

Lake Mead

National Recreation Area
National Park Service
U.S. Department of the Interior



UPGRADE OF WASTEWATER TREATMENT SYSTEM AT CALLVILLE BAY



Clark County, Nevada

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CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

Introduction

The National Park Service (NPS) is considering an upgrade of the wastewater treatment system at Callville Bay within Lake Mead National Recreation Area (NRA). Lake Mead NRA is situated in southeastern Nevada and northwestern Arizona and encompasses lands around Lake Mead and Lake Mohave. The NPS has prepared this environmental assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council of Environmental Quality's Regulations for Implementing the National Environmental Policy Act (1993), and NPS Director's Order 12: Conservation Planning, Environmental Impact and Decision Making (2000).

The EA evaluates the no action alternative and four action alternatives. The alternatives analyzed are: Alternative A: No Action; Alternative B: Construct New Lagoon West of Existing Lagoons; Alternative C: Construct New Lagoon on Adjacent Mesa; Alternative D: Re-open Abandoned Lagoon; and Alternative E: Provide Additional Treatment Within Footprint of Existing Lagoon Area. Also included is a discussion of alternatives that have been ruled out and justifications for their elimination. The EA analyzes impacts of the alternatives on the human and natural environment. It outlines project alternatives, describes existing conditions in the project area, and analyzes the effects of each project alternative on the environment.

Background

The Callville Bay wastewater treatment facility at Lake Mead National Recreation Area was originally constructed in 1968 as a two-pond treatment system to treat wastewater from small residential, commercial, and recreational facilities. In 1992, a new system was constructed to accommodate all of the developed area's sanitary wastewater treatment needs. Permitted by the Nevada Division of Environmental Protection (NDEP) at 0.038 million gallons per day (mgd), the operation consists of a collection system, one primary asphalt-lined aerated pond, a secondary asphalt-lined non-aerated pond, and a single native soil-lined infiltration pond designed for continuous subsurface discharge of secondary effluent. Thus, the main treatment and disposal process is achieved through biological stabilization (aeration), evaporation, and percolation. After the 1992 construction, the 1968 ponds were filled in and abandoned.

The existing sewer system collects wastewater from both concession and NPS facilities. Concession facilities include a lounge/snack bar/store, 760-slip marina (which includes a vessel pump-out system), trailer village, commercial laundry, maintenance area, and employee housing. NPS facilities include a fish cleaning station, RV dump station, comfort stations, employee housing, and water treatment plant. Since the 1992 construction, additional water-using facilities have been built at Callville Bay, including a concession employee dormitory, a new NPS water treatment plant, and a boat-wash

station. Furthermore, a number of new facilities at Callville Bay are in various stages of development. The NPS has constructed a new maintenance facility and is preparing to build a visitor contact station. Potential new concession facilities include a store and snack bar on the marina, a full-service restaurant, up to 80 additional marina slips, and the conversion of a portion of the NPS campground to full-service hook-ups that would be concessioner-operated. The current treatment system would be unable to accommodate these new loads, creating the need for system upgrades.

Purpose and Need

The purpose of this project is to upgrade the wastewater treatment system at Callville Bay such that it can accommodate current and future demands and allow the park to meet all of its wastewater treatment requirements. Since the system was first placed into service, various operational difficulties have been encountered. Severe erosion, brought about by exposure of fragile desert soils disturbed during construction, has worsened each year, jeopardizing the structural stability of pond embankments and roads. An indirect effect of this erosion, in addition to the deepening rill erosion on the downhill slopes above and below the system, has been the wind and water-driven transport of sediment into all ponds, especially the infiltration pond. This relocation of material has resulted in premature sealing of the floor and sideslopes of this pond, thus hampering infiltrative capacity. This translocation of soils has also displaced volume, reducing the effective capacity of the pond.

Since there is no stand-by area available for treatment expansion, and no additional capacity was designed into the system, there is no means to transfer wastewater to an adjacent or alternate cell when periodic maintenance is needed, nor is there any capacity available to provide for hydraulic dampening to accommodate those years with higher than normal rainfall. This lack of available capacity has been compounded by the addition of various water-using facilities described above. The existing treatment system is currently operating at greater than 85% of capacity which, by permit and state requirements, triggers the need to begin planning for expansion. Upgrade of the system would give the park the flexibility to accommodate increased wastewater loads, resulting from increased visitation, changing treatment regulations, or both. The proposed improvements would have a minimum life span of 20 years, although regular maintenance and upgrades could more than double the service life.

High levels of nitrate have been detected in groundwater near the treatment facility. It is unknown what contribution the pond system makes to nitrate in the groundwater. A groundwater monitoring well detected high levels of nitrate before the existing percolation pond was in place. That well has since gone dry, possibly as a result of the declining lake level, so the question has remained unresolved. However, the current pond system does not provide a means to adequately remove nitrate from the wastewater. NDEP, citing its anti-degradation policy, has stated that NPS should not exacerbate the poor condition of the groundwater, and a denitrification step must be added to the treatment process if the NPS wants to continue to discharge to groundwater.

Project Area Location

Lake Mead NRA is located in southeastern Nevada and northwestern Arizona (Figure 1). The park is approximately 1.5 million acres in size and includes both Lake Mead, formed by Hoover Dam, and Lake Mohave, formed by Davis Dam. Callville Bay is located on the northeast shore of Lake Mead's Boulder Basin (Figure 2). The developed area includes a marina, launch ramp, campground, RV village, housing, and water treatment systems (Figure 3).

**Figure 1. Regional Map
Lake Mead National Recreation Area**



Figure 2. Area Map
Lake Mead National Recreation Area

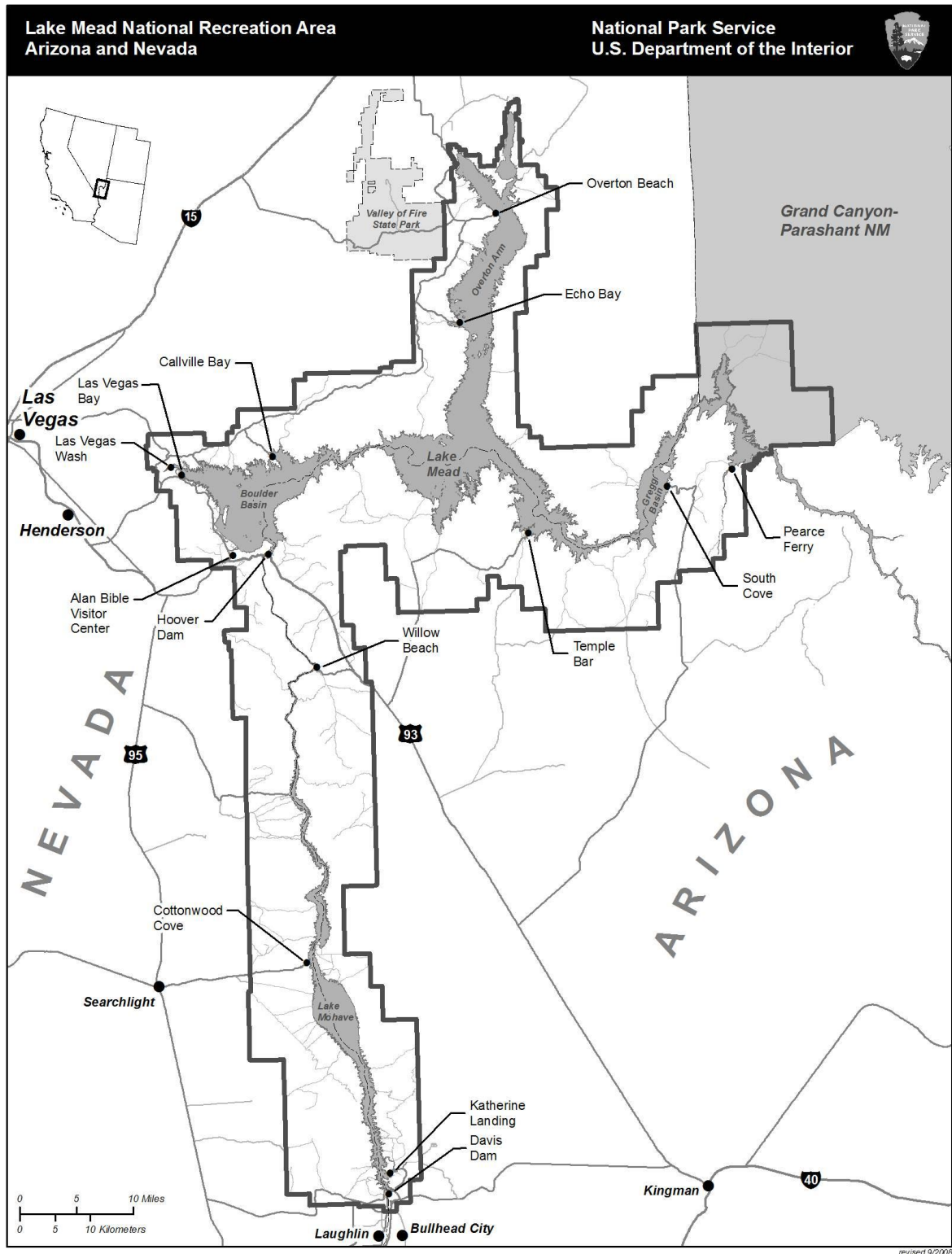
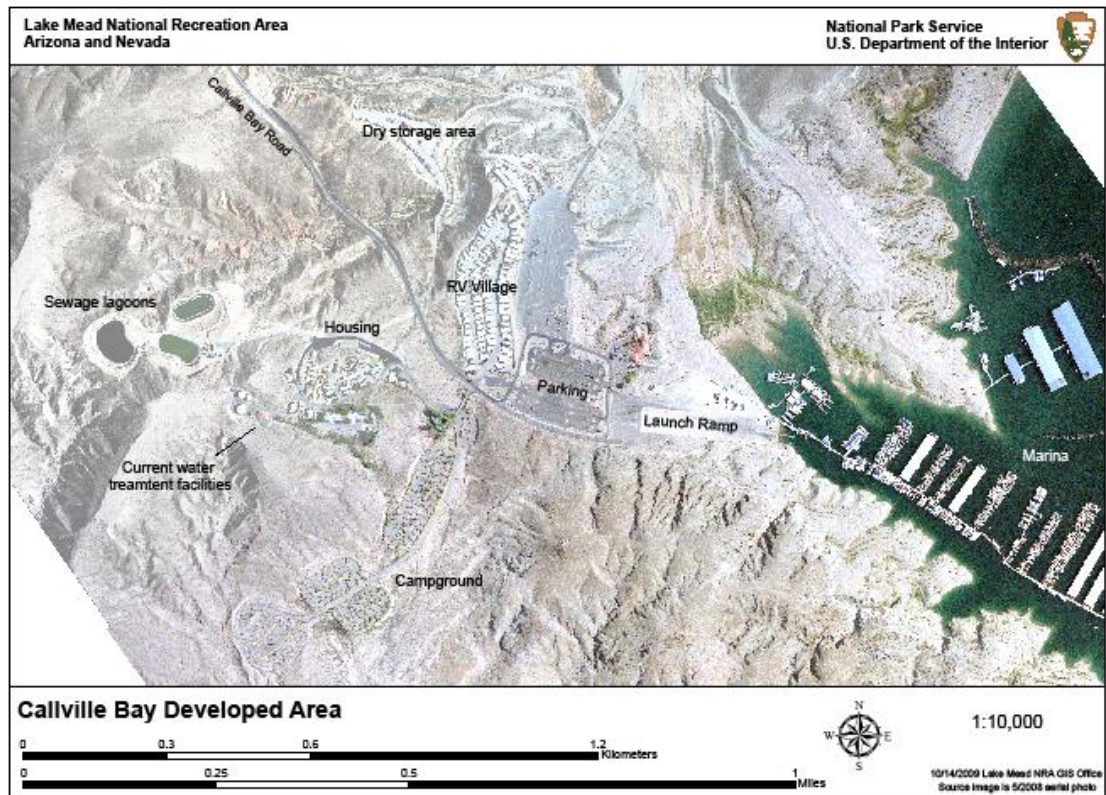


Figure 3. Callville Bay Developed Area



Related Laws, Legislation, and Other Planning and Management Documents

Servicewide Legislation and Planning Documents

The NPS Organic Act of 1916 directs the NPS to manage units “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner as will leave them unimpaired for the enjoyment of future generations.” Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress.” The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts. An action constitutes an impairment when its impacts “harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources and values.”

