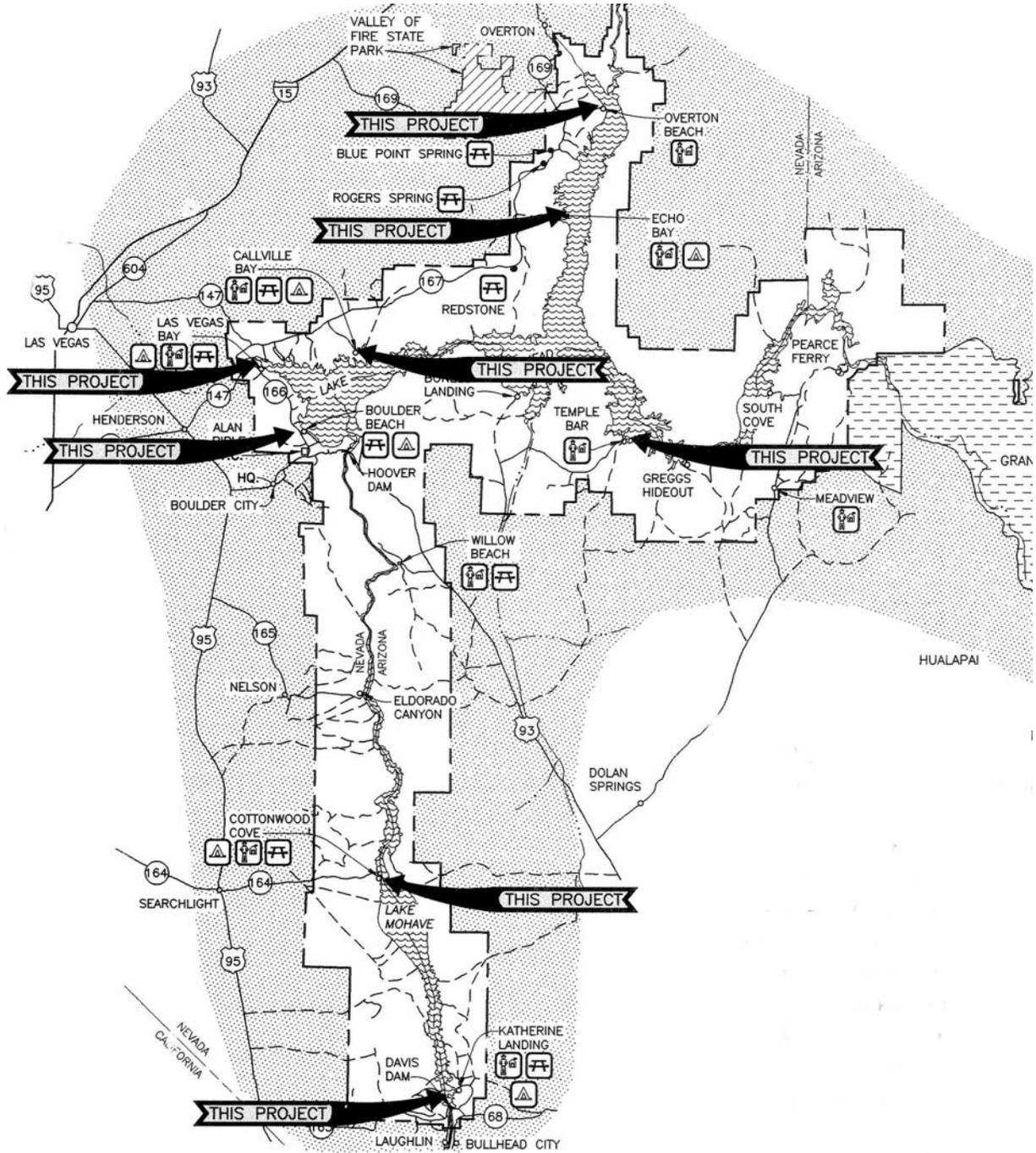


FIGURE 1. MAP OF PROPOSED WATER/SEWER PROJECTS WITHIN LAKE MEAD NRA

An environmental assessment analyzes the preferred alternative and other alternatives and their impacts on the environment. This environmental assessment has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and regulations of the Council on Environmental Quality (40 *Code of Federal Regulations* (CFR) 1508.9); National Park Service Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*; and the National Historic Preservation Act of 1966 (as amended).

PURPOSE AND SIGNIFICANCE OF THE RECREATION AREA

An essential part of the planning process is to understand the purpose, significance, and mission of the NRA for which this environmental assessment is being prepared.

Recreation Area Purpose

Purpose statements are based on legislation, legislative history, and National Park Service policies. The statements reaffirm the reasons for which the NRA was set aside as a unit of the national park system, and provide the foundation for the management and use of the NRA.

The purpose of Lake Mead NRA is to:

Provide public recreation, benefit, and use in a manner that will preserve, develop, and enhance, so far as practicable, the recreation potential, and preserve the scenic, historic, scientific, and significant features of the area (NPS 2000).

Recreation Area Significance

Park significance statements capture the essence of the NRA's importance to the natural and cultural heritage of the United States of America. Significance statements do not inventory NRA resources; rather, they describe the NRA's distinctiveness and help place the area within the regional, national, and international context. Defining significance helps NRA managers make decisions that preserve the resources and values necessary to accomplish the purpose of the NRA.

The significance of Lake Mead NRA is as follows:

Lake Mead NRA is the premiere inland water recreation area in the West with 1.5 million surface acres, including 700 miles of shoreline on lakes Mead and Mohave. It represents superlative examples of the plants, animals, and physical geography of the Mojave Desert, Colorado Plateau, and Basin and Range geologic provinces. The NRA includes many regionally and nationally significant natural resource components, including populations of federally listed threatened and endangered species of animals, birds, fish, and plants. The area also represents a continuum of cultural resources from prehistoric to

historic sites, including several culturally sensitive areas with sacred and traditional significance to contemporary American Indians.

Lake Mead NRA provides a wide variety of unique outdoor recreation opportunities ranging from warm water recreation to exploration of rugged and isolated backcountry, making it a wilderness NRA in an urbanizing setting. The area generates over \$500 million directly for the local economy. Lake Mead NRA serves as a major focus in the western United States for public outdoor water recreation, which is at a premium in this desert environment. The area is within a day's drive of 20 million people in the Los Angeles Basin and 2.7 million people in the Phoenix metropolitan area. Lake Mead is also within a 20-minute drive of the 1.1 million people in the Las Vegas valley, with up to 6,000 new residents per month and 30 million visitors per year, making Las Vegas one of the fastest growing communities and tourism destinations in the country (NPS 2000).

Recreation Area Mission

NRA purpose describes the specific reason the NRA was established. Recreation area significance is the distinctive features that make the recreation area unique from any other. Together, purpose and significance lead to a concise statement—the mission of the recreation area. The mission statements describe conditions that exist when the legislative intent for the NRA is being met.

The mission of Lake Mead NRA is to:

Provide diverse inland water recreational opportunities in a spectacular desert setting for present and future generations (NPS 2000).

PROJECT BACKGROUND, PREVIOUS PLANNING, SCOPING, AND VALUE ANALYSIS

Previous Planning

The proposed water and wastewater system rehabilitation project complies with the primary management objectives for Lake Mead NRA as stated in the approved *General Management Plan* (GMP) (NPS 1986). GMP management objectives include accommodation of increased visitor use while protecting the NRA's most outstanding natural and cultural resources.

The 2003 record of decision for the *Lake Management Plan / Final Environmental Impact Statement* for the management of water-based recreation within Lake Mead NRA describes the selected alternative for improving the management of Lakes Mead and Mohave to provide for the long-term protection of NRA resources while allowing a range of recreational opportunities for NRA visitors (NPS 2003). Under the selected alternative (alternative B), facility expansion could occur at Callville Bay, Echo Bay, Overton Beach, and Temple Bar developed areas at Lake Mead.

Scoping

Scoping is an effort to involve agencies and the general public in determining issues to be addressed in this environmental assessment. Scoping is used to determine important issues to be given detailed analysis in the environmental assessment and eliminate issues not requiring detailed analysis; allocate assignments among the interdisciplinary team members and/or other participating agencies; identify related projects and associated documents; identify permits, surveys, consultations, etc., required by other agencies; and create a schedule that allows adequate time to prepare and distribute the environmental assessment for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise (including the state historic preservation office (SHPO) and American Indian tribes) to obtain early input.

Staff of Lake Mead NRA and resource professionals of the National Park Service, Denver Service Center, conducted internal scoping. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the proposed action to other planning efforts at Lake Mead NRA.

A press release (appendix A) initiating scoping and describing the proposed action was issued on March 19, 2004. Comments were solicited during a public scoping period that ended April 22, 2004. No comments were received. The public and American Indian groups traditionally associated with the lands of Lake Mead NRA will also have an opportunity to review and comment on this environmental assessment.

The National Historic Preservation Act, as amended (16 *United States Code* [USC] 470 *et seq.*), NEPA, National Park Service Organic Act, NPS *Management Policies* (2001), Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (2001), and Director's Order – 28: *Cultural Resources Management Guideline* require the consideration of impacts on cultural resources, either listed in or eligible to be listed in, the National Register of Historic Places (NRHP). Consultation with the Arizona and Nevada SHPOs would occur prior to implementation of the project.

The Nevada (Reno) and Arizona (Phoenix) offices of the U.S. Fish and Wildlife Service (USFWS) were contacted by letters dated June 24, 2004, to request a list of threatened and endangered species that may occupy habitats in and around the above-listed marinas (appendix B). In a response dated August 30, 2004, the Nevada office of the USFWS provided a species list for those species that might be found in Clark County, Nevada (appendix B). In a response dated August 9, 2004, the Arizona office of the USFWS provided a Web site address (<http://arizonaes.fws.gov>) from which a comprehensive list of federally threatened, endangered, or candidate species recorded from Mohave County, Arizona, could be accessed (appendix B).

ISSUES AND IMPACT TOPICS

Issues

Issues and concerns affecting this proposed action were identified from past National Park Service planning efforts, and input from state and federal agencies. The major issues are the conformance of the proposed action with the *Lake Management Plan* (NPS 2003) and *General Management Plan* (NPS 1986) and potential impacts to soils, vegetation, wildlife, threatened and endangered species and other species of concern, historic structures and historic districts, cultural landscapes, floodplains and water quality, visitor experience, health and safety, and NRA operations.

NEPA calls for an examination of the impacts on all components of affected ecosystems and is the charter for the protection of the environment. NEPA requires federal agencies to use all practicable means to restore and enhance the quality of the human environment and to avoid and minimize any possible adverse effects of their actions on the environment. The preferred alternative was developed to minimize the impact to natural and cultural resources and visitor experience, while protecting water quality and health and safety and enhancing NRA, operations. Measures to prevent the introduction of invasive species and programs to reclaim impacted habitat would be implemented. Issues and mitigation measures are included in the rationale for selection of impact topics for further consideration or for dismissal from further consideration discussed below.

Derivation of Impact Topics

Specific impact topics were developed for discussion focus, and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal law, regulations, and executive orders; NPS *Management Policies* (2001); and National Park Service knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

Impact Topics Included in this Environmental Assessment

Soils

Disturbances under the preferred alternative would include disturbance through removal, stockpiling, and redistribution of soils in areas where pipeline is to be replaced or added; increased compaction in some areas; and a potential for soil erosion. Since soil disturbances would occur, soils are addressed in detail in the environmental assessment.

Vegetation

National Park Service policy is to protect the components and processes of naturally occurring biotic communities, including the natural abundance, diversity, and ecological integrity of plants (NPS 2001). Water and wastewater system rehabilitation under the preferred alternative would involve ground-disturbing activities with the potential to affect vegetation. In addition, the no-action alternative could affect vegetation through continued leaking water and wastewater; therefore, vegetation is addressed in detail in the environmental assessment.

Wildlife

National Park Service policy is to protect the components and processes of naturally occurring biotic communities, including the natural abundance, diversity, and ecological integrity of animals (NPS 2001). Under the no-action alternative, wildlife could be affected through continued leaking wastewater. Water and wastewater system rehabilitation under the preferred alternative also would involve ground-disturbing activities with the potential to affect wildlife or their habitat; therefore, wildlife is addressed in detail in the environmental assessment.

Threatened and Endangered Species and Species of Concern and Designated Critical Habitat

The Endangered Species Act (1973), as amended, requires an examination of impacts on all federally listed threatened or endangered species. National Park Service policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. Based on the list obtained from the USFWS (appendix B), threatened or endangered species, specifically the desert tortoise, razorback sucker, and bonytail chub, could be affected by both of the action alternatives. In addition, there is designated critical habitat for both the razorback sucker and the bonytail chub in Lake Mead and Lake Mohave in the vicinity of the proposed activities. Therefore, this impact topic is addressed in detail in the environmental assessment.

Historic Structures and Districts

The National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*), NEPA, the National Park Service Organic Act, NPS *Management Policies* (2001), Director's Order – 12: *Conservation Planning, Environmental Impact Analysis and Decision-making* (2001), and Director's Order – 28: *Cultural Resources Management Guideline* require the consideration of impacts on cultural resources, either listed in or eligible to be listed in the NRHP.

The undertakings described in this document are subject to section 106 of the National Historic Preservation Act, under the terms of the 1995 Servicewide Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. Although the proposed project meets the condition for Programmatic Exclusion to the Servicewide Programmatic Agreement, the environmental assessment would be submitted to the Arizona and Nevada SHPOs for

review and comment during the public review period. In addition, through a separate submittal, in accordance with the Servicewide Programmatic Agreement, the National Park Service would provide information on the project impacts to the Arizona and Nevada SHPOs.

There are a number of buildings and one structure that are potentially individually eligible for listing on the NRHP is within the area of potential effect. They are all intact Mission 66 resources potentially eligible on the national or state level. There are three historic districts within the area of potential effect. All are potentially eligible for listing in the NRHP as elements of the National Park Service Mission 66 development program. Lake Mead NRA manages potentially eligible resources as eligible. The proposed pipeline replacements would result in digging and trenching within the eligible historic districts and adjacent to some eligible historic buildings. For this reason, historic structures and districts is addressed in detail in the environmental assessment.

Cultural Landscapes

As described by the National Park Service *Cultural Resources Management Guideline* (Director's Order – 28), a cultural landscape is,

“... a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.”

The three historic districts are also defined as cultural landscapes. The proposed project could result in impacts to cultural landscape features such as pavement, curbing, walls, and vegetation. For this reason, cultural landscapes is addressed in detail in the environmental assessment.

Water Quality

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. NPS *Management Policies* (2001) provide direction for the preservation, use, and quality of water in national park units. The existing conditions have the potential to impact water quality and the proposed construction activities could also impact water quality; therefore, water quality is addressed in detail in the environmental assessment.

Visitor Experience

Short-term effects to visitor experience would be expected during project construction in the form of temporary unavailability of water and wastewater services (affecting comfort stations, pump-out stations, and potentially commercial services availability). Since construction

activities could affect visitor experience within developed areas where water and wastewater system rehabilitation is taking place; visitor experience is addressed in detail in the environmental assessment.

Health and Safety

Public safety and worker safety could potentially be affected by selection of either the no-action or preferred alternatives through ongoing concerns with the availability of fresh water and fire fighting supply in some locations, and the potential for water pollution as a result of the deteriorated wastewater collection system in some locations; therefore, health and safety is addressed in detail in this environmental assessment.

NRA Operations

NRA operations could potentially be affected by selection of either the no-action or preferred alternatives. NRA operations would suffer if water for fire fighting was not available or if NRA staff would be burdened with frequent repairs to water or wastewater systems. Therefore, NRA operations are addressed in detail in this environmental assessment.

Impact Topics Dismissed from Further Analysis

Air Quality

The 1963 Clean Air Act provides that the federal land manager (the assistant secretary for fish and wildlife and parks and the NRA superintendent) has an affirmative responsibility to protect the NRA's air quality-related values (including visibility, plants, animals, soils, water quality, cultural and historic resources and objects, and visitor health) from adverse air pollution impacts. Section 118 of the 1963 Clean Air Act requires the NRA to meet all federal, state, and local air pollution standards. Section 176(c) of the 1963 Clean Air Act requires all federal activities and projects to conform to state air quality implementation plans to attain and maintain national ambient air quality standards. *NPS Management Policies* (2001) address the need to analyze potential impacts to air quality during NRA planning.

Lake Mead NRA is classified as a class II air quality area under the Clean Air Act, as amended. Should the preferred alternative be selected, local air quality would be temporarily affected by dust and vehicle emissions. Operating equipment and hauling construction material during the construction phase would result in increased vehicle exhaust and emissions. Hydrocarbons, nitrogen oxide, and sulfur dioxide emissions would be rapidly dissipated. In addition, to reduce construction equipment emissions, the NRA would apply appropriate mitigating measures, which limit idling of construction vehicles.

Fugitive dust plumes from construction equipment would intermittently increase airborne particulates in the area near the construction site, but loading rates are not expected to be considerable. To mitigate these effects, such activity would be coupled with water sprinkling to reduce dust and airborne particulates.

Overall, there would be a slight and temporary degradation of local air quality due to dust generated from construction activities and emissions from construction equipment. These effects would last only as long as construction occurred and the NRA's overall class II air quality would not be affected by the proposal; impacts would be negligible and short term. Therefore, air quality was dismissed from further analysis as an impact topic in the environmental assessment.

Ethnographic Resources

The National Park Service defines ethnographic resources as any,

“...site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (Director’s Order – 28: Cultural Resources Management Guideline, p. 191).

The lands of Lake Mead NRA are traditionally associated with approximately 20 Indian tribes: Ak-Chin Indian Community, Chemehuevi Band of the Southern Paiute, Colorado River Indian Tribes, Fort Mojave Tribe, Fort Yuma Quechan, Gila River Indian Community, Havasupai, Hopi Tribe, Hualapai, Kaibab Paiute, Las Vegas Band of the Southern Paiute, Moapa Band of the Southern Paiute, Mohave, Navajo Nation, Pahrump Band of the Southern Paiute, Paiute Indian Tribes of Utah, Salt River Pima – Maricopa Indian Community, Shivwits Band of Paiutes, Yavapai, and Zuni. Each tribe was apprised by letter of the proposed action. There are no known ethnographic resources in the areas of potential effect and none of the tribes evinced any concerns about the proposed project. Copies of the environmental assessment will be forwarded to each associated tribe for review and comment. If the tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed. Because there are no known ethnographic resources within the areas of potential effect, ethnographic resources was dismissed from further analysis as an impact topic in the environmental assessment.

Archeological Resources

There is a diffuse lithic scatter within the area of potential effect of the proposed action: site NV DD:15:8 (ASM). The site is mainly confined to ridgetops. A second site (26CK2375) is a lithic scatter spread over 13 loci and is mainly confined to hillsides with no artifacts on the flat ridgetops. Both areas have been previously documented. All areas affected by the proposed action have been subjected to pedestrian survey. It is unlikely that any subsurface artifacts would be present because the entire site is sitting on a soil known as the Huevi-Badland formation, which has been exposed for more than 10, 000 years.

Most construction would take place in previously disturbed areas. No artifacts were found during the pedestrian survey in the disturbed area where construction would take place. An archeologist would monitor construction in previously undisturbed areas. Any impact to archeological resources would be negligible.

Any unknown sites encountered during the project would be subjected to mitigation described in “Mitigation Measures for the Preferred Alternative.” Since any effects to archeological resources would be negligible at most, this topic was dismissed from further analysis as an impact topic in the environmental assessment.

Museum Objects

Museum collections include prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens. Replacement of the NRA’s water distribution and sewer collection systems would have no effect upon the NRA’s museum collections. Therefore, museum collections were dismissed from further analysis as an impact topic in the environmental assessment.

Indian Trust Resources

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

Wetlands

Executive Order 11990 (*Protection of Wetlands*) requires an examination of impacts to wetlands. There are no jurisdictional or NPS-defined wetlands within the project area based on site observations and review of previous Lake Mead NRA documentation. Therefore, wetlands was dismissed from further analysis as an impact topic in the environmental assessment.

Prime and Unique Farmland

In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, Natural Resources Conservation Service. Prime or unique farmland is defined as soil, which particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are

no prime or unique farmlands associated with the project area based on site observations and review of Lake Mead NRA documentation; therefore, prime and unique farmland was dismissed from further analysis as an impact topic in the environmental assessment.

Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas

No areas within the project corridor are designated as ecologically critical areas, nor are there any existing or potential wild and scenic rivers within the project area. Lake Mead NRA is an important natural area, but the proposed action would not threaten the associated qualities and resources that make the NRA unique; therefore, this topic was dismissed from further analysis as an impact topic in the environmental assessment.

Geology and Geologic Hazards

Although ground-disturbing activities would occur under the preferred alternative, impacts to the geology in the project area are not anticipated, nor would geologic hazards (e.g., faults and seismic activity such as earthquakes) be anticipated to affect the project. Therefore, geology and geologic hazards was dismissed from further analysis as an impact topic in the environmental assessment.

Floodplains

Executive Order 11988 (*Floodplain Management*) requires examination of impacts to floodplains and potential risks involved in placing facilities within floodplains. NPS *Management Policies* (2001), Director's Order – 2: *Planning Guidelines*, and Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposed actions in floodplains. Although some construction work would occur in floodplains, the effect would be minimal and short term and would not impact the configuration and carrying capacity of the floodplain. All pipelines placed or replaced in the floodplain would be buried and impacts to floodplains would be short term and negligible. Therefore, floodplains was dismissed from further analysis as an impact topic in the environmental assessment.

Environmental Justice

Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. No alternative under consideration would have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's *Draft Environmental Justice Guidance* (July 1996). Therefore, environmental justice was dismissed from further analysis as an impact topic in the environmental assessment.

Scenic Resources

In an evaluation of scenic quality, both the visual character and visual quality of a viewshed are considered. A viewshed comprises the limits of the visual environment associated with the preferred alternative. During construction, impacts would result from the presence of construction equipment, and possibly dust, but they would be short term and occur mostly within the existing developed areas. Two new water tanks would be added as permanent features on the landscape; one at Cottonwood Cove and the other at Echo Bay. The tank at Cottonwood Cove would be placed adjacent to an existing above-ground tank and would, therefore cause negligible additional intrusion on the existing scenic quality. The tank at Echo Bay is located on the top of a hill and would be buried except for several feet that would remain above ground. Because of the tank's location on the top of a hill and the fact that the tank would be mostly buried and not visible to those below the hill, impacts to the scenic quality upon completion of construction would be negligible. The road that leads to the tank would be visible from the access road to Echo Bay, but would not interfere with any of the scenic views of the lake. Therefore, scenic resources was dismissed from further analysis as an impact topic in the environmental assessment.

Soundscapes

In accordance with NPS *Management Policies* (2001) and Director's Order – 47: *Sound Preservation and Noise Management*, an important part of the National Park Service mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequency, magnitude, and duration of human-caused sound considered acceptable varies among National Park Service units, as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas. Noise associated with water and wastewater system rehabilitation would be short term and localized, and construction activities would be scheduled so as to minimize effects on visitor experience. Water and wastewater system rehabilitation would not result in a measurable increase in noise in developed areas; therefore, soundscapes was dismissed from further analysis as an impact topic in the environmental assessment.

Lightscaapes

In accordance with NPS *Management Policies* (2001), the National Park Service strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. Since most of the activities associated with the water and sewerline work would occur in developed areas already subject to artificial lighting, and since most of the work would occur during daylight hours, lightscaapes would not be affected by the proposed action; therefore, lightscaapes was dismissed from further analysis as an impact topic in the environmental assessment.

Socioeconomic Environment and Land Use

Neither the no-action or preferred alternatives would change local or regional land use, nor would it appreciably affect local businesses outside Lake Mead NRA. Implementation of the preferred alternative could provide a negligible beneficial impact to the economies of Boulder City, Henderson, or Las Vegas (e.g., increased employment opportunities for the construction work force and revenues for local businesses and government related to construction activity). The duration of construction activity for the preferred alternative would be February 2006 through August 2007. Benefits to the local economy would be temporary, lasting only during construction, and negligible overall. Improvements to water and wastewater systems would result in occasional temporary, short-term, negligible, adverse impacts to concessions within the NRA during construction, and long-term, negligible, beneficial impacts as a result of the improvements. Therefore, socioeconomics was dismissed from further analysis as an impact topic in the environmental assessment.

PREFERRED ALTERNATIVE AND OTHER ALTERNATIVES

INTRODUCTION

The alternatives section describes two management alternatives for rehabilitation of water and wastewater systems at Lake Mead NRA. Alternatives for this project were developed to resolve environmental, public health and safety, and NRA operations issues.

The no-action alternative describes the continuation of present management, operation, and current conditions. It does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. The no-action alternative provides a basis for comparing the management direction and environmental consequences of the preferred alternative. Should the no-action alternative be selected, the National Park Service would respond to future needs and conditions associated with the water and wastewater systems at Lake Mead NRA without major actions or changes in course.

The preferred alternative presents the National Park Service proposed action and defines the rationale for the action in terms of resource protection and management; and visitor and operational use, costs, and other applicable factors.

Additional alternatives considered and dismissed from detailed analysis are also discussed in this section. A summary table comparing the environmental consequences of each alternative is presented at the end of the alternatives section.

ALTERNATIVE A: NO-ACTION ALTERNATIVE

The no-action alternative would continue existing conditions for water and wastewater systems at Lake Mead NRA. Existing waterlines and sewerlines, manholes, valves, and fire hydrants would remain in use in their current configuration. Additional fire hydrants, backflow prevention devices, and hose bibs would not be installed. Pipe breaks, low or high pressure problems, and nonworking valves would continue to plague the systems. Water loss through leakage and pipe breaks would continue. Both the water and sewer systems would continue to be out of compliance with federal and state regulations.

The no-action alternative would include short-term, minor repairs or improvements for the water and wastewater systems that would comprise routine maintenance or emergency repairs.

ALTERNATIVE B: PREFERRED ALTERNATIVE

Alternative B is the National Park Service preferred alternative. The preferred alternative presents the National Park Service proposed action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, and costs. Under alternative B, the aging and deteriorating water system would be upgraded, replacing existing

lines and adding new lines, increasing system efficiencies and adding water meters to manage water usage, providing additional water storage to meet demands and to provide an adequate supply for fire fighting, increasing and replacing fire hydrants for adequate fire fighting, adding backflow prevention devices to meet code requirements, and replacing existing flood irrigation with drip irrigation to promote water conservation. Alternative B would also include upgrades to the aging and deteriorating wastewater collection system including replacing pipelines, adding and replacing manholes, realigning certain portions of the line to enhance gravity flow, increasing the capacity of certain lines, and other changes to improve operational efficiency and reliability of the wastewater collection system. No changes in water use are expected from the alternative B.

OVERVIEW

The National Park Service is proposing to replace water distribution systems and sewer collection systems at eight developed marinas throughout the NRA including Boulder Beach, Callville Bay, Cottonwood Cove, Echo Bay, Katherine Landing, Las Vegas Bay, Overton Beach, and Temple Bar. Temple Bar and Katherine Landing are in Mohave County, Arizona; the other six sites are in Clark County, Nevada (see figure 1).

The water distribution systems (hereafter referred to as “water systems”) serve eight to nine million visitors annually. The water systems at these eight marinas are old and deteriorated, fail on a regular basis, do not function adequately for fire safety, do not comply with fire and plumbing codes, and are currently operated in violation of the regulations governing public water systems for the state of Nevada (NPS 2004b). The improvements would serve to update the existing water lines, but are not in response to additional identified uses or the ability to provide additional supplies to current users, except in the case of fire fighting where additional hydrants would provide additional supplies of water, as needed.

The sewer collection systems (hereafter referred to as “sewer systems”) also serve eight to nine million visitors annually. The gravity sewer mains perform the critical function of collecting sanitary wastes in the developed areas; the force mains carry that sewage to the wastewater treatment facilities. Recent hydro-flushing and videotaping of the sewer systems documented that portions are in an advanced stage of deterioration, suffering from corroded pipes, failing manholes, and leakage throughout the NRA (NPS 2004c). The sewer collection systems handle human wastewater from various sources. The sewer system is a closed system that does not include any stormwater drainage. Stormwater drainage is a separate system and is not being affected by the proposed project.

General Description of Line/Component Replacement and Addition

Disturbance areas presented below represent worst-case estimates. Where the condition of lines is unknown, they are assumed to need replacement. Testing of the lines would be used to determine actual replacement lengths. In addition, some pipeline can be replaced by slip lining or placing a new pipeline inside of the existing pipeline. The disturbance required for slip lining is significantly less than for full pipeline replacement; however, slip lining is not appropriate in all situations.

Replacement, rehabilitation, and augmentation of the existing water and sewer systems would have a number of work elements in common, both between the two processes and among the eight action areas. Those common activities are described here; specific information unique to each developed area is provided below.

Major components of work proposed on the water system would include:

- replacing aged and deteriorated water lines
- replacing aged and deteriorated mains
- replacing aged and inoperable mainline valves
- adding additional valves
- upgrading the size of existing mains to meet code requirements
- adding new mains to increase system efficiency and reliability, reducing outages
- adding additional fire hydrants to meet code requirements
- adding additional metering to better manage water usage
- adding additional water storage (tanks) to meet flow demand requirements
- adding and upgrading backflow prevention devices to meet current code requirements
- replacing existing campground surface flood irrigation systems with subsurface drip irrigation systems

Major components of work proposed on the sewer system would include:

- replacing aged and deteriorated force mains
- replacing or rehabilitating deteriorated manholes
- replacing deteriorated manhole frames and covers
- replacing or relining existing deteriorated gravity sewerlines
- providing odor control for vented sewer gases at selected locations
- realigning selected sections of existing gravity sewerlines
- increasing the capacity of selected gravity lines
- providing other miscellaneous upgrades to improve the reliability and efficiency of the sewer system

Common work elements would include excavation of the old lines and other components (e.g., valves, manholes, cleanouts, etc.), removal and disposal of old piping and other components, installation of new lines and components, and backfill and compaction after placement of the new lines and components. Reclamation of the disturbance by topsoil replacement and reseeding with native species would also occur. In locations where existing foliage contributes to the cultural landscape, vegetation would be replaced in-kind. Some portions of pipeline would be abandoned in place by cutting the pipe and sealing the ends. In addition, some pipeline to be replaced would not be removed, but rather would be abandoned in place using the same method previously described.

