National Park Service
U.S. Department of the Interior
Chaco Culture National Historical Park
New Mexico

Chaco Culture Front Country Trail Upgrade Project
Environmental Assessment/Assessment of Effect

December 2007

Environmental Assessment
Assessment of Effect

Front Country Trail Upgrade Project
Chaco Culture National Historical Park, New Mexico

Summary

The National Park Service (NPS) at Chaco Culture National Historical Park (CCNHP) is proposing trail upgrades to the existing front country trails**.** For the purposes of this document the term "front country trail" refers to those trails immediately accessible from the park's paved nine-mile loop road and which do not require a permit. The project would upgrade 3.46 miles (5.55 kilometers) of existing trails. The proposed work on the front country trails is needed to address hazards to visitor safety, persistent resource damage, and unsustainable trail design. Additionally, the proposed work increases the amount of trails that are in compliance with the Americans with Disabilities Act (ADA) of 1990. In addition to the proposed work on the trails the park proposed to add shade ramadas with picnic tables to the parking area of Pueblo Bonito and Casa Rinconada. These added amenities will provide shade and a safe and sustainable location for visitors to rest and eat.

This Environmental Assessment / Assessment of Effect (EA/AEF) evaluates two alternatives – A "No Action Alternative" and the "Proposed Action" to upgrade the front country trails, which is the NPS "Preferred Alternative." The No Action Alternative describes the current management and condition of the existing front country trails and the environmental impacts that may occur if there were no management-initiated changes to the trails. The Proposed Action describes an improved trail design. This document analyzes the potential environmental effects of this trail work.

This EA/AE 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 CCNHP's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics analyzed in this document include soils, archeological resources, park operations, and visitor use and safety. These topics were chosen by the interdisciplinary team, because one or both 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 neither alternative has the potential to have measurable impacts to these resources. No major effects are anticipated as a result of this project. Public scoping was conducted to facilitate the development of this document, and comments were received from no government agencies, one Native American tribe, and no 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 mail comments to: Superintendent; Chaco Culture National Historical Park; P.O. Box 220; Chaco Culture National Historical Park, Nageezi, New Mexico, 87037.

This environmental assessment / assessment of effect will be on public review for 30 days. The closing date for comments is 20 January 2008. Please note that names and addresses of people who

comment become part of the public record. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** NPS will honor such requests to the extent allowable by law, but you should be aware that NPS may still be required to disclose your name and address pursuant to the Freedom of Information Act. We will make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

This page intentionally left blank

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS **16**

NOTES ON NEPA TERMS AND ANALYSES **16**

PURPOSE AND NEED **1**

Introduction **1**

Purpose and Need **2**

Relationship to Other Plans and Policies **3**

Figure 1: Project Location **5**

Archeological Resources 6

Visitor Use and Safety 6

Impact Topics Dismissed From Further Analysis **7**

The *NPS Management Policies 2006* (NPS 2006) state that the NPS will preserve and protect geologic features and geologic processes as integral components of park natural systems. The underlying geology consists of primarily Cretaceous shales and sandstones within the Mesa Verde group. Primary formations visible in the park are Cliff House Sandstone and Menefee Shale. The San Juan Basin is an area rich in energy resources. If energy resources are discovered in either of these cases, extraction processes could impact Park resources ranging from soils to lightscapes and soundscapes. The main thrust of energy development in the San Juan Basin is presently focused on coal methane extraction in the northern portion of San Juan County. 7

Soils 7

Wetlands 7

Floodplains 8

Air Quality 8

Vegetation 8

Wildlife 9

Indian Trust Resources 9

Environmental Justice 10

Socioeconomics 10

Prime and Unique Farmlands 10

Soundscape Management 11

Lightscape Management 11

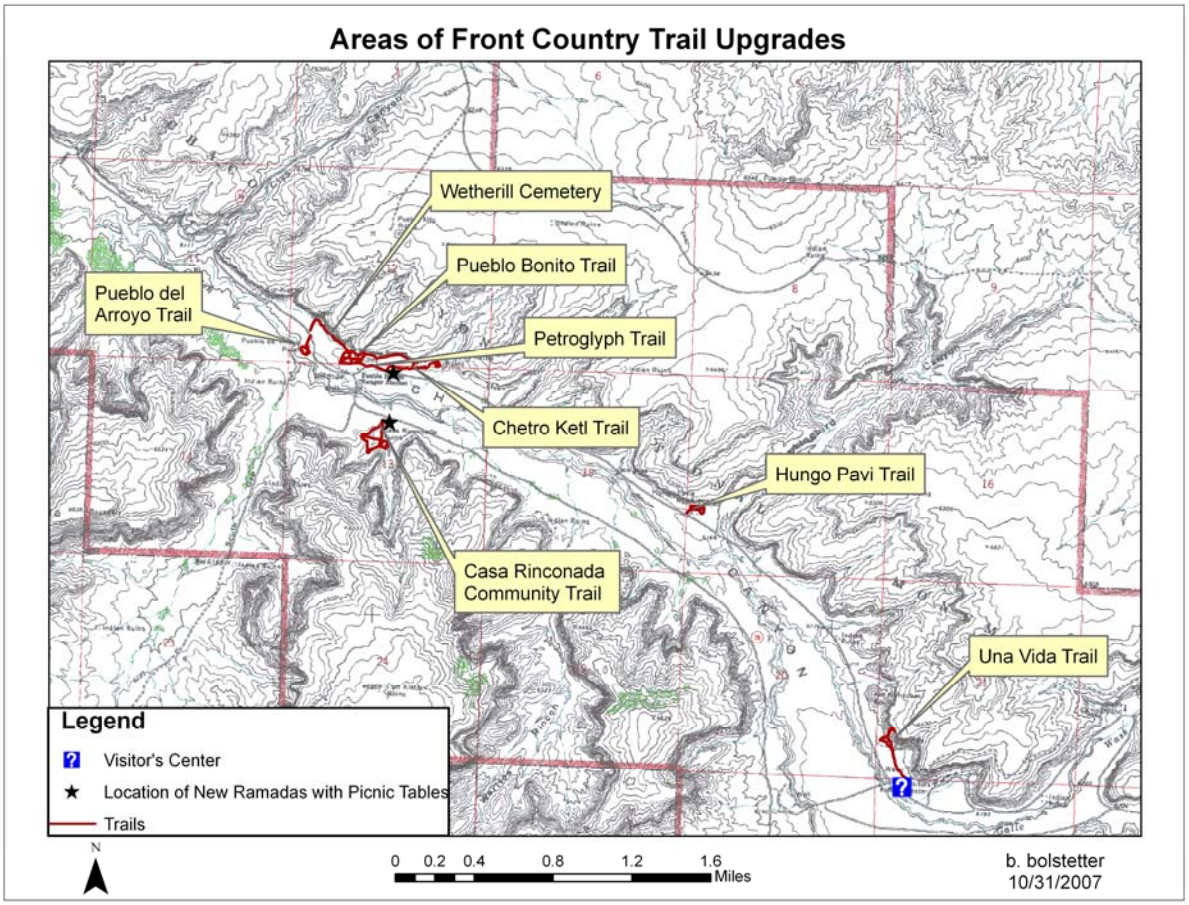
Ethnographic Resources 12

Cultural Landscapes 12

Museum Collections 12

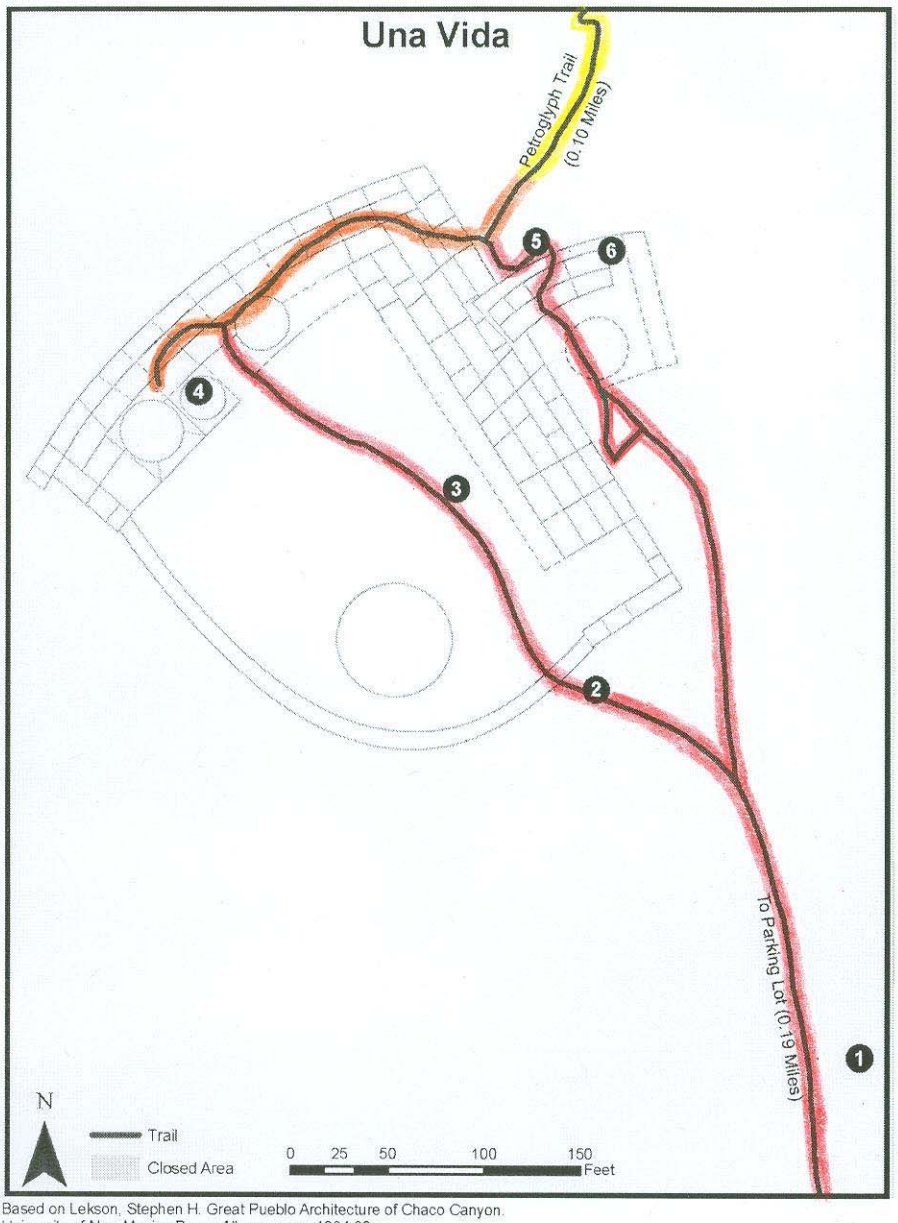
Alternatives Carried Forward **13**

The No Action Alternative – No Change in Current Conditions 13



20

Figure 5: Areas of Front Country Trail Upgrades 20

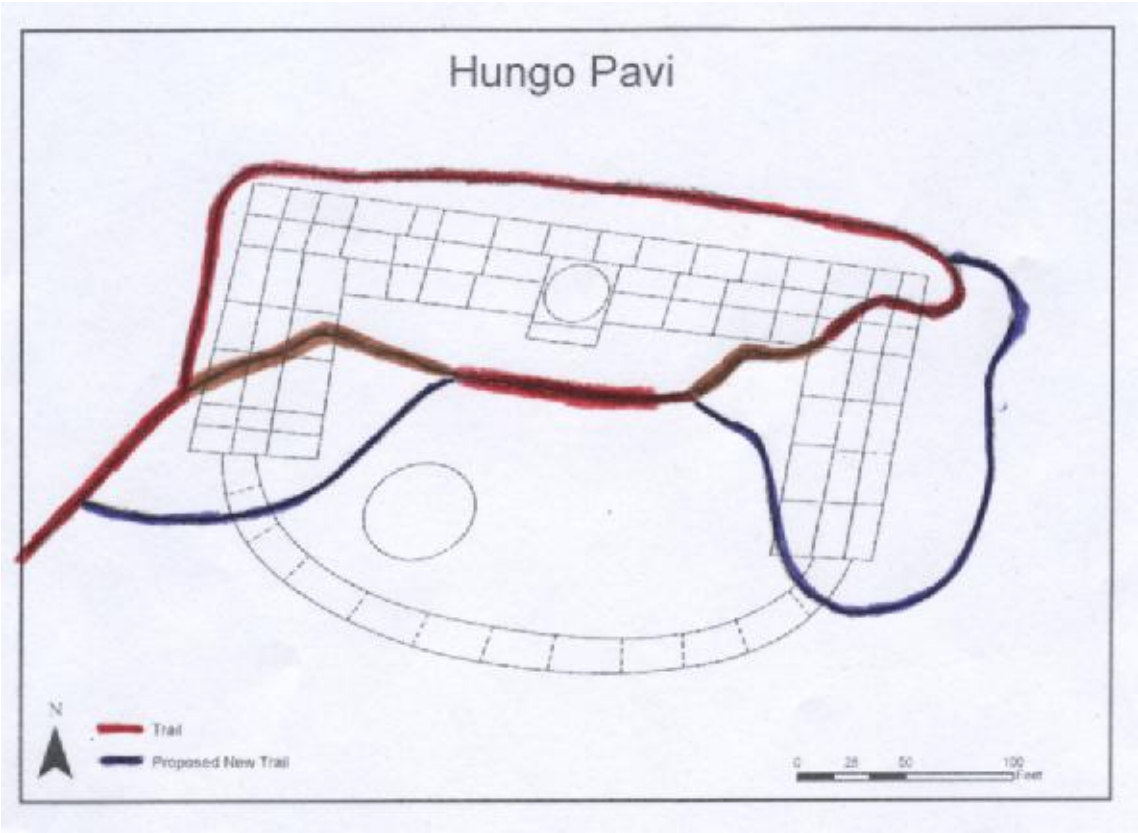


Based on Lekson, Stephen H. Great Pueblo Architecture of Chaco Canyon. University of New Mexico Press: Albuquerque. 1984:80.

.....21

Figure 6: Trail Upgrades, Una Vida.....21

The Una Vida trail is approximately 0.5 miles long. The upgrades for this trail will include approximately 1830 feet of Trail Type A (red), 191 feet of Trail Type B (orange), and 482 feet of Trail Type D (yellow). Circled numbers represent interpretive site stops.....21



.....22

Figure 7: Trail Upgrades, Hungo Pavi.....22

The Hungo Pavi trail is approximately 0.20 miles long. Upgrades for this trail will include 1,335 feet of Trail Type A (red), which will include 560 feet of new trail to be realigned around the eastern and western roomblocks (purple). Approximately 200 feet of trail (which impacts exposed architectural fabric) will be abandoned and rehabilitated in favor of the trail realignments (brown). 22

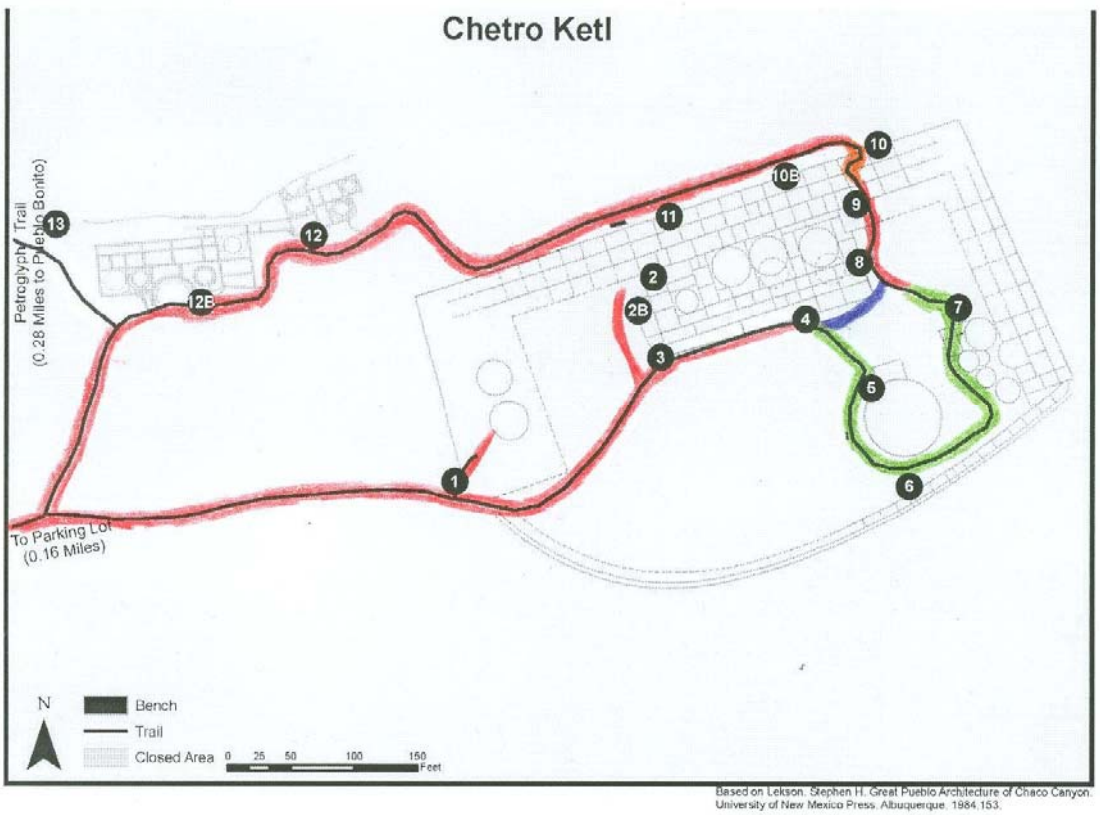


Figure 8: Trail Upgrades, Chetro Ketl 23

The Chetro Ketl trail is approximately 0.53 miles in length. The upgrades for this trail will include 2,550 feet of Trail Type A (red), 35-40 feet of Trail Type B (orange), and 250 feet of Trail Type C (green). The trail segment represented above in purple will be added to facilitate access between site stops #4 and #8 and will be of Trail Type A..... 23