NPS Management Policies (2006) requires the analysis of potential effects of each alternative to determine if actions would impair park resources. To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.” The NPS must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS 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 to the affected resources and values.

Park-Specific Legislation and Planning Documents

NPS units vary based on their enabling legislation, natural and cultural resources, missions, and the recreational opportunities appropriate for each unit, or for areas within each unit. The enabling legislation for Lake Mead NRA (Public Law 88-639), established the recreation area “for the general purposes of public recreation, benefit, and use, and in a manner that will preserve, develop and enhance, so far as practicable, the recreation potential, and in a manner that will preserve the scenic, historic, scientific, and other important features of the area, consistent with applicable reservations and limitations relating to such area and with other authorized uses of the lands and properties within such area.” An action appropriate at Lake Mead NRA, as designated by the enabling legislation, may impair resources in another unit. This environmental assessment analyzes the context, duration, and intensity of impacts related to upgrading the wastewater management system at Callville Bay, as well as the potential for resource impairment, as required by Director’s Order 12: Conservation Planning, Environmental Impact Analysis and Decision Making (2000).

Callville Bay developed area is managed according to Lake Mead NRA’s General Management Plan (1986) and Lake Management Plan (2002). The General Management Plan outlines the types of facilities and services that are appropriate for Callville Bay and includes the existing and proposed facilities described above, while the Lake Management Plan establishes guidelines for managing recreation and resources on the lake, including the establishment of marina capacities.

Issues and Impact Topics

Issues are related to potential environmental effects of project alternatives and were identified by the project interdisciplinary team. Once issues were identified, they were used to help formulate the alternatives and mitigation measures. Impact topics based on substantive issues, environmental statutes, regulations, and executive orders were selected for detailed analysis. A summary of the impact topics and rationale for their inclusion or dismissal is given below.

Issues and Impact Topics Identified for Further Analysis

The following relevant impact topics are analyzed in the EA. Whether each issue is related to taking action or no action is specified.

Geology and Soils: All action alternatives include the permanent alteration of geology and soils for the installation of lagoons or additional treatment facilities.

Vegetation: Removal of vegetation is a component of all action alternatives that involve new construction outside of previously disturbed areas.

Wildlife: Construction of new lagoons would remove habitat currently available to wildlife.

Special Status Species: Construction of new lagoons would remove habitat currently available to special status species.

Water Resources: Under the No Action Alternative, there is a risk that existing ponds may not always be able to handle wastewater loads; pond failure could send wastewater into the developed area and the lake. In addition, the existing system may be contributing to already high levels of nitrate in the groundwater.

Cultural Resources: Cultural and archaeological resources are present in previously undisturbed areas in which construction may occur under certain alternatives.

Visual Resources: All action alternatives include the construction of new facilities which, depending on their location, have varying degrees of impact on the area's scenic quality.

Park Operations: Wastewater management is the responsibility of the park's Utility Systems Branch, within the Division of Maintenance and Engineering. The No Action Alternative, the lagoon alternatives, and the treatment alternative all require different levels of staff effort to maintain.

Safety and Visitor Use and Experience: Visitors to the Callville Bay developed area may be impacted by the treatment facilities themselves (in terms of visual impacts or odors) as well as by the ability of the park to maintain or expand any visitor services that have a wastewater component.

Impact Topics Considered but Dismissed from Further Consideration

The following topics are not further addressed in this document because there are no potential effects to these resources, which are either not in the project area or would be imperceptibly impacted: designated ecologically significant or critical areas, wild or scenic rivers, wetlands, floodplains, designated coastal zones, Indian Trust Resources, prime and unique agricultural lands, sites on the US Department of the Interior's National Registry of Natural Landmarks, or sole or principal drinking water aquifers.

Although upgrades to the wastewater treatment system and associated site preparation would temporarily increase dust and noise in localized areas, these effects are temporary and would disappear upon completion of construction. Dust abatement measures would be developed to minimize impacts to air quality during construction activities. Any operational noise associated with the water treatment system would not appreciably increase the ambient noise of the developed area. Therefore, impacts to air quality and soundscapes are not further analyzed.

In addition, there are no potential conflicts between the project and land use plans, policies, or controls (including state, local, or Native American) for the project area. There are no socioeconomic impacts associated with the project, and no adjacent lands would be affected.

Regarding energy requirements and conservation potential, construction activities would require the increased use of energy for the construction itself and for transporting materials. However, the overall energy required, beyond current usage, to implement the action alternatives would be negligible when viewed in the context of local and regional rates of consumption. In addition, under the action alternatives, solar panels will be installed to offset the small increased power requirement of a new lift station.

There are no potential effects to local or regional employment, occupation, income changes, or tax base as a result of this project. The project area of effect is not populated and, per Executive Order 12898 on Environmental Justice, there are no potential effects on minorities, Native Americans, women, or the civil liberties (associated with age, race, creed, color, national origin, or sex) of any American citizen. No disproportionate high or adverse effects to minority populations or low-income populations are expected to occur as a result of implementing any alternative.

CHAPTER 2: DESCRIPTION OF ALTERNATIVES

Introduction

This section describes the alternatives considered, including the No Action Alternative. The alternatives described include mitigation measures and monitoring activities proposed to minimize or avoid environmental impacts. This section also includes a description of alternatives considered early in the process but later eliminated from further study; reasons for their dismissal are provided. The section concludes with a comparison of the alternatives considered.

Alternative A: No Action

Under the No Action Alternative, no upgrades would be made to the existing wastewater treatment system. Unlike Alternatives B, C, and D, no additional lagoons would be constructed. Unlike Alternative E, no new treatment plants would be installed. The existing ponds would not be lined, so the park would be unable to use complete containment as a wastewater management option. There would be no way to remove nitrate from the wastewater, which would continue to discharge to groundwater, and the park would be out of compliance with NDEP regulations.

Under the No Action Alternative, there would be no additional capacity that would allow the park to move water in and out of ponds so that repairs and periodic maintenance of individual ponds could take place on a controlled schedule. In addition, the area's existing wastewater treatment capacity would continue to be reduced over time as additional inflow of sediment into Pond 3 causes further sealing and reduced infiltration rates.

Under this alternative, the park would have to pump wastewater from the lagoons and haul it to other developed areas whenever loads exceeded existing capacity. Such a scenario occurred in 2004 when heavier than normal rainfall filled the ponds. It could also occur as a result of higher visitation or expanded visitor services in the Callville Bay developed area.

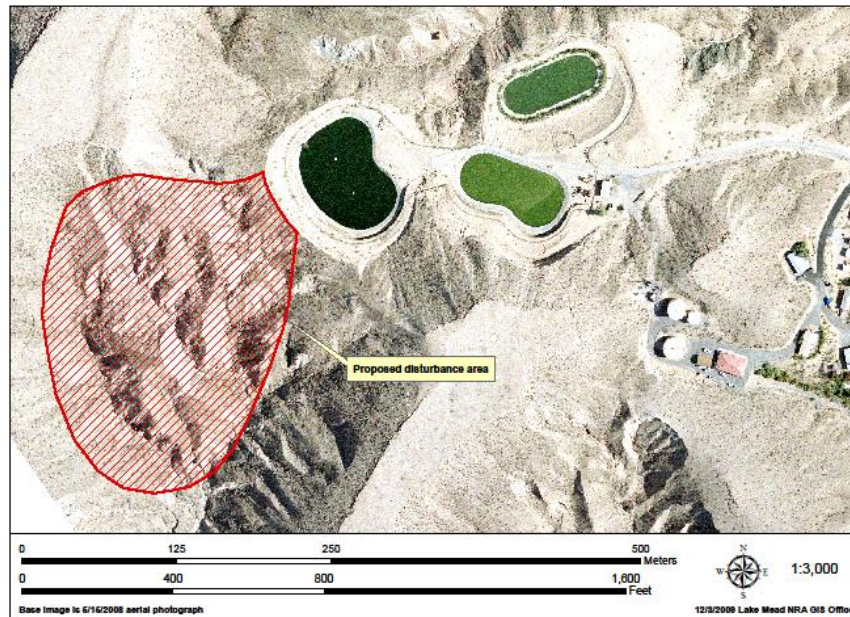
Alternative B: Construct New Lagoon West of Existing Lagoons (Management-Preferred Alternative)

Under this alternative, the existing ponds would be lined and equipped with a leak detection and collection system, and an additional lined pond with leak detection and collection system would be constructed west of existing Pond 1 (Figure 4). All wastewater would be disposed of through evaporation. Using existing infrastructure, wastewater would flow into completely-lined Pond 1 where existing mixers would remain in service to prevent septic conditions and odor problems. From there, wastewater would flow into existing Ponds 2 and 3 and, if necessary, be pumped to new Pond 4 for evaporation. The wastewater would not be treated for ammonia or nitrate

removal, as there would be no discharge to surface or groundwater. Solids would need to be removed from the lagoon bottoms periodically, but the capacity added by a fourth lagoon would allow the park to empty one lagoon whenever maintenance was needed.

In order to evaporate all the wastewater generated from expected future conditions, the area needed for the new pond would need to be just over 7 acres in size. A new pump station would be constructed to pump excess water not evaporated by Ponds 1 through 3 to the newly constructed Pond 4. A new access road would be built north of Pond 1 to provide access to Pond 4, bringing the total disturbance to approximately 7.7 acres. The existing perimeter fence would be expanded to include the new pond.

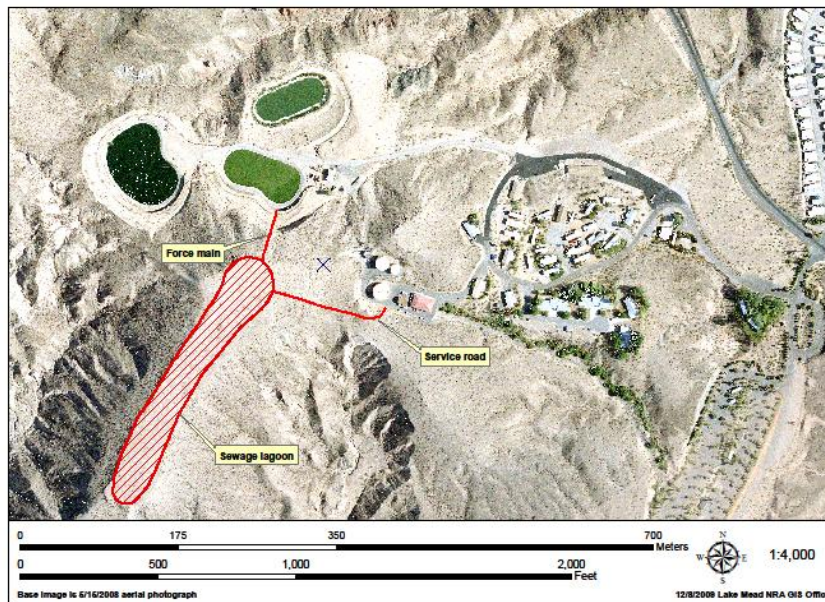
Figure 4: Location of facilities under Alternative B



Alternative C: Construct New Lagoon on Adjacent Mesa

This alternative is similar to Alternative B in that a new lined pond with leak detection and collection system would be constructed. Under this alternative, the new pond would be built on top of a mesa located south of the existing ponds (Figure 5). This in turn would require that a service road be constructed from the water treatment plant to the top of the mesa. In addition, a lift station and small diameter force main would be installed to connect the existing wastewater ponds to the new pond on top of the mesa. Constructing the pond at this location would result in 4.5 acres of disturbance on the mesa, but the access road up the steep slope would add 5.5 acres of additional disturbance. A perimeter fence with gate would be constructed around the new pond.