For purposes of this environmental assessment, it is assumed that a backhoe would be used to excavate old lines and elements, and to cut trenches for new overland routes. The impact area is assumed to be a 25-foot width with the pipeline lying approximately in the center of the 25-foot disturbance. Thus, each foot of line to be replaced/installed is estimated to require 25-square feet of impact area.

Note that portions of the sewerline replacement would be accomplished by slip lining the existing pipe (slipping a new pipe into the existing pipe). Slip lining would minimize the disturbance since the entire length of pipe would not need to be excavated. The exact locations where slip lining is feasible have not yet been identified. For purposes of this environmental assessment, no slip lining has been assumed so disturbance acreage presented in this document are the worst-case areas and actual disturbance is likely to be less than that presented.

The project is planned to be executed in two phases. The target dates for the proposed work under phase I (Temple Bar, Katherine Landing, and Cottonwood Cove) are beginning February 2006, with completion by the end of August 2007. The target dates for proposed work under phase II (Boulder Beach, Las Vegas Bay, Callville Bay, Echo Bay, and Overton) are beginning February 2007, with completion by August 2008.

A summary of activities to occur at each of the eight developed areas is presented below. Ground-disturbing activities for force main and gravity sewerline replacements would take place principally in the location of the existing sewer system. Very limited sewer system work would take place in areas that have not been previously disturbed. However, there are several small lengths of new sewerline. There are numerous lengths of new waterline. Any new disturbance that is not within current impact areas (e.g., paved areas or packed gravel) is considered new disturbance in this environmental assessment.

Installation of the utilities in the 1950s and 1960s resulted in disturbance including trenching, installation, backfilling, and associated activities such as staging. Because many of these areas have not been re-disturbed since the original installation, these areas have returned to a relatively natural state. Disturbance in these areas is referred to as re-disturbance in this environmental assessment. Permanent disturbance are areas that would be disturbed as part of this project and would not be reclaimed. New disturbance, re-disturbance, and permanent disturbance areas are summarized in table 1, following the descriptions by project area. Disturbance area, either new or replacement disturbances, within the paved/built environments of the marinas and associated developed areas (referred to as “currently disturbed areas”) are not included in table 1. Note that all numbers presented in this environmental assessment represent initial worst-case scenarios for lengths of pipeline to be installed and/or replaced. Additional testing will be conducted to determine final requirements for new or replacement lines and the actual disturbance associated with pipeline installation and replacement would likely be less than the worst-case figures presented in this environmental assessment.

Boulder Beach

Sewerline improvements for Boulder Beach would include replacement of approximately 15,000 feet of sewerline, approximately 8,000 feet of force main, and 1,000 feet of new sewerline would be placed. Spot repair would occur in four pipe segments. New manholes would be installed in three locations. Manholes would be replaced in 44 locations and 57 manholes would be repaired. For the water distribution system, approximately 12,060 feet of new pipeline would be installed and approximately 5,060 feet of pipeline would be replaced, 30 new fire hydrants would be installed and 9 fire hydrants would be replaced, 6 new backflow

prevention devices would be installed and 9 backflow prevention devices would be removed, and 36 new water meters would be installed. Repairs or adjustments would occur to 14 existing meters.

New Disturbance in Previously Undisturbed Areas: Approximately 610 feet of new waterline would be placed in previously undisturbed areas. The majority of the new waterline would be placed to access the nursery facility, maintenance facility, and the old horse corral.

Re-disturbance: Approximately 6,530 feet of sewerline and 7,000 feet of sewer force main would be replaced in existing locations. Approximately 580 feet of waterline would be replaced in existing locations. These areas were disturbed for placement of the original line, but have revegetated and have not been disturbed since original placement.



FIGURE 2. PIPELINE ROUTE OVER PREVIOUSLY UNDISTURBED GROUND TO NPS HOUSING AREA

Permanent Disturbance: There is no new permanent disturbance proposed at Boulder Beach for either the waterlines or sewerlines.

Work in Currently Disturbed Areas: The remainder of new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The replacement of approximately 8,470 feet of replacement sewerline and 1,000 feet of new sewerline would occur in highly disturbed zones. For waterlines, the remaining 12,010 feet of new waterline and 4,480 feet of replacement waterline would be installed in highly disturbed areas (figure 3).

Proposed ground-disturbing activities range from approximately 500 feet to approximately 1,500 feet from the lake high-water line.



FIGURE 3. EXISTING DISTURBANCE WHERE A NEW WATERLINE WOULD BE INSTALLED AT BOULDER BEACH

Callville Bay

Sewerline improvements for Callville Bay would include replacement of approximately 600 feet of sewerline and 1,600 feet of force main. One new manhole would be installed. Manholes would be replaced in 14 locations and 22 manholes would be repaired. For the water distribution system, approximately 3,600 feet of new pipeline would be installed, and 9 new fire hydrants, 22 new backflow prevention devices, and 7 new water meters would be installed. Repairs or adjustments would occur to 14 existing meters and 7 fire hydrants.

New Disturbance in Previously Undisturbed Areas: There would be no water or sewerline placement in previously undisturbed areas.

Re-disturbance: Approximately 500 feet of new waterline would be installed in locations of previous waterline placement that have revegetated since the original placement and have not been redisturbed.

Permanent Disturbance: There would be no new permanent disturbance proposed at Callville Bay for either the waterlines or sewerlines.

Work in Currently Disturbed Areas: All of the sewerline work and the remainder of the new waterline placement and line replacement would occur in disturbed areas that are paved or

packed gravel and have a high degree of disturbance. The installation or replacement of approximately 5,600 feet of sewerline and 1,620 feet of force main would occur in highly disturbed zones. For waterlines, the remaining 3,100 feet of new waterline would be installed in highly disturbed areas (figure 4).



FIGURE 4. NEW WATERLINE TO BE PLACED IN PREVIOUSLY DISTURBED ROADWAY AREA

Proposed ground-disturbing activities range from approximately 400 feet to 2,400 feet above the lake high-water line.

Cottonwood Cove

Sewerline improvements for Cottonwood Cove would include replacement of approximately 7,400 feet of sewerline, installation of approximately 1,100 feet, and abandonment of approximately 1,200 feet. New manholes would be installed at four locations. Manholes would be replaced in 32 locations, 5 manholes would be repaired, and 3 manholes would be abandoned. For the water distribution system, approximately 12,720 feet of new pipeline would be installed, 21 new fire hydrants, 27 new backflow prevention devices, and 19 new water meters would be installed. Repairs or adjustments would occur to 7 existing meters and 9 fire hydrants. Five existing backflow prevention devices would be removed.

New Disturbance in Previously Undisturbed Areas: Approximately 190 feet of new sewerline would be placed in previously undisturbed areas. There would be no new waterline placement in previously undisturbed areas.

Re-disturbance: Approximately 170 feet of existing sewerline would be replaced. Approximately 1,460 feet of new waterline would be placed in existing trenches. These trenches have not been disturbed for many years and the vegetation has re-established (figure 5).



FIGURE 5. EXISTING WATERLINE REPLACEMENT IN EXISTING TRENCH FROM WATER TANK IN AREA WHERE VEGETATION HAS RE-ESTABLISHED AND PIPELINE ROUTE IS NOT DETECTABLE

Permanent Disturbance: A new 400,000-gallon water tank is proposed at Cottonwood Cove, adjacent to the existing 200,000-gallon tank.

Work in Currently Disturbed Areas: The remainder of new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The installation or replacement of approximately 8,140 feet of sewerline would occur in highly disturbed zones. For waterlines, the remaining 11,260 feet of new waterline would be installed in highly disturbed areas.

Proposed ground-disturbing activities range from approximately 200 feet to approximately 4,000 feet from the lake high-water line.

Echo Bay

Sewerline improvements for Echo Bay would include placement of 300 feet of new line, replacement of approximately 5,500 feet of sewerline, spot repair of approximately 40 feet, and replacement of approximately 2,500 feet of force main. New manholes would be installed at two locations. Manholes would be replaced in 16 locations, 30 manholes would be repaired. For the water distribution system, approximately 13,500 feet of new pipeline, 12 new fire

hydrants, 27 new backflow prevention devices, and 12 new water meters would be installed. Repairs or adjustments would occur to 14 existing meters, and 9 fire hydrants. Five backflow prevention devices would be removed.

New Disturbance in Previously Undisturbed Areas: A new waterline to the new tank would be installed. The new waterline primarily follows the roadway prism where the trenching will occur; however, there is a short (approximately 350 foot section) that will be installed overland in a previously undisturbed area.

Re-disturbance: Approximately 2,000 of sewerline and 790 feet of force main would be replaced. Although the replacement would be in the same trench as the existing line, the area has not been disturbed for many years and vegetation has become re-established. Approximately 750 feet of new waterline would be installed in the same trench as an existing line running from the area of the existing water tank and pump house to the main access road. Although the line would be installed in an area that was previously disturbed for the existing line placement, the area has not been disturbed in many years and is revegetated.

Permanent Disturbance: A new 250,000-gallon water storage tank would be installed north of the road (figure 6). The disturbance area for the new tank has been estimated at 0.5 acre of permanent disturbance. The new tank would be buried so that only the top of the tank would be above ground and, since the tank would be buried on a hilltop, the tank would not be visible in the surrounding lower areas.



FIGURE 6. AREA WHERE NEW WATER TANK WOULD BE INSTALLED

To access the new water tank, two options would be considered for the access road. The first option is uphill from the main road, paralleling the waterline for a distance. This option is approximately 850 feet long. The second option is a road from the sewage lagoons, accessing the tank from the north. This road is approximately 1,800 feet in length. For purposes of calculating potential disturbance acreage for table 1, the second option is used as a worst case choice.

Work in Currently Disturbed Areas: The remainder of the new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The installation or replacement of approximately 5,500 feet of sewerline and force main would occur in highly disturbed zones. For waterlines, the remaining 4,530 feet of new waterline would be installed in highly disturbed areas (figure 7).

Proposed ground-disturbing activities range from approximately 400 feet to approximately 2,000 feet from the lake high-water line.



FIGURE 7. PIPELINE TO BE PLACED IN A CURRENTLY DISTURBED AREA ALONG THE EDGE OF THE PARKING LOT

Katherine Landing

Sewerline improvements for Katherine Landing would include approximately 1,200 feet of new sewerline, replacement of approximately 3,600 feet of sewerline, spot repair of approximately 180 feet, and replacement of approximately 1,300 feet of force main. New manholes would be installed at four locations. Manholes would be replaced in 15 locations and 48 manholes would be repaired. For the water distribution system, approximately 14,920 feet of

new pipeline would be installed, as well as 13 new fire hydrants, 31 new backflow prevention devices, and 10 new water meters. Repairs or adjustments would occur to 18 existing meters, and 1 backflow prevention device would be removed.

New Disturbance in Previously Undisturbed Areas: Approximately 100 feet of new waterline would be installed in a previously undisturbed area west of the south campground.

Re-disturbance: Approximately 2,000 feet of existing sewerline would be replaced in areas that have been previously disturbed, but that have revegetated. Approximately 300 feet of new line would be placed west of the south campground in the same location as an existing line, but where the vegetation has re-established.

Permanent Disturbance: There is no new permanent disturbance as a result of the sewerline or waterline work at Katherine Landing.

Work in Currently Disturbed Areas: The remainder of new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The installation or replacement of 1,800 feet of sewerline would occur in highly disturbed zones. For waterline, the remaining 14,520 feet of new waterlines would be installed in highly disturbed areas.

Las Vegas Bay

Sewerline improvements for Las Vegas Bay would include replacement of approximately 2,860 feet of sewerline. Manholes would be replaced in 17 locations and 16 manholes would be repaired. For the water distribution system, approximately 4,240 feet of new pipeline would be installed, as well as 8 new fire hydrants, 10 new backflow prevention devices, and 6 new water meters (figure 8). Repairs or adjustments would occur to 2 existing meters; 1 backflow prevention device would be replaced and 2 would be removed.

New Disturbance in Previously Undisturbed Areas: Approximately 250 feet of new water pipeline would be installed in previously undisturbed areas around the covered boat storage. Approximately 630 feet of new waterline would be installed in an area that has not been disturbed, running from the junction with the new waterline south of the boat storage, eastward to the road.

Re-disturbance: Approximately 2,000 feet of sewerline replacement would occur in areas that are not currently disturbed and where vegetation has re-established after the previous installation over 50 years ago.

Permanent Disturbance: There is no new permanent disturbance as a result of the sewerline or waterline construction at Las Vegas Bay.



FIGURE 8. NPS RESIDENTIAL AREA WHERE WATER METERS WOULD BE ADDED, FIRE HYDRANTS REPLACED, AND A BACKFLOW PREVENTION DEVICE INSTALLED

Work in Currently Disturbed Areas: The remainder of new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The installation or replacement of 800 feet of sewerline would occur in highly disturbed zones. For waterlines, the remaining 3,359 feet of new waterline would be installed in highly disturbed areas.

Proposed ground-disturbing activities range from approximately 200 feet to approximately 1,200 feet from the lake high-water line.

Overton Beach

Sewerline improvements for Overton Beach would include replacement of approximately 700 feet of sewerline. Spot repair would occur for approximately 8 pipe sections. Four new manholes would be installed and 23 manholes would be repaired. For the water distribution system, approximately 2,850 feet of new pipeline would be installed, as well as 5 new fire hydrants, 13 new backflow prevention devices, and 6 new water meters. Repairs or adjustments would occur to 13 existing meters.

New Disturbance in Previously Undisturbed Areas: Approximately 200 feet of new waterline would be installed in the area between the parking lot and the road leading to the trailer village. Approximately 280 feet of new line would be placed from the trailer waste station to the road.

Re-disturbance: Approximately 250 feet of new waterline would be placed in the same area as an existing waterline, creating a re-disturbance from the boat repair area to the road.

Permanent Disturbance: There would be no permanent disturbance as a result of the sewerline or waterline work at Overton Beach.

Work in Currently Disturbed Areas: The remainder of the new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The installation or replacement of all sewerlines would take place in highly disturbed zones. For waterlines, the remaining 2,120 feet of new waterline would be installed in highly disturbed areas.

Proposed ground-disturbing activities range from approximately 200 feet to approximately 800 feet from the lake high-water line.

Temple Bar

Sewerline improvements for Temple Bar would include installation of approximately 200 feet of new sewerline, replacement of approximately 7,100 feet, spot repair of approximately 180 feet, and abandonment of approximately 270 feet. Five manholes would be replaced, and 24 manholes would be repaired. For the water distribution system, approximately 8,840 feet of new pipeline would be installed, as well as 9 new fire hydrants, 13 new backflow prevention devices, and 13 new water meters. Repairs would occur to 4 existing meters and 6 existing fire hydrants.

New Disturbance in Previously Undisturbed Areas: Approximately 1,000 feet of new waterline would run from the employee trailer housing to the maintenance storage area.

Re-disturbance: Approximately 2,000 feet of waterline running cross-country from the water storage tank to the amphitheater would be replaced. Approximately 2,300 feet of sewerline would be replaced for a line running cross-country from the visitor center / ranger station, past employee trailer housing to the parking area. Approximately 110 feet of sewerline would be replaced in an area that lies between the campground and trailer village. Approximately 240 feet would be replaced between the trailer village and the National Park Service housing area.

Permanent Disturbance: There would be no new permanent disturbance at Temple Bar as a result of the waterline and sewerline work.

Work in Previously Disturbed Areas: The remainder of the new line placement and line replacement would occur in disturbed areas that are paved or packed gravel and have a high degree of disturbance. The installation or replacement of sewerlines in this highly disturbed zone would account for the remaining 4,650 feet. For waterlines, the remaining 5,840 feet of new waterline would be installed in highly disturbed areas.

Proposed ground-disturbing activities range from approximately 500 feet to approximately 3,000 feet from the lake high-water line.

TABLE 1. APPROXIMATE ACREAGE OF IMPACT FOR EACH PROJECT AREA

| Marina | New Disturbance (Acres) | Re-Disturbance (Acres) | Total Acres | Permanent Disturbance (Acres) |
|--------------------------|-------------------------|------------------------|-------------|-------------------------------|
| Boulder Beach | 0.4 | 8.1 | 9.5 | 0.0 |
| Callville Bay | 0.0 | 0.3 | 0.3 | 0.0 |
| Cottonwood Cove | 0.1 | 0.9 | 1.0 | 0.5 |
| Echo Bay | 0.2 | 2.0 | 2.2 | 1.3 |
| Katherine Landing | 0.1 | 1.3 | 1.4 | 0.0 |
| Las Vegas Bay | 0.5 | 1.1 | 1.6 | 0.0 |
| Overton Beach | 0.3 | 0.1 | 0.4 | 0.0 |
| Temple Bar | 0.6 | 2.7 | 3.3 | 0.0 |
| TOTAL (acres) | 2.2 | 16.5 | 19.7 | 1.8 |

Impact acres include both water and sewer system work.

Sustainability

The National Park Service has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design NRA facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The preferred alternative subscribes to and supports the practice of sustainable planning, design, and use of the water distribution and sewer collection systems at Lake Mead NRA.

Staging Area

Equipment for the water distribution and sewer collection systems improvements project would be stored in existing disturbed areas at Lake Mead NRA. Existing fenced maintenance yards would provide storage areas in each developed segment where improvements would occur. In addition, equipment could be stored along the existing work corridor, outside high visitor use areas. No staging areas would be located in previously undisturbed locations.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order – 12, the National Park Service is required to identify the “environmentally preferred alternative” in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the Council on Environmental Quality. The Council on Environmental Quality provides direction that “[t]he environmentally preferred alternative is the alternative that will promote the national environmental policy as expressed in section 101 of NEPA, which considers:

1. fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations
2. assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings
3. attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences
4. preserving important historic, cultural, and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice
5. achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities
6. enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources” (NEPA, section 101).

The no-action alternative is not the environmentally preferred alternative because it would not:

- prevent the ongoing leakage of untreated sewage (criteria 1 through 3)
- assure sources of safe drinking water are provided (criteria 2 and 3)
- assure that all facilities are protected from fire (criterion 5)
- reduce the need for water and sewer system maintenance that consumes depletable resources (criteria 1 and 6 not met)

The environmentally preferred alternative in this environmental assessment is the National Park Service preferred alternative. This alternative was selected based on the following criteria:

- protects public and employee health, safety, and welfare by addressing safety concerns associated with providing safe and adequate potable water supply, and eliminating ongoing leakage of untreated sewage, and providing adequate fire protection (criteria 1 through 3)
- improves operations efficiency and sustainability by reducing the need for numerous emergency repairs to the water and sewer systems, and the consumption of depletable resources associated with such repair work (criteria 1 and 6)

In short, the preferred alternative would provide protection of visitor and employee health, safety, and welfare, and improve day-to-day operations with minimal disturbance to natural and cultural resources.

General Construction Schedule and Cost

The project is planned to be executed in two phases. The target dates for the proposed work under phase I (Temple Bar, Katherine Landing, and Cottonwood Cove) are commencing February 2006, with completion by the end of August 2007. The target dates for proposed work under phase II (Boulder Beach, Las Vegas Bay, Callville Bay, Echo Bay, and Overton) are commencing February 2007, with completion by August 2008. Total cost for rehabilitation of the water distribution system is estimated at approximately \$11,600,000, and total estimated cost for rehabilitation of the sewer system is approximately \$6,900,000.

Mitigation Measures for the Preferred Alternative

Mitigation measures are presented as part of the preferred alternative. These actions have been developed to lessen or eliminate any potential adverse effects of the preferred alternative.

| Resource Area | Mitigation |
|-------------------------------|---|
| General Considerations | The National Park Service project manager would ensure that the project remains confined within the parameters established in the compliance documents and that mitigation measures are properly implemented. |
| | Construction zones would be identified and flagged before beginning the construction work and all disturbance would be confined to the flagged areas. All project personnel would be instructed that their activities must be confined to locations within flagged areas and all equipment and materials must remain within these areas. Disturbance beyond the actual construction zone would be prohibited. This does not exclude necessary temporary structures such as erosion-control fencing. |
| | All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion. Any asphalt or concrete surfaces damaged due to work on the project would be repaired to original condition. All demolition debris would be removed from the project site, including all visible concrete and metal pieces. |
| | Construction activities would be coupled with water sprinkling, as needed, to reduce fugitive dust plumes. |
| | Idling of construction vehicles would be limited to reduce construction equipment emissions. |
| | Work in washes would be performed between October and April to avoid peak thunderstorm events and wash erosion. |
| | Best management practices to reduce spills would be utilized during refueling and other activities that may release petroleum products into the environment. |
| | A hazardous spill plan would be in place, stating what actions would be taken in the case of a spill and preventive measures to be implemented such as the placement of refueling facilities, storage, and handling of hazardous materials, etc. |
| | All fuel, transmission or brake fluid leaks, or other hazardous waste leaks, spills, or releases would be reported immediately to the designated environmental manager. The environmental manager would be responsible for spill material removal and disposal to an approved offsite landfill and, if necessary, would notify the appropriate federal agency. |
| | All equipment on the project would be maintained in a clean and well-functioning state to avoid or minimize contamination from automotive fluids; all equipment would be checked daily. |

| Resource Area | Mitigation |
|-------------------------------|--|
| General Considerations | Staging for construction vehicles and equipment would be located in previously disturbed areas, outside of high visitor use areas, and would be clearly identified in advance. |
| Soils | <p>Best management practices for drainage and sediment control would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. Use of best management practices in the project area for drainage area protection would include all or some of the following actions, depending on site-specific requirements:</p> <ul style="list-style-type: none"> ▪ Keep disturbed areas as small as practical to minimize exposed soil and the potential for erosion. ▪ Locate waste and excess excavated materials outside of drainages to avoid sedimentation. ▪ Install silt fences, temporary earthen berms, temporary water bars, sediment traps, stone check dams, or other equivalent measures (including installing erosion-control measures around the perimeter of stockpiled fill material) as necessary prior to construction. ▪ Conduct regular site inspections during the construction period to ensure that erosion-control measures were properly installed and are functioning effectively. ▪ Store, use, and dispose of chemicals, fuels, and other toxic materials in an appropriate manner. ▪ Revegetate disturbed areas as soon as possible after construction is completed. |
| | Impacts and potential compaction and erosion of bare soils would be minimized in all disturbed areas by salvaging the top 6 inches of topsoil before construction begins, storing that topsoil in a designated area with construction fence around it, then placing the salvaged topsoil on restoration areas. After topsoil is replaced, it would be given a fine spray of water to help settle the soil and uncover rock in the soil, and bring up the soil fines to create a crust to help prevent wind and water erosion. |
| | No vehicle or equipment tracks would be allowed to remain after construction is complete. At a minimum, all disturbed areas would be raked out prior to spraying with water to reduce the appearance of vehicle tracks and discourage future redisturbance. |
| Vegetation | In an effort to avoid introduction of nonnative/noxious plant species, no imported topsoil would be used. |
| | Most areas of new disturbance would be allowed to return to native vegetation naturally over time as they would primarily occur in sparsely vegetated areas for which active revegetation efforts are not efficient. |
| | For areas of special concern determined to be appropriate for active revegetation, some hand salvaging of cryptogamic crust and plants prior to construction may be required. The cryptogamic crust and plants would then be replaced after topsoil is replaced. Artificial desert varnish would be applied as appropriate to provide a more natural appearance. The extent of active revegetation and the exact techniques would be site dependent. |
| | For those areas where the disturbance occurs in a potential cultural landscape or potential historic district, the vegetation would be restored in-kind to maintain the cultural and historic character. |
| | Reclaimed areas would be monitored after construction to determine if reclamation efforts are successful or if additional remedial actions are necessary. Remedial actions could include installation of erosion-control structures and controlling nonnative plant species. |

| Resource Area | Mitigation |
|--|--|
| <p>Vegetation</p> | <p>Undesirable plant species would be controlled, as necessary. To prevent the introduction and minimize the spread of nonnative vegetation and noxious weeds, the following measures would be implemented during construction:</p> <ul style="list-style-type: none"> ▪ Minimize soil disturbance. ▪ Pressure wash and/or steam clean all construction equipment to ensure that all equipment, machinery, rocks, gravel, or other materials are cleaned and weed free before entering Lake Mead NRA. ▪ Cover all haul trucks bringing asphalt or other fill materials from outside the NRA to prevent seed transport. ▪ Limit vehicle parking to existing disturbed areas where possible. ▪ Obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, obtaining weed-free sources from National Park Service approved sources outside the NRA would be required. ▪ Initiate restoration of disturbed sites immediately following construction activities. ▪ Monitor disturbed areas following construction to identify growth of noxious weeds or nonnative vegetation. Treatment of nonnative vegetation would be completed in accordance with NPS-13, <i>Integrated Pest Management Guidelines</i>. |
| <p>Wildlife</p> | <p>The contractor would be required to maintain strict garbage control so that scavengers (e.g., corvids) are not attracted to the project area. No food scraps would be discarded or fed to wildlife.</p> |
| <p>Threatened and Endangered Species and Species of Special Concern</p> | <p>A desert tortoise education program would be presented by a qualified biologist to all personnel onsite during construction activities. This program would contain information concerning the biology and distribution of the desert tortoise, its legal status and potential occurrence in the proposed project areas, the definition of “take” and associated penalties, measures designed to minimize the effects of construction activities, the means by which employees can facilitate this process, and reporting requirements to be implemented when desert tortoises are encountered. Personnel would be advised to limit their activities to designated areas and check underneath vehicles before moving them, as desert tortoises often seek shelter under parked vehicles. Personnel shall be advised to watch for desert tortoises on roads and to not handle or harass them.</p> <p>Workers would be instructed to immediately report the presence of any desert tortoise to the qualified biologist.</p> <p>Before surface-disturbing activities, a qualified desert tortoise biologist would conduct a clearance survey to locate and remove desert tortoises using techniques providing full coverage of all areas. All desert tortoise burrows, and other species’ burrows that may be used by desert tortoises, would be examined to determine occupancy of each burrow by desert tortoises. In accordance with <i>Procedures for Endangered Species Act Compliance for the Mohave Desert Tortoise</i> (USFWS 1992), a qualified desert tortoise biologist shall possess a bachelor’s degree in biology, ecology, wildlife biology, herpetology, or closely related fields. The biologist must have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and tortoise sign. In addition, the biologist shall have the ability to recognize and accurately record survey results. The qualified biologist would be approved by the USFWS prior to commencement of project activities. Only the approved qualified biologist would handle desert tortoises.</p> |

| Resource Area | Mitigation |
|--|---|
| <p>Threatened and Endangered Species and Species of Special Concern</p> | <p>All potential desert tortoise burrows found within the construction limits shall be identified and flagged for avoidance or excavation. Desert tortoise burrows that must be disturbed would be cleared of desert tortoises and eggs, and collapsed by a qualified biologist in accordance with USFWS approved protocol (<i>Desert Tortoise Council Guidelines for Handling Desert Tortoises During Construction Projects</i> 1994, revised 1999). If a desert tortoise burrow is occupied by a desert tortoise in brumation (reptilian form of hibernation), and the qualified biologist determines that excavation of the burrow and removal of the desert tortoise is not necessary, the burrow would be blocked during project activities and unblocked when potentially harmful activities have been completed. If blocked, the burrow would be checked a minimum of once in the morning, and again at the end of the day. If the desert tortoise becomes active, it would be relocated as stated above.</p> |
| | <p>Desert tortoises would be handled and relocated by a qualified desert tortoise biologist in accordance with USFWS protocol (Desert tortoise Council 1994, revised 1999). Burrows containing desert tortoises or nests would be excavated with hand tools to allow removal of desert tortoises or desert tortoise eggs. Desert tortoises moved during the desert tortoise inactive season or those in hibernation, regardless of date, would be placed into an adequate burrow; if one is not available, one would be constructed in accordance with USFWS protocols (Desert Tortoise Council 1994, revised 1999). During mild temperature periods in the spring and early fall, desert tortoises removed from the site would not necessarily be placed in a burrow. Desert tortoises and burrows would be relocated only to federally-managed lands. All desert tortoise handling and excavations, including nests, would be conducted by a qualified desert tortoise biologist, in accordance with USFWS-approved protocol.</p> |
| | <p>Special precautions would be taken to ensure that desert tortoises are not harmed as a result of their capture and movement during extreme temperatures (air temperatures below 55 degrees Fahrenheit [°F] or above 95°F). Under such adverse conditions, captured desert tortoises would be monitored continually by an authorized biologist until the desert tortoise exhibits normal behavior. If a desert tortoise shows signs of heat stress, procedures would be implemented as identified in USFWS approved protocols (Desert Tortoise Council 1994, revised 1999).</p> |
| | <p>All located desert tortoises and desert tortoise eggs would be relocated offsite by a qualified biologist, 300 to 1,000 feet into adjacent undisturbed habitat. A pair of new, disposable latex gloves would be used for each desert tortoise that must be handled. After use, the gloves would be properly disposed. Desert tortoises found aboveground would be placed under a marked bush in the shade. A desert tortoise located in a burrow would be placed in an unoccupied burrow of similar size and orientation or inside an artificially constructed burrow of the same size and orientation as the one from which it was removed, using the protocol for burrow construction in section B.5.f. of the revised Desert Tortoise Council guidelines (USFWS 1999). Any desert tortoise found within 1 hour before nightfall would be placed individually in a clean cardboard box and kept overnight in a cool, predator-free location. To minimize stress to the desert tortoise, the box would be covered and kept upright. Each box would be used only once and would then be discarded. The desert tortoise would be released the next day as stated above.</p> |
| | <p>The onsite biologist would record each observed or handled desert tortoise. Information would include the following: location, date and time of observation, whether tortoise was handled, general health and whether it voided its bladder, location desert tortoise was moved from and location moved to, and unique physical characteristics of each tortoise. Reports documenting effectiveness and compliance with the desert tortoise protection measures would be prepared every 6 months during the proposed construction. A final report would be submitted to the USFWS Southern Nevada field office in Las Vegas, Nevada, within 90 days of completion of construction.</p> |
| | <p>The qualified biologist would acquire all appropriate state permits or letters of authorization prior to handling desert tortoises and their parts, and prior to initiation of any activity that may require handling of desert tortoises.</p> |

