



# Environmental Assessment

**Reconstruction of Bonnie Clare Road,  
Milepost 0.0 to Milepost 7.7;  
Reconstruction of Grapevine Ranger Station Parking Lot and  
Sidewalks; and  
Resurfacing Mesquite Spring Campground Road,  
Milepost 0.0 to Milepost 1.9**





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**National Park Service**

**Death Valley National Park  
California and Nevada**



**United States Department of the Interior  
National Park Service  
Environmental Assessment  
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Resurfacing Mesquite Spring Campground Road,  
Milepost 0.0 to Milepost 1.9  
Death Valley National Park  
California and Nevada**

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**Summary**

The National Park Service (NPS), in cooperation with the Federal Highway Administration, is proposing to reconstruct and resurface the 7.7-mile segment of Bonnie Clare Road through Grapevine Canyon, from the Death Valley National Park boundary at the California/Nevada state line to the junction of Ubehebe Crater Road and approximately 100 feet past the Grapevine Ranger Station to tie in with the recently completed rehabilitation of Bonnie Clare Road from milepost 7.7 to milepost 40.0 and Ubehebe Road from milepost 0.0 to milepost 6.2. The National Park Service also proposes to formalize and pave the turnout at the park boundary entrance sign near the California/Nevada state line; resurface and make accessibility improvements to the parking lot and sidewalks at Grapevine Ranger Station; and resurface the 1.9-mile Mesquite Spring Campground Road.

The road reconstruction and resurfacing is needed to address extensive deterioration of the road surfaces and areas of the road surface containing ruts and pavement cracks, and to improve visitor and employee safety.

This environmental assessment examines in detail two alternatives: no action and the NPS preferred alternative. The preferred alternative includes removal of the existing asphalt and placement of a new aggregate base course and new hot asphalt concrete pavement along Bonnie Clare Road from milepost 0.0 to milepost 7.7. The proposed paved width would be 22 feet 0 inches, except in one location. The proposed design speed would be 35 miles per hour, except where noted in the following discussion. The overall area of the proposed project is approximately 46.7 acres (7.7 miles by 50 feet wide). The proposed road alignment would use the existing alignment of the straight road segments and would be modified at many of the curves to provide the needed lane width and radius for buses and large recreational vehicles to remain in one lane while traveling through the curves. The roadway vertical profile would remain unchanged for the majority of the project length in order to maintain the historic character of Bonnie Clare Road.

Rock wall and slope cuts would be avoided to the extent possible; new cuts would be implemented in a way that the resulting new rock and slope faces would be similar in angle and appearance to that of the existing steep, rough, volcanic and limestone rock that is characteristic of the rock walls and slopes. Slope cuts would be angled more steeply adjacent to archeological resources in order to avoid direct effects to those sites.

Narrow paved ditches designed to limit slope cuts would be constructed to avoid using wide, shallow drainage ditches (preserving the narrowness of the historic road corridor). Paved ditches would

## SUMMARY

require curbing to keep the pavement edge from deteriorating as a result of major storm events and vehicular traffic. Installation of curbing would be minimized to reduce impacts to the historic character of Bonnie Clare Road. Tinted concrete curbing would be used to lessen the visual intrusion of the curb in relation to the road surface.

The preferred alternative would include resurfacing the existing asphalt parking lot east of the Grapevine Ranger Station and replacing the existing sidewalks, ramps, curbs, and gutters around the perimeter of the parking lot. The new parking lot surface and sidewalks would be re-graded to a maximum 5% slope (longitudinal) to meet the Americans with Disabilities Act of 1990, as amended, and the Architectural Barriers Act of 1968, as amended (ADA/ABA) requirements along the accessible route and where possible within the parking lot surface. The end of the parking lot and sidewalk would be raised by about 2 feet to minimize the overall steepness. The end of the ramp at the building wall would be raised between 2 and 4 inches, to meet ADA/ABA requirements.

The preferred alternative would have no or negligible impacts on designated critical habitat, ecologically critical areas, wild and scenic rivers, and other natural areas; air quality; geologic hazards; lightscapes and night skies; prime and unique farmlands; park operations; socioeconomics and land use; environmental justice; climate change; museum objects; ethnographic resources; scenic resources; Indian trust resources; visual resources; or soundscapes.

The preferred alternative would contribute short- and long-term minor to moderate adverse impacts to soils and geology; long-term negligible impacts to vegetation; long-term negligible impacts to wetlands at spring heads; short- and long-term negligible to minor adverse impacts to nonwetland riparian vegetation; and short- and long-term minor adverse impact to floodplains; short- and long-term moderate impacts to cultural landscapes; short- and long-term negligible to minor adverse impacts to wildlife, special status species, and water quality; short- and long-term negligible and minor to moderate adverse impacts to archeological resources; short- and long-term negligible to minor adverse impacts to historic structures; short-term negligible to minor adverse and long-term beneficial impacts to visitor use and experience; and short-term negligible and long-term beneficial effects to health and safety.

### Notes to Reviewers and Respondents

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. *If you want us to withhold your name and address, you must state this prominently at the beginning of your comment.* We will make all submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please address comments to:

Superintendent; Death Valley National Park; Attn: Resurface and Reconstruction Portion of Bonnie Clare Road Project; PO Box 579; Death Valley, CA 92328; E-mail: [DEVA\\_superintendent@nps.gov](mailto:DEVA_superintendent@nps.gov)

Comments may also be provided at the National Park Service Planning, Environment, and Public Comment (PEPC) website at: <http://parkplanning.nps.gov/parkHome.cfm?parkID=297>

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## ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
ABA	Architectural Barriers Act of 1968, as amended
ADA	Americans with Disabilities Act of 1990, as amended
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
cm	centimeter(s)
°C	degrees Celsius
DVSHD	Death Valley Scotty Historic District
°F	degrees Fahrenheit
EA	environmental assessment
FHWA	Federal Highway Administration
ft <sup>2</sup>	square feet
GVCAD	Grapevine Canyon Archeological District
km	kilometer
m	meter(s)
MP	milepost
mph	miles per hour
NEPA	National Environmental Policy Act of 1969, as amended
NHPA	National Historic Preservation Act of 1966, as amended
NPS	National Park Service
NRHP	National Register of Historic Places
RV	recreational vehicle
SHPO	State Historic Preservation Office(r)
SR	State Route
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service



## ENVIRONMENTAL ASSESSMENT

### INTRODUCTION

The National Park Service (NPS), in cooperation with the Federal Highway Administration (FHWA), is proposing to reconstruct and resurface the 7.7-mile segment of Bonnie Clare Road through Grapevine Canyon, in Death Valley National Park (park). The road extends from the park boundary at the California/Nevada state line to the junction of Ubehebe Crater Road and approximately 100 feet past the Grapevine Ranger Station to tie in with the recently completed reconstruction of Bonnie Clare Road from milepost (MP) 7.7 to MP 40.0 and the rehabilitation of Ubehebe Road from MP 0.0 to MP 6.2. The proposed project would involve removal of the existing asphalt and placement of a new aggregate base course and new hot asphalt concrete pavement. The proposed paved width would be 22 feet 0 inches, except for a short area near Scotty's Castle where the proposed paved width would be reduced to 20 feet 0 inches in order to reduce impacts to this sensitive historic area. This road segment is a Functional Class I, Principal Park Road providing primary access through the northeastern section of the park, including the Grapevine residential area, Ubehebe Crater, and Scotty's Castle. The road connects to State Route (SR) 95 at Scotty's Junction, Nevada, via SR 267.

The National Park Service also proposes to formalize and pave the turnout at the park boundary entrance sign near the California/Nevada state line, resurface and make accessibility improvements to the parking lot and sidewalks at Grapevine Ranger Station, and resurface the 1.9-mile Mesquite Spring Campground Road.

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

### PURPOSE AND NEED FOR ACTION

The purpose of the proposed action is to provide a safe driving surface for park visitors, enhance visitor experience, and protect the government investment while adhering to the management philosophy for park roads as outlined in the *Death Valley National Park 2000 General Management Plan*. The management philosophy, as described in the 2000 general management plan, is "to protect cultural and natural resources, enhance the visitor experience while providing for a safe and efficient accommodation of Park visitors."

This action is needed because:

- The existing pavement on Bonnie Clare Road and Mesquite Spring Campground Road is in poor condition and pavement edges are deteriorating.

- Drainage control issues exist for portions of the roadways, resulting in periodic flooding and maintenance issues.
- The existing paved width on Bonnie Clare Road is typically 20 feet to 22 feet wide, with sections as narrow as 17 feet, making these sections insufficient for the volume and type of traffic using this road.
- Narrow travel lanes on Bonnie Clare Road force large vehicles to drive over the center line or off the pavement, particularly when passing another large vehicle.
- As vehicles move from the gravel shoulder back to the paved roadway on Bonnie Clare Road, gravel is pulled onto the road creating a hazard for vehicles, especially motorcycles.
- Sight distances on Bonnie Clare Road are fair to poor in places where there are sharp curves and rocks or vegetation close to the roadway.
- The Grapevine Ranger Station parking lot and sidewalks do not have adequate parking and ramps to accommodate people with disabilities.

## PROJECT BACKGROUND, PREVIOUS PLANNING, AND SCOPING

### Previous Planning

In 2004, the park began preparation of an environmental assessment to rehabilitate Bonnie Clare Road from MP 40.0 to MP 0.0, and Ubehebe Crater Road, beginning at the intersection with Bonnie Clare Road (MP 0.0) and ending at the parking facility at Ubehebe Crater Road (MP 7.0). The park also completed an ethnographic study, historic road characterization study, a draft National Register of Historic Places (NRHP) nomination form for Bonnie Clare Road, and inventoried for cultural resources along the road alignment. In 2005, the EA process was halted and the project terminated due to the potential impacts associated with widening the road through Grapevine Canyon near Scotty's Castle, specifically impacts to natural and cultural resources including the cultural landscape. Resurfacing Bonnie Clare Road from MP 40.0 to 7.7, and on Ubehebe Crater Road was completed under a separate NEPA process. In 2010, Death Valley National Park, NPS Denver Service Center, Federal Highway Administration, and NPS Pacific West Region staff reinitiated this proposed project and further refined the design to minimize impacts to cultural and natural resources.

The proposed reconstruction of Bonnie Clare Road and the resurfacing of Mesquite Spring Campground Road project complies with the primary management objectives for Death Valley National Park, as stated in the approved general management plan (NPS 2002). The general management plan objectives are to protect cultural and natural resources, enhance visitor experience while providing safe and efficient accommodation of park visitors, and change visitor-use patterns (e.g., the increasing numbers of buses and recreational vehicles [RVs] entering the park) (NPS 2002).

### Scoping

Scoping is an effort to involve agencies and the general public in determining issues to be given detailed analysis in the environmental assessment and eliminate issues not requiring detailed analysis. Scoping seeks to obtain early input from any interested stakeholder and any agency with



jurisdiction by law or expertise. A press release initiating scoping and describing the proposed action was issued on October 29, 2010 (appendix B), and public comments were solicited during a public scoping period that ended December 1, 2010. No comments were received. The public and agencies will have an opportunity to review and comment on this environmental assessment. Also, see the “Consultation and Coordination” section of this document.

## **ISSUES AND IMPACT TOPICS**

### **Issues**

Issues and concerns affecting this proposed action were identified from past NPS planning efforts and agency and public input from the scoping process. The important issues that were identified include potential impacts to geology and soils, vegetation, wildlife, special status species, visitor use and experience, health and safety, wetlands and floodplains, water quality, archeological sites, cultural landscapes, structures, and ethnographic resources.

NEPA requires the consideration of impacts on affected ecosystems and is the basic national charter for protection of the environment (CEQ Part 1500). NEPA requires federal agencies to use all practicable means to restore and enhance the quality of the human environment and to avoid and minimize any possible adverse effects of their actions on the environment. The preferred alternative would minimize impacts to natural and cultural resources, while enhancing visitor use and experience and protecting health and safety. Issues and mitigation measures are included in the rationale for selection of impact topics for further consideration or for dismissal from further consideration per the ensuing discussion.

### **Derivation of Impact Topics**

Specific impact topics were developed to focus the discussion and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal law, regulations, executive orders, NPS *Management Policies 2006*, and NPS knowledge of special or vulnerable resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

In this section of the environmental assessment, the National Park Service provides a limited evaluation and explanation as to why some impact topics are not evaluated in more detail. Impact topics are dismissed from further evaluation in this environmental assessment if:

- they do not exist in the analysis area
- they would not be affected by the proposal, or the likelihood of impacts are not reasonably expected
- through the application of mitigation measures, there would be minor or less effects from the proposal, and there is little controversy on the subject or reasons to otherwise include the topic

## IMPACT TOPICS SELECTED FOR DETAILED ANALYSIS

### Geology and Soils

The proposed action involves ground-disturbing activities on areas previously disturbed by surface flows and runoff during precipitation events. Desert wash and slope soils would be impacted through disturbance, redistribution, covering over with asphalt, and potential loss through erosion. Soils are, therefore, addressed as an impact topic in this environmental assessment.

The proposed action would result in removal of Tertiary volcanic and Paleozoic limestone rocks where roadway widening is necessary to avoid cultural and natural resources of high value, improve movement of traffic (including large vehicles and RVs), and improve sight distance. Geologic exposures not known to contain fossils would be impacted through constructing cut slopes to accommodate the proposed typical section, and construction-related rockfall. The smaller material would be incorporated into the roadbed as fill. Therefore geology is addressed as an impact topic in this environmental assessment.

The resurfacing of Mesquite Spring Campground Road would be confined to the existing roadbed and surface; therefore, geology and soils are not analyzed in detail for this segment of the proposed project.

### Vegetation

NPS policy is to protect the components and processes of naturally occurring biotic communities including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006). Existing desert wash vegetation is subject to natural disturbance related to surface flows during precipitation events, slides on steep slopes, and crushing/soil compaction by vehicles parking on the road shoulder. Proposed road reconstruction would involve ground and geologic feature-disturbing activities with the potential to disturb and remove vegetation; therefore, vegetation is addressed as an impact topic in this environmental assessment.

### Wildlife

NPS policy is to protect the components and processes of naturally occurring biotic communities, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006). Wildlife inventories for mammals, birds, reptiles, amphibians, selected insects, and benthic macroinvertebrates have been recently conducted by park natural resources staff in Grapevine Canyon habitats along Bonnie Clare Road. Wildlife species are currently exposed to visitor and maintenance activities, which have a seasonal increase during the fall, winter, and spring seasons. Proposed road reconstruction would involve increased human activity, noise, and ground-disturbing activities with the potential to disturb and/or temporarily or permanently displace wildlife or their habitat. The proposed construction could also temporarily increase the risk of wildlife mortalities through accidental killing of individuals or by increased susceptibility to predation or competitive stress. Therefore, wildlife is addressed as an impact topic in this environmental assessment.

## **Special Status Species**

The Endangered Species Act (1973), as amended, requires an examination of impacts on all federally listed threatened or endangered species. NPS policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. The National Park Service recently conducted inventories for plant and wildlife species in Grapevine Canyon habitats along Bonnie Clare Road to determine special status species locations, habitats, and existing impacts. The proposed action could affect special status species by disturbing or removing habitat, temporarily increasing noise and construction activities near sensitive habitat, and temporarily increasing the potential to spread nonnative plants. Therefore, special status species are addressed as an impact topic in this environmental assessment.

## **Wetlands, Nonwetland Riparian Vegetation, and Floodplains**

Executive Order 11988, “Floodplain Management” requires an examination of impacts to floodplains and the potential risk involved in placing facilities within floodplains. NPS *Management Policies 2006*, Director’s Order 2: *Planning Guidelines*, and Director’s Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposed actions in floodplains. The entirety of Bonnie Clare Road occurs within a desert wash floodplain; therefore, floodplains are addressed as an impact topic in this environmental assessment.

Executive Order 11990, “Protection of Wetlands” requires an examination of impacts to wetlands. Wetland and riparian habitats were delineated along the Bonnie Clare Road corridor in 2005, the polygons were placed on proposed project plan drawings for avoidance mitigation, and wetlands were revisited and further described in 2010 by park and contract biologists. The proposed road project has the potential to impact wetlands established to the road edge; therefore, wetlands are addressed as an impact topic in this environmental assessment.

## **Water Quality**

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of U.S. waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. NPS *Management Policies 2006* provide direction for the preservation, use, and quality of water in national park system units. Surface water resulting from spring and seep flows at the Scotty’s Castle boundary fenceline currently receives contaminants in the form of sediments and vehicle-generated materials (petrochemicals, brake lining metals, etc.). The proposed action would install underdrains at several locations where springs emerge under the existing asphalt. Proposed project-related weed introduction and control could result in herbicides washing into flowing water near the roadway; therefore, water quality is addressed as an impact topic in this environmental assessment.

## Archeological Resources

The National Historic Preservation Act (16 *United States Code* [USC] 470 et seq.), National Environmental Policy Act, NPS Organic Act, NPS *Management Policies 2006*, Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*, and Director's Order 28: *Cultural Resource Management* require the consideration of impacts on cultural resources, including archeological resources, either listed in or eligible for listing in the national register.

Less than 3% of Death Valley National Park has been archeologically surveyed; however, there are over 3,000 recorded archeological sites. Several archeological investigations have taken place in or near the project areas, including in Grapevine Canyon and locations adjacent to Bonnie Clare Road and Mesquite Spring Campground Road. Bonnie Clare Road bisects the Grapevine Canyon Archaeological District and there are 12 contributing features of the district immediately adjacent to or within the proposed area of potential effect (APE) for the portion of the project along Bonnie Clare Road. Four archeological sites are recorded adjacent to or within the APE for the portion of the project along Mesquite Spring Campground Road. Therefore, archeological resources are addressed as an impact topic in this environmental assessment.

## Cultural Landscapes

The National Historic Preservation Act (16 USC 470 et seq.), National Environmental Policy Act, NPS Organic Act, NPS *Management Policies 2006*, Director's Order 12 and Director's Order 28 require the consideration of impacts on cultural resources including cultural landscapes.

According to Director's Order 28, a cultural landscape is:

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

Several cultural landscapes have been identified within Death Valley National Park including Bonnie Clare Road Historic Property and Death Valley Scotty Historic District (DVSHD), both of which are in Grapevine Canyon. Bonnie Clare Road has been determined eligible for the national register under criterion A and C on a local level for its association with the NPS Mission 66 Program. A cultural landscape inventory completed in 2011 (NPS 2011d) identified a cultural landscape associated with the road. Therefore, cultural landscapes are addressed as an impact topic in this environmental assessment

A cultural landscape inventory (NPS 2005) includes descriptions for 21 historic structures at the Death Valley Scotty Historic District currently listed in the national register and nine additional historic structures that are eligible for listing as part of the district (such as the entrance road and roads throughout the complex, historic rock walls, and the watercourse). The historic concrete and wire fence that surrounds the historic district is a contributing resource and forms the boundary of the district (NPS 1978). Some of the features within the Death Valley Scotty Historic District

cultural landscape are immediately adjacent to Bonnie Clare Road (e.g., fenceline, Indian Camp, entrance road and gate, and Cottonwood Corner).

## **Historic Structures/Districts**

The National Historic Preservation Act (16 USC 470 et seq.), National Environmental Policy Act, NPS Organic Act, NPS *Management Policies 2006*, Director's Order 12, and Director's Order 28 require consideration of impacts on cultural resources including historic structures and districts. According to Director's Order 28, structures are constructed items built to serve human activity and include buildings, roads, dams, canals, bridges, defense works, mounds, ruins, etc.

The structures associated with the cultural landscapes at Bonnie Clare Road Historic Property and Death Valley Scotty Historic District will be addressed under the cultural landscape impact topic as contributing features to those cultural landscapes. The Grapevine Developed Area Historic District was recently evaluated and identified as eligible for the national register under criteria A and C as associated with the NPS Mission 66 Program (NPS 2012); therefore, historic structures/districts are addressed as an impact topic in this environmental assessment.

## **Visitor Use and Experience**

Visitor use and experience is affected by traffic volumes, time of travel (delays), turnouts to view natural resources and vistas, and safe access/egress to important sites including Scotty's Castle. Under the 1995 Park Road Systems Evaluation, 290 AADT (annual average daily traffic) were determined for Bonnie Clare Road, and when adjusted using a 3% growth rate, resulted in estimates of AADT for 2006 of 401 vehicles and in 2026 of 724 vehicles (FHWA 2005). Accidents are uncommon along this road segment. Under the proposed action, short-term effects to visitor use and experience would be expected during project construction in the form of traffic delays and construction noise. Therefore, visitor use and experience is addressed as an impact topic in this environmental assessment.

## **Health and Safety**

Bonnie Clare Road experiences relatively low vehicle use in terms of AADT; the road is used by visitors traveling from Tonopah and Beatty, Nevada, primarily to access Scotty's Castle, Mesquite Spring Campground, and Ubehebe Crater. Accidents are uncommon along this road segment and of the 16 recorded accidents, three occurred at the intersection of Ubehebe Crater Road and Bonnie Clare Road, and five occurred within the Death Valley Scotty Historic District (FHWA 2005). Historic fence posts are emplaced along the historic district boundary at the road edge; some have been damaged and struck by vehicles (others likely were struck by road maintenance equipment).

Public safety would continue to be affected by existing road conditions including narrow travel lanes, tight turns, inadequate turnouts, deteriorating road surface, rockfall, geologic exposures, and traffic volume. The preferred alternative would create the potential for public safety issues during construction; however, the road improvements are expected to result in safety improvements. Public safety would be affected by selection of either alternative; therefore, health and safety is addressed as an impact topic in this environmental assessment.

The resurfacing of Mesquite Spring Campground Road is proposed to address maintenance issues and not safety concerns; therefore, health and safety issues are not analyzed in detail for this segment of the proposed project.

### IMPACT TOPICS DISMISSED FROM DETAILED ANALYSIS

Impact topics for this project have been identified on the basis of federal laws, regulations, and orders; NPS *Management Policies 2006*; and NPS knowledge of resources at Death Valley National Park. Impact topics that are carried forward for further analysis in this environmental assessment are listed above, along with the reasons why the impact topic is further analyzed, and are described in the “Affected Environment” chapter, and the potential impacts are analyzed in the “Environmental Consequences” chapter.

Due to there being no effect or negligible effects, there would either be no contribution toward cumulative effects or the contribution would be low. For each issue or topic presented below, if the resource is found in the analysis area or the issue is applicable to the proposal, then a limited analysis of direct, indirect, and cumulative effects is presented. There is no impairment analysis included in the limited evaluations for the dismissed topics because the NPS threshold for considering whether there could be impairment is based on “major” effects.

### Designated Critical Habitat, Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas

No areas within the project corridor are designated as critical habitat or ecologically critical (NPS 2002), nor are there any existing or potential wild and scenic rivers within the project area, or receiving runoff from the project site (NPS 2004). Death Valley is an important natural area, but the proposed action would not threaten the associated qualities and resources that make the park unique. Therefore, these topics were dismissed from detailed analysis in this environmental assessment.

### Geologic Hazards

Geologic faults have not been mapped in Grapevine Canyon; however, one does occur along the east-west highway from Ubehebe Crater and extends beyond Furnace Creek. Geologic hazards (e.g., faults and seismic activity such as earthquakes) would not be anticipated nor would seismic activity be anticipated to affect the proposed project. Neither the no-action nor the preferred alternatives have the potential to impact geologic hazards; therefore, geologic hazards were dismissed from detailed analysis in this environmental assessment.

### Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 et seq.), requires land managers to protect air quality. Section 118 of the Clean Air Act requires parks to meet all federal, state, and local air pollution standards. Section 176(c) of the 1963 Clean Air Act requires all federal activities and projects to conform to state air quality implementation plans to attain and maintain national ambient

air quality standards. NPS *Management Policies 2006* address the need to analyze potential impacts to air quality during park planning. Death Valley National Park is classified as a class II “floor” air quality area under the Clean Air Act, as amended, which means it may never be redesignated to class III (NPS 2002).

The project area is in the Great Basin Unified Air Pollution Control District, as established by the State of California. This district is classified as a California state nonattainment area for particulate matter (fine dust) less than 10 microns in diameter. The general trend in upper air movement carries pollutants to the park from metropolitan areas, industrial areas, and transportation corridors to the west. In the summer, surface winds flow from the southwest, where sources that contribute to air pollution in the park include major population centers, industrial areas, and a dry lakebed. In winter, surface winds flow from the northeast. Because northeast winds comprise an air mass that originates in less developed areas, the air quality of the park is generally better in the winter (NPS 2003).

Should the preferred alternative be selected, local air quality would be temporarily affected by dust and construction vehicle emissions. Hauling construction and fill material, removing rock exposures, and operating equipment during the construction period would result in increased vehicle exhaust and emissions (hydrocarbons, nitrogen oxide, and sulfur dioxide emissions), which would be expected to rapidly dissipate.

Fugitive dust plumes from construction equipment would intermittently increase airborne particulates in the area near the project site, but loading rates are not expected to be considerable; water sprinkling to abate fugitive dust would occur during construction. Overall, there would be a slight and temporary degradation of local air quality due to dust generated from construction activities and emissions from construction equipment. These effects would last only as long as construction occurred; impacts would be negligible and short term. Therefore, air quality was dismissed from detailed analysis in this environmental assessment.

## **Prime and Unique Farmlands**

In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of proposed actions on farmland soils classified as prime or unique by the U.S. Department of Agriculture, Natural Resources Conservation Service. Prime and unique farmlands are defined as soil, which particularly produces general crops including common foods, forage, fiber, and oil seed; unique farmland produces specialty crops including fruits, vegetables, and nuts. There are no areas or soils where unique crops are produced within Grapevine Canyon; therefore, the topic, prime and unique farmlands, was dismissed from detailed analysis in this environmental assessment.

## **Park Operations**

Effects of the proposed action on park operations would be negligible; increased staff or additional equipment would not be required, nor would additional maintenance activities occur. Some staff commuting from Beatty, Nevada, or the Cow Creek park office facilities may experience short delays as part of traffic management during road construction activities; however, such delays would be less than 30 minutes and would be of negligible impact to park operations. Therefore, park operations were dismissed from detailed analysis in this environmental assessment.

## Socioeconomic Environment and Land Use

Neither the no-action or preferred alternatives would change local or regional land use, nor would it appreciably affect local businesses outside Death Valley National Park. Implementation of the preferred alternative could provide a negligible impact to the economies of Inyo County, California, and Nye County, Nevada (e.g., increased employment opportunities for the construction workforce and revenues for local businesses and government related to construction activity). The duration of construction activity for the preferred alternative is approximately 9 to 12 months, and could begin as early as September 2012 (contingent on the availability of funding). Benefits to the local economy would be temporary, lasting only during construction, and negligible overall. In addition, improvements on Bonnie Clare and Mesquite Spring Campground roads would not affect concessions within the park. Therefore, socioeconomics and land use were dismissed from detailed analysis in this environmental assessment.

## Environmental Justice

Executive Order 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-income Populations,” requires all agency missions to incorporate environmental justice by identifying and addressing disproportionately high and adverse human health or environmental effects of agency programs and policies on minorities and low-income populations or communities. No alternative under consideration would have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency’s *Draft Environmental Justice Guidance* (July 1996). Environmental justice was, therefore, dismissed from detailed analysis in this environmental assessment.

## Museum Objects

Museum collections include historic artifacts, associated records and archives, natural specimens, and archival and manuscript material contained in collections held by the park in designated storage or display areas. They may be threatened by fire, vandalism, natural disasters, and careless acts. The preservation of museum collections is an ongoing process of preventive conservation, supplemented by conservation treatment when necessary. The primary goal is preservation of artifacts in as stable condition as possible to prevent damage and minimize deterioration. The proposed reconstruction activities along Bonnie Clare Road would not affect any designated storage or display areas for museum objects of Death Valley National Park; therefore, museum objects were dismissed from detailed analysis in this environmental assessment.

## Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources in the project area including



Grapevine Canyon. Therefore, Indian trust resources were dismissed from detailed analysis in this environmental assessment.

## **Ethnographic Resources**

An ethnographic resource is defined by the National Park Service as a “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (Director’s Order 28). American Indian tribes traditionally associated with Death Valley include the Western Shoshone (also known as the Panamints, Kosos, or Timbisha Shoshone) in the central and northern half of Death Valley National Park, the Kawaiisus in the southern half, and Southern Paiutes on the eastern edge of Greenwater Valley and in the Devil’s Hole region. The National Park Service is consulting with federally recognized tribes and copies of the environmental assessment would be forwarded to them for review or comment.

Ethnographic resources of importance to the Timbisha Shoshone have been identified within the Grapevine Canyon Archeological District and are listed as contributing features to the archeological district. Because the resources are considered contributing features of the archeological district and will be addressed under archeological resources, ethnographic resources were dismissed from detailed analysis in this environmental assessment.

## **Soundscapes**

In accordance with NPS *Management Policies 2006* and Director’s Order 47: *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park system units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in national park system units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequency, magnitude, and duration of human-caused sound considered acceptable varies among national park system units, as well as potentially throughout Death Valley National Park; being generally greater in developed areas and less in undeveloped areas. Even though enhanced in the Grapevine Canyon environment, noise associated with road improvements would be short term and localized, and construction activities would be scheduled to minimize effects on visitor use and experience. Road improvements would not result in a measurable increase in traffic noise following construction. Consideration of noise impacts on wildlife and species of special concern are addressed under those impact topics. Therefore, noise was dismissed from detailed analysis in this environmental assessment.

## **Lightscapes and Night Skies**

In accordance with NPS *Management Policies 2006*, the National Park Service strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light. Construction activities would occur during daylight hours and the proposed project does not include the installation of additional lighting along the road alignment or would not appreciably add to an increase in nighttime traffic. The effects of the proposed project to

lightscares and night skies would be negligible; therefore, lightscares and night skies were dismissed from detailed analysis in this environmental assessment.

### Climate Change

Ongoing scientific research has identified the potential impacts of climate-changing pollutants on global climate. These pollutants are commonly called “greenhouse gases” and include carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, water vapor, and several trace gas emissions. Through complex interactions on a regional and global scale, these emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although climate-changing pollutant levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning fossil carbon sources have caused CO<sub>2</sub> concentrations to increase dramatically, and are likely to contribute to overall climatic changes, typically referred to as global warming.

Global climate change threatens the integrity of national parks. It challenges the NPS mission to leave park resources unimpaired for future generations. In response to this threat, the National Park Service developed the NPS Climate Change Response Strategy to provide direction to NPS staff to address the impacts of climate change (NPS 2010a). The strategy establishes goals to meet the climate change challenge, and directs the National Park Service toward energy-efficient and sustainable practices to reduce the carbon footprint of the National Park Service (the amount of greenhouse gases emitted through NPS activities) and integrate these practices into planning and operations. Goals that are applicable to this project include:

- Goal 5 – incorporate climate change considerations and responses in all levels of NPS planning.
- Goal 8 – enhance the sustainable design, construction, and maintenance of park infrastructure.
- Goal 9 – substantially reduce the NPS carbon footprint from 2008 levels by 2016 through aggressive commitment to environmentally preferable operations.

The park has developed an action plan that identifies steps that Death Valley National Park staff can undertake to reduce greenhouse gas emissions. The plan provides goals to reduce greenhouse gas emissions and provides a framework to meet these goals (NPS 2010b).

This project incorporates sustainable practices in that the existing road pavement would be pulverized and used in the road subbase, thereby reducing the amount of new aggregate needed to reconstruct the road and reducing the number of shipments of aggregate. Upon completion of the project, road maintenance would be reduced, also reducing the use of maintenance vehicles. Other impacts from construction equipment emissions would be temporary and would not measurably contribute to global climate change. Because effects to climate change would be negligible and would not result in any unacceptable impacts, climate change was dismissed from detailed analysis in this environmental assessment.

## **Scenic Resources**

In accordance with NPS *Management Policies 2006*, the National Park Service strives to preserve scenic values. Visual resources are the appearance of the features that make up the visible landscape and include land, water, vegetation, animals, and other features. Scenic resources include both the visual character (the order of the patterns composing the landscape) and visual quality (unity and intactness) of a viewshed (FHWA\_HI-88-054). A viewshed comprises the limits of the visual environment associated with the proposed action.

The viewshed along Bonnie Clare Road comprises a desert canyon that is wider at the ends and narrows considerably in the center and near Scotty's Castle, with steep rock cliffs adjacent to the roadway. Views tend to be confined and not expansive. The natural setting of the area provides the visual character that would be preserved. Visual resources are also preserved through the protection of canyon walls, steep slopes, the winding road, and views of Scotty's Castle (figure 1). The proposed action would result in removal of volcanic and limestone rock faces where roadway widening is necessary to avoid cultural and natural resources of high value, improve movement of traffic, including large vehicles and RVs, and improve sight distance. However, new rock cuts would be minimal, and designed and completed in a manner to resemble the existing rock slopes and textures (see mitigation table).

Visual impacts would occur during construction to areas close to the road construction. Following construction, sight distances would be somewhat greater and new views would not be expanded. The overall views of the traveling public through the canyon would be similar to what it is today, e.g., a narrow, winding canyon confined by steep rock walls. In most areas along the corridor, the road would be widened from 20 feet to 22 feet. In these areas, canyon walls would receive minimal alterations and the character and quality of the landscape would remain intact. The views associated with Bonnie Clare Road Historic District are addressed in the "Cultural Landscape" sections of this document and not repeated in other sections. The scenic views for which Death Valley National Park is renowned would not be affected by the proposed project. Visual resources would be affected by the proposed project; however, the changes would affect the traveling public along the roadway and would be negligible. The views of Death Valley Scotty Historic District from the road are predominately screened by vegetation, and changes to the width of and curves in the roadway in this portion of the project are minimal. The views from Death Valley Scotty Historic District toward the road are screened by vegetation and changes to the road would be predominately horizontal in nature; therefore, changes to viewsheds associated with Death Valley Scotty Historic District would be negligible. Viewsheds along Mesquite Spring Campground Road would not change under the proposed action. Therefore, visual resources were dismissed from detailed analysis in this environmental assessment.



FIGURE 1. SCOTTY'S CASTLE

## **ALTERNATIVES**

### **INTRODUCTION**

The alternatives section describes two management alternatives for Bonnie Clare Road at Death Valley National Park. Alternatives for this project were developed primarily to resolve visitor use and experience and safety issues.

The no-action alternative describes the action of continuing the present roadway management and condition. It does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. The no-action alternative provides a basis for comparing the management direction and environmental consequences of the preferred alternative. Should the no-action alternative be selected, the National Park Service would respond to future maintenance needs and conditions associated with Bonnie Clare Road using common and approved repair protocols (e.g., asphalt patching, crack sealing, chip sealing, sediment and rock removal, and/or asphalt overlay techniques).

The preferred alternative presents the NPS proposed action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, costs, and other applicable factors. Alternatives considered and dismissed from detailed analysis and a summary table comparing the environmental consequences of each alternative completes this environmental assessment section.

### **ALTERNATIVE A: NO-ACTION ALTERNATIVE**

The no-action alternative entails the continuation of existing conditions for Bonnie Clare Road. Should the no-action alternative be selected, the National Park Service would respond to future needs and conditions associated with Bonnie Clare Road in Death Valley National Park without major actions or changes in the present course.

The existing posted speed for the majority of the road is 35 miles per hour (mph); through the historic district the speed limit is posted at 35 mph. Curve warning signs are posted throughout the corridor and speed advisories of 25 mph, 20 mph, and 15 mph are assigned, depending on severity of the curves. The existing paved roadway is 17 feet to 20 feet wide with deteriorating pavement edges, which in some places further reduces the width of the lanes. Shoulder drop-offs have been created leaving depressions and holes where vehicles have left the pavement. Most horizontal curves have little super elevation (the rise at the outside of a curve to keep the vehicle on the roadway) and insufficient run-out lengths (length along a roadway needed to transition between sections) with normal crown and with no or adverse crowns (super elevations). Sharp horizontal curves, combined with minimal vertical curve length, steep to vertical rock-cut slopes, a willow tree on the shoulder at approximate MP 3.98, and a large cottonwood tree near the shoulder at Cottonwood Corner result in insufficient sight distance. The boundary entrance sign parking area is not paved and formalized.

## **ALTERNATIVES**

The Mesquite Spring Campground Road is 1.9 miles in length and 20 feet wide. The pavement is cracking and in poor condition. The Grapevine Ranger Station parking lot is approximately 200 feet by 60 feet, plus entrance roads. The parking lot currently does not meet the Americans with Disabilities Act of 1990, as amended and the Architectural Barriers Act of 1968, as amended ADA/ABA, accessibility standards.

The no-action alternative does not preclude short-term, minor repair or improvement activities for the roads and parking lots or minor ADA/ABA improvements that would be part of routine maintenance for continuing operation and safety.