Figure 5. Location of facilities under Alternative C



Alternative D: Re-open Abandoned Lagoon

Under this alternative, the new wastewater pond would be constructed at the site of an old wastewater pond which was filled in and abandoned after the existing ponds were constructed in 1992 (Figure 6). This previously disturbed site is not large enough to completely accommodate the new pond, so additional cuts in the hillside to the north and west would be required. An existing access road would be stabilized and improved to provide access. This site lies on the opposite side of the Callville Bay access road as the existing ponds, so an underground pipeline would need to be constructed to provide connectivity between ponds. The pipeline would follow existing disturbed corridors, but a new pump station would be needed to transfer wastewater between ponds.

Alternative E: Provide Additional Treatment Within Footprint of Existing Lagoon Area

Under this alternative, a new lagoon would not be constructed. Pond 1 would serve as a storage basin. A portion of Pond 2 would be converted to an Integrated Fixed Film Activated Sludge (IFAS) System, in which either fixed or suspended media would provide a substrate for biological breakdown of ammonia and nitrate. The other portion of Pond 2 would accumulate solids, which would be periodically removed. A new building housing electrical equipment and blowers would be constructed at the site to provide the aeration needed for the system, but this would be located within the footprint of the existing wastewater treatment system (Figure 7). Under this alternative, with adequate nitrate removal, Pond 3 would discharge effluent to groundwater.

Figure 6: Location of facilities under Alternative D

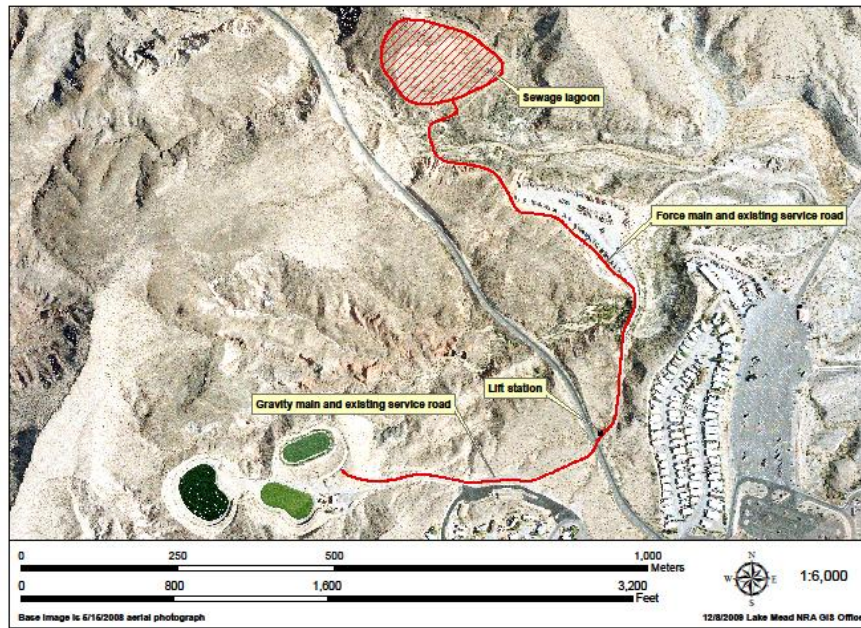
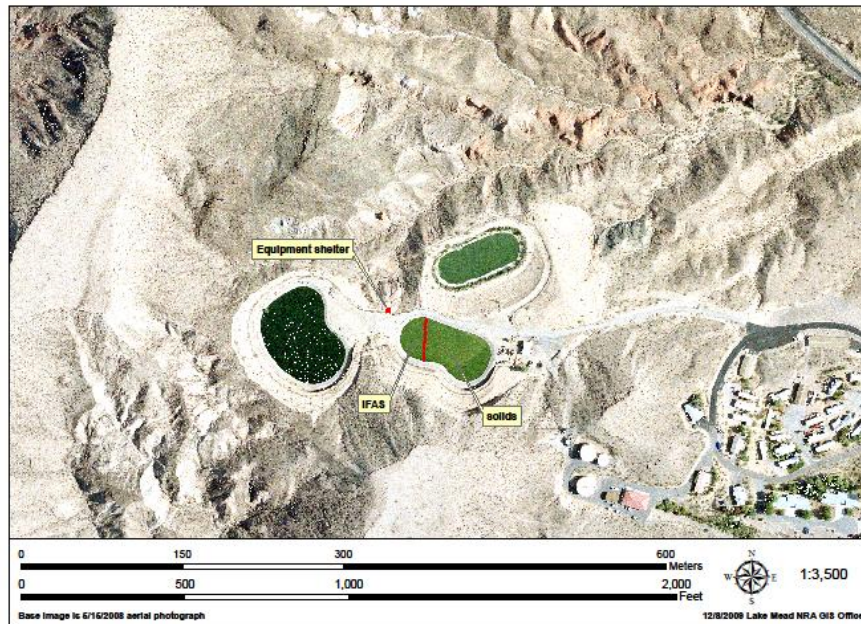


Figure 7: Location of facilities under Alternative E



Alternatives Considered but Dismissed from Further Evaluation

Several alternatives were considered initially but not carried forward for additional impact analysis. These alternatives involved different approaches to water treatment and were rejected because they were less advantageous than the water treatment option carried forward as Alternative E. Conversion of Pond 3 to a wetland to provide increased polishing prior to infiltration was rejected because such a system does not provide the consistency necessary to ensure adequate removal of inorganic nitrogen. Also, the build-up of biomass can reduce infiltration capacity and requires periodic removal. Conversion of a portion of Pond 2 to a Sequencing Batch Reactor was rejected because it includes numerous operational components and requires a greater amount of maintenance without offering improved effluent water quality or decreased capital cost. Installation of a denitrification filter between Ponds 2 and 3 and the replacement of the pond system with an oxidation ditch were rejected because both are operationally intensive and have higher construction and operational costs.

Mitigation and Monitoring

Mitigation measures are specific actions designed to reduce, minimize, or eliminate impacts of alternatives and to protect Lake Mead NRA resources and visitors. Monitoring activities are actions to be implemented during or following project implementation to assess levels of impact. The following measures would be implemented under all applicable alternatives and are assumed in the analysis of effects for each alternative.

- To reduce impacts on vegetation and soils, topsoil would be collected and stockpiled under the supervision of resource management staff. Upon completion of the project, topsoil would be placed in disturbed areas to enhance the recovery of native vegetation and reduce erosion.
- Vegetation salvage would occur within project boundaries as deemed appropriate by NPS resource managers. Salvaged plants would be stored at the park's native plant nursery and used for re-vegetation at the project site.
- To prevent the introduction and spread of non-native plant species, construction equipment would be pressure-washed prior to entering the park to ensure it is free of foreign soils and exotic plant material. Equipment brought to the project site from other locations within the park would be subject to this same requirement.
- Heavy equipment would be parked in previously disturbed areas designated by NPS; no new staging areas would be created. All project materials would be stored in these areas as well.
- Heavy equipment would be inspected daily to ensure there are no leaks of petroleum products or other hazardous materials. Use of absorbent pads and containment materials would be required.
- Best management practices would be in place during refueling and other activities that may release hazardous materials into the environment. A hazardous spill

plan would be developed prior to beginning the project, and any spills would be reported immediately.

- All areas proposed for disturbance would be clearly delineated and enclosed with tortoise-proof fencing. All project personnel would be instructed that their activities must be confined to locations within the fenced area. Disturbance beyond the actual zone would be prohibited.
- Prior to construction, NPS biologists would survey the project site for desert tortoises. Tortoises inside the construction limits would be re-located outside the project area. Tortoise burrows that cannot be avoided would be confirmed to be unoccupied by a qualified biologist before being destroyed.
- Prior to construction, NPS biologists would survey the project area for burrowing owls. Any identified burrows would be avoided or collapsed while unoccupied.
- Prior to construction, a qualified NPS biologist would provide on-site training to workers which would include information on desert tortoise biology, legal protection of the species, and all required mitigation and reporting requirements.
- Prior to construction, a qualified biologist would inform project personnel of how to identify Gila monsters, how to distinguish them from other native lizards, and how to properly report a sighting should an encounter occur.
- All trash would be disposed of in appropriate containers and removed from the project site daily to avoid attracting ravens, which may feed on juvenile desert tortoises and other wildlife.
- A stormwater pollution prevention plan would be developed and implemented to prevent erosion impacts during any construction activities. Following completion of construction, proper recontouring of the landscape and revegetation would be used to mitigate reduce erosion in the long-term.
- Dust abatement measures would be used to prevent impacts to air quality during construction.

Coordination, Consultation, and Permitting

The following consultation and coordination will occur as part of this environmental assessment:

1. As required under Section 7 of the Endangered Species Act, the NPS will consult with the U.S. Fish and Wildlife Service to minimize impacts to the federally threatened desert tortoise.
2. As required under Section 106 of the National Historic Preservation Act, the NPS will consult with the Nevada State Historic Preservation Office (SHPO) to determine the significance of cultural resources in the project area and the potential effect of the project on those resources. If the effect is adverse, the NPS will continue consultation with the SHPO to develop a plan to mitigate the adverse effect.
3. Under the action alternatives, the construction contractor would be required to obtain county dust permits and a permit from the U.S. Army Corps of Engineers, as required under Section 404 of the Clean Water Act.

Environmentally Preferred Alternative

The environmentally preferred alternative is the alternative that will promote NEPA, as expressed in Section 101 of NEPA. This alternative will satisfy the following requirements:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable or unintended consequences;
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and,
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative E is the environmentally preferable alternative because overall it would best meet the requirements in Section 101 of NEPA. By obviating the need to construct another lagoon, Alternative E prevents impacts to vegetation, wildlife (including special status species), and cultural resources, and greatly reduces impacts to geology and visual resources relative to the other action alternatives. Alternative E, therefore, best satisfies criteria 1 through 4 above. The additional treatment processes of Alternative E ensure that the park can meet its wastewater treatment requirements and not contribute to the already high level of nitrate in the groundwater (fulfilling criteria 3 and 6). Alternatives B, C, and D are more desirable in terms of park operations but result in greater impacts to geology, soils, vegetation, wildlife, special status species, cultural resources, and visual resources than Alternative E. The No Action alternative does not meet the purpose and need and fails to satisfy criteria 1, 2, 3, and 6.

Comparison of Impacts

Table 1 summarizes the potential long-term impacts of the proposed alternative. Short-term impacts are not included in this table, but are analyzed in the Environmental Consequences chapter. Impact intensity, context, and duration are also defined in the Environmental Consequences chapter.

