National Park Service
U.S. Department of the Interior
Big Bend National Park
Big Bend, Texas

Construct New Walking Trail at Dorgan-Sublett Farm

Environmental Assessment/Assessment of Effect

February 2008

Proposed New Dorgan-Sublett Trail

Environmental Assessment

Summary

The National Park Service (NPS), Big Bend National Park (Park) is considering constructing a 0.5-mile (0.8-kilometer) walking trail between the Dorgan and Sublett historic sites near the Rio Grande River within the Park's west side area. The trail would be located within the Rancho Estelle Historic District, which is between Castolon and Santa Elena Canyon. Along the new trail, wayside exhibits would be installed to interpret historic ruins. Visitors currently access historic sites by a network of several informal "social trails" from Park roads. There is currently no formal trail in the area. The existing social trails have formed from the repeated foot traffic of visitors exploring local historic sites. Many of the social trails climb steep grades and cross areas of sensitive resources, posing safety risks to visitors and causing natural and cultural resource damage.

Action is needed to address visitor safety risks and resource damage caused by multiple social trails. A sustainable trail design would focus visitor use and thereby reduce impacts to natural and cultural resources while improving visitor experience and safety. A new trail would also facilitate rehabilitation of areas that have been damaged by existing social trails.

This Environmental Assessment/Assessment of Effect (EA) evaluates three alternatives – 1) Alternative A, the No Action Alternative; 2) Alternative B, to construct a new trail and rehabilitate existing damaged areas; and 3) Alternative C, to rehabilitate damaged areas and block future access to social trails and historic sites. "Alternative A" describes the current management and condition of the area encompassing the Dorgan and Sublett sites and the environmental impacts that may occur if there were no changes in the way the Park currently manages the area. "Alternative B" describes constructing a new trail with wayside exhibits and rehabilitating areas damaged by the existing social trails." Alternative C" describes rehabilitating areas damaged by existing social trails and taking measures to block visitors from accessing historic sites in the area.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that: 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts to Big Bend National Park's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of adverse impacts. Resource topics analyzed in this document include archeological resources, historic structures, visitor experience and safety, and Park operations. These topics were chosen by the interdisciplinary team, because one or more of the alternatives has the potential to have greater-than-minor impacts on these resources. Several other resource topics were considered but dismissed from further analysis, because none of the alternatives would have measurable impacts to these resources. Neither of the action alternatives is anticipated to have any major impacts on Park resources or values. Public scoping was conducted to facilitate the development of this document, and comments were received from three government agencies and two individuals. Comments are addressed in the appropriate sections of the following environmental analysis.

Public Comment

If you wish to comment on this EA, you may post comments online at http://parkplanning.nps.gov/bibe or mail comments to: Superintendent; Big Bend National Park; P.O. Box 129; Big Bend National Park, Texas 79834. This EA will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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ABBREVIATIONS AND ACRONYMS

BIBE	Big Bend National Park
BBH#	Big Bend Historic Structure Number
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	NPS Director's Order
EA	Environmental Assessment
ESA	Endangered Species Act
GMP	General Management Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
TCEQ	Texas Commission on Environmental Quality
UNESCO	United Nations Educational, Scientific and Cultural Organization
EPA	United States Environmental Protection Agency

NOTES ON NEPA TERMS AND ANALYSES

The words "effect" and "impact" are synonymous in the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.8(b)), which implement the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq*). In accordance with the CEQ regulations and NPS Director's Order #12, *Conservation Planning, Environmental Impact Analysis, and Decision-making* (DO-12), NEPA documents must consider "beneficial" effects and impacts as well as "adverse" effects and impacts (see 40 CFR 1508.8(b) and 40 CFR 1508.27(b)(1)). Therefore, use of the words effect and impact under NEPA can refer to both adverse and beneficial environmental changes. Conversely, the term "effect" has different meaning in the context of other environmental laws, such as the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA). Specific language relevant to the implementing regulations for these laws will be called out with quotation marks when applicable.

EAs are public documents written for use by a general audience as well as agency officials and technical experts. As stated in the CEQ regulations and the NPS DO-12, EAs are intended to provide a concise and clear overview of environmental analysis. Therefore, discussions of issues in EAs generally summarize larger bodies of data used in the environmental analysis. The "References" section of this document provides a list of public domain data sources for those who wish to conduct a more detailed study of topics discussed here.

PURPOSE AND NEED

Introduction

Big Bend National Park (Park) was established on June 20, 1935 by an act of Congress "for recreational park purposes…[and]…for the benefit and enjoyment of the people." The Park encompasses more than 801,000 acres in south Brewster County in southwest Texas (Figure 1). The "big bend" of the Rio Grande River forms the Park's southern international boundary with Mexico. The Park has national significance as the largest protected area of Chihuahuan Desert topography and ecology in the United States (NPS 2004) and has international significance as a designated biosphere reserve (UNESCO 1976). The Park's river, desert, and mountain environments support an extraordinary richness of biological diversity and provide unparalleled recreational opportunities. The Park's geology offers opportunities to study igneous and sedimentary processes, including Cretaceous and Tertiary processes of paleontological interest. Archeological and historic resources provide examples of cultural interaction in the Big Bend Region and the varied ways humans have adapted to the desert and river environments (NPS 2004).

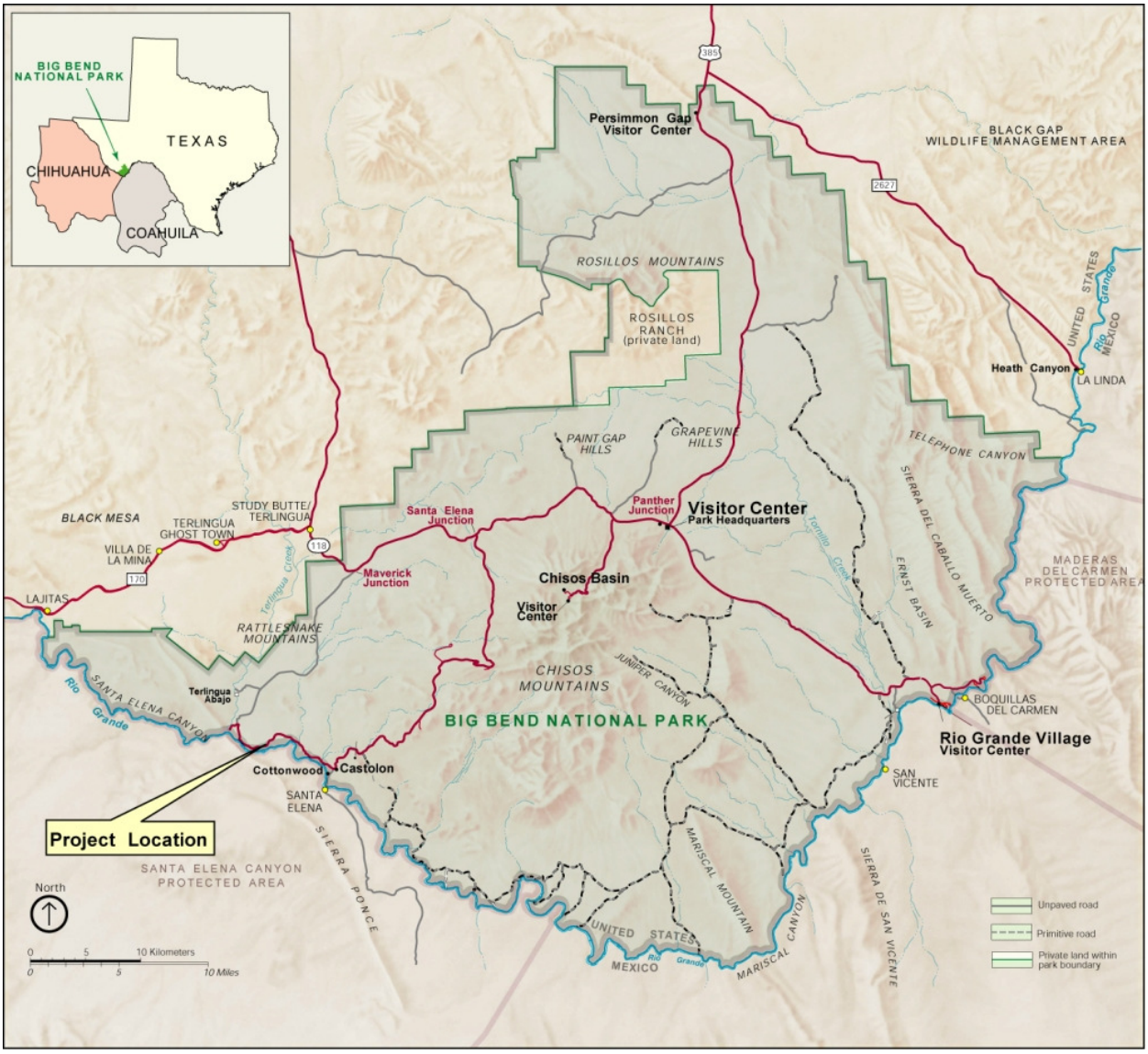
Background

The project area is located near the Rio Grande River in the Park's west side between Santa Elena Canyon and Castolon (Figure 1). The project area for this environmental analysis encompasses the Rancho Estelle Historic District, which is listed in the National Register of Historic Places (National Register). The project area includes archeological resources associated with the remains of five historic structures built as part of the Dorgan and Sublett farming venture of the early Twentieth Century (Figure 2).

Visitors exploring the area's historic resources have left a complex network of multiple social trails through and around historic ruins and their associated sites. In many areas, these social trails climb steep grades. Through erosion, the tread surfaces of many of these social trails have become rutted and unstable. Erosion and trampling associated with the social trails has caused damage to natural and cultural resources, and in many areas, the trails threaten to undercut historic structures. The steepness and instability of many of the social trails also presents safety risks to visitors exploring the historic district.

The social trails leading to the eastern segment of the project area were previously semi-formalized by a sign leading visitors up one of the historic roads then making a sharp turn up a steep slope. The trail on the slope was marked with small rock cairns, but no formal design was ever laid out for this trail and it appears to have originated as one of the social trails, which the Park later marked as a Park trail. Parking for this semi-formalized trail was on a blind curve, and therefore the Park determined that the access point for the trail was unsafe, and the Park therefore closed access to the trail. Boulders were placed where the old historic road intersected Park Route 16, and it has since become overgrown and unrecognizable as a road or as a trail. The path is still marked by rock cairns in some places on a hill slope west of historic structure BBH-12 (Figure 2), but most of the trail has been washed away, because the trail surface was steep and unstable.

Figure 1 – Project Location within the Park



Need for Action

Action is needed to address unsafe conditions for visitors exploring historic sites and to address resource damage from social trails. Three of the historic ruins in the area have standing walls that are visible from Park Route 16 (popularly known as the Santa Elena Road). These structures include the Dorgan Residence (BBH-139), the Stone Farm House (BBH-15), and the Farm Hand's Casita (BBH-13) (Figure 2). The visibility of these three historic structural ruins draws visitors into the area to explore the historic sites. The most visible of the three structures is the Dorgan Residence (BBH-139), which sits atop a mesa adjacent to Park Route 16 (Figure 3). Visitors who are attracted by these historic features often park at various points along Park Route 16 to walk to the historic sites or often to hike up steep slopes adjacent to the road. Locations where visitors currently park to access the sites are often unsafe locations to park vehicles, including informal turnouts on narrow road shoulders and blind curves.

Figure 2 – Project Area Overview Showing Historic Structures

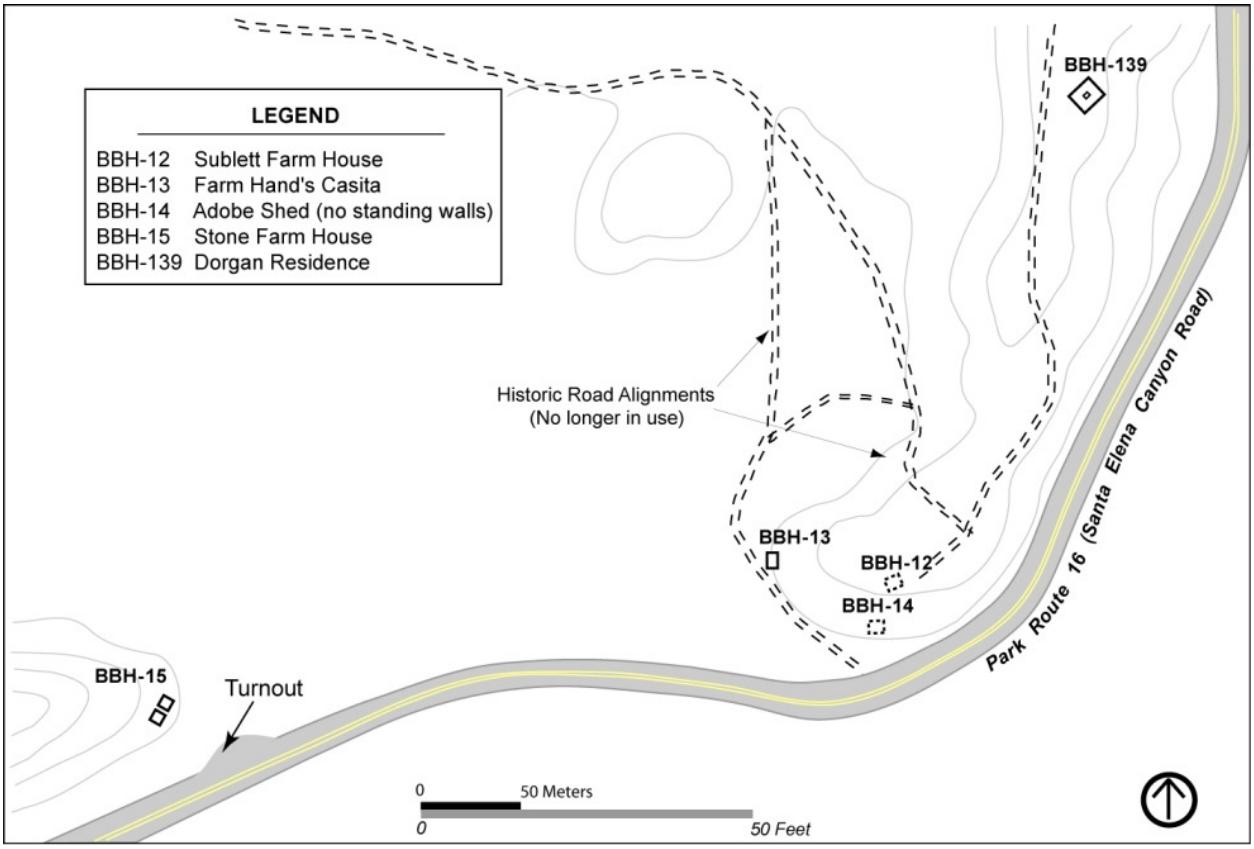
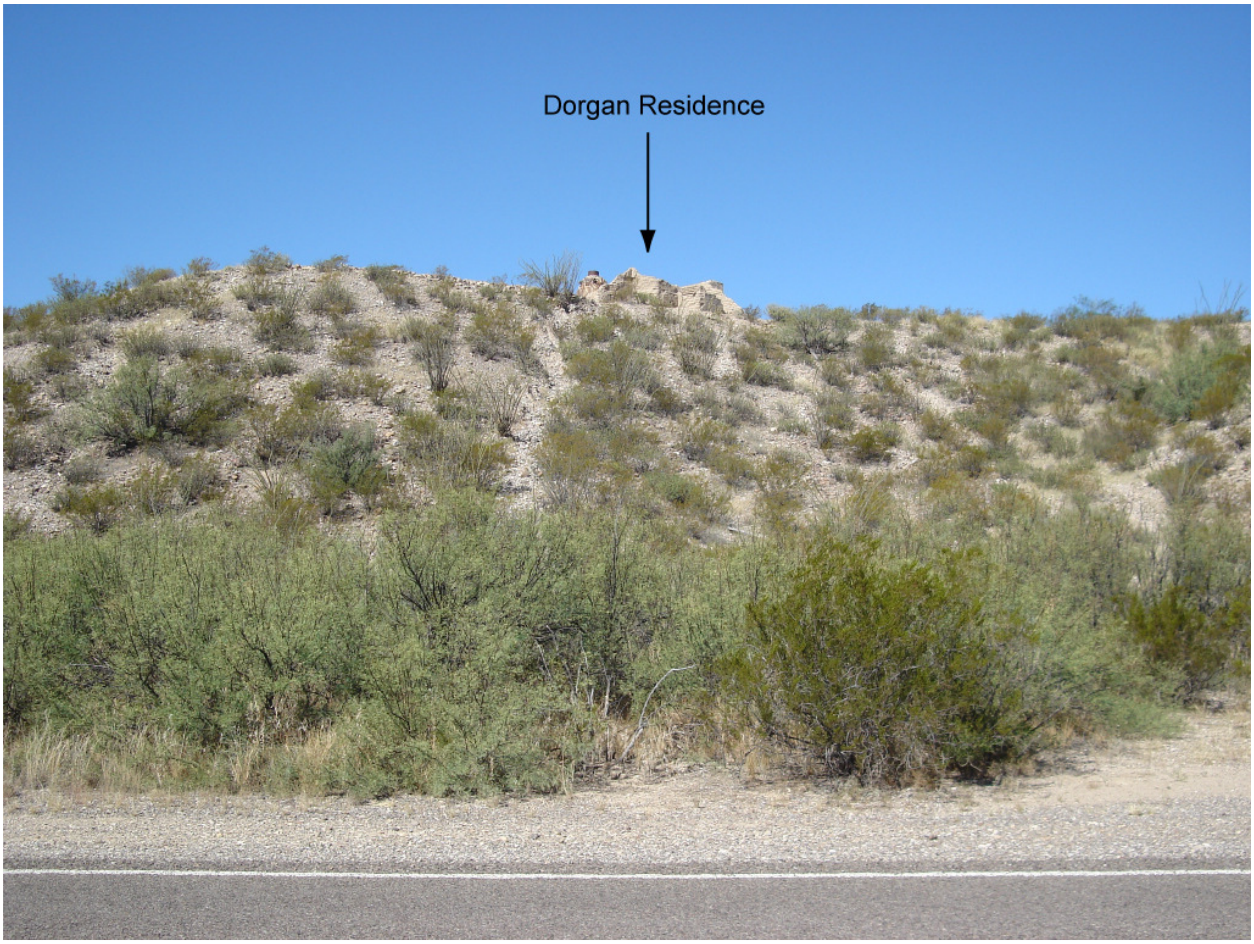