| Resource Area | Mitigation |
|---|---|
| <p>Threatened and Endangered Species and Species of Special Concern</p> | <p>Project activities that may endanger a desert tortoise would cease if a desert tortoise is found on or moves onto a project site. Project activities would resume after the biologist removes the desert tortoise from danger or after the desert tortoise has moved to a safe area. Stockpiled pipes that could attract desert tortoises would be capped or checked by a desert tortoise monitor before use.</p> |
| | <p>During construction activities, the qualified biologist would conduct periodic onsite surveys to ensure that desert tortoises have not moved into areas cleared for construction.</p> |
| | <p>During the desert tortoise active season (March 1 through October 31), all trenches and other excavations with side slopes steeper than a 1-foot rise to 3-foot length would be immediately backfilled prior to being left unattended, or covered with plywood or a similarly impassable material. An open trench or other excavation would be inspected for entrapped animals immediately prior to backfilling. If, at any time, a desert tortoise is discovered within a trench, all activity associated with that trench would cease until a qualified biologist has removed the desert tortoise, in accordance with USFWS-approved guidelines (DTC 1999).</p> |
| | <p>Stockpiled pipes that could attract desert tortoises would be capped or checked by a desert tortoise monitor before use.</p> |
| | <p>Herbicides would not be used in the project area unless approved, in writing, by the USFWS.</p> |
| | <p>Vehicles would not exceed 25 miles per hour on nonpublic access roads. The qualified biologist would monitor speed limit compliance during project activities and report instances of noncompliance to the National Park Service and USFWS.</p> |
| | <p>A litter-control program would be implemented during construction to minimize predation on desert tortoises by common ravens (<i>Corvus corax</i>) drawn to the project site. The program would include the use of covered, raven-proof trash receptacles, removal of trash from project areas to the trash receptacles following the close of each work day, and proper disposal of trash in a designated solid waste disposal facility. Precautions would be taken to prevent litter from blowing out along the road when trash is removed from the site. Any observation of raven predation on desert tortoises in the project area would be reported to the qualified biologist who would report the incident to the USFWS. Trash removal would reduce the attractiveness of the area to opportunistic predators such as desert kit fox, coyotes, and common ravens. Construction waste would be removed from the site daily and disposed of properly.</p> |
| | <p>Prior to surface disturbance activities within desert tortoise habitat, the National Park Service or the project proponent would pay a remuneration fee per acre of proposed disturbance into the Desert Tortoise Public Lands Conservation Fund Number 730-9999-2315 (section 7 account). This fund is administered by Clark County, Nevada, and used for securing and enhancing desert tortoise habitat and tortoise research.</p> |
| | <p>A razorback sucker/bonytail chub/spawning areas educational program would be presented to all personnel present during construction. This program would contain information pertaining to the biology and distribution of the razorback sucker and bonytail chub, their legal status and occurrence in the lake waters near project areas, the definition of "take" and associated penalties, measures designed to minimize the effects of construction activities, the means by which individuals can facilitate this process, and reporting requirements and corrective actions to be implemented in the unlikely event that breaches to these conservation measures should be observed.</p> |
| <p>All construction personnel would be advised not to feed fish and to dispose of all refuse properly. Trash and food items would be disposed of in predator-proof containers with resealing lids. Trash containers would be emptied daily and waste would be removed from the project area and disposed of in an approved off-site landfill. These measures would be implemented to avoid attracting nonnative fish that interact negatively with razorback suckers and bonytails.</p> | |

| Resource Area | Mitigation |
|--|--|
| Archeology | Should unknown archeological resources be uncovered during construction, work would be halted in the discovery area, the site secured, and Lake Mead NRA would consult according to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990. |
| | In compliance with the Native American Graves Protection and Repatriation Act of 1990, the National Park Service would also notify and consult concerned American Indian tribal representatives for the proper treatment of human remains, funerary, and sacred objects should these be discovered during the project. |
| | An archeological monitor would be present during any ground-disturbing activities in the culturally sensitive areas at Echo Bay and Temple Bar. |
| | Archeological specimens found within the construction area would only be removed by the National Park Service or their designated representatives. |
| Historic Structures and Districts | In areas where features contributing to the integrity of a historic structure or historic district may be affected orange caution construction fencing would be used to close or mark areas that are to be avoided by construction and equipment. |
| | Any vegetation and/or features contributing to the historic structure or district that may be removed would be replaced in kind. |
| Cultural Landscapes | In areas where features contributing to a cultural landscape may be affected, orange caution construction fencing would be used to close or mark areas that are to be avoided by construction and equipment. |
| | Any vegetation and/or features contributing to a cultural landscapes that may be removed would be replaced in kind. |
| Visitor Experience | All trenching in visitor use areas (parking lots, trailer villages, campgrounds, etc.) would be barricaded and signed with warnings in order to keep visitors at a safe distance from the construction zone. |
| | Facilities (comfort stations, dump stations, hose bibs) that are temporarily out of order due to water and sewer system rehabilitation would be signed with directions to the nearest location of operational facilities. |
| | If necessary, individual campsites or campground loops impacted by construction would be closed during periods of construction activity. |
| Park Operations | Concessions would be notified at least 24 hours in advance of temporary utility outages due to water and sewer system rehabilitation. |
| | Length of outages would be kept to a minimum to reduce economic impacts to concessions and visitor inconvenience. |
| Health and Safety | Construction in floodplains and washes would be avoided during the rainy season. If project work were to occur during this time period, a safety plan for work in desert washes would be formulated and implemented. |
| | Because of the deteriorated condition of the existing sewerlines, construction workers may encounter leaking raw sewage in the process of replacing sewerlines. Construction workers would be educated on proper handling of raw sewage or contaminated soils to prevent personal contamination and contraction of communicable diseases. The contractor would be required to provide water and equipment so workers could wash and disinfect after coming into contact with sewage. |
| | The contractor would be required to formulate and implement a health and safety plan for the project that includes clearing of the utility corridors, trenching and shoring, work in desert washes, and handling of asbestos pipe. |

Alternatives Considered but Dismissed

The water distribution and waste collection system were planned after evaluating NRA requirements, code requirements, and inspection and testing of the existing system. Although alternatives were evaluated for individual components as well as individual line locations, there were no other overall alternatives that were evaluated and dismissed.

ALTERNATIVES COMPARISON TABLE

| No-Action Alternative | Preferred Alternative |
|--|--|
| <p>The no-action alternative would continue the existing conditions for water and sewer systems at Lake Mead NRA. Existing waterlines and sewerlines, manholes, valves, and fire hydrants would remain in use in their current configuration. Additional fire hydrants, backflow prevention devices, and hose bibs would not be installed. Short-term, minor repair or improvement activities would continue to be performed for the water and sewer systems that would be a part of routine maintenance for continuing operation of the systems.</p> <p>Meets project objectives? No</p> <p>The water and sewer systems would continue to deteriorate, impacting all users and park operations. Water loss through breaks and leakage would continue to be out of compliance with state and federal regulations.</p> | <p>Under the preferred alternative, the aging and deteriorating water system would be upgraded, replacing existing lines and adding new lines; increasing system efficiencies and adding water meters to manage water usage; providing additional water storage to meet current demands and to provide an adequate supply for fire fighting; increasing and replacing fire hydrants for adequate fire fighting; adding backflow prevention devices to meet code requirements; and replacing existing flood irrigation with drip irrigation to promote water conservation. The preferred alternative would also include upgrades to the aging and deteriorating sewer collection system including replacing pipelines, adding and replacing manholes, realigning certain portions of the line to enhance gravity flow, increasing the capacity of certain lines, and other changes to improve the operational efficiency and reliability of the sewer collection system.</p> <p>Meets project objectives? Yes</p> <p>The preferred alternative would improve the conditions of the water and sewer systems. The systems would allow better water conservation and provide a consistent water supply for fire fighting needs. The life of the water and sewer systems would be extended. The systems would be in compliance with state and federal regulations.</p> |

SUMMARY OF ENVIRONMENTAL CONSEQUENCES / IMPACT COMPARISON

| Potential Environmental Impacts | | |
|--|---|--|
| Impact Topic | Alternative A: No-Action Alternative | Alternative B: Preferred Alternative |
| Soils | Impacts to soils from breaks and leakage and associated repair work would be short and long term, minor, and adverse. | Construction activities would result in short-term, negligible to minor, adverse impacts to soils through disturbance and compaction. Impacts to soils from water and sewage leakage and from pipe breaks would be eliminated with the pipeline replacements. This would result in a long-term, negligible, beneficial impact. |
| Vegetation | Overall impacts to vegetation would be short and long term, minor, and adverse. Impacts from a wildfire without adequate fire fighting abilities could be short and long term, minor to moderate, and adverse, depending on the size of the fire. | Overall impacts of the preferred alternative on vegetation would be short term, minor, and adverse, and long term, minor, and beneficial. |
| Wildlife | Impacts to wildlife from leaking raw sewage and pipe breaks would be short and long term, negligible to minor, and adverse. | Construction activities would have negligible to minor, short-term, adverse impacts on wildlife. The elimination of discharges of raw sewage and pipe breaks would have a long-term, negligible, beneficial impact to wildlife. |
| Threatened and Endangered Species | <p>Impacts to the desert tortoise would be expected to be short and long term, negligible to minor, and adverse from leaking raw sewage and pipe breaks.</p> <p>Impacts to the razorback sucker and bonytail chub would be localized, short term, minor, and adverse from discharges of raw sewage into the lake.</p> | <p>Impacts to the desert tortoise would be short term, minor, and adverse. Desert tortoise populations would benefit from the elimination of leaking raw sewage and pipe breaks. The beneficial impacts would be negligible and long term.</p> <p>Impacts to the razorback sucker and bonytail chub would be short term, negligible, and adverse. The razorback sucker and bonytail chub would benefit from the elimination of the potential for raw sewage discharge into the lake. The beneficial impacts would be long term and negligible.</p> <p>There would be no measurable adverse impact to the critical habitat of the razorback sucker and the bonytail chub. The proposed project would result in long-term, beneficial impacts to critical habitat.</p> |

| Potential Environmental Impacts | | |
|--|---|--|
| Impact Topic | Alternative A: No-Action Alternative | Alternative B: Preferred Alternative |
| Historic Structures and Districts | There would be no impacts to historic structures and districts associated with No-Action Alternative. | Impacts to historic structures and districts from the preferred alternative would be long term, negligible to minor, and adverse. |
| Cultural Landscapes | There would be no changes and no impacts to cultural landscapes associated with the no-action alternative. | Impacts to cultural landscapes from the preferred alternative would be short term, negligible to minor, and adverse. |
| Water Quality | Impacts to water quality from the no-action alternative would be localized short and long term, minor to moderate, and adverse from raw sewage discharges, and short and long term, moderate, and adverse for potable water as the treated water travels through the deteriorated pipe system to the point of delivery. | The impacts to water quality from the preferred alternative would be long term, minor to moderate, and beneficial. With the implementation of sediment control measures, the short-term construction-related impacts to water quality would be negligible and adverse. |
| Visitor Experience | Impacts to visitor experience from closure of facilities or access routes due to the need for system repairs or to restrictions placed on the site by the states of Arizona or Nevada would be short term, minor to moderate, and adverse. | The preferred alternative would have short-term, minor, adverse impacts during the construction work. Upon completion of construction, there would be long-term, minor, beneficial effects on visitor experience. |
| Health and Safety | Health risks as a result of the deteriorated water distribution and sewer collection systems would be short term, minor to moderate, and adverse. The impacts to safety are considered short and long term, minor to moderate, and adverse. | The overall systems improvements would result in a long-term, moderate, beneficial impact to health and safety. Worker safety would be a concern during construction, but with education on safe operating practices, the impacts to worker safety from construction would be short term, negligible, and adverse. |
| Park Operations | The no-action alternative would result in short- and long-term, minor to moderate, adverse impacts to NRA operations, primarily as a result of the time and expense required to maintain the existing systems in operation. | These water distribution and sewage collection improvements constitute a long-term, moderate, beneficial impact to NRA operations. |

AFFECTED ENVIRONMENT

Detailed information on resources of Lake Mead NRA can be found in the Lake Mead NRA 1986 *General Management Plan* and in the 1999 *Resources Management Plan* (NPS 1986, NPS 1999). This section provides a description of Lake Mead NRA and identifies resources potentially affected by the proposed improvements to the water distribution and sewer collection systems rehabilitation project.

LOCATION AND GENERAL DESCRIPTION OF THE NATIONAL RECREATION AREA

Lake Mead NRA is in southern Nevada and northwestern Arizona. It comprises 1,482,476 acres of federal land and 28,212 acres of nonfederal land, mostly arid desert. Lake Mead NRA encompasses two reservoirs formed on the Colorado River, which flows through Glen Canyon National Recreation Area and Grand Canyon National Park before reaching the NRA. Lake Mead NRA is about 1.5 million acres in size. About 60% of Lake Mead NRA is within the state of Arizona (Mohave County), and about 40% is within the state of Nevada (Clark County). The first reservoir is Lake Mead, 100 miles long and formed above Hoover Dam. This reservoir, at normal capacity, contains 162,766 acres of water surface (247-square miles at an elevation of 1,229 feet) and over 822 miles of shoreline. The surface level of Lake Mead has fallen 70 feet over the last few years in response to the severe to extreme drought that has affected this portion of Nevada and Arizona for several years. The second reservoir is Lake Mohave, 67 miles long and formed above Davis Dam. This reservoir has 28,800 acres of water surface (45-square miles at an elevation of 647 feet) and over 254 miles of shoreline.

Rugged mountains, deep canyons, dry washes, and sheer cliffs are typical of the landscape that surrounds Lakes Mead and Mohave. Improved access to the lakeshores is limited. Northshore Road provides access to Callville Bay, Echo Bay, and Overton Beach developed areas along the western edge of Lake Mead. Lakeshore Road is the most heavily used road in the NRA and provides access to the Alan Bible Visitor Center, Boulder Beach, and Las Vegas Bay developed areas on the southwestern portion of Lake Mead. The developed areas are centered around marina activities and most have concessions services for overnight visitors and day users.

Most of Lake Mead NRA is arid desert. In the regions proximal to the shores, daily summer temperatures are typically over 100°F, while winter high temperatures average about 50°F. Only rarely do nighttime low temperatures fall below freezing or 32°F. The region is arid, averaging from 3 to 5 inches of precipitation annually. Most precipitation falls during intense thunderstorms from July through September, when warm moist air dominates the weather pattern. These late summer and early fall thunderstorms create extreme flash flood hazards (NPS 1986, NPS 2003).

SOILS

The soils in the zone on which the various marinas were developed are typically shallow and developed on gray alluvium, generally having high salt contents that often form caliche

hardpans. The majority of the soil surface bordering the developed areas consists of desert pavement in which surface materials have been removed by wind and water and the rocks that remain armor the surface, preventing further erosion. Most of the project components will occur on the tops of and across the faces of alluvial fans.

In areas previously disturbed by construction and grading, soil fines deposited on the surface during construction are subject to erosion and colonization by various weed species such as Russian thistle. Loss of topsoil and fines occurs until wind and water erode the fines from the surface and the site is “re-armored.” This process may take years, although periodic storms may remove significant amounts of soil in a short period of time. During reclamation of disturbed areas, the NRA typically provides artificial “re-armoring” to reduce soil loss.

VEGETATION

The proposed project activities would primarily occur in developed areas. Those components that would go through relatively undisturbed areas (e.g., the new overland pipe route at Cottonwood Cove) would typically traverse sparse desert shrub, desert wash, and badland plant communities of the Mojave Desert section of the American Semi-desert and Desert Province (NatureServe 2002a). Most of the activity outside of compacted soils or paved developed areas would occur in sparse representatives of the creosote – white bursage (*Larrea tridentata* – *Ambrosia dumosa*) association. Vegetative (foliar) cover values for this type of vegetation are relatively sparse, rarely exceeding 5%–10%. The common shrubs include creosote bush, white bursage, indigobush (*Psoralea fremontii*), Pima rhatany (*Krameria erecta*), beavertail cactus (*Opuntia basilaris*), silver cholla (*Opuntia echinocarpa*), and brittlebush (*Encelia farinosa*). Herbaceous species typically present within this association included desert trumpet (*Eriogonum inflatum*) and other buckwheat species, mallow (*Sphaeralcea* sp.) and fluffgrass (*Erioneuron pulchellum*), among others, but are relatively sparse in these areas near the marinas. Creosote bush and creosote bush-white bursage communities have been identified as providing habitat for desert tortoises when sufficient herbaceous forage is also present (NatureServe 2004).

WILDLIFE

Mammals

Lake Mead NRA lists 55 different species of mammals as occurring within available habitats in the area (appendix C) (NPS 2005). Of this total, bats comprised approximately one-third of the mammal species present. The water and sewer construction would occur in most areas and habitats of the NRA, and although the work is concentrated in the developed areas, it is not restricted to these areas. It is expected that most of the species on the list, especially the smaller species, may be present in or pass through the construction areas. For the most part, mammals of the region are out after nightfall.

Birds

Due to the creation of Lakes Mead and Mohave and the associated aquatic, wetlands, and riparian habitats, over 360 species of birds have been observed at Lake Mead NRA. The high number is due to the varied habitats available and to the fact that Lake Mead NRA is on a north-south migration route for many birds. Due to the summer heat, most of the birds in the region are present in the fall, winter, and spring. During the summer months, birds may nest in the higher surrounding mountains or move farther north into a cooler climate (NPS 2005). They return as temperatures cool. Due to the proposed work occurring throughout the NRA, many observed species may be present in or pass through the construction areas. The common raven is of interest because they forage on a variety of foods, including the eggs and young of reptiles such as those of the federally threatened desert tortoise.

Reptiles and Amphibians

There are approximately 44 reptile species and 13 amphibian species that have been observed at Lake Mead NRA (NPS 2005). For the most part, the reptile species prefer rocky slopes or dry washes where boulders and brush furnish plenty of shelter and shade. Most reptiles seek shelter from the sun during the hotter daylight hours of the summer and come out as the evening temperatures cool. Due to the proposed work occurring throughout the NRA, many observed species may be present in or pass through the construction areas.

SPECIAL-STATUS SPECIES (THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN) AND CRITICAL HABITAT

Under the Endangered Species Act of 1973, as amended, an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. The USFWS has communicated that the only species of concern for this project are the desert tortoise, razorback sucker, and bonytail chub. There are no threatened or endangered vegetation species expected within the project area. A biological assessment was prepared and submitted to the USFWS. The USFWS issued a biological opinion on the preferred alternative in June 2005. A copy of the biological opinion is contained in appendix C. Brief descriptions of the desert tortoise, razorback sucker, and bonytail chub are contained in the following sections. The findings of the biological opinion are discussed in the “Environmental Consequences” section of this environmental assessment.

The Desert Tortoise

Desert tortoises are distributed from southeastern California, southern Nevada, and extreme southwestern Utah, through western and southern Arizona and northern Mexico (figure 9) (NatureServe 2004, Boyles 1998). They generally occupy habitat receiving an average annual rainfall in excess of 4 inches (10.0 centimeters [cm]) and below 12 inches (30.0 cm). In the

northern periphery of their range, they typically occur at elevations between 2,000 and 5,000 feet and occupy a variety of habitats (USFWS 1994, NatureServe 2004). The desert tortoise exhibits significant morphological and genetic variation throughout the range (NatureServe 2004). Populations occurring west of the Colorado River are thought to be distinct from those east of the river in morphology, genetics, behavior, and ecology (Lamb et al. 1989 and Lamb et al. 1994 *in* NatureServe 2004). Populations of the desert tortoise are listed as threatened within the United States (*Federal Register* April 2, 1990, and NatureServe 2004).



FIGURE 9. DESERT TORTOISE (*GOPHERUS AGASSIZII*)

Desert tortoise are predominantly herbivorous and semifossorial (burrowing) inhabitants of warm upland plateaus and mountain slopes in the Mojave Desert. They occupy creosote bush scrub and the creosote bush–white burrobush community. The native grass, big galleta, is often present where the desert tortoise is most abundant. In general, desert tortoises forage primarily on native winter and summer annual plants (dicots and grasses), perennial grasses, cacti, and perennial shrubs, in descending order of preference. Insects, caterpillars, and other insect larvae may also be eaten; desert tortoises have been observed biting road-killed anurans and lizards (Brown 1968, Okamoto 1995 *in* NatureServe 2004). It has been suggested that an active adult desert tortoise requires about 45 pounds (21 kilograms) of herbaceous forage per month (NatureServe 2004).

Desert tortoises have been observed historically throughout the middle elevations of the NRA (Schwartz et al. 1978, LeNoue and Van Inwagen 1993). Schwartz et al. (1978) considered the desert tortoise as widespread, but in small numbers throughout the Lake Mead NRA below about 4,000-foot elevation.

In 1994, a recovery plan for the Mojave population of the desert tortoise was published. The *Desert Tortoise Recovery Plan* (USFWS 1994) recognized six evolutionarily significant units within the Mojave population, and subsequently referred to these evolutionarily significant units as the various recovery units. The desert tortoise populations in Lake Mead NRA are within the eastern and northeastern Mojave recovery units. The recovery plan (USFWS 1994) also proposed two types of desert tortoise conservation areas, both of which have components that include Lake Mead NRA. The first of these is a desert wildlife management area (DWMA)

—an administrative area within the recovery unit that is managed so that reserve-level protection is afforded desert tortoise populations while maintaining and protecting other sensitive species and ecosystem functions. Lake Mead NRA is included in the Piute-Eldorado DWMA, which includes portions of both the eastern and northeastern recovery unit.

The second type of designation put forth by the recovery plan (USFWS 1994) is that of critical habitat. Critical habitat for listed species consists of: (1) the specific areas within the geographic area occupied by the species at the time it is listed, in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features (constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by the species at the time it is listed, in accordance with the provisions of section 4 of the Endangered Species Act, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species (Endangered Species Act, section 3 (5)(A)). The southern portion of Lake Mead NRA (i.e., below Hoover Dam) lies along the eastern border of and includes portions of the Piute-Eldorado critical habitat unit. However, the only project area close to this designated critical habitat is Cottonwood Cove, and all aspects of that project would occur outside the critical habitat boundary. While desert tortoises have a patchy distribution across Lake Mead NRA, areas near the lakeshore are generally located in marginal habitat with low tortoise numbers (USFWS 2002).

Desert tortoise surveys were conducted in each of the eight developed areas scheduled for water/sewer updates between July 15 and August 5, 2004. Surveys were conducted in accordance with USFWS protocols including 100% coverage of the zone of impact and additional zone of influence surveys in surrounding areas. Biologists searched for any evidence of tortoise habitation of each area, including the burrows, scat, live turtles, and skeletal remains. No evidence of desert tortoises was observed at Callville Bay, Cottonwood Cove, Echo Bay, Las Vegas Bay, Katherine Landing, Overton Beach, or Temple Bar. The proposed Boulder Beach water/sewer improvement area produced the carapace of an adult tortoise. This carapace was not found in the proposed impact zone, but in a wash in one of the lateral zones of influence. A caliche cave with desert tortoise scat was observed upslope of the carapace.

The Razorback Sucker

Razorback suckers (figure 10) formerly occurred throughout the Colorado River basin, from Wyoming and Colorado to Sonora and Baja California. This species is now much reduced in range and abundance. The largest extant population of razorback sucker occurs in Lake Mohave. Major known spawning areas in Lake Mohave include Cottonwood Cove, Arizona Bay, Six-mile Cove, and Eldorado Canyon (Minckley et al. 1991). Habitats utilized by razorback suckers include slow areas, backwaters, and eddies of medium to large rivers, and impoundments (three of the four remaining populations of greater than 100 individuals are in reservoirs, NatureServe 2004). In Lake Mohave, individuals were associated with inshore habitats, except during the hotter months when they moved offshore, possibly to avoid warmer water temperatures. Razorback suckers spawn from late January to April (rarely to May or June) in the lower Colorado River basin reservoirs, including Lake Mead, when temperatures range between about 52°F to 70°F (USFWS 1994b).



Photo: Arizona Game & Fish

FIGURE 10. RAZORBACK SUCKER (*XYRAUCHEN TEXANUS*)

Wild populations of razorback suckers continue to decline due to insufficient recruitment such that the loss of all but one of the remaining wild populations is expected within the decade. The sole exception is the Lake Mead population made up of young to middle-aged razorback suckers comprising a second post-impoundment generation (USFWS 2002). As with many other threatened and endangered fish species, nonnative fish may be the greatest threat to the continued survival and potential recovery of the razorback sucker (USFWS 2002).

There are two known spawning areas for the razorback in Lake Mead: One at Blackbird Point and one at Echo Bay. The Echo Bay spawning site is upstream of Echo Bay Marina, but still within the bay. During the nonspawning period, adults may also be found along the western shores of the Overton Arm and the north shore of Las Vegas Bay. While use of these areas is consistent across years, it is influenced by water levels. As the lake level has declined since 2000, use of the lower reach of Las Vegas Wash and the upper end of Echo Bay has not been possible (USFWS 2002).

The main spawning areas for razorback suckers in Lake Mohave are in coves in the central part of the lake, although some are found in the riverine section near Willow Beach. The central spawning sites are in the general vicinity of, but not adjacent to, Cottonwood Cove Marina. Relatively isolated rearing coves have been artificially established at more remote sites on Lake Mohave in an attempt to allow young fish to mature in a more natural environment than a hatchery. These are located at Yuma Cove (near Cottonwood Cove) and Davis Cove (near Katherine Landing) (USFWS 2002).

The final ruling listing the razorback sucker as an endangered species was published on October 23, 1991 (*Federal Register* 56 p. 54957), but critical habitat was not proposed. In March of 1994, the USFWS published its determination of critical habitat for the razorback sucker, Colorado squawfish, humpback chub, and bonytail chub (USFWS 1994b). Designated critical habitat units for the razorback sucker in Lake Mead NRA include the Colorado River and its 100-year floodplain as it flows through Mohave County, Arizona, and Clark County, Nevada, above Hoover Dam, including Lake Mead to the full-pool elevation; and the Colorado River and its 100-year floodplain as it flows through Mohave County, Arizona, and Clark County, Nevada, from Hoover Dam to Davis Dam, including Lake Mohave to the full-pool elevation.

The Bonytail Chub

The bonytail chub (figure 11), often referred to simply as the bonytail, was formerly abundant throughout the Colorado River and its larger tributaries. It has been collected from the Green River in Wyoming and Utah; the Yampa and Gunnison Rivers in Colorado; the Colorado River in Arizona, Colorado, Nevada, and California; the San Juan River in New Mexico; and the Gila and Salt Rivers in Arizona (Lee et al. 1980, Matthews and Moseley 1990, Page and Burr 1991). Presently, this fish is very rare, being presumed extirpated from three states of its former range (Colorado, New Mexico, and Wyoming), and critically imperiled throughout the rest of its current range (Utah, Nevada, Arizona, and California [NatureServe 2004]). Recently, this species has been found only in the Yampa River (Dinosaur National Monument), the Green River (Gray and Desolation Canyons), the Colorado River (Black Rocks and Cataract Canyon) (Kaeding et al. 1986; *Federal Register*, March 21, 1994), Lake Mohave (Arizona-Nevada border), and Lake Havasu (Arizona-California) (Minckley and Deacon 1991).

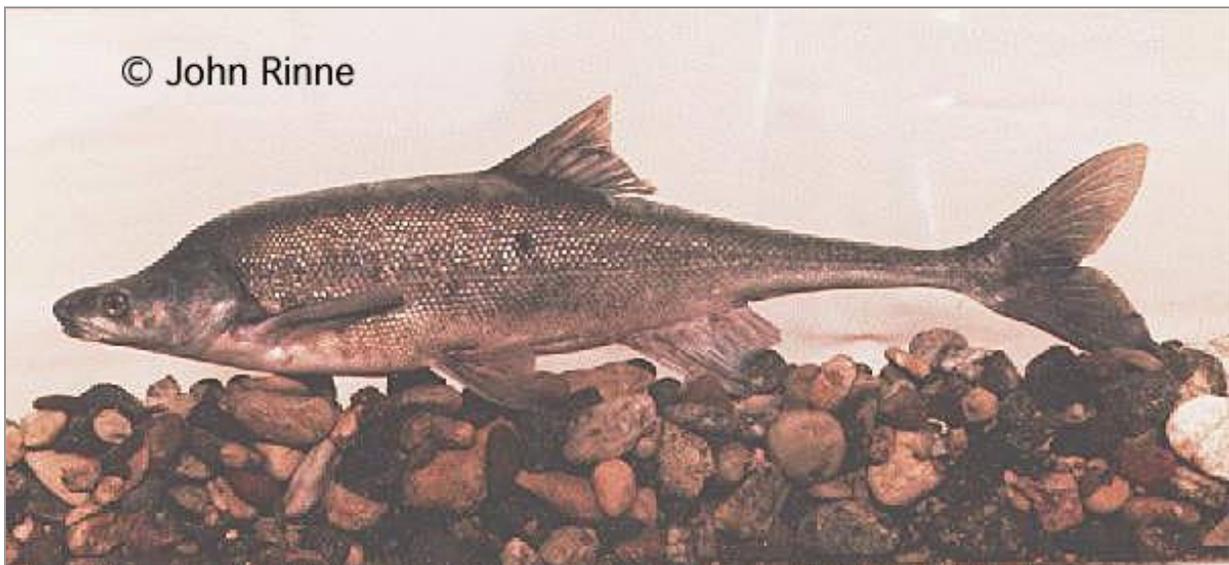


Photo: U.S. Fish and Wildlife Service

FIGURE 11. BONYTAIL CHUB (*GILA ELEGANS*)

The bonytail chub appears to be adapted to pools and eddies of mainstream rivers (NatureServe 2004). In reservoirs, this species occupies a variety of habitats including pools

and backwaters, over mud or rocks. Bonytails have a high tolerance for turbidity (Matthews and Moseley 1990). Although not much is known about the spawning habitat of bonytails, they have been observed to spawn in May in Lake Mohave. In Lake Mohave, these fish have been reported to spawn over a gravel bar in a water depth close to 30 feet (Matthews and Moseley 1990).

The bonytail chub was listed by the USFWS as endangered on April 23, 1980 (45 FR 27713), but critical habitat was not designated at that time. In March 1994, the USFWS published its determination of critical habitat for the razorback sucker, Colorado squawfish, humpback chub, and bonytail chub (USFWS 1994b). Designated critical habitat for bonytail chub includes a portion of Lake Mead NRA and is defined as “the Colorado River from Hoover Dam...to Davis Dam...including Lake Mohave up to its full pool elevation” (USFWS 1994b). The bonytail chub continues to suffer decreases in wild populations due to insufficient recruitment of wild-born and reared young adults to compensate for loss of older adults from natural causes. The remaining wild populations are extremely small and loss of the last wild-born individuals is expected within the decade (USFWS 2002).