Table 1. Comparison of Long-Term Impacts from the Alternatives Considered

IMPACT TOPIC	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E
Geology and Soils	No effect	Moderate adverse impacts	Moderate adverse impacts	Minor adverse impacts	Negligible adverse impacts
Vegetation	No effect	Moderate adverse impacts	Moderate adverse impacts	Minor adverse impacts	No effect
Wildlife	No effect	Moderate adverse impacts	Moderate adverse impacts	Minor adverse impacts	No effect
Special Status Species	No effect	Likely to adversely affect	Likely to adversely affect	Not likely to adversely affect	No effect
Water Resources	Moderate adverse impacts	Moderate beneficial effects	Moderate beneficial effects	Moderate beneficial effects	Moderate beneficial effects
Cultural Resources	No effect	Negligible adverse impacts	Negligible adverse impacts	No effect	No effect
Visual Resources	No effect	Minor adverse impacts	Moderate adverse impacts	Moderate adverse impacts	Negligible adverse impacts
Park Operations	Moderate adverse impacts	Moderate beneficial effects	Moderate beneficial effects and minor adverse impacts	Moderate beneficial effects	Moderate adverse impacts
Visitor Use and Experience	Minor adverse impacts	Moderate beneficial effects	Moderate beneficial effects and moderate adverse impacts	Moderate beneficial effects and moderate adverse impacts	Moderate beneficial effects

CHAPTER 3: AFFECTED ENVIRONMENT

Introduction

This section provides a description of the existing environment in the project area and the resources that may be affected by the proposals and alternatives under consideration. Complete and detailed descriptions of the environment and existing use at Lake Mead NRA are found in the Lake Mead NRA Lake Management Plan and Final Environmental Impact Statement (2002), Lake Mead NRA Resource Management Plan (NPS 2000) and the Lake Mead NRA General Management Plan (NPS 1986).

Location and General Description of Lake Mead NRA and the Project Area

Lake Mead NRA is approximately 1.5 million acres in size and offers a variety of water-based recreational opportunities in a scenic desert setting. Callville Bay is one of the park's most popular developed areas, given its easy access from the major urban area of Las Vegas. Situated on the northeastern shore of the Boulder Basin, the area features a marina, restaurant, general store, campground, picnic area, and launch ramp. Visitation at Callville Bay was nearly 430,000 in 2010.

Geology and Soils

The Callville Bay area is characterized by steep, hilly terrain. Like most of the recreation area, mountains and ridges generally follow a north-south orientation, interspersed with valleys and desert washes. The Black Mountains lie to the north and east of Callville Bay. Volcanic rock is prevalent in the area. Soils include lithosols and red desert soils. The project site is typical desert terrain with rocky knolls and outcroppings.

Vegetation

The Callville Bay area is characterized by typical Mohave Desert scrub, dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Areas around existing ponds may support native arrowweed (*Pluchea sericea*), as well as non-native tamarisk (*Tamarix ramosissima*) and Russian thistle (*Salsola tragus*).

Wildlife

The Mojave Desert habitat surrounding Callville Bay supports numerous wildlife species. Desert bighorn sheep (*Ovis canadensis nelsoni*) are commonly seen in the steep terrain surrounding the developed area. Other mammals include coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), black-tailed jackrabbits (*Lepus californicus*), and smaller rodents. Several species of snakes and lizards are prevalent. Desert-dwelling birds such as the black-throated sparrow (*Amphispiza bilineata*) occupy upland areas, with avian species diversity increasing in wash habitat and within the developed area. The bay itself supports waterbirds and sport fishes. The existing water treatment ponds are utilized by a variety of waterbirds and shorebirds.

Special Status Species

The federally threatened desert tortoise (*Gopherus agassizii*) occurs widely throughout the recreation area and is commonly found in the suitable habitat that surrounds the Callville Bay development. Suitable habitat also exists for the burrowing owl (*Athene cunicularia*) and the banded Gila monster (*Heloderma suspectum*); both are considered species of management concern by the State of Nevada.

Water Resources

Callville Bay is located in the northeast portion of Lake Mead's Boulder Basin. Formed by Hoover Dam's impoundment of the Colorado River, Lake Mead is the nation's largest man-made lake and serves as the primary source of drinking water for millions of people in Nevada, California, and Arizona. It also provides an environment for aquatic life and for human recreation. Desert washes in the Callville Bay area are typically dry but are subject to seasonal flash flooding, and all washes in this area drain into Lake Mead. Groundwater in the project area is primarily a result of lateral inflow of lake water and has decreased following a drop in lake levels. Further inland, groundwater is thought to be related to the base flow or shallow aquifer that drains the Las Vegas Valley. Waterbearing formations in the area are considered low-yield and contain poor quality, highly mineralized groundwater.

Cultural Resources

The Callville Bay developed area has been inventoried for cultural resources. No historic archaeological sites have been located in the area; however, several prehistoric sites have been recorded. The Muddy Creek Formation is the underlying geologic formation in the area. It contains abundant chert cobbles that are eroding out in several areas. The prehistoric archaeological sites are located in the areas where the chert cobbles are found and consist of waste material from the making of stone tools. Within the areas under

consideration for the wastewater system expansion, five isolated finds were located. The isolated finds consist of a Department of Interior survey marker, two modern rock rings, and two tested cobble loci with fewer than 10 artifacts (cobbles and flakes) at each locus. None of the isolated finds meet the NPS definition of a site and are not eligible for the National Register of Historic Places.

Visual Resources

The Callville Bay area provides striking scenic viewsheds, both terrestrial and aquatic. The developed area lies four miles south of Northshore Road, which provides views of Bowl of Fire and areas of designated wilderness. The Bay itself opens up into the Boulder Basin of Lake Mead, the country's largest man-made lake.

Park Operations

Water and wastewater systems at Lake Mead are the responsibility of the Utility Systems branch of the Maintenance Division. The branch has 14 staff members, three of whom have primarily administrative and oversight roles. The other staff must maintain the water and wastewater systems at all developed areas throughout the park. Three employees are stationed at Callville Bay, where shifts are split to provide coverage 7 days a week. These employees are also responsible for facilities at Las Vegas Bay and Government Wash and serve as back-up personnel for other developed areas.

Safety and Visitor Use and Experience

Callville Bay offers visitors a rich variety of outdoor experiences just a short distance outside the Las Vegas metropolitan area. Nearly 430,000 people visited Callville Bay in 2010. The launch ramp provides boaters with access to Lake Mead's Boulder Basin, where people enjoy fishing, skiing, and swimming. The area is also used for camping and picnicking, and visitors take advantage of the marina, general store, restaurant, and campground.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Introduction

This section presents the likely beneficial and adverse effects to the natural and human environment that would result from implementing the alternatives under consideration. This section describes short-term and long-term effects, direct and indirect effects, cumulative effects, and the potential for each alternative to result in unacceptable impacts or impairment of park resources. Interpretation of impacts in terms of their duration, intensity (or magnitude), and context (local, regional, or national effects) are provided where possible.

Methodology

In describing potential environmental impacts, it is assumed that the mitigation identified in the Mitigation and Monitoring section of this EA would be implemented under any of the applicable alternatives. Impact analyses and conclusions are based on NPS staff knowledge of resources and the project area, review of existing literature, and information provided by experts in the NPS or other agencies. Any impacts described in this section are based on preliminary design of the alternatives under consideration. Effects are quantified where possible; in the absence of quantitative data, best professional judgment prevailed.

Impacts are characterized as negligible, minor, moderate, or major, according to definitions provided for each impact topic below. In addition, the following terms may also be used in characterizing impact type:

- *Localized Impact*: The impact occurs in a specific site or area. When comparing changes to existing conditions, the impacts are detectable only in the localized area.
- *Direct Effect*: The effect is caused by the action and occurs at the same time and place.
- *Indirect Effect*: The effect is caused by the action and may occur later in time or be farther removed in distance, but is still reasonably foreseeable.
- *Short-Term Effect*: The effect occurs only during or immediately after implementation of the alternative.
- *Long-Term Effect*: The effect could occur for an extended period after implementation of the alternative. The effect could last several years or more and could be beneficial or adverse.

In the absence of quantitative data concerning the full extent of actions under a proposed alternative, best professional judgment prevailed.

Impairment Analysis

In addition to determining the environmental consequences of the alternatives, NPS Management Policies (2006) requires the analysis of potential effects to determine if actions would impair park resources. Under the NPS Organic Act of 1916 and the NPS General Authorities Act of 1970, as amended, the NPS may not allow the impairment of park resources and values except as authorized specifically by Congress. The NPS must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS 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 to the affected resources and values.

Impairment to park resources and values has been analyzed within this document. Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Definitions of impairment for relevant resource topics are provided in Table 2. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the enabling legislation or proclamation of the park; is key to the cultural or natural integrity of the park or to opportunities for enjoyment of the park; or is identified as a goal in the park's general management plan or other relevant NPS planning document. An impact would be less likely to constitute an impairment to the extent that it is an unavoidable result, which cannot be reasonably further mitigated, of an action necessary to preserve or restore the integrity of park resources or values.

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

Table 2. Impairment Definitions

Resource Topic	Definition of Impairment
Geology and Soils	The impact results in a permanent change in a large portion of the overall acreage of the park, affecting the resource to the point that the park's purpose cannot be fulfilled and the resource is degraded precluding the enjoyment of future generations.
Vegetation	The impact contributes substantially to the deterioration of the park's native vegetation. These resources are affected over the long-term to the point that the park's purpose cannot be fulfilled and the resource cannot be experienced and enjoyed by future generations.
Wildlife	The impact contributes substantially to the deterioration of natural resources to the extent that the park's wildlife and habitat no longer functions as a natural system. Wildlife and its habitat are affected over the long-term to the point that the park's purpose is not fulfilled and the resource cannot be experienced and enjoyed by future generations.
Special Status Species	The impact is likely to jeopardize the continued existence of a listed species or adversely modify large areas of critical habitat.
Water Resources	Effects alter baseline or desired water quality conditions on a long-term basis, or water quality standards are exceeded several times on a short-term and temporary basis. Impacts result in the deterioration of water quality to the extent that the Lake Mead NRA aquatic life and habitat no longer function as a natural system. Aquatic life is affected over the long-term to the point that the Lake Mead NRA purpose cannot be fulfilled and the resource cannot be experienced and enjoyed by future generations.
Cultural Resources	There is loss, destruction, or degradation of a cultural property, resource, or value to the point that it negatively affects the park's purpose, and the resource cannot be enjoyed by future generations. For purposes of Section 106, the determination would be adverse effect.
Visual Resources	The impact occurs within an extremely visually sensitive area. The impact is not compatible with the overall visual character of the area, the landscape is unable to absorb the impact, and mitigation measures are unsuccessful in alleviating the impact. The impact contributes substantially to the degradation of the overall scenic quality to the point that the park's purpose cannot be fulfilled, and resource degradation precludes the enjoyment of future generations.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the NPS will apply a standard that offers greater assurance that impairment will not occur. NPS Management Policies (2006) requires that park managers evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable. Unacceptable impacts are impacts that fall short of impairment, but are still not acceptable within a particular park's environment.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. For the purposes of this analysis, an unacceptable impact is an impact that individually or cumulatively would

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

Cumulative Impacts

Cumulative effects are the direct and indirect effects of an alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action. Federal agencies are required to identify the temporal and geographic boundaries within which they will evaluate potential cumulative effects of an action and the specific past, present, and reasonably foreseeable projects that will be analyzed. This includes potential actions within and outside the recreation area boundary. The geographical boundaries of analysis vary depending on the impact topic and potential effects. While this information may be inexact at this time, major sources of impacts have been assessed as accurately and completely as possible, using all available data.

Specific projects or ongoing activities with the potential to cumulatively affect the resources (impact topics) evaluated for the project are identified in this document and described in the following narrative. Some impact topics would be affected by several or all of the described activities, while others could be affected very little or not at all. How each alternative would incrementally contribute to potential impacts for a resource is included in the cumulative effects discussion for each impact topic.