### **ALTERNATIVE B: PREFERRED ALTERNATIVE**

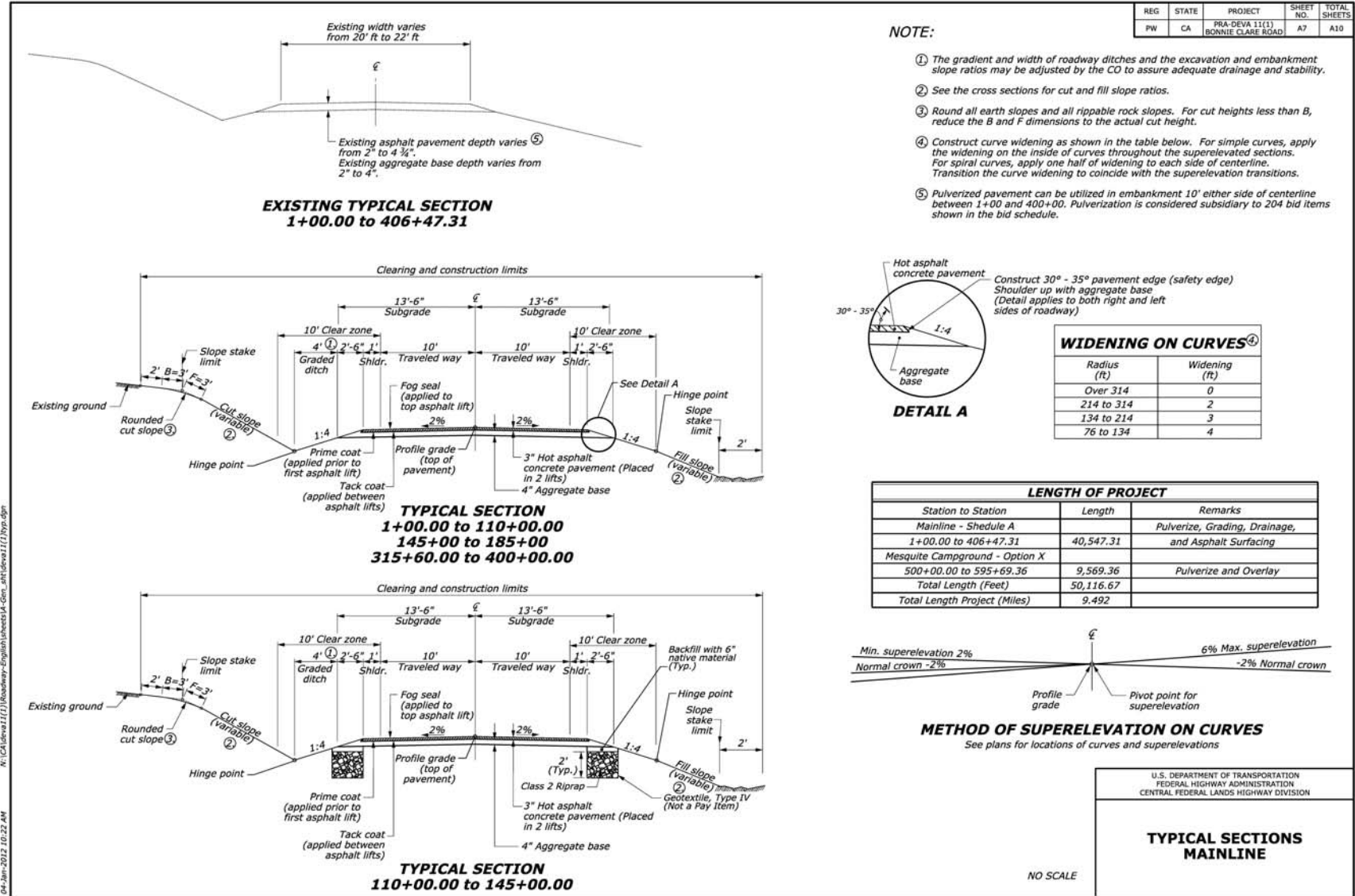
Alternative B is the NPS preferred alternative. The preferred alternative presents the NPS proposed action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, and costs. The preferred alternative meets the park planning objective of protecting cultural and natural resources and enhancing visitor experience, while providing safe and efficient accommodation of park visitors. The preferred alternative would provide adequate transportation routes to Mesquite Spring Campground and through Grapevine Canyon, with opportunities for visitors to experience park vistas and resources along the routes. The reconstruction and resurfacing of Bonnie Clare Road described in the preferred alternative would meet current and anticipated future needs for the anticipated 20-year service life.

Bonnie Clare Road, particularly the portion that is adjacent to and provides access to and egress from Death Valley Scotty Historic District, is considered to be an important part of the historical and cultural landscape. The canyon has been identified through ethnographic research as a prehistoric travel corridor for the Timbisha Shoshone, many of whom still live within park boundaries.

### **Bonnie Clare Road General Description**

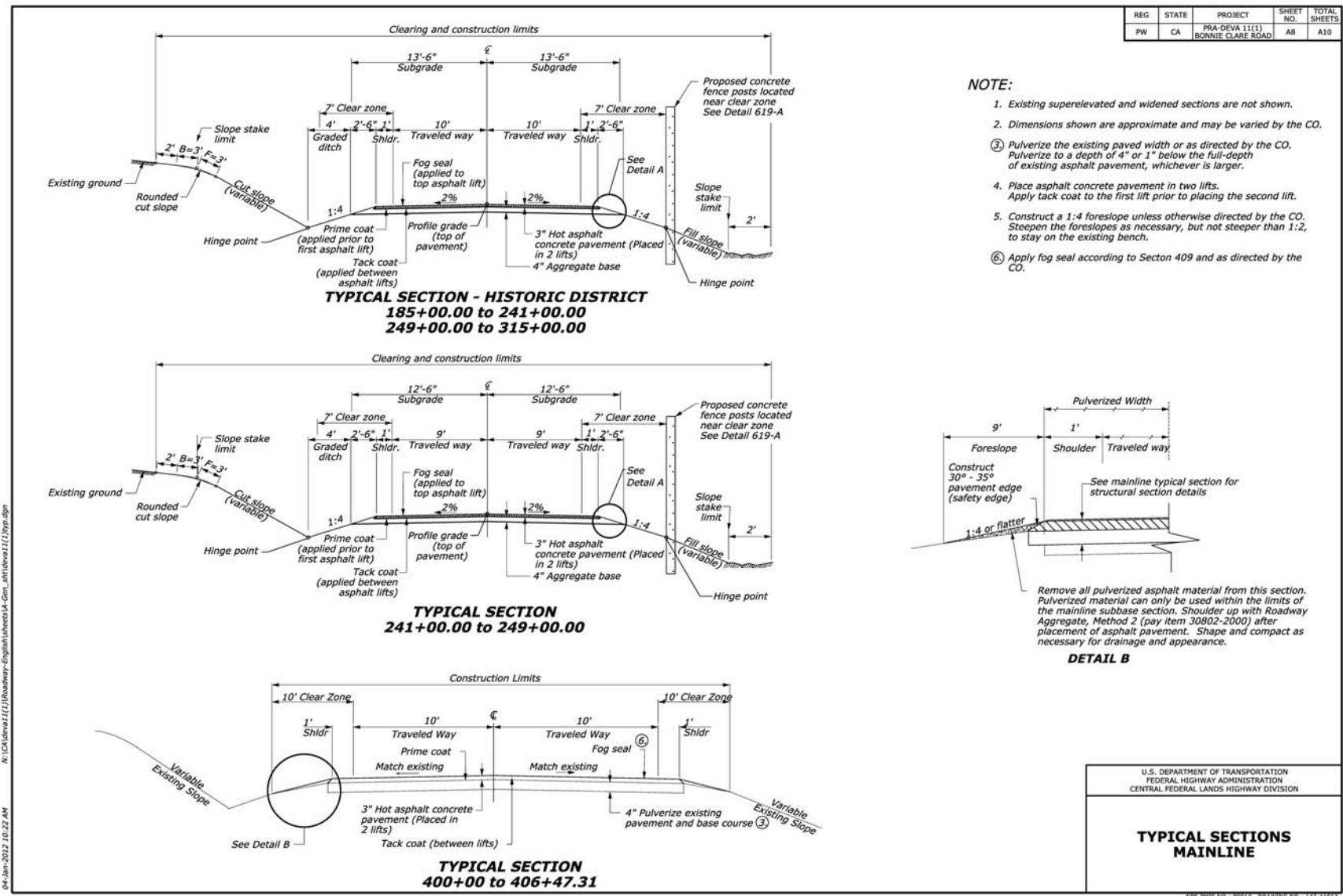
The preferred alternative would reconstruct and resurface approximately 7.7 miles of Bonnie Clare Road (Route 011) from the northeastern park boundary (California/Nevada border) at MP 0.0 to approximately 100 feet south of the Grapevine Ranger Station where previous projects on Ubehebe Road and Bonnie Clare Road ended at MP 7.7. Bonnie Clare Road proceeds from the state line southwest through Grapevine Canyon past Scotty's Castle parking area (MP 4.4) and across Cottonwood Wash (MP 5.0). Route 011 is a Functional Class I, Principal Park Road providing primary access to the northeastern section of Death Valley National Park, including the Grapevine residential area, Ubehebe Crater, and Scotty's Castle. The road connects to Nevada SR 95 at Scotty's Junction, Nevada, via Nevada SR 267.

The preferred alternative would include removal of existing asphalt and placement of a new aggregate base course and new hot asphalt concrete pavement (figures 2 and 3). The proposed paved width would be 22 feet 0 inches, except in one location described below. The proposed design speed would be 35 mph, except where noted in the following discussion. This area of the proposed project is approximately 46.6 acres (7.7 miles by 50 feet wide).



(Source: Federal Highway Administration, preliminary 50% plans, July 1, 2010)

FIGURE 2. ILLUSTRATION OF TYPICAL CROSS SECTION



(Source: Federal Highway Administration, preliminary 95% plans, January 4, 2010)

FIGURE 3. ILLUSTRATION OF TYPICAL CROSS SECTION



The proposed road alignment would use the existing alignment of the straight road segments and would be modified at many of the curves to provide the needed lane width and radius for buses and large RVs to remain in one lane while traveling through the curves. The roadway vertical profile would remain unchanged for the majority of the project length in order to maintain the historic character of Bonnie Clare Road. However, there are several locations along the road that would be subexcavated and regraded to allow for the installation of low water crossings or would be raised as much as 2.25 feet.

Although rock wall and slope cuts would be avoided to the extent possible, cuts would be required in some locations. New cuts would be implemented in a way that the resulting new rock and slope faces would be similar in angle and appearance of the existing steep, rough volcanic and limestone rock that is characteristic of the rock walls and slopes. Slope cuts would be angled more steeply adjacent to archeological resources in order to avoid direct effects to those sites.

Narrow paved ditches designed to limit slope cuts would be constructed to avoid using wide, shallow, drainage ditches (preserving the narrowness of the historic road corridor). Paved ditches would require curbing to keep the pavement edge from deteriorating as a result of major storm events and vehicular traffic. Installation of curbing would be minimized to reduce impacts to the historic character of Bonnie Clare Road. Colored concrete curbing would be used to lessen the visual intrusion of the curb in relation to the road surface.

Other features intended to minimize erosion include: (1) gabions (revetment mattresses), which would be constructed from local rock material to blend into the slopes, (2) low water crossings using buried Jersey barriers would be constructed where washes cross perpendicular to the roadway, (3) underdrains would be installed where springs emerge under the existing road surface, and (4) riprap would be used in association with revetment mattresses and drainage hardening near the northeastern project terminus.

Lane and short-duration (30 minutes or less) road closures would be in effect from MP 0.0 to MP 4.5 (Scotty's Castle) during construction.

### **Milepost 0.0 (California/Nevada State Line) to Milepost 3.5**

The existing parking area at the park boundary entrance sign (north) would be paved and formalized and the remaining unpaved disturbed area would be restored to natural conditions. The parking area would be designed and striped to accommodate an ADA/ABA-compliant access lane and parking. In order to collect traffic data, a loop detector would be installed in the asphalt and a counter would be installed at the side of the road outside the paved shoulder south of the parking area.

Buried jersey barriers and/or riprap would be installed on both sides of the road along this segment to protect the roadway during peak precipitation events. Paved ditches would be added in other areas to eliminate or minimize cuts to rock walls, particularly at culturally sensitive areas.

A construction staging area may be placed somewhere near MP 1.4. The alignment of the road would shift approximately 10 to 15 feet around the tightest curves in this area to minimize the extent of cuts to the rock wall. Existing earthen berms would be increased or new earthen berms would be added to direct drainage between MPs 0.84 and 0.87, 3.11 and 3.16, and 3.33 and 3.37.

### **Milepost 3.5 to Milepost 6.0 (adjacent to Death Valley Scotty Historic District and Scotty's Castle)**

This portion of Bonnie Clare Road is adjacent to the Death Valley Scotty Historic District. The historic fenceline around the historic district begins at approximately MP 3.5 and ends at approximately MP 6.

Except for the wetlands area at MP 3.5, there would be no curb or gutter installed along the historic fenceline, and the design speed of 25 mph would be consistent between MP 3.0 and 6.0, except for two signed curves that would be posted for 15 mph. Minor alignment shifts would be required to obtain a 22-foot roadway width and needed curve radius. These shifts would be minimal and some would require cuts on the volcanic or limestone rock formations only when necessary to widen the road bench or avoid wetlands. At MP 4.1, two nonhistoric palm trees would be removed. Revet mattresses and low water crossings would be included in a few areas to reduce erosion and direct water during precipitation events.

At MPs 4.3, 4.41, and 4.46, the existing informal turnouts would be eliminated. The gravel parking lot east of the current primary access to Scotty's Castle and the access points to the parking lot (MP 4.5) would be retained, but the overflow parking lot farther east (MP 4.4) would be eliminated. Temporary barriers would be placed on the site to discourage parking while new vegetation grows; the barriers would be removed after restoration.

In order to avoid grading as the road extends through Indian Camp, which is a contributing feature of the Death Valley Scotty Historic District, the road would be widened by paving the existing unpaved shoulders and widening the road bench by approximately 2 feet over fill.

For a short distance between MP 4.5 and 4.7 near the entrance to Scotty's Castle, the proposed paved width of the road would be reduced to 20 feet. Approximately 6 feet of the 69 feet of historic entrance road between Bonnie Clare Road and the historic entrance gate at Scotty's Castle (MP 4.6) would be paved and would become part of the roadway. The reduction of road width and the paving of this small section of entrance road would minimize impacts to the historic entrance and associated bend in the road and would avoid the need to cut the canyon rock face opposite the historic gate. In other areas adjacent to Scotty's Castle, the road would be widened by paving the existing unpaved shoulders, thereby widening the road bench. The approach aprons, entrance roads, and parking area at Scotty's Castle would be paved.

Approximately 85% of the fence adjacent to the road would be removed and reconstructed outside the "clear recovery zone," which is an area defined by the Federal Highway Administration as 7 feet from the edge of travel lanes. The historic wood fence posts at Indian Camp would not be moved from their current locations; they would be maintained in place. No new posts would be placed in wetlands.

Cottonwood Corner, at approximate MP 5.9, is at an S-curve in the road that is a significant historic characteristic of Death Valley Scotty Historic District. The proposed new alignment would shift the road slightly east, away from the spring and vegetation. No new fence posts would be placed within the spring/wetland area. The rock face opposite the spring would be cut. A temporary staging area may be placed on the opposite side of the road from the large cottonwood tree and spring. An underdrain would be installed under the road to direct water toward Cottonwood Corner at MP 5.86.

## **Milepost 6.0 to Milepost 7.7 and Grapevine Ranger Station Parking Lot**

The vertical grade of the road would be dropped at MPs 6.8 and 7.0 to accommodate a low water crossing—revet mattresses and Jersey barriers would be installed on the east side of the road. Between approximately MP 7.57 and 7.7, the footprint of the road would remain unchanged. The only action along the road in this area would be the removal and replacement of the top coat of asphalt.

The Grapevine Ranger Station and parking lot are on the west side of Bonnie Clare Road at MP 7.7. The asphalt parking lot between Grapevine Ranger Station and Bonnie Clare Road would be resurfaced, either by a fog seal or asphalt concrete overlay. The elevation in the southern portion of the parking lot would be raised, resulting in a 5% grade to maintain adequate drainage while also being ADA/ABA compliant. The result would be an elevation change of approximately 2 inches near the building. The parking spaces would be restriped to include an accessible parking stall in the central portion of the lot. The existing ramp and concrete sidewalks between the parking area and the ranger station and across the island in the parking lot would be demolished and reconstructed at less steep grades to meet ADA/ABA requirements. An ADA/ABA compliant access ramp would be built to connect with the sidewalk adjacent to the accessible parking stall. The curbs and gutters between the sidewalk and parking lot would be removed and replaced. A new handrail would be installed along the sidewalk near the restroom, and would be similar to the existing handrail. Existing concrete curbs and gutters on the outside boundary of the parking lot would be removed. New curbs and gutters would be installed using colored concrete to match the existing concrete (figure 4). A very limited amount of existing landscaping and vegetation may be impacted by installation of the new sidewalk on the south side of the ranger station. These activities would be confined to previously disturbed areas.

The small entrance station building (recycled prefabricated building installed in the 1980s) and the associated utilities to the building in the middle of the road would be removed.

## **Staging Area**

The mixing table (sediment stockpile area) near Grapevine Ranger Station may be used as the contractor staging and materials stockpile area. Excess rock, topsoil, and sediment removed from the construction site would be stored at the mixing table. Additional turn-around/staging areas could be established during construction in the areas of MPs 1.4 and 5.9.

Approximately 17,655 cubic yards of embankment and 24,780 tons of aggregate base would be imported for this project (FHWA 70% plans dated April 4, 2011; communication with FHWA, December 2010). The contractor would secure a borrow pit source that meets all of the requirements identified in the construction contract, including that the source be weed-free and approved by the National Park Service. Noncommercial areas include, but are not limited to, material sources, disposal sites, waste areas, haul roads, and staging areas.

## ALTERNATIVES

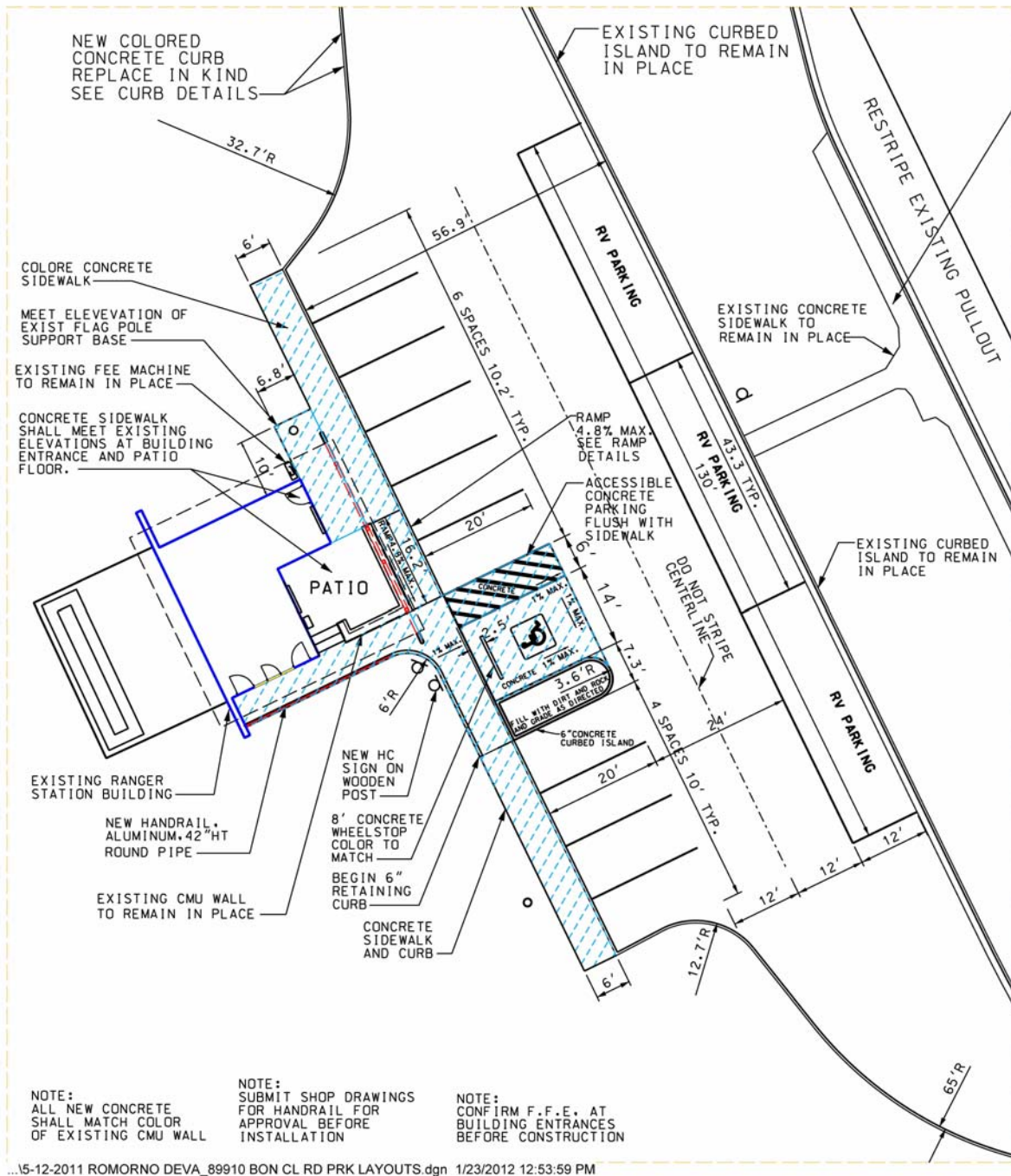


FIGURE 4. GRAPEVINE RANGER STATION PARKING LOT

## **Mesquite Spring Campground Road**

The Mesquite Spring Campground Road asphalt surface would be pulverized and overlaid with 3 inches of new asphaltic concrete pavement and fog sealed to a width of 20 feet (two 9-foot lanes with 1-foot shoulders). This work would remain within and match the existing road width, with the exception of the creation of low water crossings where needed (locations to be determined during construction).

No road improvements would be made within the Mesquite Spring Campground area. The loop at the end of the proposed project adjacent to the spring would be rehabilitated and all work would remain within the existing disturbed areas. No access or construction activities, including staging or storage, would be allowed within the Mesquite Spring campground loop. The existing loop outside the campground area at the end of the project would be rehabilitated and may be used as a construction staging area.

Revet mattresses and buried jersey barriers would be installed at locations where drainages cross perpendicular to the roadway. The locations for these low water crossings and any staging areas or turnouts would be finalized during implementation of the project and would be coordinated with park archeologists to ensure that cultural resources are avoided and appropriate site protection measures are implemented.

Lane and short-duration (30 minutes or less) road closures would occur during construction for this segment of the project.

## **Sustainability**

The National Park Service has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to: (1) minimize adverse effects on natural and cultural values (reflecting the environmental setting) and to maintain and encourage biodiversity, (2) construct and retrofit facilities using energy-efficient materials and building techniques, (3) operate and maintain facilities to promote their sustainability, and (4) illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability can be defined as living within the environment with the least impact on the environment. The preferred alternative subscribes to and supports the practice of sustainable planning, design, and use of Bonnie Clare and Mesquite Campground roads. The existing road pavement would be pulverized and used in the road subbase, thereby reducing the amount of new aggregate needed to reconstruct the road. This measure of sustainability would result in a taxpayer cost saving.

## **General Construction Schedule**

The duration of construction activity on Bonnie Clare Road would be approximately nine months to one year and could begin as early as September 2012 (contingent on the availability of funding). Mesquite Spring Campground would be closed during road rehabilitation, which is estimated to be up to two months. To the extent practicable, there would be no construction adjacent to wetland and nonwetland riparian habitats in the vicinity of Scotty's Castle (approximately MP 3.5 to 6.0) and the west end of Mesquite Spring Campground Road from March 15 to August 15 to avoid

## ALTERNATIVES

impacts to breeding bird species. The asphalt used for paving is temperature-constrained; it will not cure at air temperatures less than 50 degrees. Paving is the last phase of construction. The contractor would prioritize paving in riparian habitat areas first to finish construction in potential breeding bird habitat by March 15. However, if air temperatures do not exceed 50 degrees prior to March 15, the paving work, and only the paving work, would be completed subsequent to March 15, when air temperatures make this work feasible.

## ENVIRONMENTALLY PREFERRED ALTERNATIVE

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

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

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

- reconstruct the aging and deteriorated roadways for another 20 to 30 years of service (criterion 1)
- address the narrow travel lanes, insufficient sight distance, and tight curves that create safety hazards for motorists (criteria 2 and 3)
- address ongoing adverse effects to some important historic, cultural, and natural aspects of our national heritage to the greatest extent possible (criterion 4)
- address needed ADA/ABA improvements in parking lots (criterion 2)

The NPS preferred alternative is the environmentally preferred alternative because it would:

- protect public health, safety, and welfare by reducing the number and severity of motor vehicle accidents and by incorporating ADA/ABA improvements in parking lots (criteria 2 and 3)

- minimize the loss or damage of natural and cultural resources by reducing the potential for accidents that cause motor vehicles to leave the road surface, formalizing the boundary entrance sign parking lot, and removal of roadside turnouts that may destroy adjacent vegetation and cultural sites (criteria 1 and 4)
- allow continued safe use of the roadways and parking lots for enjoying the scenery of Death Valley National Park by park visitors (criterion 5)
- minimize adverse effects to some important historic, cultural, and natural aspects of our national heritage to the greatest extent possible (criterion 4)

In short, the preferred alternative would provide protection of the visitor experience and improve traffic safety with minimal disturbance to natural and cultural resources.

## **ALTERNATIVES CONSIDERED BUT DISMISSED**

An earlier design completed in 2004–2005, which had extended horizontal curves and wider travel lanes to 22 feet, was determined to have unacceptable impacts to natural and cultural resources and was dismissed from further consideration. Five additional options were also considered in 2005, including:

1. Alternating one-way traffic controlled by traffic signals for a 0.5-mile segment at Scotty's Castle. This option was dismissed, in part, because the additional traffic signals, transformers, and signage would be an intrusion into the cultural landscape and the concern for increased potential for head-on, side-swipe, and rear-end vehicle accidents.
2. Alternating one-way travel lanes controlled by traffic signals between the park boundary and the Ubehebe Crater intersection. This option was viewed as problematic due to the potential for wrong-way traffic movement exiting Scotty's Castle. Other reasons for dismissing this option were that the additional traffic signals, transformers, and signage would be an intrusion on the cultural landscape, and the concern for the increased potential for head-on, side-swipe, and rear-end vehicle collisions.
3. Vehicle size limitations through Grapevine Canyon (park boundary to Grapevine entrance station). This option was dismissed because road widening would still be necessary and it would not eliminate potential impacts to the cultural landscape. Denying access to Scotty's Castle to tour buses and visitors with large vehicles was also deemed an unacceptable loss.
4. One-way circulation through Grapevine Canyon (park boundary to the Ubehebe intersection). This option was dismissed because of the inconvenience to park visitors and the increased response times of emergency vehicles.
5. Close the roadway to private vehicles and operate a bus transit system. This option was eliminated because the cost of operating the transit system would exceed park entrance fees.

## MITIGATION MEASURES OF THE ACTION ALTERNATIVE

Mitigation measures are presented as part of the action alternative. These actions have been developed to lessen the adverse effects of the proposed action. Mitigation measures would be funded through the construction budget unless specifically noted in table 1.

TABLE 1. MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Area	Mitigation
General Considerations	The NPS project manager would ensure that the project remains confined within the parameters established in the compliance documents and that mitigation measures would be properly implemented.
	Construction zones would be identified and flagged before beginning construction and all disturbances would be confined to the construction area. All project personnel would be instructed that their activities must be confined to locations within flagged areas and all equipment and materials must remain within these areas. Disturbances beyond the construction zone would be prohibited. This mitigation does not exclude necessary temporary structures including silt-control barriers.
	Best management practices for drainage and sediment control, as identified and used by the Federal Highway Administration and the National Park Service, would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. Use of best management practices in the project area for drainage area protection would include all or some of the following actions, depending on site-specific requirements: (1) keeping disturbed areas small to minimize exposed soil and the potential for erosion; (2) locating waste and excess excavated materials outside of drainages to avoid sedimentation; (3) installing silt fences, temporary earthen berms, temporary water bars, sediment traps, stone check dams, or other equivalent measures (including installing erosion-control measures around the perimeter of stockpiled fill material) prior to construction; (4) conducting regular site inspections during construction to ensure that erosion-control measures were properly installed and functioning effectively; and (5) storing, using, and disposing of chemicals, fuels, and other toxic materials appropriately.
	A hazardous spill plan would be in place, stating what actions would be taken in the case of a spill, notification measures, and preventive measures to be implemented, including the placement of refueling facilities, storage, and handling of hazardous materials.
	All equipment on the project would be maintained in a clean and well-functioning state to avoid or minimize contamination from automotive fluids. All equipment would be inspected daily.
	Provisions for traffic delays shorter than 30 minutes would be made during employee commute times.
	Contractors would be required to properly maintain construction equipment (i.e., mufflers) to minimize noise of equipment use.



TABLE 1. MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Area	Mitigation
General Considerations	All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond work area boundaries. This mitigation does not exclude necessary temporary structures including erosion-control fencing.
	Material stockpiling, machinery storage, and vehicle parking would only be permitted at the mixing table and in designated areas.
	All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project area upon project completion. Any asphalt or concrete surfaces damaged due to work on the project would be repaired to original condition. All demolition debris would be removed from the project site, including all visible metal and concrete.
	Unnecessary construction vehicle engine idling would be limited to reduce noxious emissions.
	All fuel, transmission, or brake fluid leaks, or other hazardous waste leaks, spills, or releases would be reported immediately to the designated safety officer. The contractor would be responsible for spill material removal and disposal to an approved off-site landfill and, if necessary, would notify the appropriate federal agency.
	Construction would be scheduled to avoid the excessively high summer temperatures. Construction would take place during the winter, spring, and fall months to the extent practicable.
	Staging for construction vehicles and equipment would be sited in previously disturbed areas approved by the National Park Service, outside of high visitor use areas, and would be clearly identified in advance.
	Construction debris would be immediately hauled from the park to an appropriate disposal location.
Geology and Soils	New rock cuts would be designed and completed in a manner to resemble the existing rock slopes and textures.
	Top soils would be saved, stock-piled, and replaced in place after construction is completed.
Vegetation	Disturbed areas that are not paved and formalized, including roadside berms, abandoned parking areas, and turnouts, would be returned to natural conditions using active restoration to repair selected disturbed areas and control invasive species.
	Ground surface treatment would include grading to natural contours, and roughing/scarification and vertical mulching to promote natural seeding.
	Disturbed areas would be monitored after construction to determine if remedial actions such as the installation of erosion-control structures or nonnative plant species control are necessary.
	Dust abatement measures would be used to reduce deposition on vegetation adjacent to and downwind of project sites.
Wildlife Habitat	To protect herpetile habitat and individuals, road construction activities should: (1) carefully address roadside rocks; they serve as both cover and basking sites for herpetiles; and (2) replace any talus or rocks that are removed during construction to provide herpetile habitat.

TABLE 1. MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Area	Mitigation
Wildlife Habitat	A biological monitor should be present if large rocks and cliffs are going to be moved or dismantled, in order to move chuckwalla and other herpetile species to safety. Similarly, surveys of other areas to be impacted would be conducted (such as turning over rocks and digging up burrows) in order to capture and move animals to areas where construction has been completed, or where construction activities would not impact their habitat.
	To the extent practicable, no construction activity would be permitted adjacent to wetland and nonwetland riparian habitats from March 15 to August 15 to avoid potential habitat and noise impacts to breeding bird species, including the federally endangered least Bell's vireo and southwestern willow flycatcher. The asphalt used for paving is temperature-constrained; it will not cure at air temperatures less than 50 degrees. Paving is the last phase of construction. The contractor would prioritize paving in riparian habitat areas first to finish construction in potential breeding bird habitat by March 15. However, if air temperatures do not exceed 50 degrees prior to March 15, the paving work—and only the paving work—would be completed subsequent to March 15, when air temperatures make this work feasible.
	Temporary run-off barriers would be installed during construction to avoid contaminating desert wash habitats.
	<p>A preconstruction survey for the desert tortoise would be performed in potential habitat by an approved biologist/monitor. If burrows are found, the qualified biologist would mark and fence off the area. The contractor would be directed to avoid the fenced site. Other desert tortoise sign that is encountered would be marked and the contractor asked to avoid marked sites, if possible.</p> <p>The contractor and all employees would be required to participate in desert tortoise training, taught by a qualified biologist, prior to beginning work. Contractor staff would be informed that they are not permitted to move a desert tortoise (must notify the qualified biologist), and that a check under all vehicles is performed prior to moving any vehicle at any time. Desert tortoises would need to move from the area under their own power and volition (choice). Contractor staff would be required to contain food wastes immediately and remove them from the site at the end of each day. Contractor staff would be required to report any desert tortoise sightings daily.</p>
Invasive Species	Undesirable plant species would be controlled in high-priority areas and other undesirable species would be monitored and controlled, as necessary. To prevent the introduction and minimize the spread of nonnative vegetation and noxious weeds, measures would be implemented during construction: (1) minimize soil disturbance; (2) pressure wash and/or steam clean all construction equipment to ensure that all machinery, rocks, gravel, or other materials are cleaned and weed free before entering Death Valley National Park; (3) brushing down all construction equipment after every trip while transporting material outside the construction limits; (4) cover all haul trucks bringing fill materials from outside the park to prevent seed transport; (5) limit vehicle parking to existing roadways, parking lots, or access routes; (6) limit disturbance to roadsides and culvert areas, including limiting equipment to the roadbed area—no machinery or equipment should access areas outside work area boundaries; and (7) obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, obtaining weed-free sources from NPS-approved sources outside the park would be required.

TABLE 1. MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Area	Mitigation
Invasive Species	Monitor disturbed areas for up to one year following construction(until the disturbance has subsided) to identify growth of noxious weeds or nonnative vegetation and treat any individuals or patches observed. Treatment of nonnative vegetation would be completed in accordance with Director's Order 13: <i>Integrated Pest Management Guidelines</i> .
	In an effort to avoid introduction of nonnative/noxious plant species, no imported topsoil or hay bales would be used during revegetation, if attempted. On a case-by-case basis, the following materials may be used for any erosion-control dams that may be necessary: certified weed-free rice straw, cereal grain straw that has been fumigated to kill weed seed, and wood excelsior bales.
	Excess soil material that is infested with the invasive species <i>Halogeton glomeratus</i> is to be buried a minimum of 18.0 inches (45.7 centimeters [cm]) deep and covered with clean soil at the designated mixing table site. This species has been identified adjacent to the construction area on Bureau of Land Management (BLM) land, on a few sites in the proposed construction corridor, and is a serious threat to the park.
	A silt fence or similar device would be installed to prevent sedimentation to watercourses using best management practices for controlling nonpoint source pollution during construction, and sedimentation and erosion during small storm events.
	All potential contaminants (rubbish or debris, introduction of nonnative species, etc.) would be excluded or removed from the environment.
Water Quality	Fueling project-related vehicles and equipment would take place away from the water sources, and a contingency plan to control petroleum product spills during the project would be developed. Absorbent pads and containment booms would be stored on-site to facilitate cleanup of any accidental petroleum spills.
	Any soil exposed near water as a result of the project shall be protected from erosion (with plastic sheeting, filter fabric, etc.) after exposure, and stabilized as soon as practicable (with vegetation matting, etc.). If erosion-control materials are used, only tightly woven fiber netting or nonbinding materials, e.g., rice straw shall be used for erosion control or other purposes at the project site to ensure that small mammals and reptiles do not become trapped. No plastic-tied wattles shall be used.
	Erosion-control measures would be implemented to minimize minor and short-term impacts to water quality. Sediment traps or logs, silt fences, riprap, erosion check structures, and/or filters would be considered.
Air Quality	Fugitive dust plumes would be reduced to the extent possible by water sprinkling the soil during earth-disturbing activities. However, there would be no commitment from the park to provide water from Scotty's Castle or from within the park. The options for sources of water for construction would also include Beatty, Nevada. Water acquired from outside sources would be treated for aquatic invasive species and pathogens if needed.

TABLE 1. MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Area	Mitigation
Archeological Resources	If, during construction, archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources are identified by an archeologist. If it is determined that the archeological resources are important, they would be documented and an appropriate mitigation strategy developed, if necessary, in consultation with the California state historic preservation office (SHPO) and the Timbisha Shoshone Tribal Historic Preservation Officer (THPO).
	Should human remains, funerary objects, sacred objects, or objects of cultural patrimony be discovered during construction, park staff would follow provisions outlined in the Native American Graves Protection and Repatriation Act of 1990.
	Avoid impacts to archeological resources through contract language requiring the construction contractor to attend preconstruction meetings with park archeologists to develop archeological site protection and avoidance measures that would be implemented near areas within Grapevine Canyon Archeological District, Indian Camp, and along Mesquite Spring Campground Road prior to initiating construction activities. The plan would be documented in an archeological monitoring and inadvertent discovery plan, which would outline areas that would undergo archeological monitoring during construction, and would designate who would perform the monitoring (e.g., park archeologist, Timbisha monitors, etc.).
	The park would develop a plan of action for inadvertent archeological discoveries during construction. The inadvertent discovery plan of action would be documented in an archeological monitoring and inadvertent discovery plan.
	Paleontological remains and archeological specimens found within the construction area would only be removed by the National Park Service or by NPS-designated representatives.
	Avoid cuts to rock faces near archeological resources.
	Develop a section 106 agreement document requiring the park to nominate Grapevine Canyon Archeological District for the national register.
	Upon completion of construction, create barriers to prevent vehicles from leaving the travel lane at these locations.
Cultural Landscapes	Develop a section 106 agreement document requiring the park to complete the Historic American Engineering Report to document Bonnie Clare Road Historic Property.
	Use colored concrete on curbs, paved ditches and low water crossings that blend with the surrounding landscape along Bonnie Clare Road.
	Minimize cuts to canyon walls through use of narrow paved ditches along Bonnie Clare Road Historic Property.
	Cut canyon wall and rock faces to match current slopes of those same walls and faces along Bonnie Clare Road Historic Property to minimize detrimental visual appearance and effects to the feeling and setting of the road.
	Develop section 106 agreement document requiring the park to complete a fenceline treatment plan for the Death Valley Scotty Historic District historic fence.

TABLE 1. MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Area	Mitigation
Cultural Landscapes	Develop section 106 agreement document requiring the park to retain as many of the historic fence posts as practicable and to construct new fence posts to rehabilitate the original fence associated with the Death Valley Scotty Historic District in accordance with <i>Secretary of the Interior's Standards</i> .
	Reduce width of Bonnie Clare Road segment to 20 feet through most sensitive areas of Death Valley Scotty Historic District between MP 4.5 and 4.7.
	Limit horizontal and vertical disturbance to areas that have been previously disturbed through Indian Camp at Death Valley Scotty Historic District.
Historic Structures / District	Minimize impacts to vegetation at Grapevine Ranger Station.
	Match existing design and materials and use colored concrete for ramp, curbs, gutters, and sidewalk replacement at Grapevine Ranger Station.
Visitor Use and Experience	One lane of traffic would remain open during construction.
	Traffic delays that result from construction activities would be limited to a 30-minute maximum.