Figure 9: Trail Upgrades, Petroglyph Trail 24

The Petroglyph Trail is approximately 0.3 miles in length. Upgrades for this trail will include 1577 feet of Trail Type A (red) and 170 feet of Trail Type B (orange). Fill will be brought in to level out the gradient of the trail in particular sections. A spur trail leading from site stop #5 to the parking lot (approximately 375 feet in length) will be of Trail Type A as well. 24

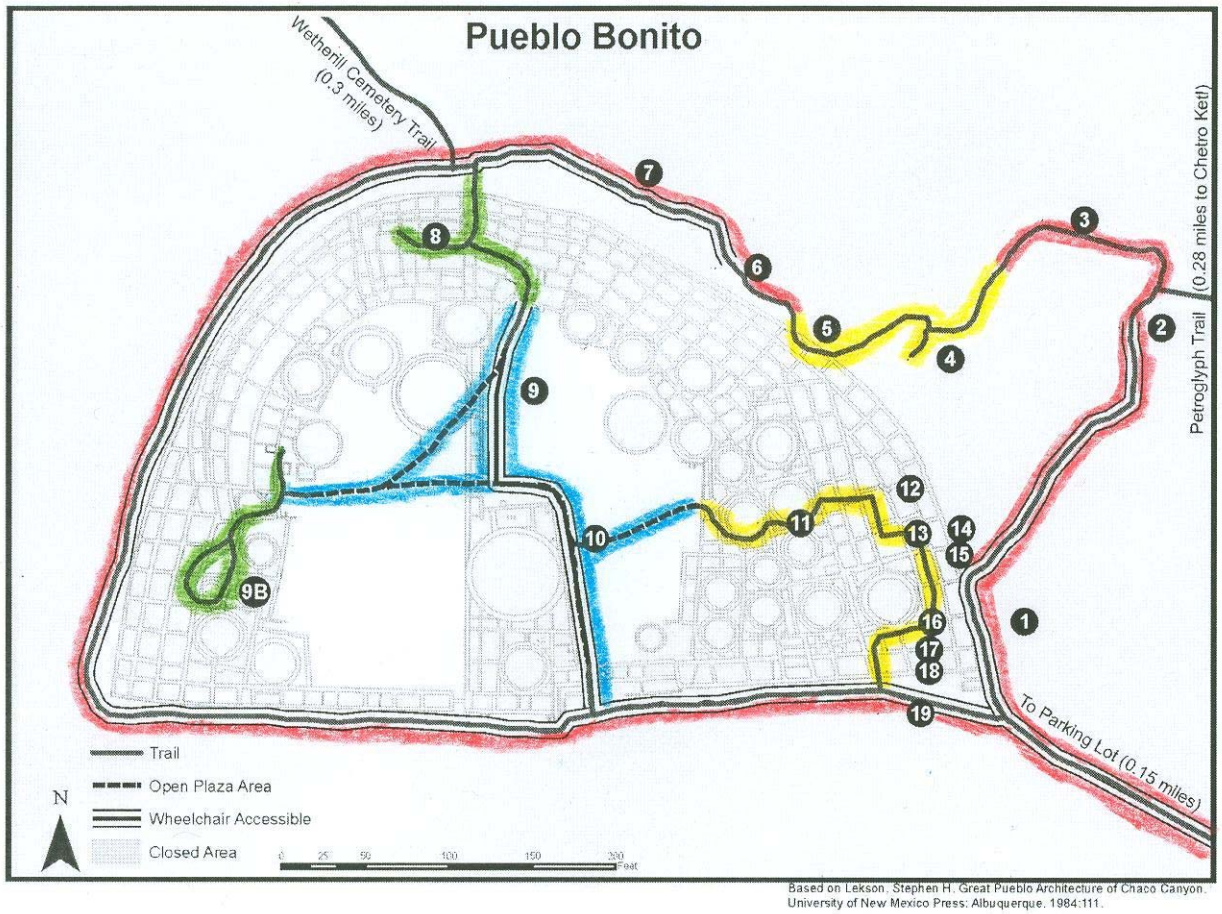
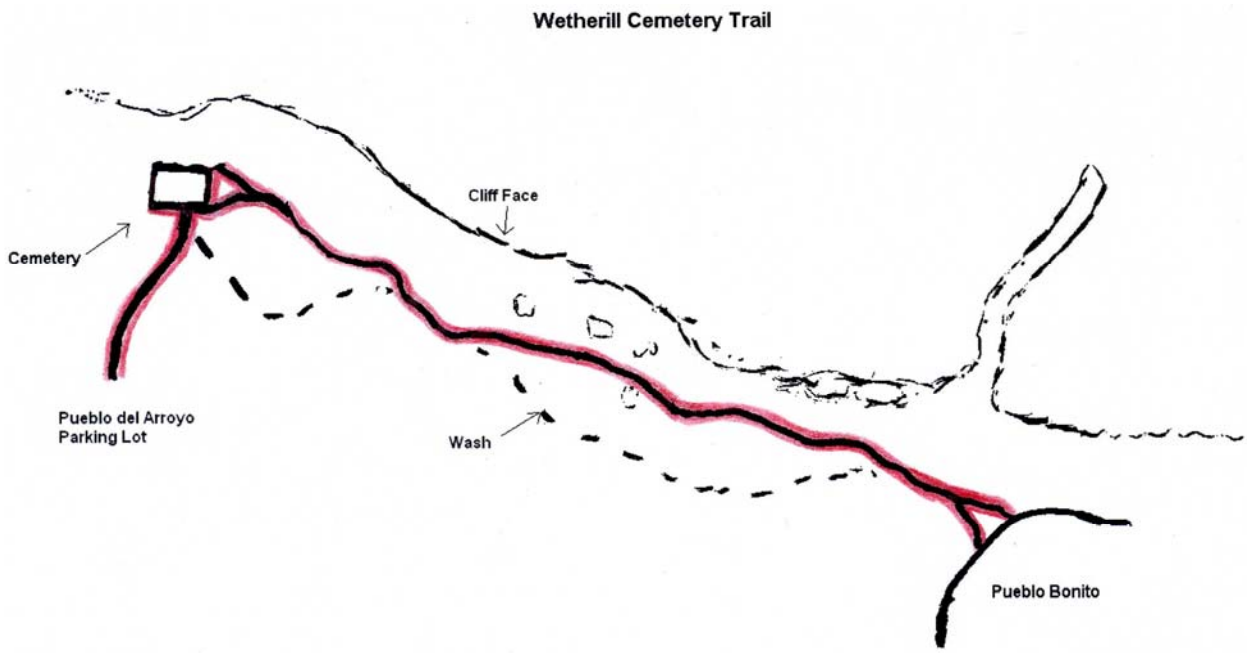


Figure 10: Trail Upgrades, Pueblo Bonito 25

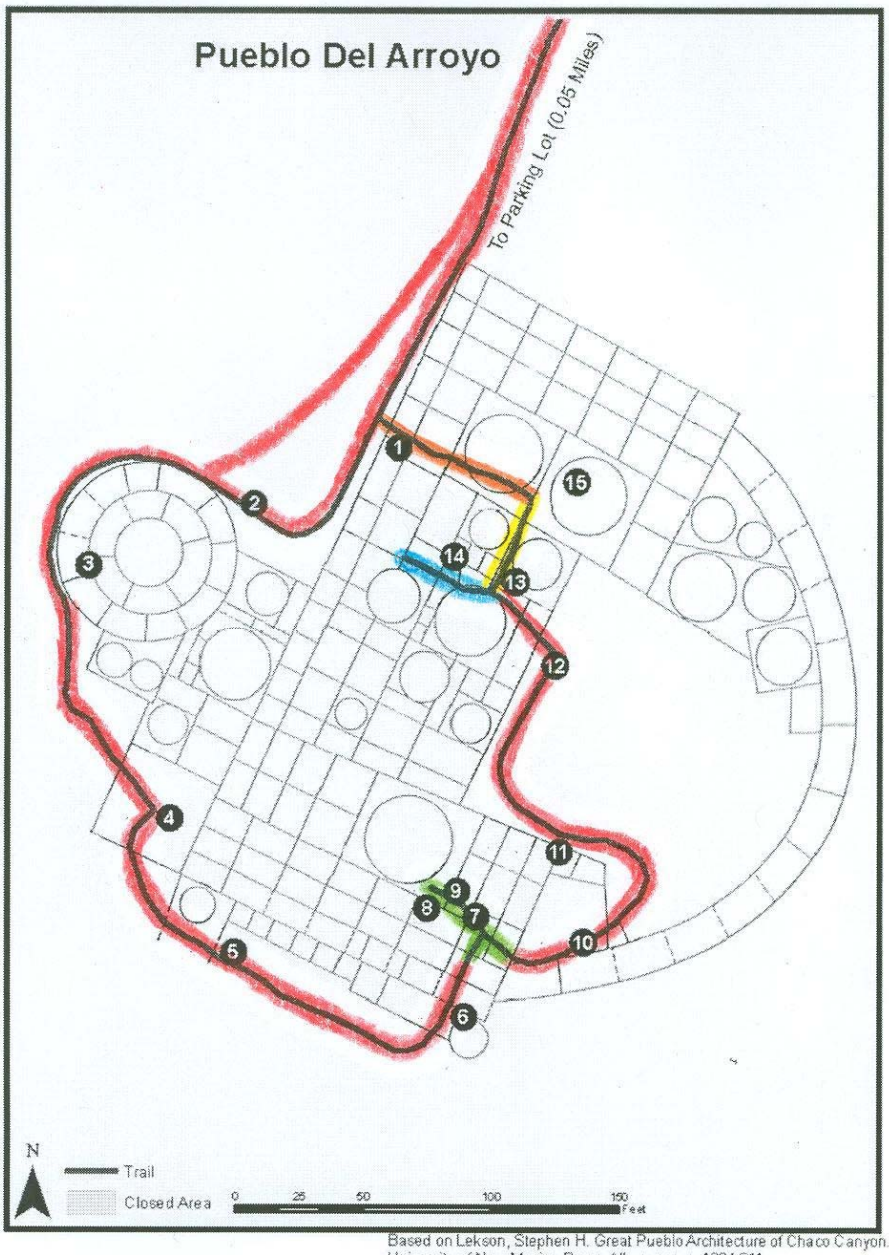
The Pueblo Bonito trail is approximately 0.75 miles in length. Upgrades for this trail will include 2,030 feet of Trail Type A (red) 183 feet of Trail Type C (green) 432 feet of Trail Type D (blue), and 418 of Trail Type E (yellow), A shade ramada with picnic tables will be added to this trail in the trailhead/parking lot area. This trailhead/ parking lot area serves Chetro Ketl and the Petroglyph Trail as well..... 25



26

Figure 11: Trail Upgrades: Wetherill Cemetery 26

The Wetherill Cemetery trail is approximately 0.25 miles in length. Upgrades for this trail will include 1,270 feet of Trail Type A (red). 26

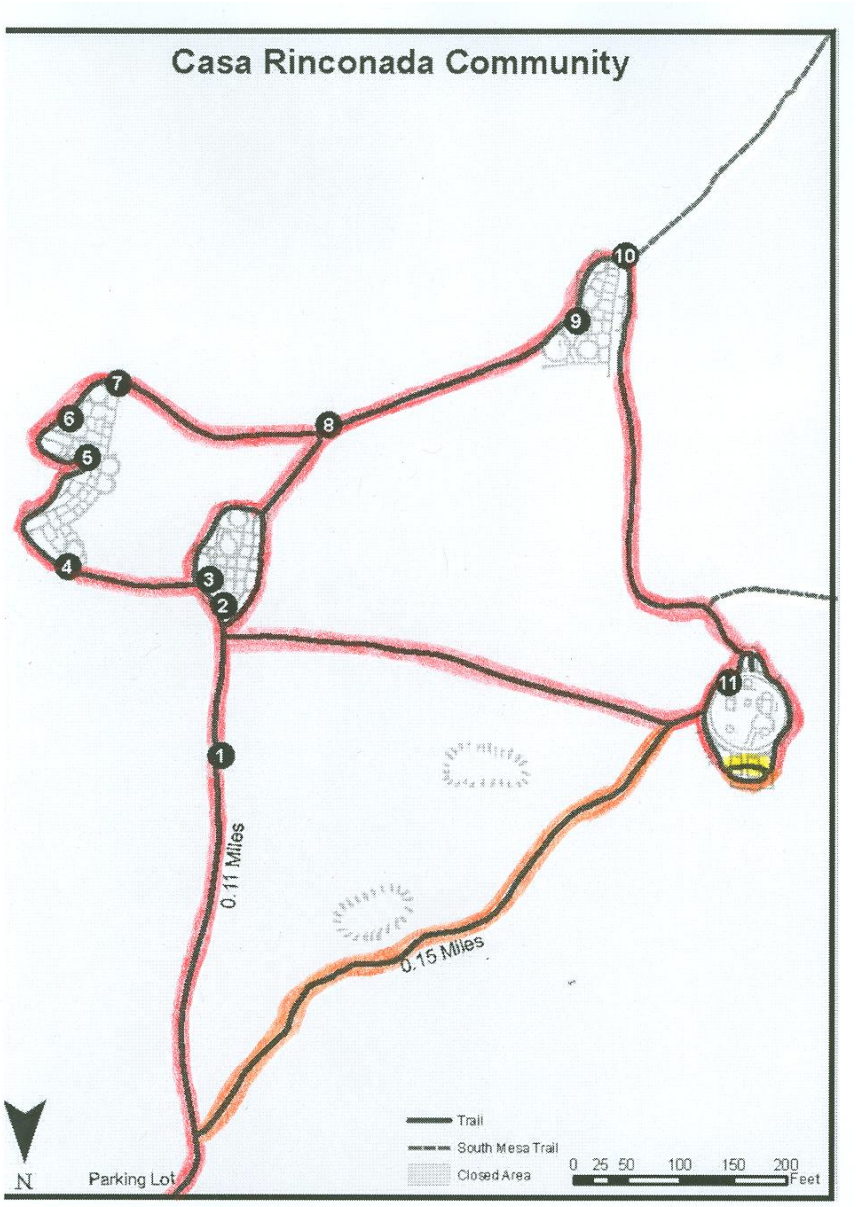


Based on Lekson, Stephen H. Great Pueblo Architecture of Chaco Canyon. University of New Mexico Press: Albuquerque. 1984:211.