HISTORIC STRUCTURES AND DISTRICTS

The Mission 66 program was a large-scale effort by the National Park Service to upgrade the national park infrastructure in the period after World War II. The heart of the initiative was the concept of a multifaceted visitor center with space dedicated to such roles as administrative offices, an information desk, restrooms, and exhibits. Mission 66 development also stressed visitor flow through both structures and buildings, but also roads and trails. Architecturally, the Mission 66 era marked a new era in park design as buildings became more modern and less ornamented.

The staff at Lake Mead NRA have identified seven buildings under the Mission 66 era potentially eligible for listing on the NRHP within the areas included in this environmental assessment. All of the buildings are potentially eligible for listing under criteria A (representing significant broad patterns in American history) or criteria C (important in architecture or engineering). The structures potentially eligible for listing include the following.

- Temple Bar Visitor Center
- Alan Bible Visitor Center at Boulder Beach
- Boulder Beach Maintenance Building
- Cottonwood Cove Ranger Station
- Cottonwood Cove Maintenance Building
- Echo Bay Ranger Station
- Echo Wash Bridge
- Las Vegas Wash Ranger Station

These structures represent Mission 66 construction and are less than 50 years old. Typically structures are not eligible for listing until they are at least 50 years old; however, the Temple Bar Visitor Center and the Alan Bible Visitor Center are believed to be eligible without waiting

for 50 years under consideration G due to its exceptional importance and high level of integrity to the Missions 66 era. The building and associated designed landscape, which consists of varied paving patterns and finishes, planters, low walls, and vegetation, retains a high level of integrity and reflects the original planning of Lake Mead NRA. The Temple Bar Visitor Center is the only intact property of its type (secondary visitor center) at the NRA and is considered potentially eligible for the NRHP at this time on the state level.

Like the Temple Bar Visitor Center, the following other properties are potentially eligible for the NRHP after 50 years have passed and are managed as eligible because they exhibit all the character-defining characteristics as defined by the National Park Service. Moreover, the buildings and structures maintain a high level of integrity. Most of the properties have associated designed landscape features.

Lake Mead NRA staff have also identified three Mission 66-era historic districts that would be eligible for listing on the NRHP once 50 years have passed since construction—the Cottonwood Cove Developed Area District, the Temple Bar Developed Area District, and the Katherine Landing Public Services District.

The Katherine Landing Public Services District includes the Katherine Landing picnic area, picnic shelter, picnic comfort station, amphitheater, campground, and associated features. Together, these elements constitute the public service discreet functional area of the Mission 66 development at Katherine Landing, the most southern developed area at Lake Mead NRA.

The Cottonwood Cove Developed Area District includes the ranger station, maintenance building, comfort stations, residences, campground, vehicle circulation, boat launch, and the layout/circulation of the concessioner area. These structures are located in a compact area representing a cohesive planned development.

The Temple Bar Developed Area District is a dispersed district that functions together as a planned module. The district includes the visitor center, campground, comfort stations, amphitheater, boat launch area, airstrip, picnic area, residences, and associated features, including varied paving patterns and finishes, planters, low walls, and vegetation. The Temple Bar residential housing area is a potential contributing resource to a proposed Temple Bar Mission 66 Historic District. Two of the residences in the area have designed landscape back yards that include concrete masonry unit walls, stepped hard edge level changes and square concrete pavers. The back edge of the yards is defined by a low continuous concrete masonry unit wall that separates the residential area from the maintenance area. A short stairway located at the midpoint between the two yards penetrates the wall and leads to the maintenance area. There is a second, higher wall a short distance back, at the edge of the maintenance area, which is a character-defining feature of the overall landscape of the two functional areas. Both residences have a hardscape area defined by large, square concrete pavers placed to create a stepped or saw-tooth-edge paved area in the backyard that serves as a patio. There are two medium size trees behind one of the residences, which are considered as contributing to the setting. The level changes, stairs, walls, and vegetation are character-defining features of the associated landscapes for this area.

CULTURAL LANDSCAPES

As discussed above, each of the historic districts has character-defining features that make up not just a historic district, but also a cultural landscape. In this case, the cultural landscapes for the areas covered in the environmental assessment includes the same area that is included in the historic districts. The structures constructed, including the buildings, walls, roads, and vegetation, reflect the values and traditions of the Mission 66 era. Of particular importance to evaluating potential project-related impacts are the impacts to the vegetation, and to structures associated with the buildings such as pavement, curbing, walls, and planters. The way these features fall on the landscape would need to be preserved during project activities or replaced following completion of project activities to preserve the cultural landscape in the defined historic districts.

WATER QUALITY

Water quality within Lakes Mead and Mohave is threatened by external sources such as Las Vegas Wash and the Virgin and Muddy Rivers, and internal sources such as NRA sewer collection, human sanitation, and gasoline and oil from boats and personal watercraft. Ultimately, the National Park Service has a “duty” under law to protect the waters of Lakes Mead and Mohave. The highest established standard for water quality in both Nevada and Arizona is for swimming (full body contact). Fishing is an important visitor activity, with established water quality standards for fisheries. Lake Mead NRA has adopted these recreational water quality standards as the desired condition for 98% of the NRA. The standard is set at 98%, rather than the desired future goal of 100% because the standards from Las Vegas Wash to a point to the north end of Las Vegas Bay campground do not include swimming or fishing as a beneficial use due to current conditions (NPS 2003).

Lake Mead provides drinking water for the Las Vegas valley, so protecting the water quality of the lake is important. The water intake that delivers drinking water to Las Vegas valley is located at an elevation of 1,050 feet above mean sea level, and the lake surface is usually above 1,280 feet, putting the intake typically at a depth of 230 feet (NPS 2003).

As discussed above, the sewer collection system threatens the quality of water in Lake Mead and Lake Mohave. In the developed areas, waste-generating activities occur close to the lake, so the pristine water quality of Lake Mead and Lake Mohave could be jeopardized if there were a major spill caused by catastrophic failure of one of the mains. Raw sewage leakage is occurring, primarily due to the age of the system, pipe breakage, bad joints, tree root intrusion, and the use of inferior materials during the original installation.

Failure of any force main will virtually shut down all commercial, residential, and recreational use within the development. It could expose visitors and employees and their families to the risk of disease transmission via direct physical contact with raw sewage. Force main failures could undermine roads, buildings, utility lines, or other structures due to high-pressure spray and would likely degrade water quality and cause contamination of the lake water environment and/or public water systems (NPS 2004c).

As a result of these extensive problems with the sewer systems throughout Lake Mead NRA, the Nevada Division of Environmental Protection (NDEP) (the state water pollution control agency for Nevada, empowered to administer and enforce the Nevada Water Pollution Control Law) has drafted a formal consent agreement containing stipulated penalties, which alleges National Park Service violation of state and federal water pollution control requirements. The state of Nevada could impose penalties of as much as \$25,000 per day per violation for not being in conformance with their regulations. NDEP has stated that the only acceptable alternative to the consent agreement and imposing the stipulated fines is to file a lawsuit against the National Park Service (NPS 2004c).

The water distribution systems have also been cited by the Nevada Division of Environmental Protection, Bureau of Safe Drinking Water (formerly the Bureau of Health Protection Services – Office of Public Health Engineering within the Nevada State Health Division) as being in violation of the Regulations Governing Public Water Systems. The distribution systems do not meet state of Arizona or Nevada standards and a reduced use restriction notice or closure notice would be issued for failure to meet these standards.

VISITOR EXPERIENCE

Lake Mead NRA is considered one of the premier water-based recreation areas in the nation with approximately eight to nine million visitors annually. Providing water-based recreational opportunities, while protecting NRA resources, is an important component of the *General Management Plan* (NPS 1986) and the *Lake Mead National Recreation Area Strategic Plan* (2001b). There are six marinas and nine paved launch ramps on Lake Mead and three marinas and four paved launch ramps on Lake Mohave. The marinas include Lake Mead, Las Vegas Bay, Callville Bay, Echo Bay, Overton Beach, and Temple Bar on Lake Mead, and Willow Beach, Cottonwood Cove, and Katherine Landing on Lake Mohave (NPS 2003).

Many of the eight to nine million yearly visitors to Lake Mead NRA are involved in water-based recreational activities between May and September, which are supported at the marina and launch ramp areas. These consist of motorboating, houseboating, sailboarding and sailing, canoeing, kayaking, rafting, waterskiing, wakeboarding, fishing, swimming, SCUBA, use of personal watercraft, picnicking, boat touring, nature study, and camping along the lakeshore. Recreationists also participate in land-based activities such as driving tours, hiking, and camping in National Park Service-managed or concession-operated campgrounds (NPS 2003).

Boulder Basin of Lake Mead and the Katherine Landing area of Lake Mohave are consistently the two busiest developed areas in the NRA. Lake Mead Marina and Lake Mohave Marina at Katherine Landing are the two largest developed areas in the NRA in terms of existing marina slips. Nearly 67% of boaters access Lake Mohave at Katherine Landing, and 26% of boaters access Lake Mead at Callville Bay (NPS 2003).

The proposed action will involve work at eight of the nine marina areas: Boulder Beach, Callville Bay, Cottonwood Cove, Echo Bay, Katherine Landing, Las Vegas Bay, Overton Beach, and Temple Bar. Facilities in these developed areas include:

- marinas with amenities such as boat rentals, stores, boat and vehicle fuel, restaurants and snack bars, dry storage facilities, and dry slips
- lodging for visitors including motels, recreational vehicle campgrounds with hook-ups, and National Park Service campgrounds
- visitor centers and ranger stations
- other support facilities such as fish cleaning stations; dump stations; and restroom, shower, and laundry facilities

Each marina concession operation is served by NPS water systems as metered commercial customers. The individual marinas own, operate, and maintain the water and sewer pumps, piping, drains, vessel pump out systems, fuel storage, pumps and piping, grease traps, oil/water separators, and other devices within the boundary of their assigned area. Concessioner distribution systems provide fresh water for visitor use as drinking water and for cooking and cleaning, downstream of the metered connection with the park systems. Concessioners also have sewer collection systems upstream of the NPS manhole or wetwell, to carry wastewater away from visitor use areas to an National Park Service owned and operated treatment system prior to discharge.

HEALTH AND SAFETY

The sewer collection system is over 50 years old and in deteriorated condition. Failure of any force main would virtually shut down all commercial, residential, and recreational use within the development. It could expose visitors and employees and their families to the risk of disease transmission via direct physical contact with raw sewage or could contaminate fresh water intake areas and the entire developed area's fresh water source. In addition, the force of the spray from a failure could undermine roads, buildings, utility lines, or other structures due to high-pressure spray. Because of the deteriorated condition of the existing sewerlines, frequent repairs are necessary, which expose NRA maintenance staff to raw sewage leaking from broken pipes and contaminating soils. In addition, the NRA maintenance staff is at risk when sewer pipes break due to the hazards of pipeline excavation and working in open trenches during repair activities.

Water supplies are at risk for shortages or contamination from line breaks and backflow. As a result, the fresh water supply for NRA visitors and employees could be temporarily unavailable until repairs are made. In addition, if fresh water becomes contaminated from backflow or line breaks, consuming the water causes the risk of contracting water-borne illness. Fire hydrants are old and inoperable and may not provide adequate water to fight fires within the developed areas. A wildfire or fire to one of the buildings could endanger visitors or NRA employees. Finally, maintenance workers at Lake Mead NRA could be exposed to hazardous materials since the piping used includes leaded joint pipe and asbestos cement pipe.

NATIONAL RECREATION AREA OPERATIONS

During the peak summer season, there are approximately 218 National Park Service employees and 620 concession employees working at Lake Mead NRA. There are approximately 380 permanent, year round concession employees. Less than 25% of the concession employees and less than 30% of the National Park Service employees are residents within the NRA, occupying National Park Service and concessioner housing. Due to the distance between the developed areas, each area maintains separate water supply and distribution systems and handle wastewater as a separate system. At each site, personnel are necessary to handle the maintenance of the deteriorated water and sewer systems. A current shortage of maintenance personnel has impacted the NRA's ability to maintain these systems, even at the most basic level of preventive maintenance. The systems are currently in a constant state of repair. Due to the age of the systems and the lack of construction drawings, locations of piping, valves, manholes, and other components are not always known, increasing response time to make repairs. The system components are over 50 years old and finding appropriate replacement parts is difficult. Park maintenance staff must expend time and money to find these parts or to retrofit or manufacture other parts to fit. The use of electrical power for pumping is also high due to the age of the system and the lack of system efficiencies.

ENVIRONMENTAL CONSEQUENCES

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

METHODOLOGY

Overall, the National Park Service based these impact analyses and conclusions on the review of existing literature and Lake Mead NRA studies, information provided by experts within Lake Mead NRA and other agencies, professional judgments and NRA staff insights, interested local American Indian tribes, and public input.

The following definitions were used to evaluate the context, intensity, type, duration, and cumulative nature of impacts associated with project alternatives:

- *Context.* Context is the setting within which an impact is analyzed such as local, parkwide, or regional. The Council on Environmental Quality requires that impact analysis include discussions of context.
- *Impact Intensity.* Impact intensity is the degree to which a resource would be beneficially or adversely affected. The criteria that were used to rate the intensity of the impacts for each resource topic are presented later in this section under each resource topic heading.
- *Type of Impact.* Impacts can be beneficial or adverse. Beneficial impacts would improve resource conditions while adverse impacts would deplete or negatively alter resources.
- *Duration.* The duration of the impacts in this analysis is defined as short term or long term. The duration for each resource topic is presented later in this section under each resource topic heading.

The following definitions of direct and indirect impacts are considered:

- direct – an effect that is caused by an action and occurs at the same time and place
- indirect – an effect that is caused by an action, but is later in time or farther removed in distance, but still reasonably foreseeable

Potential impacts are described in terms of context, intensity, type, duration, and impairment.

IMPACT INTENSITY

Soils

All available information on soils potentially impacted in the NRA was compiled. Predictions about short- and long-term site impacts were based on previous projects with similar soils and recent studies. The thresholds of change for the intensity of an impact to soils are defined as follows:

| Impact Intensity | Intensity Definition |
|------------------|---|
| Negligible | Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soils would be slight. |
| Minor | The effects to soils would be detectable. Effects to soil area would be small and localized. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful. |
| Moderate | The effect on soils would be readily apparent and result in a change to the soil character over a relatively wide area. Mitigation measures would be necessary to offset adverse effects and likely be successful. |
| Major | The effect on soils would be readily apparent and substantially change the character of the soils over a large area. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed. |

Soil impacts would be considered short term if the soils recover in less than 3 years and long term if the recovery takes longer than 3 years.

Vegetation

All available information on vegetation and vegetative communities potentially impacted along construction zones within Lake Mead NRA was compiled. Where possible, map locations of sensitive vegetation species, populations, and communities were identified. Predictions about short- and long-term site impacts were based on previous projects with similar vegetation and recent studies. The thresholds of change for the intensity of an impact are defined as follows:

| Impact Intensity | Intensity Definition |
|------------------|---|
| Negligible | No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be on a small scale. |
| Minor | The alternative would affect some individual native plants and would also affect a relatively limited portion of that species' population. Mitigation to offset adverse effects could be required and would be effective. |
| Moderate | The alternative would affect some individual native plants and would also affect a sizeable segment of the species' population over a relatively large area. Mitigation to offset adverse effects could be extensive, but would likely be successful. |

| Impact Intensity | Intensity Definition |
|------------------|--|
| Major | The alternative would have a considerable effect on native plant populations and affect a relatively large area in and out of the NRA. Mitigation measures to offset adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed. |

Duration of vegetation impacts is considered short term if the vegetation recovers in less than 3 years and long term if the vegetation takes longer than 3 years to recover.

Wildlife

The National Park Service Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the NRA's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities. According to NPS *Management Policies* (2001), the restoration of native species is a high priority (sec. 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving NRA ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals. Information on Lake Mead NRA wildlife was taken from NRA documents and records. Park natural resources management staff also provided wildlife information. The thresholds of change for the intensity of an impact to wildlife are defined as follows:

| Impact Intensity | Intensity Definition |
|------------------|--|
| Negligible | There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations. |
| Minor | Impacts would be detectable, but they would not be expected to be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be simple and successful. |
| Moderate | Breeding animals of concern are present; animals are present during particularly vulnerable life-stages such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful. |
| Major | Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. |

The duration of wildlife impacts is considered short term if the recovery is less than 1 year and long term if the recovery is longer than 1 year.

Threatened and Endangered Species and Species of Concern

The Endangered Species Act of 1973 (16 USC 1531 *et seq.*), as amended, mandates that all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the National Park Service determines that an action may adversely affect a federally listed species, consultation with the USFWS is required to ensure that the action would not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat. NPS *Management Policies* (2001) states that potential effects of agency actions would also be considered for state or locally listed species.

It is the policy of the National Park Service to manage critical habitat of such species and to perpetuate the natural distribution and abundance of these species as well as the ecosystems upon which they depend. The USFWS was contacted for a list of special-status species and designated critical habitats that may be within the project area or affected by any of the alternatives (appendix B). Information on possible threatened, endangered, and candidate species, as well as species of special concern, was also gathered from published sources. Information from prior research at Lake Mead NRA was also incorporated. Known impacts caused by development and human use were also considered. The thresholds of change for the intensity of an impact are defined as follows:

| Impact Intensity | Intensity Definition |
|------------------|--|
| Negligible | The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a USFWS "may affect, not likely to adversely affect" determination. |
| Minor | The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable, but small and localized and of little consequence. Mitigation measures, if needed to offset the adverse effects, would be simple and successful. This impact intensity equates to a USFWS "may affect, likely to adversely affect" determination. |
| Moderate | Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful. This impact intensity equates to a USFWS "may affect, likely to adversely affect" determination. |
| Major | The action would result in a noticeable effect to viability of a population or individuals of a species or resource or designated critical habitat. Impacts on a special-status species, critical habitat, or the natural processes sustaining them would be detectable, both in and out of the NRA. Loss of habitat might affect the viability of at least some special-status species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. This impact intensity equates to a USFWS "may affect, likely to jeopardize the continued existence of a species or adversely modify critical habitat for a species" determination. |

Special-status species' impacts are considered short term if the species recovers in less than 1 year and long term if it takes longer than 1 year for the species to recover.

Historic Structures and Districts

In order for a structure, building or district to be listed in the NRHP, it must meet one or more of the following criteria of significance: (1) associated with events that have made a significant contribution to the broad patterns of our history; (2) associated with the lives of persons significant in our past; (3) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; (4) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the structure or building must possess integrity of location, design, setting, materials, workmanship, feeling, and association (*National Register Bulletin, How to Apply the National Register Criteria for Evaluation*).

Under 36 CFR 800, *Protection of Historic and Cultural Properties*, “an undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.” For purposes of analyzing potential impacts to historic structures/buildings, the thresholds of change for the intensity of an impact are defined as follows:

| Impact Intensity | Impact Type | Intensity Description |
|------------------|-----------------------|--|
| Negligible | Adverse or Beneficial | Impact is at the lowest levels of detection with neither adverse or beneficial consequences. The determination of effect for section 106 would be <i>no adverse effect</i> . |
| Minor | Adverse | Alteration of a feature(s) would not diminish the overall integrity of the resource. The determination of effect for section 106 would be <i>no adverse effect</i> . |
| | Beneficial | Stabilization/preservation of features in accordance with the <i>Secretary of the Interior’s Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings</i> (1995). The determination of effect for section 106 would be <i>no adverse effect</i> . |
| Moderate | Adverse | Alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for section 106 would be <i>adverse effect</i> . A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate. |
| | Beneficial | Rehabilitation of a structure in accordance with the <i>Secretary of the Interior’s Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings</i> (1995). The determination of effect for section 106 would be <i>no adverse effect</i> . |
| Major | Adverse | Alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for section 106 would be <i>adverse effect</i> . Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b). |

| Impact Intensity | Impact Type | Intensity Description |
|------------------|-------------|--|
| | Beneficial | Restoration of a structure in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings</i> (1995). The determination of effect for section 106 would be <i>no adverse effect</i> . |

Short-term effects are those lasting less than 1 year. Long-term effects are those lasting greater than 1 year or are permanent.

Cultural Landscapes

Cultural landscapes are the result of the long interaction between people and the land, the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land-use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past—a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes; making them a good source of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

In order for a cultural landscape to be listed in the NRHP, it must possess significance (the meaning or value ascribed to the landscape) and have integrity of those features necessary to convey its significance. The character-defining features of a cultural landscape include special organization and land patterns; topography; vegetation; circulation patterns; water features; and structures/buildings, site furnishings, and objects *see the *Secretary of the Interior's Standards for the Treatment of historic Properties with Guidelines for the Treatment of Cultural Landscapes*, 1996). The thresholds of change for the intensity of an impact are defined as follows:

| Impact Intensity | Impact Type | Intensity Description |
|------------------|-----------------------|--|
| Negligible | Adverse or Beneficial | Impact is at the lowest levels of detection with neither adverse or beneficial consequences. The determination of effect for section 106 would be <i>no adverse effect</i> . |
| Minor | Adverse | Alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape. The determination of effect for section 106 would be <i>no adverse effect</i> . |
| | Beneficial | Preservation of landscape patterns and features in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes</i> (1996). The determination of effect for section 106 would be <i>no adverse effect</i> . |

| Impact Intensity | Impact Type | Intensity Description |
|------------------|-------------|--|
| Moderate | Adverse | Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for section 106 would be <i>adverse effect</i> . A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate. |
| | Beneficial | Rehabilitation of a landscape or a pattern(s) or feature(s) of the landscape in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes</i> (1996). The determination of effect for section 106 would be <i>no adverse effect</i> . |
| Major | Adverse | Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for section 106 would be <i>adverse effect</i> . Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b). |
| | Beneficial | Restoration of a landscape or its pattern(s) and feature(s) in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes</i> . The determination of effect for section 106 would be <i>no adverse effect</i> . |

Short-term effects are those lasting less than 1 year. Long-term effects are those lasting greater than 1 year or are permanent.

Water Quality

NPS *Management Policies* (2001) state that the National Park Service will “take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations” (sec. 4.6.3).

A water quality standard defines the water quality goals of a water body by designating uses to be made of the water, by setting minimum criteria to protect the uses, and by preventing degradation of water quality through antidegradation provisions. The antidegradation policy is only one portion of a water quality standard. Part of this policy (40 CFR 131.12(a)(2)) strives to maintain water quality at existing levels if it is already better than the minimum criteria. Antidegradation should not be interpreted to mean that “no degradation” can or will occur, as even in the most pristine waters, degradation may be allowed for certain pollutants as long as it is temporary and short term.

Other considerations in assessing the magnitude of water quality impacts is the effect on those resources dependent on a certain quality or condition of water. Sensitive aquatic organisms, submerged aquatic vegetation, riparian areas, and wetlands are affected by changes in water quality from direct and indirect sources.

Given the above water quality issues and methodology and assumptions, the following impact thresholds were established in order to describe the relative changes in water quality (overall, localized, short and long term, cumulatively, adverse and beneficial) under the management alternatives.

| Impact Intensity | Intensity Definition |
|------------------|---|
| Negligible | Impacts are chemical, physical, or biological effects that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions. |
| Minor | Impacts (chemical, physical, or biological effects) would be detectable, but would be well below water quality standards or criteria and within historical or desired water quality conditions. |
| Moderate | Impacts (chemical, physical, or biological effects) would be detectable, but would be at or below water quality standards or criteria in general; however, water quality standards, historical baseline, or desired water quality conditions would be altered on a periodic basis. |
| Major | Impacts (chemical, physical, or biological effects) would be detectable and would be frequently altered from the historical baseline or desired water quality conditions and/or chemical, physical, or biological water quality standards or criteria would be slightly and singularly exceeded on a regular basis. |

For water quality, if following treatment, water quality recovers in less than 1 year, the impacts are considered short term. If recovery takes longer than 1 year following treatment, the impacts are long term.

Visitor Experience

NPS *Management Policies* (2001) state that the enjoyment of NRA resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate, high-quality opportunities for people to enjoy the parks.

Part of the purpose of Lake Mead NRA is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the NRA’s management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of NRA facilities, services, and appropriate recreational opportunities.

Public scoping input and observation of visitation patterns, combined with an assessment of what is available to visitors under current management, were used to estimate the effects of the actions in the various alternatives of this document. The impact on the ability of the visitor to experience a full range of Lake Mead NRA resources was analyzed by examining resources and objectives presented in the NRA significance statement. The potential for change in visitor experience proposed by the alternatives was evaluated by identifying projected increases or decreases in use of the facilities impacted by the water and sewer system rehabilitation, and other visitor uses, and determining how these projected changes would affect the desired

visitor experience and to what degree and for how long. The thresholds of change for the intensity of an impact to visitor experience are defined as follows:

| Impact Intensity | Intensity Definition |
|-------------------------|--|
| Negligible | The visitor would not be affected or changes in visitor experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative. |
| Minor | Changes in visitor experience would be detectable, although the changes would be slight. Some visitors would be aware of the effects associated with the alternative, but the effects would be slight and not noticeable by most visitors. |
| Moderate | Changes in visitor experience would be readily apparent to most visitors. Visitors would be aware of the effects associated with the alternative and might express an opinion about the changes. |
| Major | Changes in visitor experience would be readily apparent to all visitors; severely adverse or exceptionally beneficial. Visitors would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes. |

Impacts to visitor experience are considered short term if the effects last only as long as the duration of the treatment action (i.e., repair or construction period). Impacts are considered long term if the effects last longer than the duration of the treatment action.

Health and Safety

The impact assessment for health and safety focused on the number of potential individuals impacted and the severity of the impact. The thresholds of change for the intensity of an impact are defined as follows:

| Impact Intensity | Intensity Definition |
|-------------------------|---|
| Negligible | Health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on visitor or employee health and safety. |
| Minor | The effect would be detectable, but would not have an appreciable effect on health and safety. If mitigation were needed, it would be relatively simple and would likely be successful. |
| Moderate | The effects would be readily apparent and would result in substantial, noticeable effects to health and safety on a local scale. Mitigation measures would probably be necessary and would likely be successful. |
| Major | The effects would be readily apparent and would result in substantial, noticeable effects to health and safety on a regional scale. Extensive mitigation measures would be needed, and their success would not be guaranteed. |

The effects to safety are considered short term if the effects last only for the duration of the treatment action (i.e., the repair, work, or construction is completed) and long term if the effects last beyond the duration of the treatment action.

National Recreation Area Operations

NRA operations, for the purpose of this analysis, refers to the quality and effectiveness of the infrastructure, and the ability to maintain the infrastructure used in the operation of the NRA in order to adequately protect and preserve vital resources and provide for an effective visitor experience. This includes an analysis of the condition and usefulness of the facilities and developed features used to support the operations of the NRA. Facilities included in this project include water and sewer systems, and facilities connected to these systems such as comfort stations, dump stations, hose bibs, and utilities, in support of commercial services within the NRA.

| Impact Intensity | Intensity Definition |
|------------------|---|
| Negligible | NRA operations would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on NRA operations. |
| Minor | The effect would be detectable and likely short term, but would be of a magnitude that would not have been an appreciable effect on NRA operations. If mitigation was needed to offset adverse effects, it would be simple and likely successful. |
| Moderate | The effects would be readily apparent, likely long term, and would result in a substantial change in NRA operations in a manner noticeable to staff and to public. Mitigation measures would be necessary to offset adverse effects and would likely be successful. |
| Major | The effects would be readily apparent, long term, and would result in a substantial change in NRA operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed. |

The duration of NRA operations impacts is considered short term if the effects last for the duration of the treatment action and long term if the effects last longer than the duration of the treatment action.

Cumulative Effects

Cumulative effects are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such action. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

The Council on Environmental Quality regulations, which implement 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 nonfederal) or person undertakes such other actions” (40 CFR 1508.7).

Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

Projects that Make Up the Cumulative Impact Scenario

To determine potential cumulative impacts, projects within the area surrounding Lake Mead NRA were identified. Potential projects identified as cumulative actions included any planning or development activity that was currently being implemented or that would be implemented in the reasonably foreseeable future.

These cumulative actions are evaluated in the cumulative impact analysis in conjunction with the impacts of each alternative to determine if they would have any additive effects on a particular natural resource, cultural resource, visitor use, or the socioeconomic environment. Because some of these cumulative actions are in the early planning stages, the evaluation of cumulative effects was based on a general description of the project.

Past Actions

The following past actions could contribute to cumulative effects:

- Rehabilitation of Callville Bay Road and southern portions of Northshore Road – This work included resurfacing the road, reconstruction of shoulders, replacement of culverts, and minor realignment.
- Willow Beach – Replaced sewer collection and treatment system with a new system that utilizes septic tanks, a recirculating sand filter, and subsurface disposal.

Current and Future Actions

Current actions and those projected for the future could also contribute to cumulative effects. These include:

- Rehabilitation of northern segments of Northshore Road – This project would involve resurfacing and doing some realignment of Northshore Road, as well as augment structures in some of the major drainages that these roads cross.
- Rehabilitation of the Overton Beach access road, and the Echo Bay access road – This project would represent a future action proximal to the Overton Beach and Echo Bay project areas. Rehabilitation of these roads is anticipated for 2005–2009, depending on funding.
- Relocation of the pipeline carrying treated effluent from the city of Las Vegas - Currently the treated effluent enters that lake at Las Vegas Bay. At lower water levels the effluent does not mix as well and alternatives are being evaluated to move the discharge to a deeper portion of the lake in the vicinity of Boulder basin.

- Redevelopment work at Willow Beach and the future modernization of campgrounds potentially eligible for listing on the NRHP in the Cottonwood Cove, Temple Bar and Katherine Landing developed areas – The Willow Beach developed area would be completely redeveloped, enhancing flood protection and improving visitor services. The planned modernization of potentially NRHP eligible campgrounds would include improving accessibility and updating features such as comfort stations and camp sites. .

Population growth and associated land-use changes for the region, recreational development within the Lake Mead NRA, improvements to other Lake Mead NRA road segments, threatened and endangered species protection initiatives and programs, and reduced lake levels could also contribute to cumulative effects. A *General Management Plan* amendment is being prepared to address changes in lake access and associated facilities such as launch ramps as water levels decrease. Changes associated with the amendment would occur primarily below the high water line for Lake Mead and have negligible impacts to natural and cultural resources as a result.