## ALTERNATIVES COMPARISON TABLE

Alternative A: No-Action Alternative	Alternative B: Preferred Alternative
<p>There would be no improvements to Bonnie Clare Road in Death Valley National Park. Park staff would respond to future needs and conditions associated with Bonnie Clare Road without major actions or changes in the present course. Deteriorating (i.e., loosening) road edges would continue and the road surface would continue to have areas of severe rutting and cracking. Road widening and curve straightening to better accommodate larger RVs and enhance visitor safety would not be undertaken.</p> <p>Mesquite Spring Campground Road would not be resurfaced and continue to deteriorate. The Grapevine Ranger Station parking lot and restroom facilities in the ranger station would continue to fail to meet the ADA/ABA accessibility standards.</p>	<p>The deteriorated road surface along the 7.6 miles of Bonnie Clare Road would be reconstructed and repaved to a 22 foot 0 inch width, except for a short road segment near Scotty's Castle where the proposed paved width would be reduced to 20 feet 0 inches in order to reduce impacts to this sensitive, historic area. Curves would be widened to enhance sight distances and allow larger vehicles to stay in their travel lanes. Erosion-control measures would be constructed to minimize future damage and increase the life of the road.</p> <p>Mesquite Spring Campground Road would be resurfaced. The Grapevine Ranger Station parking lot and adjoining sidewalks would meet the ADA/ABA accessibility standards.</p>

## SUMMARY OF ENVIRONMENTAL CONSEQUENCES / IMPACT COMPARISON MATRIX

Potential Environmental Impacts		
Impact Topic	Alternative A: No-Action Alternative	Alternative B: Preferred Alternative
Soils/Geology	<p>Continued road maintenance and erosion would cause long-term negligible to minor adverse impacts to geologic exposures and soils of Bonnie Clare Road and Mesquite Spring Campground Road shoulder slopes and long-term negligible impacts to alluvium of the active desert wash</p> <p>contribute short- and long-term negligible cumulative impacts to soils and geology</p>	<p>Clearing scrub, fracturing rock, removing rock and soil, constructing ditches, erosion control measures, and cutting the canyon walls would cause short- and long-term minor to moderate adverse impacts to geologic exposures and soils of Bonnie Clare Road and short-term negligible impacts to soils of Mesquite Spring Campground Road</p> <p>contribute short- and long-term negligible cumulative impacts to geologic features and soils</p>
Vegetation	<p>Continued road maintenance would cause short- and long-term direct and indirect negligible impacts to upland vegetation along Bonnie Clare Road and Mesquite Spring Campground Road</p> <p>contribute short- and long-term negligible cumulative impacts to vegetation</p>	<p>Vegetation removal during construction on rock faces and next to the roads and dust from construction would cause short- and long-term direct and indirect negligible impacts to upland vegetation types of Grapevine Canyon and Death Valley Wash</p> <p>contribute short- and long-term negligible cumulative impacts to vegetation</p>
Wildlife	<p>Continued travel along the road and road maintenance would cause short- and long-term direct and indirect negligible to minor adverse impacts to wildlife species and habitats of the Bonnie Clare Road and Mesquite Spring Campground Road corridors</p> <p>contribute short- and long-term negligible cumulative impacts to wildlife habitat</p>	<p>Reducing vegetation along the roads and human activity would attract some animals and drive others away causing short- and long- term negligible to minor adverse impacts to upland wildlife habitat of the Bonnie Clare Road corridor</p> <p>contribute short- and long-term negligible cumulative impacts</p>

*Summary of Environmental Consequences / Impact Comparison Matrix*

Potential Environmental Impacts		
Impact Topic	Alternative A: No-Action Alternative	Alternative B: Preferred Alternative
Special Status Species	<p>Continued use of the road and road maintenance would cause long-term direct and indirect negligible impacts to special status species and habitats of the Scotty's Castle area, Grapevine Canyon, and Mesquite Campground</p> <p>contribute short- and long-term negligible cumulative impacts to special-status species habitat</p>	<p>To decrease the impact to birds, no construction would take place in some locations between March 15 and August 15, and only minimal vegetation would be trimmed causing short- and long-term direct and indirect negligible to minor adverse impacts to riparian, wetland, and upland potential special status species habitat within Grapevine Canyon near Scotty's Castle and near Mesquite Spring Campground entrance</p> <p>contribute short- and long-term negligible cumulative impacts to special status species habitat</p>
Wetlands/Floodplains	<p>Continued road maintenance and continued erosion would cause short- and long-term direct negligible to minor adverse impacts to wetland, nonwetland riparian vegetation, and floodplain</p> <p>contribute short- and long-term negligible cumulative impacts</p>	<p>Widening the road and building water runoff and erosion control measures would cause long-term negligible impacts to wetlands along Bonnie Clare Road; direct and indirect short- and long-term negligible to minor adverse impacts to nonwetland riparian vegetation along both roads, that would be mitigated to minor impacts with drainage features</p> <p>contribute short- and long-term negligible cumulative impacts</p>
Water Quality	<p>Continued erosion and asphalt repairs impacting springs under the road would cause short- and long-term negligible to minor adverse impacts to water quality in the Bonnie Clare Road corridor</p> <p>contribute short- and long-term negligible cumulative impacts to water quality</p>	<p>Installation of underdrains at seeps and springs under the road and construction near streams would cause short-term negligible impacts from sediment run-off and long-term negligible to minor adverse impacts to water quality in Grapevine Canyon</p> <p>short- and long-term minor beneficial impacts to water quality by diverting springs from under the road surface to the stream due to restoration of spring flow</p> <p>contribute short- and long-term negligible cumulative impacts to water quality</p>

## ALTERNATIVES

Potential Environmental Impacts		
Impact Topic	Alternative A: No-Action Alternative	Alternative B: Preferred Alternative
Archeological Resources	<p>Continued natural deterioration processes would cause short- and long-term negligible impacts to archeological resources at GVCAD, DVSHD, and along Mesquite Spring Campground Road</p> <p>contribute short- and long-term negligible cumulative impact to archeological sites</p>	<p>Ground disturbance associated with construction along both roads would be minimized by development of monitoring plan and cuts to canyon walls within the GVCAD would result in short- and long-term negligible impacts to sites adjacent to Mesquite Spring Campground Road and minor to moderate adverse impacts to GVCAD.</p> <p>short- and long-term negligible to minor adverse cumulative impacts</p>
Cultural Landscapes	<p>Continued deterioration caused by natural processes and road maintenance would have a short- and long-term indirect negligible impact to Bonnie Clare Road Historic Property and a negligible to minor adverse impacts to the DVSHD</p> <p>contribute short- and long-term negligible cumulative impacts to the cultural landscapes</p>	<p>Cuts to canyon walls, realignment of the road, and modifications to the road's design would cause long-term direct moderate adverse effects to Bonnie Clare Road Historic Property. Moving the fence and possible impacts to Indian Camp would cause long-term, direct impacts to DVSHD. Overall there would be short- and long-term minor to adverse impacts to cultural landscapes.</p> <p>contribute short- and long-term minor adverse cumulative impacts</p>
Historic Structures/District	<p>Continued maintenance to the parking lot and sidewalks would have short- and long-term negligible impacts to Grapevine Developed Area Historic District</p> <p>contribute short- and long-term negligible cumulative impact</p>	<p>Reconstruction of the parking lot and sidewalks and raising the parking lot would cause short- and long-term negligible to minor adverse impacts to Grapevine Developed Area Historic District</p> <p>contribute short- and long-term negligible to minor, adverse cumulative impacts to historic structures/district</p>
Visitor Use and Experience	<p>Deteriorating road conditions and road maintenance would cause short- and long-term negligible to minor adverse impacts to visitor use and experience</p> <p>contribute short- and long-term negligible to minor adverse contributions to cumulative impacts on visitor use and experience</p>	<p>Construction vehicles and activities, closures, and dust would cause short-term negligible to minor adverse impacts. Improved roads and access would cause long-term beneficial impacts on visitor experience</p> <p>contribute minor adverse cumulative impacts in the short term and long-term beneficial impacts</p>



**Summary of Environmental Consequences / Impact Comparison Matrix**

<b>Potential Environmental Impacts</b>		
<b>Impact Topic</b>	<b>Alternative A: No-Action Alternative</b>	<b>Alternative B: Preferred Alternative</b>
<b>Health and Safety</b>	<p>Dangerously sharp curves and other continued unsafe road conditions would cause short- and long-term minor to moderate adverse impacts to health and safety</p> <p>contribute short- and long-term beneficial cumulative impacts on health and safety</p>	<p>Road construction safety standards would result in short-term negligible impacts during construction and improved road and travel conditions would cause long-term beneficial impacts to health and safety</p> <p>contribute short-term negligible impacts and long-term beneficial impacts to cumulative impacts</p>



## AFFECTED ENVIRONMENT

This section provides a brief description of resources in Grapevine Canyon, adjacent to Mesquite Spring Campground Road, and in the vicinity of the project that may potentially be affected by proposed road reconstruction/resurfacing.

### LOCATION AND GENERAL DESCRIPTION OF THE PARK

Death Valley National Park is one of the largest national park system units in the United States (in the lower 48 contiguous states), encompassing 3,396,192 acres (1,374,390 hectares [ha]). The majority of park lands are in the California counties of Inyo and San Bernardino, but a small portion is in the Nevada counties of Nye and Esmeralda. Access to the park occurs via SR 95 from Las Vegas and Tonopah in Nevada and via U.S. Highway 395 from San Bernardino and Bishop in California. Access within the park occurs primarily from SR 190, which crosses east to west from Death Valley Junction to Lone Pine, and from SR 78 from south to north (Shoshone to Scotty's Castle). The connecting park road access is via SR 374 to Beatty, Nevada, over Daylight Pass and SR 267 to Scotty's Junction through Grapevine Canyon. There are visitor centers at Furnace Creek and Scotty's Castle.

The Grapevine Mountains, defined on the south by Daylight Pass and Boundary Canyon and on the north by Grapevine Canyon, form the northeastern wall of northern Death Valley and expose nearly 30,000 linear feet (9,100 linear meters) of pre-Mesozoic and Paleozoic sedimentary and volcanic rocks along the entire mountain range (CDMG 1974). The Panamint Range includes the smaller Owlshead Mountains, Nelson Range, Cottonwood Mountains, and Saline Range. The Amargosa Range includes the smaller Black Mountains, Greenwater Range, Funeral Mountains, Grapevine Mountains, and Last Chance Range. Telescope Peak of the Panamint Range is the highest elevation in the park, rising 11,049 feet (3,368 meters [m]) above sea level, and lies approximately 15 miles from the lowest elevation in the Western Hemisphere—Badwater Basin salt pan 282 feet (86 m) below sea level) (NPS 2002). Important intermontane basins of Death Valley include the valleys of Greenwater, Saline, Eureka, and Mesquite Flat.

The desert mountain ranges rise in contrast to the broad, creosote bush-dominated, alluvial fans and valleys. The mountains are particularly attractive to visitors during the hot summers, providing cooler temperatures and wooded habitat. The low elevation landscape within the park is open, providing expansive vistas of basins, valleys, canyons, hills, ridges, slopes, dunes, and desert mountain ranges; geologic exposures throughout are dramatic. Early miners and ranchers developed roads and trails that today provide visitors the opportunity to drive to many remote areas where backcountry camping is provided. The expansive roadless area offers backpackers and hikers opportunities to explore the geology and landscape while observing vegetation and wildlife. There are many cultural sites interpreted for visitors; they include prehistoric use by Indian tribes (most recently by the Timbisha Shoshone Tribe) and historic sites including abandoned mining districts and the Scotty's Castle residential area (NPS 2002). Detailed information on resources in Death Valley National Park may be found in the general management plan (NPS 2002) and on the Internet website: <http://www.nps.gov/deva>.

## THE PROPOSED PROJECT AREA

Bonnie Clare Road traverses Grapevine Canyon, located in the northeast corner of Death Valley National Park in the northern part of the Grapevine Mountains. The road provides primary access through the northeast section of Death Valley National Park, and serves as one of the park entrances from the Nevada side. The only development along the road is Scotty's Castle, a popular visitor destination (see figure 1).

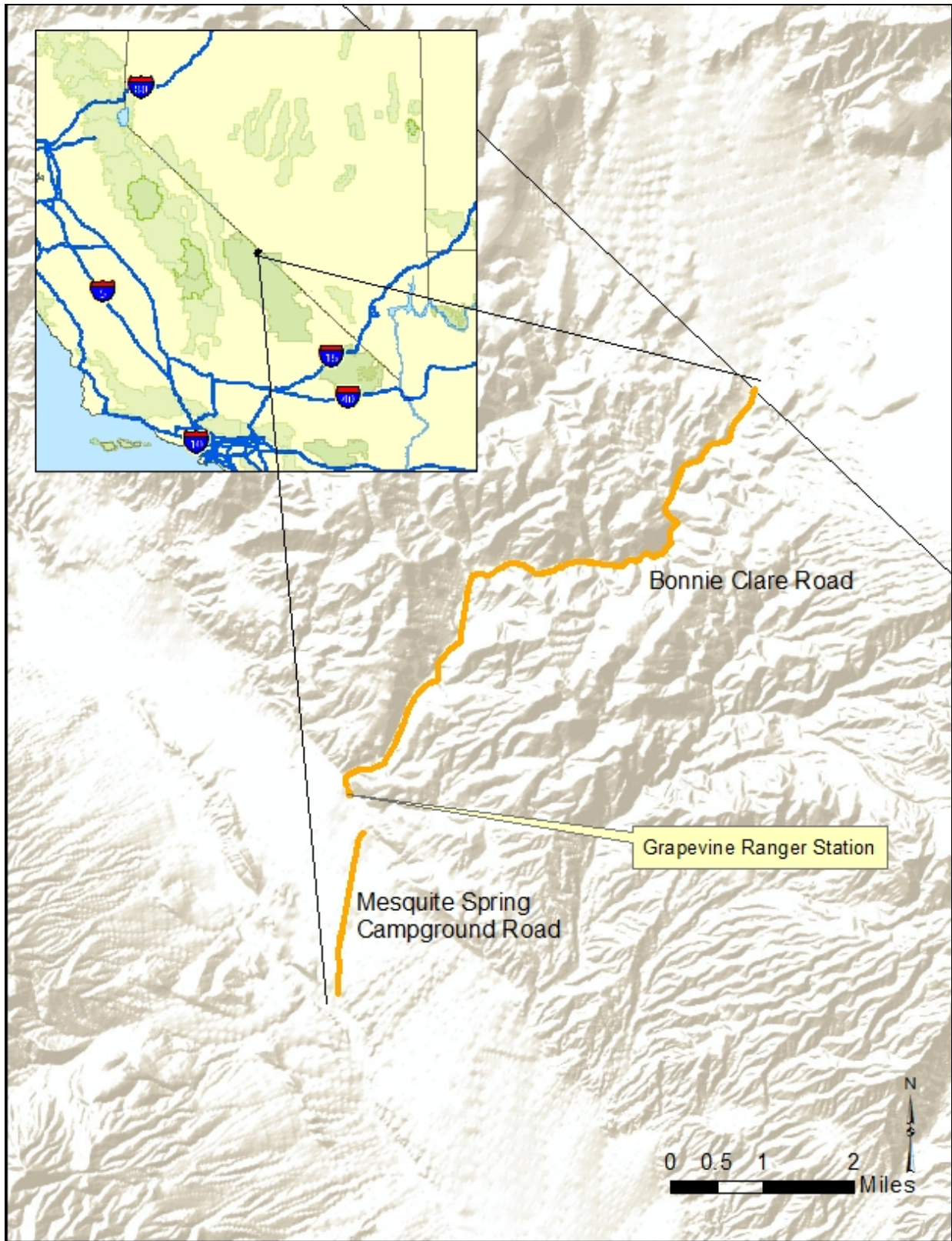
The roadway begins near the Grapevine Ranger Station and heads in a northeast direction, ascending the canyon with cliffs mostly to the southeast side. At Scotty's Castle, the roadway veers to the east, staying close to the southern edge of the canyon. A fence composed of concrete and wood fence posts and barbed wire parallels 2.6 miles of the road near Scotty's Castle. This fence is listed in the national register as a contributing feature of Death Valley Scotty Historic District. The road continues east/northeast as the canyon narrows. As the road approaches the California/Nevada border at the top of the canyon, the landscape opens into large creosote bush flats, dry lakebeds, and low slopes until it terminates at SR 95 at Scotty's Junction (figure 5).

The section of Bonnie Clare Road proposed for reconstruction includes the segment through Grapevine Canyon and: (1) is approximately 7.7 miles (11.9 kilometers [km]) in length, and (2) joins Nevada SR 267 at the park boundary (California/Nevada border) (FHWA 2010). Site elevations range from approximately 3,941 feet (1,201 m) at the California/Nevada border to approximately 2,272 feet (693 m) near the junction with Scotty's Castle Road. The northeastern and southwestern proposed corridor segments occupy broad alluvial valleys and fans and the middle portion occupies the more confined canyon, with cliff walls rising dramatically on both sides. Portions of the road occupy the sides and/or bottom of a sandy/gravelly desert wash. Mesquite Spring Campground Road is proposed for resurfacing in-place using an asphalt grinding process, from the junction with Scotty's Castle Road southeast to near the campground at Mesquite Spring, a distance of approximately 1.9 miles (3.1 km). This road corridor occupies the broad alluvial valley formed by Death Valley Wash. Mesquite Spring Campground elevation is approximately 1,800 feet (549 m).

## Geology and Soils

The Grapevine Mountains, defined on the south by Daylight Pass and Boundary Canyon and on the north by Grapevine Canyon, form the northeastern wall of northern Death Valley and expose nearly 30,000 linear feet (9,100 linear meters) of pre-Mesozoic and Cenozoic sedimentary and volcanic rocks along the entire mountain range (CDMG 1974). The Grapevine mountain range is approximately 22 miles (35 km) long, comprises a portion of the longer Amargosa Range, and is oriented in a northwest-southeasterly direction along the California/Nevada state line (Inyo County, California, and Nye County, Nevada). The highest elevation of the Grapevine Mountains (8,738 feet [2,663 m]) occurs atop Grapevine Peak near Phinney Canyon within the state of Nevada.

The mapped geologic exposures of Grapevine Canyon include: (1) Quaternary alluvium (Pleistocene, nonmarine) deposits on both the upper and lower proposed project termini, (2) Tertiary volcanic pyroclastic rocks exposed in the majority of the canyon, (3) small pockets of Tertiary intrusive rhyolite in the middle portion of the canyon, (4) Pliocene volcanic basalt exposed



**FIGURE 5. DEATH VALLEY NATIONAL PARK PROPOSED PROJECT AREA MAP**

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in the lower canyon, and (5) small exposures of Paleozoic marine limestone or dolomite rocks in the lower portion of the canyon (CDC 2010). The Bonnie Clare Road bed is constructed primarily on Quaternary alluvium and talus/rockfall slopes composed of Tertiary volcanic rocks. These rocks and formations are not known to preserve fossils. Photographs of the geologic exposures, relationship with the Bonnie Clare Road alignment, and the associated plant communities are presented in the vegetation section of this environmental assessment.

The California Geologic Survey (2010) has posted one fault-rupture hazard zone south-southwest of the Bonnie Clare Road reconstruction and Mesquite Spring Campground Road Resurfacing project. The fault runs diagonally northwest to southeast across the entire Ubehebe Crater topographic quadrangle and also crosses the southwest corner of the Scotty's Castle topographic quadrangle; it continues to the southeast crossing portions east of Tin Mountain, Dry Bone Canyon, Fall Canyon, Mesquite Flat, Stovepipe Wells NE, Grotto Canyon, Beatty Junction, Furnace Creek, Devil's Golf Course, and other topographic quadrangles within the park, continuing to the southeast, then terminating on the Old Ibex Pass topographic quadrangle (CGS 2010). Within 7.0 to 16.0 miles (11.3 km–25.8 km) north-northwest of Scotty's Castle, an earthquake swarm (a sequence of many earthquakes in one location) has been occurring since September 2010. There have been five earthquakes between magnitude 3.0 and 3.8 and one tremor recorded at magnitude 4.3.

Soil survey mapping has not been conducted for the Grapevine Canyon / Mesquite Spring Campground areas of the park; low soil development characteristics exist (sparse vegetation cover, steep slopes, large volumes of erosion, etc.). Canyon soils on the actively eroding slopes are thin and generally classed as entisols derived from breakdown of the geologic exposures (volcanic and sedimentary rocks and other materials) and vegetation establishment. Deposition of sediments washed from the up-drainage landscape and canyon slopes also represent entisols. Soils developed on slopes are thin and deposit on ledges and in depressions while sediments deposited as alluvium on the canyon floor and in Death Valley Wash are relatively deep. Annual flooding adds new sediments and redistributes and mixes them with existing deposits producing a sand and gravel texture with little organic material. Saturated soils developed below springs, seeps, and along streams are further discussed in the "Wetlands, Nonwetland Riparian Vegetation, and Floodplains" section of this environmental assessment.

## Vegetation

Upland and desert wash vegetation that has become established in the Grapevine Canyon and Death Valley Wash areas has been classified in the dry domain (300), tropical/subtropical desert division (320), American semidesert and desert province (322), and Mojave Desert section (322A) of Bailey (1995) and to the Desert Floristic Province, Mojave Desert Region, and Desert Mountains Subregion of Hickman (1996). Upland vegetation series prepared by the California Department of Fish and Game (2003) that occur within the proposed project corridor include: (1) 33.000.00 – Sonoran and Mojavean Desert Scrub and (2) 99.000.00 – Nonvegetated Desert. In the DEVA general management plan (2002), Grapevine Canyon and Death Valley Wash vegetation was generally described as scrub, part of the most extensive vegetation type in Death Valley (NPS 2002).

Desert scrub has become established on approximately 75% of the park landscape and generally includes the creosote bush (*Larrea tridentata*), saltbush (*Atriplex* spp.), and burrobrush (*Hymenoclea salsola*) shrub communities on slopes and washes within Grapevine Canyon and Death Valley Wash (NPS 2002). The remaining plant communities occur on and along springs and



seeps and are discussed in detail in the “Wetlands, Nonwetland Riparian Vegetation, and Floodplains” section of this environmental assessment. All plant communities are discussed using the guidance and nomenclature of the National Vegetation Classification System as presented in NatureServe (2010).

Upland shrubland vegetation alliances and plant associations (CDF&G 2010, NatureServe 2010) that have become established within the proposed project corridor and sampled with vegetation observation points include:

**Shadscale Sparse Shrubland (*Atriplex confertifolia* Sparse Shrubland) (CEGL003830).** Slopes supporting this plant association are moderately steep to steep and occur in the mid-portion of the road corridor. They were sampled near the RV parking lot, where the road shoulder is close to the adjacent slope. This sparse, short shrub community has become established on white volcanic material, likely ash fall or flow deposits (figure 6), and supports sparse to low cover of shadscale with up to 10% cover. The single associated shrub is Mojave buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*), which along with annual forbs, provide sparse cover. The substrate is a veneer of small to large rocks that overlay soft bedrock.



**FIGURE 6. REPRESENTATIVE SHADSCALE SPARSE SHRUBLAND  
(WHITISH BAND ABOVE ROAD, ROAD SHOULDER, AND TOESLOPE SHRUBS) (DEVA.9017)**

**Cattle Saltbush Shrubland (*Atriplex polycarpa* Shrubland) (CEGL001318).** On both sides of the roadway for an approximate 3-mile stretch, beginning east of the fence and extending south and west to just past Cottonwood Corner, this dense, short shrub plant association has become

established on alluvial desert wash substrate, toeslopes, and on the road shoulder maintenance berms (figure 7). The desert wash is of variable width through this section, mostly from a few meters wide up to 75 m wide from toeslope to toeslope. Cattle saltbush short shrubs provide moderate to dense cover (40%–80% cover) in mostly linear stands, with the stand margins supporting sparse cover of burrobush short shrubs. Creosote bush tall shrubs and brittlebush (*Encelia* spp.) short shrubs may provide sparse cover with individual shrubs growing from among the cattle saltbush shrubs. Annual forbs and grasses, including desert trumpet (*Eriogonum inflatum*) and mallow (*Sphaeralcea* sp.), provide sparse to low cover in the canopy breaks and along the more recently disturbed roadway edges. The unvegetated surface supporting this vegetation type ranges from gravel and small rocks to large rocks and boulders.

**Yellow Rabbitbrush Sparse Shrubland (*Chrysothamnus viscidiflorus* Sparse Shrubland) (n/a).**

The slope on the northeast side of the road, approximately 2 miles southwest of the park boundary, supported this plant association that has yet to be sufficiently sampled to be named in the National Vegetation Classification System (figure 8). The volcanic substrate is white to pinkish rhyolite; yellow rabbitbrush short shrubs provide low cover, up to 5%; associated short and dwarf-shrubs, which each are present in sparse cover include white bursage (*Ambrosia dumosa*), Mojave buckwheat, and Mormon-tea (*Ephedra* sp.). Annual forbs and grasses provide sparse cover and all species grow from bedrock cracks and thin gravel and soil collected between rocks. The substrate is predominantly bedrock covered by small to large rocks.

**Burrobush Wash Shrubland (*Hymenoclea salsola* Wash Shrubland) (CEGL005398).** A nearly pure stand of this plant association has become established in the alluvium of the desert wash bottom on the southeastern side of the roadway, approximately 0.10 mile east of the intersection with Ubehebe Crater Road (figure 9). The wash reach is approximately 50 m wide between the roadway shoulder and toeslope and is incised (along the maintenance berm, the wash bottom is approximately 1.0 m to 1.5 m lower than the road shoulder). Burrobush is the dominant short shrub providing up to 15% cover; sparse cover (<1% per species) in the shrub layer results from creosote bush, desert holly (*Atriplex hymenelytra*), and brittlebush (*Encelia farinosa*). Annual forbs and grasses provide sparse cover, up to 2%, in the herbaceous layer and include the forb desert trumpet. The wash bottom unvegetated surface consists of gravel and small rocks.

Mixed stands of the Burrobush Shrubland association occur at the upper end of the proposed project corridor within the desert wash, and on both road edges extending from the park boundary southwest for approximately 3.1 miles (figure 10). Burrobush is the stand dominant providing low cover, up to 10%; associated shrubs occur in sparse to low cover and include rubber rabbitbrush (*Ericameria nauseosa*), creosote bush, Mojave buckwheat, shadscale, and white bursage. Annual forbs and grasses provide sparse cover; the perennial forbs prince's-plume (*Stanleya* sp.) and sacred datura or jimsonweed (*Datura wrightii*) are occasionally present. The substrate is composed of small gravel that is reworked with each surface flow event.

**Creosote Bush – White Bursage Shrubland (*Larrea tridentata* – *Ambrosia dumosa* Shrubland) (CEGL002954).** This plant association has become established in the desert wash and on adjacent slopes on the northwestern side of Bonnie Clare Road, beginning at the park boundary and extending southwest for approximately 1.1 miles (figure 11). Further south along the road corridor, this association occurs on steep slopes of mostly black volcanic rocks and boulders, but rarely on the road edge (figure 12). Within the wash, creosote bush shrubs provide low cover, up to 10%,





**FIGURE 7. REPRESENTATIVE CATTLE SALTBUCH SHRUBLAND (DEVA.9003 AND DEVA.9009)**





**FIGURE 8. REPRESENTATIVE YELLOW RABBITBRUSH SHRUBLAND (DEVA.9008)**



**FIGURE 9. REPRESENTATIVE BURROBUSH SHRUBLAND (DEVA.9002)**





**FIGURE 10. REPRESENTATIVE BURROBUSH – MIXED SHRUB WASH SHRUBLAND (DEVA.9005)**



**FIGURE 11. REPRESENTATIVE CREOSOTE BUSH – WHITE BURSAE SHRUBLAND IN WASH (DEVA.9004)**





**FIGURE 12. REPRESENTATIVE CREOSOTE BUSH – WHITE BURSAGE SHRUBLAND ON VOLCANIC SLOPE (DEVA.9015)**

while on steep volcanic slopes the cover may be sparse to low (3%–10%); at the toe-of-slope, creosote bush cover can approach 15% to 25% due to greater moisture availability from runoff. White burrobush dwarf-shrubs provide up to 10% cover in the wash habitat, but may be present in sparse to low cover (3%–10%) on the steep slope habitat. Associated short shrubs provide sparse cover and include burrobush in the wash and brittlebush and shadscale on the slopes. Annual forbs and grasses provide sparse cover in stand openings and at the edge of the community. The unvegetated surface is small gravel in the wash and large rocks to boulders with some bedrock exposure on the slopes.

Past the southern edge of the historic entrance road to Scotty's Castle, an exposure of Paleozoic marine limestone bedrock occurs on the east side and adjacent to the roadway (figure 13). The outcrop is characterized by low cover of creosote bush (up to 10% cover) and sparse cover of white bursage, brittlebush, and annual forbs and grasses. Unique to the limestone outcrop are clumps of cottontop cactus (*Echinocactus polycephalus*) that are sparse in terms of cover, but notable because of their size. Individual plants may be salvaged during rock work at this site (Cipra 2010). The rooting substrate is predominantly bedrock cracks with small pockets of gravel and soil deposited between rocks and on small ledges.

**Creosote Bush – Desert Holly Shrubland (*Larrea tridentata* – *Atriplex hymenelytra* Shrubland) (CEGL001264).** This plant association has become established in the alluvium within the desert wash on both the southeastern and northwestern sides of Bonnie Clare Road to the top of the maintenance berm between stations 320+00 to 400+55 and on both the east and west sides of the initial 1.8 mi (2.9 km) reach of Death Valley Wash adjacent to Mesquite Spring Campground Road

(figure 14). The maintenance berm at the terminus of Bonnie Clare Road serves to impede surface water flow from crossing the road and is a physical barrier to access by typical RVs and automobiles. Creosote bush and burrobrush provide sparse to low cover (3%–5% and 1%–2%, respectively). Desert holly and white bursage each provide from 5% to 10% cover within the stand. Annual forbs, including the desert trumpet, provide up to 2% cover between the widely spaced shrubs. At the eastern end of this plant association, the wash is broad, approximately 100 m in width from toeslope-to-toeslope, and is bisected by Bonnie Clare Road and a 10 m to 12 m wide unpaved turnout. The unvegetated surface is composed principally of well-drained gravel with a low cover of cobble and small boulders; they are reworked with each surface flow event.



**FIGURE 13. REPRESENTATIVE CREOSOTE BUSH – WHITE BURSAGE SHRUBLAND ON PALEOZOIC MARINE LIMESTONE OUTCROP (SLOPE ABOVE SALT BUSH SHRUBS) (DEVA.9016)**

**Creosote Bush – Brittlebush Shrubland (*Larrea tridentata* – *Encelia farinosa* Shrubland) (CEGL002955).** West-facing slopes along the Bonnie Clare Road corridor are steep and often support stands of creosote bush in low cover with sparse to low cover of brittlebush in the understory. This type was not sampled because it occurs at the edge of the desert wash in which the roadway was constructed and would not be affected by alternatives of the proposed project; however, small patches of this plant association could occur within the project corridor in a mosaic with other creosote bush shrubland communities.





FIGURE 14. REPRESENTATIVE CREOSOTE BUSH – DESERT HOLLY SHRUBLAND (DEVA.9001)

## Wildlife

The park and the adjacent desert landscape support a variety of wildlife species including 53 species of mammals, 346 species of birds, 36 species of reptiles, 3 species of amphibians, and 6 species of fish (NPS 2002). Due to the variety of upland, wetland, riparian, geologic, and constructed habitats available within Grapevine Canyon and Death Valley Wash, relatively rich wildlife species abundance and diversity occurs as described in the ensuing discussion.

## Mammals

Surveys for small mammals were conducted along Bonnie Clare Road through Grapevine Canyon in 2005; park literature and individual accounts describe species, habitats, and management in the project area. No large mammals were observed or noted by field teams conducting wildlife and wetlands inventories during 2005. In general, small mammals including species of mice, kangaroo rats (*Dipodomys* spp.), woodrats (*Neotoma* spp.), desert cottontail (*Sylvilagus audubonii*), etc., are more numerous than large mammals, including desert bighorn sheep (*Ovis canadensis nelsoni*), mountain lion (*Puma concolor*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), kit fox (*Vulpes macrotis*), badger (*Taxidea taxus*), and black-tailed jackrabbit (*Lepus californicus*) (e<sup>2</sup>M 2004).

The desert bighorn sheep occurs in desert mountain ranges including the Grapevine Mountains where the terrain supports rolling hills for feeding areas, seeps/springs, and nearby cliffs within steep canyons that can be used for escape. The occupied range does not correlate with any specific vegetation type (NPS 2002). The present park population is estimated to be between 500 and 1,000 animals; the Grapevine Mountain metapopulation of desert bighorn sheep is estimated at 50 to 60 individuals, divided into three herds. Desert bighorn sheep do not use the habitat and springs in Grapevine Canyon extensively due to human activity. The springs are very important to transient sheep, especially rams that use the canyon as a corridor to interact with populations outside the park boundary to the north (Hibbard and Manning 2010). Park natural resources staff reported observing desert bighorn sheep along Bonnie Clare Road in 2005 (NPS 2005).

Some researchers believe that the desert bighorn sheep population in the park is declining in numbers. The causes of possible declines have not been determined; however, several factors may be involved, including: (1) introduction of diseases from livestock, (2) poor range conditions, (3) rapid increase in human activities (e.g., mining, road building, urbanization, and increased recreation), (4) illegal hunting, (5) resource competition with feral burros, (6) tamarisk invasion of springs, and (7) appropriation of water (NPS 2002). To reduce visitor impacts and prevent undue disturbance to wildlife, backcountry camping is not permitted within 0.25 mile of the springs.

Few nonnative wild burros and horses occur in the northern Grapevine Mountains and they rarely use habitats, including watering sources, within Grapevine Canyon. Under the park general management plan (2002), wild horses and burros were planned for removal from parklands.

Lalumiere et al. (2005) captured or observed 17 small mammal species from four families and seven genera using habitats adjacent to Bonnie Clare Road (table C-1; appendix C). No rare or sensitive small mammal species were captured or are known to occur in this area of the park. Small mammal traps set in wetland and riparian habitats resulted in a 95.9% capture-success rate, indicating that mesic sites represent a very important habitat for small mammals. Traps set in desert wash scrub

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and mesquite habitats resulted in 40.1% and 35.2% capture-success rates, respectively (Lalumiere et al. 2005). The most common small mammals captured included the cactus mouse (*Peromyscus eremicus*) in wetland habitats and the desert pocket mouse (*Chaetodipus penicillatus*), canyon mouse (*Peromyscus crinitus*), and Merriam's kangaroo rat (*Dipodomys merriami*) in desert scrub habitats; of the small mammals captured, only the house mouse (*Mus musculus*) is nonnative.

The species and population levels of bats using the habitats in Grapevine Canyon and Death Valley Wash are unknown. Abandoned mines, deep alcoves and crevices, large rocks, trees including Fremont cottonwood and Washington fan palm, or other roosting habitat could support a variety of bat species (NPS 2002).

## Birds

Surveys conducted in 2002 and 2005 to determine corridor use by avian species and the presence of the federally endangered least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*) resulted in identification of 106 avian species using habitats adjacent to Bonnie Clare Road and at the Mesquite Spring Campground (table C-2; appendix C). Many avian species are neotropical migrants that use local desert scrub and wetland shrubland and woodland habitats for resting, foraging, and/or breeding. The habitats surveyed in Grapevine Canyon included desert wash, mesic herbaceous, and shrubland and woodland riparian, including: (1) Honey Mesquite Shrubland, (2) Willow Species – Honey Mesquite Shrubland, (3) Fremont Cottonwood – Washington Palm / Willow Species Woodland; (4) Fremont Cottonwood – Washington Palm / Willow Species – Honey Mesquite / Native Grape Woodland, and (5) Creosote bush Scrub (Haltermann 2005, Heindel and Heindel 2002). The habitats surveyed at Mesquite Spring Campground included tall riparian shrubland and woodland and open water, including: (1) Honey Mesquite Shrubland, (2) Willow Species – Honey Mesquite Shrubland, and (3) Fremont Cottonwood / Willow Species – Honey Mesquite Woodland (Haltermann 2005).

Probable resident and migrant breeding bird species determined during field surveys included 31 species and known nonbreeding migrants included 75 species (Haltermann 2005, Heindel and Heindel 2002). Common breeding bird species observed in the project corridor, mostly in wetland and riparian habitats, included the black-throated sparrow (*Amphispiza bilineata*), house finch (*Carpodacus mexicanus*), and mourning dove (*Zenaidura macoura*); additional breeding birds observed include the blue-gray gnatcatcher (*Poliophtila caerulea*), lesser goldfinch (*Carduelis psaltria*), ash-throated flycatcher (*Myiarchus cinerascens*), verdin (*Auriparus flaviceps*), loggerhead shrike (*Lanius ludovicianus*), northern mockingbird (*Mimus polyglottis*), Bullock's oriole (*Icterus bullockii*), yellow warbler (*Dendroica petechia*), yellow-breasted chat (*Icteria virens*), blue grosbeak (*Guiraca caerulea*), lazuli bunting (*Passerina cyanea*), and long-eared owl (*Asio otus*). Nonnative avian species using habitats within the Bonnie Clare Road corridor include the chukar (*Alectoris chukar*), European starling (*Sturnus vulgaris*), and house sparrow (*Passer domesticus*).

## Herpetiles

Surveys for reptile and amphibian species were conducted in habitats adjacent to the Bonnie Clare Road corridor during 2005 (Johnson and Saulino 2005). The area surveyed included up to approximately 656 feet (200 m) from the road shoulders. The survey methods included road driving by car (evening and early morning) and visual encounter surveys on foot (day and early evening). To detect herpetile species with different temperature preferences, surveys were



conducted in March/April and July time periods. Surveys for the rare Panamint alligator lizard (*Elgaria panamintina*) were conducted in potential habitat during morning and afternoon basking periods.