Figure 3 – Dorgan Residence Ruins as seen from Park Route 16



Purpose and Park Objectives

The purpose of this proposal is to provide for visitor safety and resource protection by correcting existing problems associated with social trails near sites within the general area of the Rancho Estelle Historic District. These objectives are consistent with the Park's enabling legislation. The primary objectives of the proposal are as follows:

1. Improve visitor safety.

2. Minimize impacts to Park resources in the project area.

3. Provide improved interpretation of historic resources in the project area.

This Environmental Assessment/Assessment of Effect examines potential environmental impacts associated with three alternatives – Alternative A, the No action Alternative; Alternative B, the proposal to construct a new trail and subsequently rehabilitate areas damaged by social trails; and Alternative C, the proposal to rehabilitate areas damaged by social trails and block future access to historic sites. This Environmental Assessment/Assessment of Effect has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations (40 CFR 1500 *et seq*), NPS Director's Order #12, *Conservation Planning, Environmental Impact Analysis, and Decision-making* (DO-12), Section 106 of the National Historic Preservation Act (NHPA), NPS

Director's Order #28, *Cultural Resources Management* (DO-28); and NPS- 28: *Cultural Resource Management Guideline.*

Relationship to Other Plans and Policies

Plans and policies relevant to the alternatives analyzed here include the Park's enabling legislation, the Park's General Management Plan (GMP)(NPS 2004), and NPS *Management Policies 2006* (NPS 2006). The following summarizes how construction of the new Dorgan-Sublett trail would meet the goals and objectives of these plans and policies:

- The Park's enabling legislation states that the Park was set aside "for recreational park purposes…[and]…for the benefit and enjoyment of the people." The proposed trail would meet the objectives of the Park's enabling legislation by improving visitor enjoyment of Park historic resources.

- The central objective of the Park's GMP (NPS 2004) is to enhance visitor experience while adequately protecting Park resources. The Park's GMP states that, as time and funding permit, the Park preserves and interprets cultural resources that are listed in or eligible for listing in the National Register of Historic Places (National Register). The proposed new trail would enhance interpretation of a National register-listed historic district.

- NPS *Management Policies* 2006 (NPS 2006) state that trails "will be planned and developed as integral parts of each park's transportation system... Trails and walks will serve as management tools to help control the distribution and intensity of use. All trails and walks will be carefully situated, designed, and managed to: reduce conflicts with automobiles and incompatible uses; allow for a satisfying park experience; allow accessibility by the greatest number of people; and protect park resources." The proposed trail has been designed to meet these objectives.

Impairment

NPS *Management Policies 2006* require analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

1. necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; or

2. key to the natural or cultural integrity of the park; or

3. identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made in the Conclusion section for each of the impact topics carried forward in the "Environmental Consequences" chapter of this document.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the NPS will apply a standard that offers greater assurance that impairment will not occur. The NPS will do this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts, and they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would:

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

In accordance with *NPS Management Policies 2006*, park managers must not allow uses that would cause unacceptable impacts to park resources. To determine if unacceptable impacts could occur to the resources and values at Big Bend National Park, the impacts of proposed actions in this environmental assessment/assessment of effect were evaluated based on the above criteria. A determination on unacceptable impacts is made in the *Conclusion* section for each of the impact topics carried forward in the "Environmental Consequences" chapter of this document.

Appropriate Use

Section 1.5 of *NPS Management Policies 2006*, *Appropriate Use of the Parks*, directs that the NPS must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts. Section 8.1.2 of *NPS Management Policies 2006*, *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies; and
- consistency with existing plans for public use and resource management; and
- actual and potential effects on park resources and values; and
- total costs to the NPS; and
- whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it.

Visitor use trails are common and vital structures in most park units. Proper location, sizing, and construction methods would ensure that unacceptable impacts to park resources and values would not occur. The proposed construction of the Dorgan-Sublett Trail is consistent with the Park's general management plan and other related Park plans. With this in mind, the NPS finds that the Dorgan-Sublett Trail is an acceptable use at Big Bend National Park.

Scoping

Scoping is a process intended to identify the resources that may be affected by a proposed action, and to explore possible alternative ways of achieving the objectives of a proposed action while minimizing adverse impacts. Big Bend National Park conducted both internal scoping with appropriate NPS staff and external scoping with the public and other agencies.

Internal scoping was conducted with an interdisciplinary team of environmental resource, visitor use, and trail maintenance specialists from Big Bend National Park. Project information needed to begin internal scoping was entered into the NPS "Planning, Environment and Public Scoping" (PEPC) database system in February 2007. Interdisciplinary team members were provided details of the proposed new trail through the completion of an "Environmental Screening Form," recorded in PEPC in May 2007. Additionally, interdisciplinary team members met on October 16, 2007 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and to develop mitigation measures. Additionally, some interdisciplinary team members conducted site visits to the proposed project area prior to the internal scoping meeting.

External scoping was initiated with the distribution of a scoping letter to inform the public of alternatives under consideration, and to generate input relevant to the preparation of this EA. The scoping letter, dated November 29, 2007, was mailed to interested parties including local, State, and Federal agencies; special interest groups; academic institutions; businesses; and individuals. In addition, the scoping letter was mailed to the Park's seven affiliated Native American tribes. Scoping information was also posted on the Park's website, and a press release notifying the public of the scoping period was issued to several media outlets.

During the 30-day scoping period, two responses were received. One response was from an unaffiliated individual, who made a general comment about public enjoyment of National Parks but did not specifically reference the project. The second response was from the U.S. Fish and Wildlife Service (USFWS) requesting further information about the Park's assessment of potential effects to federally listed species and their habitats. The Park has responded in a letter report outlining assessments conducted by the Park's Biologists, which documented the data used to make a determination of "no effect" to federally listed species or their habitats. The Park will complete consultation with USFWS prior to concluding the NEPA process.

Impact Topics Retained for Further Analysis

Impact topics analyzed for all three alternatives have been identified on the basis of Federal laws and regulations, NPS Director's Orders, NPS *Management Policies 2006* (NPS 2006), and NPS knowledge of resources at Big Bend National Park. Impact topics that are carried forward for further analysis in this Environmental Assessment/Assessment of Effect are listed below along with the reasons why the impact topic is further analyzed. The regulatory context and affected environment of impact topics are also discussed below. The discussion of regulatory context provides background on agency mandates and responsibilities with regard to each impact topic. The affected environment discussion provides a baseline of existing conditions and general environmental context of the project area, which is used to analyze

potential impacts of each alternative in the “Environmental Consequences” chapter of this document.

Historic Structures (Ruins)

Although the topic of archeological resources is carried forward for further analysis, the primary focus of the cultural resources analysis is the historic structures of the area, which are part of archeological sites that form the overall historic district. *NPS-28: Cultural Resource Management Guideline* defines a historic structure as “a constructed work . . . consciously created to serve some human activity" (NPS 1998). The project area contains the remains of five historic structures that are listed in the National Register of Historic Places (National Register) as part of the Rancho Estelle Historic District (Figure 2). The primary significance of the Rancho Estelle Historic District lies in its importance in early Twentieth Century floodplain farming along the Rio Grande.

The project area is associated with the historic farming partnership between Albert Dorgan and James Sublett. The historic district’s National Register nomination states that Albert Dorgan was the son-in-law of James Sublett. James Sublett had settled in the area in 1914 or 1915 when he was hired to clear, irrigate, and farm land owned by Clyde Buttrill a few miles down river from the present study area. When Buttrill sold his land in 1918, Sublett bought four sections of land, which comprise the study area, and he started “Grand Canyon Farms” with Dorgan. Prior to Dorgan and Sublett beginning their farming enterprise, the land had been known as “Rancho Estelle,” named after L.V. Steele, who had previously used the area as ranch land.

Beginning in 1918, Dorgan and Sublett began clearing and irrigating the land to grow crops to support the local mining population. The Sublett family also began construction of an adobe house (BBH-12) on a hill top, which became the focal point of the Dorgan-Sublett complex (Casey 1969). At the toe of the slope just south of BBH-12, Sublett built an adobe structure to serve as a store (BBH-14). West of and down slope of BBH-12, another adobe (BBH-13) was built by Sublett to house hired farm hands. To the west of BBH-13 approximately 0.5 mile (0.8 kilometer), a stone house (BBH-15) was built, and the Dorgan family lived in that residence until building another residence (BBH-139) approximately ten years later. The Dorgan Residence (BBH-139), which sits approximately 0.5 mile (0,8 kilometer) northeast of BBH-15, was built some time in the late 1920s or early 1930s.

The Dorgan Residence is often cited as evidence that Dorgan was an “architect of some note” (Casey 1969). However, the general characteristics of the Dorgan Residence and the other structures in the area are best described as examples of vernacular architecture. Vernacular architecture is often described as “architecture without architects” and its defining characteristics are that it is usually constructed with primarily local found materials, using simple construction methods, without formal plans that would follow established architectural design concepts. Materials used to construct all five structures and their associated features include local natural materials such as wood, river cane, hand-made adobe brick, sandstone, and petrified wood; as well as commercially sold materials such as concrete, nails, and milled wood.

The five National register-listed historic structures in the general project area have been referenced by several different names in the literature. The names for the five structures as recorded in the National Register nomination are used here for consistency in referencing the nomination documents. The historic structure numbers assigned by the NPS are also used for consistency in referencing Park files. Names and descriptions for each of the historic structures follow:

BBH-12, Sublett Farm House: This structure was recorded in the National Register nomination as being a one-story adobe house with a cane and viga roof and a covered porch across the front of the structure (Battle 1974). The interior spaces were comprised of two rooms separated by a central hall. Today, little more than adobe melt remains, which is sitting on the thin veneer of concrete that once formed the house’s floor surface (Figure 4). This structure served as the Sublett family’s main residence from the time it was built, which was shortly after the Sublett’s bought the land in 1918. The exact date of construction is not known.

Figure 4 – Photograph of the Sublett Farm House (BBH-12) Ruins in 2007

BBH-13, Farm Hand's Casita: This structure was recorded in the National Register nomination as a "Typical Mexican farm worker's adobe home" (Battle 1974). It is a two-room, one-story adobe brick structure with stone-capped walls that form parapets for the flat roof (Figure 5). The original masonry bricks appear to have been a standardized size and shape and they are primarily laid in a running bond pattern (characterized by evenly staggered interlocking mortar joints). The parapet capstones are unshaped, semi-coursed sandstone ledgerock. Wooden canales drain water through the parapets from the roof, which has been recorded as having been originally constructed of cane and log vigas. The roof was reconstructed in 1985, and other stabilization and rehabilitation has been conducted on the structure from at least as early as 1962. The structure was likely constructed in the early 1920s. This structure is believed to have served as housing for hired farm hands working for the Dorgan-Sublett farming operations throughout the 1920s and 1930s.

Figure 5 – Photograph of Farm Hand's Casita (BBH-13) taken in 2007

BBH-14, Adobe Shed: This structure was recorded in the National Register nomination as a "one-story, single room adobe structure which served variously as a warehouse and store" (Battle 1974). In 1974, the roof was already gone and the walls had deteriorated substantially. Today there are little or no identifiable features left of the structure. The structure was likely constructed in the early 1920s.

BBH-15, Stone Farm House: This structure was recorded in the National Register nomination as "2 apartments separated by a day room, at the end of which was an outdoor cooking area and fireplace" (Battle 1974). The structure was likely constructed shortly after the Subletts bought the land in 1918. The walls are constructed of a mix of stone masonry and adobe brick (Figure 6). Masonry wall segments are semi-coursed sandstone blocks and sandstone ledgerock. It is not known how the roof was originally constructed. The National Register nomination suggests that the structure was probably used to house farm workers. However, a culture history of the area conducted in the 1960s notes that Albert Dorgan and his wife lived in the residence for at least their first ten years at the Dorgan-Sublett complex (Casey 1969). The structure is often referred to as the "Sublett Stone Farm House," though it is not clear if the Sublett family ever lived in the house or if the name is simply a reference to the Sublett Farm in general.