IMPAIRMENT OF LAKE MEAD NATIONAL RECREATION AREA RESOURCES OR VALUES

In addition to determining the environmental consequences of the preferred and other alternatives, NPS *Management Policies* (2001) and Director’s Order – 12, require analysis of potential effects to determine if actions would impair Lake Mead NRA resources.

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

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park
- identified as a goal in Lake Mead NRA’s *General Management Plan* or other relevant National Park Service planning documents

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. In this “Environmental Consequences” section, a determination on impairment is made in the conclusion statement of the appropriate impact topics for each alternative. The National Park Service does not analyze recreational values / visitor experience (unless impacts are resource based), socioeconomic values, health and safety, or park operations for impairment.

IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this environmental assessment, impacts to cultural resources (historic structures and cultural landscapes) are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality that implement the NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation’s regulations implementing section 106 of the National Historic Preservation Act (36 CFR Part 800, *Protection of Historic Properties*), impacts to cultural resources were also identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the NRHP; (3) applying the criteria of adverse effect to affected NRHP eligible or listed cultural resources; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under Advisory Council on Historic Preservation regulations a determination of either *adverse effect* or *no adverse effect* must also be made for affected NRHP listed or eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

Council on Environmental Quality regulations and the National Park Service’s *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director’s Order – 12) also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect, as defined by section 106, is similarly reduced. Cultural resources are nonrenewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under section 106 may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis sections. The section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) on NRHP eligible or listed cultural resources only, based on the criterion of effect and criteria of adverse effect found in Advisory Council regulations.

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE A: NO ACTION

Soils

Under the no-action alternative, there would be ongoing impacts to soils from continued pipe breakage and both fresh water and wastewater/untreated sewage leakage. Deteriorated sewerlines would continue to break and leak sewage into surrounding soils contaminating the soils. Fresh water leakage is estimated at over 11 million gallons each year. Both fresh water and wastewater leakage saturates soils and could cause soil erosion or collapse.

Emergency repairs to the water and sewer systems would continue for large leaks and breaks; however, not all leakage would be readily detectable and some leakage would continue on an ongoing basis. Impacts to soils from the breaks and leakage would be short and long term, minor, and adverse.

Over time, wastewater leakage could change soil nutrients by the deposition of sewage in the soil, which may result in changes in plant communities. This would represent a minor, long-term, adverse impact to soils.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect soils include: the rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, rehabilitation of the Overton Beach access road and the Echo Bay access road, and the redevelopment work at Willow Beach. In addition, growth and the associated construction of houses and roads in the Las Vegas area would negatively impact soils. Cumulative impacts from the past, present, and reasonably foreseeable future activities would result in short- and long-term, minor impacts to soils in the region. Implementation of the no-action alternative would result in minor to moderate, short- and long-term, adverse impacts to a localized area, and the overall cumulative impacts to regional soils would be short and long term, minor, and adverse.

Conclusion. Impacts to soils from breaks and leakage would be short and long term, minor, and adverse. The addition of nutrients to the soils through leakage would represent a minor, long-term, adverse impact to soils. The overall cumulative impacts to regional soils would be short and long term, minor, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Vegetation

Under the no-action alternative, ongoing water and sewer system leakage would impact vegetation by creating an artificial water source that plants would rely on for survival. The leakage condition would also influence the type of vegetation present. Possible changes in the current status of vegetative communities, either in terms of species composition or population dynamics, other than those brought about by natural environmental processes, would result from increased water and nutrients leaking from the waterlines and sewerlines. The water released from leakage or pipe breaks would have a minor localized impact on the vegetation where the leakage or pipe break occurs. Some individual plants could be affected, but the impacts would be minor to the population as a whole.

Major water/sewer system breaks would result in erosion and potential loss of vegetation for that area. Maintenance and repair work required for the various pipeline sections and components would result in disturbance to vegetation in order to uncover the pipeline and complete the repairs, should this occur in a vegetated area. Much of the water and sewer systems are in developed areas and buried under asphalt or concrete. Disturbances to vegetation as a result of heavy water flow or repair work would have a minor localized impact on the vegetation in the area where the problem occurs with individual species affected, but only minor effects to the population as a whole.

An inadequate supply of fresh water or inadequate fire hydrants for fire fighting could cause substantial harm to the vegetation through the start and spread of wildfires. Vegetation adjacent to burning buildings could also be affected if the fire could not be controlled due to a lack of hydrants or inoperable hydrants or a lack of water. This would result in a localized, minor to moderate impact on vegetation, depending on the size and extent of the fire.

Overall impacts to vegetation from the no-action alternative would continue to be minor and adverse in both the short and long term. Impacts from a wildfire without adequate supplies of water for fire fighting could be short and long term, minor to moderate, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect vegetation include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, growth in the Las Vegas area would also affect vegetation. Urban development, paving, and grading would continue to contribute to native vegetation loss and replacement with nonnative species. These past, present, and reasonably foreseeable future projects would have a minor to moderate, adverse impact to vegetation in the short and long term. The no-action alternative would provide minor contributions to adverse impacts and overall cumulative impacts would be short and long term, minor to moderate, and adverse.

Conclusion. Overall impacts to vegetation from the no-action alternative would continue to be minor and adverse in both the short and long term. Impacts from a wildfire without adequate supplies of water for fire fighting could be short and long term, minor to moderate, and adverse. The no-action alternative would provide minor contributions to the adverse impacts

and the overall cumulative impacts would be short and long term, minor to moderate, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Wildlife

Wildlife could be impacted by raw sewage leakage. Wildlife could view the raw sewage as a drinking water source and become sick. Wildlife in the vicinity of any pipe breaks could be injured by the flood of water and debris from the force of the water. Wildlife could also be injured or killed by any wildfire or structural fire for which there was inadequate supplies of water for fire fighting. Impacts would be expected to be short and long term, negligible to minor, and adverse. Impacts would be detectable, but they would not be expected to be outside the natural range of variability.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, growth in the Las Vegas area would also affect wildlife. Urban development, paving, and grading would continue to contribute to wildlife habitat degradation and loss. Impacts from the cumulative projects would be short and long term, minor, and adverse. The no-action alternative would contribute negligible to minor, adverse impacts to the cumulative impacts. The overall cumulative impacts would be short and long term, minor, and adverse.

Conclusion. Impacts would be expected to be short and long term, negligible to minor, and adverse. Impacts would be detectable, but they would not be expected to be outside the natural range of variability. The overall cumulative impacts would be short and long term, minor, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Threatened and Endangered Species and Critical Habitat

Like other wildlife, the threatened species (desert tortoise) could be impacted by the leakage of raw sewage. The desert tortoise could view the raw sewage as a drinking water source and

become sick. Tortoises in the vicinity of any pipe breaks could be injured by the flood of water and debris. Tortoises could also be injured or killed by any wildfire or structural fire for which there was inadequate supplies of water for fire fighting. Impacts to desert tortoises would be expected to be short and long term, negligible to minor, and adverse.

The endangered razorback sucker or bonytail chub could potentially be affected by sewerline breaks or ongoing leakage in proximity to the lakeshore, resulting in lake water being contaminated by raw sewage. In this situation, impacts to the razorback sucker and bonytail chub would be expected to be localized, short term, minor, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, development of private land in the vicinity of Las Vegas and its suburbs, and the associated loss and degradation of desert tortoise habitat, is anticipated to continue. Actions on private land including urban development, paving, and grading would continue to contribute to habitat degradation and loss. The cumulative impacts to desert tortoise from past, present, and reasonably foreseeable future actions would be short and long term, minor to moderate, and adverse. The no-action alternative would contribute negligible to minor adverse impacts. The overall cumulative impacts to the desert tortoise would be short and long term, minor to moderate, and adverse.

Cumulative impacts to the razorback sucker and bonytail chub would come from potential increases in sedimentation from construction activities in proximity to the lake, as well as from the inflow from Las Vegas Wash, which carries treated wastewater from Las Vegas and has been the source of potential water quality-related issues. Sedimentation would be minimized through mitigation measures outlined for each construction project. Impacts to these species and their critical habitat in Lake Mead would be expected to be short and long term, minor to moderate, and adverse. The no-action alternative would contribute minor adverse impacts to these cumulative impacts and the overall cumulative impacts to the razorback sucker and bonytail chub would be short and long term, minor to moderate, and adverse.

Conclusion. Impacts to desert tortoises from raw sewage leakage, pipe breaks, and potential wildfires would be expected to be short and long term, negligible to minor, and adverse. Impacts to the razorback sucker and bonytail chub from leakage or discharge of raw sewage into the lake would be expected to be localized, short term, minor, and adverse. The overall cumulative impacts to desert tortoises would be short and long term, minor to moderate, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Historic Structures and Districts

Under the no-action alternative, the historic structures and districts would continue to be served by the existing wastewater and sewage system. There would be no change to the existing conditions and no construction-related impacts. The integrity of the structures and associated features would not be affected. Therefore, there would be no impacts to historic structures and districts from the no-action alternative.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect historic structures and districts include the replacement of the sewer collection and treatment system at Willow Beach; redevelopment of the Willow Beach area; modernization of the campgrounds at Temple Bar, Cottonwood Cove, and Katherine Landing; and rehabilitation of the Echo Bay access road. With the appropriate planned mitigation, the past, present, and reasonably foreseeable future projects would have a short-term negligible to minor adverse effect on historic structures and associated features. Over the long-term, with appropriate planned mitigation these projects would have a negligible adverse effect on historic structures and districts. The no-action alternative would not contribute to cumulative impacts on historic structures and districts.

Conclusion. There would be no impacts to historic structures and districts under the no-action alternative. Because there would be no impacts to historic structures and districts there would be no cumulative impacts as a result of the no-action alternative.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Cultural Landscape

Under the no-action alternative, there would be no construction activities and no changes to the existing cultural landscape. The integrity of the contributing elements of the cultural landscapes of Lake Mead NRA would not be affected. Therefore, there would be no impacts to cultural landscapes from the no-action alternative.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect cultural landscapes primarily relate to the modernization of the campgrounds at Temple Bar, Cottonwood Cove, and Katherine Landing. The modernization guidelines would include mitigation to ensure the cultural landscape is maintained. With the appropriate planned mitigation, the past, present, and reasonably foreseeable future projects would have a short-term, negligible to minor, adverse effect on the cultural landscape. Over the long term, with appropriate planned mitigation, these projects would have a negligible adverse effect on the cultural landscape. The no-action alternative would not contribute to cumulative impacts on the cultural landscape.

Conclusion. There would be no impacts to cultural landscapes under the no-action alternative. There would be no contributions to the cumulative impacts from the no-action alternative.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Water Quality

As a result of extensive problems with the sewer systems throughout the NRA, including frequent pipe breaks, and deteriorated piping and leakage, the NDEP (the state water pollution control agency for Nevada, empowered to administer and enforce the Nevada Water Pollution Control Law) has drafted a formal consent agreement containing stipulated penalties that alleges National Park Service is in violation of state and federal water pollution control requirements.

Under the no-action alternative, water quality would continue to be impacted by the discharge of raw sewage from the deteriorated sewer collection pipe system. The discharges occur either as slow steady leaks or as large flows when a pipe break occurs. The discharge of the untreated wastewater could affect the quality of both surface and groundwater. Water quality impacts would be short term if the break or leakage is discovered and repaired quickly or could continue in the long term if the leakage is unknown. The impacts to water quality would be localized to the area of the discharge, minor to moderate, and adverse.

In addition, although most of the water treatment systems for fresh water have been upgraded to provide state-of-the-art water treatment for potable water, the ability to distribute the potable water without impacts to the quality is compromised by the potential for contamination from deteriorated water mains and valves. The result would be short- and long-term, moderate, adverse impacts to potable water quality as it travels from the treatment facility to the point of use.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect water quality through construction-related sediment generation include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, relocation of the treated effluent discharge from the city of Las Vegas, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, development of private land in the vicinity of Las Vegas and its suburbs could increase sediment in drainages to Lake Mead. All construction activities, on both National Park Service and private lands, would be essential to meet requirements for control of sedimentation. This would limit the potential for impacts from sedimentation to negligible.

Water quality in Lake Mead is also subject to degradation from the inflow from the city of Las Vegas into Las Vegas Wash. Although the line would be moved to discharge into the Boulder basin under a reasonably foreseeable future project, this drainage carries discharge from the

Las Vegas sewer treatment system and has the potential to degrade water quality if water treatment is not functioning properly or if the system has an emergency or unauthorized discharge. Such discharges would be mitigated. The impacts from this inflow would be expected to be short term, localized, minor, and adverse.

Overall cumulative impacts to water quality from past, present, and reasonably foreseeable future activities would be short term, negligible to minor, and adverse. The no-action alternative would contribute short- and long-term, minor to moderate, localized, adverse impacts to the cumulative impacts and the overall cumulative impacts would be short and long term, minor, and adverse for water quality at localized locations within Lake Mead.

Conclusion. The impacts to water quality from raw sewage discharge would be short and long term, localized, minor to moderate, and adverse. The impacts to potable water as it travels from the treatment facility to the point of use would be localized, short and long term, moderate, and adverse. The overall cumulative impacts would be short and long term, minor, and adverse for water quality at localized locations within Lake Mead.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Visitor Experience

The no-action alternative would result in impacts to visitor experience as both the sewer collection and fresh water distribution systems continue to deteriorate. Visitors would experience periodic closure of facilities or water supplies as systems break down and need repair. Visitors would have to travel to another location for services normally provided. Concession operations available to the visitor such as food services or accommodations, could also experience potential short-term closures when fresh water is unavailable or when wastewater cannot be safely disposed. In addition, roads or other areas might require closure for a period of time in order to allow maintenance staff to make repairs by digging up sections of the pipe system. Depending on the length of time required for repairs, impacts would be short term, localized, minor to moderate, and adverse.

The water distribution systems do not meet Arizona or Nevada state standards and a reduced use-restriction or closure notice could be issued for failure to meet these standards. Closure would impact all services to visitors at Lake Mead NRA. Depending on the restrictions or closures that would result from action by Arizona or Nevada, impacts to the visitor experience would be short or long term, localized, minor to moderate, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect visitor experience include rehabilitation of Callville Bay Road and North-shore Road, replacement of the sewer collection and treatment system at Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and Echo

Bay access roads. The road rehabilitation projects could cause visitors to experience traffic delays, although these delays would be kept to a minimum. The replacement of the sewer collection and treatment system at Willow Beach, as well as the redevelopment of the Willow Beach area, would cause temporary short-term inconveniences to visitors at Willow Beach as work occurs in this area, but result in long-term improvements. Overall cumulative impacts to visitor experience from past, present, and reasonably foreseeable future projects would be short term, minor, and adverse, with long-term, minor, beneficial impacts on project completion. The no-action alternative would provide additional localized, short-term, minor to moderate impacts, and the overall cumulative effects would be short term, minor, and adverse.

Conclusion. Impacts to visitor experience from closure of facilities or access routes due to the need for system repairs or to restrictions placed on the site by the states of Arizona or Nevada would be short term, minor to moderate, and adverse. The overall cumulative effects to visitor experience from past, present, and reasonably foreseeable future projects, in conjunction with the no-action alternative, would be short term, minor, and adverse.

Health and Safety

Under the no-action alternative, health and safety would be impacted for both NRA visitors and NRA employees and their families, including both National Park Service staff and concession staff. During the peak summer season, there are approximately 218 National Park Service employees and 620 concession employees working at Lake Mead NRA. Approximately 25% of these employees are residents within the NRA, occupying National Park Service and concessioner housing, some of which share residences with family members. The NRA has completed new water treatment facilities in many locations, but after treatment, the potable water travels through deteriorated pipes for distribution. The deteriorated pipes and valves could cause water contamination of the potable water available to both NRA staff and NRA visitors. In addition, pipes have been placed using materials now considered hazardous such as leaded joint pipe and asbestos-cement pipe. This could lead to health concerns with the potable water for visitors and result in illness.

The deterioration of the sewer collection system also creates health risks for visitors and NRA employees. Visitors would be exposed to raw sewage from pipe breaks and leakage. Park and maintenance staff would be exposed to raw sewage as they work to repair pipe breaks. The raw sewage could also seep into the lake creating a health risk for those swimming nearby. In addition, the lake serves as a fresh water source for the Las Vegas valley and any leakage of sewage close to the intake could potentially draw in contaminated water.

Health risks are considered short term because the water quality is continually monitored—if a problem was found, the risk could be averted through management of the water supply and/or treatment. Health risks as a result of the deteriorated water distribution and sewer collection system would be short term, minor to moderate, and adverse.

Safety would be of concern to both NRA staff and visitors in the event of a structural fire. The fire hydrants are deteriorated and difficult to maintain in operational order. In addition,

adequate water supplies for fighting fires are not available in all areas. The impacts to safety as a result are considered short and long term, minor to moderate, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect health and safety include rehabilitation of Callville Bay Road and North-shore Road, replacement of the sewer collection and treatment system at Willow Beach, relocation of the treated effluent discharge from the city of Las Vegas, and rehabilitation of the Overton Beach and Echo Bay access roads. During road construction projects, there is a negligible potential for adverse safety impacts to workers and visitors as a result of the construction work. Mitigation measures would be employed to minimize these risks. The replacement of the sewer collection system at Willow Beach and relocation of the treated effluent discharge would have localized, long-term, minor, beneficial impacts, but the beneficial impact would be negated by the minor to moderate, adverse impacts from the deteriorated condition of the sewer collection systems throughout the NRA. The no-action alternative would add minor to moderate, short-term, adverse contributions to cumulative effects. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have minor to moderate, short-term, adverse impacts on health and safety.

Conclusion. Health risks as a result of the deteriorated water distribution and sewer collection systems would be short term, minor to moderate, and adverse. The impacts to safety as a result of the no-action alternative are considered short and long term, minor to moderate, and adverse. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have minor to moderate, short-term, adverse impacts on health and safety.

National Recreation Area Operations

Under the no-action alternative, NRA staff would continue to be required to respond to frequent water and sewerline breaks. Park resources would need to be diverted from general routine maintenance to respond to water and sewer system emergencies. There would be temporary delays in services and the potential for traffic detours or road closures while repairs were being made. This would require additional NRA staff to direct visitors to alternate traffic routes or alternate locations for services. In addition, NRA operations would be affected if a building or wild fire should occur and inadequate water supplies are available fire fighting.

The current systems are not standardized throughout the NRA. As a result, parts must be stocked for all the different types of systems present. In addition, NRA maintenance staff must be trained to handle a number of different types of equipment and systems. This training involves both the time and the cost of training. The NRA is currently considered understaffed for these maintenance issues due to the frequency of occurrences and the difficult nature of travel from one NRA developed area to another.

Finally, leakage of fresh water is estimated at 11 million gallons annually. Most of this water has been treated, involving expense to the NRA. This leakage is wasting a resource that is scarce in the desert environment of Lake Mead.

All of these factors combine to make the effects of the no-action alternative short and long term, minor to moderate, and adverse to NRA operations.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect health and safety include rehabilitation of Callville Bay Road and North-shore Road, replacement of the sewer collection and treatment system at Willow Beach, and rehabilitation of the Overton Beach and Echo Bay access roads. These projects would require staff time to monitor. Road projects could potentially increase staff time to travel from one area to another. In addition, the growing population in the Las Vegas area would be expected to increase visitation to Lake Mead NRA, increasing the strain on NRA resources over the long term. These cumulative actions would have a short-term, negligible, adverse, and long-term, minor, adverse impact on NRA operations. The no-action alternative would have short- and long-term, minor to moderate, adverse contributions to cumulative effects. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term, minor to moderate, adverse impacts on NRA operations.

Conclusion. Implementation of the no-action alternative would result in long-term, minor to moderate, adverse impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have long-term, minor to moderate, adverse impacts on NRA operations, at a minimum.

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE B: PREFERRED ALTERNATIVE

Soils

The preferred alternative would generate new disturbance of approximately 3.3 acres across all eight project areas, with new disturbance at any one project area not exceeding 1.5 acres. The project would re-disturb approximately 16.4 acres of upland habitat that was previously disturbed during the initial installation of the water/sewer systems, which occurred 50 to 60 years ago. A total of 1.8 acres of upland habitat would be lost due to development of an unpaved road and or placement of above-ground water storage tanks.

Under the preferred alternative, numerous waterlines and sewerlines would be excavated and replaced. The trenching would disturb soils. Excavated material would be windrowed in the construction zone. Although soil windrowed during construction would be susceptible to some erosion, such erosion would be minimized by placing silt fencing, as required, adjacent to the excavated soil. Excavated soil would be windrowed only as long as it takes to dig the trench and install the replacement waterlines or sewerlines. Once construction is complete and disturbed surfaces recontoured, erosion mats or other erosion-control measures would be used to protect bare, exposed soils from erosion, where appropriate. Excess excavated soil

would be stored in approved areas. Impacts to soils from erosion would be short term and minor.

Soils within the project construction limits would be compacted and trampled by the presence of construction equipment and workers. Local soil compaction would temporarily decrease permeability, alter soil moisture, and diminish the water storage capacity of the soils; however, there would be no long-term effects with salvage of topsoil and adverse effects would be minor. Overall, construction activities would result in short-term, negligible to minor, adverse impacts to soils through disturbance and compaction.

Impacts to soils from water and sewage leakage and from pipe breaks would be eliminated with the pipeline replacements. This would result in a long-term, negligible, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect soils include: the rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system of Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and the Echo Bay access roads. In addition, growth and the associated construction of houses and roads in the Las Vegas area would negatively impact soils. Cumulative impacts from the past, present, and reasonably foreseeable future activities would result in short- and long-term, minor impacts to soils in the region. The preferred alternative would provide short-term, negligible to minor, adverse impacts to the overall cumulative impacts. The cumulative effects of past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short and long term, minor, adverse impacts on soils.

Conclusion. Construction activities would result in short-term, negligible to minor, adverse impacts to soils through disturbance and compaction. Impacts to soils from water and sewage leakage and from pipe breaks would be eliminated with the pipeline replacements. This would result in a long-term, negligible, beneficial impact. The cumulative effects of past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term, minor, adverse impacts on soils.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Vegetation

Under the preferred alternative, numerous waterlines and sewerlines would be excavated and replaced. For new pipeline placement in undisturbed areas or pipeline replacement in areas where the vegetation has re-established, heavy equipment and human activity would impact not just the vegetation over the trench, but would also impact the vegetation in a 25-foot-wide construction zone along the trench. These construction activities in previously undisturbed areas, or in areas where the existing water and sewerline corridor runs cross-country, would

result in short-term, minor, adverse impacts to vegetation. Minor, long-term, beneficial impacts to vegetation would be realized in locations where perennial water and sewer leaks and breaks would be eliminated, returning the ecosystem to a normal moisture and nutrient level, resulting in a normal density and distribution of native plant species. Adequate fire hydrants and water to fight fires would minimize the potential for vegetation to be damaged by a fire and result in a long-term, minor, beneficial impact.

Overall impacts of the preferred alternative on vegetation would be short term, minor, and adverse, and long term, minor, and beneficial.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect vegetation include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, redevelopment of Willow Beach, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, growth in the Las Vegas area would also affect vegetation. Urban development, paving, and grading would continue to contribute to native vegetation loss and replacement with nonnative species. These past, present, and reasonably foreseeable future projects would have a minor to moderate, adverse impact to vegetation in the short and long term. The preferred alternative would contribute minor, short-term, adverse impacts, and minor, long-term, beneficial impacts. The overall cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short and long term, minor to moderate, and adverse.

Conclusion. Overall impacts of the preferred alternative on vegetation would be short term, minor, and adverse, and long term, minor, and beneficial. The overall cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short and long term, minor to moderate, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Wildlife

The preferred alternative would generate new disturbance of approximately 3.3 acres across all eight project areas, with new disturbance at any one project area not exceeding 1.5 acres. The project would re-disturb approximately 16.4 acres of upland habitat that was previously disturbed during the initial installation of the water/sewer systems, which occurred 50 to 60 years ago. A total of 1.8 acres of upland habitat would be lost due to development of an unpaved road or placement of new above-ground water storage tanks.

Noise and human presence during construction activities would cause short-term impacts to wildlife species; however, these impacts would be temporary and wildlife activities would return to normal as construction is completed. During construction, some wildlife, particularly

small mammals and reptiles, would be temporarily displaced. Some individuals would be killed outright. Following project completion, wildlife would reoccupy suitable habitat in the project area. It is likely that certain larger species would avoid the construction corridor during the time construction is taking place in previously undisturbed areas, or when the existing waterlines and sewerlines travel cross-country. Other large species (i.e., common raven) may be more visible as prey species are flushed out or uncovered during ground disturbance or are made available as carrion. These circumstances are expected to have negligible to minor, short-term, adverse impacts on wildlife.

The elimination of raw sewage discharges and pipe breaks would have a long-term, negligible, beneficial impact to wildlife.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment systems at Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, growth in the Las Vegas area would also affect wildlife. Urban development, paving, and grading would continue to contribute to wildlife habitat degradation and loss. Impacts from the cumulative projects would be short and long term, minor, and adverse. The preferred alternative would have a short-term, negligible to minor, adverse impact, and a long-term, negligible, beneficial impact to wildlife. Overall cumulative impacts from past, present, and reasonably foreseeable future actions in combination with the preferred alternative would be short and long term, minor, and adverse.

Conclusion. Construction activities would have negligible to minor, short-term, adverse impacts on wildlife. The elimination of raw sewage discharges and pipe breaks would have a long-term, negligible, beneficial impact to wildlife. Overall cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short and long term, minor, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Threatened and Endangered Species and Species of Special Concern

Based on information received from the USFWS, the special-status species of concern include the desert tortoise, razorback sucker, and bonytail chub.

Desert Tortoise

The preferred alternative would occur in a portion of desert tortoise range where densities are estimated to be low. Potential impacts to individuals and habitat in the project area would be

further minimized through proposed conservation measures. The 1.8 acres of upland habitat that would be lost for tank and road placement in Nevada constitutes marginal habitat at best, and when placed in the context of its proximity to highly developed areas, becomes unsuitable. Conservation measures proposed to further reduce the potential adverse effects associated with project activities include: (1) pre-construction clearance surveys; (2) monitoring, removal, and ingress prevention activities during construction in months when desert tortoises are active; (3) conducting an education program for all project employees; and (4) establishment of a litter control program during construction.

The determination of effect on the desert tortoise as discussed in the biological opinion (appendix C) is “*may affect, likely to adversely affect.*” This determination is equivalent to a short-term, minor, adverse impact.

Desert tortoise populations would benefit from the elimination of raw sewage leakage and from the elimination of pipe breaks. The beneficial impacts would be negligible and long term.

Razorback Sucker and Bonytail Chub

The preferred alternative would have only negligible potential to result in adverse impacts to the razorback sucker or bonytail chub. Potential impacts to individuals of these two fish species would be further minimized through proposed conservation measures such as sediment control. The determination of effect on the razorback sucker and bonytail chub, as outlined in the biological opinion (appendix C), is “*may affect, not likely to adversely affect.*” This is equivalent to short-term, negligible, adverse impacts.

The razorback sucker and bonytail chub would benefit from the elimination of the potential for raw sewage to discharge into the lake. The beneficial impacts would be long term and negligible.

Critical Habitat. Assuming implementation of the conservation measures as previously described, and the flow-through nature of the lake waters, it is not anticipated that the preferred alternative would have any detectable or measurable adverse impact on the critical habitat for the razorback sucker or bonytail chub. However, the preferred alternative would result in conservation of at least 11 million gallons of water per year, and a substantially reduced risk of a major sewage pollution event. These two effects represent long-term, beneficial impacts to critical habitat for these two fish species.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, development of private land in the vicinity of Las Vegas and its suburbs, and the associated degradation and loss of desert tortoise habitat is anticipated to continue. Actions on private land including urban development, paving, and grading would continue to contribute to habitat degradation and loss. The cumulative impacts to desert tortoise from past, present, and reasonably foreseeable future actions would be short and long term, minor to moderate, and adverse. The preferred alternative would contribute minor, adverse impacts. The overall

cumulative impacts to the desert tortoise would be short and long term, minor to moderate, and adverse.

Cumulative impacts to the razorback sucker and bonytail chub would come from potential increases in sedimentation deposited into the lake from construction activities in proximity to the lake, as well as from the inflow from Las Vegas Wash, which carries treated wastewater from Las Vegas and has been the source of potential water quality-related issues. Sedimentation would be minimized through mitigation measures outlined for each construction project. Impacts to these species and their critical habitat in Lake Mead would be expected to be short and long term, minor to moderate, and adverse. The preferred alternative would contribute negligible adverse impacts to these cumulative impacts and the overall cumulative impacts to the razorback sucker and bonytail chub would be short and long term, minor to moderate, and adverse.

Conclusion. The determination of effect for the desert tortoise, as discussed in the biological opinion (appendix C), is “*may affect, likely to adversely affect.*” This determination is equivalent to a short-term, minor, adverse impact. Desert tortoise populations would benefit from the elimination of raw sewage leakage and from the elimination of pipe breaks. The beneficial impacts would be negligible and long term.

The determination of effect for the razorback sucker and bonytail chub, as outlined in the biological opinion (appendix C), is “*may affect, not likely to adversely affect.*” This is equivalent to short-term, negligible, adverse impacts. The razorback sucker and bonytail chub would benefit from elimination of the potential for raw sewage to discharge into the lake. The beneficial impacts would be long term and negligible.

There would be no measurable adverse impact to the critical habitat for the razorback sucker and the bonytail chub. The preferred alternative would result in conservation of at least 11 million gallons of water per year, and in a substantially reduced risk of a major sewage pollution event. These two effects represent long-term beneficial impacts to the critical habitat.