Observed and recorded were 15 native species: 9 lizards, 5 snakes, and 1 frog (table C-3; appendix C). Potentially occurring herpetile species habitats were also listed. The most common reptiles observed in the corridor were the side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), western banded gecko (*Coleonyx variegata*), zebra-tailed lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), and desert spiny lizard (*Sceloporus magister*).

Habitat preferences for lizard species along Bonnie Clare Road were determined by Johnson and Saulino (2005). The side-blotched lizard occurs in fairly open sites with rocks available for basking. Western whiptails commonly occur in open sites where rocks used for basking are mostly absent. Western banded geckos require rocks large enough to hide between and under for protection from predators and the heat of the day. The zebra-tailed lizard occurs in open habitats characterized by shrubs, including desert washes and hill slopes covered with fine to gravelly talus. The desert horned lizard (*Phrynosoma platyrhinos*) occupies fairly fine, soft substrates in the vicinity of ant mounds and may occur on sites with occasional patches of fine soil covered by gravel or small rocks; ant mounds were commonly observed on the road shoulders in 2010. Desert iguanas occur on relatively flat habitats that support large-stature creosote bush shrubs. The Great Basin collared lizard (*Crotaphytus bicinctores*) occupies sites characterized by moderately large rocks. Desert spiny lizards and chuckwalla (*Sauromalus ater*) occur in piles of large rocks or on cliffs with near vertical surfaces with cracks or small recesses for rapid escape. Nearly all lizard species bask on small to large rocks.

## **Insects and Benthic Macroinvertebrates**

Johnson and Saulino (2005) recorded 14 butterfly species and 20 species of dragonflies and damselflies in the vicinity of Scotty's Castle, adjacent to Bonnie Clare Road and within the proposed project corridor. The species lists are presented in table C-4; appendix C.

Macrobenthic invertebrates were surveyed and sampled in three sites on September 30, 2010 (HDR/e<sup>2</sup>M 2010). The results of sampling seep, spring, and stream habitats were eight orders, 11 families, and nine genera (1,271 specimens in the aggregate) (table C-5; appendix C). The most abundant taxa sampled were a snail of the Hydrobiidae (spring head habitat of the Scotty's Castle pump house site), a caddisfly of the genus *Hydropsyche* (stream habitat of the Scotty's Castle proper site), an amphipod species (*Hyalella azteca*) (Scotty's Castle pump house site), and a soldier fly of the genus *Stratiomys* (standing water of the Scotty's Castle seep site). The snail may be the recently discovered and described *Pyrgulopsis* sp. (family Hydrobiidae) a freshwater snail species with a gill and an operculum.

Physical and water quality data were acquired and recorded at each macrobenthic invertebrate sample site to provide context for the survey task. The September 30, 2010, data are provided in table 2. Macrobenthic invertebrate families identified near Scotty's Castle were compared to the Hilsenhoff Biotic Index to determine general tolerance for organic pollutants causing low dissolved oxygen in water bodies. On a scale of 0–10, the sampled families (scores were averaged at each site by the families present) were assessed from 5.3 to 7.0 or from good to fairly poor in terms of tolerance to organic pollutants / low dissolved oxygen levels. The fairly poor tolerance level was

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associated with the Scotty's Castle pump house site (two macrobenthic invertebrate families) where groundwater emerges and the good tolerance level was associated with the pooled water of the Scotty's Castle seep site (four macrobenthic invertebrate families). The Scotty's Castle proper site supported nine macrobenthic invertebrate families and was assessed at the 6.5 tolerance value (fair water quality).

**TABLE 2. SITE AND WATER QUALITY DATA ACQUIRED FOR THREE SCOTTY'S CASTLE SITES  
ADJACENT TO BONNIE CLARE ROAD**

Parameter	Seep Site	Pump House Site	Proper Site
Bank Vegetation Height	High – right and left bank	High – right and left bank	High – right bank; Low – left bank (maintained landscape)
Bank Stability, Erosion / Vegetation Protection	(100% vegetation cover)	(100% vegetation cover)	Bank Stability, Erosion – minimal; Vegetation Protection – Optimal (90% vegetation cover)
Stream Channel	—	—	High gradient
Stream Flow Description	Standing Water / Shallow Pool	Slow and shallow	Rapid and shallow
Seep/Spring/Channel Width	—	1.1 m wide	1.52 m wide; 50% cover of channel by water (marginal)
Channel Alteration	None observed	None observed	Low (Bonnie Clare Road channelization at toeslope)
Substrate: [seep], {spring-head}, (riffle)	[100% cover by roots and rhizomes]	{100% cover by roots and rhizomes}	(Marginal – occasional riffle or bend)
Embeddedness	—	—	High
Substrate Size (diameter)	1–6 mm (fine sediment)	1.2–20 mm (cobble and pebbles)	1–20 mm (75% fine sediment cover)
Depth to Substrate	5.0 cm	10.2 cm	—
Depth to Root Mass	2.5 cm	4.0 cm	—
Flow Volume / Velocity	—	15–20L/Minute	20L/Minute (0.012cfs)
Oxidation Reduction Potential	99.7mV	166.0mV	83.6 mV
pH	7.22	7.85	8.06
Temperature	19.9°C	26.6°C	23.1°C
Specific Conductance	1308µS/cm	742µS/cm	805µS/cm
Dissolved Oxygen	14.1% (1.31 mg/L)	75.4% (6.04 mg/L)	78.3% (6.68 mg/L)
Tolerance Value	5.3 (good water quality)	7.0 (fairly poor water quality)	6.5 (fair water quality)

Source: HDR/e<sup>2</sup>M 2010

## Special Status Species

Under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.), an endangered species is defined as any species in danger of extinction throughout all or a major portion of its range; a threatened species is any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. The California Department of Fish and Game (2010) and the National Park Service (2010) have a list of threatened and endangered plant and wildlife species, including federal status species. The National Park Service conducted corridor-specific surveys for amphibians, reptiles, birds, mammals, lepidopterans, macrobenthic invertebrates, and plants between 2005 and 2010. No state or federally listed endangered, threatened, or candidate species were observed; however, potential habitat for the desert tortoise (*Gopherus agassizii*) (state threatened, federal threatened), Panamint alligator lizard (*Elgaria panamintina*) (BLM sensitive), southwestern willow flycatcher (*Empidonax traillii extimus*) (state endangered, federal endangered), willow flycatcher (*Empidonax traillii*) (state endangered), and least Bell's vireo (*Vireo bellii pusillus*) (state endangered, federal endangered) occurs. Five individuals of the rare plant, littleleaf rockcress (*Arabis microphylla*), a California 4.3 (limited distribution) species, were observed during the botanical survey.

**Botanical Survey.** During April 2010 and April 2011, following good precipitation and flowering seasons, Jane Cipra (park botanist) conducted a botanical survey of the entire road corridor, focused on rare and nonnative plant species. During this survey, five plants of littleleaf rockcress (*Arabis microphylla* var. *microphylla*), a California 4.3 (limited distribution) species, were observed on a volcanic rock outcrop approximately 0.10 mile west of the eastern terminus of the historic fence in Grapevine Canyon. This outcrop would be graded and contoured during construction under the preferred alternative as proposed. On the opposite road shoulder, a wetland stand has become established.

## Least Bell's Vireo and Southwestern Willow Flycatcher Surveys

Riparian habitats in the park, Grapevine Canyon, and Mesquite Spring Campground represent potential habitats for two state and federally listed endangered bird species, the least Bell's vireo and the southwestern willow flycatcher (Halterman 2005, Heindel and Heindel 2002). Bird surveys were conducted between late March and late July 2005, and in April and May 2002 to determine whether either species use the riparian habitats near Bonnie Clare Road and at Mesquite Spring Campground. No least Bell's vireos or southwestern willow flycatchers were observed or detected during the breeding season. Halterman (2005) observed a single, nonvocalizing willow flycatcher, which she presumed to be a migrant little willow flycatcher (*Empidonax traillii brewsteri*) using the riparian habitat near Scotty's Castle for a rest stop. However, Heindel and Heindel (2002) mentioned that two pairs of least Bell's vireos previously nested in willow riparian and wetland sites near Scotty's Castle but the habitat was disrupted during waterline installation. In the 2002 survey it was surmised that two of four sites surveyed within Grapevine Canyon required a more complex understory to be attractive breeding habitat for least Bell's vireos, and two of four sites surveyed lacked dense willows overhanging water, preferred southwestern willow flycatcher nesting habitat (Heindel and Heindel 2002).

Historically, the least Bell's vireo was a common species in lowland riparian habitats of California, including Owens Valley. Currently, the least Bell's vireo is occasionally observed spring and fall during migration (NPS 2006), but no critical breeding grounds have been identified within the

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park. The least Bell's vireo winters in southern Baja California in Mexico and migrates to California in mid to late March and usually leaves the breeding grounds by September (Kus 2002).

Once a least Bell's vireo selects a breeding territory, it is likely to use that area for the remainder of its life and will use the same nesting shrub or tree year after year (making the species highly susceptible to disturbance that destroys breeding sites). The decline of the least Bell's vireo is contributed to habitat loss and degradation and brood parasitism by the brown-headed cowbird (*Molothrus ater*). Least Bell's vireos often nest near open spaces or trails; nest failure and abandonment can be caused by human disturbance, including trampling of nests or nest sites or the clearing of vegetation (Kus 2002).

The southwestern willow flycatcher is rarely observed in the park and no critical habitat has been identified in the park (DEVA 2002). Seventy-five riparian sites have been documented as active breeding grounds for the southwestern willow flycatcher within the United States; the known breeding population is between 300 and 500 pairs. The southwestern willow flycatcher uses dense riparian vegetation associated with streams, rivers, lakes, or other bodies of water for breeding habitat (Sogge et al. 1997).

Identification of the southwestern willow flycatcher is problematic because there are four subspecies that are differentiated by subtle differences in color and morphology. In the park, the endangered subspecies is rarely observed; two other flycatcher subspecies use the riparian areas of the park to rest during their migration to the Sierra Nevada range north of the park (little willow flycatcher and the Great Basin willow flycatcher (*Empidonax traillii adastus*). Timing of the bird surveys is the most effective way to determine whether observed willow flycatchers are migrants passing through or are using the park as a breeding site (Sogge et al. 1997). Potential Bonnie Clare Road riparian habitat includes a single tree species like Goodding willow or mixtures of native broadleaf trees and shrubs including Fremont cottonwood and willow shrubs. Stand height typically ranges from 3 m to 15 m and is characterized by an overstory of Fremont cottonwood, Goodding willow, or other broadleaf trees. Typically, there are recognizable subcanopy layers and a dense understory of mixed shrub and herbaceous species.

During the 2002 and 2005 surveys, five avian species of special concern for the park, the horned lark (*Eremophila alpestris*), loggerhead shrike (*Lanius ludovicianus*), long-eared owl (*Asio otus*), yellow warbler (*Dendroica petechia*), and the yellow-breasted chat (*Icteria virens*), were observed. The loggerhead shrike was also observed during the site visit in October 2010. Both the yellow warbler and the long-eared owl are classified as second priority species (on the decline in a large portion of their California range, but their numbers are high enough that danger of extirpation is not imminent). The yellow-breasted chat is a third-priority species (faces no serious threats and populations appear stable, but the California populations are small enough that should a threat arise, the species is vulnerable) for the state of California (CDF&G and PRBO 2001).

**Reptile Survey.** No desert tortoises were observed during the 2005 site survey of Bonnie Clare Road conducted by Johnson and Saulino, nor have there been more recent occurrence reports adjacent to the road. In 2003, Woodman determined the area at the Scotty's Castle Road / Ubehebe Crater Road junction to not represent desert tortoise habitat; the area is very rocky, shrubs are sparse, and the elevation is low. Generally, the range of the desert tortoise includes the Mojave and Sonoran deserts in southern California, Arizona, southern Nevada, the southwestern tip of Utah, and Sonora and northern Sinaloa, Mexico (USFWS 1994). The Mojave population of the desert tortoise (an administrative designation for animals living north and west of the Colorado River) is listed as a threatened species by the federal government and the State of California. Critical habitat

for this species was designated in 1994 (USFWS 1994); there is no designated critical habitat within the park.

The desert tortoise range extends across the southern half (approximately) of the park where the current population is believed to be small (e<sup>2</sup>M 2005). The Mojave population of the desert tortoise occurs primarily in valleys and on low to moderately sized hills characterized by xeric shrubs with sparse to moderate creosote bush and white bursage cover. Typical soils of the habitat range from sand to sandy-gravel, although caliche, desert pavement, and rock and boulder terrain are occasionally occupied, including along the edges of basaltic flow and other rock outcrops. Desert tortoises spend a large portion of the year in underground burrows to avoid extreme temperatures, and for younger tortoises, to avoid a variety of predators (e.g., coyotes, foxes, raptors, and ravens) (USFWS 1994). They are typically active during the spring, early summer, and autumn when annual plants are most common and daily temperatures are within their range of tolerance. Additional desert tortoise activity occurs occasionally during warm weather in winter months and after summer rainstorms (USFWS 1994).

**Panamint Alligator Lizard.** The Panamint alligator lizard is listed by the Bureau of Land Management as a sensitive species and the California Department of Fish and Game as a species of special concern (Johnson and Saulino 2005). The species is known from a few sites in a geographically small area, and although it was not observed along Bonnie Clare Road, potential habitat is present. Several visual encounter surveys specifically targeting the Panamint alligator lizard were conducted in areas dominated by Fremont cottonwood / wild grape woodlands, and on adjacent roads and talus slopes. In addition to visually scanning and listening for this species, surveyors searched in leaf litter and talus piles. These surveys were conducted in the morning and late afternoon, when the Panamint alligator lizard would most likely be basking in the open.

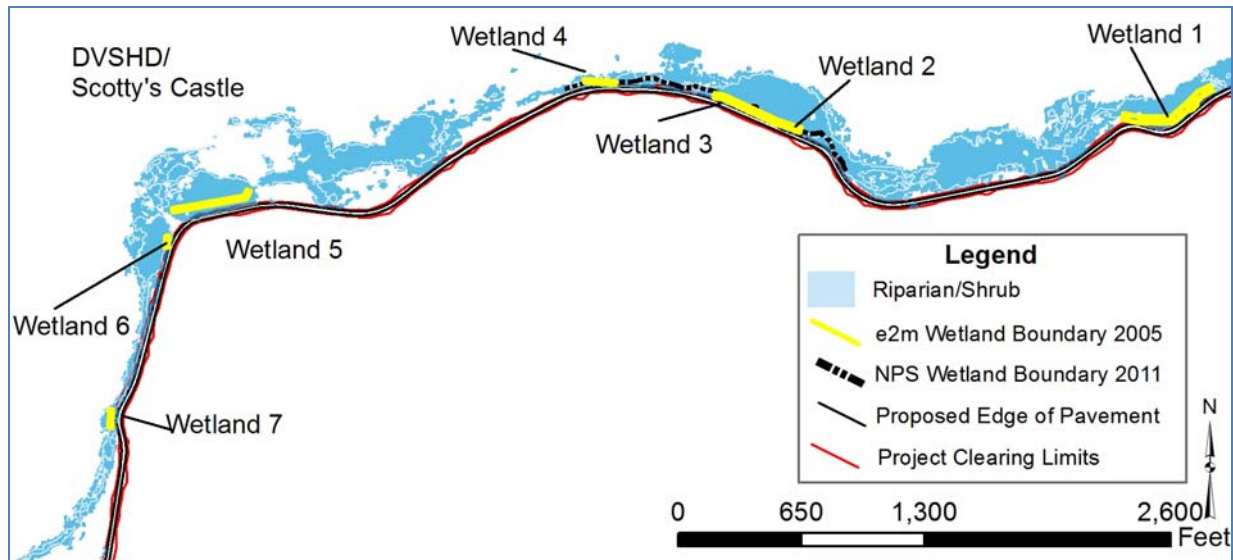
## **Wetlands, Nonwetland Riparian Vegetation, and Floodplains**

Wetland and nonwetland riparian vegetation series prepared by CDF&G (2003) that occur near Scotty's Castle and at Mesquite Spring Campground within the proposed project corridor include: (1) 45.000.000 – Meadows and Seeps not dominated by grasses; (2) 52.000.00 – Marsh; (3) 61.000.00 – Riparian Forest and Woodland; and (4) 63.000.00 – Low to High Elevation Riparian Scrub. For this discussion, wetlands have three diagnostic environmental characteristics, e.g., hydrophytic vegetation, hydric soils, and wetland hydrology (USACE 1987). Nonwetland riparian vegetation supports hydrophytic vegetation, but lacks two diagnostic environmental characteristics, e.g., hydric soils and wetland hydrology within the proposed project corridor. The floodplain of Grapevine Canyon extends the length of the Bonnie Clare Road segment to be reconstructed, while Mesquite Spring Campground Road is on the alluvial fan above Death Valley Wash.

**Wetlands.** Eight emergent, shrub-scrub, and wooded wetland sites were identified in proximity to Bonnie Clare Road in the vicinity of Scotty's Castle during a 2005 field inventory (e<sup>2</sup>M 2005) (figure 15). During 2011, the National Park Service conducted additional wetland field delineation to ensure that stands would be avoided to the extent possible during the proposed project design phase. The dominant and common wetland plant species identified during these field inventories are rated as facultative wetland or obligate in terms of wetland indicator status (USDA PLANTS Database 2011; <http://plants.usda.gov>) and include Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), California fan palm (*Washingtonia filifera*), honey mesquite (*Prosopis glandulosa*), mule's-fat (*Baccharis salicifolia*), California/native grape (*Vitis californica*), southern cattail (*Typha domingensis*), chairmaker's bulrush (*Scirpus americanus*), rush (*Juncus*

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*balticus*), and common reed (*Phragmites australis*) (e<sup>2</sup>M 2005, NPS 2011). The dominant species observed during the e<sup>2</sup>M (2005) delineation by site included: Wetland 1 (willow trees and shrubs, native grape vines, common reed); Wetland 2 (native grape vines); Wetland 3 (willow trees and shrubs, native grape vines, southern cattail); Wetland 4 (California fan palm, honey mesquite trees and shrubs, mule's-fat shrubs, southern cattail); Wetland 5 (California fan palm, native grape vines, rush species); Wetland 6 (California fan palm, willow trees and shrubs); Wetland 7 (willow trees and shrubs, mule's-fat shrubs, rush species); and Wetland 8 (Fremont cottonwood, California fan palm, willow trees and shrubs, common reed, rush species).



(Source: e<sup>2</sup>M 2005 and NPS 2011)

**FIGURE 15. MAPPED WETLAND BOUNDARIES**

The hydrology supporting wetland vegetation is permanent groundwater seeps and springs with additional surface inflow during precipitation events sufficiently large to result in runoff. Hydric soils were evaluated at selected wetland sites near Bonnie Clare Road and were described as moist throughout the exposed column, having high organic content in the upper 1.0 inch (2.54 cm), consisting of mixed sand and gravel below the surface layer, and exhibiting matrix colors ranging from hue/value/chroma of 10YR4/3 to 7.5YR4/3 (e<sup>2</sup>M 2005, USDA-NRCS 2000). Wetland 8 near Scotty's Castle was characterized by a thick layer of leaf litter, in places exceeding 10.0 inches (0.3 m) in depth; the litter layer served to retain moisture and contributed to the high organic content of the topsoil layer.

The distances from the delineated wetland margins to the edge of the Bonnie Clare Road template (e<sup>2</sup>M 2005) were as follows: Wetland 1 (0.0 m•1.0 m); Wetland 2 (12.0 m); Wetland 3 (1.0 m); Wetland 4 (14.0 m•27.0 m); Wetland 5 (0.0–1.0 m); Wetland 6 (11.0 m); Wetland 7 (1.0 m•2.0 m); and Wetland 8 (0.0 m•1.0 m). These wetland locations were plotted onto construction design plans, field verified in 2011, and avoided to the extent possible during development of the current proposed alignment to be used for impact evaluation. Where springs emerge from under the existing asphalt pavement at two locations on Bonnie Clare Road, hydrophytic plants have become established in hydric soils and wetland hydrology onto the shoulder and could not be avoided for the approximately 200 ft<sup>2</sup> area of the combined sites.

The vegetation alliances represented by the dominant and common hydrophytic plant species within the proposed project corridor are discussed below.

**Nonwetland Riparian Vegetation.** Riparian communities that have species composition similar to wetlands, but are not classified as wetlands because they do not meet all three criteria of hydrophytic vegetation, hydric soils, and wetland hydrology as described by the USACE (1987), have become established at the edge of the floodplain and adjacent to existing roadway fill slopes. Most of the mature trees (e.g., Fremont cottonwood, California fan palm, American elm (*Ulmus americana*), white mulberry (*Morus alba*), etc.) at Scotty's Castle and at Cottonwood Corner were planted as landscaping elements during the construction and original design and occupation of Scotty's Castle. These plantings required irrigation with spring water to be maintained in this desert environment. Because it was introduced into this area of the park, even though native elsewhere in U.S. desert environments, the California fan palm is considered a nonnative invasive species (Cipra 2011). The nonwetland riparian woodland near the entrance to Mesquite Spring Campground occurs adjacent to the existing roadway toe-of-fill for 150 m; the majority of the stand is east of the proposed project terminus (Cipra 2011).

The canopy/edge of nonwetland riparian vegetation was delineated to create a true color hard copy map of 2009 digital imagery at the 1 inch=500 ft (2.54 cm = 152.4 m) scale and representative ground photographs and cover information were collected in Grapevine Canyon during the October 2010 field review; three riparian stands were identified within Death Valley Wash near the Mesquite Spring Campground entrance (Cipra 2011, Halterman 2005); and Blodgett (2011) used supervised classification algorithms within ArcGIS Desktop 10.0 to prepare a nonwetland riparian vegetation cover layer using 1 m, 4-band 2009 National Agricultural Imagery Program aerial imagery from which to analyze proposed project effects (figure 16). The nonwetland riparian vegetation data layers of Blodgett (2011) have been digitally overlain on the current construction design drawings for impact analysis and avoidance mitigation during the planning phase (FHWA 2011).

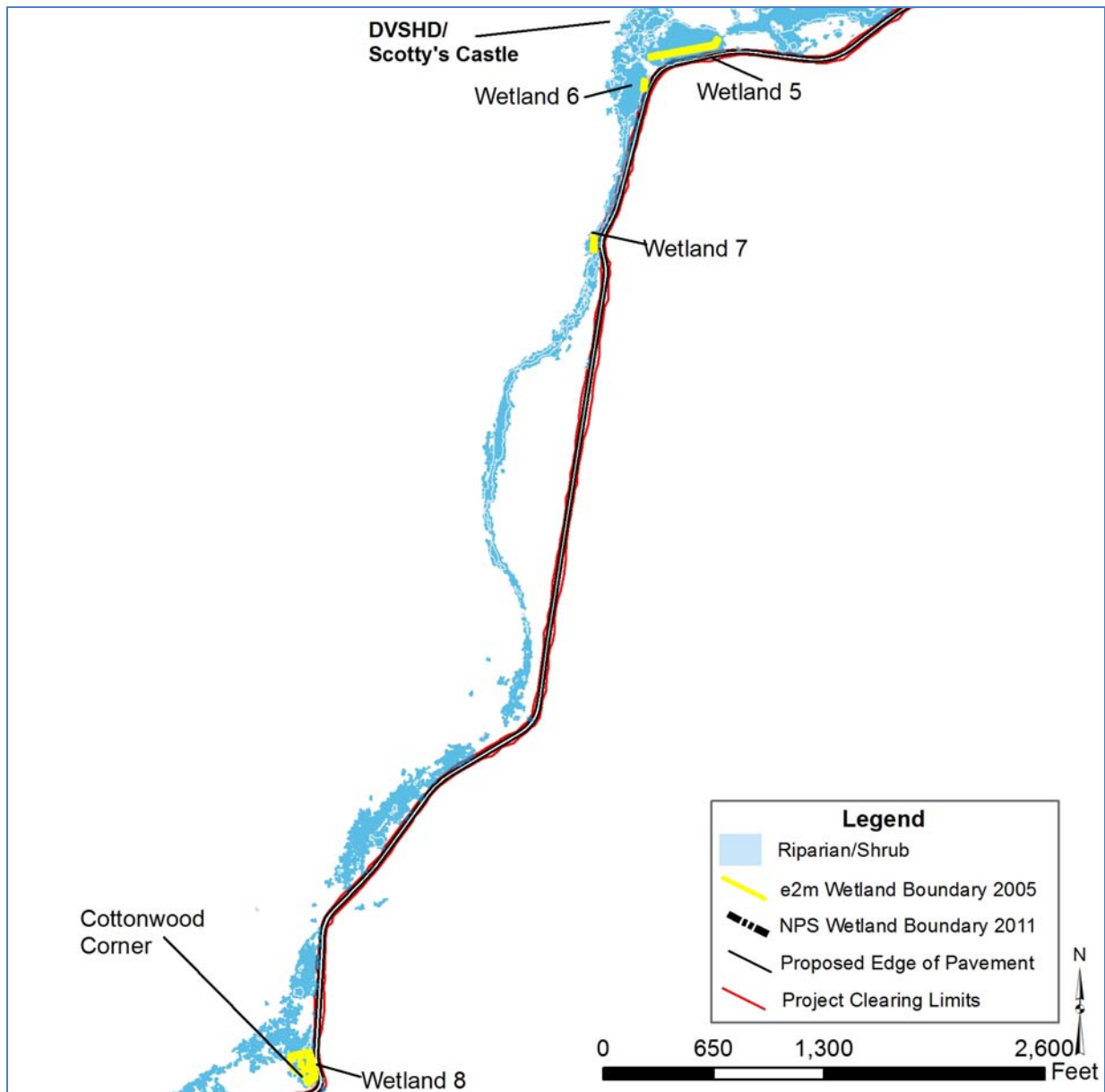
The hydrology supporting nonwetland riparian vegetation is principally groundwater, which is available at depth to these deep-rooted plant species. The hard surfaces of Bonnie Clare and Mesquite Spring Campground roads contribute runoff into nonwetland riparian vegetation types during precipitation events.

**Classification.** In general, the wetland and nonwetland riparian vegetation can be classified into alliances per the National Vegetation Classification System of NatureServe (2010), as follows:

**Fremont Cottonwood Temporarily Flooded Woodland Alliance (*Populus fremontii* Temporarily Flooded Woodland Alliance) (A.644).** Fremont cottonwood (facultative wetland) trees characterize the riparian wetland stand at Cottonwood Corner are among the most common trees in the riparian plantings at the Scotty's Castle picnic area, and provide the canopy cover for the riparian habitat established near the Mesquite Spring Campground entrance east of the proposed project terminus (figure 17). At Cottonwood Corner, the approximately 30 m tall Fremont cottonwood trees provide up to 25% cover in the canopy layer and established root suckers provide up to 5% cover in the subcanopy layer. Among the mature trees, there are many dead branches, several of which hang over Bonnie Clare Road. These branches grew from a trunk that is approximately 6 m from the current edge of pavement, but the trunk angles across the road (figure 18). Also contributing to cover within the approximately 10 m tall subcanopy layer are nonnative California fan palms (*Washingtonia filifera*) and Goodding willow (*Salix gooddingii*) trees that together provide up to 10% cover. The tall shrub layer is composed of mulefat (*Baccharis*

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*salicifolia*) and honey mesquite (*Prosopis glandulosa*), which provide up to 5% cover. The herbaceous layer is characterized by the tall grass common reed (*Phragmites australis*) providing up to 15% cover and the short saltgrass (*Distichlis spicata*) (facultative wetland), which provides low cover near the road edge. The unvegetated surface cover includes downed wood and leaf litter with high cover. A groundwater-emitting spring emerges at Cottonwood Corner, partially under the road surface, which results in a ridged and troughed road surface due to the weight of RVs and their short radius turn at this site (figure 19).



(Source: Blodgett 2011)

**FIGURE 16. MAPPED NONWETLAND RIPARIAN VEGETATION BOUNDARY**





**FIGURE 17. REPRESENTATIVE FREMONT COTTONWOOD WOODLAND (DEVA.9013 AND DEVA.9014)**





**FIGURE 18. TREE TRUNK AND BRANCHES OVERHANGING BONNIE CLARE ROAD SEGMENT**



**FIGURE 19. ROAD SURFACE DAMAGE DUE TO SPRING FLOW AND RV TRAFFIC AT COTTONWOOD CORNER (NOTE ROADSIDE VEGETATION NORTHEAST OF COTTONWOOD CORNER IS CATTLE SALTBU SHRUBLAND)**

At Scotty's Castle picnic area, the mature Fremont cottonwood trees are interplanted with Siberian elm (*Ulmus pumila*), California fan palms, and white mulberry (*Morus alba*), resulting in approximately 55% canopy cover over California wild grapevines, the stream, and Bermuda grass (*Cynodon dactylon*) maintained lawn. This stand is irrigated partially by sprinklers, but mainly by subsurface saturation from the perennial stream.

Near the Mesquite Spring Campground entrance the Fremont cottonwood riparian woodland stand supports a subcanopy/tall shrub understory composed of honey mesquite and screwbean mesquite or tornillo (*Prosopis pubescens*) trees and shrubs. This important plant community and wildlife habitat occurs along the lower Mesquite Spring Campground Road for 150 m; the stand is east of and adjacent to the proposed project terminus.

**California Fan Palm Seasonally Flooded Woodland Alliance (*Washingtonia filifera* Seasonally Flooded Woodland Alliance) (A.485).** California fan palm (facultative wetland) trees have become established as stands on the grounds of Scotty's Castle and occur in low cover as canopy and understory trees with Fremont cottonwood, honey mesquite, and Goodding willow nearer the road shoulder (figure 20). A linear stand of California fan palms occurs at the roadway toe-of-fill adjacent to the Scotty's Castle picnic area; individual trees and seedlings are occasionally present in wetland and riparian habitats near the road shoulder. California fan palms were introduced to this area in the 1930s during landscaping of the Scotty's Castle site and are considered a nonnative, invasive species in Death Valley; therefore, the vegetation alliance described herein should be considered seminatural in terms of classification. Where the community occurs as stands, California fan palms up to 15 m tall provide approximately 35% to 50% cover. Species of willow tall shrubs comprise the 5 m to 10 m tall understory and provide 5% to 10% cover. Understory herbaceous vegetation may be from 1 m to 5 m tall, provide 10% to 20% cover, and includes southern cattail, chairmaker's bulrush, and goldenrod (*Solidago* sp.), which have become established in the flowing water. Within the picnic area stand, the understory is characterized by Bermuda grass providing up to 25% cover, which is maintained and irrigated as a lawn. The unvegetated surface consists predominantly of litter with low cover attributed to open water and small rocks.

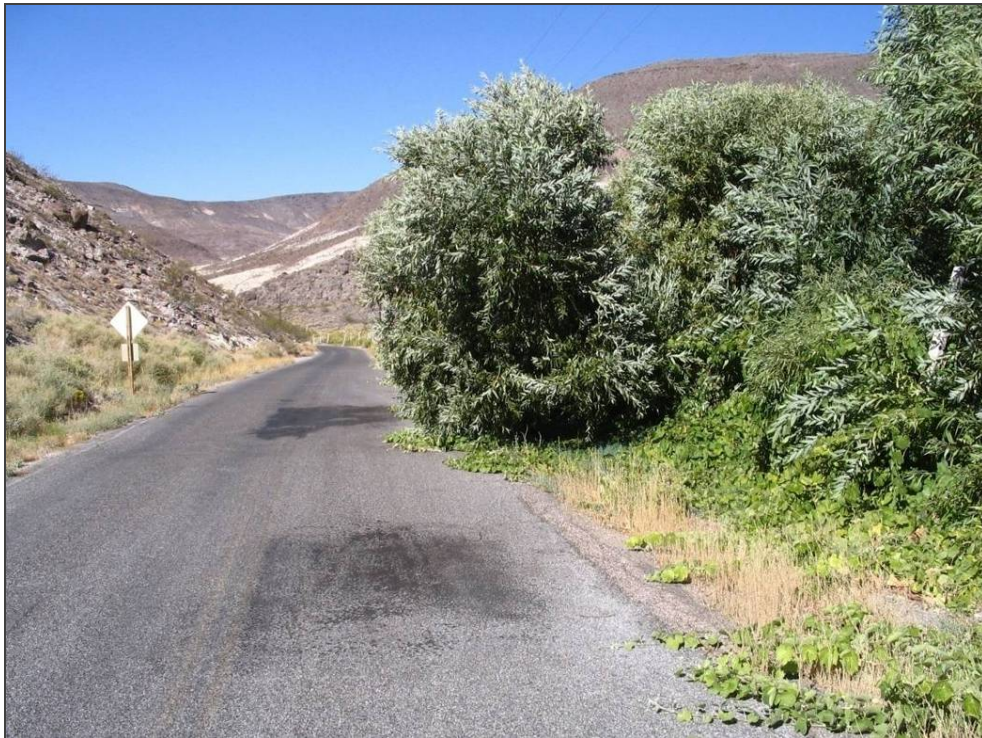
**Goodding Willow, Willow Species Temporarily Flooded Shrubland Alliance (*Salix gooddingii* (*Salix* spp.) Temporarily Flooded Woodland Alliance) (A.947).** Goodding willow (obligate) trees characterize a few wetland and riparian stands near and adjacent to the road shoulder of Bonnie Clare Road (figure 21). Canopy Goodding willow trees range from 10 m to 15 m tall and provide approximately 30% cover. In the subcanopy, this species and other willow tree or tall shrub species provide low cover, up to 5%. The shrub layer is characterized by the vining California wild grape, which occurs in 40% to 65% cover. The herbaceous layer may be up to 4 m tall and provides low cover of southern cattail, chairmaker's bulrush, and common reed. The unvegetated surface is nearly completely covered by litter and branches.

**Mule's Fat Shrubland Alliance (*Baccharis salicifolia* Shrubland Alliance) (A.933).** Mule's fat (facultative wetland) tall shrubs characterize the moist soils along both banks of the linear drainage carrying flows from discharging seeps and springs below Scotty's Castle. Mule's fat and long-leaved brickellbush (*Brickellia longifolia*) tall shrubs (2 m to 3 m tall) provide between 60% to 90% cover in dense stands (figure 22). The flowing water typically supports narrow bands of southern cattail and/or chairmaker's bulrush providing low herbaceous cover in the center of each stand. The unvegetated surface is composed of a high cover of litter and small branches and a low cover of small to large rocks.





**FIGURE 20. REPRESENTATIVE WOODLAND STAND OF INVASIVE CALIFORNIA FAN PALMS INTRODUCED AND ESTABLISHED IN SCOTTY'S CASTLE DEVELOPED AREA IN THE LAST CENTURY**



**FIGURE 21. REPRESENTATIVE GOODDING WILLOW WOODLAND AND ROADWAY DAMAGE RESULTING FROM SPRING FLOW UNDER THE ASPHALT SURFACE (DEVA.9011 AND DEVA.9012)**





**FIGURE 22. REPRESENTATIVE MULE’S FAT SHRUBLAND (DARK GREEN SHRUBS ON RIGHT, GRAY-GREEN SHRUBS ATOP THE BERM ON LEFT ARE CATTLE SALTBU SH SHRUBLAND)**

**Honey Mesquite Shrubland Alliance (*Prosopis glandulosa* Shrubland Alliance (A.1031).** Honey mesquite (facultative upland) trees characterize a small woodland stand at approximate MP 4.13 (figure 23) and large stands at the Mesquite Spring Campground site (located east of the proposed project terminus). Estimated cover for the 10 m to 15 m tall canopy trees along Bonnie Clare Road is 25% for honey mesquite and 5% for California fan palm. Understory tall and short shrubs include mule’s fat, cattle saltbush, and honey mesquite providing 15% to 20% cover. The vine, California wild grape, is distributed throughout the stand and provides approximately 15% cover. Understory herbaceous species include southern cattail (*Typha domingensis*) and chairmaker’s bulrush (*Scirpus americanus*), which provide approximately 15% cover and demarcate the zone of seepage at this site. The nonnative annual forb, Russian-thistle (*Salsola tragus*), occurs along the road edge at this site with sparse cover. Maintenance pruning of the largest honey mesquite tree has occurred to enhance safety and site distance along Bonnie Clare Road. The unvegetated surface has a moderate to high cover of litter and branches and low cover of small to large rocks.

**Baltic Rush Seasonally Flooded Herbaceous Alliance (*Juncus balticus* Seasonally Flooded Herbaceous Alliance) (A.1374).** One patch of Baltic rush (obligate) was observed providing approximately 25% cover; it occurs approximately 39.4 feet (12 m) from the edge of the pavement near Scotty’s Castle. The unvegetated surface has a high cover of litter.