Figure 6 – Photograph of Stone Farm House (BBH-15) taken in 2007

BBH-139, Dorgan Residence: As stated in the National Register nomination, the Dorgan Residence "has outstanding architectural merit among the remaining structures of its time, type, and place" (Battle 1974). The structure was a one-story ranch home of primarily adobe brick wall construction with a total footprint of approximately 1,200 square feet (111 square meters) (Battle 1974). A unique feature of the construction is the large square main room, measuring 30ft X 30ft (9m X 9m) with a two-way fireplace constructed of petrified wood with concrete mortar. The fireplace sits in the center of the structure and it acted as a structural pier to support very large cottonwood log beams extending to the corners of the structure and forming a hipped, almost flat roof with the large chimney at the apex. The roof is now gone and the structure is in ruins. Other significant architectural features include the jambs and lintels, which are hand-hewn logs with saw-cut mortised joints. Lintels over the main entrance are carefully selected cured logs forming segmental arches. Floors are concrete slab. The floor plan consists of the large main room and three smaller rooms on the northeast and southwest sides. The southeast side was opened to a covered ramada overlooking the floodplain of the Rio Grande and Mexico to the south. Walls were originally plastered on their exterior and interior surfaces.

Figure 7 – Photograph of Dorgan Residence (BBH-139) taken in 2007

Four of the above-mentioned structures (BBH-12, BBH-13, BBH-15, and BBH-139) are adjacent to the proposed new trail alignment. Because all three alternatives have the potential to affect historic structures, this topic has been retained for further analysis.

Archeological Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended (16 USC 470 et seq.); NPS Director's Order #28, *Cultural Resources Management* (DO-28); NPS-28, *Cultural Resource Management Guideline* (NPS 1998); and NPS *Management Policies 2006* (NPS 2006) require the NPS to consider the effects of their undertakings on historic properties that are listed in or eligible for listing in the National Register, and to consult with State Historic Preservation Officers in their determinations of eligibility and project effects. The National Register contains a wide range of historic property types, including historic buildings and structures, archeological sites, groups of buildings or sites forming historic districts, cultural landscapes, and individual objects. The potential to affect eligible cultural resources (historic properties) must be evaluated for the entire "area of potential effects" (APE) for a given undertaking. The APE is defined as the entire footprint of all project activities and associated actions, and it may include the viewshed surrounding the project footprint.

Archeological resources are the tangible remains of human occupations that are no longer in use. As stated in NPS-28, "[a]rcheological studies address research questions historians and historical architects may have about the location, construction methods, developmental history, age, and use of historic and prehistoric sites and structures for which only ruins or subsurface remains now exist." The NPS Director's Order 28B *Archeology*, affirms a long-term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the National Park System. As one of the principal stewards of America's heritage, the NPS is charged with

the preservation of the commemorative, educational, scientific, and traditional cultural values of archeological resources for the benefit and enjoyment of present and future generations. Archeological resources are nonrenewable and irreplaceable, so it is important that all management decisions and activities throughout the National Park System reflect a commitment to the conservation of archeological resources as elements of our national heritage.

The project area is a National Register listed historic district that contains archeological resources, including the ruins of historic structures. Although the historic structures in the Rancho Estelle District constitute archeological resources as well as historic structures (see National Register Bulletin 15: pp. 4, 21), for the purpose of analyzing this impact topic, archeological resources include historic features and objects other than the historic ruins that have already been discussed above under the topic "Historic Structures."

Surface artifacts associated with the archeological sites in the project area are extremely sparse (averaging no more than one artifact per every 100 square meters [1,076 square feet]). The sparse surface artifacts suggest that artifact scatters in the area likely have limited information potential. However, there may be artifacts in subsurface contexts that retain sufficient integrity to contribute to the information potential of sites in the Rancho Estelle Historic District. Other archeological remains in the area include various features such as concrete stock tanks and infrastructure associated with the main structures in the historic district. Features in the area have retained sufficient integrity to contribute to the information potential of sites in the historic district. Infrastructure includes informal two-track roads that once connected historic residences in the area. The historic roads do not have any constructed features and lack physical integrity, therefore their significance lies in their alignment alone.

The archeological resources in the project area are significant for their potential to contribute information to an overall understanding of early farming and ranching along the Rio Grande floodplain. The significance of the Rancho Estelle Historic District is discussed in greater detail above under the topic "historic structures." Although all of the alternatives would affect individual artifacts and features associated with archeological resources in the area, no intact deposits or features exist within the APE, and therefore neither of the action alternatives would impact any characteristics of these resources qualifying them for National Register inclusion. The Park Archeologist has therefore determined that a finding of "no adverse effect" is appropriate in compliance with NHPA, Section 106 (pers. Comm., Thomas Alex, Big Bend National Park Archeologist, October 2007). To ensure that neither of the action alternatives would have an "adverse effect" on archeological resources, the Park Archeologist has developed mitigation measures to protect archeological resources, including a collection strategy for artifacts and avoidance measures in the trail's design. These mitigation measures are discussed in greater detail in the "Environmental Consequences" chapter of this document. Although none of the alternatives would have greater than minor effects on archeological resources under NEPA, this topic has been retained for further analysis to provide a discussion of Section 106 compliance for archeological resources.

Visitor Experience and Safety

According to NPS *Management Policies 2006* (NPS 2006), the enjoyment of park resources and values by people is part of the fundamental purpose of all NPS units. The NPS is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks. Within the parks, NPS maintains an atmosphere that is open, inviting, and accessible to all. Further, the NPS provides opportunities for forms of enjoyment that are uniquely suited and appropriate to the exceptional natural and cultural resources found in the parks. The NPS *Management Policies 2006* (NPS 2006) also states that scenic views and visual resources are considered highly valued associated characteristics that the NPS should strive to protect.

Big Bend National Park typically receives between 300,000 and 400,000 visitors every year. Approximately 80% of visitors use the Park's trails. The Park's trails include walking and hiking trails that interpret many of the Park's significant cultural resources. Currently, the project area is open to visitors, but no formal trail has been constructed in the area and there no signs or other interpretative media

available for visitors who wish to learn about the historic resources within the Rancho Estelle historic district. Visitors currently explore the area from one formal pullout and several unsafe informal pullouts along Park Route 16. Visitors use steep, unstable social trails to access historic ruins. Because all three alternatives have the potential to affect visitor experience and safety, this topic has been retained for further analysis.

Park Operations

Parks must consider the potential effects of proposed actions on park operations. Currently, periodic road maintenance is the only park operation carried out in the general vicinity of the project area. Existing road maintenance operations would not be affected by any of the alternatives. Park operations that could be affected by alternatives include trails maintenance, interpretation, resource management, and curation operations. There is currently no trail maintenance program associated with the project area, no interpretive programs are conducted in the area, and the Park has not collected artifacts from the archeological sites. If the alternative to construct a new trail is selected, all three of these activities would increase in the area. If the alternative of closing social trails is selected, maintenance and resource management activities would increase and there is potential that law enforcement activities may increase. Because both of the action alternatives have the potential to have greater-than-minor effects on some Park operations, this topic has been retained for further analysis.

Impact Topics Dismissed From Further Analysis

The following presents an overview of impact topics that were considered but ultimately dismissed from further analysis. Impact topics were dismissed from further analysis if it was determined that the project did not have the potential to cause substantial change to these resources and values. The regulatory context and baseline conditions relevant to each impact topic were analyzed in the process of determining if a topic should be retained or dismissed from further analysis. An outline of background information used in considering each topic is provided below along with the reasons for dismissing each topic from further analysis.

Soils

NPS Management Policies 2006 (NPS 2006) state that the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. These policies further state that “[m]anagement action will be taken by superintendents to prevent or at least minimize adverse, potentially irreversible impacts on soils.”

Soils in the project area include soil map units identified by the USDA, Natural Resources Conservation Service (NRCS) as “Tornillo loam, occasionally flooded” (TOA) and “Chamberino very gravelly loam, rolling” (CHD) (NRCS 1985). TOA soils characterize the lower elevation portion of the project area, and CHD soils characterize the small hills and mesas in the area.

TOA soils are defined as deep, nearly level to gently sloping soils on broad alluvial flats in valley floors. Slopes are 0-3% (0-1.7 degree slopes). Tornillo soils make up approximately 70-100% of the TOA map unit, and the remainder are Pantera soils. Tornillo soil is well drained with slow to medium surface runoff and moderate permeability. In most areas, creosotebush and grasses are the dominant vegetation on TOA soils. In the project area, TOA soils form an alluvial fan that is cut by three to four narrow arroyos running approximately northwest to southeast. These arroyos support nearly all of the trees in the area. The NRCS-defined use categories for this soil map unit include recreation and wildlife habitat.

CHD soils are defined as deep, very cobbly and very gravelly, calcareous soil. Slopes are 5-15% (2.9-8.6 degree slopes) with generally rolling topography occasionally cut by steep drainages. Nearly all historic features in the area are found on the ridge tops and slopes of this soil map unit. Chamberino soil makes

up 60-80% of the CHD soil map unit, and the remainder are Tornillo and Pantera soils. Chamberino soil is well drained with medium surface runoff and moderate permeability.

Both action alternatives would involve some manipulations of soils to rehabilitate damaged areas and/or to clear and subsequently compact a small area of soil for the trail tread surface. These actions would have negligible effects on soils. Although the Park's resource specialists are concerned about the erosive effects associated with the No action Alternative, these concerns are associated with the potential effects to other resources such as cultural resources rather than with the potential that natural soil processes are being substantially altered. Therefore, because none of alternatives would have greater than negligible effects on natural soil processes, this topic has been dismissed from further analysis.

Topography and Geology

NPS *Management Policies 2006* (NPS 2006) states that the NPS will preserve and protect geologic features and geologic processes as integral components of park natural systems. The project area is located near the Rio Grande River within the general geographic area known as the Basin and Range physiographic province. The project area is located at an elevation ranging from 2160-2200 feet (658-670 meters) above mean sea level. The topography varies from flat alluvial plains to low-lying rolling hills and mesas. The geology of the area is primarily characterized by the Late Cretaceous sedimentary Aguja Formation.

Under the action alternatives, negligible ground disturbance would be required to rehabilitate damaged areas and/or to achieve the gradual grade climb necessary to provide a sustainable design for segments of the new trail on hill slopes. Soils and rock removed during construction of the new trail would be used to rehabilitate eroded segments of social trails that would no longer be used. None of the rock used in the rehabilitation of the existing social trails would be collected from pristine or large bedrock outcrops. Rehabilitating the eroded social trails and restoring the natural grade in these areas is expected to have a negligible to minor beneficial effect on local geology by reducing erosion. Although the Park's resource specialists are concerned about the erosive effects associated with the No Action Alternative, these concerns are associated with the potential effects to other resources such as cultural resources rather than with the potential that topography and geology would be substantially altered. Therefore, because none of the alternatives would have an effect on topography and geology that would be greater than minor, this topic has been dismissed from further analysis.

Paleontological Resources

NPS Management Policies 2006 states that paleontological resources (fossils), including both organic and mineralized remains in body or trace form, will be protected, preserved, and managed for public education, interpretation, and scientific research (NPS 2006). The Park is known to contain an abundance and diversity of paleontological resources representing an uninterrupted 35 million-year-long fossil record, which includes fossil remains of dinosaurs, crocodiles, turtles, plants, fish, amphibians, and early mammals. The proposed project site is located on the surface of the Aguja Formation, which has been found to contain abundant fossils in some areas of the Park. The Aguja Formation dates to the Campanian Stage (approximately 85-70 million years ago) of the Late Cretaceous Period, and it is composed of sandstones interbedded with shale and lignite. Large vertebrates that are commonly found in the Aguja Formation include the giant crocodilian, the horned dinosaur, and the hadrosaur. While there are no known paleontological resources in the project area, the possibility exists that previously unidentified fossils may be uncovered by ground disturbing activities associated with either of the action alternatives. The Division of Science and Resources Management, in coordination with Park's Trails Supervisor, has developed mitigation measures to ensure protection of paleontological resources. If previously unidentified paleontological resources should be found during ground disturbing activities associated with either action alternative, work would stop in the area of the discovery and the Park's Archeologist and Geologist would determine the appropriate treatment of those resources in accord with *NPS Management Policies 2006.* Because there are no known paleontological resources in the project area and because the Park has developed mitigation measures to manage any potential discovery of

previously identified paleontological resources, it is expected that none of the alternatives would have an effect on these resources or that effects could be mitigated to ensure that they would be less than minor. Therefore, because none of the alternatives would have greater-than-minor effects on paleontological resources, this topic has been dismissed from further analysis.

Water Resources including Wetlands

Surface waters of the United States are regulated by the Clean Water Act (CWA). The purpose of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters". The CWA is the primary authority under which the U.S. Environmental Protection Agency (U.S. EPA), the Texas Commission on Environmental Quality (TCEQ), and the Army Corps of Engineers (ACOE) regulate surface effects to waters within the boundaries of Texas. The BOR also has jurisdiction over some surface waters in Texas, including the Rio Grande.

Executive Order 11990 *Protection of Wetlands* requires Federal agencies to avoid, where possible, adversely impacting wetlands. NPS *Management Policies 2006* (NPS 2006) and Director's Order 77-1 *Wetlands Protection*, mandate that the NPS will strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. For regulatory purposes, the term "wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and other similar areas.

The Park's hydrologist has determined that the project area is not located within or adjacent to wetlands. Additionally, none of the alternatives has the potential to cause measurable change to water quality or quantity (pers. comm. Jeffrey Bennett, NPS Hydrologist/Physical Scientist, October 2007). Because none of the alternatives has the potential to cause measurable change to surface waters and there are no wetlands within or adjacent to the project area, this topic has been dismissed from further analysis.

Floodplains

Executive Order 11988 *Floodplain Management* requires all Federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. As per NPS *Management Policies 2006* (NPS 2006) and Director's Order 77-2 *Floodplain Management*, NPS is mandated to strive to preserve floodplain values and minimize hazardous floodplain conditions. The project area would be located within a floodplain. However, none of the alternatives would involve construction in a floodplain, nor would any alternative adversely impact floodplains. Therefore, this topic has been dismissed from further analysis.

Air Quality

The Clean Air Act (CAA) of 1963 (42 U.S.C. 7401 et seq.) was established to promote public health and welfare by protecting and enhancing the nation's air quality. Section 118 of the CAA requires the Park to meet all Federal, State, and local air pollution standards. Because the Park is a national park encompassing more than 6,000 acres, it is classified as a Class I airshed under the CAA, as amended. This stringent air quality classification protects Class I airsheds from air quality degradation. The CAA outlines the responsibility of Federal land managers in protecting air quality and related values and resources including visibility, plants, animals, soils, water quality, cultural resources, and public health from adverse air pollution impacts. Under the 1990 CAA Amendments, the U.S. EPA sets limits for quantities of certain airborne pollutants in the United States. These limits are referred to as the National Ambient Air Quality Standards (NAAQS). Six criterion air pollutants are monitored for compliance with NAAQS: Carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), fine particulate matter (PM10 and PM2.5), sulfur dioxide (SO2), and lead (Pb). New developments or operations that have the potential to be "major point sources" of air pollutants must apply for operating permits under the Federal Title V operating permit program ("Part 71 Program"). Areas where pollutant levels are above the NAAQS limits, and therefore are not in compliance with the NAAQS, are termed "non-attainment areas." In non-

attainment areas, local ordinances and State policies may require stricter monitoring of even minor sources of air pollution.