The overall cumulative impacts to the desert tortoise would be short and long term, minor to moderate, and adverse. The overall cumulative impacts to the razorback sucker and bonytail chub would be short and long term, minor to moderate, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA’s establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA’s *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Historic Structures and Districts

Some of the trenching proposed in this project may impact the landscaping, paving, and/or walls associated with Temple Bar Visitor Center, Echo Bay ranger station, Las Vegas Wash ranger station, and Boulder Beach maintenance building. There is potential danger of

undermining the walls or causing collapse by removing portions of the walls, and there is the possibility that other historic fabric of the designed landscape may be removed or replaced. Fire hydrants would be replaced in the vicinity of the Boulder Beach maintenance building. Backflow preventers would be installed in the vicinity of the Temple Bar Visitor Center. The replacement of fire hydrants and backflow prevention devices would not be so obtrusive as to affect the integrity of the historic buildings. With mitigation, including the replacement of vegetation and other features in-kind, the use of orange caution construction fencing to close/mark areas that need to be avoided by construction and equipment, and avoiding the removal of historic fabric, effects to the historic structure would be long term, adverse, and negligible to minor, depending on the extent to which elements contributing to the historic integrity of the historic structures could be avoided.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect historic structures and districts include the replacement of the sewer collection and treatment system at Willow Beach; redevelopment of the Willow Beach area; modernization of the campgrounds at Temple Bar, Cottonwood Cove, and Katherine Landing; and rehabilitation of the Echo Bay access road. With the appropriate planned mitigation, the past, present, and reasonably foreseeable future projects would have a negligible to minor, adverse effect on historic structures and districts. The preferred alternative would contribute negligible to minor adverse impacts to historic structures. Overall cumulative impacts to historic structures and districts would be negligible to minor and adverse.

Conclusion. With mitigation, the impacts to historic structures from the preferred alternative would be long term, negligible to minor, and adverse. Overall cumulative impacts to historic structures and districts would be negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Section 106 Summary. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preferred alternative would have *no adverse effect* on Lake Mead NRA historic structures and districts.

Cultural Landscapes

The trenching associated with the preferred alternative may affect the landscaping, paving, curbing, and/or walls that contribute to the Cottonwood Cove Developed Area District, Katherine Landing Public Service District, and the Temple Bar Developed Area District. Potential effects could range from the removal of historic fabric of the cultural landscapes to damage of features contributing to the integrity of the landscapes. Fire hydrants would be replaced or moved in the vicinity of the Katherine Landing Public Service District and the Cottonwood Cove Developed Area District. Backflow preventers would be installed in the

vicinity of the upper campground at Cottonwood Cove and the Katherine Landing Public Service District. The replacement of fire hydrants and backflow prevention devices would not be so obtrusive as to affect the integrity of the cultural landscapes. Landscaping, pavement, and curbing could be temporarily removed; however, all features would be replaced in kind. With mitigation, including the replacement of vegetation and other features in kind, the use of orange caution construction fencing to close/mark areas that need to be avoided by construction and equipment, and avoiding the removal of historic fabric, effects to the cultural landscapes would be short term, adverse, and negligible to minor, depending on the extent to which contributing features could be avoided.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect cultural landscapes primarily relate to the modernization of campgrounds at Temple Bar, Cottonwood Cove, and Katherine Landing. The modernization guidelines would include mitigation to ensure the cultural landscape is maintained. With the appropriate mitigation, the past, present, and reasonably foreseeable future projects would have a short-term, negligible to minor, adverse effect on cultural landscapes. The preferred alternative would contribute short-term, negligible to minor, adverse impacts, and the overall cumulative impacts would be short term, negligible to minor, and adverse.

Conclusion. With mitigation, the impacts to historic structures from the preferred alternative would be short term, minor, and adverse. The overall cumulative impacts would be short term, negligible to minor, and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Section 106 Summary. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preferred alternative would have *no adverse effect* on Lake Mead NRA historic districts and cultural landscapes.

Water Quality

The preferred alternative would provide a long-term solution to the current water quality issues that the NDEP has indicated constitute a potential violation of water pollution regulations. The discharge of raw sewage as a result of the deteriorated pipeline system breaks and leakage would be eliminated. In addition, the impacts to potable water as a result of the deteriorated distribution system would be eliminated, and water quality improvements would result. The impacts to water quality from the preferred alternative would be long term, minor to moderate, and beneficial.

Construction activities have the potential to affect water quality in the short term. Impacts would be mitigated through the implementation of best management practices to control

sediment discharges from the construction areas. With the implementation of these sediment control measures, the short-term construction-related impacts to water quality would be negligible and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect water quality through construction-related sediment generation include: rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, relocation of the treated effluent discharge for the city of Las Vegas, and rehabilitation of the Overton Beach and Echo Bay access roads. In addition, development of private land in the vicinity of Las Vegas and its suburbs could increase sediment in drainages to Lake Mead. All construction activities, on both National Park Service and private lands would be required to meet requirements for control of sedimentation. This would limit the potential for impacts from sedimentation to negligible.

Water quality in Lake Mead is also subject to degradation from the inflow of treated effluent from the Las Vegas sewer treatment system and has the potential to degrade water quality if water treatment is not functioning properly or if the system has an emergency or unauthorized discharge. Such discharges would be mitigated. The impacts from this inflow would be expected to be short term, localized, minor, and adverse.

Overall cumulative impacts to water quality from past, present, and reasonably foreseeable future activities would be short term, negligible to minor, and adverse. The impacts to water quality from the preferred alternative would be long term, minor to moderate, and beneficial, and short term, negligible, and adverse. Overall cumulative impacts of the past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short term, negligible to minor, and adverse, and long term, minor to moderate, and beneficial.

Conclusion. The impacts to water quality from the preferred alternative would be long term, minor to moderate, and beneficial. With the implementation of sediment control measures, the short-term construction-related impacts to water quality would be negligible and adverse. Overall cumulative impacts of the past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short term, negligible to minor, and adverse, and long term, minor to moderate, and beneficial.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the NRA's establishing legislation, (2) key to the natural or cultural integrity of the NRA or to opportunities for enjoyment of the NRA, or (3) identified as a goal in the NRA's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of NRA resources or values.

Visitor Experience

During construction, visitors would experience some inconveniences when certain water and/or sewer systems are not operational, resulting in comfort stations, dump stations, and commercial services that are not operational. Construction would introduce visual, audible, and atmospheric intrusions, which could reduce the quality of the visitor experience during

the construction period. However, such impacts would be localized and temporary, lasting only as long as construction. As a result, construction-related impacts to visitor experience would be short term, minor, and adverse in nature.

Upon completion of the preferred alternative, the repaired water and sewer systems would result in improved conditions by reducing future closures due to breakage and need for repair, and increasing the number of fire hydrants and hose bibs. Although it is not anticipated that the system condition would have any impact on visitation numbers, the experience would be improved over current conditions and result in a long-term, minor, and beneficial effect.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect visitor experience include rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, redevelopment of the Willow Beach area, and rehabilitation of the Overton Beach and Echo Bay access roads. The road rehabilitation projects could cause visitors to experience traffic delays, although these delays would be kept to a minimum. The replacement of the sewer collection and treatment system at Willow Beach and redevelopment of the Willow Beach area would cause temporary short-term inconveniences to visitors at Willow Beach as work occurs on these systems, but result in long-term improvements. Overall cumulative impacts to visitor experience from past, present, and reasonably foreseeable future projects would be short term, minor, and adverse, and long term, minor, and beneficial. The preferred alternative would contribute short-term, minor, adverse, and long-term, minor, beneficial impacts to the cumulative impacts and the resulting overall cumulative impacts would be short term, minor, and adverse, and long term, minor, and beneficial.

Conclusion. The preferred alternative would have short-term, minor, adverse impacts during the construction phase. Upon completion of construction, there would be long-term, minor, beneficial effects on visitor experience. The overall cumulative impacts would be short term, minor, and adverse, and long term, minor, and beneficial.

Health and Safety

Rehabilitation of the water systems would result in fewer waterline breaks, significantly reducing the probability of water supply contamination from raw sewage. In addition, the new water distribution pipelines would reduce the potential for treated water to become contaminated during transport. Rehabilitation of sewer systems would result in fewer sewerline breaks that would have to be repaired by NRA maintenance staff, significantly reducing the exposure of maintenance staff to raw sewage. The improvements to the fire hydrants and fire fighting water supplies would result in a beneficial impact to overall safety. The overall systems improvements would result in a long-term, moderate, beneficial impact to health and safety.

Worker safety would be a concern during construction, but with education on safe operating practices, the impacts to worker safety from construction would be short term, negligible, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect health and safety include rehabilitation of Callville Bay Road and North-

shore Road, replacement of the sewer collection and treatment system at Willow Beach, and rehabilitation of the Overton Beach and Echo Bay access roads. During road construction projects, there is a negligible potential for adverse safety impacts to workers and visitors as a result of the construction work. Mitigation measures would be employed to minimize these risks. The replacement of the sewer collection system at Willow Beach would have a long-term, minor, beneficial impact in this area, but this beneficial impact would be negated by the minor to moderate, adverse impacts from the deteriorated condition of the remainder of the sewer collection systems throughout the NRA. The preferred alternative would contribute short-term, negligible, adverse impacts, and long-term, moderate beneficial impacts. The overall cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short term, negligible, and adverse, and long term, minor to moderate, and beneficial.

Conclusion. The overall systems improvements would result in a long-term, moderate, beneficial impact to health and safety. Worker safety would be a concern during construction, but with education on safe operating practices, the impacts to worker safety from construction would be short term, negligible, and adverse. The overall cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would be short term, negligible, and adverse, and long term, minor to moderate, and beneficial.

National Recreation Area Operations

Rehabilitation of the water and sewer systems would result in fewer water and sewerline breaks, substantially reducing the number of repairs that need to be made by NRA maintenance staff, substantially increasing the time and resources available for general maintenance and upkeep, or other preventive maintenance. Additional system components installed as a part of the project, such as backflow prevention devices, would require regular testing. However the additional workload associated with these components would be more than offset by the time savings realized through replacement of deteriorated components that require constant maintenance.

Increased domestic water use is not expected from the preferred alternative. Elimination of water leaks would reduce the amount of water that requires treatment by at least 11 million gallons of water per year, reducing energy and other costs, freeing up operational funding that can be redirected within the NRA. In addition, having a system with all similar components would reduce the parts inventory necessary, as well as maintenance staff training requirements. These improvements constitute a long-term, moderate, beneficial impact to NRA operations.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions with the potential to affect health and safety include rehabilitation of Callville Bay Road and Northshore Road, replacement of the sewer collection and treatment system at Willow Beach, and rehabilitation of the Overton Beach and Echo Bay access roads. These projects would require staff time to monitor. Road projects could potentially increase staff time to travel from one area to another. In addition, the growing population in the Las Vegas area would be expected to increase visitation to the NRA, increasing the strain on NRA resources over the long term.

These cumulative actions would have a short-term, negligible, adverse, and long-term, minor, adverse impact on NRA operations. The preferred alternative would result in a long-term, moderate, beneficial impact to NRA operations. Cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would have short term, negligible, and adverse, and long term, minor, and beneficial impacts.

Conclusion. The preferred alternative would have long-term, moderate, beneficial impacts on NRA operations. Cumulative impacts from past, present, and reasonably foreseeable future actions, in combination with the preferred alternative, would have short-term, negligible, and adverse, and long-term, minor, and beneficial impacts.

CONSULTATION AND COORDINATION

SCOPING

Scoping is the effort to involve agencies and the general public in determining the scope of issues to be addressed in the environmental assessment. Among other tasks, scoping determines important issues and eliminates issues not important; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related projects and associated documents; identifies other permits, surveys, consultations, etc., required by other agencies; and creates a schedule that allows adequate time to prepare and distribute the environmental assessment for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise (including the Advisory Council on Historic Preservation, the Nevada and Arizona SHPOs, and American Indian tribes) to obtain early input.

Staff of Lake Mead NRA, the Federal Highway Administration, and resource professionals of the National Park Service, Denver Service Center, conducted internal scoping. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the proposed action to other planning efforts at the NRA.

A press release (appendix A) initiating scoping and describing the proposed action was issued on March 19, 2004. Comments were solicited during a public scoping period that ended April 22, 2004. No comments were received. The public and American Indian groups traditionally associated with the lands of Lake Mead NRA will also have an opportunity to review and comment on this environmental assessment.

COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

For the no-action alternative, no permits would be required.

The undertakings described in this document are subject to section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*). Consultation with the Arizona and Nevada SHPOs would occur prior to implementation of the project.

In accordance with section 7(c) of the Endangered Species Act of 1973, as amended (16 USC 1531 *et seq.*), it is the responsibility of the federal agency proposing the action (in this case the National Park Service) to determine whether the proposed action would adversely affect any listed species or designated critical habitat. The National Park Service submitted a biological assessment to the USFWS documenting the likely effects to the desert tortoise, razorback sucker, and bonytail chub. The National Park Service made a determination that the proposed project *may affect and is likely to adversely affect* the desert tortoise, and a determination that the proposed project *may affect and is not likely to adversely affect* the razorback sucker. In a

biological opinion issued in June 2005, the USFWS concurred with this determination (appendix C).

The National Park Service preferred alternative, would comply with Executive Order 11988 (*Floodplain Management*) and the Fish and Wildlife Coordination Act of 1934, Public Law 85-624, as amended (16 USC §§ 661-666c). The following approvals and permits from jurisdictional agencies could be required before the preferred alternative could be implemented.

- U.S. Army Corps of Engineers, Nationwide or Individual Permit (as appropriate), pursuant to section 404 of the Clean Water Act, for minor discharge of dredged or fill material in waters of the United States.
- Arizona Department of Environmental Quality, State Water Quality Certification, pursuant to section 401 of the Clean Water Act.
- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Quality Planning, Water Quality Certification, pursuant to section 401 of the Clean Water Act.
- Arizona Department of Environmental Quality's Arizona Pollution Discharge Elimination System Construction General Permit for authorization to discharge stormwater associated with construction activity under the National Pollutant Discharge Elimination System.
- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control, General Construction Stormwater Permit for authorization to discharge stormwater associated with construction activity under the National Pollutant Discharge Elimination System.
- Nevada and Arizona SHPOs – Concurrence that no historic properties would be affected and that effects from the project on historic and archeological resources have been taken into account, in accordance with section 106 of the National Historic Preservation Act.
- U.S. Fish and Wildlife Service, consultation regarding threatened and endangered species, in compliance with section 7 of the Endangered Species Act of 1973, as amended.

LIST OF NATIONAL PARK SERVICE CONTACTS AND DOCUMENT PREPARERS

This environmental assessment was prepared by engineering-environmental Management, Inc., under the direction of the National Park Service. Denver Service Center and Lake Mead National Recreation Area staff provided invaluable assistance in the development and technical review of this environmental assessment. National Park Service staff that was consulted includes:

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Steve Daron – Archeologist
Steve Spearman – Utility Systems Leader

National Park Service – Denver Service Center

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APPENDIX A: NATIONAL PARK SERVICE PRESS RELEASE



National Park Service
U.S. Department of the Interior

Lake Mead
National Recreation Area

601 Nevada Highway
Boulder City, NV 89005

702 293-8907
702 293-8936

Lake Mead NRA News Release

March 19, 2004
For Immediate Release
Roxanne Dey, (702) 293-8947
roxanne_dey@nps.gov
Release #: 18-04

Environmental Assessment Being Prepared for Rehabilitation of the Water Distribution Systems and Wastewater Collection Systems at Lake Mead National Recreation Area

Officials at Lake Mead National Recreation Area are soliciting public comments on the proposed project to rehabilitate the water distribution systems and wastewater collection systems within Lake Mead National Recreation Area.

The National Park Service is proposing to rehabilitate the water distribution systems and wastewater systems in nine developed areas within Lake Mead National Recreation Area because of the deteriorating condition of these systems. Rehabilitation of the park-wide water and wastewater systems is necessary to improve safety and health conditions by providing a safe and reliable public drinking water supply, and to provide adequate fire safety for park visitors and park and concessioner employees. This project is also necessary to comply with water systems regulations and plumbing fire codes. Implementation of this project would protect Lake Mead and Lake Mohave from raw sewage contamination, reduce water consumption, and reduce labor and material costs required to maintain the deteriorating, out-of-date systems.

Rehabilitation of the water distribution systems would include all work associated with replacing approximately 153,000 linear feet of 6-inch, 8-inch, and 10-inch water mains. Rehabilitation of the 50- to 70- year old wastewater collection systems would consist of replacing all force mains, gravity sewer mains, and manholes.

The National Park Service is in the process of preparing an environmental assessment to identify and evaluate feasible alternatives, including no action, for this proposal. As a result, Lake Mead National Recreation Area is seeking public feedback on the issues and potential alternatives. Written comments should be sent by April 22, 2004 to: Superintendent, Lake Mead National Recreation Area, Attention: Compliance Office, 601 Nevada Way, Boulder City, Nevada 89005.

Lake Mead National Recreation Area is a unit of the National Park Service.

• -NPS-

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The National Park Service cares for special places saved by the American people so that all may experience our heritage.

APPENDIX B: CONSULTATION AND COORDINATION LETTERS



United States Department of the Interior

U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 FAX: (602) 242-2513



In Reply Refer to:

AESO/SE
02-21-04-I-0366

August 9, 2004

Memorandum

To: Superintendent, Lake Mead National Recreation Area, National Park Service,
Boulder City, Nevada (Attn: William Dickenson)

From: Field Supervisor

Subject: Proposal to Replace Water Distribution Systems and Sewer Collection Systems Park-
wide in the Lake Mead National Recreation Area

Thank you for your recent request for information on threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may occur in your project area. The Arizona Ecological Service Field Office has posted lists of the endangered, threatened, proposed, and candidate species occurring in each of Arizona's 15 counties on the Internet. Please refer to the following web page for species information in the county where your project occurs: <http://arizonaes.fws.gov>

If you do not have access to the Internet or have difficulty obtaining a list, please contact our office and we will mail or fax you a list as soon as possible.

After opening the web page, find County Species Lists on the main page. Then click on the county of interest. The arrows on the left will guide you through information on species that are listed, proposed, candidates, or have conservation agreements. Here you will find information on the species' status, a physical description, all counties where the species occurs, habitat, elevation, and some general comments. Additional information can be obtained by going back to the main page. On the left side of the screen, click on Document Library, then click on Documents by Species, then click on the name of the species of interest to obtain General Species Information, or other documents that may be available. Click on the cactus icon to view the desired document.

Please note that your project area may not necessarily include all or any of the species in a list. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Under the General Species Information, citations for the Federal Register (FR) are included for each listed and proposed species. The FR is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be

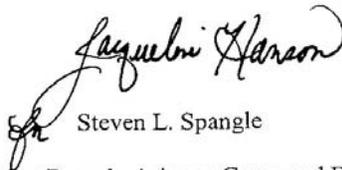
needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency will need to request formal consultation with us. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency will need to enter into a section 7 conference. The county list may also contain candidate species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, we recommend the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona and some of the Native American Tribes protect some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species, or contact the appropriate Native American Tribe to determine if sensitive species are protected by Tribal governments in your project area. We further recommend that you invite the Arizona Game and Fish Department and any Native American Tribes in or near your project area to participate in your informal or formal Section 7 Consultation process.

For additional communications regarding this project, please refer to consultation number 02-21-04-I-0366. We appreciate your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Brenda Smith (928) 226-0614 (x101) for projects in Northern Arizona, Tom Gatz (602) 242-0210 (x240) for projects in central Arizona and along the Lower Colorado River, and Sherry Barrett (520) 670-6150 (x223) for projects in southern Arizona.



Steven L. Spangle

cc: Bob Broscheid, Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

W:\Cathy Gordon\species list letters\National Park Service Lake Mead Water Distribution Systems and Sewer Collection Systems Park Wide.doc.cgg



United States Department of the Interior

FISH AND WILDLIFE SERVICE
 Nevada Fish and Wildlife Office
 1340 Financial Boulevard, Suite 234
 Reno, Nevada 89502
 (775) 861-6300 ~ Fax: (775) 861-6301



August 30, 2004
 File Number 1-5-04-SP-518

Memorandum

To: Superintendent, Lake Mead National Recreation Area, Boulder City, Nevada

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Updated Species List for the Proposed Parkwide Water Distribution System and Sewer Collection System Replacement, Lake Mead National Recreation Area, Clark County, Nevada

This is in response to your letter received on June 24, 2004, regarding the replacement of the water distribution and sewer collection system at nine developed areas on the Lake Mead National Recreation Area, Clark County, Nevada and Mohave County, Arizona. The following federally listed species may occur in or near the vicinity of the subject project area in Clark County, Nevada:

- Desert tortoise (*Gopherus agassizii*) (Mojave population), threatened
- Razorback sucker (*Xyrauchen texanus*), endangered, critical habitat
- Bonytail chub (*Gila elegans*), endangered, critical habitat

This list fulfills the requirement of the Fish and Wildlife Service (Service) in Nevada to provide information on listed species pursuant to section 7(c) of the Endangered Species Act of 1973, as amended (Act), for projects that are authorized, funded, or carried out by a Federal agency. It is our understanding that a separate species list will be requested for Mohave County, Arizona from the Service's Flagstaff office.

Based on the information provided in your correspondence, the proposed project is within the range of the threatened desert tortoise. However, designated critical habitat for the desert tortoise does not occur within the proposed project area. The endangered razorback sucker occurs within lakes Mead and Mohave, which are designated critical habitat. Erosion or runoff from the proposed project may terminate with lakes Mead and Mohave. Since this project may cross wash areas, we ask that you be aware of potential impacts project activities may have on waters of the United States. Discharge of dredged or fill material into wetlands or waters of the United States is regulated by the Army Corps of Engineers pursuant to section 404 of the Clean

Superintendent

File No. 1-5-04-SP-518

Water Act. We recommend you contact the Regulatory Section of the Army Corps of Engineers, St. George Regulatory Office (321 North Mall Drive, Suite L-101, St. George, UT 84790-7314, 435-986-3979) regarding the possible need for a permit.

The Nevada Fish and Wildlife Office no longer provide species of concern lists. Most of these species for which we have concern, are also on the sensitive species list for Nevada maintained by the State of Nevada's Natural Heritage Program (Heritage). Instead of maintaining our own list, we are adopting Heritage's sensitive species list and partnering with them to provide distribution data and information on the conservation needs for sensitive species to agencies or project proponents. The mission of Heritage is to continually evaluate the conservation priorities of native plants, animals, and their habitats, particularly those most vulnerable to extinction or are in serious decline. Consideration of these sensitive species and exploring management alternatives early in the planning process can provide long-term conservation benefits and avoid future conflicts.

For a list of sensitive species by county, visit Heritage's website at www.heritage.nv.gov. For a specific list of sensitive species that may occur in the project area, you can obtain a data request form from the website or by contacting Heritage at 1550 East College Parkway, Suite 137, Carson City, NV 89706, 775-687-4245. Please indicate on the form that your request is being obtained as part of your coordination with the Service under the Endangered Species Act. During your project analysis, if you obtain new information or data for any Nevada sensitive species, we request that you provide the information to Heritage at the above address.

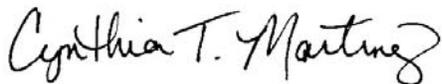
Also, we are concerned that the proposed project may impact plant species listed as sensitive under the Heritage Program. These species may also be listed as critically endangered by the State of Nevada under Nevada Revised Statutes (NRS) 527.260-300. For these species, no member of its kind may be removed or destroyed at any time by any means except under special permit issued by the State Forester (NRS 527.270). It should be noted that many of the plant species on the State's critically endangered list are not federally listed by the Service because of the protection afforded to them under the State law. Consideration of these species during project impact evaluation and planning, as well as early coordination with the State, is important to assist with species conservation efforts and to prevent the need for Federal listing actions in the future.

Finally, based on the Service's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703 et seq.), we are concerned about potential impacts the proposed project may have on migratory birds in the project area. Direct impacts to migratory birds on project lands, and indirect impacts to migratory birds on adjacent areas, should be considered during project evaluation.

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File No. 1-5-04-SP-518

Please reference File No. 1-5-04-SP-518 in future correspondence concerning this species list. If you have any questions regarding this correspondence or require additional information, please contact Shawn Goodchild in our Southern Nevada Field Office at (702) 515-5230.


for Robert D. Williams

APPENDIX C: BIOLOGICAL OPINION



United States Department of the Interior

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JUN 22 2005

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June 3, 2005
 File No. 1-5-05-F-420

Memorandum

To: Superintendent, Lake Mead National Recreation Area, National Park Service,
 Boulder City, Nevada

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Biological Opinion for the Park-wide Replacement of Water Distribution and
 Sewer Collection Systems within Lake Mead National Recreation Area, Clark
 County, Nevada, and Mohave County, Arizona

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the subject project and its effects on the federally listed as endangered razorback sucker (*Xyrauchen texanus*) and bonytail chub (*Gila elegans*), and their designated critical habitat, and the threatened desert tortoise (*Gopherus agassizii*) (Mohave population), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*).

We concur with the National Park Service's (NPS) determination that the proposed project is *not likely to adversely affect* the razorback sucker or bonytail chub, and will not adversely modify critical habitat for the razorback sucker or bonytail chub. This concurrence is based on review of the description of the proposed action, minimization measures for the species as described in the biological assessment, and available biological data. This response regarding these species of fish constitutes informal consultation under regulations promulgated in 50 CFR § 402.14, which establish procedures governing interagency consultation under section 7 of the Act. This informal consultation does not authorize any take of razorback sucker or bonytail chub. No designated desert tortoise critical habitat would be affected by the proposed project, and therefore will not be further analyzed. However, the proposed project will adversely affect the desert tortoise, and the biological opinion that follows addresses those effects and comprises the remainder of this document.

The following biological opinion is based on information provided in your biological assessment dated December 2004 (NPS 2004), and our files. A complete administrative record of this

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consultation is on file in the Service's Southern Nevada Field Office, Las Vegas, Nevada. Your December 13, 2004, request for initiation of consultation was received on December 15, 2004, at which time we initiated formal consultation.

A. CONSULTATION HISTORY

June 24, 2004 – The Lake Mead National Recreation Area (NRA) requested a species list from the Service's Nevada Fish and Wildlife Office and the Arizona Ecological Services Field Office regarding the Park-wide replacement of water distribution and sewer collection systems.

August 9, 2004 – The Arizona Ecological Services Field Office responded to the species list request with a notification to obtain listed species from their web page.

August 30, 2004 – The Southern Nevada Field Office, Las Vegas, Nevada responded to the species list request with a species list and a recommendation to contact the Nevada State Heritage program to obtain a list of sensitive species.

December 15, 2004 – The Southern Nevada Field Office received the biological assessment (NPS 2004) regarding the project.

January 28, 2005 – The Southern Nevada Field Office sent a memo indicating receipt of biological assessment and associated consultation start date of December 15, 2004.

B. BIOLOGICAL OPINION

I. Description of the Proposed Action

a. Proposed Action and Action Area

The NPS, Lake Mead NRA proposes to renovate and improve water distribution and wastewater collection systems at eight developed sites, including Boulder Beach, Callville Bay, Cottonwood Cove, Echo Bay, Las Vegas Bay, and Overton Beach, Clark County, Nevada, as well as Katherine Landing and Temple Bar, Mohave County, Arizona (Figure 1). Water distribution systems, ranging from water mains and other delivery systems, to drip irrigation, would be replaced and built to existing construction code. Structures, such as large-capacity water storage tanks, would be constructed to increase capacity of the system to support 8-9 million visitors per year. Sewer collection systems, and associated structures such as pipelines and manholes, would be replaced to increase capacity and reliability.

Heavy equipment, such as backhoes, would be used primarily to excavate and remove existing sewer and water components, as well as cut trenches to place new lines. A portion of the sewer

DESCRIPTION OF THE PROPOSED ACTION

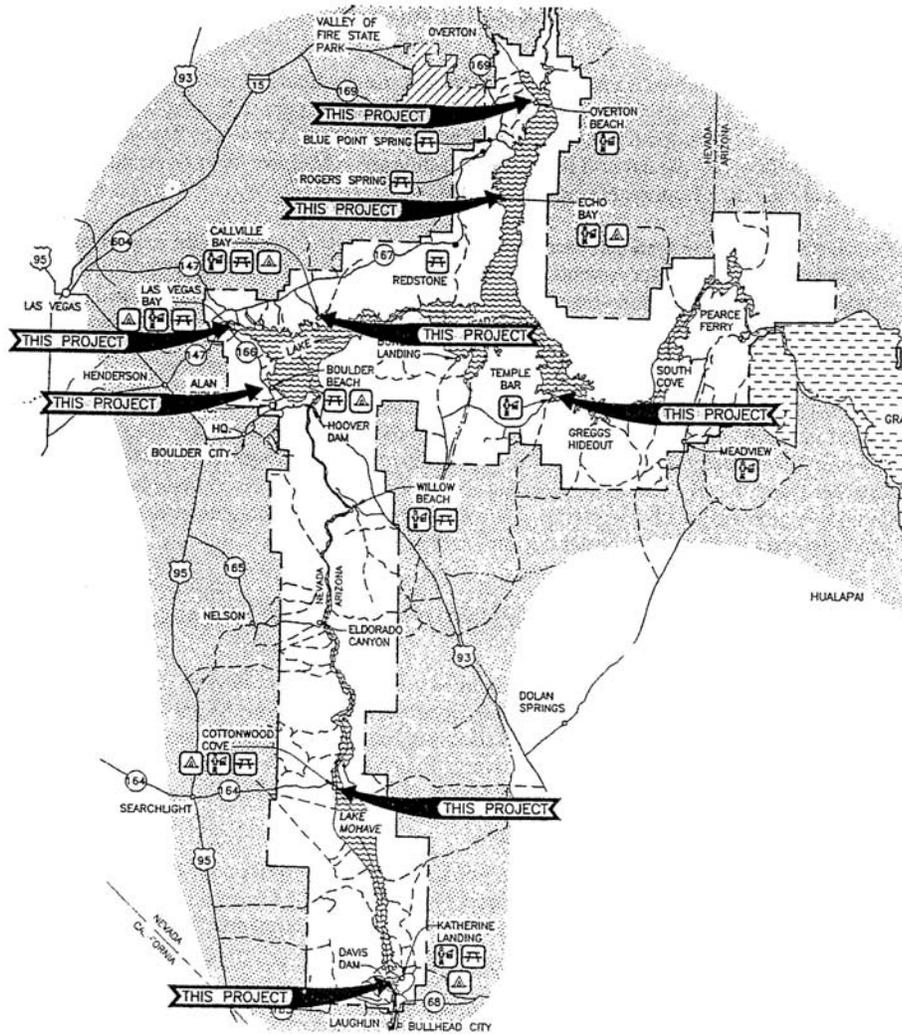


FIGURE 1. MAP OF PROPOSED WATER / SEWER PROJECTS WITHIN LAKE MEAD NRA

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system would be slip-lined with new pipe, reducing the need to excavate. Slip-lining consists of feeding a new liner pipe into the old, which does not need to be removed or excavated. It is unknown the extent of the slip-lining; however, lengths of sewer line would be individually evaluated and slip-lining would be used to the maximum extent possible. Old piping and other components would be removed and disposed, and trenches would be immediately backfilled upon placement of new structure, compacted, and restored to native habitat. To reduce disturbance, a portion of the old pipes would be left in place, capped, and abandoned. Work is anticipated to be initiated in February 2006, and last for 18 months.