..... 27

Figure 12: Trail Upgrades, Pueblo del Arroyo 27

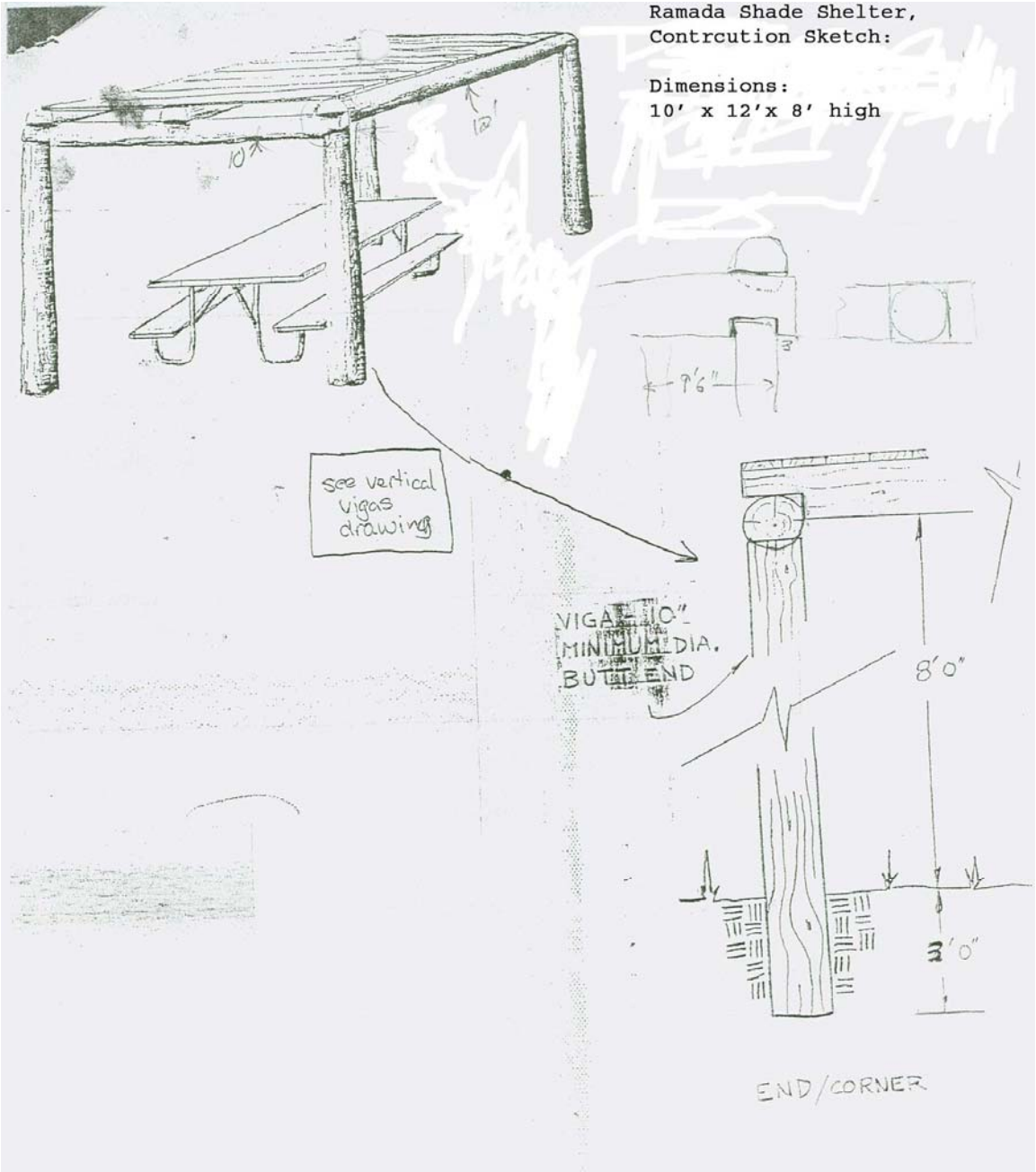
The Pueblo del Arroyo trail is approximately 0.25 miles in length. Upgrades for this trail will include 930 feet of Trail Type A (red), 60 feet of Trail Type B (orange), 37 feet of Trail Type C (green), 80 feet of Trail Type D (blue) , and 110 feet of Trail Type E (yellow). In the Trail Type E section, capping will be added to the masonry lining the trail and road base will be added to the surface and compacted. An administrative access road running from near the trailhead to past site stop #2 will be formalized to allow a more ADA accessible way into the site. 27



..... 28

Figure 13: Trail Upgrades, Casa Rinconada Community 28

The Casa Rinconada Community trail is approximately 0.75 miles in length. Upgrades to this trail will include 2,329 feet of Trail Type A (red) and 513 feet of Trail Type B (orange). 40 feet will be maintained as is (yellow). A shade ramada with picnic tables will be added to this trail in the trailhead/parking lot area. 28



.....29

Figure 14: Shade Ramada Construction Sketch **29**

Alternative Considered but Dismissed **30**

Permanent Closure of the Front Country trails 30

Hardening of the Front Country trail surfaces **30**

Mitigation Measures for the Proposed Action **30**

Alternative Summaries **32**

Identification of the Environmentally Preferred Alternative **33**

ENVIRONMENTAL CONSEQUENCES **35**

METHODOLOGY **35**

Archeological Resources **38**

Regulatory Context and Affected Environment **38**

Intensity Level Definitions 39
Impacts of the No Action Alternative 39
Impacts of the Preferred Alternative 40
Regulatory Context and Affected Environment 40
Intensity Level Definitions 41
Impacts of the No Action Alternative 41
Impacts of the Preferred Alternative 42
Intensity Level Definitions 43
Impacts of the No Action Alternative 43
Impacts of the Preferred Alternative 44

External Scoping **45**

Internal Scoping **46**

Environmental Assessment / Assessment of Effect Review and List of Recipients **46**

List of Preparers **46**

REFERENCES **47**

LIST OF TABLES

Table 1 – Indian Groups Notified by Letter of Proposed Action during Scoping 4
Table 2 – Alternatives Summary & Extent to which Each Alternative Meets Project Objectives 32
Table 3 – Environmental Impact Summary by Alternative..... 29

LIST OF FIGURES

Figure 1 – Project Location 5
Figure 2 – The No Action Alternative: Photographs Illustrating Poor Trail Conditions 14
Figure 4 – Diagrams of Trail Types and Generalized Locations 17
Figure 5 -- Areas of Front Country Trail Upgrades 20
Figure 6 -- Una Vida Trail Upgrades 21
Figure 7 -- Hungo Pavi Trail Upgrades 22
Figure 8 -- Chetro Ketl Trail Upgrades 23
Figure 9 -- Petroglyph Trail Upgrades 24
Figure 10 -- Pueblo Bonito Trail Upgrades 25
Figure 11 -- Wetherill Cemetery Trail Upgrades 26
Figure 12 -- Pueblo del Arroyo Trail Upgrades 27
Figure 13 -- Casa Rinconada Community Trail Upgrades 28
Figure 14 - - Shade Ramada Construction Sketch 29

ABBREVIATIONS AND ACRONYMS

ADA	Americans with Disabilities Act
CCNHP	Chaco Culture National Historical Park
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	NPS Director's Order
EA/AEF	Environmental Assessment/ Assessment of Effect Form
GMP	General Management Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
RMP	Resource Management Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
USEPA	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.

EA/AEFs are public documents written for use by a general audience, agency officials, and technical experts. As stated in the CEQ regulations and the NPS DO-12, EA/AEFs are intended to provide a concise and clear overview of environmental analysis relevant to the Proposed Action. Therefore, discussions of significant issues 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

Chaco Culture National Historical Park (CCNHP) is located in northwest New Mexico, approximately 60 miles south of the city of Farmington. The park was originally designated Chaco Canyon National Monument in 1907. The passage of the Organic Act in 1916 created the National Park Service, within which the monument was included. The Organic Act set forth the NPS mission to preserve unimpaired the features of each park and provide for the enjoyment of these features by future generations. In 1980 the monument was enlarged to its current size of 34,000 acres and designated a National Historical Park. The park was added to the UNESCO list of World Heritage Sites in 1987. The park contains thousands of archaeological sites, material evidence of a culture known collectively in modern times as the Ancestral Puebloans (also sometimes referred to as the "Anasazi"), who lived in Chaco Canyon during the period from circa 800 to 1200 A.D. More than 10,000 years of human activity is preserved in Chaco Canyon. Use of the canyon culminated in the Chaco civilization that flourished between the 9th and 13th centuries and was characterized by remarkable achievements in architecture, designed landscape, art, agriculture, social complexity, economic organization, engineering, and astronomy. The trail system serves as the primary transportative and interpretive facility that connects visitors with these elements of Ancestral Pueblo culture in Chaco (RMP 2003).

This Environmental Assessment / Assessment of Effect (EA/AEF) examines potential environmental impacts associated with upgrading the front country trails. This EA/AEF 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*), and NPS Director's Order #12, *Conservation Planning, Environmental Impact Analysis, and Decision-making* (DO-12).

Background

CCNHP typically receives between 60,000 and 80,000 visitors every year (CCNHP visitor statistics). A nine-mile paved interpretive loop road allows visitors to drive around the canyon floor and see the cultural sites from afar. Parking stops along the way serve as trailheads to the front country trails where visitors can leave their cars and hike short distances to walk in and around several of the large cultural sites preserved by the Park (see Figure 1).

The trail system at CCNHP is largely non-standardized and is not regularly maintained. Improvements and maintenance have occurred haphazardly, in response to urgent maintenance issues, resource protection concerns, the availability of funds, volunteer labor and/or periodic interest. As noted in the 1985 GMP "visitors frequently wander from the designated route and disturb fragile or unstable surfaces, sometimes placing their own safety in jeopardy" (NPS 1985:35). This occurs, in part, because the condition of the front country trail system makes it difficult for visitors to determine where established trails are located.

The trail system at CCNHP was never comprehensively, formally designed and engineered. Incrementally, over the past 50-60 years preferred existing routes through the public archeological sites began to be formally designated and maintained, while less desirable routes were closed. Park staff stabilized archeological features in locations where the trail passes over and through exposed architecture, while gravel was added to the surface of other portions of the trail. Today, adopted as the parks front country trail system they serve as the interpretive gateway to all of the parks cultural and natural resources. Over the years, various types of gravel have been applied to the surface. However, none of the trails have edging; therefore, applied gravel has migrated off of the trail along with becoming mixed into the compact dirt. Periodic attempts at surface improvements have resulted in

front country trails that are predominately compacted dirt which is uneven, becomes thick with mud during periods of rain and snow, and prone to the development of social trails.

Although trails are inherently dynamic features that require regular maintenance, well designed trails are easier to maintain and require fewer maintenance episodes. 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. For best hiking conditions and to reduce maintenance needs, trails should ideally follow a linear gradient of less than 10% (5.8 degree slope) (Griswold 1982, USFS 1984). Currently, 19% of CCNHP's front country trail system exceeds the desired 10% grade. The Park seeks a less than 10% grade on its front country trail to meet sustainable and ADA trail design standards. An improved trail design and layout is necessary to reduce ongoing resource damage and unmanageable maintenance problems, to improve visitor use and safety, and to improve the efficiency of park operations.

Purpose and Need

The purpose of the proposal is to improve the safety, sustainability, and positive front country experience for the visitors to CCNHP.

A comprehensive assessment of the trails, initiated in 2005, showed extensive social trails interweaving the established trail system. The outward appearance of these social trails looks the same as the established trails. Therefore, even though park literature and signs emphasize staying on established trails, the visiting public is often unable to differentiate what the park intends to be an established trail and is off trail or a social trail. The trails are only minimally and reactively maintained by park staff and volunteers.

The proposed project would edge and surface approximately 3.46 miles (5.55 kilometers) of existing front country trails. This project will also repair areas along the trails where erosion has become a serious issue. This trail work will also increase the amount of trails that are in compliance with the Americans with Disabilities Act (ADA) of 1990. The Proposed Action will also realign two segments of trail in one archeological site. This realignment will total 0.10 miles (0.16 kilometers) of trail and will provide enhanced resource protection by abandoning two trail segments that walk visitors over exposed archeological architecture, improve visitor access by lowering the trail grade, and providing an improved visitor experience through increased interpretive opportunities. These realigned trail segments will essentially formalize two long-standing social trails in favor of established trail segments that go over exposed architectural fabric. These established trail segments will be abandoned and rehabilitated.

The Proposed Action would meet the primary goals of the Park's enabling legislation – protecting and interpreting park resources. These goals will be met through the accomplishing the following objectives:

1. Improve visitor safety by adding all-weather surfaces that will not become slick and muddy in inclement weather.

2. Providing a clearly navigable and well-designed trail system that will improve visitor satisfaction and understanding.

3. Minimize impacts to park resources.

4. Implement a sustainable design for trail system and trail system maintenance that would make long-term maintenance practical and make park operations more efficient

5. Establish ADA accessible trails to the greatest extent possible.

Relationship to Other Plans and Policies

Plans and policies relevant to the Proposed Action include the Park's enabling legislations (35 Stat. 2119, 45 Stat. 2937, 46 Stat. 1165, PL 96-550, PL 104-11), the Park's Resource Management Plan (NPS 2003), the Park's Trail Management and Maintenance Plan (NPS 2007), and the NPS Trail Management Handbook (NPS 1983) and the NPS Management Policies 2006 (NPS 2005). Following is more information pertaining to how this proposal meets the goals and objectives of these plans and policies:

- CCNHP's enabling legislation states that the Park was set aside because the "public good would be promoted by preserving these prehistoric remains as a National Monument." The Proposed Action would meet the objectives of the Park's enabling legislation by improving visitor satisfaction and enjoyment of primary Park resources.

- The central objective of the CCNHP's *Resource Management Plan* (NPS 2003) is to outline a strategy for protecting Park resources. While the document doesn't mention trails *per se*, the trail system is a vital mechanism for negotiating visitor traffic through and around areas with fragile natural and cultural resources. The Proposed Action would meet some main objectives of the RMP by enhancing visitor experience and reducing resource damage.

- The CCNHP *Trail Management Plan* (NPS 2007) identifies front country trails as areas of high visitor use. The Park's trail management plan states that these areas are to be uniform in appearance, compliant with standards of universal design where those standards do not conflict with the protection of the resources, and designed and constructed in a sustainable manner. The Proposed Action meets the objectives outlined in this plan.

- The NPS *Trail Management Handbook* (NPS 1983) states that well planned trails "will enhance and reinforce the visitors' experience." Further, trails "should be designed and constructed to produce minimum disturbance to the natural environment, top ensure the safety and enjoyment of the users, to protect adjacent resources, to consider the aesthetic quality of an area, and to adequately function for the intended use." The Proposed Action will meet these objectives.

- NPS *Management Policies 2006* (NPS 2006) state that trails "will be planned and developed as integral parts of each park's transportation system and incorporate principles of universal design. 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 realignment has been designed to meet these objectives.

SCOPING

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in an EA/AEF. CCNHP conducted both internal scoping with appropriate National Park Service staff and external scoping with the public and interested and affected groups and agencies.

Internal scoping was conducted by the staff of CCNHP between April – October 2007. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined what the likely issues and impact topics would be, and identified the relationship, if any, of the proposed action to other planning efforts at the park.

A press release describing the proposed action was issued on July 12, 2007 (see appendix 1, for the text). The following American Indian tribes traditionally associated with the lands of CCNHP and others with whom park staff regularly consults were also sent copies of the press release on July 12, 2007:

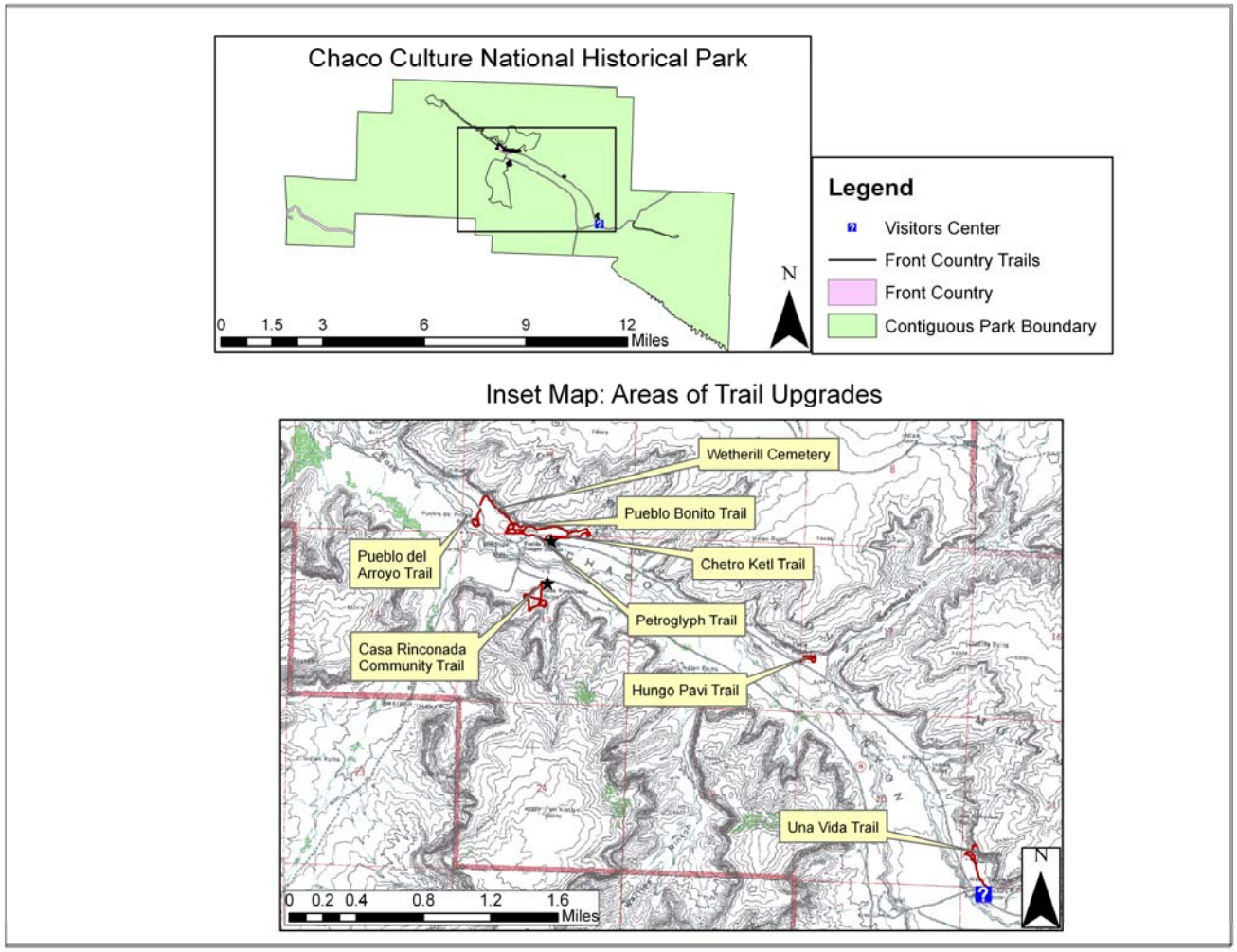
Table 1, Indian Groups Notified By Letter of Proposed Action during Scoping

Pueblo of Cochiti	Pueblo of Isleta	Pueblo of Sandia	Jicarilla Apache Tribe
Hopi Tribe	Pueblo of Jemez	Pueblo of Santa Ana	Southern Ute Tribe
Pueblo of Laguna	Pueblo of Pojoaque	Pueblo of Santa Clara	Ute Mountain Tribe
Pueblo of Nambe	Pueblo of San Felipe	Pueblo of Santo Domingo	Ysleta del Sur Pueblo
Navajo Nation	Pueblo of Zia	Pueblo of Taos	Pueblo of San Juan
Pueblo of Picuris	Pueblo of San Ildefonso	Pueblo of Tesuque	Pueblo of Acoma
Pueblo of Zuni			

Comments were solicited during external scoping until August 15, 2007. The Park received one response from the Navajo Nation requesting a copy of the EA/AEF.