Water and wastewater management is a large program within Lake Mead NRA. The park is currently constructing arsenic treatment plants at Cottonwood Cove, Temple Bar, and Willow Beach in order to comply with revised guidelines from the Environmental Protection Agency. These areas are supplied by wells, so the water requires different treatment than the park's other developed areas. The park recently completed minor upgrades to the wastewater lagoons at Boulder Beach and Cottonwood Cove to improve their operational efficiency, and similar work is underway at Katherine's Landing.

A number of other projects have been completed or are planned for the Callville Bay developed area. Over the last several years, the park has had to extend the launch ramp in response to the lowering lake level. Last year, after topography made it infeasible to extend the ramp any farther, a new ramp was constructed along the south side of the bay to maintain recreational access. The park also recently constructed a new maintenance building at Callville Bay and this year will begin construction of a new visitor contact station to serve visitors in this busy area of the park.

Geology and Soils

Laws, Regulations, and Policies

NPS Management Policies (2006) stipulates that the NPS will preserve and protect geologic resources as integral components of park natural systems. Geologic resources include geologic features and geologic processes. The fundamental policy, as stated in the NPS Natural Resource Management (NPS-77, 1991) is the preservation of the geologic resources of parks in their natural condition whenever possible.

Soil resources would be protected by preventing or minimizing adverse potentially irreversible impacts on soils, in accordance with NPS Management Policies (2006). NPS-77 specifies objectives for each management zone for soil resources management. These management objectives are defined as: (1) natural zone- preserve natural soils and the processes of soil genesis in a condition undisturbed by humans; (2) cultural zone- conserve soil resources to the extent possible consistent with maintenance of the historic and cultural scene and prevent soil erosion wherever possible; (3) park development zone- ensure that developments and their management are consistent with soil limitations and soil conservation practices; and, (4) special use zone- minimize soil loss and disturbance caused by special use activities, and ensure that soils retain their productivity and potential for reclamation.

Zones within the recreation area have been designated in the Lake Mead NRA General Management Plan, which provides the overall guidance and management direction for Lake Mead NRA.

Criteria and Thresholds for Impact Analysis

The following impact thresholds were established for analyzing impacts to geology and soils in the project area.

- *Negligible impacts:* Impacts have no measurable or perceptible changes in soil structure and occur in a relatively small area.
- *Minor impacts:* Impacts are measurable or perceptible, but localized in a relatively small area. The overall soil structure is not affected.
- *Moderate impacts:* Impacts are localized and small in size, but cause a permanent change in the soil structure in that particular area.
- *Major impacts:* Impact on the soil structure is substantial, highly noticeable, and permanent.

Alternative A

Under the No Action Alternative, the park would continue to operate the Callville Wastewater Treatment Facility unimproved with no new or additional disturbance. This alternative would have no new impacts to geology or soils.

Cumulative Effects: There would be no cumulative effects to geology and soils as a result of Alternative A.

Conclusion: Alternative A would have no effect on geology and soils; there would be no unacceptable impacts, and no impairment would occur.

Alternative B

Approximately 7.7 acres of land would be permanently altered for the construction of a new treatment lagoon. Because of the topography and complex drainage of this area, this alternative requires large cuts and fills and a complete topographical redesign of the project area. This alternative results in greater impacts to geology and soils than any other alternative except Alternative C.

Cumulative Effects: Geology and soils in the developed areas of Lake Mead NRA have been previously impacted by the establishment of park facilities and concessioner operations. Other impacts are occurring as the park adapts operations to accommodate the declining lake level. The construction of an additional wastewater lagoon is a small incremental cumulative effect to geology and soils.

Conclusion: Alternative B would result in localized, long-term, moderate adverse impacts to geology and soils. There would be no unacceptable impacts and no impairment under this alternative.

Alternative C

Construction of a new lagoon on top of the mesa would require the disturbance of 4.5 acres for the lagoon and an additional 5.5 acres for an access road to the top of the mesa. Impacts to geology and soils are greatest under this alternative.

Cumulative Effects: Although the new lagoon would be located in a different area and require slightly more disturbance, cumulative effects would be similar to those of Alternative B.

Conclusion: Alternative C would result in localized, long-term, moderate adverse impacts to geology and soils. There would be no unacceptable impacts and no impairment under this alternative.

Alternative D

This alternative would impact 3 acres of land. The new lagoon would utilize the area previously disturbed by the original lagoon but would also expand into currently undisturbed desert. The pipeline and pump station would be installed in previously disturbed areas. This alternative requires less new disturbance than Alternatives B and C, but still results in greater permanent changes to geology and soils than Alternatives A and E.

Cumulative Effects: Cumulative effects are similar to those described for Alternative B.

Conclusion: Alternative D would result in localized, long-term, minor to moderate impacts to geology and soils. There would be no unacceptable impacts and no impairment under this alternative.

Alternative E

Implementation of an IFAS system would require a new support building, but this would be constructed within the existing footprint of the current wastewater treatment system. Therefore, Alternative E would result in no new ground disturbance and only a small permanent change in geology and soils at the site where the building is located. This alternative has the smallest impact to geology and soils among any of the action alternatives.

Cumulative Effects: Alternative E would not appreciably add to the adverse cumulative effects to geology and soils, as the activity would occur in an area already modified by past actions.

Conclusion: Alternative E would result in localized, long-term, negligible impacts to geology and soils. There would be no unacceptable impacts and no impairment under this alternative.

Vegetation

Laws, Regulations, and Policies

The NPS Organic Act directs the park to conserve the scenery and the natural objects unimpaired for future generations. NPS Management Policies (2006) defines the general principles for managing biological resources as maintaining all native plants and animals as part of the natural ecosystem. When NPS management actions cause native vegetation

to be removed, then the NPS will seek to ensure that such removals will not cause unacceptable impacts to native resources, natural processes, or other park resources. Exotic species, also referred to as non-native or alien, are not a natural component of the ecosystem. They are managed, up to and including eradication, under the criteria specified in NPS Management Policies (2006) and NPS-77.

Criteria and Thresholds for Impact Analysis

The following impact thresholds were established for analyzing impacts to vegetation in the project area:

- *Negligible impacts:* Impacts have no measurable or perceptible changes in plant community size, integrity, or continuity.
- *Minor impacts:* Impacts are measurable or perceptible and localized within a relatively small area. The overall viability of the plant community is not affected and the area, if left alone, recovers.
- *Moderate impacts:* Impacts cause a change in the plant community (e.g. abundance, distribution, quantity, or quality); however, the impact remains localized.
- *Major impacts:* Impacts to the plant community are substantial, highly noticeable, and permanent.

Alternative A

Under the No Action Alternative, the Park would continue to operate the Callville Wastewater Treatment Facility unimproved with no new or additional disturbance. Capacity problems would be alleviated by pumping and hauling sludge from the Callville facility to another Park wastewater treatment facility. This alternative would have no new impacts to vegetation.

Cumulative Effects: There would be no cumulative effect to vegetation as a result of Alternative A.

Conclusion: Alternative A would have no effect on vegetation; there would be no unacceptable impacts, and no impairment would occur.

Alternative B

Alternative B would result in the removal of all native vegetation within the 7.7-acre footprint of the new lagoon and service road. This alternative results in greater impacts to vegetation than Alternatives A, D, and E.

Cumulative Effects: Native vegetation at Lake Mead NRA is impacted by a variety of activities. Construction and development results in direct removal of plants, but such projects are limited to development zones identified in park planning documents. Illegal off-road activity negatively affects plant communities, as does the spread of non-native

plant species. Since the Callville wastewater project occurs in the creosote-dominated community characteristic of most of the park, removal of plants under Alternative B represents a small incremental cumulative impact to vegetation.

Conclusion: Alternative B would result in long-term, moderate adverse impacts to vegetation. There would be no unacceptable impacts and no impairment under this alternative.

Alternative C

Under Alternative C, vegetation would be removed for the construction of both the new lagoon and the access road to the top of the mesa. The total disturbance would be approximately 10 acres, although the density of vegetation on top of the mesa is lower relative to surrounding areas. Impacts to vegetation under this alternative are similar to Alternative B and greater than Alternatives A, D, and E.

Cumulative Effects: Cumulative effects would be similar to those described under Alternative B.

Conclusion: Alternative C would have long-term, moderate adverse impacts to vegetation. There would be no unacceptable impacts and no impairment under this alternative.

Alternative D

Under Alternative D, three acres of vegetation would be impacted to accommodate the new lagoon and associated infrastructure. However, much of this area has been previously disturbed and is in varying degrees of recovery, so impacts to vegetation would be less than those of Alternatives B and C but greater than those of Alternatives A and E.

Cumulative Effects: Cumulative effects would be similar to, if slightly smaller in magnitude than, those described under Alternatives B and C.

Conclusion: Alternative D would have long-term, minor impacts to vegetation. There would be no unacceptable impacts and no impairment under this alternative.

Alternative E

All components of Alternative E would occur within the existing footprint of the current wastewater treatment facility, where native vegetation has already been removed. There would be no additional impacts to vegetation under this alternative.

Cumulative Effects: There would be no cumulative effects to vegetation as a result of Alternative E.

Conclusion: Alternative E would have no effect on vegetation; there would be no unacceptable impacts, and no impairment would occur.

Wildlife

Laws, Regulations, and Policies

The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the NPS to mean native animal life should be protected and perpetuated as part of the recreation area's natural ecosystem. Natural processes are relied on to maintain populations of native species to the greatest extent possible. The restoration of native species is a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and ecological integrity of plants and animals.

The recreation area also manages and monitors wildlife cooperatively with the Arizona Game and Fish Department and the Nevada Division of Wildlife.

Criteria and Thresholds for Impact Analysis

The following impact thresholds were established for analyzing impacts to wildlife and wildlife habitat in the project area:

- *Negligible impacts*: No species of concern are present; no impacts or impacts with only temporary effects are expected.
- *Minor impacts*: Nonbreeding animals of concern are present, but only in low numbers. Habitat is not critical for survival; other habitat is available nearby. Occasional flight responses by wildlife are expected, but without interference with feeding, reproduction, or other activities necessary for survival. Mortality of species of concern is not expected.
- *Moderate impacts*: Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or winter; mortality or interference with activities necessary for survival expected on an occasional basis, but not expected to threaten the continued existence of the species in the park.
- *Major impacts*: Breeding animals are present in relatively high numbers, and/or wildlife is present during particularly vulnerable life stages. Habitat targeted by actions has a history of use by wildlife during critical periods, but there is suitable habitat for use nearby. Few incidents of mortality could occur, but the continued survival of the species is not at risk.

Alternative A

Under the No Action Alternative, the Park would continue to operate the Callville Wastewater Treatment Facility unimproved, with no new or additional disturbance. Therefore, this alternative would have no impacts to wildlife.

Cumulative Effects: There would be no cumulative effects to wildlife as a result of Alternative A.

Conclusion: Alternative A would have no effect on wildlife; there would be no unacceptable impacts, and no impairment would occur.

Alternative B

Alternative B requires extensive earthwork to recontour the area and accommodate the new facilities, and would result in the displacement of wildlife within the 7.7-acre footprint of the new lagoon. Larger species would likely be flushed from the area during construction while smaller species may be killed by earth-moving equipment. If construction occurs during periods of dormancy, there would be greater likelihood of mortality of animals inside underground burrows. The habitat would be permanently altered, and animals would not return to the area. This alternative results in greater impact to wildlife than Alternatives A, D, and E.

Cumulative Effects: Displacement of wildlife occurs whenever construction and development removes suitable habitat. Similar impacts occurred as a result of the construction of arsenic treatment plants at other developed areas and from recent road improvement projects within the park. Future construction related to roads, rights-of-way, and recreation will be restricted to limited areas defined in park planning documents. Actions comprising Alternative B represent a small cumulative contribution to impacts to park wildlife.

Conclusion: Alternative B would result in long-term, moderate adverse impacts to wildlife. There would be no unacceptable impacts and no impairment under this alternative.