The only air quality monitor within Brewster County is located within the Park boundaries. Data recorded by the Park's air quality monitor for the 2007 calendar year include data for ozone and fine particulate matter of 2.5 micrometers (approximately 0.0001 inches) or less. These data indicate that neither of these pollutants has exceeded the NAAQS in the overall Park vicinity. The project area is not in a non-attainment area and neither action alternative has the potential to be a "major point source" of air pollution under the CAA. Additionally, neither action alternative has the potential to affect visibility or any other air quality values defined for Class I airsheds. None of the alternatives has the potential to have measurable impacts on air quality. Therefore, this topic has been dismissed from further analysis.

Vegetation

According to the NPS *Management Policies 2006* (NPS 2006), NPS strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants. The NPS *Management Policies 2006* (NPS 2006) also contains management guidelines for avoiding the introduction of exotic plant species, and removal, when necessary, of exotic plant species from NPS units.

The project area is characterized by desert scrub and floodplain/upland riparian vegetation. The flat alluvial fan of the lower portions of the project area varies from grasslands dotted with creosotebush to dense mesquite thickets. Thickets are formed mostly along arroyos that cut the alluvial plain, generally running northwest to southeast. Common species in the general vicinity of the project area may include screwbean, willow, desert willow, acacia, common reed, creosote, tarbush, lechuguilla, mariola, prickly pear, candelilla, hetchia, tobosa grass, sacaton, and chino grama. The exotic invasive buffelgrass was identified within the project area, and the exotic saltcedar and giant reed were identified near the project area, but outside the area of consideration for this analysis.

If the alternative of constructing a new trail is selected, a narrow path of vegetation would be cleared through the flat alluvial fan areas associated with the project, where vegetation is most dense. This clearing would have only a negligible effect on the overall plant composition and structure that characterizes the general area. As a mitigation measure to prevent the spread of the exotic plant species, any buffelgrass or other exotic plants displaced or removed by project activities would not be removed from the general area in which the exotic plant is already established. The other two alternatives under consideration would have little or no effect on vegetation. Because none of the alternatives has the potential to have greater-than-minor effects on vegetation, this topic has been dismissed from further analysis.

Wildlife

NPS Management Policies 2006 (NPS 2006), states that the NPS strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of animals. The general area surrounding the proposed trail site may provide habitat for several native wildlife species that depend on desert scrub and floodplain riparian habitat types. Native wildlife in the project area may include several species of birds, mammals, reptiles, and insects. There are no known permanent water resources in the immediate vicinity of the project area that would support native amphibians or fish.

Numerous bird species are associated with Rio Grande riparian areas of the Park, including several nesting neo-tropical migrant species, such as the gray hawk, common black hawk, lesser nighthawk, black-chinned hummingbird, ash-throated flycatcher, Trail's flycatcher, Bell's vireo, Lucy's warbler, yellow-breasted chat, summer tanager, blue grosbeak, painted bunting, and Scott's oriole. Resident nesting bird species in the Park include scaled quail, white-winged dove, Inca dove, greater roadrunner, ladder-backed woodpecker, black and Say's phoebe, vermilion flycatcher, verdin, cactus wren, rock wren, black-

tailed gnatcatcher, northern mockingbird, curve-billed thrasher, crissal thrasher, canyon towhee, black-throated sparrow, northern cardinal, pyrrhuloxia, and house finch.

Mammals commonly found in riparian areas of the Park include javelina, striped and hog-nosed skunk, black-tailed jackrabbit, and desert cottontail. Other mammals may include mule deer, spotted skunk, and ring-tail cat. Rodent species commonly found use sandy soils, and brushy and grassy habitats along the river, and they include yellow-faced pocket gopher, kangaroo rats, and the desert pocket mouse. Abundant prey animals in riparian areas of the Park support the bobcat, coyote, and gray fox, and occasionally the mountain lion. Spring-fed streams and the Rio Grande support beaver.

A wide variety of reptiles occur in the riparian areas of the Park. Lizards common to the area include the southwestern earless, desert spiny, canyon, side-blotched, checkered, and marbled whiptail. Native turtle species associated with the Rio Grande watershed include yellow mud turtle, Big Bend slider, and the spiny softshell. Common snakes that are abundant park wide include the coachwhip, bullsnake, diamondback rattlesnake, black-tailed rattlesnake, blotched water snake, ringneck snake, and checkered garter snake.

The natural landscape and general wildlife habitat in the project area has been previously disturbed and altered by ranching, farming, historic residential occupation, and road construction. Alteration of the native habitat structure in the general area has included the introduction of exotic plants such as buffelgrass, saltcedar, and giant reed. The presence of humans, human-related activities, and structures has removed or altered much of the native wildlife habitat in the project area, which has limited the number and variety of wildlife occurrences locally. Noise associated with the construction and subsequent use of the proposed trail may disturb wildlife in the immediate vicinity. However, the project area is already subject to noises that may disturb wildlife as a result of the current use of Park Route 16. Therefore, the proposed new trail would not substantially increase disturbance to wildlife. Construction-related noise would be temporary, and use of the trail would create only a negligible increase in noise disturbance to wildlife. Because none of the alternatives has the potential to have a greater-than-negligible effect on wildlife, this topic has been dismissed from further analysis.

Special Status Species

The Endangered Species Act of 1973 requires examination of impacts on all federally listed threatened, endangered, and candidate species. Section 7 of the Endangered Species Act (ESA) requires all Federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) or designated representative to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In addition, the *NPS Management Policies 2006* and Director's Order 77 *Natural Resources Management Guidelines* require the NPS to examine the impacts on Federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006). For the purposes of this analysis, the USFWS and the Texas Parks and Wildlife Department (TPWD) were contacted with regards to federally listed and state-listed species to determine those species that could potentially occur on or near the project area.

The Park's Botanist and the Park's Wildlife Biologist have evaluated the project area and found that no suitable habitat for federally listed exists in the project area. Additionally, the Park has found that neither of the action alternatives would constitute a "major construction activity" as defined in 50 CFR 402.02, and therefore habitat evaluations are sufficient to document that no federally listed species are located in the project area. The Park is conducting ongoing consultation with USFWS concurrent with the NEPA process and will complete consultation before concluding the NEPA process.

The TPWD did not respond to initial scoping with any concerns regarding state-listed species. The Park will notify TPWD of the availability of the environmental assessment at the start of the 30-day public review period. Any comments or recommendations received from TPWD during the public review period will be incorporated into the Park's consideration of alternatives.

Further protection under the Migratory Bird Treaty Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition, this act serves to protect environmental conditions for migratory birds from pollution or other ecosystem degradations. Because the project would not result in substantial changes to migratory bird habitat and the increases in noise in the area would be negligible, the Park's biologist have determined that effects, if any, to migratory birds and their habitat would be negligible.

Because no threatened, endangered, or other species of concern are known to occur in the project area, the topic of threatened and endangered species was dismissed from further analysis.

Biosphere Reserves

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognized within the framework of UNESCO's program on Man and the Biosphere. Biosphere reserves are established to promote and demonstrate a balanced relationship between humans and the biosphere. Areas of sufficient size qualify for biosphere designation based on their bio-geographical diversity and their ability to preserve biodiversity through organizational and legal mechanisms designed to manage human activity and development within the framework of biodiversity objectives. None of the alternatives would impact the Park's biodiversity or other characteristics qualifying it as a biosphere, and none of the alternatives conflict with the Park's biosphere management objectives. Therefore, this topic has been dismissed from further analysis.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act states that "certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." The segment of the Rio Grande River that borders the Park is a designated Wild and Scenic River. Both action alternatives are consistent with the intent of the Wild and Scenic River Act and the "Rio Grande Wild and Scenic River" GMP (NPS 2004b). Because none of the alternatives would have measurable impacts on the characteristics qualifying this segment of the Rio Grande as a designated wild and scenic river, this topic has been dismissed from further discussion.

Wilderness Values

The Wilderness Act of 1964 (16 U.S.C. 1131 et seq.) authorized Congress to designate undeveloped, roadless areas of 5,000 acres or more to be set aside as wilderness "for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness." Wilderness areas are places " where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The Park has 538,000 acres that were recommended to Congress for wilderness designation in 1978. Until Congress acts on the 1978 recommendation for wilderness designation, the Park manages recommended wilderness areas as wilderness. Because the proposed project area is not in an area that has been recommended for wilderness designation, this topic has been dismissed from further analysis.

Ethnographic Resources

As defined in NPS-28, *Cultural Resource Management Guideline* (1998), ethnographic resources may be any "site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it." Ethnographic resources may include sites that are eligible for inclusion in the National Register. National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (TCPs), provides guidance for determining National Register eligibility for a historic property based on "traditional

cultural significance," which may be defined as "those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice." Many TCPs are Native American religious sites that are protected under the American Indian Religious Freedom Act and Executive Order 13007, *Indian Sacred Sites*; as well as the NHPA. NPS-28*, Cultural Resource Management Guideline* (1998), which implements DO-28, states that the NPS must strive to preserve and protect ethnographic resources.

Historical documents by the Spanish indicate that the project area was occupied in the 1600s (and earlier) by bands collectively referred to as the Chisos Indians. Linguistically, the Chisos spoke the Concho dialect of the Uto-Aztecan language family. The Chisos Indians likely fled the area when Apache groups invaded in the 1700s. Historic accounts suggest that the Comanche were the last indigenous group to regularly occupy the lands around the Big Bend (Casey 1969).

Ethnographic resources of importance to modern living descendants of the people who occupied the area historically and prehistorically are not known to exist in the proposed project area. The seven tribes affiliated with the Park – Apache Tribes of Oklahoma, Blackfeet, Comanche Tribe of Oklahoma, Kickapoo Traditional Tribe of Texas, Kiowa Tribe of Oklahoma, Mescalero Apache Tribe, and Ysleta Del Sur Pueblo – were notified of the proposal in a letter dated November 29, 2006. No tribes responded with concerns regarding the proposal. Because there are no known ethnographic resources in the project area, this topic has been dismissed from further analysis.

Cultural Landscapes

NPS-28, *Cultural Resource Management Guideline* (NPS 1998) states that 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." A cultural landscape comprises all cultural and natural resources associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values within a given geographic area. Cultural landscapes are the result of the interaction between humans and the natural landscape. The project area is within the Rancho Estelle Historic District, which is listed in the National Register. The primary significance of the Rancho Estelle Historic District lies in its importance in early Twentieth Century floodplain farming along the Rio Grande. Although the area has not yet been evaluated as part of a cultural landscape study, and is therefore not a designated cultural landscape, the Park currently manages this district as a cultural landscape. Contributing features to the cultural landscape would include the farmland in the floodplain below the sites of historic ruins described above. Other outlying features; such as outbuildings, fences, or corrals no longer exist (pers. Comm., Thomas C. Alex, Big Bend National Park Archeologist, February 2008). There are no intact historic landscape elements within the project footprint, and none of the alternatives would alter the integrity of the historic landscape setting of the project area. Therefore, this topic has been dismissed from further analysis.

Museum Collections

According to NPS Director's Order 24, *Museum Collections* (DO -24), the NPS must consider the potential for impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material). The DO-24 provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections.

The project area is not located near any museum collection facilities. However, the Park plans to collect a small number of artifacts as a mitigation measure for effects to archeological resources associated with the proposal to construct a new trail, and any artifacts collected would be accessioned and housed in the Park's collection facility. The Park's collection strategy is outlined in more detail under the topic of "archeological resources" in the "Environmental Consequences" chapter of this document. It is not expected that the curation needs associated with this proposal would be substantial, and because the

existing facility has sufficient storage capacity to accession the small amount of artifacts associated with the proposal, the project would not impact existing collections. Additionally, all curation procedures would be consistent with DO-24. Personnel hours needed to accession artifacts in accordance with DO-24 is discussed under the topic of "park operations." The collections space and staff commitment needed to curate artifacts would have only a negligible effect on the Park's overall museum collections, and therefore this topic has been dismissed from further analysis.

Indian Trust Resources

Indian trust resources are assets held in trust by the United States for Native Americans. The U.S. Department of the Interior's (DOI) Secretarial Order 3175, *Departmental Responsibilities for Indian Trust Resources,* requires that any anticipated impacts to Indian trust resources from a proposed project or action by DOI 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 at Big Bend National Park. Because there are no lands within the Park held in trust by the Secretary of the Interior for the benefit of Indians, this topic has been dismissed from further analysis.

Environmental Justice

The EPA defines environmental justice as the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people; including a racial, ethnic, or socioeconomic group; should bear a disproportionate share of the negative environmental consequences of industrial, municipal, or commercial operations or the execution of Federal, state, local, or tribal programs and policies. Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

The proposed project area is located in Brewster County. The U.S. Census Bureau 2000 statistics show that the population of Brewster County is 8,866, of which 34% of the in-labor force live below the Federal poverty level, and 62.5% of the population may be considered members of a minority ethnic group. Because the new trail would be available for use by all visitors regardless of race, ethnicity, or income; and the construction workforces would not be hired based on their race, ethnicity, or income; the neither of the action alternatives would not have disproportionate health or environmental effects on minorities or low-income populations or communities. Therefore, environmental justice has been dismissed from further analysis.

Socioeconomics

The NPS DO-12 requires that NPS units consider potential direct and indirect impacts to the local economy, including impacts to neighboring businesses in the general project vicinity. None of the alternatives would change local and regional land use or appreciably impact local businesses or other agencies. Because none of the alternatives would impact the socioeconomic environment of the area, this topic has been dismissed from further analysis.

Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981, as amended, requires Federal agencies to consider the effects of their actions on prime and unique farmland soils. Prime farmland is defined in the Federal

Register, Vol.6, Parts 400-699, January 1, 2001, Section 657.5(a). Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also suitable for cropland, pastureland, rangeland, or forestland. It is not suited to urban or water use. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops according to acceptable farming methods. Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops. Based on the Texas criteria for prime or unique farmlands (NRCS n.d.), the project area is not suitable for supporting prime or unique farmland, and therefore this topic has been dismissed from further analysis.

Soundscape Management

In accordance with NPS *Management Policies 2006* (NPS 2006) and Director's Order 47, *Sound Preservation and Noise Management*, an important component of the NPS's mission is the preservation of natural soundscapes associated with NPS 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 NPS 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 frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units as well as potentially throughout each NPS unit, being generally greater in developed areas and less in undeveloped areas.

The Dorgan-Sublett location is in an area of the Park that is occasionally used by visitors, and which is adjacent to a paved road where vehicle noise can be heard. Both action alternatives may generate short-term (approximately one week) human-caused sound associated with trail construction and/or rehabilitation activities, and if a trail were constructed, it would potentially increase human sounds associated with visitor use. However, because the area is already subject to vehicle noise from the nearby Park Route 16, neither of the action alternatives would substantially contribute to the aggregate of all human-caused sounds in the area, and therefore the effects would be negligible. Because the area is already subject to human-caused sound and neither action alternative is expected to substantially increase the noise levels in the local area, this topic has been dismissed from further analysis.