The actions described in this document are subject to §106 of the National Historic Preservation Act, as amended in 1992 (16 USC §470 *et seq*.). Consultations with the New Mexico State Historic Preservation Office (SHPO) have been ongoing since the inception of the project. This environmental assessment/assessment of effect will also be submitted to the SHPO for review and comment to fulfill CCNHP's obligations under §106 (36 CFR §800.8[c], *Use of the NEPA process for section 106 purposes*).

Figure 1: Project Location



Impacts Retained for Further Analysis

Impact topics analyzed for the No Action Alternative and the Proposed Action 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 Chaco Culture National Historical Park. Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. A brief overview of impact topics retained for further analysis in this Environmental Assessment / Assessment of Effect are listed below along with the reasons why the impact topic is further analyzed. Detailed analysis of each of these topics, including the regulatory context and the existing baseline conditions (affected environment) for each of these topics is provided in the *Environmental Consequences* section of this document.

Archeological Resources

In addition to the National Historic Preservation Act and the National Park Service *2006 Management Policies*, the National Park Service's 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 National Park Service 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 Service reflect a commitment to the conservation of archeological resources as elements of our national heritage.

The Proposed Action is expected to have greater than negligible impacts on archeological resources in the area of the existing trails. Therefore the topic of archeological resources has been retained for further analysis.

Visitor Use and Safety

According to the *NPS Management Policies 2006*, the enjoyment of park resources and values by people is part of the fundamental purpose of all park units. The National Park Service is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks, and will maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of society. Further, the National Park Service will provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks. The *NPS Management Policies 2006* also state that scenic views and visual resources are considered highly valued associated characteristics that the National Park Service should strive to protect.

The Proposed Action is expected to have greater than negligible impacts on visitor experience and safety. Therefore the topic of visitor experience and safety has been retained for further analysis.

Park Operations

Parks must consider the potential effects of proposed actions on overall park operations. Trail maintenance and management is the parks operation relevant to this proposed project. The front country trails themselves currently receive no regular maintenance. Maintenance is performed on an emergency basis and when volunteers are available. If the Proposed Action is implemented the trails will be upgraded and improved to a condition that will require only negligible maintenance. Maintenance will be necessary only on a life cyclic basis, with an estimated life cycle of 15-25 years. Therefore, implementation of the Proposed Action would shift regular maintenance of the trails to a

concentrated effort based upon the life cycle of the materials used in the construction which is estimated to be a 15-25 year cycle.

The Proposed Actions is expected to have greater than negligible impacts on park operations; therefore this topic is 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 detailed analysis. Impact topics were dismissed from further analysis if it was determined that the project did not have the potential to cause significant measurable change to these resources and values. The regulatory context and baseline conditions relevant to each impact topic were briefly 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.

Topography and Geology

The *NPS Management Policies 2006* (NPS 2006) state that the NPS will preserve and protect geologic features and geologic processes as integral components of park natural systems. The underlying geology consists of primarily Cretaceous shales and sandstones within the Mesa Verde group. Primary formations visible in the park are Cliff House Sandstone and Menefee Shale. The San Juan Basin is an area rich in energy resources. If energy resources are discovered in either of these cases, extraction processes could impact Park resources ranging from soils to lightscapes and soundscapes. The main thrust of energy development in the San Juan Basin is presently focused on coal methane extraction in the northern portion of San Juan County.

Minor ground disturbance will likely be required to achieve the gradual grade necessary to provide a sustainable design for the improved trails, but most of the work that will occur will be additive, not subtractive. Rehabilitating the eroded portions of the existing trails is expected to have a beneficial effect on local geology by reducing erosion. Because the Proposed Action would have a negligible net effect on topography and geology, this topic has been dismissed 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. Soil conservation and soil amendment practices may be implemented to reduce impacts. Importation of off-site soil or soil amendments may be used to restore damaged sites. Off-site soil normally will be salvaged soil, not soil removed from pristine sites, unless the use of pristine site soil can be achieved without causing any overall ecosystem impairment.”

The Proposed Action is expected to have no impacts on soils in the area of the existing trails; therefore the topic of soils has been dismissed from further analysis

Wetlands

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 similar areas. The project area has been examined by the Park’s natural resource specialist, who has determined that the project area is not located within or adjacent to wetlands (pers. comm. Brad Shattuck, CCNHP Chief of Natural Resources, October 2007). Because 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 has been examined by the Park’s natural resource specialist, who has determined that the project area is not located within a 100-year floodplain (pers. comm. Brad Shattuck, CCNHP Chief of Natural Resources, October 2007). Because the project area is not located within the Chaco Wash’s 100-year floodplain, this topic has been dismissed from further analysis.

Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) was established to promote the public health and welfare by protecting and enhancing the nation’s air quality. The act establishes specific programs that provide special protection for air resources and air quality related values associated with National Park Service units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. Chaco Culture National Historical Park is designated as a Class II air quality area under the Clean Air Act. A Class II designation indicates the maximum allowable increase in concentrations of pollutants over baseline concentrations of sulfur dioxide and particulate matter as specified in Section 163 of the Clean Air Act. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

Trail upgrading activities such as hauling materials and operating equipment could result in temporary increases of vehicle exhaust, emissions, and fugitive dust in the general project area. Any exhaust, emissions, and fugitive dust generated from construction activities would be temporary and localized, and would likely dissipate rapidly because air stagnation at CCNHP is rare. Overall, the project could result in a negligible degradation of local air quality, and such effects would be temporary, lasting only as long as restoration activities are being conducted. The Class II air quality designation for CCNHP would not be affected by the proposal; therefore, air quality has been dismissed from further consideration.

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.

Native Park vegetation includes: Alkalai Sacaton (*Sporobolus airoides*), Apache Plume (*Fallugia paradoxa*), Big sagebrush (*Artemisia tridentate*), Blue Grama Grass *(Bouteloua gracilis)*, Broom Snakeweed *(Gutierrezia sarothrae),* Chokecherry *(Prunus virginiana),* Claret Cup Cactus *(Echinocereus triglochidiatus),* Cliffrose (*Purshia mexicana*), Desert Four O'Clock *(Mirabilis multiflora),* Four-wing Saltbush (*Atriplex canescens*), Gambel Oak (*Quercus gambelii*), Greasewood *(Sarcobatus vermiculatus),* Hoary Aster *(Asteraceae canescens)*, Indian Ricegrass *(Achnatherum hymenoides),* Mormon Tea *(Ephedra torreyana),* Narrowleaf Yucca (*Yucca angustissima*), New Mexican Privet (Olive) *(Forestiera neomexicana)*, One Seed Juniper *(Juniperus monosperma)*, Pinyon Pine (*Pinus edulis*), Rabbit brush or Chamisa (*Chrysothamnus nauseosus*), and Wolfberry *(Lycium pallidum)*.

Small amounts of vegetation would be displaced, disturbed, and/or compacted in the areas of construction particularly in the footprint of the trail alignment. These disturbances would result in negligible, site-specific, adverse effects on vegetation. However, reseeding and reestablishing natural drainage patterns in the area of the rehabilitated trail would likely have negligible to minor site-specific beneficial effects on vegetation. Because the net effects on vegetation of the No Action Alternative and the Proposed Action would be negligible to minor and site-specific, this topic has been dismissed from further analysis. However, potential impacts to "special status species," including special status vegetation, are addressed in the *Environmental Consequences* section of this document (see below).

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.

Common wildlife in the Park includes several mammals, reptiles, and birds. The following are some common examples: elk *(Cervus elaphus)*, desert mule deer *(Obdocolleus hemionus)*, coyote *(Canus latrans)*, bobcat *(Lynx rufus)*, American badgers *(Taxidea taxus)*, pallid bats *(Antrozous pallidus),* big brown bats *(Epstisicus fuscus)*, western pipistrelle *(Pipistrellus hesperus),* desert cottontail *(Syvilagua audubonli)*, black-tailed jack rabbit *(Lepus californicus)*, porcupines *(Erithizon dorsatum),* prairie rattlesnakes *(Crotalus viridis)*, gopher/bull snakes *(Pituophis melanoleucus)*, collared lizards *(Crotaphutus collaris),* common ravens *(Corvus corax)*, turkey vultures *(Cathartes aura)*, Cooper's hawk *(Accipiter cooperii)*, red-tailed hawk (*Buteo jamaicensis*), golden eagles (*Aquila chrysaetos),* great horned owl (*Bubo virginianus*), black-chinned hummingbirds (*Archilochus alexandri)*, Say's phoebe (*Sayornis saya*), Cassin's kingbird (*Tyrannus vociferans)*, Canyon towhee *(Pipilo fuscus)*, and several subspecies of dark-eyed juncos *(Junco hyemalis, J. hyemalis hyemalis, J. hyemalis oreganus, J. hyemalis mearnsi)*.

During construction, noise would increase, which may disturb wildlife in the local area. Construction-related noise would be temporary and negligible to minor, and existing sound conditions would resume following construction activities. Because the net effects on wildlife of the No Action Alternative and the Proposed Action would be negligible to minor and localized, this topic has been dismissed from further analysis. However, potential impacts to "special status species," including special status wildlife, are addressed in the *Environmental Consequences* section of this document (see below).

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 Chaco Culture National Historical 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 that all federal agencies, to the extent practicable and permitted by law, consider environmental justice effects by identifying and assessing potential disproportionate adverse human health and environmental effects of programs, policies, and activities on minority and low-income populations.

The proposed project area is located in San Juan County. The U.S. Census Bureau 2000 statistics show that the population of San Juan County is 113,801, of which 21.5% of the in labor force live below the federal poverty level, and 47.2% of the population may be considered members of a minority ethnic group. Because the nature and location of the Proposed Action would not have the potential to have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in EPA (1998) and CEQ (1997) environmental justice guidance, this topic was 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. The Proposed Action would neither change local and regional land use nor appreciably impact local businesses or other agencies. Because the Proposed Action’s scale and scope does not have the potential to 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. The NRCS maintains data for prime and unique farmlands throughout the United States. However federal lands are not included in the NRCS inventory. Based on the New Mexico criteria for prime or unique farmlands (NRCS n.d.), project area soils are 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 national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

The proposed locations for the trail upgrades and all associated construction activities would occur in an area of the Park that is heavily used by visitors. Sound generated by the short-term construction of the trail work may include sounds from breaking rock with hand tools, the sound of a diesel-powered roller compactor, and other similar sounds. Mitigations will be undertaken to minimize the effects to the soundscape including regulating times of construction work, notifying the public of the work schedule in advance, and keeping machine-generated noise to a minimum. Because the area is already subject to human-caused sound, the mitigations that will be undertaken to minimize these impacts, and that the trail work's short-term construction sounds and long-term use sounds are not expected to significantly 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, 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 that which is necessary for basic safety requirements. There are no lights proposed for the front country trails. Therefore, this topic has been dismissed from further analysis.

Cultural Resources

Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); the National Park Service's Director's Order 28 *Cultural Resource Management Guideline*; and National Park Service *2006 Management Policies* (2005) require the consideration of impacts on historic properties that are listed on or eligible to be listed in the National Register of Historic Places. The National Register is the nation's inventory of historic places and the national repository of documentation on property types and their significance. The above-mentioned policies and regulations require federal agencies to coordinate consultation with State Historic Preservation Officers regarding the potential effects to properties listed on or eligible for the National Register of Historic Places.

The National Park Service, as steward of many of America's most important cultural resources, is charged to preserve historic properties for the enjoyment of present and future generations. Management decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources. The National Park Service will protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with the policies and principles contained in the *2006 Management Policies* and the appropriate Director's Orders.

For the purposes of the following discussion, cultural resources include archeological resources, historic structures, cultural landscapes, ethnographic resources, and museum collections. Consultation with the New Mexico State Historic Preservation Officer is occurring in tandem with this EA.

Ethnographic Resources

Per the National Park Service's Director's Order 28 *Cultural Resource Management*, ethnographic resources are defined as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. According to DO-28 and Executive Order 13007 on sacred sites, the National Park Service should try to preserve and protect ethnographic resources.

The archaeological resources in CCNHP are also designated as ethnographic resources, based on information provided to the Park by its affiliated tribes. The Native American tribes traditionally associated with the Park were apprised of the proposed project in a letter dated July 12, 2007, and one response was received, requesting a copy of the EA/AEF. Therefore, this topic has been dismissed from further consideration. The impacts to these sites are considered and retained under 'archeological resources'.

Cultural Landscapes

According to the National Park Service's Director's Order 28 *Cultural Resource Management Guideline*, 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. Although a cultural landscape inventory has not been conducted for the Park, information provided by the Park's affiliated tribes note that the archeological resources are included as part of larger cultural landscapes. Therefore, this topic has been dismissed from further consideration and the impacts to the archeological structures are retained under the subject of 'archeological resources'.

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. Because the project area is not located near any museum collection facilities and the Proposed Action is not expected to generate collections, this topic has been dismissed from further analysis.

ALTERNATIVES CONSIDERED

During spring 2007, an interdisciplinary team of CCNHP employees met for the purpose of developing project alternatives. This meeting resulted in the definition of project objectives, and a list of alternatives that could potentially meet these objectives. Two action alternatives and the No Action Alternative were initially considered for this project. Of these, one of the action alternatives – the alternative to close the front country trails– was dismissed from further consideration, because it was not prudent or reasonable. One action alternative 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 Carried Forward

NEPA's implementing regulations (40 CFR 1502.14) require analysis of at least two alternatives, including the alternative of taking no action – the "No Action Alternative" – and the alternative that is the Proposed Action, which is usually the "Preferred Alternative." NPS DO-12 recommends that it is appropriate to interpret the No Action Alternative as a "continuation of existing conditions and activities." That is, the No Action Alternative should be taken to mean "no change" in current conditions, and it is meant to serve as a baseline against which other alternatives may be measured. NPS DO-12 recommends that the Proposed Action may be considered the Preferred Alternative when sufficient analysis has been conducted to evaluate the relative merits of each reasonable alternative. In addition to the No Action Alternative and the Preferred Alternative, NPS DO-12 directs NPS managers to identify the "Environmentally Preferred Alternative" from among the alternatives evaluated.

The No Action Alternative – No Change in Current Conditions

Under this alternative, the trails would not be upgraded, and the existing front country trail system would continue to be used and maintained as it is now. Figures 2 and 3 provide photographs of existing trail conditions Figure 2 shows a social trail extending over exposed architectural fabric into a closed portion of an archeological site, posing a risk to visitor safety and causing damage to the resources. Figure 3 shows muddy and slick conditions after heavy rainfall events, which pose a threat to visitor safety. Frequent maintenance episodes would be required to address ongoing erosion problems, which would be costly and time consuming. Due to current budget and time constraints and the condition of the existing trail, it is currently impractical to maintain the trails, and the park relies on volunteers to do much of this work. Because the existing trails are not designed in a sustainable manner, and previous repairs have been washed out within a few months of completion of those repairs, it is expected that any future repairs would also be washed out in a short time. Severe weather conditions would cause the trails to become more heavily eroded, likely resulting in segments of the trail being unusable. Should the No Action Alternative be selected, the NPS would make all attempts to respond to future needs and conditions of the trail without major actions or changes in present management direction. However, because funding and environmental limitations would likely prevent the appropriate maintenance of the trail, the Park may have to consider emergency trail closures when trail conditions pose risks to visitor safety and/or the destruction of Park resources.

Figure 2: Alternative A, No Action

Social trail leading into closed portion of archeological site

Figure 3: Alternative A, No Action

Slick and muddy conditions on trail

The Proposed Action – Trail Upgrades

The Proposed Action would upgrade approximately 3.46 miles (5.55 kilometers) and realign approximately 0.10 miles (0.16 kilometers) of trail in the CCNHP front country. The project area focuses on eight trails that begin either at parking lots or trailheads. Seven of these trails lead up to and through protected archeological sites and one trail leads up to and around a small cemetery. The existing trails range in width from 3-15 feet and average between 0-10% grades, though 19% of the total front country trail system is above 10% grade. The existing trails are predominantly composed of compacted dirt and loose gravel, which is susceptible to washout and gullying after heavy rainfall events and create hazardous muddy surfaces when wet.

The trail upgrades will be largely located in the same footprint as the current trails, will be between 3-15 feet in width and will be edged with metal landscaping rails to delineate trail parameters. See figures 4-12 for diagram of proposed surface. The trails will be surfaced with compacted road base (3/4" aggregate base course, a mixture of 3/4 inch and less aggregate mixed with crusher fines commonly used on roads, walkways, patios and retaining walls), which will provide a stable and compact all weather surface. Edging will be added to the surface of the trails and held in place by ¼” x 12” pegs which will be hand hammered into the trail edges.