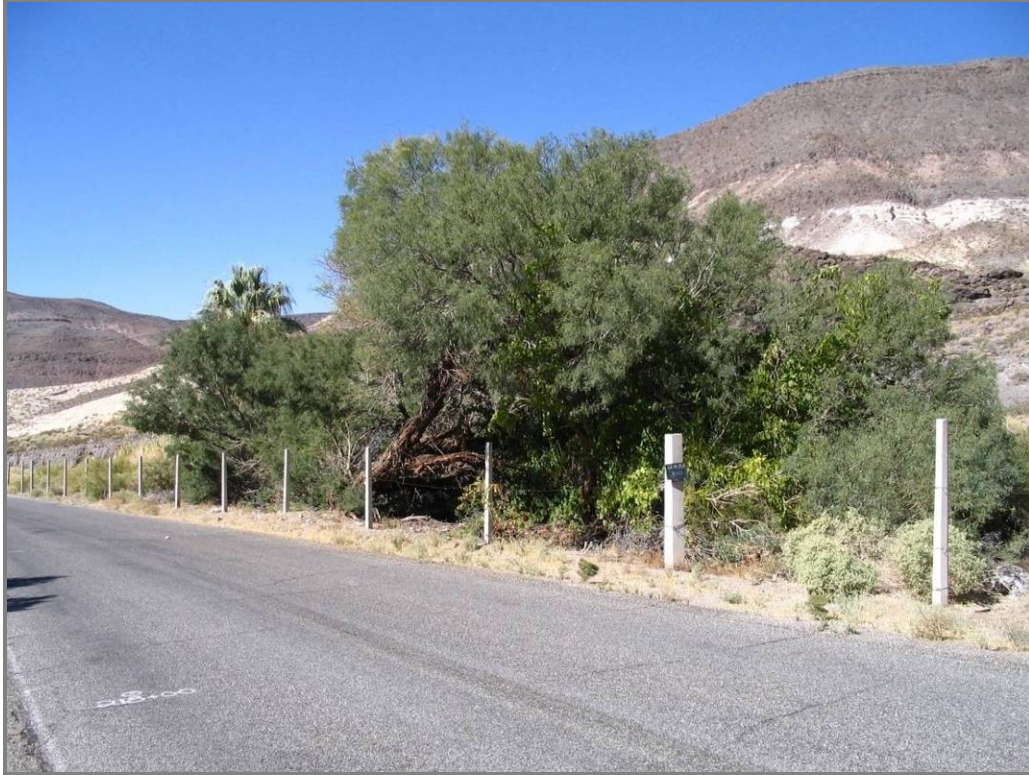


FIGURE 23. REPRESENTATIVE HONEY MESQUITE WOODLAND AND HISTORIC FENCE POSTS (DEVA.9010)

**Common Reed Semipermanently Flooded Herbaceous Alliance (*Phragmites australis* Semipermanently Flooded Herbaceous Alliance) (A.1431).** This vegetation alliance occurs in wetlands and riparian habitats that have become established in small stands or patches at Cottonwood Corner and near the Death Valley Scotty Historic District upper boundary. Common reed (facultative wetland) stands established at the wetland margin or in the shade of overstory trees are up to 3 m tall, and form nearly pure stands or patches providing 15% to 40% cover. Commonly associated tall shrubs that provide low cover include mule's fat, long-leaved brickellbush, and cattle saltbush. The unvegetated surface has a high cover of litter.

**Chairmaker's Bulrush Semipermanently Flooded Herbaceous Alliance (*Schoenoplectus americanus* Semipermanently Flooded Herbaceous Alliance) (A.1432).** Chairmaker's bulrush (obligate) has become established in flowing water from Scotty's Castle updrainage to the spring head (figure 24). Stands and patches are typically less than 1.0 m wide and the plants may exceed 2.0 m in height, sometimes intermixed with southern cattail, overtopped by California wild grapevines, providing 5% to 15% cover, and understory to California fan palm, honey mesquite, or Goodding willow trees. The cover provided is low, up to 10% to 25% cover, because of the narrow and upright stems. This plant community has become established at the toe-of-fill in the stream flowing in front of the Scotty's Castle picnic area. The unvegetated surface has high cover of open water and low cover of litter.





**FIGURE 24. REPRESENTATIVE LINEAR STAND OF CHAIRMAKER'S BULRUSH HERBACEOUS VEGETATION (BAND OF TALL VEGETATION BETWEEN PALM TREES) (DEVA.9014)**

**California Native Grapevine Shrubland (*Vitis californica* Vine Shrubland (Unclassified).** Bonnie Clare Road is proposed to be reconstructed through Grapevine Canyon and the namesake California native grape (facultative wetland) is common in most wetland and riparian habitats, typically vining over understory trees and shrubs to the edge of pavement (figure 25). The grapevines are dense and provide 75% to 100% cover; they are not rooted in the road shoulder and can be pruned to accommodate a wider roadway, if necessary. Associated species include most of the other wetland and riparian species listed above, over which the vines are draped. The unvegetated surface has high cover of small rocks and low to moderate cover of litter.

Wetland soils were evaluated at selected sites near Bonnie Clare Road and were described as moist throughout the exposed column, having high organic content in the upper 1.0 inch (2.54 cm), consisting of mixed sand and gravel below the surface layer, and exhibiting matrix colors ranging from hue/value/chroma of 10YR4/3 to 7.5YR4/3 (e<sup>2</sup>M 2005, USDA-NRCS 2000). Wetland 8 near Scotty's Castle was characterized by a thick layer of leaf litter, in places exceeding 10.0 inches (0.3 m) in depth; the litter layer served to retain moisture and contributed to the high organic content of the top soil layer.

The distances from the delineated wetland margins to the surveyed edge of the proposed Bonnie Clare Road template were as follows: Wetland 1 (0.0 m–1.0 m); Wetland 2 (12.0 m); Wetland 3 (1.0 m); Wetland 4 (14.0 m–27.0 m); Wetland 5 (0.0–1.0 m); Wetland 6 (11.0 m); Wetland 7 (1.0 m–2.0 m); and Wetland 8 (0.0 m–1.0 m) (e<sup>2</sup>M 2005). The riparian woodland near the entrance to Mesquite Spring Campground occurs adjacent to the existing roadway toe-of-fill for



**FIGURE 25. REPRESENTATIVE CALIFORNIA NATIVE GRAPE VINE SHRUBLAND (DEVA.9011)**

150 m; the entire stand is east of the proposed project terminus (Cipra 2011). These wetland locations were plotted onto construction design plans and field verified, resulting in the current alignment to be used for impact evaluation. Riparian plant communities were also digitized and overlain on the construction design plans (Blodgett 2011) to be used for impact evaluation. Although the centerline of the desert wash within Grapevine Canyon and Death Valley Wash are delineated on topographic maps, there is no 100-year floodplain map-based designation by the Federal Emergency Management Agency (CDWR 2010). During the 2010 field investigation, it was stated that flows within the Grapevine Canyon wash overtop Bonnie Clare Road when a sufficiently large precipitation event occurs requiring sediments, gravel, and rocks to be removed from the travel lanes (Holeso, pers. comm., 2010). The wash appears sufficiently large to contain surface flows because no high-water debris lines were observed on either wash bank or adjacent toeslopes.

Where springs emerge from under the existing asphalt pavement of Bonnie Clare Road, wetland plants have become established to the toe-of-fill. Most of the mature trees at Scotty's Castle and at Cottonwood Corner were planted for landscaping of mesic sites during the construction and original occupation of Scotty's Castle. Characteristic riparian and emergent wetland species of the project area include Fremont cottonwood, California fan palm, Goodding willow, shrub willow species, mule's fat, honey mesquite, Baltic rush, common reed, bulrush, southern cattail, and California native grape. The floodplain is characterized by burrobrush, rabbitbrush, creosote bush, cattle saltbush, buckwheat, white bursage, prince's plume, and desert holly. One wash occurs through the length of Grapevine Canyon subject to flash flooding during precipitation events, and



carries flowing water below the spring and seep heads (e.g., Scotty's Castle, Cottonwood Corner, and Mesquite Spring) in the middle portion of the canyon and at Mesquite Spring Campground.

**Floodplains.** Floodplain boundaries were determined from 1:6,000-scale (1inch = 500' or 2.54 cm = 152.4 m) true color aerial photographs acquired by the USDA, National Aerial Imagery Program in 2007, over which the footprint of the project area was overlaid and best professional judgment was used to identify direct impacts to the floodplain. The Grapevine Canyon Wash appears sufficiently large to contain surface flows because no high-water debris lines were observed on either wash bank or adjacent toeslopes during the site visit. The wash varies from less than 50-feet (15.5 m) wide in the upper canyon to over 600-feet (182.9 m) wide in the lower canyon. Up to 5 miles (8 km) of Bonnie Clare Road and 0.1 mile (0.2 km) of Mesquite Spring Campground Road are likely within the 100-year floodplain; although the centerline of the desert washes are delineated on topographic maps, there is no 100-year floodplain map-based designation by the Federal Emergency Management Agency for Grapevine Canyon or Death Valley Wash (CDWR 2010).

Flows through Grapevine Canyon result during precipitation events sufficiently intense to create runoff from Slate Ridge, Bonnie Claire Flat, and Sarcobatus Flat occurring on adjacent BLM-managed land and from the Grapevine Mountain slopes adjacent to Bonnie Clare Road; canyon flows are tributary to Death Valley Wash and ultimately, Salt Creek. Flows within Death Valley Wash updrainage of Mesquite Spring occur primarily from the slopes and alluvial fans of the Last Chance Mountain Range and the north-facing slopes of Slate Ridge. Approximately 4,000 linear feet (1,219 linear meters) of nonwetland riparian vegetation types and wetlands established in proximity to Bonnie Clare and Mesquite Spring Campground roads are within these floodplains.

Currently, when surface flows are sufficiently large they inundate the Bonnie Clare Road surface in the upper canyon and deposit sand and gravel on the road surface, which requires post-event removal by park maintenance crews (Holeso, pers. comm., 2010). Likewise, tributary washes also carry flows across the paved roadway and leave sand and gravel deposits. Rainfall on unstable slopes adjacent to Bonnie Clare Road may result in small landslides across the road and may also loosen boulders that can roll or slide onto the road surface and require park maintenance crew removal. Flood events add new sediments and nutrients to the washes and redistributes and mixes them with existing deposits producing a sand and gravel texture with little organic material; the depth to bedrock of alluvial deposits on floodplains is unknown, although one excavated pit observed in the corridor/floodplain did not expose bedrock at approximately 2 m deep.

Activities included in the proposed action will occur or partially occur within floodplains including vegetation clearing, resurfacing Mesquite Spring Campground Road travel lanes, reconstruction and resurfacing Bonnie Clare Road travel lanes, turnout establishment, drainage improvement, and relocation of electric and telephone lines, poles, and boxes. Bonnie Clare Road was historically constructed entirely on the floodplain bottom in Grapevine Canyon during the 1920s, and in the early 1950s a portion was relocated to the upper floodplain edge (toeslopes of cliffs) to circumvent the historic Albert Johnson property boundary now comprising the Death Valley Scotty Historic District. No flood flow volume would be lost as a result of this project and a portion of the new road may carry flood flows following precipitation events of sufficient intensity to contribute large runoff volumes. Therefore, the risk of this project within the Grapevine Canyon and Death Valley Wash floodplains to visitors is assumed to be minimal. Since there would be no loss of floodplain area in terms of width and depth, this proposed action does not represent a risk to people or property elsewhere in the drainage area.

## Water Quality

The water resources of the region are regulated under the 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, and the California Water Resources Control Board, more specifically, under the Porter-Cologne Water Quality Control Act, as amended (CWRCB 2010). Geographically, water resources of the project area occur within the South Lahontan Hydrologic Region (SLHR 2004). Water quality standards and control measures for surface and ground waters of the Lahontan Region are stated in the Water Quality Control Plan for the Lahontan Region (basin plan). The basin plan designates beneficial uses for water bodies and establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses. State water quality standards also include a nondegradation policy. Water quality control measures include total maximum daily loads, which are often, but not always, adopted as basin plan amendments.

In general, basinwide water levels in wells and discharge from springs have not changed appreciably or recharge has equaled discharge, as is the case near Scotty's Castle (Straininger's Spring) (SLHR 2004). In terms of domestic use, much of the groundwater basinwide is rated marginal to inferior; the principle reasons include elevated levels of fluoride, boron, chloride, sulfate, and/or total dissolved solids. Straininger's and Mesquite springs groundwater is described as sodium bicarbonate in character and is considered suitable for domestic use (SLHR 2004).

Several of the larger Death Valley springs, including those emerging at Scotty's Castle, derive water from a regional aquifer, the Lower Carbonate Aquifer, which extends as far east as southern Nevada and Utah (USGS n.d., Friese, pers. comm., 2010). The Lower Carbonate Aquifer maintains large hydraulic conductivity; it is composed of limestone, dolomite, and calcareous shales of Paleozoic age that underlie many valleys and appear along the flanks of some mountain ranges. The geologic units of the Lower Carbonate Aquifer include all Devonian-, Silurian-, and Ordovician-aged strata, plus the Cambrian Nopah Formation, the Bonanza King Formation, and the upper two-thirds of the Carrara Formation (Laczniak et al. 1996). Sometimes included in the Lower Carbonate Aquifer are Pennsylvanian and Mississippian carbonates (USGS n.d.).

These water-storing carbonates, which have an aggregate thickness of about 26,247 feet (8,000 m), are generally the most permeable rocks of Death Valley. Much of the water in the Lower Carbonate Aquifer has been stored for several thousand years, since the Pleistocene ice ages when the climate was cooler and wetter. The current dry climate and precipitation regime does not provide enough rain and snow to recharge the Lower Carbonate Aquifer at the rate at which water is being withdrawn; however, some recharge from snowmelt does occur. Within the park, all Lower Carbonate Aquifer-fed springs with available water quality data exhibit very stable time-series with no identifiable upward or downward trends or seasonal responses (Friese, pers. comm., 2010). At a local level, there may be minor water quality changes during large precipitation events due to flows emanating from the alluvial gravels.

On-site, the groundwater is collected from the spring, treated, and stored for park and visitor use on the northeastern border of Scotty's Castle. When the storage tanks are full, the water bypasses the tanks to flow through the landscaped area, including along the toeslope of Bonnie Clare Road fill, then flows past Cottonwood Corner. Spring volume near Scotty's Castle is about 250 gallons/minute (946 liters/minute) and at Mesquite Spring is about 0.1 ft<sup>3</sup>/sec (2.8 liters/minute) (Friese, pers. comm., 2010, CDPH 2010). At least two additional springs that emerge under the Bonnie Clare Road asphalt surface at approximate MP 4.0 and at Cottonwood Corner, contribute

flows to the desert wash. Down-drainage of Cottonwood Corner, the spring-fed surface flows dissipate into the substrate or are lost to evaporation. Following precipitation events resulting in surface flows, the desert wash in Grapevine Canyon drains to Death Valley wash near Ubehebe Crater Road updrainage from Mesquite Spring.

Cottonwood Corner is the result of distinct manipulation of the drainage and springs by Albert Johnson during the 1920s (NPS 1999). In establishing the roadway, particular emphasis was placed on enclosing a spring on the southern part of the property (past Cathedral Point) by routing Bonnie Clare Road as far to the east as possible via the curve at Cottonwood Corner. As roadwork around the spring southeast of Cathedral Rock neared completion, road crews found additional water in the road cut and also piped it under the roadway into the Albert Johnson property to claim the water.

Generally, water at Scotty's Castle and Mesquite Spring is hard (high in dissolved solids – 410.0 ppm and 820.0 ppm, respectively); Scotty's Castle springs and Mesquite Spring were also analyzed for arsenic (38.0 ppb and 35.4 ppb, respectively). Water quality data derived from spring water emerging at Scotty's Castle (Mesquite Spring – 2003 data) and providing drinking water include:

- |  |  |
|--|--|
| ▪ a pH of 8.2 [7.9]                                | ▪ sulfate – 86.0 ppm [172 ppm]                                 |
| ▪ corrosivity index of 11.6 [N/A]                  | ▪ fluoride (natural source) of 2.0 ppm [3.5 ppm]               |
| ▪ bicarbonate hardness of 240.0 ppm [353 ppm]      | ▪ nitrate (NO <sub>3</sub> ) of 3.3 ppm [0.3 ppm]              |
| ▪ calcium carbonate hardness of 25.0 ppm [126 ppm] | ▪ calcium at 5.4 ppm [27.1 ppm]                                |
| ▪ sodium - 150.0 ppm [221.0 ppm]                   | ▪ magnesium at 2.7 ppm [14.2 ppm]                              |
| ▪ chloride - 42.0 ppm [82.6 ppm]                   | ▪ specific conductance of 690.0 S/cm [1250.0 S/cm] (CDPH 2010) |
| ▪ zinc - 130.0 ppm [1.0 ppm]                       |  |

Radionuclide levels of Scotty's Castle spring water include gross alpha emitters of 6.1 pCi/L, Radium 226 and 228 of <.051 and <1.59 pCi/L, respectively, and uranium at 6.5 pCi/L (6.3 pCi/L at Mesquite Spring) (CDPH 2010).

Physical and water quality data were acquired and recorded on September 30, 2010, at three macrobenthic invertebrate sample sites (stream, seep, spring head) near Scotty's Castle (HDR/e<sup>2</sup>M 2010). The water volume measured at the actively flowing stream and spring head sites averaged 15 to 20 liters per minute—pH (defined as minus the decimal logarithm of the hydrogen ion activity in a solution) was neutral to slightly basic, measuring 8.06, 7.22, and 7.85 at the stream, seep, and spring head sites, respectively. Corresponding water temperatures at these sites were 23.1°C, 19.9°C, and 26.6°C. Additional water quality parameters measured in the stream, seep, and spring head environments included oxidation/reduction potential and specific conductance, as follows: (1) 83.6 millivolts and 805 S/cm; (2) 99.7 millivolts and 1308 S/cm; and (3) 166.0 millivolts and 742 S/cm (HDR/e<sup>2</sup>M 2010). Dissolved oxygen measured and recorded at the stream, seep, and spring head sites, respectively, ranged from high in flowing water to low in standing water, e.g., 78.3% (6.68 mg/L), 14.1% (1.31 mg/L), and 75.4% (6.04 mg/L). (HDR/e<sup>2</sup>M 2010); Mesquite Spring recorded 8.3 mg/L dissolved oxygen (CDPH 2010).

## AFFECTED ENVIRONMENT

Macrobenthic invertebrate families identified in surface water habitats near Scotty's Castle were compared to the Hilsenhoff Biotic Index to determine general tolerance for organic pollutants causing low dissolved oxygen in water bodies (HDR/e<sup>2</sup>M). On a scale of 0 to 10, the sampled families (scores were averaged at each site by the families present) were assessed from 5.3 to 7.0 or from good to fairly poor in terms of tolerance to organic pollutants / low dissolved oxygen levels. The fairly poor tolerance level was associated with the spring head site (two macrobenthic invertebrate families) where groundwater emerges and the good tolerance level was associated with the pooled water of the seep site (four macrobenthic invertebrate families). The stream site supported nine macrobenthic invertebrate families and was assessed at the 6.5 tolerance value (fair water quality).

## Archeological Resources

A report in compliance with section 106 of the National Historic Preservation Act and its implementing regulation (36 CFR 800) was submitted to the California SHPO on January 23, 2012, and the Advisory Council on Historic Preservation on January 24, 2012. The report established the APE for the project and assessed the effects of the project on historic properties within the APE (figures 26 and 27) (see appendix D). The report determined that the Grapevine Canyon Archeological District is within the APE for the portion of the project along Bonnie Clare Road, and four unevaluated sites along Mesquite Spring Campground Road are within the APE for that portion of the project. There are no archeological sites within the APE for the portion of the project at Grapevine Ranger Station parking lot (Carmany-George 2012b).

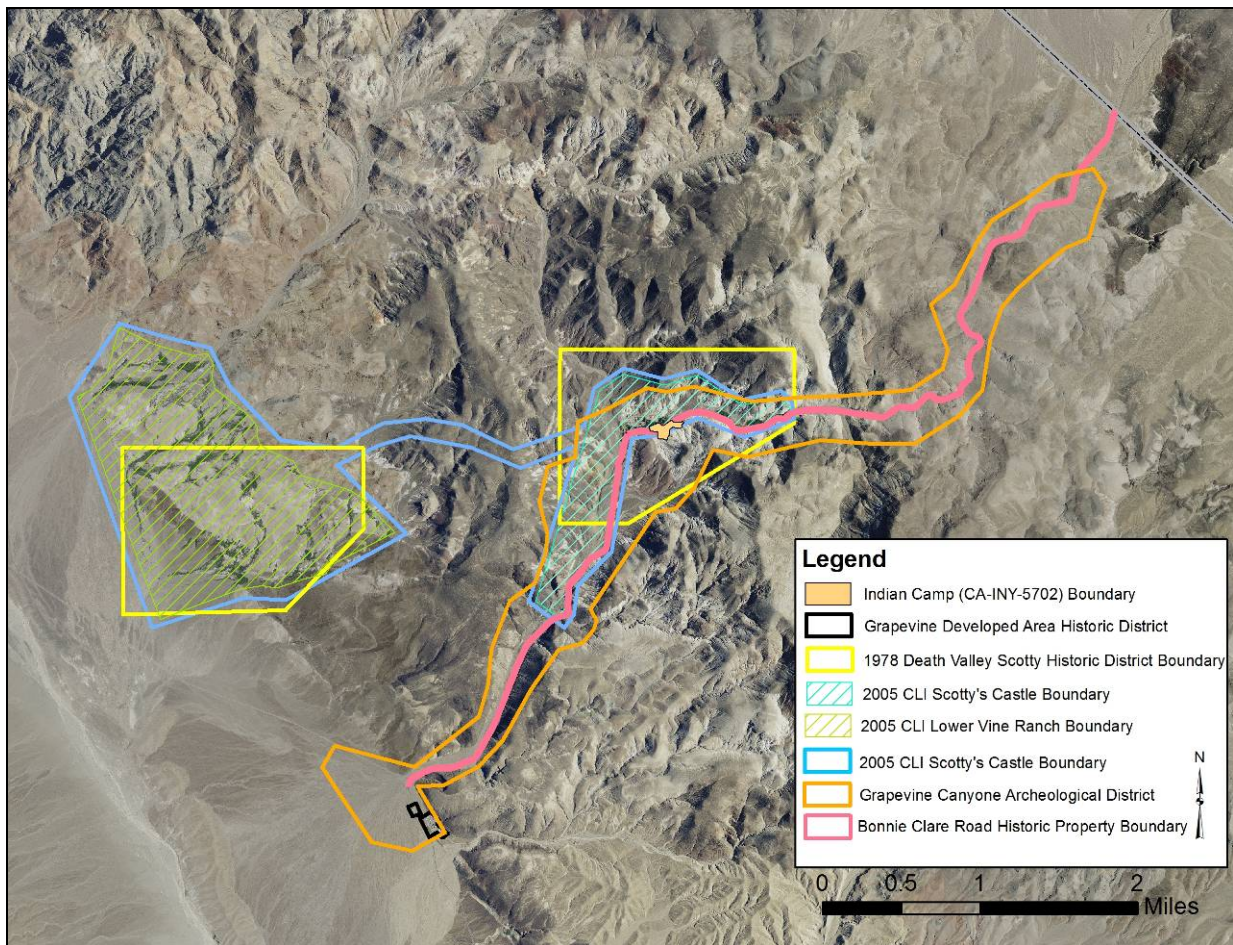
**Grapevine Canyon Archeological District.** Archeological surveys have been conducted within Grapevine Canyon since 1952. Since that time several investigations have taken place and dozens of sites and isolates have been recorded. In 2012, the park determined that the archeological resources within the canyon comprise the Grapevine Canyon Archeological District extending the length and width of the canyon (Carmany-George 2012a).

There are 46 recorded individual archeological sites within Grapevine Canyon Archeological District—44 contributing archeological sites and 2 noncontributing sites—and 19 archeological isolates—17 contributing and 2 noncontributing. The district also includes natural features like the canyon walls and springs, that are important to the Timbisha Shoshone Tribe. The district is determined eligible for listing in the national register on a local level under criterion A for its association with the American Indian ethnic heritage and transportation. The district is also eligible on a local level under criterion D for the precontact and historic archeological information it has regarding American Indian economics, industry, and social history. The period of significance for Grapevine Canyon Archeological District spans from 3000 BC to the 1930s. Based on the ethnographic importance of the canyon's natural landscape and cultural resources, the district boundary incorporates the entire canyon including the canyon walls and the sites on the alluvial fan at the west end of the canyon (Carmany-George 2012a).

The Grapevine Canyon Archeological District is bisected by Bonnie Clare Road, and there are 12 contributing archeological features and one noncontributing feature of the district (table 3) as well as natural features (e.g., canyon walls and springs) within or adjacent to the APE for direct effects for the project (Carmany-George 2012b).

Site CA-INY-5702, or Indian Camp, is a component of Death Valley Scotty Historic District and is discussed along with the other components of that cultural landscape that could potentially be impacted by the preferred alternative.

**Archeological Sites Along Mesquite Spring Campground Road.** The area adjacent to Mesquite Spring Campground Road was initially surveyed in 1993 and additional investigations were conducted in 2009 and 2010. As a result of these investigations, 12 archeological sites were recorded near Mesquite Spring Campground Road. In May and October 2011 in support of the proposed project, park archeologists performed additional investigations adjacent and parallel to both sides of Mesquite Spring Campground Road using pedestrian transects. As a result of this investigation, four sites and four isolated occurrences were documented within 33 feet (10 m) of the centerline of the road placing them within or adjacent to the APE for direct effects for the project (table 4). Archeological isolates are generally not considered eligible for the national register (Bergstresser 2009) and are not examined further.



**FIGURE 26. MAP DISPLAYING HISTORIC PROPERTY BOUNDARIES WITHIN GRAPEVINE CANYON**



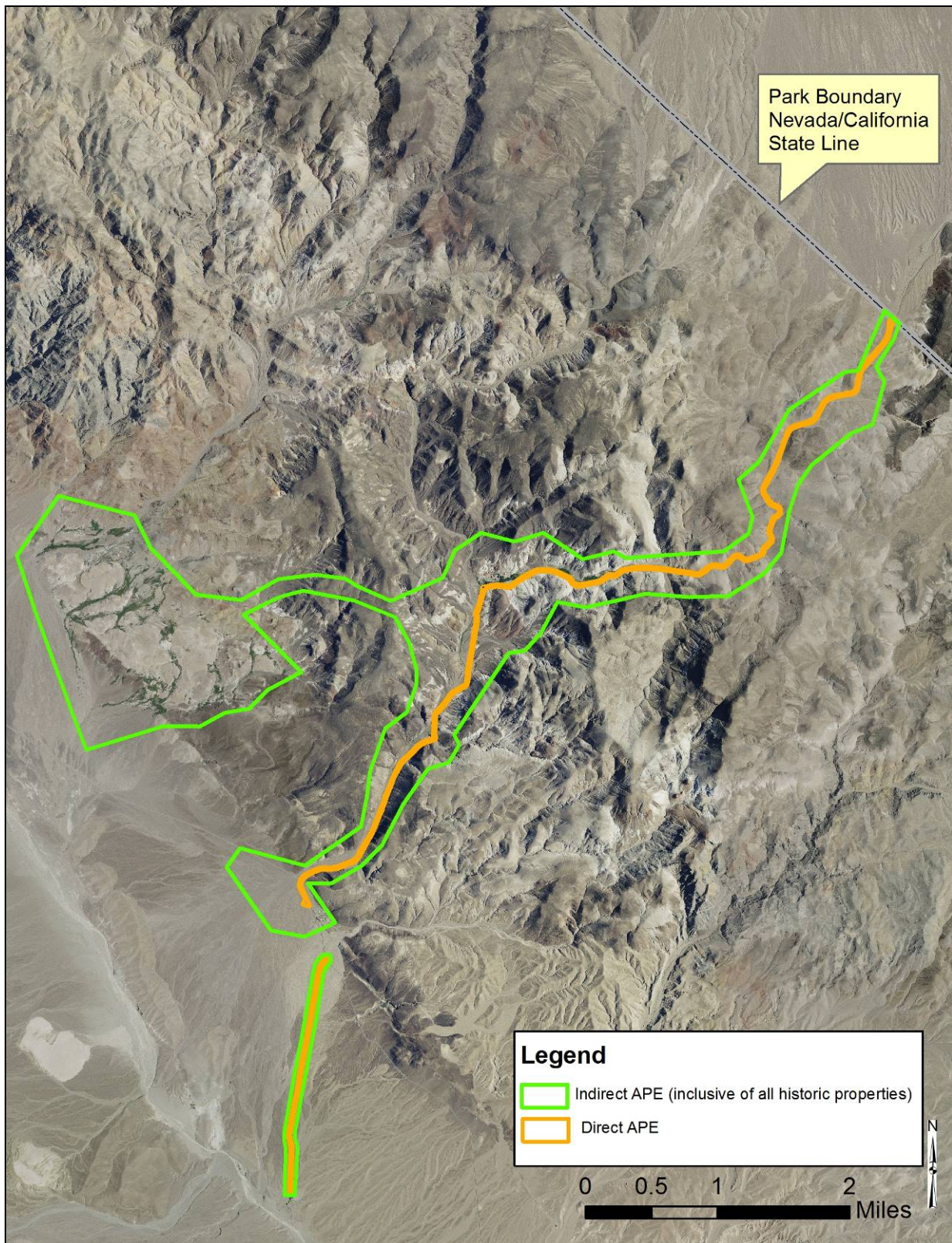


FIGURE 27. MAP DISPLAYING DIRECT AND INDIRECT APE FOR PROPOSED PROJECT

TABLE 3. CONTRIBUTING FEATURES OF GVCAD WITHIN OR ADJACENT TO THE APE FOR DIRECT EFFECTS

State Number	Description	Artifacts and Features	Age*
DEVA 2003-04	Rockshelter	rock cairns, hunting blind, rock wall, lithic debitage	P
CA-INY-07551	Lithic scatter and rock alignment	lithic debitage (10), hunting camp with rock circle and pecked stone	P
CA-INY-03069	Petroglyph and pictograph	glyphs on two boulders	P
IO 69	Cairn with historic can	rock cairn with historic can in it	Unknown
CA-INY-02873	Rockshelter	lithic scatter (5), burned wood and charcoal, FCR; blue glass hexagonal bead; Nonhistoric trash (glass)	M
CA-INY-02875	Lithic scatter and collapsed cairn and historic dump	lithic scatter (175+) with 3 ceramics; Historic dump with metal cans, glass, wooden box screen, collapsed cairn, milled wood, charcoal	M
CA-INY-02872	Rockshelter	2 Possible and 1 possible rockshelter at the site; lithic scatter (35) and bone fragment, oval storage pit, basket-making materials; historic scatters of glass, ceramics, metal, milled lumber, "V" metal fencing	M
DEVA 2003-06	Rockshelter	lithic debitage (~320) and 5 ceramics; historic dump with metal, ceramic and glass	M
CA-INY-02881	Hunting blind		Unknown
CA-INY-07552*	Historic dump	historic spice cans, turnkey sardine cans, hole in top mild cans, metal barrel loop, bale of wire, asbestos, glass, concrete, terra cotta tile	H
CA-INY-07553	Lithic scatter	lithic debitage (~500)	P
CA-INY-04850H	Bedrock milling, lithic scatter and historic scatter	lithic debitage (7), 4 rock cairns, 1 rock circle, 2 portable metates, boulder metates, trail segment, lithic quarry; Historic ceramics, road segment	M
Natural Features	Canyon walls, rock faces, springs	none	

\*P=Precontact; H=Historic; M=Multicomponent (Precontact and Historic); Unknown=no date assigned

\*Site is a noncontributing feature of the Grapevine Canyon Archeological District.

TABLE 4. ARCHEOLOGICAL SITES IN APE FOR MESQUITE SPRING CAMPGROUND ROAD

State Number	Description	Artifacts and Features	Age
CA-INY-4851H	Historic Road Segment	One, two-track road segment	H—20th C
CA-INY-4822	Rock Circle	Rock circle with 1 lithic flake, historic isolate	M
CA-INY-4734H	Historic Road Segments	Two segments of road, trash can lid, rectangular can; lithic scatter	M
CA-INY-4852H	Trash Scatter	Mason jar lids, clear glass fragments, cans	H—20th C

These sites have not been evaluated for NRHP eligibility and will be treated as eligible until they have been tested (McCuistion 2011).

### Cultural Landscapes

Cultural landscapes can fall within the APE for direct or indirect effects for a project. A report in compliance with section 106 of the National Historic Preservation Act and the implementing regulation (36 CFR 800) was submitted to the California SHPO on January 23, 2012, and the Advisory Council on Historic Preservation on January 24, 2012. The report established the APE for the project and assessed the effects of the project on historic properties within the APE (see appendix D). The report determined that the Bonnie Clare Road Historic Property and Death Valley Scotty Historic District are within the APE for the portion of the project along Bonnie Clare Road. There are no cultural landscapes at Grapevine Ranger Station or along Mesquite Spring Campground Road (Carmany-George 2012b).

**Bonnie Clare Road Historic Property.** A draft cultural landscape inventory for Bonnie Clare Road, including the historic context for the road and statement of significance (NPS 2011d), was submitted to the California SHPO on July 1, 2011. The document sought SHPO concurrence with the NPS finding that Bonnie Clare Road is eligible for the national register at the local level under criteria A and C, for its association with the NPS Mission 66 road planning and road design program between 1947 and 1951. The SHPO's office has informally concurred via e-mail and will follow up with a formal concurrence via letter.

The draft cultural landscape inventory for the road identified several character-defining features associated with the Bonnie Clare Road Historic Property (NPS 2011d). The following is a list of those defining features:

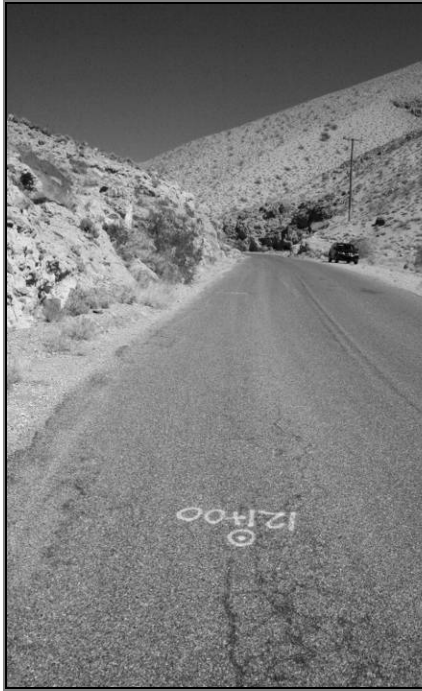
- Natural systems and features that influenced the road alignment and provide for its distinct setting:
  - Geomorphology of the canyon
  - Vegetation and the springs
- Spatial organization features of the road including:
  - Alignment
    - tight curves in the upper canyon
    - straight sections (figure 28)



- curves that follow the canyon slopes as the road passes through Death Valley Scotty Historic District
  - bend at the historic entrance to Death Valley Scotty Historic District /Scotty's Castle
  - alignment between Cottonwood Corner and Death Valley Scotty Historic District / Scotty's Castle
  - S-curve at Cottonwood Corner
- Road's undulating grade between Cottonwood Corner and Death Valley Scotty Historic District / Scotty's Castle
- 20–22 feet width of the road, the soft shoulders and turnouts
- Relationship of the road to the historic fenceline at Death Valley Scotty Historic District / Scotty's Castle
- Topographic features of the road are:
  - 7% or less grade
  - Cross section with a 30-foot-wide bench, ¼ inch to 1-foot crown, 10-foot-wide paved travel lanes, 3-foot-wide soft shoulders, and 2-foot-wide unpaved ditches at cut slopes
  - Vertical rock cuts
  - Fill that was used on the approaches to Death Valley Scotty Historic District /Scotty's Castle
- Views and vistas of the road including those of:
  - Chimes Tower and the Scotty's Castle entrance gate when traveling from Cottonwood Corner
  - Panoramic view of Tin Mountain when driving out of Grapevine Canyon into Death Valley (figure 29)
  - Cottonwood Corner and Cathedral Rock when traveling between Death Valley Scotty Historic District /Scotty's Castle and the valley (figure 30)

**Death Valley Scotty Historic District.** The area referred to as Scotty's Castle within Death Valley Scotty Historic District is the only development along Bonnie Clare Road and extends for approximately 2.6 miles along the north and west sides of Bonnie Clare Road. The historic district was listed in the national register in 1978 and includes cultural landscape resources. A cultural landscape inventory of the historic district was completed in 2005 (NPS 2005) and the California SHPO concurred with the findings of the inventory on September 28, 2005 (with the exception of changing the period of significance). The historic district is listed in the national register under criteria B and C on a regional level for its significance in 20th century architecture, folklore, and social history, and on a local level for its significance in archeology, art, and invention. The property's period of significance is 1922 to 1931. This specific area includes 300 acres of land and structures associated with the Death Valley Ranch on Bonnie Clare Road.

The remaining portion of Death Valley Scotty Historic District includes the access road and additional 1,200 acres and features at Lower Vine Ranch northwest of Scotty's Castle. The Lower Vine Ranch and the access road between Scotty's Castle and the Lower Vine Range are well outside the APE for indirect visual effects for the proposed project but, as part of the historic district, they are included in the APE.



○  
**FIGURE 28. BONNIE CLARE ROAD AT MILEPOST 2.5, FACING NORTHEAST**



**FIGURE 29. BONNIE CLARE ROAD AT MILEPOST 7.2, FACING WEST**



**FIGURE 30. BONNIE CLARE ROAD AT MILEPOST 5.0, FACING NORTH**

The cultural landscape inventory (NPS 2005) included descriptions for 21 historic structures at Scotty's Castle currently listed in the national register and identified 9 additional historic structures that are eligible for listing as part of the district, including the entrance road and roads throughout the complex, historic rock walls, and the watercourse. The fence that surrounds the historic district is a contributing feature and forms the boundary defining the district (NPS 1978). Structures within the boundary of the historic district include the house and annex, chimes tower, guest house, powerhouse and pavilion, gas house, cookhouse, motel/garage, swimming pool, Scotty's Cabin, stable, entrance gates, solar heater, gravel separator, wishing well, fencelines, Scotty's grave, powder storage, spring access road, tile courtyard between the castle and annex, walkways at the cook house and guest house, driveway at the motel/garage, watercourses, retaining walls, entrance road and building complex access roads, and watercourse north of Bonnie Clare Road.

The majority of the structures at Scotty's Castle are outside the APE for direct effects for the project. Contributing features to Scotty's Castle within the APE for direct effects that would potentially be impacted include the historic fenceline (MP 3.5 to 6.0), Indian Camp archeological site (MP 4.4), the entrance road and gate (MP 4.6) and the stream north of the road, and Cottonwood Corner (MP 5.9).

**Description of Historic Fence.** The historic fence that forms the boundary of the property is a unique structure. A survey of the 574 fence posts adjacent to Bonnie Clare Road was conducted in April 2011 and the condition of fence posts documented as "fair" from this survey were rechecked in January 2012 by park and region staff. The survey was limited to the approximate 2.6 miles of historic fence that parallel Bonnie Clare Road and did not include the remaining 3.14 miles of fence around Scotty's Castle or the approximate 6.0 miles of fence around Lower Vine Ranch.