Lightscape Management

In accordance with *NPS Management Policies 2006* (NPS 2006), the NPS strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. The Park strives to limit the use of artificial outdoor lighting to only that which is necessary for basic safety requirements. Because no lights would be installed as part of either action alternative, this topic has been dismissed from further analysis.

ALTERNATIVES CONSIDERED

During October of 2007, an interdisciplinary team of NPS employees met to develop project alternatives. This meeting resulted in the definition of project objectives and a list of alternatives that could potentially meet these objectives. Initially, three action alternatives and the No Action Alternative were considered for this project. Of these, one of the action alternatives – to construct a trail on a different route than the one finally selected – was dismissed from further consideration, because it was not prudent or feasible. Two action alternatives and the No action Alternative are carried forward for further evaluation in this Environmental Assessment/Assessment of Effect. A summary table comparing alternative components is presented at the end of this chapter.

Alternatives Analyzed

Alternative A – The No Action Alternative

Under this alternative, the trail would not be constructed, and the Park would not address resource damage caused by social trails. The existing social trails would continue to be used and they would continue to threaten natural and cultural resources. Additionally, the visitors using the trails would be at increased risk of injury from unsafe walking conditions as the trails become more unstable with use and ongoing erosion. Figures 8 and 9 show examples of existing social trail conditions. Should the No Action Alternative be selected, the NPS would make all attempts to respond to any substantial resource damage associated with social trails without major actions or changes in present management direction. However, time and funding constraints would likely make it difficult for the Park to implement the appropriate resource protection measures.

Figure 8 – Photograph of one of the Social Trails near the Dorgan Residence (BBH-139)

Figure 9 – Photograph Showing an Example of a Steep Social Trail

Alternative B – Construct a New Trail

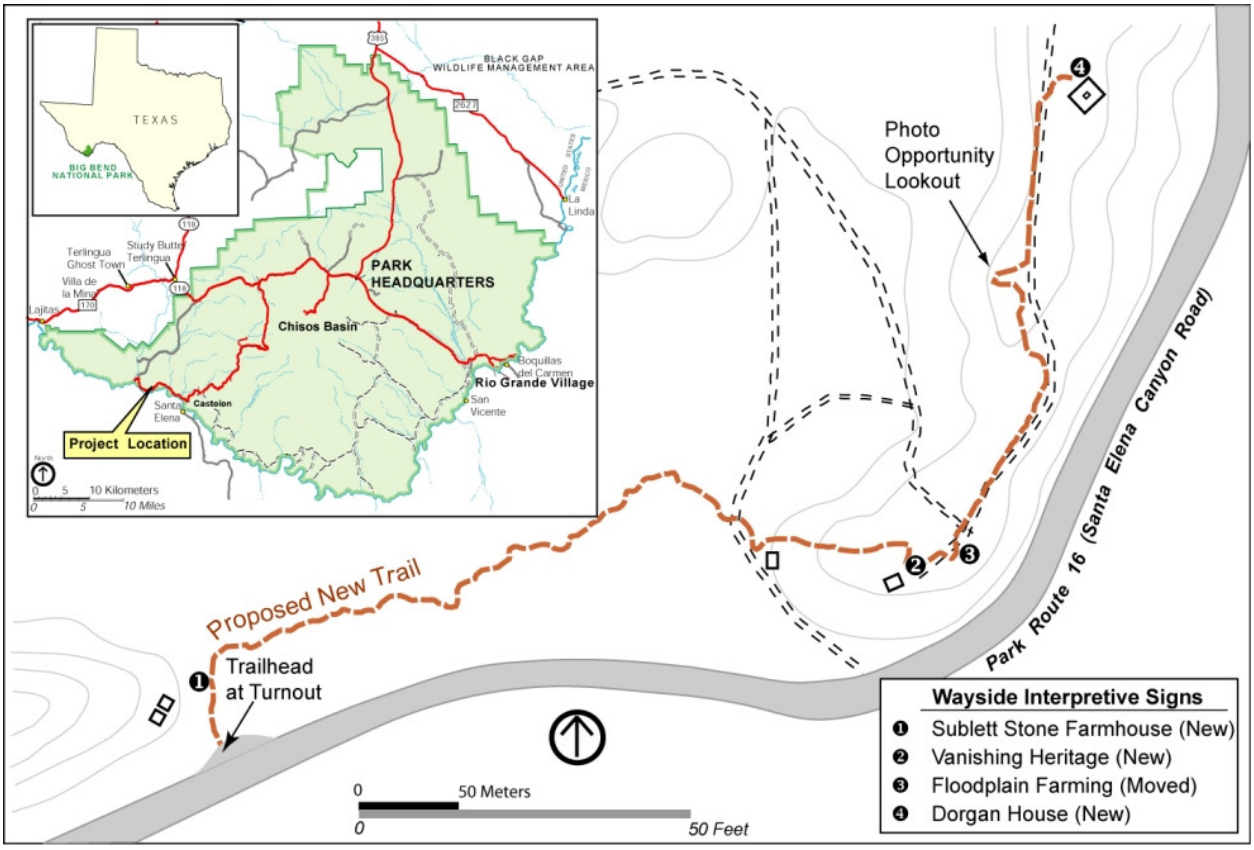
Under this alternative, a new walking trail would be constructed that would provide visitor experience opportunities at the Dorgan Residence (BBH-139), Sublett Farm House (BBH-12), Farm Hand's Casita (BBH-13), and Stone Farm House sites (BBH-15). The trail would be pedestrian only. No bikes or horses would be permitted on the trail. Four wayside signs would be installed, interpreting the historic significance of sites associated with the Dorgan and Sublett historic farming and residential areas of the Rancho Estelle Historic District. All areas damaged by existing social trails would be rehabilitated to help restore natural processes and prevent future use by visitors.

New Trail Location

The project area is located in the Park's west side area between Castolon and Santa Elena Canyon. The proposed new trail would provide visitor access to several significant historic sites along Park Route 16 (popularly known as the Santa Elena Canyon Road). The new trail would begin at a turnout near the Stone Farm House (BBH-15) ruins. At the Stone Farm House, an interpretive wayside would provide an overview of the historical significance of the site. From the Stone Farm House, the trail would follow an eastward, brush-cleared path through grasslands and mesquite thickets to a point just north of the Farm Hand's Casita (BBH-13). From the Farm Hand's Casita, the trail would begin a steady climb up a small hill to a location just west of the Sublett Farm House (BBH-12) where a wayside sign titled "Vanishing Heritage" will interpret the Sublett Farm House's adobe ruins. From the Sublett Farm House site, the trail would extend to a point overlooking the floodplain valley below, where a wayside sign would interpret

floodplain farming. From that wayside, the trail would follow part of an old roadbed along a ridge towards the Dorgan Residence (BBH-139). Approximately midpoint between the Sublett Farm House and the Dorgan Residence, the trail would make a turn westward to a photo opportunity overlook where all four structures as well as a contemporaneous structure across the border in Mexico can be viewed from a single point. From that point, the trail would turn back towards the old roadbed and follow that road to the Dorgan Residence, which marks the end of the trail (Figure 10). From this point, visitors would return to the trailhead on the same trail surface described above, in reverse direction.

Figure 10 – Proposed Trail Alignment and Wayside Sign Locations



New Trail Design

Well designed trails are easier to maintain and require fewer maintenance episodes than unplanned trails, such as social trails. Well designed trails are also safer and more enjoyable for visitors, and they reduce the potential for impacts to natural and cultural resources that may result from foot traffic and erosion. The trail has been designed by the Trails Supervisor, Interpretation Division, and Science and Resources Management Division to be a “minimum build” trail that reduces maintenance needs while minimizing the potential for natural and cultural resource impacts. Trail construction and maintenance would be accomplished under the supervision of the Park’s trail crew, and may be conducted with the assistance of volunteer groups.

The trail would be approximately 0.5 mile (0.8 kilometer) long, starting at the Stone Farm House (BBH-15) site and ending at the Dorgan Residence (BBH-BBH139) site. Figure 10 shows the primary alignment to be followed in constructing the trail. The final alignment of the trail would be determined in the field by following natural features of the landscape to achieve a path with minimal construction and minimal landscape alteration. Trail design in the lower areas where the landscape is alluvial fan would be accomplished primarily by removing vegetation, possibly with a brush hog or similar rotary mower. To

reduce future maintenance requirements associated with vegetation clearing, the Trails Supervisor would position the final footprint of the trail to avoid trees and shrubs that are known to regrow rapidly, such as mesquite. The final footprint of the trail would also follow natural drainage features to avoid the need for constructed features such as footbridges and headwalls. Because soils in the lower portions of the project area are known to compact easily under foot traffic, the design of the trail in this area would include surface hardening by foot traffic from visitor and staff use. Following the initial construction of the trail, the Interpretation and Visitor Services Division would schedule ranger-led tours to ensure that the correct path is followed by visitors in the initial period after trail construction. Conducting tours would help facilitate trail hardening.

Some areas of the new trail, primarily on hilltops and hillslopes, would require channeling water away from eroded historic road surfaces and existing trails with berms or swales. Materials to be used to gain elevation and prevent erosion on the new trail would be local natural materials and may include rock, soil, and logs. These materials may also be used as necessary throughout the trail to control erosion and/or protect resources. It is not anticipated that any constructed features, such as footbridges or headwalls, would be required. However, the Trails Supervisor would periodically monitor the trail condition during future maintenance episodes following initial construction and assess maintenance needs to determine if use patterns or trail conditions warrant constructed features. If constructed features are deemed necessary, the Trails Supervisor would consult with the Park's Archeologist to ensure that any proposed trail features would be compatible with but differentiated from historic materials and that they would harmonize with the overall visual character of the historic district.

The description of proposed new trail is based on preliminary designs and best information available at the time of this writing. Specific distances, areas, and layouts used to describe the proposed trail are only estimates and could change during final site design. If changes during final site design are not consistent with the intent and effects of the selected alternative, then the Trails Supervisor would coordinate with the Park's Science and Resources Division, and additional compliance would be completed, as appropriate.

Rehabilitation of Areas Damaged by Social Trails

All areas damaged by social trails would be fully rehabilitated with erosion checks and recontouring to natural slope. Any materials removed to create the new trail would be used to fill severely eroded areas of existing social trails. Where the general outline of the rehabilitated social trails may be visible after rehabilitation and prior to vegetation recovery, various methods of "camouflaging" may be used to prevent future use of these areas. These methods may include moving larger rocks to block access, transplanting a few native shrubs to block old trails from view, and removing old trail markers (small cairns). The Trails Supervisor would coordinate with the Park's Botanist, as needed, to determine plant avoidance measures and transplanting methods. Camouflaging would be focused primarily in areas where the old and new trails intersect or where old social trail alignments may be visible from Park Route 16. Additionally, to prevent parking in areas other than the paved turnout designated for the trail, a road sign directing visitors to the turnout may be placed in the general area where the Dorgan Residence is visible from the road. Informal turnouts on the road may be camouflaged and/or blocked with large rocks or boulders if the Park determines that it is necessary to prevent future parking in these areas.

Alternative C – Social Trail Closure Only

Under this alternative, the Park would rehabilitate areas damaged by social trails and block visitor access to the historic sites from the road. The Park would not construct a new trail to provide visitor access to the historic sites and no wayside interpretive signs would be installed to communicate the historic significance of the sites. All areas damaged by social trails would be fully rehabilitated with erosion checks and recontouring to natural slope. Where the general outline of the rehabilitated social trails may be visible after rehabilitation and prior to vegetation recovery, various methods of "camouflaging" may be used to prevent future use of these areas. These methods may include moving larger rocks to block access, transplanting a few native shrubs to block old trails from view, and removing old trail markers (small cairns). Camouflaging would be focused primarily in areas where old social trail alignments may be visible

from Park Route 16. Additionally, informal turnouts on the road may be camouflaged and/or blocked with large rocks or boulders if the Park determines that it is necessary to prevent future parking in these areas.

Alternative Considered but Dismissed

The CEQ regulations implementing NEPA require that Federal agencies "…use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment" (40 CFR 1500.2 (c)), and briefly discuss reasons for eliminating alternatives from detailed study (40 CFR 1500.14 (a)). The following alternative was considered, but was dismissed from further analysis. Reasons for dismissal of this alternative are provided below.

Construct New Trail in Alternate Location

During internal scoping, members of the interdisciplinary team explored the possibility of locating the trail to avoid removal of vegetation associated with several small arroyos. Several routes were explored and mapped with a global positional system unit. These routes lie just north of the proposed alignment for the new trail. By exploring and mapping different routes, interdisciplinary team members found that each alternate route would be longer than the proposed route and that each route considered would have the same or greater vegetation removal requirements than would the proposed route. Because all other routes considered would be longer and would not mitigate the need for vegetation removal, these alternate routes were dismissed from further consideration.

Mitigation Measures

The following mitigation measures have been developed to minimize the degree and/or severity of adverse effects, and would be implemented during all activities associated with either of the action alternatives, as appropriate:

- To ensure minimum impacts to vegetation, any transplanting of native shrubs would be coordinated with the Park's Botanist.
- Park-listed sensitive plants near the proposed project area would be flagged for avoidance prior to the start of trail work, and the Park's Botanist would provide guidance to the Trails crew on the avoidance of Park-listed sensitive plants. The trail alignment may be adjusted as necessary to avoid any Park-listed sensitive plants.
- To prevent the spread of exotic plant species, no foreign materials with the potential to introduce exotic plant species would be brought into the area, and exotic plants removed from the new trail footprint would remain in areas where they are already established.
- The Trails Supervisor would coordinate with the Park's Botanist if vegetation clearing required the removal of more than a few small-to-medium-sized trees.
- All crew members and volunteers assisting in the trail work efforts would be educated about the importance of avoiding impacts to sensitive resources that have been flagged for avoidance, which may include sensitive plants and cultural resources.
- To mitigate potential effects to the information potential of archeological resources, any artifacts that may be attractive to collectors or that are temporally or culturally diagnostic will be collected from the trail footprint and a buffer zone around the trail footprint to be determined in the field by the Park Archeologist. Surface artifacts associated with the archeological sites in the project area are extremely sparse (averaging no more than one artifact per every 100 square meters [1,076 square feet]), and the

Park Archeologist's collection strategy is to only collect diagnostic or collectible artifacts. If necessary, areas of some archeological sites would be flagged for avoidance prior to the start of project activities.

- To avoid impacts to archeological resources, the trail has been designed in consultation with the Park's Archeologist to avoid all archeological features, and all ground disturbing construction activities will be monitored by an NPS archeologist.

- Should construction unearth previously undiscovered cultural resources, work would stop in the area of discovery and the Park would consult with the State Historic Preservation Officer and the Advisory Council on Historic Preservation, as necessary, according to 36 CFR 800.13, *Post Review Discoveries*. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.

- Should construction unearth previously undiscovered paleontological resources, work would stop in the area of discovery and the Trails Supervisor would consult the Park Archeologist and Geologist. The Park's Science and Resources Division would determine the appropriate treatment of paleontological resources, in accordance with *NPS Management Policies 2006*.

- In accordance with NPS *Management Policies 2006*, the NPS would strive to construct the trail with a sustainable design to minimize potential environmental impacts. Development would not compete with or dominate Park features, or interfere with natural processes, such as the seasonal migration of wildlife or hydrologic activity. To the extent possible, the design and management of the trail would emphasize environmentally sensitive construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings.