Road base will be transported by wheel barrows and by small heavy equipment, specifically a Bobcat Skid Steer Loader (model S185). The Bobcat has a width of 66 inches and a turning radius of 79 inches.

Road base will be compacted by a Weber gas powered roller compactor DVH 550R (model CR-3). The CR-3 has a 5-15 hertz vibration feature, a centrifugal force of 7,350 pounds, and a working width of 20-24 inches. The roller compactor’s vibrator feature will be turned off within 50 feet of the cultural sites in order to prevent structural damage to prehistoric architecture.

Fill soil will be used on portions of the trails needing repair from gulling and washouts. Soils will be natural materials acquired from either a BLM quarry from which the park is under permit to use or from an in-house stock pile of excess road base/sandy soil. Soil from the BLM quarry is approved and has been utilized in the on-going 15 year back-fill project where portions of public front country archeological sites have been back-filled for long term stabilization. Likewise, the in-house stock pile of road base has been utilized to repair and maintain portions of the front country trail for 10 years.

Erosion control features will be installed in conjunction with the improved trail surface in areas where water erosion is affecting the trail. Four to six inch PVC pipe will be utilized as culverts to divert or channel water away from trails and architecture. All erosion control features will be designed in consultation with the Chief of Cultural Resources to ensure features complement stabilization efforts.

Due to the unique condition and preservation needs of each cultural site, trail upgrades within the sites will vary. Some trails within the sites will be edged with metal railings and surfaced with road base while others will only have road base added to the current trail surface. In some areas on the trails, no improvements will be made at this time. See Figures 5-12 for specific work plans.

In addition to the surface work on the trails the Proposed Action will include installing three (3) shade shelter ramada’s; two (2) will be located in the island between the loop road and Pueblo Bonito Parking lot, one on each side of the restroom, the third will located at the south eastern edge of the Casa Rinconda parking lot.

The ramada’s super structure will be pealed pine logs (10 “ in diameter), notched with a center beam. The roofing will also be pealed pine stringer poles spaced approximately 1-2 inches apart depending on

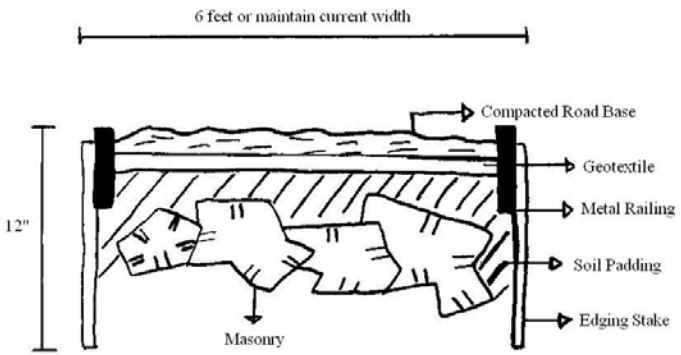
the diameter of each pole. The four post-supports are made of 10" diameter pealed pine, requiring the excavation of 2-3 foot deep post-holes which will be dug with post hole diggers.

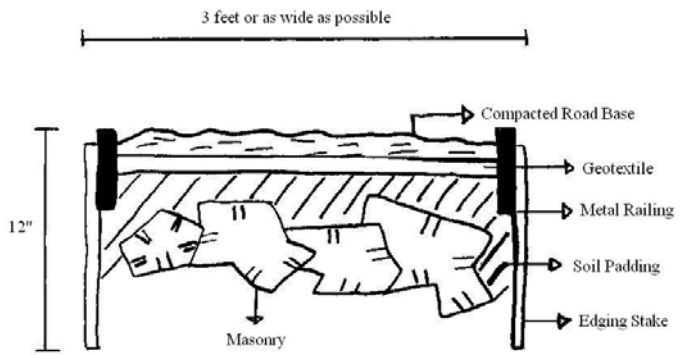
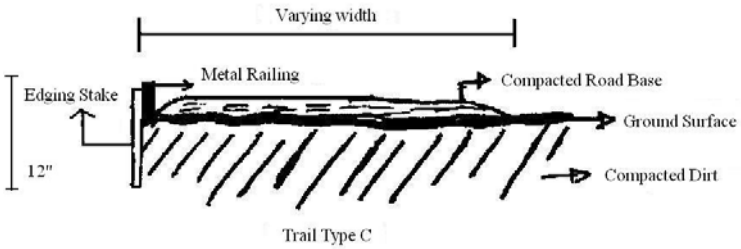
Clearing of native vegetation will be necessary to install these structures. The clearing will be accomplished with hand tools such as mclouds and shovels. Surface disturbance of the soil will be 2-3 inches or less. See figure 14 for a construction sketch.

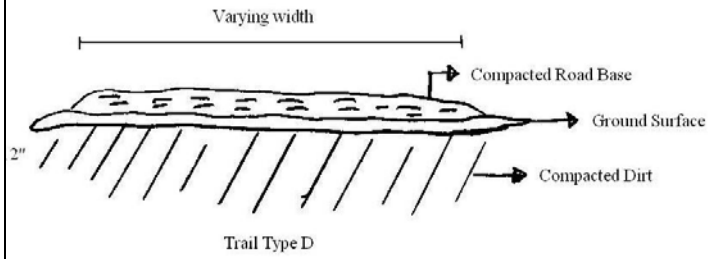
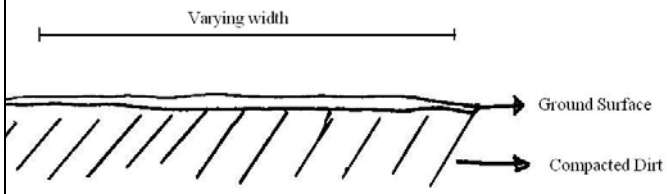
This description of planned trail upgrades is based on preliminary designs and the best information available at the time of this writing. Specific distances, areas, and layouts used to describe the proposed action are estimates and could change during final trail design. If changes during final trail design are not consistent with the intent and effects of the selected alternative, the trail supervisor would coordinate with the park's Chiefs of Natural and Cultural Resource Divisions and additional compliance would be completed as appropriate.

Figures 4-12: Alternative B, Trail Upgrades

Figure 4: Diagrams of Trail Types and Generalized Locations

Trail Type	Description	Location	Diagram (not to scale):
A	Edged with metal rails Surfaced with compacted road base at 2" intervals 6 feet in width or maintain current trail width Can include the placement of geotextile and soil padding over sections of masonry if needed Improves ADA access Represented in **RED** on Figures 6-12	primarily outside archeological sites	
B	Edged with metal rails Surfaced with compacted road base at 2" intervals 3 feet in width or as wide as topography and architecture will allow Can include the placement of geotextile and soil padding over sections of masonry if needed Improves ADA access Represented in **ORANGE** on Figures 6-12	outside and inside archeological sites	

			
C	Perimeter edged with metal rails Surfaced with compacted road base at 2" intervals Varying width Improves ADA access Represented in **GREEN** on Figures 6-12	Plazas and open areas within archeological sites	

D	Surfaced with compacted road base at 2” intervals Varying width Represented in **BLUE** in Figures 6-12	plazas	 Trail Type D
E	Maintain trail as is Represented in **YELLOW** in Figures 6-12	roomblocks	 Trail Type E

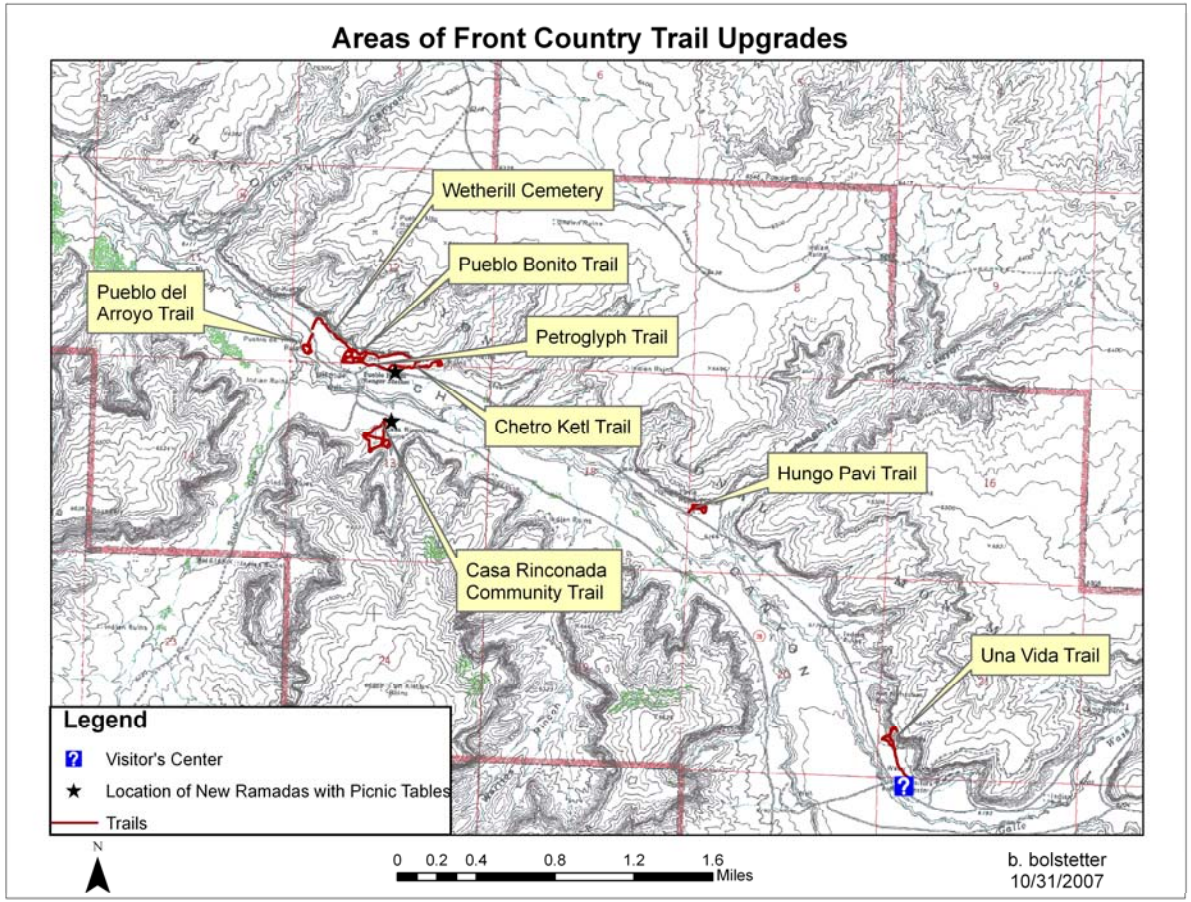
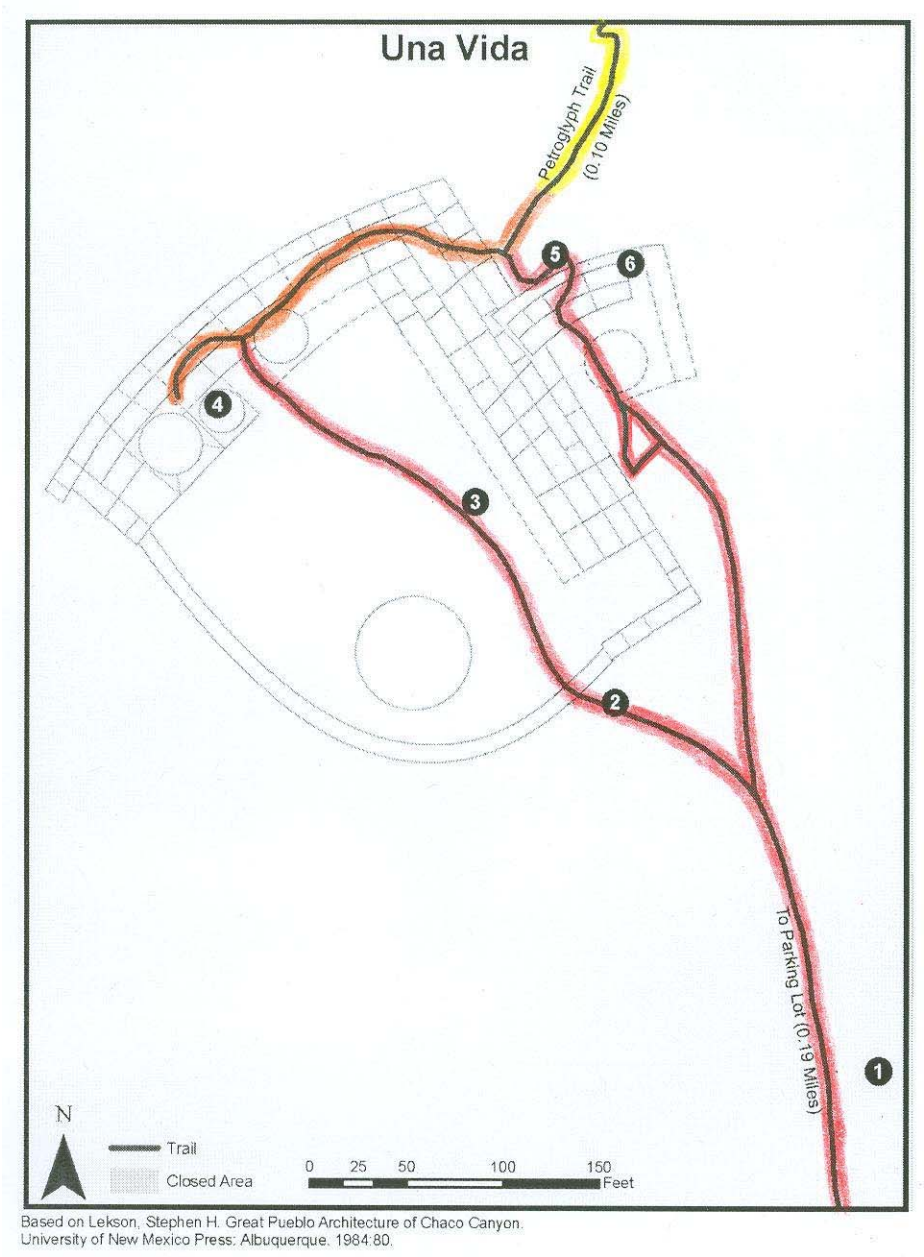


Figure 5: Areas of Front Country Trail Upgrades



Based on Lekson, Stephen H. Great Pueblo Architecture of Chaco Canyon. University of New Mexico Press: Albuquerque. 1984:80.

Figure 6: Trail Upgrades, Una Vida

The Una Vida trail is approximately 0.5 miles long. The upgrades for this trail will include approximately 1830 feet of Trail Type A (red), 191 feet of Trail Type B (orange), and 482 feet of Trail Type D (yellow). Circled numbers represent interpretive site stops

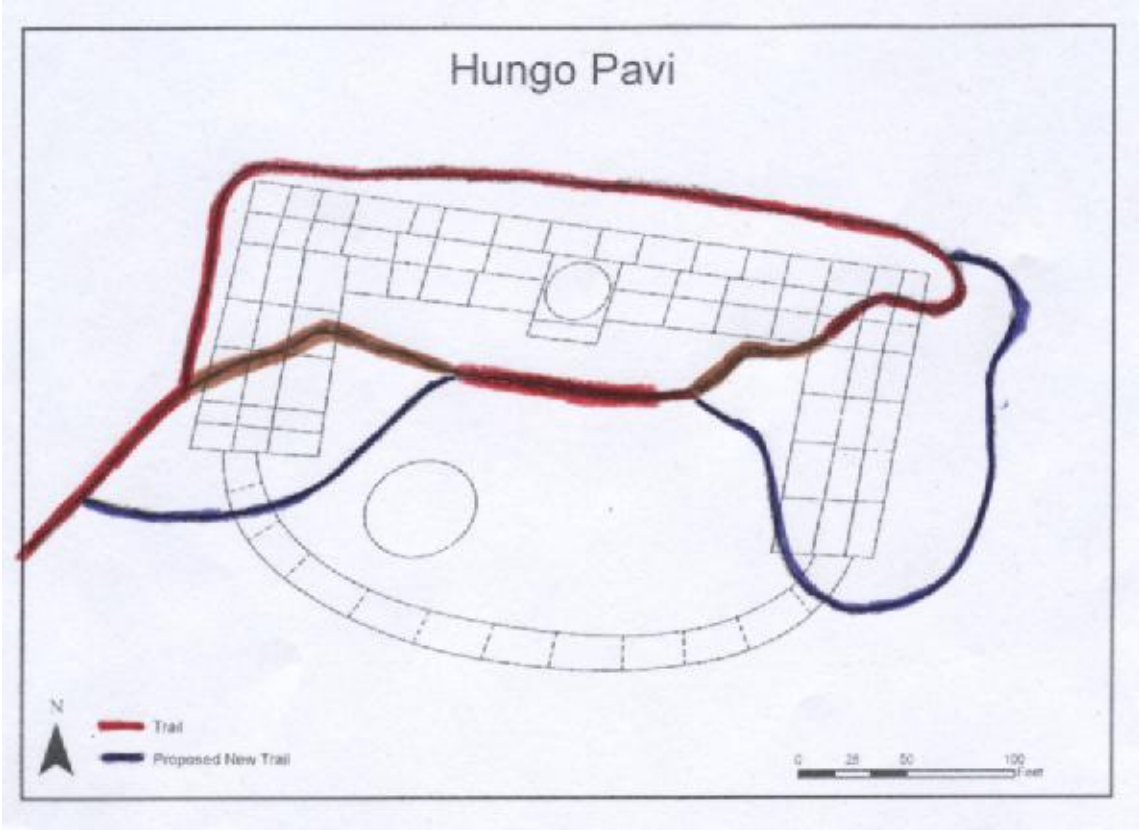


Figure 7: Trail Upgrades, Hungo Pavi

The Hungo Pavi trail is approximately 0.20 miles long. Upgrades for this trail will include 1,335 feet of Trail Type A (red), which will include 560 feet of new trail to be realigned around the eastern and western roomblocks (purple). Approximately 200 feet of trail (which impacts exposed architectural fabric) will be abandoned and rehabilitated in favor of the trail realignments (brown).