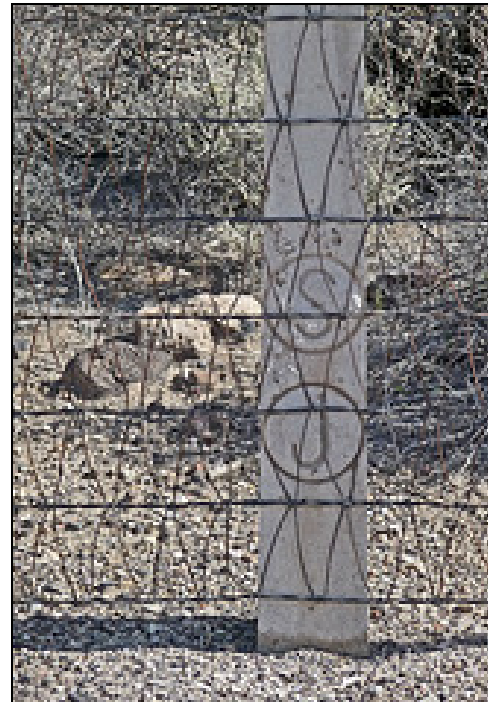
The fence along Bonnie Clare Road was constructed between 1928 and 1930. In 1929, Johnson decided to move the public road (Bonnie Clare Road) from the center of his property to the south and east edges of his property and install the fence along the edge of the road in order to clearly delineate his property boundary (NPS n.p.).

There were five types of fence posts recorded along the 2.6-mile stretch of Bonnie Clare Road.

1. The majority of the posts were either 8- or 11-foot tall concrete posts that are flat on one side and rounded on the other (figure 31). These posts are 5-inches wide at the base and 4-inches wide at the top with an S and J with a circle around each letter and stamped on the flat side (figure 32), which faces Bonnie Clare Road.
2. The second type of fence post is an 8-foot tall concrete post with a wood post attached to extend the height of the post to 11 feet.
3. The third type of fence post is a square concrete corner post measuring 7 inches by 7 inches.
4. The fourth type of post is a concrete corner post with a shelf to support a horizontal cross-beam.
5. The fifth fence post type along Bonnie Clare Road is a rounded wooden fence post. These are found near Indian Camp and appear to have been in place since at least 1927.



**FIGURE 31. SECTION OF CONTRIBUTING FENCE  
ALONG BONNIE CLARE ROAD**



**FIGURE 32. S AND J MARKING ON HISTORIC  
FENCE POST (NOTE THE V-PATTERN  
LATTICE METAL FENCING)**

Along the majority of the fenceline the metal wire consists of five strands of barbed wire attached to the flat side of the posts by a smooth piece of wire wrapped around the round portion of the fence posts. There are four sections of woven-wire lattice type V-pattern metal fencing. This type of fence was used immediately south of Scotty's Castle, at Indian Camp, and in two areas west of the spring house gate (NPS n.p.).

Portions of the historic fence that are adjacent to Bonnie Clare Road may have been previously affected by road construction activities between 1947 and 1951. The portion of the fence at Cottonwood Corner was likely removed in 1971 when the road was widened in that location (NPS n.p.). Other portions have been damaged by road maintenance and removal of gravel swept onto the road by precipitation events, boulders loosened from adjacent slopes, and by automobile accidents (Holeso, DEVA maintenance, pers. comm., October 18, 2010). Some posts have been lost to flash flooding in the canyon while other fence posts have deteriorated from age and weathering, which has caused them to crack and spall from freeze-thaw events (NPS n.p.).

The fence survey concluded that approximately half of the 83-year-old fence posts are in good condition while the other half are in fair to poor condition (e.g., cracked, broken, spalling, etc.) and that most of the barbed wire along the fence is loose, broken, or missing. Even though the fence has deteriorated with age and weathering, it continues to retain its integrity of feeling, association, design, materials, workmanship, setting, and location as a contributing feature to Scotty's Castle, and continues to visually delineate the historic district's boundary along Bonnie Clare Road (NPS n.p.). Eight-five percent of the fence posts along the historic fenceline that parallels the road (39% of the approximate 5.74 miles of fenceline circling the Scotty's Castle area) are within the clear

recovery zone (7 feet from the edge of the travel land) of the proposed realignment of Bonnie Clare Road.

**Description of Indian Camp.** Indian Camp (site CA-INY-5702H) was listed in the national register nomination form as a contributing feature of Death Valley Scotty Historic District, but was not recorded as an archeological site until the late 1990s by Brewer et al. (2000). The site, which is bisected by Bonnie Clare Road, is a multicomponent precontact American Indian lithic scatter and historic American Indian habitation site. The site is approximately 32,063 square meters.

This site may be the location of the late precontact/ethnohistoric village of Mahunu (Johnson 2006). Later, the site was the place where American Indian laborers, mostly local Timbisha Shoshone hired by Albert Johnson to work on Scotty's Castle, lived with their families from 1922 to 1931. The camp was closed when Johnson's personal fortunes took a downturn with the Great Depression and construction on the facility was discontinued. When Death Valley National Monument was established in 1933, the land where the camp was located came under NPS jurisdiction and the people relocated to find work. Indian Camp has also been identified as an ethnographic resource of importance to the Timbisha Shoshone Tribe (Johnson 2006).

Limited excavations have been conducted at Indian Camp. There were four loci of activity identified within the site, each of which had historic artifacts and a limited number of precontact artifacts. Based on the findings from the limited excavation, it was determined that there are several intact deposits that have the potential to yield information about the cultural continuity of the area (Pearson 2003).

Indian Camp has been previously impacted by widening and paving Bonnie Clare Road (1951), the "cleanup" of the area in the 1970s by the National Park Service, which included bulldozing and burning camp remains, grading the area on the north side of the road for a parking lot, and vegetation removal on the north side of the road (Johnson 2006). The small-scale archeological excavations at Indian Camp resulted in the determination that surface artifact density does not directly correlate to subsurface density and is not a good indicator of the probability for intact or partially intact subsurface features (Pearson 2003).

**Description of Historic Entrance.** Construction on Scotty's Castle entrance gate, designed by Charles MacNeilledge in the Spanish style, began in 1928. The entrance road and entrance gate dam were built in 1930 by American Indian laborers; the gate having two crenellated towers, each two stories high (figure 33). Large wooden gates are attached to the towers using hand-wrought iron fittings. In 1930, an extensive amount of grading occurred near the entrance and fill was added to raise the roadbed at the entrance gate. A small lake was excavated to hold water from the spring that was channeled through two watercourses north of Bonnie Clare Road toward the entrance. On the west side of the gate, a dam was built to contain the water, and the dike (which was actually the entrance road prism) served to channel water under the bridging entrance gate (NPS 2005). Immediately east of the entrance road and gate is a tree- and grapevine-lined, spring-fed water course/stream that parallels the road and flows toward the gate.

The 2005 cultural landscape inventory for Scotty's Castle reported that the entrance gate and entry road still convey a sense of arrival and a transition between public and private space. The gate has been closed to the public, but it and the entrance road still retain integrity as entrance features to Scotty's Castle, as an "impressive approach" (NPS 2005). Although vegetation has encroached and changed the historic dimension of the stream channel, it continues to flow under the entry, and contribute to the historic character of the district.



FIGURE 33. REAR VIEW OF THE ENTRANCE GATE AT SCOTTY'S CASTLE

**Description of Cottonwood Corner.** Cottonwood Corner (figure 34) was created by Johnson in 1931 by constructing an S-curve in Bonnie Clare Road that acted as an earthen dam to direct the water from a nearby spring onto his property. Johnson and his construction supervisor, Roy Thompson, designed Cottonwood Corner to be a pleasing, green approach to Scotty's Castle from the south and the S-curve became an important part of the approach to Scotty's Castle (NPS 2005).

In accordance with the Timbisha Homeland Act of 2000, the park and the Timbisha coordinate efforts for the preservation of natural and cultural resources within some areas of the park. Cottonwood Corner has been identified by the Timbisha Shoshone as a spring site that should be managed in a traditional manner. The park staff and the Timbisha work together to manage the wetland and spring area (Bonstead 2010). The 2005 cultural landscape inventory conducted by the park documented that the "greenery at the entrance gate and Cottonwood Corner closely resembles historic conditions and original design intent," however, it notes that the dam at Cottonwood Corner has eroded away (NPS 2005).

### Historic Structures/Districts

Historic structures/districts can fall within the APE for direct or indirect effects for a project. A report in compliance with section 106 of the National Historic Preservation Act and the implementing regulation (36 CFR 800) was submitted to the California SHPO on January 23, 2012, and the Advisory Council on Historic Preservation on January 24, 2012. The report established the APE for the project and assessed the effects of the project on historic properties within the APE. The report determined that the Grapevine Developed Area Historic District is within the APE for the portion of the project at Grapevine Ranger Station. The report also determined that outside of



the Bonnie Clare Road Historic District and the Death Valley Scotty Historic District, which are discussed under the cultural landscapes section, there are no other historic structures or districts with the APE along Bonnie Clare Road and that there are none within the APE for Mesquite Spring Campground Road (Carmany-George 2012b).



**FIGURE 34. COTTONWOOD CORNER FACING NORTH  
ALONG BONNIE CLARE ROAD**

**Grapevine Developed Area Historic District.** The Grapevine Developed Area Historic District, including the ranger station building, parking lots, landscaping, four-unit apartment building, utility building, and road in the maintenance area, were constructed between 1964 and 1965 at the end of the Mission 66 capital improvement program. The park has recently determined that the area is eligible for the national register on a local level under criterion A for its association with the Mission 66 program as the only intact example in the park representing Mission 66 development with both visitor and park support services. The area is also eligible under criterion C on a local level because it embodies distinct Mission 66 planning and architectural characteristics and are a representation of modern park planning and infrastructure in the park. There are three contributing buildings (four-unit apartment, utility building, and ranger station) and one contributing structure (road in the

maintenance area) within the district. The district also contains the following noncontributing structures: entrance station, RV parking area, seven-bay storage shelter, and Bonnie Clare Road within the district (NPS 2011c).

The Grapevine Ranger Station, semicircular parking lot and median, curbing around the parking lot and median, landscaping, ranger station sign, and water spigot are within or adjacent to the project area. The remaining contributing features of the Grapevine Developed Area Historic District are visually obscured from the project by topography and vegetation. The APE for indirect effects encompasses the entire district.

The Grapevine Ranger Station building, concrete sidewalk, asphalt parking lot, concrete curbing and median were constructed ca. 1965. The ranger station is a modern design with a horizontal look and flat roof and is of pinkish-brown concrete. The design and color allow the building to blend in with its desert environment, which was a Mission 66 design tenant. The parking lot is currently asphalt and the sidewalk, curbs, and gutters are concrete (NPS 2011c). There is a limited amount of desert vegetation adjacent to the parking lot, parking lot median, and sidewalks.



## Visitor Use and Experience

Bonnie Clare Road is a Functional Class I, Principal Park Road. It provides primary access through the northeast section of Death Valley National Park, including the Grapevine residential area, Ubehebe Crater, and Scotty's Castle. The road connects to Nevada SR 95 at Scotty's Junction, Nevada, via Nevada SR 267. Bonnie Clare Road is used by visitors traveling to and from Tonopah and Beatty, Nevada, and offers an alternate access route to attractions to the south (including Furnace Creek).

The current road condition is poor—the existing pavement is in marginal condition and pavement edges are deteriorating. The road width is typically 20 feet to 22 feet, with sections as narrow as 17 feet, making these sections insufficient for the volume and type of traffic (motorcycles, passenger vehicles, vans and small buses, large buses, and self-contained or towed RVs). Commercial vehicles are not permitted on this road except by waiver. Sight distances are fair to poor in places with sharp curves and rock or vegetation close to the roadway, reducing the quality of the visitor experience. There are minimal turnouts or parking areas along the roadway to allow slower moving traffic to turnout of the traffic lane or for visitors to stop and view the scenery.

Visitor services and attractions in the project area include Scotty's Castle (visitor center, museum, and guided living history tours), Grapevine Ranger Station (telephone), Mesquite Spring (campground with water and flush toilets), and Ubehebe Crater. There are no formal hiking trails accessed from this segment of Bonnie Clare Road.

Under the 1995 Park Road Systems Evaluation, 290 AADT were determined for Bonnie Clare Road, and when adjusted using a 3% growth rate, resulted in estimates of AADT for 2006 of 401 vehicles, and in 2026 of 724 vehicles (FHWA 2005). This area of the park receives little visitation when compared to the park as a whole. The 2010 park visitation (through September) was 850,078, while the Grapevine area visitation figures during the same time period was 22,618, or 2.7% of the total (NPS Stats, September 2010; these numbers are compiled from traffic counters).

Scotty's Castle is the principal attraction at the north end of the park. Interpretation staff at Scotty's Castle stated that approximately 50,000 to 60,000 people tour Scotty's Castle every year. Visitation at this site is highly seasonal with July through August averaging 50 visitors a day. The busy season is mid-October through the end of April. During the busy season, visitation is approximately 600 people per day and parking lots are at capacity at these times (A. Snow, pers. comm., 2010). Scotty's Castle is staffed by 22 park interpreters (9 permanent and 13 seasonal), most of whom live at Cow Creek.

Mesquite Spring Campground is a fee campground at the end of Mesquite Spring Campground Road and near Grapevine Ranger Station. It contains 30 sites for up to eight people each with tables and fire pits. The campsites do accommodate RVs. The campground also has water, flush toilets and a pump station. The campground is busiest from October to April during cooler weather.

## Health and Safety

Bonnie Clare Road experiences relatively low vehicle use in terms of AADT; it is used by visitors traveling from Tonopah and Beatty, Nevada, primarily to access Scotty's Castle, Mesquite Spring Campground, and Ubehebe Crater. Accidents are uncommon along this road segment. Of the 10

recorded accidents between 1999 and 2007, two occurred at the intersection of Ubehebe Crater Road and Bonnie Clare Road, and three occurred in the Scotty's Castle parking area or near the entrance (FHWA 2005 and NPS 2010c). Historic fence posts are emplaced along the historic district boundary at the road edge. Some have been struck by vehicles and others likely were struck by road maintenance equipment.

The current road condition has the potential to put visitors at risk for accidents. Narrow travel lanes, tight turns, inadequate turnouts, a deteriorating road surface, periodic flooding, rock walls and vegetation near the road surface, and fallen rock all contribute to unsafe conditions. Larger vehicles are forced to drive over the centerlines or off the pavement, particularly when passing another large vehicle due to the narrow travel lanes. As vehicles move from the gravel shoulder back onto the paved roadway, gravel is pulled onto the road creating a hazard for vehicles, especially motorcycles. Sight distances are fair to poor in places with sharp curves and rock or vegetation close to the roadway. There are minimal turnouts or parking areas along the roadway to allow slower-moving traffic to turnout of the line of traffic or for visitors to stop and view the scenery. Drainage control issues exist for portions of the roadway, resulting in periodic flooding and maintenance issues. This road segment winds through Grapevine Canyon and many visitors tend to drive too fast for conditions. The most alarming condition of this section of roadway is at Cottonwood Corner where the road slumps.

There have been accidents at or near the entrance to Scotty's Castle. Visibility is limited here and visitors are sometimes confused by the access point to this attraction. The entrance to the parking lot is narrow and difficult to maneuver for larger vehicles causing traffic slowdowns to turn into the historic gated entrance. The proposed action would include paving approach aprons and the parking area at Scotty's Castle, helping to reduce potential accidents.

Widening Bonnie Clare Road to obtain a consistent paved width is needed to accommodate current traffic volumes and to provide safe passage through Grapevine Canyon for passenger vehicles, vans and small buses, large buses, and self-contained or towed RVs. Installation of additional turnouts in Grapevine Canyon and other locations along this road segment would be needed to prevent traffic hazards and accidents.

The National Park Service has an ambulance and fire truck that are alternatively stationed at Grapevine or Scotty's Castle, depending on staffing. Statistically, when park staff respond to an accident, it is likely it would be southbound from Scotty's Castle. Most NPS emergency responders, ambulances, and emergency gear are housed in the central part of the park.



## **ENVIRONMENTAL CONSEQUENCES**

### **INTRODUCTION**

This section describes the potential environmental consequences associated with the no-action and preferred alternatives. The methodologies and assumptions for assessing environmental consequences are discussed, including consideration of context, intensity, and duration of impacts; cumulative impacts; and measures to mitigate impacts. Subsequent sections under the “Environmental Consequences” section are organized by impact topic, first for the no-action alternative, and then for the NPS preferred alternative.

The National Park Service evaluates all potential impacts by considering the direct, indirect, and cumulative effects of the proposed action on the environment, along with connected and cumulative actions. Impacts are described in terms of context and duration. The context or extent of the impact is described as localized or parkwide. The duration of impacts is described as short term (during construction or up to one year following initiation of construction), or long term (generally after construction and extending up to five years or longer). However, the long-term impact would last more than one year and could be permanent in nature, such as the loss of soil due to the construction of a new facility. Although an impact may only occur for a short duration at one time, if it occurs regularly over a longer period of time the impact may be considered to be a long-term impact. For example, the noise from a vehicle driving on a road would be heard for a short time and intermittently, but because vehicles would be driving the same road throughout the 15-year life of the plan, the impact on the natural soundscape would be considered to be long term.

The intensity and type of impact is described as negligible, minor, moderate, or major, and as beneficial or adverse. The identification of “major” effects would trigger the need for an environmental impact statement. Where the intensity of an impact could be described quantitatively, the numerical data are presented; however, most impact analyses are qualitative and use best professional judgment in making the assessment.

### **METHODOLOGY**

Overall, the National Park Service based these impact analyses and conclusions on the review of existing literature and park studies, information provided by experts at the park and other agencies, professional judgments, and park staff insights.

### **CONTEXT, DURATION AND INTENSITY, AND TYPE OF IMPACT**

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

### **Context**

Context is the setting within which an impact is analyzed such as local, parkwide, or regional. The Council on Environmental Quality requires that impact analyses include discussions of context. For this environmental assessment, local impacts would occur within the general vicinity of the roadway, while parkwide impacts would affect a greater portion of the park; regional impacts would extend outside the boundary of the park.

### **Duration**

The duration of an impact is the time period for which the impacts are evident and are expressed in the short term or in the long term. A short-term impact would be temporary in duration and would be associated with roadway improvements, as well as the period of site restoration. Depending on the resource, impacts may last as long as construction takes place, or a single year or growing season, or longer. Impact duration for each resource is unique to that resource. Impact duration for each resource is presented in association with impact intensities in the following “Methodologies” section.

### **Intensity**

Impact intensity is the degree to which a resource would be beneficially or adversely affected. The criteria used to rate the intensity of the impacts for each resource topic are presented later in this section under each topic heading.

### **Type of Impact**

Impacts can be beneficial or adverse. Beneficial impacts would improve resource conditions, while adverse impacts would deplete or negatively alter resources.

## **IMPACT INTENSITY THRESHOLDS**

### **Geology and Soils**

All available information on geologic exposures and soils of the road corridors to potentially receive impacts was compiled from agency databases, previous studies, and current site review. Predictions concerning short- and long-term site impacts were based on previous projects in desert environments with similar exposures and soils/fill materials. The thresholds of change for the intensity of an impact to geologic exposures and soils are defined as follows:

Impact Intensity	Intensity Definition
Negligible	Geologic exposures, processes, and soils development would not be affected or the effects would be below or at the lower levels of detection based on standard scientific methodologies for geologic features and processes and soil formation. Any effects to geologic exposures and soils would be slight.
Minor	The effects to geologic exposures, processes, and soils development would be detectable upon monitoring for loss or change of features or shallow developed soils and would be small and localized with minimal loss of contextual information. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.
Moderate	The effect on geologic exposures, processes, and soils development would be apparent and result in a change over a relatively wide area. Upon monitoring, some geologic features and contextual information would be lost and disruption to key geologic processes would be short term. Mitigation measures would be necessary to offset adverse effects and would likely be successful.
Major	The effect on geologic exposures, processes, and soils development would be readily apparent and substantially change the character of the geology and soils over a large area. Upon monitoring, many geologic features and contextual information would be lost and disruption to key geologic processes would be permanent. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

Geologic exposures that are altered due to construction cannot be recovered and the effect is long term. Soil impacts would be considered short term if the soils recover in less than three years and long term if the recovery takes longer than three years.

## Biological Resources

All available information on biological resources potentially impacted in the park was compiled from biological staff, previous site-specific studies, and current site reviews. Predictions about short- and long-term site impacts were based on previous projects and recent studies. The thresholds of change for the intensity of an impact to biological resources are defined as follows:

Impact Intensity	Intensity Definition
Negligible	An action that could affect biological resources or degraded sites, but the change would be so small that it would not be of any measurable or perceptible consequence. Mitigation is rarely required.
Minor	An action that could affect biological resources or degraded sites, but the change would be slight and localized, with few measurable consequences. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.
Moderate	An action that would result in readily apparent changes to affect biological resources with measurable consequences. Mitigation would be needed to offset adverse effects, would be somewhat complex to implement, and its success would require monitoring and management prescriptions.

Impact Intensity	Intensity Definition
Major	A severely adverse or exceptionally beneficial effect to biological resources would result. Mitigation measures to offset adverse effects would be needed, extensive, and success could not be guaranteed; monitoring would be required to inform management direction.

Biotic community impacts would be considered short term if the community recovers in less than one year (one growing season), and long term if the recovery requires longer than one year.

## Vegetation

All available information on vegetation and plant communities potentially impacted along Bonnie Clare Road was compiled from previous NPS studies, reports, and current site review. Where possible, map locations of sensitive vegetation species, populations, and communities were identified. Predictions about short- and long-term site impacts were based on previous projects with similar vegetation and recent studies. The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Intensity Definition
Negligible	No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species population size, integrity, or continuity. The effects would be on a small scale.
Minor	The alternative would affect some individual native plants and would also affect a relatively limited portion of the plant community, but the viability of the plant community would not be affected and would recover naturally. Mitigation to offset adverse effects could be required and would be effective.
Moderate	The alternative would affect some individual native plants and would also cause a localized change in the plant community (e.g., abundance, distribution, quantity, or quality) possibly over a relatively large area. Mitigation to offset adverse effects could be extensive, but would likely be successful.
Major	The alternative would have a considerable permanent and noticeable effect on native plant populations, the plant community, and affect a relatively large area of the park. Mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed.

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

## Wildlife

The National Park Service Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected



and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities. According to NPS *Management Policies 2006*, the restoration of native species is a high priority (sec. 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals. Information on Death Valley National Park wildlife was acquired from park documents, records, site-specific studies, and current site review. Park natural resource management staff also provided wildlife information. The thresholds of change for the intensity of an impact to wildlife are defined as follows:

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

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

## **Special Status Species**

It is the policy of the National Park Service to manage critical habitat of sensitive species and to perpetuate the natural distribution and abundance of these species and the ecosystems on which they depend. The U.S. Fish and Wildlife Service (USFWS) was contacted for a list of special status species and designated critical habitats that may be within the proposed project area or affected by any of the alternatives. Information on possible species of special concern was gathered from published sources. Information from prior research at Death Valley National Park was incorporated; known impacts caused by development and human use were also considered. The thresholds of change for the intensity of an impact are defined as follows:

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

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

## Wetlands, Nonwetland Riparian Vegetation, and Floodplains

The National Park Service has adopted the policy of preserving wetland and floodplain values and minimizing potentially hazardous conditions associated with flooding. Wetlands and floodplain protection legislation and NPS procedural manuals considered and consulted for impact analyses included Executive Orders 11990, “Protection of Wetlands” and 11988, “Flood Plain Management,” and NPS Director’s Order Numbers: 77-1: *Wetland Protection* (2008), 77-2: *Floodplain Management* (2003), and 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (2006). This guidance was used to: (1) avoid wetlands impacts to the extent practicable, (2) describe effects to wetland values, (3) provide effective mitigation measures, and (4) ensure no net loss of wetland functions and values. Wetlands are lands that are transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, or (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year (Cowardin et al. 1979). The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Intensity Definition
Negligible	Wetlands would not be affected or the effects to the resource would be below or at the lower levels of detection. There would be no change in the ability of a floodplain to convey floodwaters or its values and functions. Short- and long-term effects to wetlands or floodplains would not occur and any detectable effects would be slight.
Minor	The effects to wetlands or floodplains would be detectable and relatively small in terms of area and the nature of the change; however, the wetland processes, functions, and integrity would remain unaffected.
Moderate	Impacts to wetlands would be readily apparent and temporary to the wetland's defining attributes. In addition, the wetland processes, function, and integrity would be temporarily affected, including a long-term effect on wetland vegetation.
Major	Effects to wetlands or floodplains would be observable over a relatively large area, would be long term. The character of the wetland or floodplain would be changed and the dynamics upset so that the functions typically provided by the wetland or floodplain would be permanently altered.

The effects to wetlands are considered short term if the wetland recovers in less than three years. Impacts would be long term if the wetland takes more than three years to recover.

## Water Quality

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

Other considerations in assessing the magnitude of water quality impacts include the effect on biotic species dependent on a certain quality or condition of water. Sensitive aquatic organisms, submerged aquatic vegetation, riparian areas, and wetlands are affected by changes in water quality from direct and indirect sources. In order to assess the magnitude of water quality impacts to park waters under the two alternatives, state water quality standards governing the waters of the park were examined and compared to baseline water quality data; a current benthic macroinvertebrate study was performed. Given the above water quality issues, methodology, and assumptions, the following impact thresholds were established in order to describe the relative changes in water quality:

Impact Intensity	Intensity Definition
Negligible	Chemical or physical changes to water quality would not be detectable, would continue to conform to state water quality standards or criteria, and would be within historical water quality conditions.

Impact Intensity	Intensity Definition
Minor	Chemical or physical changes to water quality would be detectable, but would be well within state water quality standards or criteria and within historical water quality conditions.
Moderate	Chemical or physical changes to water quality would be detectable, but would be at or below state water quality standards or criteria. Water quality would be altered on a short-term basis and/or localized compared to historical baseline water quality conditions.
Major	Chemical or physical changes to water quality would be detectable and would be frequently altered from the historical baseline water quality conditions; and/or chemical, physical, or biological water quality standards or criteria would be regional, localized to sitewide, and exceeded on a short- and long-term basis.

The effects to water quality are considered short term if, following road construction, the recovery would take less than one year. Impacts would be long term if, following road construction, the water quality requires more than one year to recover.

## Cultural Resources / Section 106 of the National Historic Preservation Act

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and reflect the determinations made in compliance with section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation regulations implementing section 106 of the NHPA (36 CFR 800, *Protection of Historic Properties*), impacts to cultural resources were identified and evaluated by: (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the national register; (3) applying the criteria of adverse effect to affected NRHP-eligible or -listed cultural resources; and (4) considering ways to avoid, minimize, or mitigate adverse effects. Appendix D includes a description and illustrations of the area of potential effect for the proposed project.

A separate section 106 compliance document was submitted to the California SHPO and the Timbisha Shoshone Tribe, requesting concurrence with the APE, the determination of properties within the APE, and the assessment of effects to the properties by the proposed project. The document was submitted on January 23, 2012, and to the Advisory Council on Historic Preservation on January 24, 2012.

Under Advisory Council on Historic Preservation regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected NRHP-listed or -eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects of the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A

determination of *no adverse effect* means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the national register.

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

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

## **Archeological Resources**

The National Historic Preservation Act and National Environmental Policy Act require consideration of impacts on archeological resources listed in or eligible for listing in the national register. Archeological resources have the potential to contain important information about the way humans lived in the past. If an archeological resource has yielded or is likely to yield information important to our understanding of past lifeways, it is eligible for listing in the national register at a local, regional, or national level of significance. For the purposes of analyzing impacts to archeological resources, the thresholds for the intensity of an impact are based on the potential for a site(s) to yield information important to our understanding of the past lifeways of humans. The thresholds for the intensity of an impact are defined as follows:

<b>Impact Intensity</b>	<b>Intensity Definition</b>
<b>Negligible</b>	Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for section 106 would be no effect.
<b>Minor</b>	Adverse: alteration of a pattern(s) or feature(s) would not diminish the overall integrity of the resource. The determination of effect for section 106 would be no adverse effect.
<b>Moderate</b>	Adverse: alteration of a pattern(s) or feature(s) would diminish the overall integrity of the resource, but does not diminish the integrity of the resource to the point of being ineligible. The determination of effect for section 106 would be <i>adverse effect</i> .
<b>Major</b>	Adverse: alteration of a pattern(s) or feature(s) would greatly diminish or destroy the overall integrity of the resource to the extent that it is no longer eligible for listing in the national register. The determination of effect for section 106 would be <i>adverse effect</i> .



## Cultural Landscapes

In order for a cultural landscape to be listed in the national register, it must be associated with an important historic context, i.e., possess significance (the meaning or value ascribed to the property). The cultural landscape also has integrity of the features necessary to convey its significance, i.e., location, design, setting, workmanship, materials, feeling, and association (see *National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation*). For purposes of analyzing potential impacts to cultural landscapes, the thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Intensity Definition
Negligible	Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for section 106 would be no effect.
Minor	Adverse: alteration of a feature would not diminish the overall integrity or character-defining features of a NRHP-eligible or listed historic property but does not diminish the integrity of the resource to the point of being ineligible. The determination of effect for section 106 would be <i>no adverse effect</i> .
Moderate	Adverse: impacts to an NRHP-eligible or listed structure would change the character-defining features of the resource, but does not diminish the integrity of the resource to the point of being ineligible. The determination of effect for section 106 would be <i>adverse effect</i> .
Major	Adverse: impacts to an NRHP-eligible or listed structure would change character-defining features of a resource, diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the national register. The determination of effect for section 106 would be <i>adverse effect</i> .

## Historic Structures/Districts

In order for a structure to be listed in the national register, it must be associated with an important historic context, i.e., possess significance (the meaning or value ascribed to the property). The structure must also have integrity of the features necessary to convey its significance, i.e., location, design, setting, workmanship, materials, feeling, and association (see *National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation*). For purposes of analyzing potential impacts to historic structures, the thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Intensity Definition
Negligible	Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for section 106 would be no effect.
Minor	Adverse: result in little, if any, loss of integrity or character-defining features of a NRHP-eligible or listed building, structure, or district. The determination of effect for section 106 would be <i>no adverse effect</i> .

Impact Intensity	Intensity Definition
Moderate	Adverse: impacts to an NRHP-eligible or listed structure would change the character-defining features of the resource, but does not diminish the integrity of the resource to the point of being ineligible. The determination of effect for section 106 would be <i>adverse effect</i> .
Major	Adverse: impacts to an NRHP-eligible or listed structure would change character-defining features of a resource, diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the national register. The determination of effect for section 106 would be <i>adverse effect</i> .

## Visitor Use and Experience

National Park Service *Management Policies 2006* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate, high-quality opportunities for people to enjoy the parks.

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

Public scoping input and observation of visitation patterns, combined with an assessment of what is available to visitors under current management, were used to estimate the effects of the actions in the various alternatives of this document. The impact on the ability of the visitor to experience a full range of Death Valley National Park resources was analyzed by examining resources and objectives presented in the park significance statement. The potential for change in visitor use and experience proposed by the alternatives was evaluated by identifying projected increases or decreases in use of Bonnie Clare Road, and other visitor uses, and determining how these projected changes would affect the desired visitor experience, and to what degree and for how long. The thresholds of change for the intensity of an impact to visitor use and experience are defined as follows:

Impact Intensity	Intensity Definition
Negligible	The visitor would not be affected or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use and/or experience would be detectable, although the changes would be slight. Some of the visitors would be aware of the effects associated with the alternative, but the effects would be slight and not noticeable by most visitors.
Moderate	Changes in visitor use and/or experience would be readily apparent to most visitors. Visitors would be aware of the effects associated with the alternative and might express an opinion about the changes.

Impact Intensity	Intensity Definition
Major	Changes in visitor use and/or experience would be readily apparent to all visitors, severely adverse or exceptionally beneficial. Visitors would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

Impacts to visitor use and experience are considered short term if the effects last only as long as the construction period. Impacts are considered long term if the effects last longer than the construction period.

## Health and Safety

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

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

The effects to safety are considered short term if the effects last for the period of construction and long term if the effects last beyond the period of construction.

**Direct Versus Indirect.** The following definitions of direct and indirect impacts are considered:

*Direct*—an effect that is caused by an action and occurs at the same time and in the same place.

*Indirect*—an effect that is caused by an action that is later in time or farther removed in distance, but is still reasonably foreseeable.

**Cumulative Effects.** Council on Environmental Quality regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects.

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

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

**Projects that Make Up the Cumulative Impact Scenario.** To determine potential cumulative impacts, projects within the Grapevine Canyon area and surrounding park were identified. Potential projects identified as cumulative actions included any planning or development activity that was completed, that is currently being implemented, or that would be implemented in the reasonably foreseeable future.

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

A number of other projects ongoing in the park were discussed relative to cumulative impacts. These projects are listed below.

- Air Tour Management Plan – (planning process has been initiated, future plan)
- Scotty’s Castle Waterline Replacement – (environmental assessment and FONSI completed, project in progress)
- Rehabilitation of Road Segment Ubehebe – 7-mile segment (completed)
- Rehabilitation of Road Segment – 33 miles of Bonnie Clare Road (completed)

## **Impairment of National Park Service Values**

The Organic Act and the General Authorities Act prohibit impacts that would result in impairment to park resources or values. 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. An impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park
- identified as a goal in the park general management plan or other relevant NPS planning documents (NPS 2006)

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The issue of impairment is considered throughout the NEPA process. The superintendent's determination of no impairment will be rendered following completion of public review and agency consultation, and provided as an attachment to the decision document.

## ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE A: NO ACTION

### Geology and Soils

Under the no-action alternative there would be no reconstruction of Bonnie Clare Road through Grapevine Canyon or resurfacing of Mesquite Spring Campground Road; the existing road surfaces would be repaired, as necessary, for the safety of staff and visitors, occasional slide and rockfall materials would be removed from the roadway, and soils would be eroded and washed across the road during intense rainfall events. The adjacent volcanic and limestone rock formations would remain unaltered except for occasional rockfall or small slides. The soils that have developed in recent times on hills and slopes, alluvium used historically for roadbed fill material, or alluvium deposited into the desert wash would remain subject to erosion and redistribution during intense precipitation events and to compaction by park vehicles and maintenance equipment and vehicles driving and parking off the asphalt surface. Both the geologic exposures and soils would be managed under the general management plan; therefore, there would be long-term negligible to minor adverse impacts to geologic exposures and soils in Grapevine Canyon and soils in Death Valley Wash under the no-action alternative.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect geologic exposures and soils include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term, negligible impacts on geologic exposures and soils.

The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible impacts on geologic exposures and soils.

**Conclusion.** There would be long-term negligible to minor adverse impacts to the geologic exposures and soils of Bonnie Clare Road shoulder slopes and soils of Mesquite Spring Campground Road, and long-term negligible impacts to alluvium of the active desert wash under the no-action alternative. The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts to soils.

### Vegetation

Vegetation types occurring within Grapevine Canyon habitats adjacent to Bonnie Clare Road and Death Valley Wash habitats adjacent to Mesquite Spring Campground Road include sparse creosote bush, shadscale, and rabbitbrush communities on slopes and rock outcrops; cattle saltbush and burrobrush communities in the desert washes and on the fill of road shoulders; and

riparian and emergent wetlands of springs, seeps, and streams. The upland vegetation impacts are discussed in this section and the riparian and emergent wetland impacts are discussed under the “Wetlands, Nonwetland Riparian Vegetation, and Floodplains” section.

Under the no-action alternative, there would be no reconstruction of Bonnie Clare Road or resurfacing of Mesquite Spring Campground Road, maintenance would be performed on a scheduled or as-needed basis (removal of rockfall or sediments from the travel lanes to the road shoulders and patching deteriorated asphalt as needed). The vegetation that has become established on the adjacent rock outcrops, slopes, road shoulder fill, alluvial deposits, and desert washes would remain intact and would be managed under the general management plan provisions for native and nonnative plant species; therefore, there would be no change, resulting in short- and long-term direct and indirect negligible impacts to vegetation near the roadway under the no-action alternative due to maintenance activities, nonnative species control, soil compaction, and vehicle accidents extending beyond the road surface.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect vegetation include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road) and the completion of the waterline replacement at Scotty’s Castle. Improvements associated with each of these projects would have short-term negligible impacts on vegetation.

The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible impacts on vegetation.

**Conclusion.** There would be short- and long-term direct and indirect negligible impacts to upland vegetation along Bonnie Clare Road and Mesquite Spring Campground Road under the no-action alternative. The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts to upland vegetation.

## **Wildlife**

Wildlife habitat types occurring along the existing Bonnie Clare Road corridor proposed for reconstruction under this project includes upland desert scrub communities of rock outcrops, hills and slopes, and desert washes (Mesquite Spring Campground Road traverses desert wash and riparian habitats); roadside berms, cobbles, and boulders; and riparian and emergent wetlands. Uplands predominantly support creosote bush, shadscale, and burrobush sparse shrublands, and riparian wetlands are characterized by woodland, shrubland, and emergent wetland vegetation with diverse structure and high cover. Each habitat may be used exclusively by wildlife species, or more typically, a variety of habitats are used by individual species within each species’ home range. For example, open water and emergent wetlands provide habitat for species of macrobenthic invertebrates exclusively, but avian and mammal species may use both these habitats (breeding, foraging, escape cover, etc.) and adjacent upland habitats (foraging, escape cover, migration, etc.).

Adjacent to the existing asphalt road surface, the shoulder area commonly supports ant hills (ants are used as forage by some reptiles and birds); cobbles and boulders provide basking sites for reptiles; and the berms support burrowing small mammals. The burrows are also used by reptiles. Human and vehicle presence is moderate during the months of October through April of each year,



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possibly causing avoidance of adjacent habitats by more sensitive wildlife species, e.g., desert bighorn sheep, bats, etc.

Under the no-action alternative there would be no reconstruction of Bonnie Clare Road or resurfacing of Mesquite Spring Campground Road. The wildlife habitat that has become established within the corridor would remain intact and subject to planned or emergency roadway maintenance under the general management plan provisions for wildlife species. Therefore, there would be no change, resulting in short- and long-term direct and indirect negligible to minor adverse impacts to wildlife species near the road due to human presence and vehicle traffic (would result in collisions and/or killing of wildlife). Wetland and riparian communities established within the corridor would lose some wildlife habitat value if vegetation was pruned from the road shoulder, resulting in direct short- and long-term negligible to minor adverse impacts to diverse and structured wildlife habitat.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible impacts on wildlife.