Alternative C

Under Alternative C, wildlife would be displaced for the construction of both the new lagoon and the access road to the top of the mesa. There is more total habitat disturbance under this alternative than under Alternative B, although some of the habitat being disturbed (i.e. the hard rocky surface of the mesa and the steepest parts of the slope) is of lower quality relative to that of Alternative B. Wildlife would experience the same types of impacts as under Alternative B. The impacts would occur over a slightly larger area but would include areas where animal densities are lower. Therefore, impacts to wildlife under this alternative would be similar to Alternative B but greater than Alternatives A, D, and E.

Cumulative Effects: Cumulative effects would be similar to those described under Alternative B.

Conclusion: Alternative C would result in long-term, moderate adverse impacts to wildlife. There would be no unacceptable impacts and no impairment under this alternative.

Alternative D

Under Alternative D, approximately 3 acres of wildlife habitat would be impacted to accommodate the new lagoon and associated infrastructure. The portion of the site that

has been previously disturbed area is in varying degrees of recovery and thus provides less suitable habitat for wildlife. Animals may move through the area but would be less likely to occupy the site, so harassment and mortality would be less likely. Impacts to wildlife would be less than those of Alternatives B and C, but greater than those of Alternatives A and E.

Cumulative Effects: Cumulative effects would be similar to, if slightly smaller in magnitude than, those described under Alternatives B and C.

Conclusion: Alternative D would result in minor adverse impacts to wildlife. There would be no unacceptable impacts and no impairment under this alternative.

Alternative E

All components of Alternative E would occur within the existing footprint of the current wastewater treatment facility, where wildlife has already been displaced. There would be no additional impacts to wildlife under this alternative.

Cumulative Effects: There would be no cumulative effects to wildlife as a result of Alternative E.

Conclusion: Alternative E would have no effect on wildlife; there would be no unacceptable impacts, and no impairment would occur.

Special Status Species

Laws, Regulations, and Policies

Section 7 of the Endangered Species Act mandates all federal agencies determine how to use their existing authorities to further the purposes of the Act to aid in recovering listed species, and to address existing and potential conservation issues. Section 7(a)(2) states that each federal agency shall, in consultation with the Secretary of the Interior, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

NPS Management Policies (2006) directs the parks to survey for, protect, and strive to recover all species native to National Park System units that are listed under the Endangered Species Act. It sets the direction to meet the obligations of the Act. NPS Management Policies (2006) also directs the NPS to inventory, monitor, and manage state and locally listed species, and other native species that are of special management concern to the parks, to maintain their natural distribution and abundance.

The General Management Plan designated 1,050,030 acres, or 70 percent of the NRA, as natural zones, and areas with known habitat or potential habitat for rare, threatened, or endangered species were further protected by placement in the environmental protection or outstanding natural feature subzone of the natural zone. Management of these zones

focuses on the maintenance of isolation and natural process and restoration of natural resources.

Criteria and Thresholds for Impact Analysis

The Endangered Species Act defines the terminology used to assess impacts to listed species as follows:

- *No effect*: The appropriate conclusion when the action agency determines that its proposed action would not affect a listed species or designated critical habitat.
- *Is not likely to adversely affect*: The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.
- *Is likely to adversely affect*: The appropriate finding if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial. If the overall effect of the proposed action is beneficial to the listed species, but is also likely to cause some adverse effects, then the proposed action “is likely to adversely affect” the listed species. If incidental take is anticipated to occur as a result of the proposed action, an “is likely to adversely affect” determination should be made.
- *Is likely to jeopardize listed species/adversely modify critical habitat*: The appropriate conclusion when the action agency or the U.S. Fish and Wildlife Service identifies situations in which the proposed action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat.

Alternative A

Under the No Action Alternative, the Park would continue to operate the Callville Wastewater Treatment Facility unimproved, with no new or additional disturbance. This alternative would have no new impacts to special status species.

Cumulative Effects: There would be no cumulative effects to special status species as a result of Alternative A.

Conclusion: Alternative A would have no effect on special status species; there would be no unacceptable impacts, and no impairment would occur.

Alternative B

Alternative B requires extensive earthwork to recontour the area and accommodate the new facilities, and would result in the displacement of all special status species within the 7.7-acre footprint of the new lagoon. Harassment of individual animals would occur when they were flushed from or relocated out of the project area prior to construction. In addition, the secretive nature of these species means that some individuals could be overlooked, and mortality during construction is possible. This alternative results in greater impacts to special status species than Alternatives A, D, and E.

Cumulative Effects: The project site includes desert tortoise habitat and potential habitat for the banded Gila monster and western burrowing owl. These species can be impacted by a variety of activities at Lake Mead NRA. Illegal off-road vehicle activity and trespass cattle can trample individuals or collapse occupied burrows. Construction activities permanently displace individuals and eliminate suitable habitat within the specified zones of development. New construction under Alternative B would not occur in designated critical habitat for any sensitive species, and the habitat that would be impacted is among the most common found throughout the NRA. The displacement of individuals and the loss of habitat under Alternative B would represent a small incremental cumulative impact to special status species.

Conclusion: Alternative B is likely to adversely affect special status species, including the federally threatened desert tortoise. Although approximately 7.7 acres of previously undisturbed habitat would be lost, there is suitable habitat immediately outside the project area, as well as thousands of acres throughout the park. Therefore no unacceptable impacts and no impairment would occur under this alternative.

Alternative C

Under Alternative C, special status species would be displaced for the construction of both the new lagoon and the access road to the top of the mesa. There is more total habitat disturbance under this alternative than under Alternative B, but much of the habitat is less suitable relative to Alternative B, with the exception of the rim around the mesa where caliche caves serve as potential habitat for the banded Gila monster, western burrowing owl, and desert tortoise. Harassment of individual animals would occur when they were flushed from or relocated out of the project area prior to construction. In addition, the secretive nature of these species means that some individuals could be overlooked, and mortality during construction is possible. Impacts to special status species under this alternative are similar to Alternative B but greater than Alternatives A, D, and E.

Cumulative Effects: Cumulative effects would be similar to those described under Alternative B.

Conclusion: Alternative C is likely to adversely affect special status species, including the federally threatened desert tortoise. Although approximately 10 acres of previously undisturbed habitat would be lost, there is suitable habitat immediately outside the project

area, as well as thousands of acres throughout the park. Therefore no unacceptable impacts and no impairment would occur under this alternative.

Alternative D

Under Alternative D, approximately 3 acres of habitat would be impacted to accommodate the new lagoon and associated infrastructure. The portion of the site that has been previously disturbed area is in varying degrees of recovery and thus provides less suitable habitat for special status species. Special status species may move through the area but would be less likely to occupy the site, so harassment and mortality would be less likely. Impacts to special status species would be less than those of Alternatives B and C, but greater than those of Alternatives A and E.

Cumulative Effects: Cumulative effects would be similar to, if slightly smaller in magnitude than, those described under Alternatives B and C.

Conclusion: Alternative D is not likely to adversely affect special status species. There would be no unacceptable impacts and no impairment under this alternative.

Alternative E

All components of Alternative E would occur within the existing footprint of the current wastewater treatment facility, where special status species have already been displaced. There would be no additional impacts to special status species under this alternative.

Cumulative Effects: There would be no cumulative effects to special status species as a result of Alternative E.

Conclusion: Alternative E would have no effect on special status species; there would be no unacceptable impacts, and no impairment would occur.

Water Resources

Laws, Regulations, and Policies

The Clean Water Act of 1987, and supporting criteria and standards promulgated by the Environmental Protection Agency (EPA), the Nevada Department of Environmental Protection, and the Arizona Department of Environmental Quality (ADEQ), are used at Lake Mead NRA to protect the beneficial uses of water quality, including human health, health of the aquatic ecosystem, and recreational use.

A primary means for protecting water quality under the Clean Water Act is the establishment, implementation, and enforcement of water quality standards. Generally, the federal government has delegated the development of standards to the individual states subject to EPA approval. Water quality standards consists of three components: (1) the designated beneficial uses of a water body, such as aquatic life, cold water fishery, or body contact recreation (i.e. swimming or wading); (2) the numerical or narrative criteria that define the limits of physical, chemical, and biological characteristics of water that are

sufficient to protect the beneficial uses; and (3) an anti-degradation provision to protect the existing uses and quality of water.

A state's anti-degradation policy is a three-tiered approach for maintaining and protecting various levels of water quality. In Tier 1 waters, the existing uses of a water body and the quality necessary to protect the uses must be maintained. This is considered to be the base level of protection that must be applied to the water body. If the water quality in a water body already exceeds the minimum requirements for the protection of the designated uses (Tier 2), then the existing water quality must be maintained. The third level provides protection for the state's highest quality waters or where ordinary use classification may not suffice; these water bodies are Tier 3 waters and are classified as Outstanding National Resource Waters. The existing water quality must be maintained and protected at this level. Lakes Mead and Mohave are Tier 1 water bodies.

Water quality in Lake Mead NRA in Nevada is regulated by NDEP under water quality standards and regulations that are promulgated in the Nevada Administrative Code (Chapter 445A.118-445A.225). Consistent with federal regulations, Nevada has established numerical and narrative standards that protect existing and designated uses of the State's waters, and implements the anti-degradation requirements by establishing "requirements to maintain existing higher quality." Compliance with the numerical standards for water quality is determined at control points that are specified in the regulations.

Title 18, chapter 11 of the Arizona Administrative Code lists ADEQ's water quality standards. The standards establish water quality criteria for the waters of Arizona and designated uses for surface waters, including Lakes Mead and Mohave.

Criteria and Thresholds for Impact Analysis

The following impact thresholds were established for analyzing impacts to water resources in the project area:

- *Negligible impacts*: Effects are not detectable or are well within water quality standards and/or historical ambient or desired water quality conditions.
- *Minor impacts*: Effects are detectable but within water quality standards and/or historical ambient or desired water quality conditions.
- *Moderate impacts*: Effects are detectable and within water quality standards, but historical baseline or desired water quality conditions are being altered on a short-term basis.
- *Major impacts*: Effects are detectable and significantly and persistently alter historical baseline or desired water quality conditions. Limits of water quality standards are locally approached, equaled, or slightly singularly exceeded on a short-term and temporary basis.

Alternative A

If no upgrades are made to the current wastewater treatment system, there is a risk that the existing ponds would not be able to handle wastewater loads, especially during flood events or as a result of continued reduction in pond volume. Pond failure would send wastewater into the developed area and the lake. In addition, nitrate would continue to be discharged to groundwater, where nitrate levels are already high, and the park would remain out of compliance with NDEP regulations. Impacts to water resources are greatest under this alternative.

Cumulative Effects: Water resources at Lake Mead are affected by local and regional consumption, changes in tributary water quality, recreation-based impacts, and drought. Relative to the lake as a whole, localized impacts to water quality resulting from No Action would represent a small adverse contribution to cumulative water resource impacts.

Conclusion: There would be localized, moderate adverse impacts to water quality under Alternative A. There would be no unacceptable impacts and no impairment under this alternative.

Alternative B

Construction of a new lagoon would ensure that the park has sufficient capacity to handle high wastewater loads. It would also improve the park's ability to conduct repairs and regular maintenance on the entire system, reducing the likelihood of system failure and wastewater flows into the lake. All wastewater would be evaporated, so there would be no discharge to groundwater and no contribution to the already high nitrate levels in the area's groundwater.

Cumulative Effects: Water resources at Lake Mead are affected by local and regional consumption, changes in tributary water quality, recreation-based impacts, and drought. Relative to the lake as a whole, localized impacts to water quality resulting from Alternative B would represent a small beneficial contribution to cumulative water resource impacts.