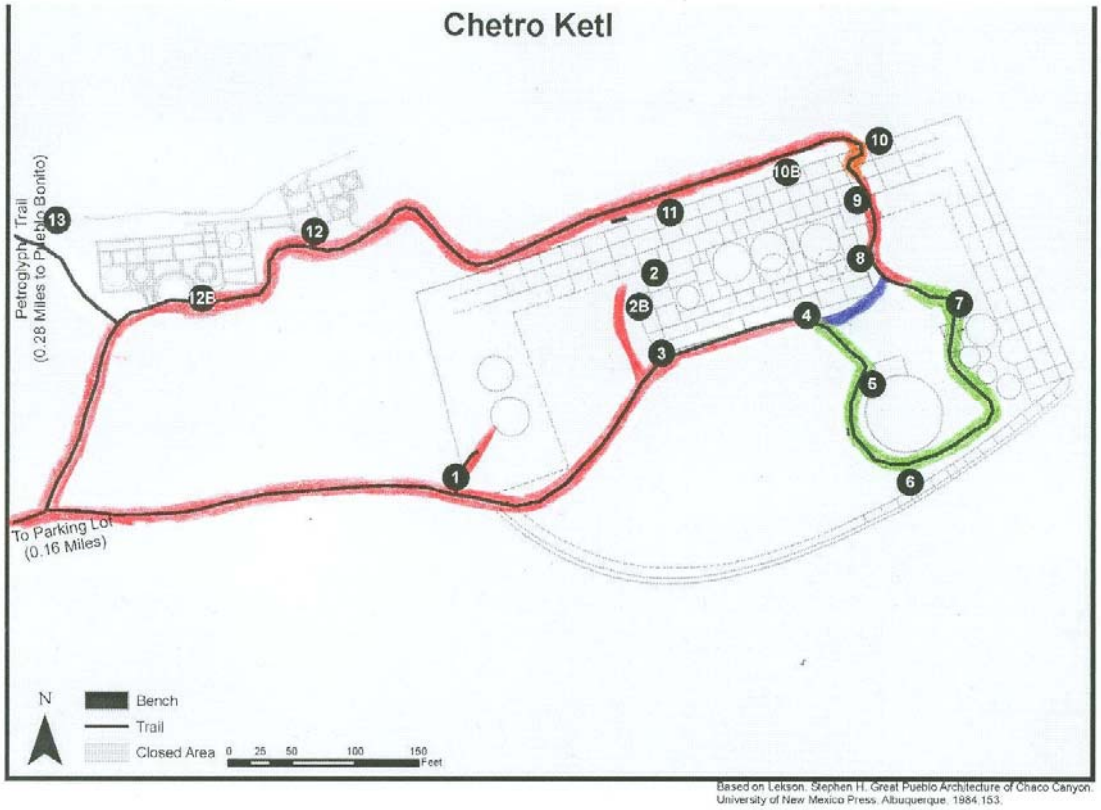


Figure 8: Trail Upgrades, Chetro Ketl

The Chetro Ketl trail is approximately 0.53 miles in length. The upgrades for this trail will include 2,550 feet of Trail Type A (red), 35-40 feet of Trail Type B (orange), and 250 feet of Trail Type C (green). The trail segment represented above in purple will be added to facilitate access between site stops #4 and #8 and will be of Trail Type A.

Figure 9: Trail Upgrades, Petroglyph Trail

The Petroglyph Trail is approximately 0.3 miles in length. Upgrades for this trail will include 1577 feet of Trail Type A (red) and 170 feet of Trail Type B (orange). Fill will be brought in to level out the gradient of the trail in particular sections. A spur trail leading from site stop #5 to the parking lot (approximately 375 feet in length) will be of Trail Type A as well.

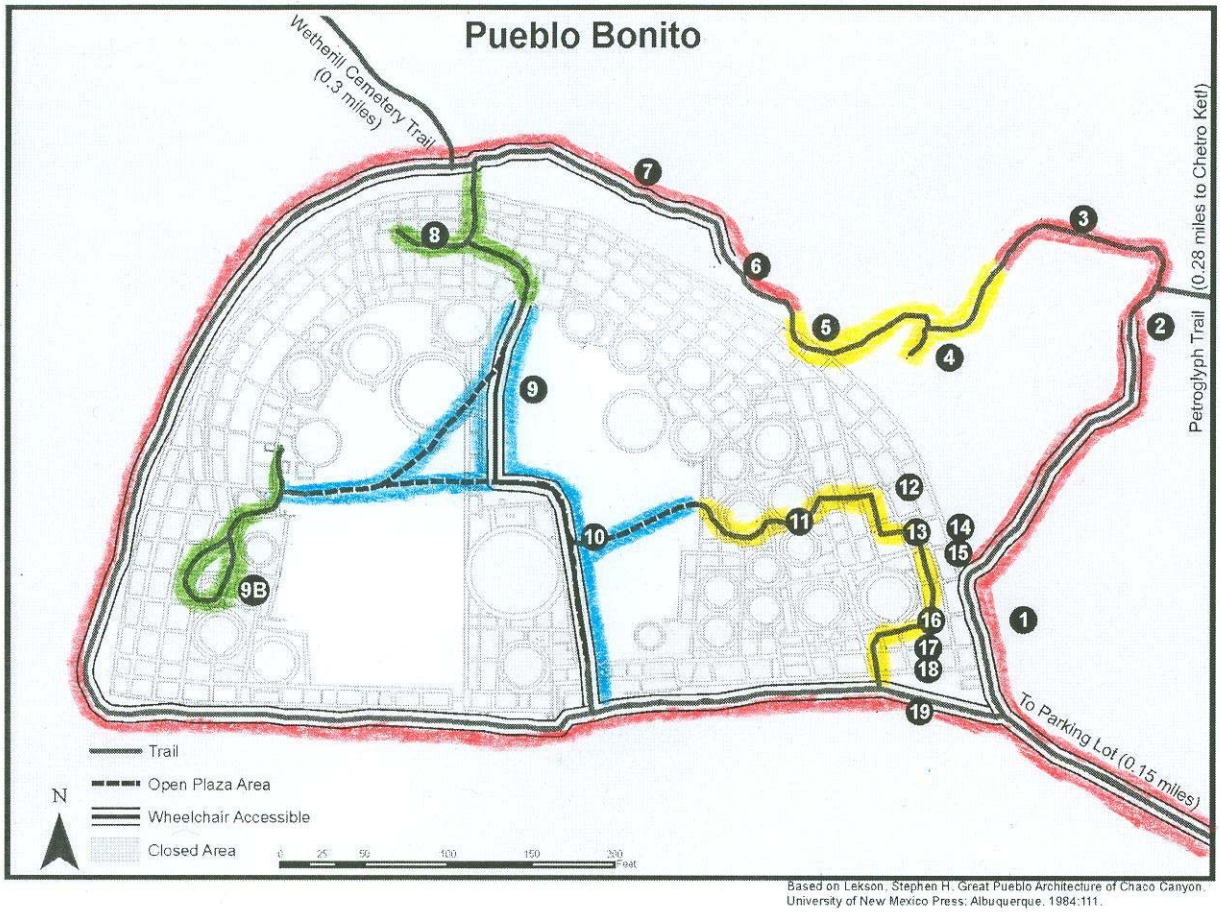


Figure 10: Trail Upgrades, Pueblo Bonito

The Pueblo Bonito trail is approximately 0.75 miles in length. Upgrades for this trail will include 2,030 feet of Trail Type A (red) 183 feet of Trail Type C (green) 432 feet of Trail Type D (blue), and 418 of Trail Type E (yellow), A shade ramada with picnic tables will be added to this trail in the trailhead/parking lot area. This trailhead/ parking lot area serves Chetro Ketl and the Petroglyph Trail as well.

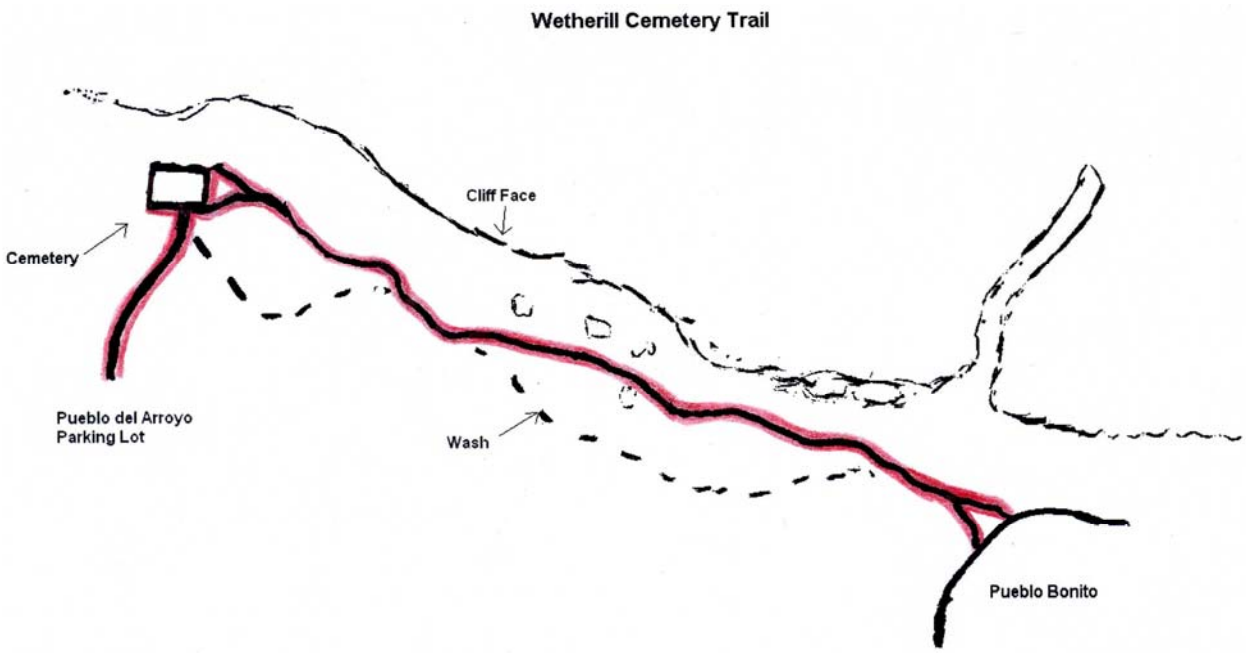


Figure 11: Trail Upgrades: Wetherill Cemetery

The Wetherill Cemetery trail is approximately 0.25 miles in length. Upgrades for this trail will include 1,270 feet of Trail Type A (red).

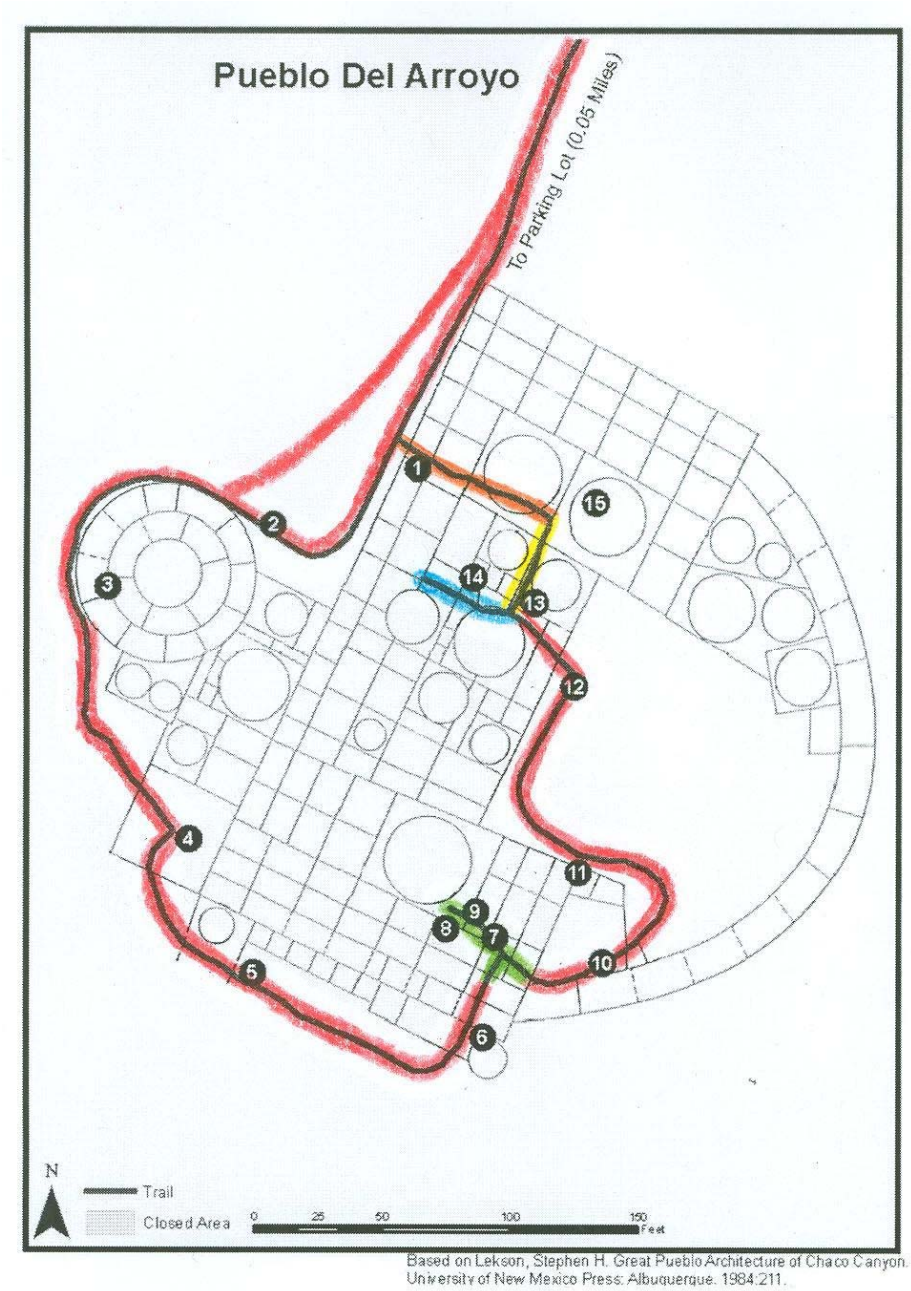


Figure 12: Trail Upgrades, Pueblo del Arroyo

The Pueblo del Arroyo trail is approximately 0.25 miles in length. Upgrades for this trail will include 930 feet of Trail Type A (red), 60 feet of Trail Type B (orange), 37 feet of Trail Type C (green), 80 feet of Trail Type D (blue) , and 110 feet of Trail Type E (yellow). In the Trail Type E section, capping will be added to the masonry lining the trail and road base will be added to the surface and compacted. An administrative access road running from near the trailhead to past site stop #2 will be formalized to allow a more ADA accessible way into the site.