- To prevent visitor parking on informal turnouts on Park Route 16, rocks and/or vegetation may be used to block parking in these areas and a sign may be installed to direct visitors to the paved turnout.

- Although it is not anticipated that constructed features, such as footbridges, would be required for the trail, trail conditions and future use may warrant the installation of minor constructed features to maintain the trail and/or to protect natural processes. If constructed features are needed, the Trails Supervisor would consult with the Park's Archeologist to ensure that the design and materials for those features are compatible with but differentiated from the character of local historic features and harmonize with the overall visual quality of the historic district.

- To protect the esthetic quality and health of trees in the area of the trail, all personnel conducting vegetation management maintenance of the trail, including volunteers, would complete a course of study in dendrology in accordance with the Park's Trails Maintenance Program policies.

Alternative Summaries

Table 1 summarizes the key components of the action alternatives and the No Action Alternative, and it compares the ability of these alternatives to meet the project objectives, which are identified in the "Purpose and Need" chapter of this document. As shown in the following table, Alternative B meets each of the objectives identified for this project, while Alternative A does not address any of the objectives, and Alternative C only addresses two of the three main project objectives.

Table 1 – Alternatives Summary and Extent to which Each Alternative Meets Project Objectives

Alternative A - No Action Alternative	Alternative B – Construct Trail	Alternative C – Close Social Trails Only
A trail would not be constructed and the ground surface of the existing social trails would not be rehabilitated. The existing social trail would continue to be used, and it they would likely continue to degrade and threaten natural and cultural resources.	A new trail would be constructed that meets sustainable trail design and safety standards. The footprint of existing social trails would be rehabilitated with native natural materials and recontoured to natural grade as needed.	A new trail would not be constructed. The footprint of existing social trails would be rehabilitated with native natural materials and recontoured to natural grade as needed.
Meets Project Objectives?	**Meets Project Objectives?**	**Meets Project Objectives?**
No. Continuing the existing conditions would not improve visitor safety, because the existing social trails are rutted and unstable. This alternative does not meet the objective of minimizing impacts to park resources, because the existing social trails would continue to erode, and cause resource damage. This alternative does not meet visitor use and experience goals – to provide improved interpretation of historic resources in the area, because no interpretation would be developed for the sites.	Yes. Constructing a trail would improve safety for visitors by providing an alternative to the rutted and unstable social trails. This alternative would minimize resource damage by correcting erosion problems, and this alternative would provide an improved interpretive experience by installing wayside signs that would communicate the significance of the historic sites in the Rancho Estelle District.	Partially. This alternative only meets two of the three primary objectives of the project. This alternative addresses visitor safety by closing the rutted and unstable social trails, and this alternative would minimize resource damage by correcting erosion problems. However, this alternative does not meet visitor use and experience goals – to provide improved interpretation of historic resources in the area, because no interpretation would be developed for the sites.

Table 2 summarizes the anticipated environmental impacts of each alternative. Only those impact topics that have been carried forward for further analysis are included in this table. The "Environmental Consequences" chapter provides a more detailed explanation of these impacts. Effects presented below are the net effects of all actions and conditions associated with each alternative.

Table 2 – Environmental Impact Summary by Alternative

Impact Topic	Alternative A No Action Alternative	Alternative B Construct Trail	Alternative C Close Social Trails Only
Historic Structures	The No Action Alternative would result in minor to moderate impacts to historic structures, because ongoing erosion from social trails could undercut structures, and structural ruins would be more prone to trampling without a defined path to direct visitors away from sensitive resources.	Alternative B would result in minor to moderate beneficial effects to historic structures, because it would correct ongoing erosion from social trails that threaten to undercut historic structures, and it would also direct visitors away from structural ruins, thereby making them less prone to trampling.	Alternative C would result in minor to moderate beneficial effects to historic structures, because it would correct ongoing erosion from social trails that threaten to undercut historic structures, and it would also prevent visitors from accessing structural ruins, thereby making them less prone to trampling.
Archeological Resources	The No Action Alternative would result in minor to moderate impacts to archeological resources, because ongoing erosion from social trails could disturb sensitive and significant archeological features and objects without a defined path to direct visitors away from sensitive resources.	Alternative B would result in negligible beneficial effects to archeological resources, because it would correct ongoing erosion from social trails that threaten to disturb subsurface deposits, and it would also direct visitors away from sensitive archeological resources.	Alternative C would result in negligible to minor beneficial effects to archeological resources, because it would correct ongoing erosion from social trails that threaten to disturb sensitive archeological resources, and it would also prevent visitors from accessing archeological sites.
Visitor Experience and Safety	The No Action Alternative would result in primarily negligible effects to visitor use and experience, because the features and visitor functions in the project area would not change.	Under Alternative B, construction of a well designed trail, installation of interpretive signs, and rehabilitation of damaged areas would have minor to moderate beneficial effects on visitor experience and safety.	Alternative C would have negligible to minor beneficial effects on visitor safety but minor to moderate adverse effects on visitor experience by closing an area of the Park that is currently open to visitors.
Operations	The No Action Alternative would not measurably change current Park operations, because the existing social trails would continue to be used as they are now with no change in management of the area.	Although construction of the trail may have greater-than-minor short-term effects on some Park operations associated with trail construction and resource protection, over the long term, implementation of Alternative B would not have greater than minor effects on any division's operations.	Rehabilitation of areas damaged by social trails would have greater-than-minor short-term adverse effects on some Park operations and may have long-term greater-than-minor effects on some division's operations if visitors continue to try to access the area, which would create a need for follow up maintenance and monitoring.

Identification of the Environmentally Preferred Alternative

The Environmentally Preferred Alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101, as follows:

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

The No Action alternative (Alternative A) does not meet any of the above six evaluation factors, because it retains social trails that do not meet safety standards or resource protection standards, and it does not adequately provide for public enjoyment of the areas resources. This alternative causes ongoing impacts to important Park resources such as natural and cultural resources.

Alternative C, closure of existing social trails and subsequent rehabilitation of damaged areas is not the Environmentally Preferred Alternative, because it does not facilitate the best balance between public enjoyment of resources and protection and preservation of those resources. Therefore, it does not address the "widest range of beneficial uses" component of the above evaluation factors. Closing existing social trails would not provide a safe and serviceable trail that enhances visitor experience. Because this alternative would not provide for public enjoyment of the area's resources, it does not meet the above six criteria as well as the proposal to construct a trail in the area – Alternative B.

Alternative B, the proposal to construct a trail in the project area is the Environmentally Preferred Alternative, because it facilitates the best balance between public enjoyment of resources and protection and preservation of those resources. Therefore, it addresses more components of these six evaluation factors than do the other two alternatives. The proposal to construct the Dorgan-Sublett Trail would provide a safe and serviceable trail that enhances visitor experience, while minimizing environmental impacts to the greatest extent possible. Because the new trail would follow sustainable design standards, it would be used by future generations for the enjoyment of Park resources. Rehabilitating areas damaged by the existing social trails would also mitigate ongoing resource impacts.

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Because it meets the Purpose and Need for the project, the project objectives, and is the Environmentally Preferred Alternative, Alternative B, the proposal to construct the Dorgan-Sublett Trail is also recommended as the NPS Preferred Alternative. For the remainder of this document, Alternative B may be referred to as the "Preferred Alternative."

ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the Preferred Alternative as well as potential impacts of the other two alternatives. Impact topics analyzed for this project have been identified on the basis of Federal laws and regulations, NPS Director's Orders, NPS *Management Policies 2006* (NPS 2006), and NPS knowledge of resources at Big Bend National Park. The regulatory context and affected environment was discussed in the "Impact Topics Retained for Further Analysis" section of this document. A detailed discussion of the potential impacts of each alternative on resources relevant to each topic analyzed is provided below.

METHODOLOGY

Topics analyzed in this chapter include archeological resources, historic structures, visitor experience and safety, and Park operations. Direct, indirect, and cumulative effects, as well as impairment are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are listed below. Additionally, more specific impact thresholds are provided for each resource topic in the sections that follow.

- ***Type*** describes the classification of the impact as either beneficial or adverse, direct or indirect:
  - Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition
  - Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition
  - Direct: An effect that is caused by an action, occurring in the same time and place as the action
  - Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable

- ***Context*** describes the area or location in which the impact would occur.
  - Site Specific: Impacts would be restricted to the project footprint and the use corridor around the project footprint
  - Local: In the general project area, which is defined as the entire Rancho Estelle Historic District.
  - Park Wide: Includes the entire Park
  - Regional: Includes Brewster County and surrounding counties and communities, including communities across the Rio Grande River in Mexico

- ***Duration*** describes the length of time an effect would occur, either short-term or long-term:
  - Short-term impacts generally last only during construction, and the resources resume their pre-construction conditions following construction
  - Long-term impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction

- ***Intensity*** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

Cumulative Effects

The CEQ regulations (40 CFR 1508.7) require assessment of cumulative impacts in the decision-making process for Federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Cumulative impacts are considered for both the all three alternatives.

Cumulative impacts were determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects in Big Bend National Park. The geographic scope of this analysis includes actions within the general project area, while the temporal scope includes projects dating back to the historic era. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis:

- Construction and Maintenance of Park Route 16: Park Route 16 provides visitor access to the general project area.

- Exotic Plant Management: The Park strives to carry out exotic plant eradication and habitat restoration as time and funding permit. Exotic plant management efforts may be conducted in the project area in the future.

- Trail Signs and Markers: The Park previously attempted to formalize the existing network of numerous social trails by setting a trail sign and trail markers (small rock cairns) along a preferred path to the Farm Hand's Casita (BBH-13) and Sublett Farm House (BBH-12)sites. However, it was later determined that the trail access point along Park Route 16 was unsafe, because it was on a blind curve. Additionally, the trail path was too steep a climb to provide a sustainable trail. Therefore, the Park has since stopped maintaining trail markers and signs in the area.

- Turnout Construction and Maintenance: A paved turnout was recently constructed near the Stone Farm House (BBH-15) site to provide safe visitor access to the site.

- Ranching: Ranching was conducted in the area until the 1920s.

- Farming: Farming was conducted in the area from the 1920s until the late 1930s or 1940s.

Impacts to Cultural Resources and §106 of the National Historic Preservation Act

In this Environmental Assessment/Assessment of Effect, impacts to historic properties are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). This Environmental Assessment/Assessment of Effect is intended, however, to also comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA). To achieve this, a Section 106 summary is included in the analysis for action alternatives for each of the cultural resource topics carried forward, which includes "Historic Structures" and "Archeological Resources." The topics of cultural landscapes, ethnographic resources, and museum collections were dismissed from further analysis in "Impacts Dismissed from Further Consideration," because none of the alternatives would have greater-than-minor effects under NEPA, nor would they have "adverse effects" as described in 36 CFR 800.5. The "Section 106 Summary" is intended to meet the requirements of NHPA, Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of "effect" and the criteria of "adverse effect" found in the Advisory Council's regulations (36 CFR 800). This document will be used to consult with the Texas State Historic Preservation Officer in compliance with Section 106.

Under the Advisory Council's regulations, a determination of either "adverse effect" or "no adverse effect" must be made for affected historic properties that are eligible for or listed in the National Register of Historic Places (National Register). 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 of the resource's location, design, setting, materials, workmanship, feeling,

or association). “Adverse effects” also include reasonably foreseeable effects caused by an action alternative 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 in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

In accordance with the Advisory Council on Historic Preservation’s regulations implementing Section 106 of the NHPA (36 CFR 800, *Protection of Historic Properties*), impacts to historic properties for this project were identified and evaluated by (1) determining the “area of potential effects;” (2) identifying cultural resources present in the “area of potential effects” that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of “adverse effect” to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize, or mitigate “adverse effects.”

CEQ regulations and NPS DO-12 *Conservation Planning, Environmental Impact Analysis and Decision-Making* also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g. reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although “adverse effects” under Section 106 may be mitigated, the effect remains adverse.

In order for a historic property to be listed in the National Register, it must meet one or more of the following criteria of significance: A) associated with events that have made a significant contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the historic property must possess integrity of location, design, setting, materials, workmanship, feeling, association (*National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*).

Historic Structures (Ruins)

Intensity Level Definitions

The structures in the project area are listed in the National Register as part of the Rancho Estelle Historic District. The methodology used for assessing impacts to these historic structures is based on how an alternative would affect the features and characteristics that make these structures significant. The thresholds for this impact assessment are as follows:

Negligible: Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of NHPA Section 106, the determination of effect would be “no adverse effect.”

Minor: Adverse: Alteration of a feature(s) would not diminish the overall integrity of the resource. The determination of effect for NHPA Section 106 would be “no adverse effect.”

Beneficial: Stabilization/preservation of features in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties*. The determination of effect for NHPA Section 106 would be “no adverse effect.”

Moderate: Adverse: Alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for NHPA Section 106 would be “adverse effect.” A memorandum of agreement (MOA) would be executed among the NPS and applicable State Historic Preservation Officer and, if necessary, the Advisory Council on Historic

Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from major to moderate.

Beneficial: rehabilitation of a structure in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. The determination of effect for NHPA Section 106 would be "no adverse effect."

Major: Adverse: alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for NHPA Section 106 would be "adverse effect." Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Beneficial: restoration of a structure in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. The determination of effect for NHPA Section 106 would be "no adverse effect."

Impairment: A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Big Bend National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents.

Impacts of Alternative A (No Action Alternative)

The No Action Alternative would result in minor to moderate impacts to historic structures in the area, because social trails would continue to erode and would likely undercut significant historic features. Impacts associated with the No Action Alternative may also include trampling of structural ruins associated with the use of social trails that cut through these resources.

Cumulative Effects: Previously, Park Route 16 has been constructed adjacent to the project area. This constructed feature may have had negligible to minor adverse effects on historic structures that are close to the road, such as the Sublett Adobe Shed (BBH-14). Additionally, previous Park attempts to formalize social trails in the area have led to erosion problems affecting all cultural resources in the project area, because many social trails are on steep slopes. The No Action Alternative will cause adverse impacts to historic structures through the continued trampling and potentially future undercutting of historic structures resulting from the existing social trails. Cumulatively, this alternative will have an overall minor to moderate adverse effect on historic structures when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The No Action Alternative would result in minor to moderate impacts to historic structures, because ongoing erosion from social trails could undercut structures, and structural ruins would be more prone to trampling without a defined path to direct visitors away from sensitive resources. This alternative would contribute to the cumulative disturbance of historic structures, when considered with other past, present, and reasonably foreseeable future actions. The overall effects on historic structures of the No Action Alternative would be minor to moderate, long-term, adverse, direct and indirect, and cumulative effects at the local level. This alternative would not impair the Park's historic structures. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Impacts of Alternative B (Preferred Alternative)

The Preferred Alternative would result in minor to moderate beneficial effects to the historic structures in the area by correcting erosion problems associated with existing social trails and directing visitor use away from sensitive structural remains. Numerous social trails are currently found adjacent to historic structural remains. It is likely that if erosion problems associated with these social trails go unchecked, the structures will be undercut, leading to loss of their physical integrity. By routing visitor use away from structural ruins, the Preferred Alternative would reduce impacts to the remains of these historic structures. The trail alignment has been developed by both the Trails Maintenance Crew Supervisor and by the Park's Archeologist with the intent of focusing visitation away from sensitive resources. The following outlines how each of the structures named in the NRHP nomination will be avoided by the new trail:

BBH-12, Sublett Farm House: Existing social trails climb a small mesa from the west and cross the mesa following a route that is directly adjacent to the BBH-12 structural remains. Under the Preferred Alternative, visitors would approach this site after following a steady grade to reach a point east of the structural remains. As visitors reach the top of the mesa, they would be directed to a wayside sign, "Vanishing Heritage," sitting approximately 10 meters east of the ruins. From that wayside, visitors are directed on to another wayside as the trail leads away from BBH-12. The new trail would reduce potential trampling of BBH-12 historic fabric, because it would not pass adjacent to BBH-12, as the existing social trails do. By removing existing social trails that threaten structural remains and directing visitor traffic away from this ruin, the Preferred Alternative would help facilitate the Park's preservation objectives for this historic resource.