The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible impacts on wildlife.

**Conclusion.** There would be short- and long-term direct and indirect negligible to minor adverse impacts to wildlife species and habitats of the Bonnie Clare Road and Mesquite Spring Campground Road corridors under the no-action alternative. The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts to wildlife habitat.

## Special Status Species

Special status wildlife species potentially occurring within Grapevine Canyon and at Mesquite Spring would predominantly use riparian and wetland habitats in the vicinity of Scotty's Castle, Mesquite Spring, and adjacent to both roads. Woodlands of Fremont cottonwood and thickets of California native grapevines and associated rocks could provide habitat for the Panamint alligator lizard. The southwest willow flycatcher and least Bell's vireo could use the structured riparian and wetland vegetation stands near Scotty's Castle and Mesquite Spring for resting, breeding, and nesting activities; status of both species in the corridor is undetermined. Five avian species of special concern for the park (horned lark, loggerhead shrike, long-eared owl, yellow warbler, and yellow-breasted chat) were observed in riparian and desert scrub habitats within the corridor. Five plants of the annual littleleaf rockcress, a California 4.3 (limited distribution) species, were observed on a volcanic rock outcrop at MP 3.6.

At Scotty's Castle and Mesquite Spring, including the picnic areas, human presence is high during the fall through spring months of October through April of each year. Avoidance of these habitats by more sensitive and mobile wildlife species occurs, including special status species, resulting in short- and long-term indirect negligible impacts to mobile special status species.

Under the no-action alternative, there would be no reconstruction/resurfacing project for Bonnie Clare and Mesquite Spring Campground roads and scheduled or emergency maintenance activities would occur. The potential special status aquatic, wetland, riparian, and upland habitats and species that have become established on or otherwise use these sites would remain intact and subject to disease and age, toppling by wind-throw, flash flooding, and would be managed under the general management plan provisions for special status species. Therefore, there would be no change, resulting in short- and long-term direct and indirect negligible impacts to special status species within Grapevine Canyon and at Mesquite Spring due to human presence and recreational land use during the fall through spring seasons.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect special status species include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible impacts on special status species.

The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible impacts on special status species.

**Conclusion.** There would be long-term direct and indirect negligible impacts to special status species and habitats of the Scotty's Castle and Mesquite Spring areas and Grapevine Canyon under the no-action alternative. The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts to special status species.

### **Wetlands, Nonwetland Riparian Vegetation, and Floodplains**

Under the no action alternative, Bonnie Clare Road would be maintained by asphalt patching when necessary, removing traffic hazards (rocks, gravel, sediments, etc.) as necessary following runoff events, and by repairing the road surface over springheads as necessary to allow safe roadway travel. Approximately 4,000 linear feet (1,219 linear m) of nonwetland riparian vegetation types and wetlands have become established in proximity to Bonnie Clare and Mesquite Spring Campground roads within the Grapevine Canyon and Death Valley Wash floodplains.

The eight delineated wetlands described and mapped by e<sup>2</sup>M (2005) and field-verified by the National Park Service (2011) occur near the road fill slope and adjacent spring-fed stream from near Scotty's Castle to Cottonwood Corner. Nearly all nonwetland riparian vegetation has established along the road fill slope and wash channel and connects the eight wetland sites along Bonnie Clare Road corridor on the right side of the road; a honey mesquite tree occurs on the left road shoulder at Cottonwood Corner. Nonwetland riparian vegetation also occurs at the terminus of the Mesquite Spring Campground Road, established to the toe-of-fill. The floodplain of Grapevine Canyon extends the length of the Bonnie Clare Road segment to be reconstructed, while the Mesquite Spring Campground Road is on the alluvial fan draining to Death Valley Wash; neither floodplain would receive additional impacts from roadway use and maintenance.

Under the no-action alternative, there would be no reconstruction of Bonnie Clare Road or resurfacing of Mesquite Spring Campground Road or construction within wetland communities,

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nonwetland riparian vegetation, or in the Grapevine Canyon and Death Valley Wash floodplains. There would be no change to the extant wetland and nonwetland riparian vegetation stands established along the roadways; grapevines growing onto the road surface and selected tree limbs and branches and grapevines would be pruned to provide sight distance and eliminate safety hazards. Road maintenance activities including clearing sand and gravel, rock and boulder removal, and asphalt patching would occur as necessary to provide for safe travel of road users. Existing wetlands, nonwetland riparian vegetation, and the floodplains would be managed under the provisions of the general management plan.

**Wetlands.** The eight mapped wetland sites occur within an approximately 2.5-mile reach (approximately 1.0 mile up-drainage of Scotty's Castle and approximately 1.5 miles down-drainage of Scotty's Castle). For safety reasons, it may be necessary to prune the willow shrub encroaching the roadway at MP 4.0 and the Fremont cottonwood trunk overarching the roadway at MP 5.8 (Cottonwood Corner), resulting in short- and long-term direct negligible impacts to wildlife habitat weighed against the negligible to minor beneficial impact for the safety of the traveling public. Asphalt patching would be required at both spring head sites as necessary to maintain the road surface integrity resulting in short- and long-term direct negligible impacts to less than 50 ft<sup>2</sup> of wetland vegetation established on the road shoulder adjacent to the asphalt surface.

**Nonwetland Riparian Vegetation.** Riparian communities that are not classified as wetlands because they do not meet all three criteria of hydrophytic vegetation, hydric soils, and wetland hydrology established by the U.S. Army Corps of Engineers (1987) have become established at the edge of the floodplains and adjacent to roadway fill slopes. California native grapevines grow to or near the edge of the pavement on approximately 2,900 feet (884 m) of road shoulder; other riparian and emergent wetland communities established in the drainage paralleling Bonnie Clare Road include mule's fat shrubs (approximately 1,150 feet [351 m]), Goodding willow woodlands and shrublands (approximately 975 feet [297 m]), mixed Fremont cottonwood and California fan palm woodlands (approximately 675 feet [206 m]), honey mesquite shrubland (approximately 250 feet [76 m]), common reed herbaceous vegetation (approximately 250 feet [76 m]), and Baltic rush (approximately 125 feet [38 m]). At the terminus of Mesquite Spring Campground Road, approximately 150 feet (46 m) of Fremont cottonwood and honey mesquite woodland occurs near the toe-of-fill. In general, the vegetation that has become established would remain intact, be subject to planned and emergency maintenance activities including pruning the grapevines from the road shoulder, and would be managed under the general management plan provisions for native and nonnative plant species; therefore, there would be no change, resulting in short- and long-term direct and indirect negligible to minor adverse impacts to nonwetland riparian vegetation of the road shoulder toe-of-fill under the no-action alternative.

**Floodplains.** Currently, when surface flows are sufficiently large they inundate the Bonnie Clare Road surface in the upper canyon and deposit sand and gravel on the road surface, which requires post-event removal by park maintenance crews (Holeso, pers. comm., 2010). Likewise, tributary washes also carry flows across the paved roadway and leave sand and gravel deposits. Rainfall on unstable slopes adjacent to Bonnie Clare Road may result in small landslides across the road and may also loosen boulders that can roll or slide onto the road surface and require park maintenance crew removal. Flood events add new sediments and nutrients to the washes and redistributes and mixes them with existing deposits producing a sand and gravel texture with little organic material; the depth to bedrock of alluvial deposits on floodplains is unknown.

The Grapevine Canyon floodplain would receive and transport runoff and sediments from precipitation events onto the road surface causing road maintenance in the form of blading

sediments from the road surface to the shoulder, bank, and berm, resulting in short- and long-term direct negligible to minor adverse impacts to desert wash vegetation on the road shoulder and adjacent to the toe-of-fill. Sediments transported in runoff from Grapevine Canyon would be deposited in Death Valley Wash resulting in no change to the ability of this floodplain to carry flows and move sediment loads. Blading sediment from the road following flood events typically occurs using methods that rapidly/conveniently reopen the road; these methods may not address future flood events which may affect the natural hydrologic/sedimentologic regime by pushing sediment upslope or blocking tributary channels resulting in short- and long-term direct negligible to minor adverse impacts to the natural hydrology and sediment deposition regimes.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect wetlands and floodplains include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle (approximately 0.2 acre of nonwetland riparian habitat), and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible to minor impacts on nonwetland riparian vegetation and floodplains.

The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible to minor impacts on wetlands, nonwetland riparian vegetation, and floodplains.

**Conclusion.** There would be short- and long-term direct negligible to minor adverse impacts to wetland, nonwetland riparian vegetation, and the natural hydrology and sediment deposition regimes of the floodplains under the no-action alternative. The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts.

## **Water Quality**

Under the no-action alternative, there would be no reconstruction/resurfacing of Bonnie Clare Road and Mesquite Spring Campground Road through Grapevine Canyon and Death Valley Wash, and the existing road surface over spring and seep areas would be repaired, as necessary, for the safety of staff and visitors. Springs under the road create the need for road repairs (repeated applications of asphalt) and the spring orifices would continue to be packed with asphaltic material, which may degrade water quality, resulting in short- and long-term minor adverse impacts to water quality at these locations. The flow volume and water quality would remain unaltered and reflect discharge rates and water quality parameters from the regional aquifer. Surface flows adjacent to the road toe-of-fill would remain subject to the erosion of sediments and contaminants deposited on the road by vehicles during precipitation events resulting in runoff. Water quality would be managed under the general management plan; therefore, there would be no change, resulting in short- and long-term negligible to minor and adverse impacts to the water quality of receiving waters adjacent to Bonnie Clare and Mesquite Spring Campground roads under the no-action alternative.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect water quality include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the Air Tour Management Plan. Improvements

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associated with each of these projects would have short- and long-term negligible impacts on water quality.

The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible impacts on water quality.

**Conclusion.** There would be short- and long-term negligible to minor and adverse impacts to water quality in the Bonnie Clare and Mesquite Spring Campground road corridors under the no-action alternative. The no-action alternative would contribute short- and long-term negligible impacts to cumulative impacts to water quality.

### Archeological Resources

Under the no-action alternative, there would be no road construction; however, the two roads and the Grapevine Ranger Station parking lot and sidewalks would continue to be maintained. Archeological resources that would potentially be impacted by this alternative include the Grapevine Canyon Archeological District, specifically the 12 contributing and one noncontributing archeological resources adjacent to or bisected by Bonnie Clare Road, and the four archeological sites adjacent to Mesquite Spring Campground Road. There are no archeological resources that would be impacted by this alternative in the Grapevine Ranger Station parking lot APE.

**Grapevine Canyon Archeological District.** The majority of the project area along Bonnie Clare Road from the California/Nevada state line west to the Ubehebe Crater Road intersection is within the boundaries of the Grapevine Canyon Archeological District. Typically archeological resources are affected directly by construction-related activities and are not adversely affected by noise or visual intrusions.

There are 13 archeological resources within the Grapevine Canyon Archeological District adjacent to Bonnie Clare Road. This includes 11 contributing and 1 noncontributing archeological sites and the natural features of the canyon that contribute to the district, e.g., the canyon walls, rock formations, and springs. One of the archeological sites within Grapevine Canyon Archeological District is bisected by Bonnie Clare Road and there is one that is within 2 m of the edge of the existing roadway; however, there are no recorded artifacts or features immediately adjacent to the road in either location. Indirect impacts to these archeological sites include continued use of the road that would continue to erode the edge of the pavement. In addition, road maintenance would continue under this alternative.

Under the no-action alternative, there would be no construction activities; however, ongoing use and maintenance would result in short- and long-term, negligible indirect impacts to the archeological resources along Bonnie Clare Road.

**Archeological Sites Along Mesquite Spring Campground Road.** There are three archeological sites recorded adjacent to and one site bisected by Mesquite Spring Campground Road; however, there are no artifacts or features from sites CA-INY-4851, -4822, and -4852 within the areas previously disturbed by road construction activities. A feature of site CA-INY-4734, a segment of two-track road, is immediately adjacent and adjoining the campground road. Indirect impacts to

these archeological sites include continued use of the road that would continue to erode the edge of the pavement. In addition, road maintenance would continue under this alternative.

Under the no-action alternative, there would be no construction activities; however, ongoing use and maintenance would result in short- and long-term, negligible indirect impacts to the archeological resources along Mesquite Spring Campground Road.

**Cumulative Impacts.** The completed rehabilitation of Ubehebe Crater Road and 33 miles of Bonnie Clare Road outside Grapevine Canyon and the proposed Scotty's Castle Waterline Replacement and Air Tour Management Plan would have short- and long-term negligible to minor adverse impacts to archeological resources. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would be short- and long-term negligible impacts on archeological resources.

**Conclusion.** Under the no-action alternative, there would be short- and long-term negligible indirect impacts to Grapevine Canyon Archeological District and to archeological resources along Mesquite Spring Campground Road. The no-action alternative would contribute a short- and long-term negligible cumulative impact.

**Section 106.** Under 36 CFR 800, *Protection of Historic Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance or ability to provide information) of its location, design, setting, materials, workmanship, feeling, or association.

Under the no-action alternative, there would be no section 106 undertaking. Routine maintenance and repair actions under the no-action alternative would be the same as have been conducted in the past and compliance with section 106 would be conducted on an as-needed basis and would be action-specific. Therefore, under 36 CFR 800, the no-action alternative would result in “no adverse effect to historic properties” to Grapevine Canyon Archeological District and to the sites along Mesquite Spring Campground Road.

## **Cultural Landscapes**

Under the no-action alternative, there would be no road construction; however, the two roads and the Grapevine Ranger Station parking lot and sidewalks would continue to be maintained. Cultural landscapes that would potentially be impacted by this alternative include the Bonnie Clare Road Historic Property and Death Valley Scotty Historic District, which are along Bonnie Clare Road. There are no cultural landscapes that would be impacted by this alternative in the Grapevine Ranger Station parking lot APE or Mesquite Spring Campground Road APE.

**Bonnie Clare Road Historic Property.** Under the no-action alternative, there would be no road construction. Indirect impacts include continued use of Bonnie Clare Road by heavy vehicles that would continue to erode the edge of the pavement. In addition, there would be continued road maintenance to remove gravel washed onto the road by runoff from precipitation events.

Under the no-action alternative, the resulting indirect impacts to Bonnie Clare Road Historic Property would be short- and long-term and negligible.



**Death Valley Scotty Historic District.** Under the no-action alternative, there would be no road construction, and the historic fence, Indian Camp, the entrance road and gate, and Cottonwood Corner at the Death Valley Scotty Historic District would not be altered.

Indirect impacts include persistent use of Bonnie Clare Road by heavy RVs and buses that would continue to erode the edge of the pavement. Because of the proximity of the historic fence to the road, continued use of the road under the no-action alternative may indirectly impact the historic fence through traffic accidents and continued road maintenance to remove gravel washed onto the roadway by runoff from heavy rainfall. The fence would also continue to deteriorate from weather and aging. There would be no impacts to Indian Camp, the entrance road and gate or to Cottonwood Corner.

Under the no-action alternative, the resulting indirect impacts to features of Death Valley Scotty Historic District would be short- and long-term negligible to minor and adverse.

**Cumulative Impacts.** The completed rehabilitation of Ubehebe Crater Road and 33 miles of Bonnie Clare Road outside Grapevine Canyon and the proposed Scotty's Castle Waterline Replacement and Air Tour Management Plan would have short- and long-term negligible impacts on cultural landscapes. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would be short- and long-term negligible impacts on cultural landscapes.

**Conclusion.** Under the no-action alternative, there would be short- and long-term indirect negligible impacts to Bonnie Clare Road Historic Property and indirect short- and long-term negligible to minor and adverse impacts to Death Valley Scotty Historic District (e.g., the historic fence). Therefore, the alternative would have indirect short- and long-term negligible to minor adverse impacts on cultural landscapes. The no-action alternative would contribute a short- and long-term negligible to cumulative impact.

**Section 106.** Under 36 CFR 800, *Protection of Historic Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance or ability to provide information) of its location, design, setting, materials, workmanship, feeling, or association.

Under the no-action alternative, there would be no section 106 undertaking. Routine maintenance and repair actions under the no-action alternative would be the same as have been conducted in the past and compliance with section 106 would be conducted on an as-needed basis and would be action specific. Therefore, under 36 CFR 800, the no-action alternative would result in "no adverse effect to historic properties" to Bonnie Clare Road Historic Property and the Death Valley Scotty Historic District.

### Historic Structures/Districts

Under the no-action alternative, there would be no road construction. No historic structures identified as eligible for or listed in the national register would be affected under this proposal. The parking lot and sidewalk at Grapevine Ranger Station would not be altered.

Indirect impacts include continued use of Grapevine Ranger Station parking lot and sidewalks and weather-related deterioration of the asphalt and concrete surfaces.

The resulting indirect impacts to Grapevine Developed Area Historic District would be short- and long-term and negligible; therefore, the indirect impacts of the alternative on historic structures would be short- and long-term and negligible.

**Cumulative Impacts.** The completed rehabilitation of Ubehebe Crater Road and 33 miles of Bonnie Clare Road outside Grapevine Canyon and the proposed Scotty's Castle Waterline Replacement and Air Tour Management Plan would have a long-term negligible impact on historic structures. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would be short- and long-term negligible cumulative impacts on historic structures.

**Conclusion.** Under the no-action alternative, there would be short- and long-term negligible impacts to Grapevine Developed Area Historic District. The no-action alternative would contribute a short- and long-term negligible cumulative impact.

**Section 106.** Under 36 CFR 800, *Protection of Historic Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance or ability to provide information) of its location, design, setting, materials, workmanship, feeling, or association.

Under the no-action alternative, there would be no section 106 undertaking. Routine maintenance and repair actions under the no-action alternative would be the same as have been conducted in the past and compliance with section 106 would be conducted on an as-needed basis and would be action-specific. Therefore under 36 CFR 800, the no-action alternative would result in "no adverse effect to historic properties" to Grapevine Developed Area Historic District.

## **Visitor Use and Experience**

Visitors that drive the 7.7-mile segment of Bonnie Clare Road (included in the proposed project) experience deteriorated road conditions. Under the no-action alternative, the National Park Service would respond to future road needs and conditions without major actions or changes in the present course. The no-action alternative does not preclude short-term minor repair or improvement activities for the road that would be part of routine maintenance for continuing operation and road safety. The existing condition constitutes a short- and long-term negligible to minor adverse impact to visitor use and experience.

Under the no-action alternative, Mesquite Spring Campground Road would not be resurfaced. The campground would remain open. The road would continue to deteriorate; resulting in a negligible to minor adverse effect to visitor use and experience.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect visitor experience include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completed waterline replacement at Scotty's Castle, and the planned Air Tour Management Plan. Improvements associated with each of these projects (e.g., rehabilitated road surfaces, improved infrastructure, and air tour management) would have long-term minor beneficial impacts on visitor experience. The no-action alternative would have negligible to minor adverse contributions to cumulative impacts in the short and long term. The cumulative impacts of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible to minor beneficial impacts on visitor use and experience.

**Conclusion.** The deteriorating condition of Bonnie Clare Road constitutes a short- and long-term, negligible to minor, adverse impact to visitor use and experience. The cumulative impacts of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term negligible to minor beneficial impacts on visitor use and experience.

### Health and Safety

Under the no-action alternative, visitors traveling on Bonnie Clare Road would continue to encounter dangerous conditions from narrow travel lanes, tight turns, inadequate turnouts, a deteriorating road surface, flooding, rock walls and vegetation near the road surface, fallen rock, and ingress/egress problems at Scotty's Castle. These issues constitute a short- and long-term, minor to moderate, adverse impact to health and safety. Rangers would respond to accidents from either Grapevine or Scotty's Castle, or from Stovepipe Wells or Furnace Creek, depending on staffing and the size of the accident.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect health and safety include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the planned Air Tour Management Plan. Improvements associated with each of these projects (e.g., rehabilitated road surfaces, improved infrastructure, and air tour management) would have long-term minor beneficial impacts on health and safety.

The no-action alternative would have minor to moderate, adverse contributions to cumulative impacts in the short and long term. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short- and long-term beneficial impacts on health and safety.

**Conclusion.** Under the no-action alternative, current road and related deficiencies would continue to constitute a short- and long-term minor to moderate adverse impact to health and safety. Cumulative impacts, in conjunction with the no-action alternative, would have short- and long-term beneficial impacts on health and safety.

## **ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE B: PREFERRED ALTERNATIVE**

### **Geology and Soils**

Under alternative B, the Bonnie Clare Road surface would be reconstructed and the roadbed realigned, where necessary, to provide safe travel for visitors and NPS staff; Mesquite Spring Campground Road would be resurfaced within its existing template. Post-development geologic exposures and soils would be managed under the provisions of the general management plan. Topsoils would be saved, stockpiled and replaced in place after construction is completed.

Impacts to the limestone and volcanic geologic exposures and derived soils of ridges and slopes within Grapevine Canyon would include clearing desert scrub vegetation, fracturing the rock, removal and hauling of rock and soil, emplacement of riprap (covering approximately 0.3 acre), installation of paved ditches (covering approximately 0.9 acre), installation of buried Jersey barrier (covering approximately 0.1 acre), installation of revet mattresses (prevent erosion and scour are filled with rock on-site, covering approximately 0.3 acre), and contouring the remaining rock wall and slope on approximately 3,735 feet (1,138 m) of limestone outcrop and volcanic rock outcrop. Removing and redistributing limestone and volcanic rocks and associated soils from a total of approximately 1.3 acres would result in long-term moderate adverse impacts on regionally common bedrock exposures and associated soils.

Impacts to road shoulder fill and desert wash sediments adjacent to the existing Bonnie Clare Road template would include grading, removal to install riprap, buried Jersey barrier, and revet mattresses, burial underfill and asphalt overlay, and compaction during the construction phase; approximately 1.4 acres of alluvial soils and road shoulder fill material would be so covered/and or compacted. The resulting effect would be short- and long-term, minor, adverse impacts to soils and fill materials that have been exposed and compacted by maintenance activities, vehicles straying from the paved surface, and by flowing water during precipitation events. Mesquite Spring Campground Road would be resurfaced in-place using an asphalt grinding process resulting in short-term, negligible, adverse impacts due to exposure of fill soils to precipitation events and dust generation.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect geology and soils include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road) and the completion of the waterline replacement at Scotty's Castle. Improvements associated with each of these projects would have long-term minor adverse impacts on geology and soils.

The preferred alternative would contribute short- and long-term, negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short- and long-term minor adverse impacts on geology and soils.

**Conclusion.** There would be short- and long-term minor to moderate adverse impacts to geologic exposures and soils of Bonnie Clare Road and short term, negligible, impacts to soils of Mesquite Spring Campground Road under alternative B. The preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts to geologic features and soils.

## Vegetation

Under alternative B, Bonnie Clare Road would be reconstructed for the approximately 7.7-mile length including widened travel lanes, curve reduction, and erosion-control structure placement. Mesquite Spring Campground Road would be resurfaced in-place for the approximately 1.9-mile length. The affected area would encompass the length of Grapevine Canyon on or in proximity to the existing roadway alignment, Mesquite Spring Campground Road from near the junction with Scotty's Castle Road to the edge of the campground, and post-development upland shrubland habitats would be managed under the provisions of the general management plan. The affected area encompasses approximately 47 acres and includes the existing roadway; above-ground electrical lines, poles, and guide wires; underground telephone cables and pedestals; and vehicle turnouts; post-development upland vegetation types would be managed under the provisions of the general management plan.

The upland desert scrub and desert wash shrubland vegetation types that have become established on rock outcrops, slopes, road shoulder fill (including berms), and in the desert washes within Grapevine Canyon (construction on Mesquite Spring Campground Road would occur within the existing template) would be cleared and soils/bedrock exposed on approximately 1.3 acres; cut outcrops and slopes would be laid back to mimic the site topography. The resulting rock, gravel, and excess soil would be used for construction materials and road fill during the project. Shrubland vegetation removal from 1.3 acres of rock outcrops and slopes and 1.4 acres of existing roadbed shoulder fill and desert wash would result in long-term minor adverse impacts due to loss of cover, structure, and vegetation diversity from regionally common plant communities within the park. Dust generated during construction could inhibit photosynthetic activity and reproduction of individual plants adjacent to the corridor resulting in short-term direct negligible impacts. Selected cacti within Grapevine Canyon may be transplanted to revegetation sites within the park resulting in short- and long-term negligible impacts due to rehabilitation to a native vegetation type. Following construction, the road shoulder area not further disturbed by maintenance activities, would provide sites for annual plants and disturbance-oriented shrubs to re-establish, resulting in short- and long-term negligible impacts to plant species. The Indian Camp parking lot would be closed and revegetated to upland shrublands and riparian woodlands on approximately 0.4 acre, resulting in long-term minor beneficial impacts to biotic species.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect vegetation include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and reconstruction of 7 miles of Ubehebe Crater Road) and the completion of waterline replacement at Scotty's Castle. Improvements associated with each of these projects would have short-term negligible impacts on vegetation.

The preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short- and long-term negligible impacts on vegetation.

**Conclusion.** There would be long-term direct and indirect negligible impacts to upland vegetation types of Grapevine Canyon and Death Valley Wash under this alternative. Additionally, the preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts.

## **Wildlife**

Under alternative B, Bonnie Clare Road would be reconstructed, including widening travel lanes, reducing curves, emplacement of erosion-control devices, relocation of telephone and electrical lines, and removal and replacement of historic fence posts; Mesquite Spring Campground Road would be resurfaced within the existing template. The affected area would encompass approximately 47 acres and post-development wildlife species and habitat including wetlands and riparian habitat (evaluated under the “Wetlands, Nonwetland Riparian Vegetation, and Floodplains” section), road shoulder habitat, desert wash habitat, and recontoured rock faces would be managed under the provisions of the general management plan. The upland sparse desert scrub or short-stature shrubland habitats that have become established within Grapevine Canyon on bedrock exposures, road shoulders and berms, and desert wash sites would be cleared of vegetation cover; the site topography would be altered to contour bedrock exposures and slopes, and roadbed fill would be graded and compacted to support erosion-control structures and the asphalt overlay.

Desert shrubland habitat removal in Grapevine Canyon would result in short- and long-term direct and indirect minor adverse impacts to wildlife of the road corridor due to loss of cover, structure, and vegetation diversity from a regionally common habitat within the park. Individual reptiles and small mammals in particular would be covered over and crushed during earth moving and rock outcrop/slope reconstruction activities and others would disperse into the adjacent habitat causing competitive stress, resulting in short-term direct and indirect minor adverse impacts to resident wildlife individuals in the construction zone. During construction, predators may be drawn to the corridor to forage on displaced or crushed wildlife individuals and be subject to vehicle collisions resulting in short-term direct negligible impacts. Additional short-term direct and indirect negligible impacts to wildlife would include: avoidance of active construction sites by wildlife species due to human presence, noise generation, and vibration from heavy equipment; sedimentation to surface water, particularly the stream along the picnic area at Scotty’s Castle, potentially affecting macrobenthic invertebrates; dust generation during construction; and pruning of mesic vegetation including grapevines and willow branches.

Following construction, the road shoulder area not further disturbed by maintenance activities would provide sites for ant hills to be formed, and burrows for small mammals resulting in short- and long-term negligible impacts to some wildlife species. The Indian Camp parking lot would be closed and revegetated to upland shrublands and riparian woodlands on approximately 0.4 acre, resulting in long-term minor beneficial impacts to wildlife.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty’s Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible impacts on wildlife.

The preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short- and long-term negligible impacts on wildlife.



**Conclusion.** There would be short- and long- term negligible to minor adverse impacts to upland wildlife habitat of the Bonnie Clare Road corridor. Additionally, the preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts.

### Special Status Species

Under alternative B, Bonnie Clare Road would be reconstructed for the approximately 7.7-mile length including widened travel lanes, curve reduction, and erosion-control structure placement, among other proposed construction elements; Mesquite Spring Campground Road would be resurfaced within its current approximately 1.9-mile-long template. The entire affected area would encompass the length of Grapevine Canyon on or in proximity to the existing roadway alignment, a reach of the Death Valley Wash alluvial fan on the existing road template, and post-development special status species aquatic, wetland, nonwetland riparian vegetation, and upland shrubland and woodland habitats would be managed under the provisions of the general management plan. To minimize the potential for impacting breeding birds, no construction activities would occur near wetland and nonwetland riparian vegetation habitat during the bird breeding season from March 15 to August 15 (if air temperatures do not exceed 50°F prior to March 15, the paving work, and only the paving work, would be completed subsequent to March 15, when air temperatures make this work feasible) resulting in short-term direct minor beneficial impacts to breeding birds along the road corridors. Nonwetland riparian vegetation and wetland potential habitat for the federally and California listed endangered least Bell's vireo and southwestern willow flycatcher would receive short- and long-term direct and indirect negligible impacts due to installation of underdrains at two Grapevine Canyon spring sites; pruning and trimming encroaching limbs and shrubs from over the travel lanes and road shoulder; and from dust generation. The Panamint alligator lizard (a BLM-sensitive species and California Department of Fish and Game species of special concern) potential habitat of nonwetland riparian grapevines would receive short-term direct negligible impacts due to pruning and trimming from over the road shoulder and from dust generation.

The volcanic bedrock habitat for the littleleaf rockcress would be removed to widen the roadway into the cliff wall to avoid impacts to wetlands and historic remnants on the opposite road shoulder resulting in long-term direct minor adverse impacts to a California 4.3 (limited distribution) special status species due to habitat removal.

Fill material would be required under this alternative, as well as other types of noncommercial areas. Noncommercial areas include but are not limited to material sources, disposal sites, waste areas, haul roads, and staging areas. The contractor would provide the FWA Environmental Section with written documentation prepared by a biological specialist that such activities would not affect any species protected under the Endangered Species Act.

In summary, because the sparse, rocky, and steep creosote bush scrub habitat of the Bonnie Clare Road corridor is not considered habitat for the federally listed, threatened desert tortoise (Woodman 2003), no desert tortoise were observed during two reptile surveys (Johnson and Saulino 2005, Woodman 2003), and pre-construction desert tortoise surveys and a contractor awareness class would be conducted, there would be no effects to this species. Because riparian and wetland habitat that could provide resting, breeding, and nesting cover for the federally endangered least Bell's vireo and southwestern willow flycatcher if present, this highway reconstruction project may affect, but is not likely to adversely affect, these listed species.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect special status species include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible impacts on special status species.

The preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short- and long-term negligible impacts on special status species. Alternative B would contribute to overall cumulative impacts to special status species habitat within the park.

**Conclusion.** There would be short- and long-term direct and indirect negligible to minor adverse impacts to riparian and wetland potential special status species habitat within Grapevine Canyon near Scotty's Castle and near the Mesquite Spring Campground entrance under this alternative. There would be negligible effects on the least Bell's vireo and southwestern willow flycatcher because these avian species have not been observed here for several years and construction near potential habitat would be avoided during the breeding season. There would be no effect on the desert tortoise. Additionally, the preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts (e.g., Proposed Scotty's Castle Waterline Replacement impact to 0.2 acre of nonwetland riparian habitat) to special status species habitat within the park.

### **Wetlands, Nonwetland Riparian Vegetation, and Floodplains**

Under alternative B, Bonnie Clare Road would be reconstructed for the approximately 7.7-mile length including widened travel lanes, curve reduction, and runoff water/erosion-control structure placement; Mesquite Spring Campground Road would be resurfaced within its existing template. Construction elements include the existing roadway and drainage features; above-ground electrical lines, poles, and guide wires; underground telephone cables and boxes; and vehicle turnouts. The entire affected area encompasses approximately 47 acres (19 ha). Affected floodplains include portions of Grapevine Canyon, desert washes tributary to Grapevine Canyon, and alluvial fans of Death Valley Wash.

Within the affected area, nearly centered on Scotty's Castle, are predominantly wooded, scrub-shrub, and herbaceous nonwetland riparian vegetation types, which occur in Grapevine Canyon for approximately 2.5 miles (4.0 km) and near the terminus of Mesquite Spring Campground Road. Wetlands delineated within the road corridors occur near the existing toe-of-fill within the fenceline of Death Valley Scotty Historic District, were nearly entirely avoided during the design process, and would receive impacts only at two sites where spring flow emerges under the existing asphalt surface. Desert wash floodplains, including tributary washes, occur within Grapevine Canyon and in Death Valley Wash. The Indian Camp parking lot would be closed and allowed to revegetate to upland shrublands and riparian woodlands/shrublands on approximately 0.4 acre (0.16 ha) post-project. Post-development nonwetland riparian vegetation, wetlands, and the floodplains would be managed under the provisions of the general management plan.

**Wetland Impacts.** The proposed project limits about mapped wetland boundaries (e<sup>2</sup>M 2005, NPS 2011) (see figure 15), as defined by the U.S. Army Corps of Engineers (1987) and Cowardin et al. (1979) at two spring-heads near MPs 4.0, 4.2, 4.7, and 5.9. During the design process, wetlands delineated and mapped in 2005 were avoided to the extent possible. An additional field survey was

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conducted by the National Park Service in 2011 to further refine wetland boundary mapping and guide the final design relative to avoidance resulting in short- and long-term minor indirect beneficial impacts due to wetland protection and preservation.

At two sites, wetland hydrology is provided by spring-heads that emerge underneath the existing road surface; the two springs occur northeast of Scotty's Castle (MP 4.0) and at Cottonwood Corner (MP 5.9). Flows, water quality, and the groundwater table elevation would be protected by installing underdrains at both sites. Underdrain installation has been designed to minimize impacts to delineated and mapped palustrine emergent/shrub-scrub wetlands to less than 200 ft<sup>2</sup>, resulting in short-term direct negligible adverse impacts due to the loss of wetlands established at the road edge. Providing underdrains and directing the spring flow to the toe-of-fill would result in long-term direct minor beneficial impacts due to asphalt removal from spring orifices, underdrain installation to direct flows to the Grapevine Canyon streambed, and to reduced future maintenance activities at these sites.

Under Directors Order 77-1: *Wetland Protection*, this highway reconstruction project falls under the excepted action 4.2.1.g "Maintenance, Repair, or Renovation." Impacts to emergent and scrub-shrub wetlands mapped along the proposed corridor were avoided except for two springs that emerge from under the road. These spring locations would be modified with road underdrains (resulting in 200 square feet of impact) in order to improve hydrology and minimize the need for road maintenance and repair at these locations. Therefore, according to the excepted actions in section 4.2.1.g of Directors Order 77-1: *Wetland Protection*, a wetland statement of findings is not required.

**Nonwetland Riparian Vegetation Impacts.** Riparian communities that are not classified as wetlands because they do not meet all three criteria of hydrophytic vegetation, hydric soils, and wetland hydrology defined by the U.S. Army Corps of Engineers (1987) have become established at the edge of the floodplains and adjacent to roadway fill slopes and have been mapped to the edge of canopy cover for impact analysis (Blodgett 2011) (see figure 16). Nonwetland riparian vegetation would be affected by pruning tree branches, tall shrub branches and canopies, and vines from the proposed construction zone on the roadway shoulder. Pruning activities would occur along the east side of Bonnie Clare Road from near Scotty's Castle to Cottonwood Corner (approximately 0.58 acre) and near the terminus of Mesquite Spring Campground Road (approximately 0.002 acre). The mapped nonwetland riparian types within the proposed project clearing limit include Fremont cottonwood woodland (0.1 acre, including removal of two nonnative, invasive fan palm trees), Goodding willow woodland (0.13 acre), honey mesquite shrubland (0.01 acre), mule's fat shrubland (0.24 acre), common reed herbaceous vegetation (0.02 acre), and California grapevine shrubland (0.08 acre).

Following construction as proposed, the grapevines would spread rapidly on the new road shoulder within one year and tree/tall shrub canopies would re-spread within two years. Limiting the amount of pruning and clearing to the road shoulder would reduce the area of impact and would result in short- and long-term direct negligible to minor beneficial effects to shrub and tree canopy habitat. Pruning and clearing approximately 0.6 acre (0.2 ha) of nonwetland riparian vegetation would result in short- and long-term indirect and direct minor adverse impacts due to loss of vegetation cover and habitat.

Indian Camp parking lot would be closed and allowed to revegetate to upland shrublands and riparian woodlands/shrublands on approximately 0.4 acre (0.16 ha) resulting in long-term direct

minor beneficial impacts to nonwetland riparian vegetation types and habitat due to tree and shrub re-establishment.

**Floodplain Impacts.** Bonnie Clare and Mesquite Spring Campground roads occupy the Grapevine Canyon floodplain and Death Valley Wash alluvial fan for approximately 4.6 miles (7.4 km) and 0.1 mile (0.2 km), respectively. Approximately 4,000 linear feet (1,219 linear meters) of nonwetland riparian vegetation types and wetland vegetation established in proximity to Bonnie Clare and Mesquite Spring Campground roads would be subject to sedimentation from disturbed road fill erosion during precipitation events, resulting in short-term direct negligible to minor adverse impacts. The floodplains of Grapevine Canyon and Death Valley Wash would receive and transport runoff and sediments from precipitation events and could flood the construction site in Grapevine Canyon, resulting in short-term direct negligible to minor adverse impacts to desert wash vegetation on the road shoulder and adjacent to the toe-of-fill. Drainage features of the preferred alternative would have a short- and long-term minor beneficial effect on floodplain function compared to the no-action alternative. The proposed drainage engineering would withstand moderate flood events without the need for maintenance and repairs, which are also impacts to the floodplain. Features that direct flowing water along the sides of the road when possible and direct water across the road when necessary; would help maintain natural down-slope movement of water, sediment, and nutrients resulting in short- long-term minor beneficial effects to the floodplain.

Under *Procedural Manual 77-2: Floodplain Management, Section V. B. Excepted Actions*, the “procedural manual does not apply to historic or archeological structures, sites, or artifacts whose location is integral to their significance.” Bonnie Clare Road is a historic property whose location and alignment are integral to its historic significance. Therefore, a floodplains statement of findings is not required.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect wetlands, nonwetland riparian vegetation types, and floodplains include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement for 1.01 mile at Scotty’s Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible impacts on wetlands and floodplains and localized short-term minor adverse impacts due to nonwetland riparian vegetation removal during waterline replacement (0.2 acre of riparian habitat).

The preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts that are largely mitigated by the drainage features proposed for installation. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short- and long-term negligible impacts on wetlands and floodplains and short term minor impacts on nonwetland riparian habitat within the park.

**Conclusion.** There would be direct long-term negligible adverse impacts to wetlands established near spring heads emerging from under Bonnie Clare Road asphalt. There would be direct and indirect short- and long-term negligible to minor adverse impacts to nonwetland riparian vegetation types adjacent to Bonnie Clare and Mesquite Spring Campground roads under this alternative. Drainage features installed to direct and control flows into the floodplains would mitigate these impacts to a minor level over the short and long term. Additionally, the preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts.

## Water Quality

Under alternative B, the Bonnie Clare Road surface would be reconstructed and widened, the roadbed realigned, where necessary, to provide safe travel for the public and park staff, and underdrains would be installed at locations where springs or seeps emerge under the existing asphalt; Mesquite Spring Campground Road would be resurfaced in-place using an asphalt grinding process. The springs from which drinking water is collected for use at Scotty's Castle and Mesquite Spring Campground would not be affected by this project. Post-development surface water sources and water quality would be managed under the provisions of the general management plan.

Impacts to the spring and seep areas and to water quality near Scotty's Castle would include site excavation, underdrain installation, and covering by roadbed material and an asphalt overlay on approximately 0.08 acre of spring and seep area. Additional water quality impacts would result by construction activity adjacent to an approximately 350 feet reach of the flowing stream at the roadway toe-of-fill on the edge of the Scotty's Castle picnic area. Removing the existing roadway layers, installing underdrains, and replacing the road surface layers from a total of approximately 0.08 acre would result in short-term minor adverse impacts to water quality of the springs due to sedimentation and temporary capture or redirection of flows. Proposed drainage features designed to divert the springs from beneath Bonnie Clare Road to the adjacent stream would have long-term minor beneficial impacts on water quality because springs under the road create the need for frequent road repairs (repeated asphalt applications) and spring orifices would no longer need to be packed with asphalt during repairs.

The construction adjacent to approximately 350 feet of flowing stream would result in short-term minor adverse impacts to water quality due to sedimentation. Approved mitigation would reduce short-term impacts to water quality due to sedimentation to negligible and adverse. In the long term, sedimentation from road shoulders and slopes during precipitation events, contamination from petrochemicals and metals deposited by vehicles on the road surface, and application of herbicides to control weeds becoming established on disturbed soils of road shoulders and slopes would result in negligible to minor and adverse impacts to water quality.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect water quality include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the Air Tour Management Plan. Improvements associated with each of these projects would have short- and long-term negligible impacts on water quality.

The preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts which are largely mitigated by the underdrain features proposed for installation to direct spring flow to the stream. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short- and long-term negligible impacts on water quality.

**Conclusion.** There would be short- and long-term negligible to minor adverse impacts to water quality in Grapevine Canyon under this alternative. Underdrain features installed to capture and direct spring flows to the stream would mitigate these impacts to a negligible level over the long-term due to eliminating the need for repeatedly adding layers of asphalt over springs. Additionally,

the preferred alternative would contribute short- and long-term negligible impacts to cumulative impacts to water quality.

## **Archeological Resources**

Actions associated with the preferred alternative that would impact archeological resources include widening Bonnie Clare Road beyond the existing road pavement onto the existing soft shoulder, which has been repeatedly disturbed since 1951 by shoulder grading and repair activities. Other sections of the road would be realigned to straighten some of the dangerous curves and widen the pavement to permit better views around the curves and safer travel for large vehicles. The predominant centerline shifts proposed for the road are approximately 20 feet (6 m) in a few locations around the sharpest curves along the road.

Narrow paved ditches and curbing as well as gabions, low water crossings, and drains at spring locations, are also proposed in a few areas along Bonnie Clare Road to help reduce erosion and maintenance costs caused by flooding within the canyon. In some areas, rock faces and slopes in Grapevine Canyon would need to be cut to avoid impacts to wetlands. The existing gravel turnout at the entrance to the park at MP 0.0 would be paved and formalized. It would be designed to be compliant with ADA/ABA requirements and a traffic loop and counter would be installed near the turnout. Three turnouts and one parking lot would be eliminated and allowed to revert to natural states.

This alternative would also involve the reconstruction of the parking lot and sidewalks in the Grapevine Ranger Station by raising the south end of the parking lot and grading the area to a 5% slope and by constructing ADA/ABA-compliant sidewalks. New curbs and gutters would also be installed. The concrete for the sidewalks, curbs, and gutters would be tinted to match the existing rockfaces. All work would remain within previously disturbed areas.

The Mesquite Spring Campground Road surface would be pulverized and overlaid with 3 inches of asphaltic concrete pavement and fog sealed. This work would remain within and match the existing road width with the exception of the creation of low water crossings where needed. No road improvements would be made within the Mesquite Spring Campground area. The loop at the end of the project would be rehabilitated and all work would take place within the existing disturbed areas. It may also serve as a construction staging area. Low water crossing would be installed at locations where drainages cross the roadway. The locations for these low water crossings would be finalized during implementation of the project; however, the locations would be coordinated with park archeologists to ensure cultural resources are avoided and appropriate site protection measures are implemented.

In addition, fill material for the road and aggregate for fence posts would be required under the proposed project as well as other types of noncommercial areas. Noncommercial areas include, but are not limited to, material sources, disposal sites, waste areas, haul roads, and staging areas. The contractor would be required to provide the FWA Environmental Section with a report in accordance with the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*, determining if historic properties listed or eligible for listing in the national register are present and if they would be affected by the proposed activity. The Federal Highway Administration would coordinate with the California SHPO and other parties to complete the section 106 process for noncommercial areas.



## ENVIRONMENTAL CONSEQUENCES

These actions could impact the Grapevine Canyon Archeological District along Bonnie Clare Road and archeological resources along Mesquite Spring Campground Road. There are no known archeological resources at the Grapevine Ranger Station parking lot that would be impacted. The archeological site at Death Valley Scotty Historic District and Indian Camp, would be addressed as part of that district under cultural landscapes.

**Grapevine Canyon Archeological District.** Twelve (11 contributing and 1 noncontributing) archeological resources of the 46 archeological resources recorded in Grapevine Canyon Archeological District are within 20 m of the edge of Bonnie Clare Road, and there are several locations where the canyon walls, which are contributing features of the historic district and are ethnographically important to the Timbisha Shoshone Tribe, would be cut. Archeological site CA-INY-4850 is currently bisected by Bonnie Clare Road; however, the current project design would avoid impact to intact deposits at this location. Three other contributing archeological sites (CA-INY-2873, -2872, and -2881) have been mapped in or immediately adjacent to the project boundaries.

To mitigate potential adverse impacts to individual contributing archeological resources within Grapevine Canyon Archeological District and by extension to the district prior to any construction activities, the National Park Service plans to use contract language requiring the construction contractor to attend preconstruction meetings with park archeologists and other appropriate parties as identified by the park. During these meetings, park personnel and contractors would develop archeological site protection and avoidance measures that would be implemented prior to initiating construction activities. The types of measures that may be developed would be site- and action-specific, but could include the presence of archeological and or Timbisha monitors during construction activities and/or the use of temporary fencing or other materials to establish construction boundaries near sites. In addition, the park would develop a plan of action for inadvertent archeological discoveries during construction. The avoidance measures and inadvertent discovery plan would be documented in an archeological monitoring and inadvertent discovery plan.

Preconstruction meetings and the development and implementation of the proposed archeological monitoring and inadvertent discovery plan would result in avoidance of contributing archeological deposits within the Grapevine Canyon Archeological District. However, cuts to the canyon walls would adversely impact the natural resources that are ethnographically significant to the Timbisha Shoshone Tribe and that bind the Grapevine Canyon Archeological District into a contiguous district, which would result in minor to moderate and adverse impacts to the historic district.

**Archeological Sites Along Mesquite Spring Campground Road.** There are four archeological sites within or adjacent to the APE for the road resurfacing project. There are no recorded archeological deposits from sites CA-INY-4822, CA-INY-4851H, or CA-INY-4852H within the existing road prism. A portion of the old road at site CA-INY-04734H encroaches onto the existing road prism, but there are no recorded artifacts associated with this site within the APE for the project. Because the preferred alternative remains within the existing road prism, there would no impact on-site CA-INY-4734H.

To mitigate potential adverse impacts to individual contributing archeological resources near Mesquite Spring Campground Road prior to any construction activities, the National Park Service plans to use contract language requiring the construction contractor to attend preconstruction meetings with park archeologists and other appropriate parties as identified by the park. During these meetings, the park personnel and contractor would develop archeological site protection and

avoidance measures that would be implemented prior to initiating construction activities. The types of measures that may be developed would be site- and action-specific, but could include the presence of archeological and/or Timbisha monitors during construction activities and/or the use of temporary fencing or other materials to establish construction boundaries near sites. In addition, the park would develop a plan of action for inadvertent archeological discoveries during construction. The avoidance measures and inadvertent discovery plan would be documented in an archeological monitoring and inadvertent discovery plan.

Preconstruction meetings and the development and implementation of the proposed archeological monitoring and inadvertent discovery plan would result in avoidance of contributing archeological deposits near Mesquite Spring Campground Road, which would result in long-term negligible to minor impacts to archeological resources.

Therefore, as long as the mitigation measures discussed above for the resources along Bonnie Clare Road and Mesquite Spring Campground Road are implemented, this alternative would result in short- and long-term negligible and minor to moderate adverse impacts to archeological resources.

**Cumulative Impacts.** The completed rehabilitation of Ubehebe Crater Road and 33 miles of Bonnie Clare Road outside Grapevine Canyon, and the proposed Scotty's Castle waterline replacement and Air Tour Management Plan would have a long-term negligible impact on archeological resources. Alternative B would contribute a short- and long-term negligible to minor and adverse cumulative impact to archeological resources.

**Conclusion.** Under the preferred alternative, there would be short- and long-term negligible and minor to moderate adverse impacts to archeological resources. Alternative B would contribute short- and long-term negligible to minor adverse cumulative impacts to archeological resources within the park.

**Section 106.** Under 36 CFR 800, *Protection of Historic Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g., diminishing the integrity (or the extent to which a resource retains its ability to provide information) of its location, design, setting, materials, workmanship, feeling, or association.

Under alternative B, even though the avoidance measures would minimize the impact of the project on archeological features contributing to the Grapevine Canyon Archeological District, the canyon walls would be altered, which would result in a finding of "adverse effect to historic properties" under 36 CFR 800 for the historic district. The National Park Service has consulted with the California SHPO and Timbisha Shoshone Tribe and is developing a programmatic agreement outlining measures to mitigate the adverse effects of the preferred alternative. The programmatic agreement stipulates that the Grapevine Canyon Archeological District would be nominated for listing in the national register.

Under alternative B, as long as the avoidance measures and minimization are implemented the project would result in "no adverse effect to historic properties" under 36 CFR 800 for the archeological resources along Mesquite Spring Campground Road.

## Cultural Landscapes

Actions associated with the preferred alternative that would impact cultural landscapes encompass all the proposed activities associated with the reconstruction of Bonnie Clare Road, which would have impacts to several of the contributing features of the Bonnie Clare Road Historic Property. Actions that would impact the Death Valley Scotty Historic District include rehabilitation of 85% of the historic fence outside of the clear recovery zone, construction activities within Indian Camp boundaries, widening the road onto the historic entrance road at the entrance gate, and realignment of the road at Cottonwood Corner. There would be no cultural landscapes impacted by the actions proposed for Grapevine Ranger Station or Mesquite Spring Campground Road.

**Bonnie Clare Road Historic Property.** Collaborative development of the project plans by the Federal Highway Administration and the National Park Service has resulted in the incorporation of design measures to minimize the impact of this undertaking to the Bonnie Clare Road Historic Property. The following outlines the project's effects to the character-defining features of Bonnie Clare Road Historic Property that are identified in the cultural landscape inventory that was completed in 2011 (NPS 2011b).

### 1. Natural Systems and Features

#### Geomorphology/Geology:

The canyon walls influenced the historic road alignment and road profile. The proposed project would slightly shift the road's alignment, but the majority of the road's alignment would continue to be influenced by the canyon's geomorphology, and the road would continue to meander through the narrow canyon. Cuts to the canyon walls would be minimal and would be undertaken in a manner that would mimic the existing rock face angles, which would result in minor to moderate adverse impacts to the canyon walls.

#### Vegetation at Springs:

The vegetation at the springs along Bonnie Clare Road provide a distinct setting that is unlike surrounding desert vegetation. Removal of two, nonhistoric palm trees from the spring area at MP 4.1 and trimming of limited vegetation that is encroaching on the road would have a negligible to minor impact on vegetation at the springs.

### 2. Spatial Organization

#### Alignment:

The character-defining spatial organizational features of the road include its alignment and tight curves in the upper (eastern) part of the canyon, straight sections, curves that follow the canyon slopes past Scotty's Castle, the bend at the historic entrance to Scotty's Castle, and the road's alignment between Cottonwood Corner (including the S-curve) and Scotty's Castle. These features represent the integrity of the design and location of the road.

The maximum shift in road centerline alignment is 20 feet ensuring the road would still follow the canyon slopes and most of the straight sections of the road would be retained. Although the bend at the entrance would be retained without cutting the canyon face in that location, approximately 6 feet of the historic entrance road to Scotty's Castle would be paved to create wider travel lanes around the bend. The S-curve at Cottonwood Corner would also be retained, however, to widen the road in this

location the road would be realigned to the southeast approximately 13 feet. The proposed changes would have a minor to moderate adverse impact on road alignment.

**Undulating Grade between Cottonwood Corner and Scotty's Castle:**

Another character-defining spatial organizational feature of the road is the undulating grade of the road between Scotty's Castle and Cottonwood Corner. The vertical alignment of the road between Cottonwood Corner and Scotty's Castle would be raised by as much as 2.25 feet, which would result in a minor to moderate adverse impact to the road grade.

**General Road Width:**

Other spatial features include the road's 20–22 feet width, the soft shoulders and turnouts, and the relationship of the road to the historic fenceline at Scotty's Castle. The road is already 22 feet in some locations and increasing the road's width to a uniform 22 feet would result in a minor to moderate adverse impact to the width and design of the road.

**Soft Shoulders and Turnouts:**

Low water crossings, paved ditches, curbs, riprap features, andrevet mattresses would be added to several areas along the length of the realigned road segment to reduce erosion from flash flood events. The soft shoulders would be eliminated in these locations, but where these features would not be added, the soft shoulders would be retained. The proposed project involves removal of the informal turnouts at MP 4.3, 4.41, and MP 4.46. These proposed changes would result in a minor to moderate adverse impact to the design of the road.

**Historic Fenceline Defines North and East Edges of Death Valley Scotty Historic District:**

Eight-five percent of the fence posts along the historic fenceline that parallels the road (39% of the approximate 5.74 miles of fenceline encircling the Scotty's Castle area or 19% of the total 11.74 miles of fence at Scotty's Castle and Lower Vine Ranch) are within the clear recovery zone (7 feet from the edge of the travel lane) of the proposed realignment of Bonnie Clare Road. The fence influenced the design and location of the road and also provides a distinctive feeling while driving the roadway toward Scotty's Castle. Proposed mitigation for the adverse effects to the historic fence includes rehabilitation of the fence at the edge of the clear recovery zone 7 feet from the edge of the travel lane (see effects to Scotty's Castle for more detail). If this proposed mitigation is implemented, the new fence alignment would closely mirror the current fence alignment and changes to the proximity of the fence to the road would be minimal. There would be a negligible to minor adverse impact to the feeling of the fence in proximity to the road and the fences association with Scotty's Castle. (This provides an assessment of effect for the fence as a feature representing the integrity of the road. Effects to the fence as a contributing feature of Death Valley Scotty Historic District are discussed in a later section.)

**3. Topography**

**Grade:**

The road's topography is 7% or less grade. The 7% or less grade would be retained by the proposed project so there would be a negligible impact to the grade of the road.

### Cross-Section:

A major component of the road's design is its cross section with a 30-foot wide bench,  $\frac{1}{4}$  inch to 1 foot crown, 10-foot wide paved travel lanes, 3-foot wide soft shoulders, and 2-foot wide unpaved ditch at cut slope. The cross section of the road would change to reflect 11-foot wide travel lanes with soft shoulders in some locations and narrow paved ditches, curbs, gutters, and low water crossings where needed. Most of the original road shoulders and 2-foot wide ditches have been adversely affected or eliminated by flash flooding events and subsequent clean-up and repair activities.

The design minimizes the effect of the new elements and added features by incorporating narrow paved ditches rather than the normally used wide shallow ditches. In addition, the ditches, curbs, and gutters would be constructed using colored concrete so they blend into the canyon's natural landscape. Although these measures would reduce the impact of the altered features, the project would have a minor to moderate adverse effect to the cross-section design of the road.

### Vertical Rock Cuts:

In locations where cuts to the rock faces and angled slope cannot be avoided, the cuts would result in slopes that would mimic as closely as possible the existing rock and slope angles. Although these measures would reduce the effect of the altered design, there would be a minor to moderate adverse impact to the vertical rock cuts in the canyon.

### Fill:

The fill that was used on the approaches to Scotty's Castle is another feature of the topography that is significant. The fill in these locations would not be impacted by the project resulting in a negligible to minor adverse impact to the fill.

## 4. Views and Vistas

### Chimes Tower and Entrance Gate while Traveling from Cottonwood Corner to Scotty's Castle:

These views are significant factors in the feeling and association of the road with Scotty's Castle. The minor shifts in road alignment outlined in the proposed plans would have no perceptible impact on the views from the road toward Scotty's Castle.

### Tin Mountain Panoramic View Driving through Grapevine Canyon to the Valley:

This view is significant to the feeling and association of the road with Grapevine Canyon and Death Valley. The minor shifts in road alignment outlined in the proposed plans would have no perceptible impact on the views of Tin Mountain from the road.

### Cottonwood Corner and Cathedral Rock—Views To and From Scotty's Castle to the Valley:

These views are significant factors in the feeling and association of the road with Grapevine Canyon and Scotty's Castle. The minor shifts in road alignment outlined in the proposed plans would have no perceptible impact on the views.

Therefore, the project would have a negligible to minor adverse impact on the views and vistas from the road.

Table 5 summarizes the effects of the proposed project on each character-defining feature of the road. There would be a long-term minor to moderate adverse impact to 7 of the 13 contributing features resulting in an overall moderate adverse impact to Bonnie Clare Historic Property.

**TABLE 5. SUMMARY OF EFFECTS TO BONNIE CLARE ROAD HISTORIC PROPERTY**

<b>Character-defining Features (identified in the cultural landscape inventory)</b>	<b>Impact Level / Assessment of Effect</b>
<b>Natural Systems and Features</b>	
Geomorphology/Geology	Minor to Moderate Adverse Impact/ Adverse Effect
Vegetation/Springs	Negligible to Minor Adverse Impact/ No Adverse Effect
<b>Spatial Organization</b>	
Alignment	Minor to Moderate Adverse Impact/ Adverse Effect
Undulating Grade	Minor to Moderate Adverse Impact/ Adverse Effect
Width	Minor to Moderate Adverse Impact/ Adverse Effect
Shoulders and Turnouts	Minor to Moderate Adverse Impact/ Adverse Effect
Historic Fenceline	Negligible to Minor Adverse Impact/ No Adverse Effect
<b>Topography</b>	
Grade	Negligible Impact/ No Adverse Effect
Cross-Section	Minor to Moderate Adverse Impact/ Adverse Effect
Vertical Rock Cuts	Minor to Moderate Adverse Impact/ Adverse Effect
Fill	Negligible to Minor Adverse Impact/ No Adverse Effect
<b>Views and Vistas</b>	
Chimes Tower and Entrance Gate	Negligible to Minor Adverse Impact/ No Adverse Effect
Tin Mountain	Negligible to Minor Adverse Impact/ No Adverse Effect
Cottonwood Corner & Cathedral Rock	Negligible to Minor Adverse Impact/ No Adverse Effect

**Death Valley Scotty Historic District.** The collaborative development of the designs by the Federal Highway Administration and the National Park Service has resulted in minimization of the effects of this undertaking to Death Valley Scotty Historic District / Scotty's Castle. The following discussion is presented by effects to the character-defining features of Scotty's Castle adjacent to the project area followed by an assessment of the undertaking to the entire historic district.

*Historic Concrete Fence*— There are 5.4 miles of historic fence around Scotty's Castle with 2.6 miles of fence paralleling Bonnie Clare Road. Eighty-five percent of the concrete fence posts along Bonnie Clare Road would be relocated a minimum of 7 feet from the edge of the new travel lane leaving the remaining 3.19 miles of fence around Scotty's Castle and the 6.0 miles of historic fenceline around Lower Vine Ranch intact.

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The setting of the fence around Scotty's Castle and its feeling and association with Scotty's Castle and with Bonnie Clare Road would be retained by the proposed fence relocation. However, the location of the fence along Bonnie Clare Road would be affected by moving the fence outside the clear recovery zone. In accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 2012a) and its standards and guidelines for rehabilitation of historic properties, the existing fence posts would be used to build a new mold for the production of replacement posts, which would be built with concrete that matches the original composition of the concrete posts. Posts that are in good condition would be retained and reused. These actions would retain the integrity of material and workmanship of the fence and would minimize the impact of the project on the fence.

The rehabilitation of the fence would have a minor to moderate adverse impact on the historic fenceline.

*Indian Camp*— Bonnie Clare Road currently bisects Indian Camp (site CA-INY- 5702H). Previous road construction and maintenance projects in the vicinity of Indian Camp are likely to have affected archeological deposits, if any existed, next to and below the road as it bisects the site; however, it is impossible to confirm the absence of intact deposits below the road surface until the road surface has been removed. In order to minimize impacts to Indian Camp, the plans for the road as it bisects Indian Camp limit disturbance to the existing vertical and horizontal road footprint. The road would be widened approximately 2 feet to the north onto previously disturbed areas by placing fill over the top of the existing disturbed ground surface. One previously moved fence post would be relocated to its original location. It is unlikely but still possible that Indian Camp could be adversely impacted by the project if unexpected deposits exist under the road surface.

The overflow parking area on top of Indian Camp on the north side of the road and the turnout at MP 4.4 would be rehabilitated to a natural state and vegetation would be encouraged to grow. Elimination of the overflow parking area and turnout would eliminate additional impacts to Indian Camp in this area.

The proposed design minimizes adverse effects to Indian Camp by limiting the vertical and horizontal disturbance to previously disturbed areas. However, there is a possibility that intact deposits could exist under the road surface, which would be removed as part of the project. As a result, the project would have a minor to moderate adverse impact on the Indian Camp archeological site (CA-INY-05702H).

*Entrance Gate, Road, and Stream*— The proposed project includes a slight shift of the road alignment (approximately 6 feet or 1.8 m to the north) at the historic entrance road of Scotty's Castle (MP 4.6) toward the gate along the historic entrance road. This shift would result in the paving of approximately 6 feet of the entrance road apron. The entrance road is approximately 69-feet long from the edge of Bonnie Clare Road to the gate. The plans do not incorporate any direct changes to the entrance gate and only a minor portion of the entrance road apron would be directly affected. There would be no change to the existing embankment of the historic entrance road.

The application of asphalt at ground level and the minor shift of Bonnie Clare Road onto the entrance road would have no visual effect on the entrance gate. There would be no cuts to the canyon rock face across from the historic entrance, and the proposed project is not expected to increase traffic so there would be no permanent audible impact from the project.



The proposed project specifies very minor changes to the road width along the stream course between Scotty's Castle and Bonnie Clare Road. There would be no changes to the stream's alignment or to the landscaped trees near the stream. A minor amount of vegetation may be trimmed at the edge of the road where vegetation is currently encroaching onto the road.

The project would have a minor adverse impact on the entrance road, gate, or stream.

*Cottonwood Corner*—The road would shift slightly south and east, away from Cottonwood Corner. The clearing limits for the project do not extend into the vegetated areas at the S-curve. No fence posts would be relocated within the wetland or vegetated area at Cottonwood Corner. An underdrain to direct water from a spring under the road would be placed at this location. In addition, riprap would be added to the west side of the corner next to the road to reduce erosion into the spring. The steeply sloped area on the east side would be cut and this area (opposite the spring and cottonwood tree) would be used as a staging area (MP 5.9).

The project would have a minor impact to Cottonwood Corner.

Table 6 summarizes the impacts to the individual contributing features on Death Valley Scotty Historic District within the APE for the project. Overall, the project would have a long-term minor to moderate adverse impact to the historic district.

**TABLE 6. TABLE OF EFFECTS TO CONTRIBUTING FEATURES OF DVSHD**

<b>Cultural Resource</b>	<b>MP</b>	<b>Proposed Actions That May Affect</b>	<b>Level of Impact/Effect</b>
Historic Fence	3.5 to 5.96	Road widening and shifts in road alignment, requirement to move fence at least 7 feet from edge of the travel lane. Placement of low water crossings and riprap erosion control features, and paved ditches. Putting in a new gate, eliminating parking areas.	Minor to moderate adverse impact / adverse effect
Indian Camp	4.42 to 4.5	Road currently bisects the site; however, it is likely that the portion under the site has been previously disturbed. Work would remain within previously disturbed areas both vertically and horizontally. Eliminating the turnout and parking lot would not require any ground disturbance.	Minor to moderate impact / possible adverse effect
Historic Entrance Area (road, gate, stream)	4.6	Roadbed shifts approximately 6 feet on to the historic entrance road with no effects to the stream or gate. Effect to entrance road is very minor and does not diminish the integrity of the entrance gate, road, or historic district.	Minor adverse impact / no adverse effect

TABLE 6. TABLE OF EFFECTS TO CONTRIBUTING FEATURES OF DVSHD

Cultural Resource	MP	Proposed Actions That May Affect	Level of Impact/Effect
Cottonwood Corner	5.87 to 5.92	Roadbed shifts away from (to the left/east) Cottonwood Corner. No new fence posts would be installed. An underdrain would be installed under the road and riprap would be installed on the west side of the road to control erosion. Placement of a staging area on the left/east side. Cut to steeply sloped areas on left/east.	Minor impact / no adverse effect

**Cumulative Impacts.** The completed rehabilitation of Ubehebe Crater Road and 33 miles of Bonnie Clare Road outside Grapevine Canyon, and the proposed Scotty's Castle Waterline Replacement and Air Tour Management Plan would have short- and long-term negligible impacts on cultural landscapes. Alternative B would contribute long-term minor and adverse cumulative impacts to cultural resources within the park.

**Conclusion.** Under the preferred alternative, there would be short- and long-term minor to moderate adverse impacts to cultural landscapes within the park. Alternative B would contribute short- and long-term minor to moderate adverse impacts to cultural landscapes within the park.

**Section 106.** Under 36 CFR 800, *Protection of Historic Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance or ability to provide information) of its location, design, setting, materials, workmanship, feeling, or association.

Under this alternative, there would be an adverse effect to the cultural landscapes at Bonnie Clare Road Historic Property and Death Valley Scotty Historic District (e.g., to the fence and Indian Camp). The National Park Service has consulted with the California SHPO and is developing a programmatic agreement outlining measures to mitigate the adverse effects of the preferred alternative. The programmatic agreement stipulates that the park would mitigate adverse effects to Bonnie Clare Road Historic Property through the preparation of a Historic American Engineering Report to document the Bonnie Clare Road Historic Property.

The programmatic agreement also requires the National Park Service would mitigate adverse effects to Death Valley Scotty Historic District by developing a treatment plan to preserve, rehabilitate, restore, and/or reconstruct the affected historic fence in a manner that meets the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. This fenceline treatment plan would document the appearance, integrity, and condition of the fenceline, and, recommend appropriate preservation and management measures that would not adversely affect significant character-defining features of the fenceline, the Death Valley Scotty Historic District, or the cultural landscape.

In addition the programmatic agreement stipulates that the park avoid impacts at Indian Camp through contract language requiring the construction contractor to attend preconstruction meetings with park archeologists and other appropriate NPS personnel and consulting parties as identified by the park. During these meetings, park personnel and the contractor would develop archeological site protection and avoidance measures that would be implemented prior to initiating construction activities. In addition, the park would develop a plan of action for inadvertent archeological discoveries during construction. The avoidance measures and inadvertent discovery plan of action would be documented in an archeological monitoring and inadvertent discovery plan. The plan would outline which areas would undergo archeological monitoring during construction and who would perform the monitoring (e.g., park archeologist, Timbisha monitors, etc.). The plan would also outline the procedures to be taken if an inadvertent discovery is made by the construction contractor or the monitors.

### **Historic Structures/Districts**

Actions associated with the preferred alternative that would impact historic districts comprises the proposed work at Grapevine Ranger Station including leveling and resurfacing the parking lot at a 5% grade and replacement of sidewalks with ADA/ABA-compliant structures. The curbs and gutters around the parking lot would also be replaced in-kind with concrete tinted to the existing concrete. The parking lot would be restriped to include an ADA/ABA-accessible parking stall. These activities would be confined vertically and horizontally to the previously disturbed area. The small entrance station building (e.g., fee booth) on an island in the road at Grapevine Ranger Station and the associated utilities to the building would be removed.

The only historic structure/district impacted by this project is the Grapevine Developed Area Historic District. The other historic districts and structures, Death Valley Scotty Historic District including its buildings and structures and the Bonnie Clare Road Historic Property, were discussed under the cultural landscape heading.

The Grapevine Ranger Station and associated exterior railing, semicircular parking lot and median, curbing around the parking lot and median, landscaping, ranger station sign, and water spigot are contributing features of the Grapevine Developed Area Historic District that are within or adjacent to the project area. The remaining contributing features of the Grapevine Developed Area Historic District (the apartments, utility buildings and road in the maintenance area) are visually obscured from the project by topography and vegetation.

The *Secretary of the Interior's Standards for Rehabilitation* would be used to match the materials for the new sidewalk, ramp, gutters, and curbs in color. There would be no change in the footprint, design, setting, feeling, materials, location, association, or use of the parking lot or sidewalks. Changes to the elevation of the parking lot or the sidewalk would not substantially change, obscure, or destroy any portion of the historic district and would not drastically change their relationship to the ranger station building or the other features of the historic district. The result of the proposed project would result in a parking lot, sidewalks, curbing, and gutters that would appear very similar to the existing features so there would be no adverse effect to the integrity of the property; therefore, there would be a long-term negligible to minor adverse impact to the historic district.

**Cumulative Impacts.** The completed rehabilitation of Ubehebe Crater Road and 33 miles of Bonnie Clare Road outside Grapevine Canyon and the proposed Scotty's Castle Waterline Replacement and Air Tour Management Plan would have a long-term negligible impact on historic

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structures. Alternative B would contribute short- and long-term negligible to minor adverse cumulative impacts to historic structures within the park.

**Conclusion.** Under the preferred alternative, there would be short- and long-term negligible to minor adverse impacts to Grapevine Developed Area Historic District. Alternative B would contribute short- and long-term negligible to minor adverse cumulative impacts to historic structures within the park.

**Section 106.** Under 36 CFR 800, *Protection of Historic Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance or ability to provide information) of its location, design, setting, materials, workmanship, feeling, or association.

Under this alternative, there would be no adverse effect to Grapevine Developed Area Historic District.

### Visitor Use and Experience

During construction, visitors would experience some delays along Bonnie Clare Road. Mitigation requires, however, that the delays be limited to 30 minutes. Construction traffic from the mixing table and borrow sites would contribute noise and dust. Fugitive dust may affect the quality of views from the road. Mitigation, however, requires that construction vehicles have well-maintained mufflers and watering or other dust abatement measures are included in required mitigation. Staging areas are required to be outside of high visitor use areas so reduced aesthetics should not be a concern from staging activities. Exhaust smells from construction vehicles would be minimized by limiting engine idling (a mitigation requirement). Ingress and egress at Scotty's Castle may be affected during construction activity at that site. It is not expected that visitation numbers would decrease during construction, because of mitigation measures in place and the fact that Bonnie Clare Road is the most direct route to the Scotty's Castle-Grapevine area. Overall, impacts to the visitor use and experience during construction (the short term) would be minor and adverse in nature.

Upon completion of the preferred alternative, the repaired road surface, wider travel lanes, better sight lines, wider turns, additional turnouts in Grapevine Canyon, and better ingress/egress at Scotty's Castle would all improve driving conditions and an enhanced visitor experience. Although it is not anticipated that the improved road condition would have any impact on visitation numbers, the driving experience would be improved resulting in a long-term minor beneficial impact.

During resurfacing of Mesquite Spring Campground Road, estimated to be no longer than two months, the campground would be closed. Park staff would announce the closure on the park website. Other campgrounds would remain available to park visitors. This would result in a short-term negligible effect to visitors. Upon completion of the resurfacing project, the effects would be long term and negligible for visitors.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect visitor experience include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the

completion of the waterline replacement at Scotty's Castle, and the planned Air Tour Management Plan. Improvements associated with each of these projects (e.g., rehabilitated road surfaces, improved infrastructure, and air tour management) would have long-term minor beneficial impacts on visitor experience.

The preferred alternative would have minor adverse contributions to cumulative impacts in the short term, negligible, and negligible to minor beneficial impacts in the long term. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have negligible to minor adverse impacts on visitor experience in the short term, and negligible to minor beneficial impacts in the long term.

**Conclusion.** The preferred alternative would have short-term negligible to minor adverse impacts. Upon completion of the preferred alternative, there would be long-term beneficial impacts on visitor experience. Cumulative impacts, in conjunction with the preferred alternative, would have short-term negligible to minor adverse impacts and long-term negligible beneficial impacts on visitor experience and use.

## **Health and Safety**

The preferred alternative would include a number of actions that would contribute to the health and safety of motorists, such as a consistent 22 feet to 24 feet paved width, wider shoulders, wider turns, increased sight distances, new rock and slope faces, better flood control, additional turnouts, and improved access to Scotty's Castle. During construction, interactions between motorists and construction traffic would be minimized by vehicle stops, barriers, and standard road construction safety procedures. Traffic control may be challenging as lines of vehicles curve back along the roadway, out of sight of flaggers. Construction flaggers/traffic controllers would be asked to cease roadwork and open a travel lane for emergency responders, should an accident occur. Impacts during construction would be short term and negligible. Once construction is complete, the improved road should reduce the number of accidents, which are already low. The improved road would also make law enforcement or emergency response faster due to a road that is easier to navigate. These road improvements constitute a long-term beneficial impact to health and safety.

**Cumulative Impacts.** Past, present, and reasonably foreseeable future projects with the potential to affect visitor experience include other completed roadway-related projects (e.g., rehabilitation of 33 miles of Bonnie Clare Road, and rehabilitation of 7 miles of Ubehebe Crater Road), the completion of the waterline replacement at Scotty's Castle, and the planned Air Tour Management Plan. Improvements associated with each of these projects (e.g., rehabilitated road surfaces, improved infrastructure, and air tour management) would have long-term beneficial impacts on visitor experience.

The preferred alternative would contribute short-term negligible adverse impacts and long-term moderate beneficial impacts to cumulative impacts. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short-term negligible and long-term beneficial impacts on health and safety.

**Conclusion.** Under the preferred alternative, road improvements would constitute a short-term, negligible impact and long-term, beneficial impact to health and safety. Cumulative impacts, in conjunction with this alternative, would have short-term negligible and long-term beneficial impacts on health and safety.



## CONSULTATION AND COORDINATION

### SCOPING

Scoping is the effort to involve agencies and citizens in determining the scope of issues to be addressed in an environmental document. Among other tasks, scoping determines important issues and eliminates issues not important; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related projects and associated documents; identifies permits, surveys, consultations, etc., required by other agencies; and creates a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise (including the California State Parks / State Historic Preservation Office, U.S. Fish and Wildlife Service, and the Bureau of Land Management) to obtain early input (see appendix A). The National Park Service also consulted with the Timbisha Shoshone Tribe.

As described throughout this document, consultation has been ongoing with the California State Parks / SHPO and the Timbisha Shoshone Tribe. The separate National Historic Preservation Act, section 106 process will result in a programmatic agreement outlining measures to mitigate the adverse effects of the preferred alternative.

A press release initiating scoping and describing the proposed action was issued on October 29, 2010 (appendix B). Comments were solicited during a public scoping period that ended December 2, 2010. No comments were received from the public. The public and agencies will also have an opportunity to review and comment on this environmental assessment.

### LIST OF PREPARERS

This environmental assessment was prepared by AARCHER, Inc., under the direction of the National Park Service.

The preparers of this document are:

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Michael Duwe	Health and Safety, Visitor Use and Experience
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Death Valley National Park and Denver Service Center staff provided invaluable assistance in the development and technical review of this environmental assessment. NPS staff that provided information include:

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## DISTRIBUTION LIST

### Agencies

Bureau of Land Management  
California Department of Fish and Game  
California Dept. of Transportation  
California State Clearing House  
California State Parks  
Inyo County Board of Supervisors  
Inyo County Planning Department  
National Park Service  
State Water Resources Control Board  
U.S. Fish and Wildlife Service

### Tribes

Timbisha Shoshone Tribe

### Organizations/Businesses

Amargosa Conservancy  
Beatty Chamber of Commerce  
Beatty Town Advisory Board  
California Desert Protection League  
California Native Plant Society  
Center for Biological Diversity  
Death Valley 49ers, Inc.  
Death Valley Chamber of Commerce  
Death Valley Conservancy  
Death Valley Natural History Association  
Desert Protective Council  
Desert Research Institute  
Furnace Creek Inn & Ranch Resort  
High Desert Multiple Use Coalition

Lone Pine Chamber of Commerce  
National Parks Conservation Association  
Native American Rights Fund  
Panamint Springs Resort  
Sierra Club

**Libraries**

Amargosa Valley Library  
Bishop Branch Library  
Independence Central Library  
Lone Pine Branch Library  
Pahrump Community Library  
Ridgecrest Branch Library



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