The area of activity consists of a 25-foot pathway centered over the structure. Total acres that would be disturbed are less than 4.7 in Arizona and 15 in Nevada, depending on the amount of slip-lining, which would reduce the area disturbed. Sites would either be permanently or temporarily disturbed. Temporary disturbance would involve restoration of sites where activities occur. Permanent disturbance would consist of permanent water tanks or paving. Acreage previously disturbed consists of sites that were excavated or otherwise disturbed during previous installation of sewer or water systems, or other activities. New disturbance would consist of 3.3 acres, and previously disturbed habitat would consist of 16.4 acres. In Nevada, a total of 12.4 acres has been previously disturbed and 1.8 would be permanently disturbed. There would be no permanent disturbance of desert habitat in Arizona.

b. Proposed Minimization Measures

NPS proposes the following measures to minimize potential effects to the desert tortoise, as a result of project activities (NPS 2004):

1. Work in washes would be performed between October and April to avoid peak thunderstorm events and erosion of wash.
2. Best Management Practices to reduce spills would be utilized during refueling and other activities that may release petroleum products into the environment.
3. Equipment would be properly maintained to reduce air and water pollution.
4. To prevent weeds, no imported topsoil would be used, and all sites would be revegetated using local native species.
5. Sites would be monitored for non-native and invasive species, which would be treated and removed.
6. A desert tortoise education program would be presented to all personnel onsite during construction, which would include biology and distribution (range-wide and local) of

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the species, legal status, definition of take, and associated penalties. It would also include measures to minimize effects of construction activities on the desert tortoise, means by which employees can incorporate these measures or take corrective actions if necessary, and process and reporting requirements for tortoises that are found on the site.

7. All sites to be disturbed would be flagged, and there would be no disturbance outside of flagged areas.
8. Before surface-disturbing activities, a qualified desert tortoise biologist would conduct a clearance survey to locate and remove desert tortoises using techniques providing full coverage of all areas. All desert tortoise burrows, and other species' burrows that may be used by tortoises, would be examined to determine occupancy of each burrow by desert tortoise. In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise* (Service 1992), a qualified desert tortoise biologist would possess a bachelor's degree in biology, ecology, wildlife biology, herpetology, or closely related fields. The biologist would have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and tortoise sign. In addition, the biologist would have the ability to recognize and accurately record survey results.
9. All burrows found within areas proposed for disturbance, whether occupied or vacant, would be excavated by a qualified biologist and collapsed or blocked to prevent desert tortoise re-entry. All burrows would be excavated with hand tools to allow removal of desert tortoises or desert tortoise eggs. All desert tortoise handling and excavations, including nests, would be conducted by a qualified desert tortoise biologist in accordance with Service-approved protocol (Desert Tortoise Council {DTC}) *Guidelines for Handling Desert Tortoises During Construction Projects 1994*, revised 1999).
10. All located desert tortoises and desert tortoise eggs would be relocated offsite by a qualified biologist, 300 to 1,000 feet into adjacent undisturbed habitat. Desert tortoises found aboveground would be placed under a bush in the shade. A Desert tortoise located in a burrow would be placed inside an artificially constructed burrow of the same size and orientation as the one from which it was removed, using the protocol for burrow construction in section B.5.f. of the revised DTC guidelines (1999).
11. The onsite qualified biologist would record each observed or handled desert tortoise. Information would include the following: location, date and time of observation, whether the desert tortoise was handled, general health and whether it voided its

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bladder, location desert tortoise was moved from and location moved to, and unique physical characteristics of each desert tortoise. Reports documenting effectiveness and compliance with the desert tortoise protection measures would be prepared every six months during the proposed construction.

12. During construction activities, the qualified biologists would conduct periodic onsite surveys to ensure that desert tortoises have not moved into areas cleared for construction.
13. Project activities that may endanger a desert tortoise would cease if a desert tortoise is found on or moves onto a project site. Project activities would resume after the qualified biologist removes the desert tortoise from danger or after the desert tortoise has moved to a safe area. Stockpiled pipes that could attract desert tortoises would be capped or checked by a desert tortoise monitor before use.
14. During the desert tortoise active season (March 1 through October 31), all trenches and other excavations with side slopes steeper than a 1-foot rise to 3-foot length would be immediately backfilled prior to being left unattended, or covered with plywood or similarly impassable material. An open trench or other excavation would be inspected for entrapped animals immediately prior to backfilling. If, at any time, a desert tortoise is discovered within a trench, all activities associated with that trench would cease until a qualified biologist has removed the desert tortoise, in accordance with Service-approved guidelines (DTC 1999).
15. Trash and food items would be disposed of properly in predator-proof containers with resealing lids. Trash containers would be emptied daily and waste would be removed from the project area and disposed of in an approved landfill. Trash removal would reduce the attractiveness of the area to opportunistic predators such as desert kit fox (*Vulpes macrotis*), coyotes (*Canis latrans*), and common ravens (*Corvus corax*). Construction waste would be removed from the site daily and disposed of properly.
16. Prior to surface disturbance activities within desert tortoise habitat, the NPS or project proponent would pay a remuneration fee per acre of proposed disturbance into the Desert Tortoise Public Lands Conservation Fund Number 730-9999-2315 (section 7 account). This fund is administered by Clark County, and used for securing and enhancing desert tortoise habitat and desert tortoise research.

II. Status of the Species Rangewide/Critical Habitat

The desert tortoise is a large, herbivorous reptile found in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. The Mojave population of the

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desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Sonoran Desert in California. Desert tortoises reach 8 to 15 inches in carapace length. Adults have a domed carapace and relatively flat, unhinged plastron. Shell color is brownish, with yellow to tan scute centers. The forelimbs are flattened and adapted for digging and burrowing. Optimal habitat has been characterized as creosote bush scrub (*Larrea tridentata*) in which precipitation ranges from 2 to 8 inches, where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982; Turner 1982; Turner and Brown 1982). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982).

Desert tortoises are most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, they occur in succulent scrub, cheesebush scrub, blackbrush scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub, and scrub-steppe vegetation types of the desert and semidesert grassland complex (Service 1994). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and overwintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Region, desert tortoises occur most commonly on gently sloping terrain with soils ranging from sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, desert tortoises can be found in steeper, rockier areas.

The size of desert tortoise home ranges varies with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 25 to 200 acres (Berry 1986). Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than 7 miles at a time (Berry 1986). In drought years, the ability of desert tortoises to drink while surface water is available following rains may be crucial for desert tortoise survival. During droughts, desert tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators.

Desert tortoises are most active during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rainstorms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. In Nevada and Arizona, desert tortoises are considered to be active from approximately March 15 through October 15. Further information on the range, biology, and ecology of the desert tortoise can be found in Berry and Burge (1984), Burge (1978), Burge

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and Bradley (1976), Bury *et al.* (1994), Germano *et al.* (1994), Hovik and Hardenbrook (1989), Karl (1981, 1983a, 1983b), Luckenbach (1982), Service (1994), and Weinstein *et al.* (1987).

On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 FR 42270). On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). Reasons for the determination included significant population declines, loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and off-highway vehicle activity have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence, were illegal collection by humans for pets or consumption, upper respiratory tract disease (URTD), predation on juvenile desert tortoises by common ravens and kit foxes, fire, and collisions with vehicles on paved and unpaved roads.

On June 28, 1994, the Service approved the final Desert Tortoise (Mojave Population) Recovery Plan (Recovery Plan) (Service 1994). The Recovery Plan divides the range of the desert tortoise into 6 recovery units and recommends establishment of 14 Desert Wildlife Management Areas (DWMAs) throughout the recovery units. Within each DWMA, the Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the Recovery Plan recommends that land management within all DWMAs should restrict human activities that negatively impact desert tortoises (Service 1994). The DWMAs/ areas of critical environmental concern (ACECs) have been designated by the Bureau of Land Management (BLM) through development or modification of their land use plans in Arizona, Nevada, Utah, and parts of California.

The California Desert Conservation Area Plan (BLM 1980) is the primary plan that guides the overall management of desert tortoise habitat in California. Land use planning activities are underway in California to complete designation of DWMAs/ACECs. Desert tortoise habitat management in Arizona is covered primarily by the Mojave Amendment to BLM's Arizona Strip Resource Management Plan, which was prepared to implement the Recovery Plan. BLM Arizona Strip Field Office designated 167,065 acres of desert tortoise habitat as ACECs. In Nevada, BLM's Las Vegas, Ely, and Battle Mountain field offices manage desert tortoise habitat; 941,800 acres of desert tortoise habitat were designated as ACECs by the Las Vegas and Ely field offices. No desert tortoise critical habitat or proposed ACECs occur within the jurisdiction of the Battle Mountain Field Office. The regulation of activities within critical habitat through section 7 consultation is based on recommendations in the Recovery Plan (Service 1994).

Long-term monitoring of desert tortoise populations is a high priority recovery task as identified in the Recovery Plan. From 1995 to 1998, pilot field studies and workshops were conducted to

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develop a monitoring program for desert tortoise. In 1998, the Desert Tortoise Management Oversight Group identified line distance sampling as the appropriate method to determine rangewide desert tortoise population densities and trends. Monitoring of populations using this method is underway across the range of the desert tortoise. Successful rangewide monitoring will enable managers to evaluate the overall effectiveness of recovery actions and population responses to these actions, thus guiding recovery of the Mojave desert tortoise. Rangewide desert tortoise population monitoring began in 2001 and is conducted annually.

Changing ecological condition as a result of natural events or human-caused activities may stress individuals and result in a more severe clinical expression of URTD (Brown *et al.* 2002). For example, the proliferation of non-native plants within the range of the desert tortoise has had far-reaching impacts on desert tortoise populations. Desert tortoises have been found to prefer native vegetation over non-natives (Tracy *et al.* 2004). Non-native annual plants in desert tortoise critical habitat in the western Mojave Desert were found to compose over 60 percent of the annual biomass (Brooks 1998). The reduction in quantity and quality of forage may stress desert tortoises and make them more susceptible to drought- and disease-related mortality (Brown *et al.* 1994). Malnutrition has been associated with several disease outbreaks in both humans and turtles (Borysenko and Lewis 1979). What is currently known with certainty about disease in the desert tortoise relates entirely to individual desert tortoises and not populations; virtually nothing is known about the demographic consequences of disease (Tracy *et al.* 2004).

a. Recovery Plan Assessment and Recommendations

The General Accounting Office (GAO) Report, *Endangered Species: Research Strategy and Long-Term Monitoring Needed for the Mojave Desert Tortoise Recovery Program* (U.S. General Accounting Office 2002), directed the Service to periodically reassess the Recovery Plan to determine whether scientific information developed since its publication could alter implementation actions or allay some of the uncertainties about its recommendations. In response to the GAO report, the Service initiated a review of the existing Recovery Plan in 2003.

In March 2003, the Service impaneled the Recovery Plan Assessment Committee (Committee) to assess the Recovery Plan. The Committee was selected to represent several important characteristics with particular emphasis on commitment to solid science. The charge to the Committee was to review the entire Recovery Plan in relation to contemporary knowledge to determine which parts of the recovery plan will need updating. The recommendations of the Committee were presented to the Service and Desert Tortoise Management Oversight Group approximately a year later, on March 24, 2004. The recommendations will be used as a guide by a recovery team of scientists and stakeholders to modify the 1994 Recovery Plan. A revised recovery plan is anticipated by the end of 2005.

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The Committee recognized that the distribution and abundance data indicate trends leading away from recovery goals in some parts of the species' range. These results indicate a need for more aggressive efforts to facilitate recovery. Many of the original prescriptions of the Recovery Plan were never implemented although these prescriptions continue to be appropriate. New prescriptions should be prioritized to assess redundancies and synergies within individual threats.

b. Recovery Units

The Northeastern Mojave Recovery Unit occurs primarily in Nevada, but it also extends into California along the Ivanpah Valley and into extreme southwestern Utah and northwestern Arizona. Vegetation within this unit is characterized by creosote bush scrub, big galleta-scrub steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations). Topography is varied, with flats, valleys, alluvial fans, washes, and rocky slopes. Much of the northern portion of the Northeastern Mojave Recovery Unit is characterized as basin and range, with elevations from 2,500 to 12,000 feet. Desert tortoises typically eat summer and winter annuals, cacti, and perennial grasses. Desert tortoises in this recovery unit, the northern portion of which represents the northernmost distribution of the species, are typically found in low densities (about 10 to 20 adults per square mile).

A kernel analysis was conducted in 2003-2004 for the desert tortoise (Tracy *et al.* 2004) as part of the reassessment of the 1994 Recovery Plan. The analyses revealed several areas in which the kernel estimations for live desert tortoises and carcasses did not overlap. The pattern of non-overlapping kernels that is of greatest concern is those in which there were large areas where the kernels encompassed carcasses but not live animals. These regions represent areas within DWMA's where there were likely recent die-offs or declines in desert tortoise populations. The kernel analysis indicated large areas in the Piute-Eldorado Valley where there were carcasses but no live desert tortoises. For this entire area in 2001, there were 103 miles of transects walked, and a total of 6 live and 15 dead desert tortoises found, resulting in a live encounter rate of 0.06 desert tortoises per mile of transect for this area. This encounter rate was among the lowest that year for any of the areas sampled in the range of the Mojave desert tortoise (Tracy *et al.* 2004).

Kernel analysis for the Coyote Springs DWMA showed areas where the distributions of carcasses and living desert tortoises do not overlap; however, densities of adult desert tortoises for the region do not show a statistical trend over time. Thus, while there may be a local die-off occurring in the northern portion of this DWMA, this does not appear to influence the overall trend in the region as interpreted by study plot data. Because permanent study plots for this region were discontinued after 1996, if there have been recent declines in numbers they are not reflected in the analysis. Nevertheless, large regions of non-overlapping carcass and live desert tortoise kernels in the regions were not identified adjacent to the Coyote Springs DWMA. The probability of finding either a live desert tortoise or a carcass was relatively very low for Beaver Dam Slope and Gold-Butte Pakoon, and moderately low for Mormon Mesa/Coyote Springs.

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The Eastern Mojave Recovery Unit is situated primarily in California, but also extends into Nevada in the Amargosa, Pahrump, and Piute valleys. In the Eastern Mojave Recovery Unit, desert tortoises are often active in late summer and early autumn in addition to spring because this region receives both winter and summer rains and supports two distinct annual floras on which they can feed. Desert tortoises in the Eastern Mojave Recovery Unit occupy a variety of vegetation types and feed on summer and winter annuals, cacti, perennial grasses, and herbaceous perennials. They den singly in caliche caves, bajadas, and washes. This recovery unit is isolated from the Western Mojave Recovery Unit by the Baker Sink, a low-elevation, extremely hot and arid strip that extends from Death Valley to Bristol Dry Lake. The Baker Sink area is generally not considered suitable for desert tortoises. Desert tortoise densities in the Eastern Mojave Recovery Unit can vary dramatically, ranging from 5 to as much as 350 adults per square mile (Service 1994).

Ivanpah and Piute–Eldorado valleys contained study plots that were analyzed in the Eastern Mojave Recovery Unit analysis. While there was no overall statistical trend in adult density over time, the 2000 survey at Goffs and the 2002 survey at Shadow Valley indicate low densities of adult desert tortoises relative to earlier years. Unfortunately, there are no data in the latter years for all five study plots within this recovery unit, and therefore, while there is no statistical trend in adult densities, we cannot conclude that desert tortoises have not experienced recent declines in this area. The probability of finding a carcass on a distance sampling transect was considerably higher for Ivanpah, Chemehuevi, Fenner, and Piute-Eldorado, which make up the Eastern Mojave Recovery Unit.

The Northern Colorado Recovery Unit is located completely in California. Here desert tortoises are found in the valleys, on bajadas and desert pavements, and to a lesser extent in the broad, well-developed washes. They feed on both summer and winter annuals and den singly in burrows under shrubs, in intershrub spaces, and rarely in washes. The climate is somewhat warmer than in other recovery units, with only 2 to 12 freezing days per year. The desert tortoises have the California mitochondrial DNA (mtDNA) haplotype and phenotype. Allozyme frequencies differ significantly between this recovery unit and the Western Mojave, indicating some degree of reproductive isolation between the two.

Desert tortoises in the Eastern Colorado Recovery Unit, also located completely in California, occupy well-developed washes, desert pavements, piedmonts, and rocky slopes characterized by relatively species-rich succulent scrub, creosote bush scrub, and Blue Palo Verde–Ironwood–Smoke Tree communities. Winter burrows are generally shorter in length, and activity periods are longer than elsewhere due to mild winters and substantial summer precipitation. The desert tortoises feed on summer and winter annuals and some cacti; they den singly. They also have the California mtDNA haplotype and shell type.

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The Upper Virgin River Recovery Unit encompasses all desert tortoise habitat in Washington County, Utah, except the Beaver Dam Slope, Utah population. The desert tortoise population in the area of St. George, Utah is at the extreme northeastern edge of the species' range and experiences long, cold winters (about 100 freezing days) and mild summers, during which the desert tortoises are continually active. Here the animals live in a complex topography consisting of canyons, mesas, sand dunes, and sandstone outcrops where the vegetation is a transitional mixture of sagebrush scrub, creosote bush scrub, blackbush scrub, and a psammophytic community. Desert tortoises use sandstone and lava caves instead of burrows, travel to sand dunes for egg-laying, and use still other habitats for foraging. Two or more desert tortoises often use the same burrow. Shell morphology and mtDNA have not been studied in this recovery unit, but allozyme variation is similar to that found in the Northeastern Mojave Recovery Unit.

The Western Mojave Recovery Unit occurs completely in California and is exceptionally heterogeneous and large. It is composed of the Western Mojave, Southern Mojave, and Central Mojave regions, each of which has distinct climatic and vegetational characteristics. The most pronounced difference between the Western Mojave and other recovery units is in timing of rainfall and the resulting vegetation. Most rainfall occurs in fall and winter and produces winter annuals, which are the primary food source of desert tortoises. Above-ground activity occurs primarily in spring, associated with winter annual production. Thus, desert tortoises are adapted to a regime of winter rains and rare summer storms. Here, desert tortoises occur primarily in valleys, on alluvial fans, bajadas, and rolling hills in saltbrush, creosote bush, and scrub steppe communities. Desert tortoises dig deep burrows (usually located under shrubs on bajadas) for winter hibernation and summer aestivation. These desert tortoises generally den singly. They have a California mtDNA haplotype and a California shell type.

Distribution: The prescriptions for recovery in the Recovery Plan were for individual populations and assumed that preserving large blocks of habitat and managing threats in that habitat would be principally all that would be necessary to recover the species. However, that original paradigm, and the prescriptions made within that paradigm, may be wrong. Existing data have revealed population crashes that have occurred asynchronously across the range. There are reports that some populations, which have crashed previously, have subsequently increased in population density. Additionally, all known dense populations of desert tortoises have crashed. This suggests that density-dependent mortality occurs in desert tortoise populations, and that population dynamics may be asynchronous.

These characteristics indicate that desert tortoises may exist in a classic metapopulation structure (Hanski 1999; Levins and Culver 1971; Levins *et al.* 1984), and this should portend profoundly different prescriptions for recovery. In particular, if desert tortoises have historically existed in metapopulations, then connections among habitat patches are a necessary part of conservation prescriptions. Additionally, habitat suitable for desert tortoises, but without desert tortoises, should be regarded as equally necessary for recovery. Long-term persistence cannot be

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determined from desert tortoise density or desert tortoise numbers alone, but assessment must include the complexities of metapopulation dynamics and the habitat characteristics that promote metapopulation dynamics including habitat connectivity through inefficient corridors (*i.e.*, partial connectivity), asynchrony of subpopulation dynamics, and several separate habitat patches. Some of the characteristics of proper metapopulation function may already have been obviated by proliferation of highways, and habitat fragmentation due to satellite urbanization. Thus, management may require artificially facilitating metapopulation processes such as movement among patches.

The genetic distinctness of desert tortoise populations and their pathogens should be assessed to guide all manipulative management actions (*e.g.*, head starting, translocation, habitat restoration, and corridor management). The Committee proposed a revision to the previous delineation of recovery units, or distinct population segments (DPSs) based on new scientific information. The recommended delineations reflect the prevailing concepts of subpopulation “discreteness,” and “significance,” and incorporate morphological, behavioral, genetic, and environmental information. The Committee’s recommendation reduces the number of DPSs from six to five by leaving the original Upper Virgin River and Western Mojave units intact and recombining the four central units into three reconfigured units: Lower Virgin River Desert, Northeastern Mojave Desert (including Amargosa Valley, Ivanpah Valley, and Shadow Valley), and Eastern Mojave and Colorado Desert. These recommended DPSs are based largely on the best resolving biochemical/genetic data of Rainboth *et al.* (1989), Lamb *et al.* (1989), Lamb and Lydehard (1994), and Britten *et al.* (1997). Because these delineations are general and not definitive at this time, more data and analyses are required which may result in additional modification. The action area for this consultation occurs in the Lower Virgin River Desert and Northeastern Mojave DPSs.

The 1994 Recovery Plan conceived desert tortoises to be distributed in large populations that required large areas and large densities to recover. However, existing data are consistent with the possibility that desert tortoises have evolved to exist in *metapopulations*. Metapopulation theory conceives that desert tortoises are distributed in metapopulation patches connected with corridors that allow inefficient and asynchronous movements of individuals among the patches. This paradigm conceives that some habitat patches within the range of the desert tortoise will have low population numbers or no desert tortoises at all, and others will have higher population numbers. Movement among the patches is necessary for persistence of the “system.” If desert tortoises evolved to exist in metapopulations, then long-term persistence requires addressing habitat fragmentation caused by highways and satellite urbanization. Ensuring the integrity and function of natural corridors among habitat patches might require active management of desert tortoise densities in habitat patches and associated corridors.

Land managers and field scientists identified 116 species of alien plants in the Mojave and Colorado Deserts (Brooks and Esque 2002). The proliferation of non-native plant species has

also contributed to an increase in fire frequency in desert tortoise habitat by providing sufficient fuel to carry fires, especially in the intershrub spaces that are mostly devoid of native vegetation (Service 1994; Brooks 1998; Brown and Minnich 1986). Changes in plant communities caused by alien plants and recurrent fire may negatively affect the desert tortoise by altering habitat structure and species composition of their food plants (Brooks and Esque 2002).

Disease was identified in the 1994 Recovery Plan as an important threat to the desert tortoise. Disease is a natural phenomenon in wild populations of animals and can contribute to population declines by increasing mortality and reducing reproduction. However, URTD appears to be a complex, multi-factorial disease interacting with other stressors to affect desert tortoises (Brown *et al.* 2002; Tracy *et al.* 2004). The disease occurs mostly in relatively dense desert tortoise populations, as mycoplasmal infections are dependent upon higher densities of the host (Tracy *et al.* 2004).

Reproduction: Desert tortoises possess a combination of life history and reproductive characteristics that affect the ability of populations to survive external threats. Desert tortoises grow slowly, require 15 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner *et al.* 1984; Bury 1987; Tracy *et al.* 2004). At Yucca Mountain, Nye County Nevada (Northeastern Mojave Recovery Unit), Mueller *et al.* (1998) estimated that the mean age of first reproduction was 19 to 20 years; clutch size (1 to 10 eggs) and annual fecundity (0 to 16 eggs) were related to female size but annual clutch frequency (0 to 2) was not. Further, Mueller suggested that body condition during July to October may determine the number of eggs a desert tortoise can produce the following spring.

McLuckie and Friedell (2002) determined that the Beaver Dam Slope desert tortoise population, within the Northeastern Mojave Recovery Unit, had a lower clutch frequency (1.33 ± 0.14) per reproductive female and fewer reproductive females (14 out of 21) when compared with other Mojave desert tortoise populations. In the 1990's, Beaver Dam Slope experienced dramatic population declines due primarily to disease and habitat degradation and alteration (Service 1994). The number of eggs that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Henen 1997; McLuckie and Fridell 2002).

Numbers: Data collected on 1-square-mile permanent study plots indicate that desert tortoise populations have declined both in numbers of desert tortoises found during surveys and in densities of live desert tortoises at most sites since the plots were first established 20-30 years ago (Berry *et al.* 2002). Declines of 50 to 96 percent have occurred regardless of initial desert tortoise densities.

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Increases in the occurrence of shell-skeletal remains have been found to correspond with declines in numbers and densities of live desert tortoises with the exception of certain plots where poaching has been documented (Berry 2003).

Results of desert tortoise surveys at three survey plots in Arizona indicate that all three sites have experienced significant die-offs. Six live desert tortoises were located in a 2001 survey of the Beaver Dam Slope Exclosure Plot (Walker and Woodman 2002). Three had definitive signs of URTD, and two of those also had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 31 live desert tortoises in 1996, 20 live desert tortoises in 1989, and 19 live desert tortoises in 1980. The 2001 survey report indicated that it is likely that there is no longer a reproductively viable population of desert tortoises on this study plot. Thirty-seven live desert tortoises were located in a 2002 survey of the Littlefield Plot (Young *et al.* 2002). None had definitive signs of URTD. Twenty-three desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 80 live desert tortoises in 1998 and 46 live desert tortoises in 1993. The survey report indicated that the site might be in the middle of a die-off due to the high number of carcasses found since the site was last surveyed in 1998. Nine live desert tortoises were located during the mark phase of a 2003 survey of the Virgin Slope Plot (Goodlett and Woodman 2003). The surveyors determined that the confidence intervals of the population estimate would be excessively wide and not lead to an accurate population estimate, so the recapture phase was not conducted. One desert tortoise had definitive signs of URTD. Seven desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 41 live desert tortoises in 1997 and 15 live desert tortoises in 1992. The survey report indicated that the site may be at the end of a die-off that began around 1996-1997.

The Western Mojave has experienced marked population declines as indicated in the Recovery Plan and continues today. Spatial analyses of the Western Mojave show areas with increased probabilities of encountering dead rather than live animals, areas where kernel estimates for carcasses exist in the absence of live animals, and extensive regions where there are clusters of carcasses where there are no clusters of live animals. Collectively, these analyses point generally toward the same areas within the Western Mojave, namely the northern portion of the Fremont-Kramer DWMA and the northwestern part of the Superior-Cronese DWMA. Together, these independent analyses, based on different combinations of data, all suggest the same conclusion for the Western Mojave. Data are not currently available with sufficient detail for most of the range of the desert tortoise with the exception of the Western Mojave (Tracy *et al.* 2004).

Declines in desert tortoise abundance appear to correspond with increased incidence of disease in desert tortoise populations. The Goffs permanent study plot in Ivanpah Valley, California, suffered 92 to 96 percent decreases in desert tortoise density between 1994 and 2000 (Berry 2003). The high prevalence of disease in Goffs tortoises likely contributed to this decline (Christopher *et al.* 2003). Upper respiratory tract disease has not yet been detected at permanent study plots in the Sonoran Desert of California, but is prevalent at study plots across the rest of

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the species' range (Berry 2003) and has been shown to be a contributing factor in population declines in the Western Mojave Desert (Brown *et al.* 1999; Christopher *et al.* 2003). High mortality rates at permanent study plots in the Northeastern and Eastern Mojave and Sonoran Deserts appear to be associated with incidence of shell diseases in tortoises (Jacobson *et al.* 1994). Low levels of shell diseases were detected in many populations when the plots were first established, but were found to increase during the 1980s and 1990s (Jacobson *et al.* 1994; Christopher *et al.* 2003). A herpesvirus has recently been discovered in desert tortoises, but little is known about its effects on desert tortoise populations at this time (Berry *et al.* 2002; Origi *et al.* 2002).

The kernel analysis of the Eastern Colorado Recovery Unit shows that the distributions of the living desert tortoises and carcasses overlap for most of the region. The Chuckwalla Bench study plot occurs outside the study area, which creates a problem in evaluating what may be occurring in that area of the recovery unit. However, the few transects walked in that portion of the DWMA yielded no observations of live or dead desert tortoises. This illustrates our concern for drawing conclusions from areas represented by too few study plots and leaves us with guarded concern for this region. The percentage of transects with live animals was relatively high for most DWMA within the Eastern Colorado Recovery Unit. In addition, the ratio of carcasses to live animals was low within this recovery unit relative to others.

The status and trends of desert tortoise populations are difficult to determine based only upon assessment of desert tortoise density due largely to their overall low abundance, subterranean sheltering behavior, and cryptic nature of the species. Thus, monitoring and recovery should include a comprehensive assessment of the status and trends of threats and habitats as well as population distribution and abundance.

For more information on desert tortoise or expanded discussions on recovery units and recommended DPSs, please refer to the Recovery Plan (Service 1994) and report prepared by the Recovery Plan Assessment Committee (Tracy *et al.* 2004).

c. Critical Habitat - Rangeland

On February 8, 1994, the Service designated approximately 6.45 million acres of critical habitat for the Mojave population of the desert tortoise in portions of California (4.75 million acres), Nevada (1.22 million acres), Arizona (339 thousand acres), and Utah (129 thousand acres) (59 FR 5820-5846, also see corrections in 59 FR 9032-9036), which became effective on March 10, 1994. Desert tortoise critical habitat was designated by the Service to identify the key biological and physical needs of the desert tortoise and key areas for recovery, and focuses conservation actions on those areas. Desert tortoise critical habitat is composed of specific geographic areas that contain the primary constituent elements of critical habitat, consisting of the biological and physical attributes essential to the species' conservation within those areas,

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such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. The specific primary constituent elements of desert tortoise critical habitat are: sufficient space to support viable populations within each of the six recovery units, and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

Critical habitat units were based on recommendations for DWMA's outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (Service 1993). These DWMA's are also identified as "desert tortoise ACECs" by BLM. Because the critical habitat boundaries were drawn to optimize reserve design, the critical habitat unit may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements.

III. Environmental Baseline

a. Status of the Species in the Action Area

The majority of Lake Mead NRA is characterized by generally north-south trending mountain ranges and shallow valleys. Desert tortoise habitats are most often associated with well-drained sandy loam soils of plains, alluvial fans, and bajadas. Soils in the area are gravelly with desert pavement with patches of gypsiferous soils. Most Mojave desert tortoise burrows are dug under creosote bush or white bursage (*Ambrosia dumosa*) shrubs which are the dominant vegetation identified in the biological assessment (NPS 2004).