Conclusion: There would be localized, moderate beneficial effects to water resources under Alternative B. There would be no unacceptable impacts and no impairment under this alternative.

Alternative C

Like Alternative B, Alternative C also involves the construction of a new wastewater pond. Therefore, the beneficial effects to water resources from Alternative C are the same as those described for Alternative B.

Cumulative Effects: Cumulative effects would be the same as those of Alternative B.

Conclusion: There would be moderate beneficial effects to water resources under Alternative C. There would be no unacceptable impacts and no impairment under this alternative.

Alternative D

Like Alternatives B and C, Alternative D also involves the construction of a new wastewater pond. Therefore, the beneficial effects to water resources from Alternative D are the same as those described for Alternatives B and C.

Cumulative Effects: Cumulative effects would be the same as those of Alternative B.

Conclusion: There would be moderate beneficial effects to water resources under Alternative D. There would be no unacceptable impacts and no impairment under this alternative.

Alternative E

Under Alternative E, an IFAS system would be utilized to remove nitrate from the wastewater. This would allow the park to discharge to groundwater without further contributing to its high nitrate level. Although there is no additional lagoon capacity under this alternative, discharging to groundwater would allow the park to manage wastewater loads while remaining in compliance with NDEP regulations.

Cumulative Effects: Cumulative effects would be the same as those of Alternative B.

Conclusion: There would be moderate beneficial effects to water resources under Alternative E. There would be no unacceptable impacts and no impairment under this alternative.

Cultural Resources

Laws, Regulations, and Policies

Numerous legislative acts, regulations, and NPS policies provide direction for the protection, preservation, and management of cultural resources on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan regardless of the final alternative chosen. Applicable laws and regulations include the NPS Organic Act of 1916, the Antiquities Act of 1906, the National Historic Preservation Act of 1966 (1992, as amended), the National Environmental Policy Act of 1969, the Archeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. Applicable agency policies relevant to cultural resources include Chapter 5 of NPS Management Policies (2006) and Director's Order 28: Cultural Resource Management (1998).

Section 106 of the National Historic Preservation Act requires that federal agencies with direct or indirect jurisdiction over undertakings take into account the effect of those

undertakings on properties that are listed on, or eligible for listing on, the National Register of Historic Places. Section 110 of the act further requires federal land managers to establish programs in consultation with the state historic preservation office to identify, evaluate, and nominate properties to the national register. This act applies to all federal undertakings or projects requiring federal funds or permits.

Criteria and Thresholds for Impact Analysis

The following impact thresholds were established for analyzing impacts to cultural resources in the project area:

- *Negligible impacts:* The impact is at the lowest level of detection, with neither adverse nor beneficial consequences. The determination of effect under Section 106 would be no effect.
- *Minor impacts:* The alteration of a feature or features can be completed according to Secretary of Interior standards and does not diminish the integrity of the resource. The determination of effect under Section 106 would be no adverse effect.
- *Moderate impacts:* The alteration of a feature or features diminishes the integrity of the resource. The determination of effect under Section 106 would be adverse effect, but measures are identified to mitigate the impacts.
- *Major impacts:* The alteration of a feature or features diminishes the integrity of the resource. The determination of effect under Section 106 would be adverse effect, and no measures are developed to mitigate the impacts.

Alternative A

Under the No Action Alternative, the Park would continue to operate the Callville Wastewater Treatment Facility unimproved, with no new or additional disturbance. This alternative would have no new impacts to cultural resources.

Cumulative Effects: There would be no cumulative effects to cultural resources as a result of Alternative A.

Conclusion: Alternative A would have no effect on cultural resources; there would be no unacceptable impacts, and no impairment would occur.

Alternative B

Alternative B would result in the disturbance of some of the isolated finds and scattered artifacts in the area, none of which meet the NPS definition of a site or are eligible for the National Register of Historic Places.

Cumulative Effects: Cultural resources at Lake Mead NRA are impacted by natural processes (such as aging and weathering), illegal activities (such as vandalism and looting), and legitimate endeavors (such as construction and development). The

negligible impacts of Alternative B would not have an appreciable cumulative effect on cultural resources.

Conclusion: Alternative B would have negligible effects on cultural resources; there would be no unacceptable impacts, and no impairment would occur.

Alternative C

Alternative C would result in the disturbance of some of the isolated finds and scattered artifacts in the area, none of which meet the NPS definition of a site or are eligible for the National Register of Historic Places.

Cumulative Effects: Similar to Alternative B, the negligible impacts of Alternative C would not have an appreciable cumulative effect on cultural resources.

Conclusion: Alternative C would have negligible effects on cultural resources; there would be no unacceptable impacts, and no impairment would occur.

Alternative D

There are no sites or artifacts located in the area of the abandoned lagoon site, so there would be no effect to cultural resources under Alternative D.

Cumulative Effects: There would be no cumulative effects to cultural resources as a result of Alternative D.

Conclusion: Alternative D would have no effect on cultural resources; there would be no unacceptable impacts, and no impairment would occur.

Alternative E

All components of Alternative E would occur within the existing footprint of the current wastewater treatment facility, so there would be no additional impacts to cultural resources under this alternative.

Cumulative Effects: There would be no cumulative effects to cultural resources as a result of Alternative E.

Conclusion: Alternative E would have no effect on cultural resources; there would be no unacceptable impacts, and no impairment would occur.

Visual Resources

Laws, Regulations, and Policies

The enabling legislation of Lake Mead NRA specifically addresses the preservation of the scenic features of the area. The NPS manages the natural resources of the park, including highly valued associated characteristics such as scenic views, to maintain them in an unimpaired condition for future generations.

The intent of this analysis is to identify how each alternative would affect the overall visual character of the area. The assessment of potential visual impacts involves a subjective judgment concerning the degree of landscape modification allowable before a threshold of impact is exceeded. Human preference for landscape types or characteristics is not uniform across cultures and populations, but there are common preferences among visitors to federal lands, and natural-looking landscapes are thought to be the most appealing.

In determining impacts on the visual resource, the NPS considered the visual sensitivity of the area and the level of visual obtrusion each alternative would have on the existing landscape. Visual sensitivity is dependent on the ability of the landscape to absorb the potential impact and the compatibility of the change with the overall visual character of the area. Absorption relates to how well the project will blend into the landscape, taking into account factors such as form, line, and color. Compatibility considers the character of the visual unit and how much contrast is created by the project.

Criteria and Thresholds for Impact Analysis

The following impact thresholds were established for analyzing impacts to visual resources in the project area:

- *Negligible impacts:* The impact is at the lower level of detection and causes no measurable change. The effects of the project do not dominate the landscape and are essentially imperceptible. The ability of the landscape to absorb the effects is very high, and the change is compatible with the existing visual character of the area.
- *Minor impacts:* The impact is slight but detectable and the change would be small. The project effects are subordinate to the surrounding landscape and relatively low in dominance. The ability of the landscape to absorb the effects is high, and the change is compatible with the existing visual character of the area. If mitigation is needed to offset adverse effects, it is simple and likely to be successful.
- *Moderate impacts:* The impact is readily apparent and the change attracts attention and alters the view, and the dominance of the effects on the landscape is high. The ability of the landscape to absorb the impact is low, and the change is moderately compatible with the existing visual character of the area. Mitigation measures are necessary to offset adverse effects and are likely to be partially successful.
- *Major impacts:* The impact is severe and the change would be highly noticeable. The effects of the project dominate the landscape. The ability of the landscape to absorb the impact is very low, and the impact has very little compatibility with the overall visual character of the area. Extensive mitigation measures are needed to offset adverse effects, and their success is not guaranteed.

Alternative A

Since there would be no upgrades to the Callville Bay wastewater management system under the No Action alternative, there would be no changes to the area which could create visual impacts.

Cumulative Effects: There would be no cumulative effect to visual resources under Alternative A.

Conclusion: Alternative A would have no effect on visual resources, so there would be no unacceptable impacts and no impairment under this alternative.

Alternative B

Under Alternative B the construction of a new lagoon would result in 7.7 acres of new disturbance. The additional area of disturbance would expand the visual impact of the area, but the site sits in a low valley that is not visible from the Callville access road or from typical visitor use areas, including the lake. The surrounding ridges that look down on the site are not easily accessed, nor frequently used, by hikers. Since the site is rarely visible to visitors, impacts to visual resources would be greater than those under Alternatives A and E but less than those under Alternatives C and D.

Cumulative Effects: The natural scenic quality of the Callville Bay area has already been impacted by the infrastructure created to support recreation, although the existing facilities constitute less of an impact due to their location in a designated development zone where man-made structures are expected. The addition of another lagoon supporting the existing development is therefore considered a minor contribution to cumulative effects to visual resources.

Conclusion: Alternative B would have a minor adverse effect on visual resources. There would be no unacceptable impacts and no impairment under this alternative.

Alternative C

Under Alternative C, visual impacts would result from both the new lagoon and the road that would be built to access it on top of the mesa. Due to the steepness of the slope leading to the top of the mesa, the access road results in more ground disturbance than the lagoon itself. The disturbance up the side of the hill would be visible from many areas within the developed area, including the Callville Bay access road. Also, treatment lagoons are required to be fenced, and a fence erected on top of the mesa would be visible from both the developed area and from the lake. Impacts to visual resources would be greater than those that would occur under Alternatives A, B, or E.

Cumulative Effects: Like Alternative B, Alternative C adds to the visual impacts of an area already altered for human use. However, the incremental contribution of this alternative to the total cumulative impact is slightly larger due to its more visible location.

Conclusion: Alternative C would have moderate adverse effects on visual resources. There would be no unacceptable impacts and no impairment under this alternative.

Alternative D

Re-opening the abandoned lagoon would result in visual impacts seen by anyone travelling on the Callville Bay access road as they enter or leave the developed area. The site is only a few hundred feet east of the road, and while there is still evidence of earlier disturbance, some site recovery has occurred, so the construction of a new lagoon would appreciably increase the impact. Since the site is so close to the road, attempts to artificially screen it from view would require a large construction effort with its own visual impacts. Impacts to visual resources would be greater than those that would occur under Alternatives A, B, or E.

Cumulative Effects: Like Alternative B, Alternative D adds to the visual impacts of an area already altered for human use. However, the incremental contribution of this alternative to the total cumulative impact is slightly larger due to its more visible location.

Conclusion: Alternative D would have moderate adverse effects on visual resources. There would be no unacceptable impacts and no impairment under this alternative.

Alternative E

Under Alternative E, the only new infrastructure required is a building to house electrical equipment and blowers. Since this would be located adjacent to the existing lagoons within the disturbed footprint, and since the entire wastewater treatment area is not easily seen by park visitors, there would be little to no effect to the area's visual resources. The impact, while slightly greater than under the No Action alternative, is lower than would occur under any other action alternative.

Cumulative Effects: Alternative E would have a negligible cumulative effect to visual resources.

Conclusion: Alternative E would have a negligible effect on visual resources. There would be no unacceptable impacts and no impairment under this alternative.

Park Operations

Criteria and Thresholds for Impact Analysis

Park operations refer to the ability of the park to adequately protect and preserve vital park resources and to provide for an enjoyable visitor experience. Operational efficiency is influenced not only by park staff, but also by the adequacy of the existing infrastructure used in the day to day operation of the park. Analysis of impacts to park operations must consider (1) employee and visitor health and safety, (2) the park's mission to protect and preserve resources, and (3) existing and needed facilities and infrastructure. The

following impact thresholds were established for analyzing impacts to park operations in the project area:

- *Negligible impacts:* Park operations are not affected, or the effects are at low levels of detection and do not have an appreciable effect on park operations.
- *Minor impacts:* The effect is detectable and likely short-term, but is of a magnitude that does not have an appreciable effect on park operations. If mitigation is needed to offset adverse effects, it is simple and likely to be successful.
- *Moderate impacts:* The effects are readily apparent, likely long-term, and result in a substantial change in park operations in a manner noticeable to staff and to the public. Mitigation measures are necessary to offset adverse effects and are likely to be successful.
- *Major impacts:* The effects are readily apparent, long-term, and result in a substantial change in park operations in a manner noticeable to staff and the public. Changes are markedly different from existing operations. Extensive mitigation measures are needed to offset adverse effects, and their success is not guaranteed.