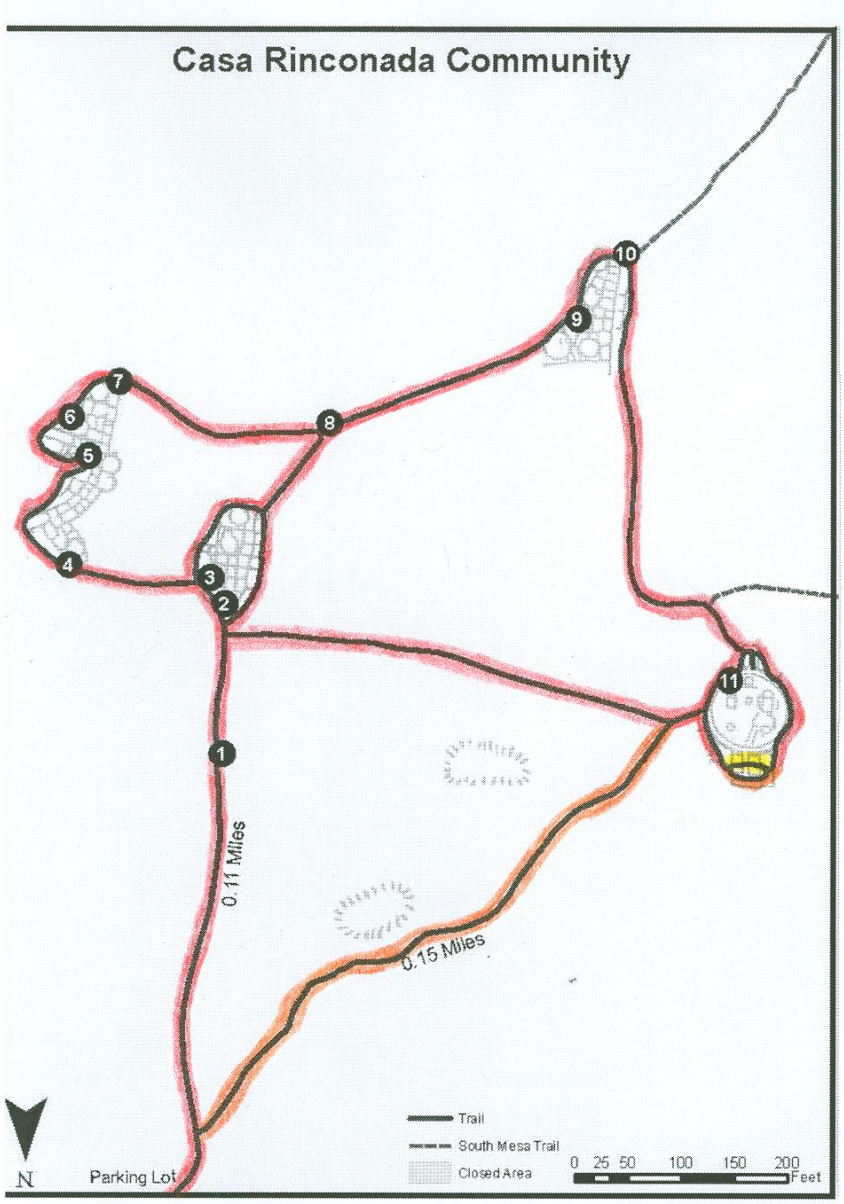


Figure 13: Trail Upgrades, Casa Rinconada Community

The Casa Rinconada Community trail is approximately 0.75 miles in length. Upgrades to this trail will include 2,329 feet of Trail Type A (red) and 513 feet of Trail Type B (orange). 40 feet will be maintained as is (yellow). A shade ramada with picnic tables will be added to this trail in the trailhead/parking lot area.

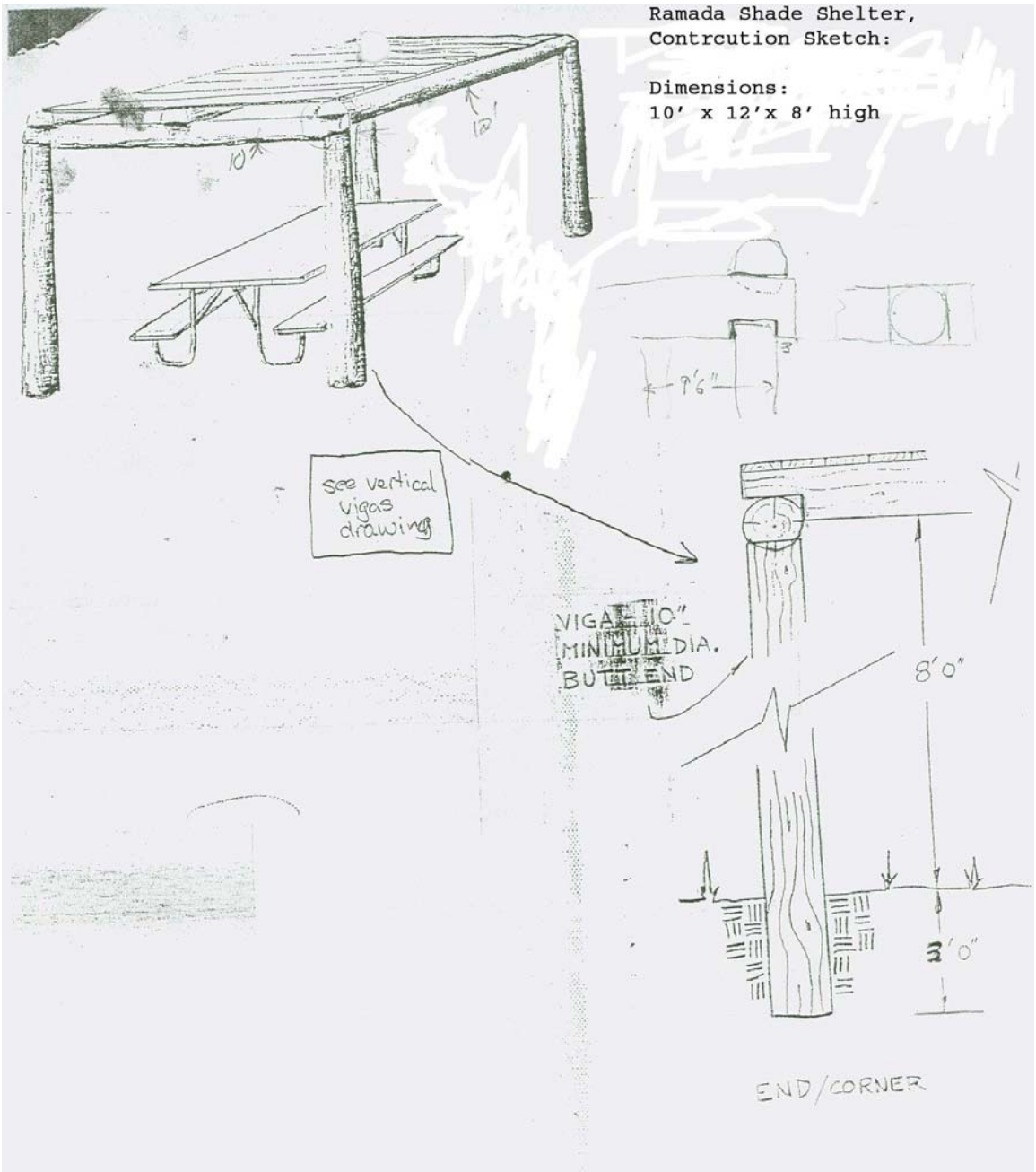


Figure 14: Shade Ramada Construction Sketch

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.

Permanent Closure of the Front Country trails

The alternative to close the front country trails to visitation was dismissed from further analysis, because it is in conflict with the Park's enabling legislation, the Park's GMP and NPS Management Policies 2006. The alternative of closing the front country trails does not meet the criteria of "reasonable alternative," as defined in the CEQ regulations, because it would not "avoid or minimize adverse effects…upon the quality of the human environment." Based on initial analysis of this alternative, it was determined that closure of the front country trails would in fact have adverse effects on visitor experience and safety, natural and cultural resources. Therefore, this alternative was dismissed because it only partially meets the purpose and need for the project and is in conflict with overall Park objectives.

Hardening of the Front Country trail surfaces

Alternatives to harden the front country trail system with asphalt, cement, or chemical soil stabilizers was dismissed from further analysis at this time because the impacts to the resources do not warrant such action at this time. The Park seeks a trail design that emphasizes environmentally sensitive construction, use of nontoxic materials, and integration of visitors with natural and cultural settings. The Proposed Action is the most environmentally sound, lowest impact alternative that is minimally intrusive to the visitor experience. It is also the foundational step in a graduated strategy of management, should the need arise to harden the trails with a more substantial surface such as cement or asphalt.

Mitigation Measures for the Proposed Action

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 the Proposed Action, as needed:

- To minimize the amount of ground disturbance, staging and stockpiling areas would be located in previously disturbed areas, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.

- The Trails Supervisor would coordinate with the Park's Natural Resource manager if vegetation clearing requires the removal of more than a few small plants. To reduce the amount of vegetation trampling, the trail crew would limit work to a use corridor within six feet of each trail footprint.

- Park-listed sensitive plants and microbiotic soils near the proposed project area would be flagged for avoidance prior to the start of trail work. Park staff would collect seeds from sensitive plant species in the project area for a seed bank, and some of these seeds may be used in revegetating the area of the existing trail.

- All crew members and volunteers assisting in the trail work efforts would be educated about the importance of avoiding impacts to sensitive resources. When necessary, a Park archeologist will provide monitoring or instruction to trail crew in culturally sensitive areas.

- To maintain visitor use of the front country trails during construction, segments of the existing trail would be closed only after improved trail segments that bypass them have been constructed and are usable.

- Should construction unearth previously undiscovered cultural resources, work would be stopped 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.

- Fugitive dust generated by construction would be controlled by spraying water on the construction site, if necessary.

- To reduce noise and emissions, construction equipment would not be permitted to idle while not in use.

- To minimize possible petrochemical leaks from construction equipment, park staff would regularly monitor and check equipment to identify and repair any leaks. Spill kits will be kept onsite and staff contractors will be trained on MSDS and clean-up procedures in the event of a spill or leak.

- The Park would ensure that all members of the trail crew are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. Trail crew members would also be informed on procedures to follow in case previously unknown archeological resources are uncovered during construction.

- To minimize impacts to park visitors and to the soundscape, variations on construction timing may be considered. One option includes conducting the majority of the work in the off-season or shoulder seasons. Another option includes implementing daily construction activity curfews such as not operating construction equipment between the hours of 10-11AM and 12-1PM during the spring or fall, and 5PM-5AM in the summer. The Park would determine this in consultation with the trail crew.

- To minimize impacts to visitor experience during construction, the Park will issue information at the Visitor's Center as to project area, so that visitors can plan their trip accordingly. Notices of trail work will also be posted on the Park website.

- To minimize impacts to Park's cultural resources, primarily hand tools will be used. The use of some motorized equipment will be necessary to transport fill materials and to compact the loose fill. Tools and materials would be confined to the trail footprint or to other previously disturbed ground. To facilitate the implementation measures outlined in this document and to minimize impacts to park resources, the Trail Supervisor would coordinate with the Chiefs of Natural and Cultural Resource Divisions before using equipment other than hand tools.

- To minimize impacts to visitor and trail crew safety, construction cones and safety flagging will be implemented around the work area at all times. Trail crew will be required to wear safety vests and hard hats around mechanized equipment.

- To minimize damage to the cultural resources from the roller compactor that will be used to compact the road base or crusher fines, the compactor's vibrator feature will be turned off

within 50 feet of the cultural sites. This will prevent structural damage to the prehistoric architecture.

- According to 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.

Alternative Summaries

Table 1 summarizes the major components of the Proposed Action 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, the Proposed Action meets each of the objectives identified for this project, while the No Action Alternative does not address any of the objectives.

Table 2 – Alternatives Summary and Extent to which Each Alternative Meets Project Objectives

No Action Alternative	Proposed Action – Trail Realignment
The trails would not be upgraded and would remain in their current condition. Trail rehabilitation would continue to occur in reaction to weather events as staffing and funding would allow. Surfaces would remain uneven, prone to gullying, and inaccessible to a certain segment of the visitor population.	Trails will be upgraded in such a manner as to meet sustainable trail design and safety standards. The footprints of existing trails would be widened and brought above grade, edged with metal railings, and filled with compacted road base. This will increase the universal design of the front country trail system.
Meets Project Objectives?	**Meets Project Objectives?**
No. Continuing the existing conditions would not provide for a trail that meets current health and safety standards, because the trails are difficult to travel after weather events. This alternative does not meet the objective of minimizing impacts to park resources, because the existing trail would continue to erode, and resource damage would increase. This alternative does not meet visitor use and experience goals, because the trails are not accessible to all segments of the visitor population. This alternative would not meet the goal of providing a sustainable design for the trail that would make its long-term maintenance practical, because the existing trail would continue to be impractical to maintain.	Yes. Trail upgrades would improve health and safety for visitors and staff hiking the trail, because they would be constructed to recommended trail design standards. The improved trais would not be as prone to erosion as the existing trails, and therefore it would have less potential to impact Park resources. This alternative would improve visitor experience by making the front country trails less difficult to travel. This alternative would provide a new sustainable trail design that would reduce efforts needed to maintain the trail in a safe and serviceable condition.

Table 3 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 3 – Environmental Impact Summary by Alternative

Impact Topic	No Action Alternative	Proposed Action – Trail Realignment
Archeological Resources	Continued erosion of the trails and artifact collection would have direct and indirect, localized, moderate, long-term, adverse impacts on archeological resources.	Improved drainage and reduced sediment export would have direct and indirect, localized, moderate, long-term, beneficial effects on archeological resources.
Visitor Use and Safety	Continued social trails and ADA inaccessibility would reduce visitor enjoyment and increase safety hazards resulting in direct and indirect, localized, moderate, long-term, adverse impacts to visitor experience and safety.	The improved trail design would improve visitor enjoyment of the trail and improved safety resulting in direct and indirect, localized, moderate, long-term, beneficial impacts to visitor experience and safety.

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:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and aesthetically 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 does not meet any of the above six evaluation factors, because it retains a trail that does not meet safety standards or resource protection standards, and it does not adequately provide for public enjoyment of the areas resources. Ongoing impacts to significant Park resources cultural resources will not occur without mitigation.

The Proposed Action to upgrade the front country trail system 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 most components of these six evaluation factors. The Proposed Action to upgrade the front country trail system would provide a safe and serviceable trail that enhances visitor experience by providing a level, hardened all weather surface that, where appropriate, meets ADA accessibility standards, while

minimizing environmental impacts to the greatest extent possible. The Proposed Action will preserve important historic, cultural, and natural aspects of our national heritage protected by CCNHP by establishing clear trails that will prevent visitors from traveling social trails that trample cultural and natural resources. Because the improved trails would follow sustainable design standards, they would be used by future generations for the enjoyment of Park resources; the design of the trails will permit a balance between population and resource use by allowing more visitors to use them with less detriment to the resources. Upgrading the front country trail system will address and help mitigate ongoing resource impacts.

Because it meets the Purpose and Need for the project, the project objectives, and is the Environmentally Preferred Alternative, the Proposed Action to upgrade the front country trails is also recommended as the NPS Preferred Alternative. For the remainder of the document, the Proposed Action to upgrade the front country trails will 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 No Action Alternative. 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 Chaco Culture National Historical Park. A detailed discussion of the regulatory context, affected environment, and potential impacts of each alternative on resources relevant to each topic analyzed is provided below. The discussion of regulatory context provides background on agency mandates and responsibilities with regard to each impact topic. The "affected environment" statement provides a baseline of existing conditions and general environmental context for analyzing potential impacts of each alternative.

METHODOLOGY

Topics analyzed in this chapter include archeological resources, visitor use and safety. 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, which may occur in the same time and place as the action or at a later point in time.
  - Indirect: An effect that is caused by an action but is farther removed in distance and time, 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, which is defined for this project as approximately six feet on either side both the improved trail alignment and the existing trail alignment to be rehabilitated.
  - Local: In the general project area, defined as the front country of CCNHP
  - Park Wide: Includes the entire Park
  - Regional: Includes San Juan and McKinley Counties and surrounding counties and communities

- ***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 Environmental Assessment / Assessment of Effect.

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 No Action and Preferred Alternatives.

Cumulative impacts were determined by combining the impacts of the No Action Alternative and the Preferred Alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Chaco Culture National Historical Park and the surrounding region, as applicable. The geographic scope of this analysis includes actions within the park boundaries, while the temporal scope includes projects for the past ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future:

- Trail Construction, Use, and Maintenance: There are approximately 3 miles of front country trails in the CCNHP front country trail system. Trail designs are generally comprised of natural materials and are designed to blend in with the natural landscape.

- Backfill and Drainage Repair Program, Ongoing: For over fourteen years, CCNHP has engaged in a backfill and drainage repair program which improves water surface runoff and equalizes the differential fill levels within the archeological structures. This work reduces the deterioration of prehistoric architectural fabric by decreasing the static loading.

- Preservation and Stabilization Work, Ongoing: Since the 1930s, CCNHP Cultural Resources staff has engaged in the preservation and stabilization of the architectural fabric of many archeological sites in the Park. This work involves adding capping, re-pointing, and adding mortar to the existing structures. To get materials into the cultural sites, Park staff drives small vehicles on the trails and up into the cultural sites.

- Signs and Barriers: Signs are placed throughout the front country trail system for direction, safety, and educational messages. Barriers are placed throughout the front country trail system for resource protection purposes. Most of these signs are temporary and migratory in nature and are not installed in the ground. Others are permanent and are sunk into the ground surface. The number of signs and barriers used is the minimum needed for visitor safety and resource protection.

- Exotic vegetation Management, Ongoing: The park has been removing and treating its exotic vegetation intermittently for the past ten years. Since success is achieved by treating the same areas for 4 to 5 years, future work will focus on early detection and maintaining the acreage treated.

- Visitation Increases, Future: CCNHP currently hosts between 60,000 and 80,000 visitors annually. While the Park is currently able to sustain visitation of this amount, any future increase in visitation could have an effect on the management and preservation of resources within CCNHP.

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 NPS Organic Act of 1916 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. These laws give the NPS the management discretion to allow certain impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park. 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 impairment if it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS 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 resource topics carried forward in this chapter.

Impacts to Cultural Resources and Section 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 comply with the requirements of both NEPA and §106 of the National Historic Preservation Act (NHPA). To achieve this, a §106 summary is included under the Preferred Alternative for each of the cultural resource topics carried forward including Historic Structures. The topic of archeological resources was retained for further consideration in *Impacts Retained for Analysis* because they were identified within the project area. The topics of cultural landscapes and ethnographic resources were dismissed from further consideration in *Impacts Dismissed from Further Analysis* because they are not mutually exclusive of archeological resources, which were retained for analysis. The topic of museum collections was dismissed from further consideration in *Impacts Dismissed from Further Analysis* because none were identified in the project area. The §106 Summary is intended to meet the requirements of §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 criteria of adverse effect found in the Advisory Council's regulations.