Desert tortoise surveys were conducted along Lakeshore Road in support of the biological assessment prepared for improvements to the road in 1991 (NPS 1991). The proposed alignment for the River Mountains Loop Trail occurs within 0.75 mile of Lakeshore Road. From 1995 to 1997, additional desert tortoise transects were walked between the Lake Mead Marina and the park boundary with the City of Henderson by NPS biologists yielding population estimates of low density. One-square kilometer study plots located north and south of Northshore Road yielded observations of 4 to 8 live desert tortoises and 24 to 86 desert tortoise burrows.

Under the Natural Resources Preservation Program, the following actions have been implemented within Lake Mead NRA (NPS 2003):

- Over 400, 1.5-mile triangular strip transects have been conducted, exceeding one transect per 2,500 acres;

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- A total of 14 square-kilometer study plots have been established throughout Lake Mead NRA.

Based on the information collected in the activities described above, NPS determined that the overall abundance of desert tortoise on Lake Mead NRA is low (less than 45 desert tortoises per square mile).

b. Factors Affecting the Species Environment in the Action Area

Lake Mead NRA staff are actively working with Clark County, the University of Nevada, the Nevada Department of Wildlife, Arizona Game and Fish Department, BLM, and U.S. Geological Survey- Biological Resources Division to increase knowledge of the desert tortoise in the action area, Lake Mead NRA, and rangewide. Currently underway are population surveys and monitoring, and demographic studies to determine longevity and causes of mortality. Livestock grazing has been removed from Lake Mead NRA. Non-native plants occur largely in disturbed areas, included the edges of Northshore Road, parking lots and developments, and Boxcar Wash.

HCPs Involving Lake Mead NRA

Since the Mojave population of the desert tortoise was listed under the Act in 1989, three regional-level HCPs have been implemented for development of desert tortoise habitat in Clark County, Nevada. Because approximately 89 percent of Clark County consists of public lands administered by the Federal government, there is little opportunity to purchase private lands as mitigation under an HCP for the loss of desert tortoise habitat. Alternatively, funds are collected and spent to implement conservation and recovery actions on Federal lands as mitigation for impacts that occur on non-Federal lands. Lake Mead NRA lands are included in these areas where mitigation funds are used to promote recovery of the desert tortoise.

On May 23, 1991, the Service issued a biological opinion on the issuance of incidental take permit PRT-756260 (File No. 1-5-91-FW-40) under section 10(a)(1)(B) of the Act. The Service concluded that incidental take of 3,710 desert tortoises on up to 22,352 acres of habitat within the Las Vegas Valley and Boulder City in Clark County, Nevada, was not likely to jeopardize the continued existence of the desert tortoise. The permit application was accompanied by the *Short-Term HCP for the Desert Tortoise in the Las Vegas Valley, Clark County, Nevada* (Regional Environmental Consultants 1991) (Short-term HCP) and an implementation agreement that identified specific measures to minimize and mitigate the effects of the action on desert tortoises.

On July 29, 1994, the Service issued a non-jeopardy biological opinion on the issuance of an amendment to incidental take permit PRT-756260 (File No. 1-5-94-FW-237) to extend the expiration date of the existing permit by one year (to July 31, 1995) and include an additional

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disturbance of 8,000 acres of desert tortoise habitat within the existing permit area. The amendment did not authorize an increase in the number of desert tortoises allowed to be taken under the existing permit. Additional measures to minimize and mitigate the effects of the amendment were also identified. Approximately 1,300 desert tortoises were taken under the authority of PRT-756260, as amended. In addition, during the Short-term HCP, as amended, approximately 541,000 acres of desert tortoise habitat have been conserved in Clark County on lands administered by BLM and NPS.

On July 11, 1995, the Service issued an incidental take permit (PRT-801045) to Clark County, Nevada, including cities within the county and the Nevada Department of Transportation (NDOT), under the authority of section 10(a)(1)(B) of the Act. The permit became effective August 1, 1995, and allowed the "incidental take" of desert tortoises for a period of 30 years on 111,000 acres of non-Federal land in Clark County, and approximately 2,900 acres associated with NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye counties, Nevada. The Clark County Desert Conservation Plan (DCP) served as the permittees' HCP and detailed their proposed measures to minimize, monitor, and mitigate the effects of the proposed take on the desert tortoise (Regional Environmental Consultants 1995). The permittees imposed, and NDOT paid, a fee of \$550 per acre of habitat disturbance to fund these measures. The permittees expended approximately \$1.65 million per year to minimize and mitigate the potential loss of desert tortoise habitat. The majority of these funds were used to implement minimization and mitigation measures such as increased law enforcement; construction of highway barriers; road designation, signing, closure, and rehabilitation; and desert tortoise inventory and monitoring within the lands initially conserved during the Short-term HCP, and other areas being managed for desert tortoise recovery (e.g., ACECs or DWMA). The benefit to the species, as provided by the DCP, substantially minimized and mitigated those effects that occurred through development within the permit area and aided in recovery of the desert tortoise.

On November 22, 2000, the Service issued an incidental take permit (TE-034927-0) to Clark County, Nevada, including cities within the county and NDOT, under the authority of section 10(a)(1)(B) of the Act. The permit supersedes the incidental take permit for the DCP. In the biological/conference opinion (File No. 1-5-00-FW-575), the Service determined that issuance of the incidental take permit to Clark County would not jeopardize the listed desert tortoise or southwestern willow flycatcher, or any of the 76 unlisted, un-proposed species covered under the permit. Under the special terms and conditions of the permit, take of avian species, with the exception of American peregrine falcon (*Falco peregrinus anatum*) and phainopepla (*Phainopepla nitens*), would not be authorized until acquisition of private lands in desert riparian habitats in southern Nevada has occurred. The incidental take permit allows incidental take of covered species for a period of 30 years on 145,000 acres of non-Federal land in Clark County, and within NDOT rights-of-way, south of the 38th parallel in Nevada. The Clark County Multiple Species HCP and Environmental Impact Statement (MSHCP) (Regional Environmental Consultants 2000), serves as the permittees' HCP and details their proposed measures to

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minimize, mitigate, and monitor the effects of covered activities on the 78 species. In addition to measures specified in the MSHCP and its implementing agreement, the permittee shall comply with the special terms and conditions of the permit and measures stated in Sections 3C and 3D of the DCP, which were incorporated by reference into the MSHCP and incidental take permit.

Several consultations have been completed regarding NPS projects relative to desert tortoise. Informal consultations that did not involve take include 1-5-I-95-332 (Lake Mead Ferry Service), 1-5-I-00-409 (Overton Power Right-of-Way), 1-5-00-I-415 (Basic Water Right-of-Way), 1-5-01-I-529 (Improved Access to Blue Point Bay), 1-5-01-I-548 (Las Vegas Wash Stabilization), 1-5-01-I-568 (Water Safety Center), 1-5-02-I-462 (Entrance Station and Road Realignment 1-5-03-484, (Soils Monitoring), 1-5-03-I-487 (Relocation of Lake Mead Cruises), and 1-5-03-I-540 (Electric Pole Maintenance and Road Realignment). Formal consultations involving the desert tortoise include 1-5-95-F-91 (Northshore Road Rehabilitation), 1-5-02-F-462.amd (Cottonwood Cove Entrance Station), and 1-5-03-F-485 (Northshore Road Rehabilitation).

IV. Effects of the Proposed Action on the Listed Species

Direct effects encompass the immediate, often obvious effect of the proposed action on the desert tortoise or its habitat. Indirect effects are caused by, or result from the proposed action, and are later in time, but still reasonably certain to occur. In contrast to direct effects, indirect effects are more subtle, and may affect populations and habitat quality over an extended period of time, long after construction activities have been completed. Indirect effects are of particular concern for long-lived species such as the desert tortoise, because project-related effects may not become evident in individuals or populations until years later.

Desert tortoises could be adversely affected during project activities. Vehicle and equipment operation in the project area and on access roads poses the greatest threat to desert tortoises. Desert tortoises could be killed, injured, or captured and moved out of harm's way. Additional harassment may occur from increased levels of noise and ground vibrations produced by vehicles and heavy equipment (Bondello 1976; Bondello, *et al.* 1979). Ground vibrations can cause desert tortoises to emerge from their burrows; slapping the ground several times within a few feet of a desert tortoise burrow entrance will often cause a desert tortoise to emerge (Medica, *et al.* 1986). Desert tortoises may seek shelter underneath vehicles or equipment and be taken if not seen prior to moving the vehicles or equipment. Measures proposed by the NPS should minimize these effects, which include: (1) provide a biologist to oversee project activities, clear project areas, and handle desert tortoises as required, (2) construct desert tortoise-proof fencing around the project site and a cinder-block around the buildings, (3) educate project personnel on desert tortoise minimization measures, (4) stop work in the immediate vicinity of any desert tortoise that appears in the project area, (5) look for desert tortoises on access roads, (6) require

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workers to check for desert tortoises underneath project vehicles before moving them, (7) impose a 25 mile-per-hour speed limit, (8) delineate and flag clearing limits, (9) excavate/block all desert tortoise burrows in the work area, and (10) provide compensation to fund conservation actions. Scheduling the project mostly during the winter months should further minimize potential effects to the desert tortoise.

Trash accumulation at the proposed project site may attract and concentrate predators such as ravens, coyotes, and kit fox, which may result in increased predation of desert tortoises. Natural predation in undisturbed, healthy ecosystems is generally not an issue of concern. However, predation rates may be altered when natural habitats are disturbed or modified. Common raven populations in the California deserts have increased tenfold from 1968 to 1992 in response to expanding human use of the desert (Boarman and Berry 1995). Because ravens make frequent use of food, water, and nest site subsidies provided by humans, their population increases can be tied to this increase in food and water sources, such as landfills and septic ponds (Service 1994; Boarman 2002). Ravens may be attracted to landfills or project sites if trash is accessible by scavengers (Boarman 2002). Considering that ravens were very scarce in this area prior to 1940, it is assumed that the current level of raven predation on juvenile desert tortoises is an unnatural occurrence (BLM 1990). The measure proposed by the NPS to dispose of litter in appropriate receptacles will minimize predation on desert tortoises in the action area from subsidized predators.

V. Cumulative Effects

Cumulative effects are those effects of future non-Federal (State, local government, or private) activities that are reasonably certain to occur in the project area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. We do not anticipate any cumulative effects from future non-Federal activities in the project area.

VI. Conclusion

After reviewing the current status of the desert tortoise, the environmental baseline for the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the project, as proposed and analyzed, is not likely to jeopardize the continued existence of the Mojave desert tortoise because:

- Potential impacts to the species would be minimized by measures proposed by the NPS.
- The proposed project would mostly occur within previously disturbed sites.

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- No new public access is anticipated to be created as a result of the project.
- Very few desert tortoises in low density habitat are anticipated to be affected by the project.
- Water and sewer infrastructure would be improved as a result of this project, and less likely to fail and cause additional disturbance in the future.

C. INCIDENTAL TAKE STATEMENT

Section 9 of the Act, as amended, prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The following terms and conditions may: (1) restate measures proposed by the NPS, (2) modify the measures proposed by the NPS, or (3) specify additional measures considered necessary by the Service. Where these terms and conditions vary from or contradict the minimization measures proposed under the *Description of the Proposed Action*, specifications in these terms and conditions shall apply. The measures described below are nondiscretionary and must be implemented by the NPS so that they become binding conditions of any project, contract, grant, or permit issued by NPS as appropriate, in order for the exemption in section 7(o)(2) to apply. The Service's evaluation of the effects of the proposed actions includes consideration of the measures developed by the NPS, and repeated in the *Description of the Proposed Action* portion of this biological opinion, to minimize the adverse effects of the proposed action on the desert tortoise. Any subsequent changes in the minimization measures proposed by the NPS may constitute a modification of the proposed action and may warrant reinitiation of formal consultation, as specified at 50 CFR § 402.16. These reasonable and prudent measures are intended to clarify or supplement the protective measures that were proposed by the NPS as part of the proposed action.

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The NPS has a continuing duty to regulate the activity that is covered by this incidental take statement. If the NPS fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

I. Amount of Take

Based on the analysis of impacts provided above, measures proposed by the NPS, and anticipated project duration, the Service anticipates that the following take could occur as a result of the proposed action:

1. No desert tortoises may be incidentally injured or killed by project activities.
2. All desert tortoises found in harm's way may be harassed by capture and removal from the proposed project area. The Service estimates that no more than eight desert tortoises may be affected by project activities.
3. All desert tortoise eggs may be destroyed during construction activities or harassed by removal from the proposed project area. However, the Service estimates that relatively few if any eggs would be destroyed because of the minimization measures and the occurrence of the proposed activities in previously disturbed areas.
4. No desert tortoise are anticipated to be taken in the form of indirect mortality through predation by scavengers drawn to trash or discarded food in the project area.
5. An unknown number of desert tortoises may be taken indirectly in the form of harassment or harm through increased noise and ground vibrations associated with construction, use of heavy equipment, and other project activities.

II. Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the desert tortoise.

III. Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of desert tortoise:

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1. The NPS shall implement measures to minimize injury or mortality of desert tortoises due to project-related activities.
2. The NPS shall implement measures to minimize predation on desert tortoises by predators or scavengers drawn to project areas.
3. The NPS shall implement measures to minimize destruction of desert tortoise habitat, such as soil compaction or crushed vegetation, due to construction activities.
4. The NPS shall implement measures to ensure compliance with the reasonable and prudent measures and terms and conditions in this biological opinion.

IV. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the NPS must fully comply with the following terms and conditions, which implement the reasonable and prudent measures described above.

1. To implement Reasonable and Prudent Measure Number 1, the NPS shall fully implement the following measures to minimize injury or mortality of desert tortoises due to project-related activities:
 - a. A desert tortoise education program will be presented to all personnel onsite during construction activities by an authorized biologist. This program will contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the proposed project area, the definition of "take" and associated penalties, measures designed to minimize the effects of project activities, the means by which employees can facilitate this process, and reporting requirements to be implemented when desert tortoises are encountered. Personnel will be informed to limit their activities to designated areas and check underneath vehicles before moving them, as desert tortoises often seek shelter under parked vehicles. Personnel shall be informed to be vigilant for desert tortoises on roads and not to handle or harass desert tortoises.
 - b. Authorized biologists or monitors will be approved by the Service prior to commencement of project activities. Only an authorized biologist may handle desert tortoises. Individuals proposed to serve as authorized

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biologists or monitors shall complete the enclosed form (Attachment A) and return to the Service.

- c. If desert tortoises are found on-site, all desert tortoises within the project area shall be moved out of harm's way. Such desert tortoises will be relocated 300 to 1,000 feet offsite into adjacent undisturbed habitat. A pair of new, disposable latex gloves will be used for each desert tortoise that must be handled. After use, the gloves will be properly disposed. Desert tortoises found above ground will be placed under a marked bush in the shade; in an unoccupied burrow of similar size/orientation; or a burrow constructed by the authorized biologist in accordance with Section B.5.f of the Service-approved protocols (Desert Tortoise Council 1994, revised 1999). Any desert tortoise found within one hour before nightfall will be placed individually in a clean cardboard box and kept overnight in a cool, predator-free location. To minimize stress to the desert tortoise, the box will be covered and kept upright. Each box will be used only once and will then be discarded. The desert tortoise will be released the next day as stated above.

All potential desert tortoise burrows within the construction limits shall be identified and flagged for avoidance or excavation. Desert tortoise burrows that must be disturbed shall be cleared of desert tortoises and eggs, and collapsed by an authorized desert tortoise biologist in accordance with the Service protocol (Desert Tortoise Council 1994, revised 1999). If a desert tortoise burrow is occupied by a desert tortoise in brumation, and the authorized biologist determined that excavation of the burrow and removal of the desert tortoise is not necessary, the burrow shall be blocked during project activities and unblocked when potentially harmful activities have been completed. If blocked, the burrow shall be checked a minimum of once in the morning, and again at the end of the day. If the desert tortoise becomes active, it shall be relocated as stated above.

- d. Desert tortoises and nests shall be handled and relocated by a qualified desert tortoise biologist in accordance with Service-approved protocol (Desert Tortoise Council 1994, revised 1999). Burrows containing desert tortoises or nests shall be excavated by hand, with hand tools, to allow removal of the desert tortoise or eggs. Desert tortoises moved during the desert tortoise inactive season or those in hibernation, regardless of date, must be placed into an adequate burrow; if one is not available, one shall be constructed in accordance with Desert Tortoise Council (1994, revised

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- 1999) criteria. During mild temperature periods in the spring and early fall, desert tortoises removed from the site shall not necessarily be placed in a burrow. Desert tortoises and burrows shall be relocated only to federally-managed lands.
- e. Special precautions will be taken to ensure that desert tortoises are not harmed as a result of their capture and movement during extreme temperatures (*i.e.*, air temperatures below 55° F or above 95° F). Under such adverse conditions, desert tortoises captured will be monitored continually by an authorized biologist until the desert tortoise exhibits normal behavior. If a desert tortoise shows signs of heat stress, procedures shall be implemented as identified in Service-approved protocols (Desert Tortoise Council 1994, revised 1999).
 - f. Project activities that may endanger a desert tortoise will cease if a desert tortoise is found on a project site. Project activities may resume after an authorized biologist removes the desert tortoise from danger or after the desert tortoise has moved to a safe area.
 - g. Herbicides shall not be used in the project area unless approved in writing by the Service.
 - h. All desert tortoises observed by project workers shall be reported immediately to an authorized biologist.
 - i. Vehicles will not exceed 25 miles-per-hour on non-public access roads. Authorized biologists will monitor speed-limit compliance during project activities and report instances of non-compliance to the NPS and Service.
 - j. All fuel, transmission or brake fluid leaks, or other hazardous waste leaks, spills, or releases will be reported immediately to the designated environmental supervisor. The environmental supervisor shall be responsible for spill material removal and disposal to an approved offsite landfill, and if necessary, will notify the appropriate Federal agency.
2. To implement Reasonable and Prudent Measure Number 2, the NPS shall fully implement the following measure to minimize predation on desert tortoises by predators and scavengers drawn to project areas:
 - a. A litter-control program shall be implemented during construction to minimize predation on desert tortoises by ravens drawn to the project site.

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This program shall include the use of covered, raven-proof trash receptacles, removal of trash from project areas to the trash receptacles following the close of each work day, and proper disposal of trash in a designated solid waste disposal facility. Precautions will be taken to prevent litter from blowing out along the road when trash is removed from the site.

- b. The NPS shall report any observations of raven predation on desert tortoises in the project area.
3. To implement Reasonable and Prudent Measure Number 3, the NPS shall fully implement the following measures to minimize destruction of desert tortoise habitat, such as soil compaction or crushed vegetation, due to construction activities:
 - a. All equipment, vehicles, and construction materials will remain within designated areas. Staging areas will be located in previously disturbed areas whenever possible.
 - b. Cross-country travel and travel outside construction zones and flagged areas will be prohibited.
 - c. Where possible, within the defined construction limits, cleared native vegetation shall be removed in a manner that may allow their subsequent replanting for habitat restoration.
 - d. Clearing limits will be delineated with fencing or flags prior to any ground disturbing activities and maintained throughout construction.
 - e. Where grading is required in previously undisturbed habitat, the top 6 inches of the surface shall be stockpiled within the fenced construction limits, separately from materials graded/excavated from a greater depth than 6 inches. The surface materials may contain organics and seeds that can be beneficial in habitat restoration and shall be spread on the surface of temporarily disturbed areas at project completion.
 - f. All temporarily disturbed areas will be restored in accordance with NPS standards.
 - g. BMPs and erosion control structures will be implemented.

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- h. Prior to surface disturbing activities associated with the proposed project, the NPS will pay remuneration fees to be deposited into the Desert Tortoise Public Lands Conservation Fund (account number 730-9999-2315) (Section 7 Account) for compensation of desert tortoise habitat loss.

The fee will be assessed at the rate of \$682 per acre of new disturbance. These fees will be indexed for inflation based on the Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U). Information on the CPI-U can be found on the internet at: <http://stats.bls.gov/news.release/cpi.nws.htm>. The next adjustment will occur on March 1, 2006. If paid prior to March 1, 2006, the total fees due will be \$2,250.60.

Clark County serves as the administrator of the funds, but does not receive any benefit from administering these funds. These funds are independent of any other fees collected by Clark County under the MSHCP. None of these funds shall be used to develop a habitat conservation plan.

The payments shall be accompanied by the attached Section 7 Fee Payment Form (Attachment B), and completed by the payee. The project proponent or applicant may receive credit for payment of such fees and deduct such costs from desert tortoise impact fees charged by local government entities. Payment shall be by certified check or money order payable to Clark County and delivered to:

Clark County Desert Conservation Program
 Department of Air Quality & Environmental Management
 Clark County Government Center
 500 South Grand Central Parkway, first floor (front counter)
 Las Vegas, Nevada 89155-1712
 (702) 455-5821

4. To implement Reasonable and Prudent Measure Number 4, the NPS shall fully implement the following measures to ensure compliance with the reasonable and prudent measures, terms and conditions, reporting requirements, and reinitiation requirements in this biological opinion:

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- a. The authorized biologist will record each observation of all desert tortoises within the project area. Information will include the following: Location, date and time of observation, whether desert tortoise was handled, general health and whether it voided its bladder, location desert tortoise was moved from and location moved to, and unique physical characteristics of each desert tortoise. A final report will be submitted to the Service's Southern Nevada Field Office in Las Vegas, Nevada, within 90 days of completion of construction.
- b. The authorized biologist will acquire all appropriate State permits or letters of authorization prior to handling desert tortoises and their parts, and prior to initiation of any activity that may require handling desert tortoises.
- c. Appropriate state permits or approvals will be obtained prior to handling any live desert tortoise, desert tortoise carcass, or desert tortoise eggs.
- d. In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise* (Service 1992), an authorized desert tortoise biologist shall possess a bachelor's degree in biology, ecology, wildlife biology, herpetology, or closely related fields. The biologist must have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and desert tortoise sign. In addition, the biologist shall have the ability to recognize and accurately record survey results.

The Service believes that no desert tortoises will be accidentally injured or killed, and that eight tortoises may be taken in the form of harassment through capture and movement out of harm's way during the project; no desert tortoises will be taken in the form of indirect mortality through predation by scavengers drawn to the project area; all desert tortoise eggs may be destroyed during construction activities or harassed by removal from the proposed project area (however, the Service estimates that relatively few if any eggs would be destroyed because of the minimization measures and the occurrence of the proposed activities in previously disturbed areas); and an unknown number of desert tortoises will be taken indirectly in the form of harm or harassment through increased noise associated with operation of heavy equipment.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take or loss of habitat identified is exceeded, such incidental take and habitat loss represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The NPS must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

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Reporting Requirements

Upon locating a dead or injured endangered or threatened species, initial notification must be made to the Service's Division of Law Enforcement in Las Vegas, Nevada, at (702) 388-6380. Care should be taken in handling sick or injured desert tortoises to ensure effective treatment and care for the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured desert tortoises, or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by the Service's Division of Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed. All deaths, injuries, and illnesses of desert tortoises, whether associated with project activities or not, will be summarized in an annual report.

The biologist will record each observation of handled desert tortoises. Data will include the following: location, date, time of observation, whether the desert tortoise was handled, the general health of the desert tortoise, whether it voided its bladder, the location the desert tortoise moved from and the location it moved to, and any unique physical characteristics. Reports documenting the effectiveness and compliance with the desert tortoise protection measures will be prepared every six months. A final report will be reviewed and approved by the NPS, and then submitted to the Service within 90 days of completion of construction.

The following actions should be taken for injured or dead desert tortoises if directed by the Service's Division of Law Enforcement:

Injured desert tortoises shall be delivered to any qualified veterinarian for appropriate treatment or disposal. Dead desert tortoises suitable for preparation as museum specimens shall be frozen immediately and provided to an institution holding appropriate Federal and State permits per their instructions. Should no institutions want the desert tortoise specimens, or if it is determined that they are too damaged (crushed, spoiled, etc.) for preparation as a museum specimen, then they may be buried away from the project area or cremated, upon authorization by the Service's Division of Law Enforcement. The NPS or the project proponent shall bear the cost of any required treatment of injured desert tortoises, euthanasia of sick desert tortoises, or cremation of dead desert tortoises. Should sick or injured desert tortoises be treated by a veterinarian and survive, they may be transferred as directed by the Service.

D. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened

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species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service proposes the following conservation recommendations:

- a. The contractor should wash construction vehicles and equipment prior to entry to the project site to minimize the spread of weeds.
- b. The NPS or its contractor should manually control weeds onsite for perpetuity.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

E. REINITIATION

This concludes formal consultation on the actions outlined in your December 13, 2004, request. As required by 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If we can be of any further assistance, please contact Shawn Goodchild in the Southern Nevada Field Office, at (702) 515-5230.



for Robert D. Williams

Attachments

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cc:

Supervisory Biologist - Habitat, Nevada Department of Wildlife, Las Vegas, Nevada
Field Supervisor, Arizona Ecological Services Field Office, U.S. Fish and Wildlife Service,
Phoenix, Arizona

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Attachment A.**DESERT TORTOISE MONITOR AND BIOLOGIST
RESPONSIBILITIES AND QUALIFICATIONS**

Below is a form that we request that you complete which would provide necessary information that will allow us to review your qualifications to work with desert tortoise. Please submit this completed form to the requesting agency instead of your resume. The responsibilities and general skills required for *desert tortoise monitors* and *authorized biologists* are identified below.

DESERT TORTOISE MONITOR - Approved by the Fish and Wildlife Service or other agency as designated by the Fish and Wildlife Service to monitor project activities within desert tortoise habitat, ensure proper implementation of protective measures, and report incidents of non-compliance in accordance with biological opinions or permit. Monitors should have sufficient desert tortoise training and field experience to detect the presence of desert tortoises through observations of animals and sign including scat and burrows. A monitor is typically not authorized to handle desert tortoises, or determine presence/absence of desert tortoises or conduct clearance surveys.

AUTHORIZED BIOLOGIST - Approved by the Fish and Wildlife Service or other agency as designated by the Fish and Wildlife Service to conduct activities that may result in "take" of the desert tortoise including locating tortoises and their sign, recording and reporting tortoise and sign observations in accordance with approved protocol, and ensuring that the effects of the project on the desert tortoise and its habitat are minimized in accordance with a biological opinion or permit. "Take" has been defined as actions which "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." An authorized biologist should have thorough knowledge of desert tortoise behavior, natural history, and ecology, and demonstrate substantial field experience and training to successfully:

- handle desert tortoises
- excavate burrows to locate desert tortoise or eggs
- relocate desert tortoises
- reconstruct desert tortoise burrows
- unearth and relocate desert tortoise eggs
 - locate, identify, and record all forms of desert tortoise sign.

DESERT TORTOISE BIOLOGIST QUALIFICATIONS STATEMENT

| | |
|------------------------|--|
| 1. Name: | |
| Address: | |
| City, State, zip code: | |
| Phone number: | |
| Email address: | |

2. Date:

3. States in which authorization is requested (check all that apply):
 California Nevada Utah Arizona

If authorization is sought for desert tortoise work under a Biological Opinion, provide the following:

Biological Opinion File No. (USFWS): _____ Date: _____
 Project Name and Proponent: _____

4. Desert tortoise training:
 Dates (dd/mm/year): _____
 Location: _____
 Instructor/sponsor: _____

5. Education: Provide up to three:

| | 1. | 2. | 3. |
|----------------|----|----|----|
| Institution | | | |
| Dates attended | | | |
| Major/minor | | | |
| Degree | | | |

6. Specify activities anticipated that require authorization (*e.g.*, capture, weigh, measure, attach telemetry devices, release, etc.)

7. Do you hold, or have you held, any State or Federal wildlife permits? If yes, provide the following:

Dates: _____
 Species: _____
 State (specify) or Federal: _____
 Covered activities: _____

8. Project or activity for which authorization and approval is requested:

9. Experience. Complete for each position held. Include **only** those positions that involved desert tortoise experience. Distinguish between Mojave and Sonoran desert tortoise experience.

Include only **your** experience, not information for the project you worked on (e.g., if 100 tortoises were handled on a project and you handled five of those tortoises, include only those five).

| | |
|--|--|
| a. Project Name: Your Position: Responsibilities and skills used or acquired: | |
| Dates (dd/mm/year): | From: To: |
| Total field experience: No. of hours _____ or 8-hr. days _____ conducting desert tortoise-related activities. | |
| <ul style="list-style-type: none"> • No. of wild desert tortoises you encountered: <100 mm carapace length _____ >100 mm carapace length _____ • No. of desert tortoises you handled: Wild _____ Captive, wild* _____ • No. of transect miles/kilometers walked: _____ • Prior authorizations for desert tortoise under Biological Opinions (specify number, date, and project and location if known): | |
| *include only desert tortoises that are part of a translocation program, not pet tortoises. | |
| b. References that can verify your field qualifications and skills. Provide information on the right for up to 3. | Name: Employer/Position: Address/location: Phone no.: Email: |
| | Name: Employer/Position: Address/location: Phone no.: Email: |
| | Name: Employer/Position: Address/location: Phone no.: Email: |

Attachment B

SECTION 7 FEE PAYMENT FORM
Entire form is to be completed by project proponent

Biological Opinion File Number: 1-5-05-F-420

Fish and Wildlife Service Office that Issued the Opinion: Reno, Nevada

Species: Desert tortoise (*Gopherus agassizii*)

Project: Park-wide Replacement of Water Distribution and Sewer
Collection Systems within Lake Mead National Recreation Area, Clark
County, Nevada, and Mohave County, Arizona

Number of Acres to be Disturbed: _____
Fee Rate (per acre): \$ _____
Total Payment Required: \$ _____
Amount of Payment Received: \$ _____
Date of Receipt: _____

Check or Money Order Number: _____

Project Proponent: _____

Telephone Number: _____

Authorizing Agency:

Make checks payable to:

Deliver check to:

National Park Service
Clark County Treasurer
Clark County Desert Conservation Program
Department of Air Quality & Environmental Management
Clark County Government Center
500 South Grand Central Parkway, first floor (front counter)
Las Vegas, Nevada 89155-1712
(702) 455-5821

If you have questions, you may call the Southern Nevada Field Office of the U.S. Fish and Wildlife Service at (702) 515-5230.



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