BBH-13, Farm Hand's Casita: The trail would pass approximately 5 to 10 meters north of this structure. Because this site is characterized primary by standing architecture and there is little or no historic material on the ground at this location, the new trail would not cause trampling of significant historic resources. The trail alignment under the Preferred Alternative would be farther from this structure than are the existing social trails, and therefore, by directing visitor use further from the structure, it would help facilitate the Park's preservation objectives for this historic resource.

BBH-14, Adobe Shed: Although these structural remains were previously accessed by social trails, this site would not be accessible or visible from the new trail under the Preferred Alternative. By avoiding this site completely, the Preferred Alternative would help facilitate the Park's preservation objectives for this historic resource.

BBH-15, Stone Farm House: The trail will pass approximately 10 meters east of the main structure at this site, and a wayside sign, "Sublett Stone Farmhouse" would be placed east of the ruins to direct visitor traffic away from structural remains. After the wayside sign, visitors will continue east-northeast away from the site. By directing visitor use away from structural remains, the Preferred Alternative would help facilitate the Park's preservation objectives for this historic resource.

BBH-139, Dorgan Residence: Existing social trails are immediately adjacent to this ruin's standing walls (see example in Figure 8, above), threatening to undercut significant architectural remains. Social trails that threaten to undercut architectural material are found along the eastern edge of the structure at the mesa edge, which is characterized by a steep slope leading to Park Route 16, from which visitors often access these ruins by climbing the heavily eroded social trails. The Preferred Alternative would direct visitors to approach this structure from the west, following a level surface along the mesa top. Because the Preferred Alternative would eliminate steep social trails that threaten to undercut the historic fabric of this structure, it would help facilitate the Park's preservation objectives for this historic resource.

Cumulative Effects: As described under Alternative A, Park Route 16 has been constructed adjacent to the project area. This constructed feature may have had negligible to minor adverse effects on historic structures that are close to the road, such as the Sublett Adobe Shed (BBH-14). Additionally, previous Park attempts to formalize social trails in the area have led to erosion problems affecting all cultural resources in the project area, because social trails are on steep slopes. Alternative B would have a beneficial effect on historic structures by directing visitors away from sensitive historic structures.

Therefore, cumulatively, this alternative would not contribute to adverse cumulative effects on historic structures when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The Preferred Alternative would result in minor to moderate beneficial effects to historic structures, because it would correct ongoing erosion from social trails that threaten to undercut historic structures. The Preferred Alternative would also direct visitors away from structural ruins, thereby making them less prone to trampling. This alternative would not contribute to the cumulative disturbance of historic structures, when considered with other past, present, and reasonably foreseeable future actions. The overall effects on historic structures of the Preferred Alternative would be minor to moderate, long-term, beneficial, indirect effects at the local level. This alternative would not impair the Park's historic structures. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

NHPA Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of "adverse effects" (36 CFR 800.5, *Assessment of Adverse Effects*), the NPS concludes that implementation of the Preferred Alternative would have "no adverse effect" on historic structures associated with the National Register-listed Rancho Estelle Historic District.

Impacts of Alternative C (Close Social Trails)

Alternative C would result in minor to moderate beneficial effects to the historic structures in the area by correcting erosion problems associated with existing social trails, which threaten sensitive structural remains. Numerous social trails are currently found adjacent to historic structural remains. It is likely that if erosion problems associated with these social trails go unchecked, the structures will be undercut, leading to loss of their physical integrity. By correcting problems associated with social trails and blocking them from futures use, Alternative C would have beneficial effects on historic structures.

Cumulative Effects: As described under Alternative A, Park Route 16 has been constructed adjacent to the project area. This constructed feature may have had negligible to minor adverse effects on historic structures that are close to the road, such as the Sublett Adobe Shed (BBH-14). Additionally, previous Park attempts to formalize social trails in the area have led to erosion problems affecting all cultural resources in the project area, because social trails are on steep slopes. Alternative C would have a beneficial effect on historic structures by removing social trails. Therefore, cumulatively, this alternative would not contribute to adverse cumulative effects on historic structures when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Alternative C would result in minor to moderate beneficial effects to historic structures, because it would correct ongoing erosion from social trails that threaten to undercut historic structures. Alternative C would also prevent visitors from accessing structural ruins, thereby making them less prone to trampling. This alternative would not contribute to the cumulative disturbance of historic structures, when considered with other past, present, and reasonably foreseeable future actions. The overall effects on historic structures of Alternative C would be minor to moderate, beneficial, long-term, indirect effects at the local level. This alternative would not impair the Park's historic structures. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Archeological Resources

Intensity Level Definitions

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Archeological resources have the potential to answer, in whole or in part, such research questions. In order for an archeological resource to be eligible for the National Register, it must meet one or more of the following criteria of significance: A) associated with events that have made

a significant contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the archeological resource must possess integrity of location, design, setting, materials, workmanship, feeling, association (*National Register Bulletin 36, Guidelines for Evaluating and Registering Archeological Properties*). For purposes of analyzing impacts to archeological resources either listed in or eligible to be listed in the National Register, the thresholds of change for intensity of an impact are defined as follows:

Negligible: Impact is at the lowest levels of detection - barely measurable with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of NHPA Section 106, the determination of effect would be "no adverse effect."

Minor: Adverse: disturbance of a site(s) results in little, if any, loss of significance or integrity and the National Register eligibility of the site(s) is unaffected. For purposes of NHPA Section 106, the determination of effect would be "no adverse effect."

Beneficial: maintenance preservation of a site(s). For purposes of NHPA Section 106, the determination of effect would be "no adverse effect."

Moderate: Adverse: disturbance of a site(s) does not diminish the significance or integrity of the site(s) to the extent that its National Register eligibility is jeopardized. For purposes of NHPA Section 106, the determination of effect would be "adverse effect."

Beneficial: stabilization of the site(s). For purposes of NHPA Section 106, the determination of effect would be "no adverse effect."

Major: Adverse: disturbance of a site(s) diminishes the significance and integrity of the site(s) to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be "adverse effect."

Beneficial: active intervention to preserve the site. For purposes of NHPA Section 106, the determination of effect would be "no adverse effect."

Impairment: A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Big Bend National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents.

Impacts of Alternative A (No Action Alternative)

The No Action Alternative would result in minor to moderate impacts to archeological resources in the area, because social trails would continue to erode and would likely disturb significant subsurface archeological features and/or objects. Impacts associated with the No Action Alternative may also include trampling of sensitive archeological features associated with the use of social trails that cut through these resources.

Cumulative Effects: Previously, Park Route 16 has been constructed adjacent to the project area. This constructed feature may have had negligible to minor adverse effects on archeological resources that are close to the road. Additionally, previous Park attempts to formalize social trails in the area have led to erosion problems affecting all cultural resources in the project area, because social trails were on steep slopes. The No Action Alternative will cause adverse impacts to archeological resources through the continued trampling and potentially future unearthing of significant archeological features and objects as a result of continued use of existing social trails. Cumulatively, this alternative will have an overall minor to

moderate adverse effect on archeological resources when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The No Action Alternative would result in minor to moderate impacts to archeological resources, because ongoing erosion from social trails could uncover sensitive and significant archeological features and objects, because there is no defined path to direct visitors away from sensitive resources. This alternative would contribute to the cumulative disturbance of archeological resources, when considered with other past, present, and reasonably foreseeable future actions. The overall effects of the No Action Alternative on archeological resources would be minor to moderate, long-term, adverse, direct and indirect effects and cumulative effects at the local level. This alternative would not impair the Park's archeological resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Impacts of Alternative B (Preferred Alternative)

The project area has been heavily disturbed in areas around archeological sites and very little of the surface artifact scatters remain. The footprint of the proposed trail would be adjacent to archeological sites, which include archeological surface features and extremely sparse artifact scatters. The trail has been routed to avoid all known archeological features. The sparse surface artifacts scatters in the area do not generally retain integrity of location or association. Due to the general proximity of the trail to archeological resources, the possibility exists that subsurface archeological resources may be present. To minimize any potential disturbance of unknown archeological resources, an NPS archeologist would monitor ground disturbance associated with trail construction and rehabilitation work in areas near archeological sites. If during construction previously undiscovered archeological resources are discovered, all work in the immediate vicinity of the discovery would stop until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in consultation with the State Historic Preservation Officer. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

If either significant archeological resources (i.e. National Register eligible objects or features) or human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during trail work, all items would be left in situ and the trail would be rerouted to avoid further disturbance. Archeological resources determined ineligible for listing in the National Register would be recovered if they were determined by the Park Archeologist to be diagnostic of a time period or culture or if they are determined to be attractive to collectors. All recovered artifacts would be documented and accessioned in the Park's artifact repository within the Park. Because significant resources would be avoided, potential impacts to archeological resources would be adverse but negligible to minor in intensity.

Cumulative Effects: As described under Alternative A, Park Route 16 has been constructed adjacent to the project area. This constructed feature may have had negligible to minor adverse effects on archeological resources that are close to the road. Additionally, previous Park attempts to formalize social trails in the area have led to erosion problems affecting all cultural resources in the project area, because social trails are on steep slopes. Alternative B would have a beneficial effect on archeological resources by directing visitor use away from sensitive archeological features. Therefore, cumulatively, this alternative would not contribute to adverse effects on archeological resources when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The Preferred Alternative would result in negligible beneficial effects to historic archeological resources, because it would correct ongoing erosion from social trails that threaten to unearth subsurface deposits. The Preferred Alternative would also direct visitors away from sensitive archeological resources, thereby making them less prone to trampling. This alternative would not contribute to the cumulative disturbance of archeological resources, when considered with other past, present, and reasonably foreseeable future actions. The overall effects on archeological resources of the Preferred Alternative would be negligible to minor, beneficial, direct and indirect, and long-term at the local level. This alternative would not impair the Park's archeological resources. Implementation of this alternative would

not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

NHPA Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of "adverse effects" (36 CFR 800.5, *Assessment of Adverse Effects*), the NPS concludes that implementation of the Preferred Alternative would have "no adverse effect" on archeological resources associated with the National Register-listed Rancho Estelle Historic District.

Impacts of Alternative C (Close Social Trails)

Alternative C would result in negligible to minor beneficial effects to archeological resources in the area by correcting erosion problems associated with existing social trails, which threaten sensitive resources. Numerous social trails are currently found within archeological sites and adjacent to sensitive archeological features. It is likely that if erosion problems associated with these social trails go unchecked, the significant archeological resources may be uncovered by erosion, leading to loss of their physical integrity. By correcting erosion associated with social trails, and by blocking access to archeological sites, this alternative would have minor to moderate beneficial effects on archeological resources.

Cumulative Effects: As described under Alternative A, Park Route 16 has been constructed adjacent to the project area. This constructed feature may have had negligible to minor adverse effects on archeological resources that are close to the road. Additionally, previous Park attempts to formalize social trails in the area have led to erosion problems affecting all cultural resources in the project area, because social trails are on steep slopes. Alternative C would have a beneficial effect on archeological resources by removing social trails. Therefore, cumulatively, this alternative would not contribute to adverse effects on archeological resources when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Alternative C would result in minor to moderate beneficial effects on archeological resources, because it would correct ongoing erosion from social trails that threaten to uncover or disturb sensitive archeological resources. Alternative C would also prevent visitors from accessing archeological sites, thereby making them less prone to trampling. This alternative would not contribute to the cumulative adverse effects on archeological resources, when considered with other past, present, and reasonably foreseeable future actions. The overall effects of Alternative C on archeological resources would be minor to moderate, long-term beneficial, direct, and indirect effects at the local level. This alternative would not impair the Park's archeological resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Visitor Experience and Safety

Intensity Level Definitions

The methodology used for assessing impacts to visitor experience and safety is based on how the No Action Alternative and the two action alternatives would affect the visitor and local safety operations, particularly with regards to the visitors' enjoyment of the Park's historic resources. The thresholds for this impact assessment are as follows:

Negligible: Visitors would not be affected or changes in visitor experience and/or safety would be below or at the lowest level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.

Minor: Changes in visitor experience and/or safety would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

Moderate: Changes in visitor experience and/or safety would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative, and would likely be able to express an opinion about the changes.

Major: Changes in visitor experience and/or safety would be readily apparent and have substantial long-term consequences. The visitor would be aware of the effects associated with the alternative, and would likely express a strong opinion about the changes.

Impacts of Alternative A (No Action Alternative)

The No Action Alternative may ultimately have measurable adverse effects on visitor experience and safety. Although the existing social trails would continue to be used, ongoing erosion problems would threaten the integrity of natural and cultural resources, ultimately leading to diminished visitor experience in the area. Additionally, the existing social trails pose safety risks associated with accessing the trails from unsafe locations on Park Route 16 and potential tripping hazards associated with rutted social trails. Therefore, the No Action Alternative could have direct, long-term, minor to moderate, adverse impacts on visitor experience and safety.

Cumulative Effects: Past, present, and future actions affecting visitor experience and safety in the project vicinity include construction, maintenance, and use of Park Route 16; previous Park attempts to formalize social trails; and possible future exotic plant management activities. Overall, Park Route 16 has a beneficial effect on visitor experience by providing for visitor enjoyment of the area. However, the road also poses safety risks to visitors who park in undesignated informal turnouts to explore the historic structures in the project area. The Park's previous attempt to formalize existing social trails increased the use and degradation of unstable trail surfaces, leading to potentially unsafe hiking and walking conditions. Present and future exotic plant management plans are expected to ultimately have a beneficial effect on visitor experience by improving the visual character of natural landscapes. The No Action Alternative will cause indirect adverse impacts to visitor safety through the continued use of hazardous parking areas and associated hazardous social trails. Cumulatively, this alternative will have an overall negligible to minor adverse effect on visitor experience and safety when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The No Action Alternative would result in primarily negligible effects to visitor use and experience because the features and visitor functions in the project area would not change. Ultimately, however, this alternative may have a minor, long-term, indirect, adverse effect on visitor experience at the local level due to diminished visitor experience associated with resource degradation and due to potentially hazardous walking conditions associated with unstable social trails. Cumulatively, this alternative would have a negligible to minor adverse effect on visitor experience and safety when considered with other past, present, and reasonably foreseeable future actions. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Impacts of Alternative B (Preferred Alternative)

Implementation of the Preferred Alternative would create stable trail surfaces and expand visitor experience of significant historic resources through the use of wayside interpretive signs. Currently, visitors explore the area following social trails that are unstable and rutted in many places, presenting visitors with hazardous walking conditions. These trails are also eroding and impacting natural and cultural resources, which will ultimately lead to a diminished visitor experience in the area. Creating a stable trail surface for visitors to explore historic resources would improve both visitor experience and visitor safety. Adding wayside interpretive signs in the area would improve visitor understanding of the historic resources by providing historic context narratives and resources protection messages to enhance visitor enjoyment of these resources. Construction of the trail is expected to be of very short duration (less than five days) and would not interfere with current visitor use of the area. As part of the Preferred Alternative, areas damaged by social trails would be rehabilitated, which would have a beneficial effect on

the visual character of the area by facilitating the restoration of natural processes and eliminating the appearance of a network of confusing social trails. By providing a path between historic sites, visitors would no longer need to access each site from various locations along Park Route 16, and therefore visitor safety would be improved by the Preferred Alternative, because visitor would no longer be using unsafe turnout locations along the road.