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 on the National Register of Historic Places. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify 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 the Preferred Alternative that would occur later in time; be farther removed in distance; or be cumulative (36 CFR Part 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 of Historic Places.

In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 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 the National Park *Service's Conservation Planning, Environmental Impact Analysis and Decision-Making* (Director's Order #12) 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 §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

In order for a historic property to be listed in the National Register of Historic Places, 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, How to Apply the National Register Criteria for Evaluation*).

Archeological Resources

Regulatory Context and Affected Environment

In addition to the National Historic Preservation Act and the National Park Service *2006 Management Policies*, the National Park Service's 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 National Park Service 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 Service reflect a commitment to the conservation of archeological resources as elements of our national heritage.

CCNHP was created by presidential proclamation because the cultural sites within it were "of extraordinary interest because of their number and their great size and because of the innumerable and valuable relics of a prehistoric people which they contain[ed]" (35 Stat. 2119). There are approximately 4,000 documented archeological sites under the Park's protection. Around twenty of these are open to visitation and all of them are accessible via the Park's front country and back country trail system.

Because the existing trail system was not comprehensively designed, it is sometimes difficult for visitors to distinguish between the established trail system and social trails. Currently, social trails extend into fragile portions of the archeological sites, which are closed to visitation.

Intensity Level Definitions

The methodology used for assessing impacts to archeological resources is based on how the No Action Alternative and Preferred Alternative would affect the preservation of those resources. The thresholds for this impact assessment are 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 §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 Section 106, the determination of effect would be no adverse effect.

Beneficial: maintenance preservation of a site(s). For purposes of §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 Section 106, the determination of effect would be adverse effect.

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

Impacts of the No Action Alternative

The No Action Alternative may ultimately have measurable adverse effects on archeological resources. Although the existing trail system would continue to be used, frequent confusion between established and social trails will continue to bring visitor traffic into fragile archeological areas. Should the No Action Alternative be selected, the NPS would make all attempts to respond to future needs and conditions of the trail without major actions or changes in present management direction. However, because funding and environmental limitations would likely continue to prevent the appropriate maintenance of the trail, the Park may have to consider emergency trail closure when trail conditions pose risks to Park resources. The No Action Alternative has the potential to have direct, long-term, moderate, adverse impacts on archeological resources.

Cumulative Effects

Past and present actions affecting archeological resources in the CCNHP front country have included the backfill and drainage repair program in addition to the construction, use, and maintenance of the front country trail system and its associated features such as signs and barriers. With the exception of the Preferred Alternative and the continuation of the backfill and drainage repair, there are no present or reasonably foreseeable future projects that would have measurable effects on the archeological resources. Overall, the cumulative effects of past and present actions on archeological resources are moderate to major, localized, and long-term effects, which have generally been beneficial. The No Action Alternative would not contribute to beneficial cumulative effects, because it would likely result in adverse impacts on the archeological resources.

Conclusion
The No Action alternative has the potential to have direct, indirect, and cumulative adverse impacts on the archeological resources, which would be long-term and localized. Impacts to these resources would result in continued degradation of the Park's most popular and fragile visitor attractions – the archeological sites in the front country.

Impacts of the Preferred Alternative

The Preferred Alternative would have moderate to major beneficial effects on the archeological resources at the site-specific level and minor to moderate beneficial effects on the resources at the local level. The improved trail design will easily distinguish the established trail system from social trails, which will keep visitor traffic away from sensitive and fragile archeological areas. The addition of materials will not intrude into unexcavated archaeological areas. Therefore, it is anticipated that the Preferred Alternative would ultimately result in a net beneficial effect that would be direct and indirect, localized, long-term, and moderate.

Cumulative Effects
Past and present actions affecting archeological resources in the CCNHP front country have included the backfill and drainage repair program in addition to the construction, use, and maintenance of the front country trail system and its associated features such as signs and barriers. With the exception of the Preferred Alternative and the continuation of the backfill and drainage repair, there are no present or reasonably foreseeable future projects that would have measurable effects on the archeological resources. Overall, the cumulative effects of past and present actions on archeological resources are moderate to major, localized, and long-term effects, which have generally been beneficial. The Preferred Alternative would contribute to beneficial cumulative effects on archeological resources at the local level.

Conclusion
The Preferred Alternative has the potential to have direct, indirect, and cumulative beneficial impacts on archeological resources, which would be long-term and localized. Beneficial effects on the resources would result from the improved trail system providing a clear visual indicator of closed vs. open areas within the archeological sites.

Visitor Use and Safety

Regulatory Context and Affected Environment

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 park 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.

The Park contains thousands of archaeological sites, material evidence of a culture known collectively in modern times as the Ancestral Puebloans who lived in Chaco Canyon during the period from circa 800 to 1200 A.D. Use of the canyon is best known for the Chaco civilization that flourished between the 9th and 13th centuries that was characterized by remarkable achievements in architecture, designed landscape, art, agriculture, social complexity, economic organization, engineering, and astronomy. While the Ancestral Puebloan sites are the cultural

sites for which Chaco was protected as a National Monument, more than 10,000 years of human activity is preserved in Chaco Canyon, from Archaic period campsites to Navajo hogans, to historic Anglo structures. The trail system serves as the primary interpretive facility that connects visitors with these elements of Chacoan culture.

Because the existing trail system is largely undesigned, it is at times difficult for visitors to distinguish between established and social trails. The existing front country trails are minimally maintained due to financial and staffing reasons, and the park is in need of a trail system that requires less frequent maintenance. Approximately 19% of the total front country trail length in CCNHP is above 10% grade, meaning that a fifth of the front country trails are inaccessible for a certain segment of our visiting population.

Intensity Level Definitions

The methodology used for assessing impacts to visitor experience and safety is based on how the No Action Alternative and Preferred Alternative would affect the visitor and local safety operations, particularly with regards to the visitors' enjoyment of the Park's primary resources and emergency response operations of local agencies. 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 the No Action Alternative

The No Action Alternative may ultimately have measurable adverse effects on visitor experience and safety. Although the existing trail system would continue to be used, frequent maintenance episodes would be required to address ongoing erosion problems and social trails, which would be costly and time consuming, and which are currently unfeasible. Severe weather conditions would cause the trails to become muddy and slick, possibly resulting in segments of the trails being unusable, especially for certain segments of the visiting population. Should the No Action Alternative be selected, the NPS would make all attempts to respond to future needs and conditions of the trail system without major actions or changes in present management direction. However, because funding and environmental limitations would likely continue to prevent the appropriate maintenance of the trail, the Park may have to consider emergency trail closure when trail conditions pose risks to human safety and/or Park resources. The No Action Alternative has the potential to have direct, long-term, moderate, adverse impacts on visitor use and experience.

Cumulative Effects
Past and present actions affecting visitor experience and safety in the CCNHP front country have included the construction and maintenance of the front country trail system and its associated features such as parking lots, pit toilets, signs, and barriers. With the exception of the Preferred Alternative and the possibility of visitation increases, there are no present or reasonably foreseeable future projects that would have measurable effects on visitor experience and safety at the local level. Overall, the cumulative effects of past and present actions on visitor experience and safety are moderate to major, localized, and long-term effects, which have generally been beneficial. The No Action Alternative would not contribute to beneficial cumulative effects, because it would likely result in adverse impacts on visitor experience and safety at the local level.

Conclusion
The No Action alternative has the potential to have direct, indirect, and cumulative adverse impacts on visitor experience, which would be long-term and localized. Impacts to visitor experience would result from continued degradation of the Park's most popular visitor attractions – the archeological sites in the front country.

Impacts of the Preferred Alternative

The Preferred Alternative would have moderate to major beneficial effects on visitor experience and safety at the site-specific level and minor to moderate beneficial effects on visitor experience at the local level. The improved trail design would have an average gradient of 7-9% (4 degree slope) making it easier, safer, and more enjoyable for a larger percentage of visitors to navigate. ADA access to the sites will increase due to the elements of universal design that will be incorporated into the trails, increasing satisfaction, enjoyment, and understanding for this segment of the visitor population. Although construction activities have the potential to impact visitor use through construction related noise, mitigation measures have been developed to ensure that there would be little or no disruption in visitor use of the area during trail construction. Additionally, while most of the trail work will be done with hand tools, some work will require the use of motorized equipment, which may cause excessive noise in the area. Use of these trail construction techniques would be planned to avoid times of high visitation such as weekends and holidays. Therefore, during construction it is anticipated that the Preferred Alternative would have direct and indirect, localized, short-term, negligible to minor adverse effects, but that this alternative would ultimately result in a net beneficial effect that would be direct and indirect, localized, long-term, and moderate.

Cumulative Effects
Past and present actions affecting visitor experience and safety in the CCNHP front country have included the construction and maintenance of the front country trail system, parking lots, composting and pit toilets, signs and barriers. The cumulative effects of these moderate-major impacts, localized actions and long term effects are generally beneficial providing designated routes for visitors to walk through prehistoric cultural sites, safe and stabilized surfaces to park vehicles, necessary and appropriate sanitary facilities and resource informative signs and low impact barriers to protect fragile and irreplaceable resources.

Implementation of the Preferred Alternative would continue cumulative effects in this same beneficial vain, providing safe and sustainable all weather trail surfaces for current and future visitors. These beneficial effects will be long term and localized.

With the exception of the Preferred Alternative, there are no present or reasonably foreseeable future projects that would have measurable effects on visitor experience and safety at the local level.

Overall, the cumulative effects of past and present actions on visitor experience and safety are moderate, localized, and long-term effects, which have generally been beneficial. These actions in The Preferred Alternative would contribute to beneficial cumulative effects on visitor experience and safety at the local level.

Conclusion
The Preferred Alternative has the potential to have direct, indirect, and cumulative beneficial impacts on visitor experience and safety, which would be long-term and localized. Beneficial effects on visitor experience would result from the improved trail providing a safer and more enjoyable hiking experience in CCNHP.

Park Operations

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/who would conduct these duties; how activities should be conducted; and administrative procedures. The methodologies used to assess potential changes to park operations are defined as follows:

Intensity Level Definitions

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 the No Action Alternative

The No Action Alternative would not measurably change current park operations at CCNHP. The existing trails would continue to function as they are with intermittent emergency maintenance associated with visitor safety and resource protection issues. Stabilization and interpretive activities would continue to be interrupted during and after rain and snow because the trails are to muddy to safely traverse along with further damaging the surface of the trails if used while wet and muddy.

Cumulative Effects
Effects of the No Action Alternative is likely to result in the continued general decline of trail conditions which will likely produce an increased impact on staff of the park due to an increased number of emergency repairs to trails and possible seasonal closures due to damaged and impassable trails due to rain and the resulting mud. Under this alternative, park operations

associated with the current and future use of the existing trails are likely to be negatively impacted in a minor to moderate level.

Conclusion
The No Action alternative has the potential to have direct, indirect, and cumulative adverse impacts on park operations, which would be long-term and localized. Impacts to park operations would result from continued degradation of the Park's most utilized infrastructure, the front country trail system.

Impacts of the Preferred Alternative

The Preferred Alternative would have minor to moderate beneficial effects on park operations. If implemented, the trails will provide a safe and accessible all weather surfaces that would enable staff to carry out stabilization and interpretive activities even when the ground at large is wet or muddy. If implemented, this alternative would upgrade and improve trail conditions so that regular day-to-day and/or seasonal maintenance of the trails would be negligible consisting of occasional re-seating of the edging rails if or when they start to come out of the ground due to a multi-seasonal ground freeze-thaw cycles. Maintenance would shift from unplanned emergency work to planned and scheduled work activities; thereby improving park operations. Comprehensive maintenance would be required on a life cycle basis, with an estimated life cycle of 15-25 years. This life cyclic work would be planned and scheduled and made a part of the parks regular cyclic maintenance program thereby improving park operations because staff would be able to plan and schedule any comprehensive maintenance work. Likewise, annual cyclic maintenance funds would be utilized to accomplish the cyclic maintenance further improving park operations by feeing up base funds to be used in other areas of park operatins.

Cumulative Effects

Cumulative effects of the Preferred Action Alternative, in conjunction with other infrastructure improvements such as the paved loop road, paved parking lots and appropriate sanity facilities, will likely result in a minor to moderate long term beneficial effect to park operations when considered with other pst, present and reasonably foreseeable future actions

Conclusion
Implementation of the Preferred Alternative has the potential to have direct, indirect, and cumulative beneficial impacts on park operations, which would be long-term and localized. Beneficial effects on park operations would result from the improved trail providing a safer and more enjoyable hiking experience in CCNHP.

CONSULTATION and COORDINATION

External Scoping

External (public) scoping was conducted to inform various agencies and the public about the proposal to upgrade the front country trails at Chaco Culture National Historical Park and to generate input on the preparation of this Environmental Assessment / Assessment of Effect. This effort was initiated with the distribution of a press release which was to other Federal parks and agencies, local newspapers, chambers of commerce, and CCNHP affiliated tribes. With this press release, the public was given 30 days to comment on the project beginning July 12, 2007.

The following agencies and Native American tribes were sent scoping information or were contacted for information regarding the project:

Federal Agencies
National Park Service Units: Mesa Verde National Park, Aztec Ruins National Monument, Chimney Rock Archeological Area (USFS), El Malpais National Monument, El Morro National Monument and the Denver Regional Office Interagency Management Group

State Agencies
New Mexico State Historical Preservation Office

Affiliated Native American Groups

Pueblo of Cochiti	Pueblo of Isleta	Pueblo of Sandia	Jicarilla Apache Tribe
Hopi Tribe	Pueblo of Jemez	Pueblo of Santa Ana	Southern Ute Tribe
Pueblo of Laguna	Pueblo of Pojoaque	Pueblo of Santa Clara	Ute Mountain Tribe
Pueblo of Nambe	Pueblo of San Felipe	Pueblo of Santo Domingo	Ysleta del Sur Pueblo
Navajo Nation	Pueblo of Zia	Pueblo of Taos	Pueblo of San Juan
Pueblo of Picuris	Pueblo of San Ildefonso	Pueblo of Tesuque	Pueblo of Acoma
Pueblo of Zuni			

Newspapers: Albuquerque Journal, Albuquerque Tribune, Cibola Beacon, UNM Daily Lobo, Santa Fe New Mexican, Navajo Times, Durango Herald, Farmington Daily Times, Gallup Independent, Hopi Tutuveni

Other: Aztec Chamber of Commerce

During the 30-day scoping period, no responses were received from the public through letters, telephone calls, and visitor contact. One Native American tribe, the Navajo Nation, responded to the press release, requesting a copy of the EA/AEF. No federal or state agencies responded during the scoping period.

Internal Scoping

Internal scoping was conducted by an interdisciplinary team at CCNHP comprising the Chief of Cultural Resources, Chief Ranger, Chief of Interpretation, Chief of Natural Resources & Facilities Management along with other interested staff members. Interdisciplinary team members met between April-September 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 possible mitigation measures. The team also gathered background information and discussed public outreach for the project. Over the course of the project, team members have conducted individual site visits to view and evaluate the proposed construction site. The results of these meetings are the Preferred Alternative documented in this Environmental Assessment / Assessment of Effect.

Environmental Assessment / Assessment of Effect Review and List of Recipients

The Environmental Assessment / Assessment of Effect will be released for public review on 17 December 2007. To inform the public of the availability of the Environmental Assessment / Assessment of Effect, the National Park Service will publish and distribute a letter or press release to various agencies, tribes, and members of the public on the Park's mailing list. Copies of the Environmental Assessment / Assessment of Effect will be provided to interested individuals, upon request. Copies of the document will also be available for review at the Park's visitor center and on the internet at http://www.nps.gov/chcu.

The Environmental Assessment / Assessment of Effect is subject to a 30-day public comment period ending 18 January 2008. During this time, the public is encouraged to submit their written comments to the National Park Service 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 National Park Service 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):

Brianne Bolstetter, Park Ranger, National Park Service, Chaco Culture National Historical Park, Nageezi, New Mexico

Consultants and Editors (provided information and edited content):

Dabney Ford, Chief of Cultural Resources, National Park Service, Chaco Culture National Historical Park, Nageezi, New Mexico

Brad Shattuck, Chief of Natural Resources, National Park Service, Chaco Culture National Historical Park, Nageezi, New Mexico

BJ Ratlief, Chief Ranger, National Park Service, Chaco Culture National Historical Park, Nageezi, New Mexico

REFERENCES

NPS 1983 Trail Management Handbook, National Park Service, U.S. Department of the Interior, 1983.

NPS 1985 General Management Plan and Development Concept Plan, Chaco Culture National Historical Park, 1985.

NPS 2003 Resource Management Plan, Chaco Culture National Historical Park, July 2003.

NPS 2006 *Management Policies*, National Park Service, U.S. Department of the Interior, December 2006.

NPS 2007 Trail Management Plan, Chaco Culture National Historical Park, 2007

NPS 2007 DRAFT Comprehensive Interpretive Plan, Chaco Culture National Historical Park, 2007

NPS 2007 Foundation Management Plan, Chaco Culture National Historical Park, 2007