Alternative A

Under the No Action Alternative, there would be no change in the day-to-day management of wastewater at Callville Bay. However, there would be a higher frequency of incidents in which greater amounts of staff time are spent pumping wastewater from the lagoons for transport to other areas. This would occur anytime there was a need for pond maintenance or repair (because the park would not have the extra pond capacity) or whenever wastewater loads exceed existing capacity. The latter scenario will become more common as additional sediment inflow into the ponds reduces their functional capacity.

Cumulative Effects: The Utility Systems staff at Lake Mead NRA must manage the water and wastewater systems throughout the park. Declining lake levels have increased the amount of time spent managing water intakes. New arsenic treatment plants are being constructed at three locations in the park. At Callville Bay, the park is preparing to construct a visitor contact station and needs to upgrade the electrical utility lines serving the area. Additional time spent on an inadequate wastewater treatment system would have minor cumulative effects on park operations.

Conclusion: Alternative A would result in moderate adverse effects to park operations.

Alternative B

Under Alternative B, construction of an additional lagoon would provide enough capacity to allow park staff to complete maintenance and repairs on a controlled schedule. It would also reduce the likelihood of staff having to pump and transport wastewater to

other areas during times of heavy loads. Since minimal new infrastructure is needed, and since all wastewater would be disposed of by evaporation, this alternative improves the ability of park staff to manage wastewater at Callville Bay.

Cumulative Effects: Improved wastewater management at Callville Bay helps offset increased workloads of Utility Systems staff described above and represents a positive cumulative effect on park operations.

Conclusion: Alternative B would result in moderate beneficial effects to park operations.

Alternative C

Like Alternative B, Alternative C provides an additional lagoon for wastewater management, and the beneficial effects are the same as those described for Alternative B. However, there would also be minor adverse effects resulting from the need to maintain the steep access road to the top of the mesa.

Cumulative Effects: Cumulative effects would be the same as those described under Alternative B.

Conclusion: Alternative C would result in moderate beneficial effects as well as minor adverse impacts to park operations.

Alternative D

Like Alternatives B and C, Alternative D provides an additional lagoon for wastewater management, and the beneficial effects are the same as those described for Alternative B.

Cumulative Effects: Cumulative effects would be the same as those described under Alternative B.

Conclusion: Alternative D would result in moderate beneficial effects to park operations.

Alternative E

Under Alternative E, the park would use an IFAS system to break down ammonia and nitrate so that effluent could be discharged to groundwater without compromising groundwater quality. However, there are multiple components to such a system, and a full-time employee would be needed to maintain it. Since the park is unable to increase its base staff at this time, such a position could only be filled if another position was eliminated, which would negatively affect park operations. Alternative E results in the greatest adverse impact to park operations.

Cumulative Effects: Implementation of Alternative E would take a full-time position away from the existing duties of the Utility Systems branch described under the Cumulative Effects of Alternative A and thus would be a moderate cumulative adverse impact to park operations.

Conclusion: Alternative E would result in moderate adverse effects to park operations.

Safety and Visitor Use and Experience

Laws, Regulations, and Policies

NPS Management Policies (2006) states that the enjoyment of the park's resources is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitor enjoyment.

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

Criteria and Thresholds for Impact Analysis

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 safely experience a full range of Lake Mead NRA resources was analyzed by examining resources and objectives presented in the park's 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 areas impacted by the proposal, and determining how these projected changes would affect the desired visitor experience. The following impact thresholds were established for analyzing impacts to safety and visitor use and experience:

- *Negligible impacts:* Safety would not be affected, or the effects are at low levels of detection and do not have an appreciable effect on visitor or employee health and safety. The visitor is not affected, or changes in visitor use and experience are below or at the level of detection. The visitor is not likely be aware of the effects associated with the alternative.
- *Minor impacts:* The effect is detectable, but does not have an appreciable effect on health and safety. Changes in visitor use and experience are detectable, although the changes would be slight. Some visitors are aware of the effects associated with the alternative, but the effects are slight and not noticeable by most visitors.
- *Moderate impacts:* The effects are readily apparent and result in substantial, noticeable effects to health and safety on a local scale. Changes in visitor use and experience are readily apparent to most visitors. Visitors are aware of the effects associated with the alternative and might express an opinion about the changes.
- *Major impacts:* The effects are readily apparent and result in substantial, noticeable effects to health and safety on a regional scale. Changes in visitor use and experience are readily apparent to all visitors. Visitors are aware of

the effects associated with the alternative and are likely to express a strong opinion about the changes.

Alternative A

Under Alternative A, no changes to the existing wastewater treatment facilities would be made. Although there are no direct effects to visitor experience at this time, the increasing inadequacy of the system would prevent the park from expanding any visitor services that have a wastewater component, so minor impacts would be expected in the future.

Cumulative Effects: The visitor experience at Callville Bay has been negatively affected by the declining lake level and its impact on recreation, but the park has worked to offset this by extending the existing launch ramp and building a second one for low-water conditions. A planned visitor contact station will also improve the visitor experience. The minor impacts of Alternative A would have a small cumulative effect on visitor experience.

Conclusion: Alternative A would have minor adverse impacts to visitor use and experience. There would be no unacceptable impacts under this alternative.

Alternative B

Construction of a new lagoon west of the existing wastewater treatment system would provide the capacity to handle current and future wastewater loads resulting from visitor recreation in the area. The location of the lagoon adjacent to existing lagoons would ensure that there are no impacts to visitors in terms of scenery or odors. Benefits to visitor experience would be equal to those of Alternative E and greater than those of all other alternatives.

Cumulative Effects: Improved wastewater management, along with new launch ramps and increased visitor contact capabilities, would have moderate beneficial cumulative impacts to visitor experience in the Callville Bay area.

Conclusion: Alternative B would have moderate beneficial effects to visitor use and experience. There would be no unacceptable impacts under this alternative.

Alternative C

Construction of a new lagoon on the mesa adjacent to the wastewater treatment facility would have many of the same benefits as Alternative B. However, unlike Alternative B, there would be visual impacts (described under Visual Resources above) that would affect the visitor experience. Alternative C would have greater impacts to visitor experience than Alternatives B or E but fewer than Alternative D.

Cumulative Effects: Improved wastewater management, along with new launch ramps and increased visitor contact capabilities, would have beneficial cumulative effects to the visitor experience at Callville Bay. Adverse cumulative effects to visitor experience would stem from the visual impacts as described under Visual Resources.

Conclusion: Alternative C would have both moderate beneficial effects and moderate adverse impacts to visitor use and experience. There would be no unacceptable impacts under this alternative.

Alternative D

Re-opening the abandoned lagoon would offer the same benefits as Alternative B but would also create visual impacts (described under Visual Resources above) and potential odor issues due to its proximity to the main access road. Alternative D would therefore have greater impacts to visitor experience than any of the other action alternatives.

Cumulative Effects: Cumulative effects would be the same as under those described under Alternative C.

Conclusion: Alternative D would have both moderate beneficial effects and moderate adverse impacts to visitor use and experience. There would be no unacceptable impacts under this alternative.

Alternative E

Under Alternative E, the IFAS system would provide the same benefits to visitor experience as described under Alternative B but without the construction of an additional lagoon. Incorporating the IFAS system into the existing treatment facility would ensure that there are no indirect effects to the experience (related to visual impacts, odors, etc.). Benefits to visitor experience would be equal to those of Alternative B and greater than those of all other alternatives.

Cumulative Effects: Cumulative effects under Alternative E would be the same as those described under Alternative B.

Conclusion: Alternative E would have moderate beneficial effects to visitor use and experience. There would be no unacceptable impacts under this alternative.

CHAPTER 5: PUBLIC AND AGENCY INVOLVEMENT

A 30-day public scoping period occurred from July 13 to August 14, 2009. A scoping press release (Appendix A) was sent to television stations, newspapers, magazines, and radio stations in Las Vegas, Henderson, Boulder City, Pahrump, Overton, Logandale, Laughlin, Nevada; Meadview, Kingman, Phoenix, and Bullhead City, Arizona; and Needles and Los Angeles, CA. The press release was also posted on the Lake Mead NRA internet website, on the NPS Planning, Environment, and Public Comment (PEPC) internet website, and at Callville Bay. No comments were received.

A press release announcing the availability of this environmental assessment is sent to the above entities and is posted on the park and PEPC websites. In addition, the announcement is posted at the park's Headquarters in Boulder City and at Callville Bay.

Lake Mead NRA's mailing list is comprised of 237 federal, state, and local agencies; individuals; businesses; and organizations. The environmental assessment is distributed to those individuals, agencies, and organizations likely to have an interest in this project. Entities on the park mailing list that do not receive a copy of the environmental assessment receive a letter notifying them of its availability and methods of accessing the document.

The environmental assessment is published on the Lake Mead NRA internet website at (<http://www.nps.gov/lame>) and on the NPS PEPC internet website at <http://parkplanning.nps.gov/>. Copies of the environmental assessment are available at area libraries, including: Boulder City Library, Clark County Community College (North Las Vegas), Clark County Library, Las Vegas Public Library, Green Valley Library (Henderson), James I. Gibson Library (Henderson), Sahara West Library (Las Vegas), Mohave County Library (Kingman, AZ), Sunrise Public Library (Las Vegas), University of Arizona Library (Tucson, AZ), University of Nevada Las Vegas James R. Dickinson Library, Meadview Community Library, Moapa Valley Library (Overton, NV), Mesquite Library, Mohave County Library (Lake Havasu City, AZ), Laughlin Library, Searchlight Library, and Washington County Library (St. George, UT).

Comments on this environmental assessment must be submitted during the 30-day public review and comment period. Comments on the EA can be submitted on the PEPC website at <http://parkplanning.nps.gov/> or may be submitted in writing to the following address:

National Park Service, Lake Mead NRA
Attention: Compliance Office
601 Nevada Way
Boulder City, Nevada 89005

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

CHAPTER 6: LIST OF PREPARERS

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CHAPTER 7: REFERENCES

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APPENDIX A. SCOPING PRESS RELEASE

National Park Service
U.S. Department of the Interior

LAKE MEAD NATIONAL RECREATION AREA News Release

For Immediate Release: July 13, 2009
Release No.: 2009-35
Contact: Andrew S. Muñoz, 702-293-8691

NPS SEEKS PUBLIC COMMENT ON PROPOSED WASTEWATER TREATMENT UPGRADES

LAS VEGAS - The National Park Service is seeking public comment on the proposed upgrade of wastewater treatment facilities within the Callville Bay developed area in the Lake Mead National Recreation Area. The upgrades are necessary to increase treatment capacity and address elevated nitrate levels in the water discharged from existing wastewater lagoons. The Park Service will be preparing an environmental assessment to evaluate the potential impacts associated with the upgrades.

The assessment will analyze the construction of four acres of new wastewater lagoons as well as the alternative option of mechanized nitrate removal. Potential impacts to park resources will be analyzed for each alternative.

Comments and recommendations concerning the scope of the environmental assessment, the issues it should cover, the alternatives to consider, and other resource concerns will be accepted through Aug. 14, 2009. They may be submitted by U.S. Mail to Lake Mead National Recreation Area, Compliance Office, 601 Nevada Way, Boulder City, NV 89005 or via the internet at <http://parkplanning.nps.gov/>.

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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.