Cumulative Effects: As described under Alternative A, past, present, and future actions affecting visitor experience and safety in the project vicinity include construction, maintenance, and use of Park Route 16; previous Park attempts to formalize social trails; and possible future exotic plant management activities. Overall, Park Route 16 has a beneficial effect on visitor experience by providing for visitor enjoyment of the area. However, the road also poses safety risks to visitors who park in undesignated informal turnouts to explore the historic structures in the project area. The Park's previous attempt to formalize existing social trails increased the use and degradation of unstable trail surfaces, leading to potentially unsafe hiking and walking conditions. Present and future exotic plant management plans are expected to ultimately have a beneficial effect on visitor experience by improving the visual character of natural landscapes. The Preferred Alternative would contribute to beneficial effects to visitor experience and safety by eliminating the need for hazardous parking areas and associated hazardous social trails, and by providing expanded visitor experience through a well designed trail with interpretive wayside signs. Cumulatively, this alternative will have an overall beneficial effect on visitor experience and safety, and therefore it would not contribute to cumulative adverse effects when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Under the Preferred Alternative, construction of a well designed trail, installation of interpretive wayside signs, and rehabilitation of damaged areas would have a minor to moderate beneficial effect on visitor experience. Additionally, by providing a more stable walking surface and by guiding visitors to safe parking areas, the Preferred Alternative would have a minor to moderate beneficial effect on visitor safety. Overall, the Preferred Alternative would have minor to moderate, direct and indirect, long-term, beneficial effects on visitor experience and safety at the local level. Cumulatively, this alternative would not contribute to adverse cumulative effects on visitor experience and safety when considered with other past, present, and reasonably foreseeable future actions. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Impacts of Alternative C (Close Social Trails)

Alternative C would have adverse effects on visitor experience in the area, by eliminating use of the area by visitors. Although the area is not currently designated as a visitor destination on any maps, the area is open to visitors, and many visitors use the existing social trails to explore the historic resources in the area. This alternative would close an area that is currently open to visitors, and therefore this alternative would have minor to moderate adverse effects on visitor experience. Effects on visitor safety in the area would be negligible to minor beneficial effects by eliminating potentially hazardous conditions along Park Route 16 and hazardous walking conditions on unstable social trails.

Cumulative Effects: Past, present, and future actions affecting visitor experience and safety in the project vicinity include construction, maintenance, and use of Park Route 16; previous Park attempts to formalize social trails; and possible future exotic plant management activities. Overall, Park Route 16 has a beneficial effect on visitor experience by providing for visitor enjoyment of the area. However, the road also poses safety risks to visitors who park in undesignated informal turnouts to explore the historic structures in the project area. The Park's previous attempt to formalize existing social trails increased the use and degradation of unstable trail surfaces, leading to potentially unsafe hiking and walking conditions. Present and future exotic plant management plans are expected to ultimately have a beneficial effect on visitor experience by improving the visual character of natural landscapes. Implementation of Alternative C would cause indirect beneficial effects to visitor safety by eliminating the use of hazardous parking areas and associated hazardous social trails. Cumulatively, this alternative would have an overall negligible to minor adverse cumulative effect on visitor experience, and it would have not contribute to

cumulative adverse effects on visitor safety when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Alternative C would have negligible to minor beneficial effects on visitor safety but minor to moderate adverse effects on visitor experience by closing an area of the Park that is currently open to visitors. Ultimately, the net effects of Alternative C would be direct, long-term, negligible to minor, adverse impacts on visitor experience and safety at the local level. Cumulatively, this alternative would have a negligible to minor effect on visitor experience and safety when considered with other past, present, and reasonably foreseeable future actions. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Park Operations

Intensity Level Definitions

Implementation of a project can effect the operations of a park such as the number of employees needed; the type of duties that need to be conducted; when and who would conduct these duties; how activities should be conducted; and administrative procedures. The methods used to assess potential changes to Park operations are defined as follows:

Negligible: Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.

Minor: The effect would be detectable, but would be of a magnitude that would not have an appreciable adverse or beneficial effect on Park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and successful.

Moderate: The effects would be readily apparent and would result in a substantial adverse or beneficial change in Park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The effects would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.

Impacts of Alternative A (No Action Alternative)

The No Action Alternative would not measurably change current Park operations at Big Bend National Park. Existing social trails would continue to be used by visitors, and the Park would not collect artifacts, nor would it take measures to address any resource damage associated with the social trails. The Park would not operate visitor services in the area.

Cumulative Effects: Any project that occurs in the Park has an effect on Park operations; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and Park operations. Roads and trails work, such as the construction and maintenance of Park Route 16, primarily involve Maintenance Division staff. Installing and maintaining signs and trail markers may involve both Interpretive Division and Maintenance Division staff as well as volunteer staff. Resource management projects such as exotic vegetation management primarily involve Science and Resources Division staff, but may also involve Maintenance Division staff and volunteer staff. Under this alternative, Park operations associated with the current and future use of the Rancho Estelle Historic District area would not change. Therefore, Park operations would not appreciably change when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The No Action Alternative would not measurably change current Park operations, because the existing social trails would continue to be used as they are now with no change in management of the area. Therefore, cumulatively, the No Action Alternative would have little or no impact on Park operations when considered with other past, present, and reasonably foreseeable future actions. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Impacts of Alternative B (Preferred Alternative)

The construction of a new trail under the Preferred Alternative would require initial construction by the Trails Crew. The Trails Supervisor anticipates that initial construction of the trail would take a crew of five approximately five days to complete trail construction. This initial construction period would have a short-term negligible to minor effect on the Trails Crew's operations. After initial construction, trail maintenance episodes would include clearing vegetation in the area of the trail. These maintenance episodes would be required once a year, and the work would be completed by a crew of five in approximately one to three days. To offset the Trails Crew staff requirements for maintenance, trails maintenance may be carried out with the assistance of properly trained volunteer staff under the supervision of the Trails Crew. Volunteer training would include taking a dendrology class, which would have short-term (less than one week) impacts on the class's operations and on volunteer operations during the training period. Overall the effects on the Trail's Crew's operations would be negligible to minor in the short term and negligible over the long term.

Because the trail will be designed with minimal construction, requiring foot traffic associated with visitor use to harden the surface, the Interpretation and Visitor Services Division will conduct several ranger-led tours to guide visitors during the initial period following trail construction. The requirement to conduct ranger-led tours would have a short-term minor to moderate effect on that division's operations. After the initial period of trail use, no ranger-led programs would be required to help define the trail, but they may be conducted in accordance with the Interpretation and Visitor Services Division's program policies. Overall the effects on the Interpretation and Visitor Services Division's operations would be minor to moderate in the short term and negligible over the long term.

Because some artifacts would be collected as a mitigation measure for archeological resources, the Science and Resources Management Division staff would document, accession, and store artifacts in the Park's collections facility. The requirement to accession artifacts would have a short-term minor to moderate effect on that division's operations and a negligible effect over the long term. It is expected that a very low volume of artifacts would be collected, and very little storage space would be required to house these collections, and therefore the project would not have a substantial affect on overall curation operations.

Cumulative Effects: As described under Alternative A, any project that occurs in the Park has an effect on park operations. Therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and park operations. Roads and trails work, such as the construction and maintenance of Park Route 16, primarily involve Maintenance Division staff. Installing and maintaining signs and trail markers may involve both Interpretation Division and Maintenance Division staff as well as volunteer staff. Resource management projects such as exotic vegetation management primarily involve Science and Resources Management Division staff, but may also involve Maintenance Division staff and volunteer staff. Under this alternative, Park operations associated with the current and future use of the Rancho Estelle Historic District area would increase slightly within the year following initial construction, and overall this would have a negligible to moderate adverse effect on employee work loads. Cumulatively, this alternative would have a short-term negligible to moderate effect on some Park operations when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Although construction of the trail may have short-term effects on some Park operations, over the long term, implementation of the Preferred Alternative would not have greater-than-minor effects on

any division's operations. Therefore, measurable effects to Park operations would be direct, short-term, negligible to moderate, adverse effects on the operations of the Trails Crew, Interpretation and Visitor Services Division, and Science and Resources Division. Cumulatively, this alternative would have a short-term negligible to moderate effect on some Park operations when considered with other past, present, and reasonably foreseeable future actions. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

Impacts of Alternative C (Close Social Trails)

Under Alternative C, rehabilitation of areas damaged by social trails would require initial work by the Trails Crew and/or Science and Resources Division. Initial work would take a crew of five approximately two to five days to complete rehabilitation. This initial rehabilitation period would have a short-term negligible to minor effect on the operations of the Trails Crew and Science and Resources Division. After initial rehabilitation, future maintenance episodes may be required if new social trails are formed. If visitors continue to use the area, law enforcement efforts may be required to monitor the area for activity. Overall, this alternative would have short-term, minor to moderate, adverse effects on some Park operations. If efforts to dissuade visitors from using the area are unsuccessful, future efforts may be needed that would have long-term, negligible to moderate, adverse effects on some Park operations.

Cumulative Effects: As described under Alternative A, any project that occurs in the Park has an effect on park operations. Therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and park operations. Roads and trails work, such as the construction and maintenance of Park Route 16 primarily involve Maintenance Division staff. Installing and maintaining signs and trail markers may involve both Interpretive Division and Maintenance Division staff as well as volunteer staff. Resource management projects such as exotic vegetation management primarily involve Science and Resources Management Division staff, but may also involve Maintenance Division staff and volunteer staff. Under this alternative, Park operations associated with the current and future use of the Rancho Estelle Historic District area would increase slightly during initial rehabilitation of areas damaged by social trails. Overall this would have a negligible to moderate adverse effect on employee work loads. Cumulatively, this alternative would have a short-term, negligible to moderate adverse effect on some Park operations when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Rehabilitation of areas damaged by social trails would have greater-than-minor short-term adverse effects on some Park operations and may have long-term greater-than-minor effects on some division's operations if visitors continue to try to access the area following social trail closure. Therefore, measurable effects to Park operations would be direct, short-term and possibly long-term, negligible to moderate, adverse effects on the operations of the Trails Crew, Science and Resources Division, and possibly law enforcement. Cumulatively, this alternative would contribute to adverse effects on Park operations when considered with other past, present, and reasonably foreseeable future actions. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of *NPS Management Policies 2006*.

CONSULTATION AND COORDINATION

External Scoping

External scoping was initiated with the distribution of a scoping letter to inform the public of the proposed trail realignment, and to generate input relevant to the preparation of this EA. The scoping letter, dated November 29, 2007, was mailed to interested parties including local, State, and Federal agencies; special interest groups; academic institutions; businesses; and individuals. In addition, the scoping letter was mailed to the Park's seven affiliated Native American tribes. Scoping information was also posted on the Park's website.

During the 30-day scoping period, two responses were received. One response was from an unaffiliated individual, who made a general comment about public enjoyment of National Parks but did not specifically reference the project. The second response was from the U.S. Fish and Wildlife Service (USFWS) requesting further information about the Park's assessment of potential effects to federally listed species and their habitats. The Park has responded in a letter report outlining assessments conducted by the Park's Biologists, which documented the data used to make a determination of "no effect" to federally listed species or their habitats. The Park will complete consultation with USFWS prior to concluding the NEPA process.

Internal Scoping

Internal scoping was conducted with an interdisciplinary team of environmental resource, visitor use, and trail maintenance specialists from Big Bend National Park. Project information needed to begin internal scoping was entered into the NPS "Planning, Environment and Public Scoping" (PEPC) database system in February 2007. Interdisciplinary team members were provided details of the proposed new trail through the completion of an "Environmental Screening Form," recorded in PEPC in May 2007. Additionally, interdisciplinary team members met on October 16, 2007 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and to develop mitigation measures. Additionally, some interdisciplinary team members conducted site visits to the proposed project area prior to the internal scoping meeting.

Environmental Assessment Review Period

The EA will be released for public review in February 2008. To inform the public of the availability of the EA, the NPS will publish and distribute a letter or press release to various agencies, tribes, and members of the public on the Park's mailing list, as well as place an ad in the local newspaper. Copies of the EA will be provided to interested individuals, upon request. Copies of the document will also be available for review at http://parkplanning.nps.gov/bibe.

The EA is subject to a 30-day public comment period. During this time, the public is encouraged to submit their written comments to the NPS address provided at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed prior to the release of a decision document. The NPS will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the Environmental Assessment/Assessment of Effect, as needed.

List of Preparers

Preparers (developed EA content):

- Deirdre Morgan-Remley, NEPA/Cultural Resources Specialist, Morgan Environmental Associates, Castroville, Texas

Contributors (provided information and guidance):

NPS, Big Bend National Park, Texas
- Erik Walker, Trails Supervisor
- Davd Elkowitz, Chief of Interpretation and Visitor Services
- Raymond Skiles, Wildlife Biologist and Wilderness Coordinator
- Thomas Alex, Archeologist
- Betty Alex, GIS Specialist
- Jeff Bennett, Hydrologist and Physical Science Specialist
- Joe Sirotnak, Botanist

Reviewers (provided guidance and recommendations on content):
- Cheryl Eckhardt, NEPA/106 Specialist, National Park Service Intermountain Region

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APPENDIX A – REVIEWS OF CULTURAL RESOURCES SPECIALISTS

I have reviewed this preferred alternative for conformity with requirements for the NPS Section 106 process, with the 1995 Servicewide Programmatic Agreement (if applicable), and applicable parts of the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*, *NPS Management Policies 2006*, *NPS Cultural Resource Management Guideline*, and NPS Director's Order-28 concerning issues relevant to the Section 106 process, including identification and evaluation of historic properties and further consultation needs. I have stated any additional stipulations that should apply, and I concur with the recommended assessment of effect above.

Archeologist:_____ **Date:**_____
Comments:

Historical Architect:_____ **Date:**_____
Comments:

Cultural Landscape Architect:_____ **Date:**_____
Comments:

Historian:_____ **Date:**_____
Comments:

Curator:_____ **Date:**_____
Comments:

Ethnographer:_____ **Date:**_____
Comments:

Superintendent's Review and Approval:
_____ No Effect _____ No Adverse Effect _____ Adverse Effect

Stipulations, if any:

Recommended by
Compliance Coordinator _____ **Date:**_____

Approved by
Superintendent_____ **Date:**_____