



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

# Visitor Center Rehabilitation and Renovation Environmental Assessment

February 2009



Chaco Culture NHP Visitor Center Public Entrance (NPS photo)



# Visitor Center Rehabilitation and Renovation

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## Environmental Assessment

### Summary

The National Park Service is proposing to completely rehabilitate and renovate the park's only visitor center/headquarters building. The existing visitor center was constructed in 1957 and has been remodeled or expanded several times. It is not presently adequate for the functions that it is intended to serve. The heating and cooling systems, the electrical system, and the roof need to be replaced. The electrical system was not designed to support the extensive use of computers and often fails. There are cracks in walls and floors caused by soil movement that allow unfettered access to rodents in an area where hantavirus is endemic, exposing park staff and visitors to potentially lethal health risks. As confirmed by a recent geotechnical distress investigation, structural supports need to be installed beneath the building's foundation, and site drainage improvements need to be made in order to adequately mitigate soil stability issues. The building does not meet standards for preservation and protection of museum collections. Rather than deal with these deficiencies individually and sequentially, the park is proposing to address all the building's deficiencies at one time.

The specific purposes of the rehabilitation and renovation are to protect public and employee health, safety, and welfare by meeting Occupational Safety and Health Administration (OSHA) standards, Uniform Building Code and National Fire Codes; to improve its operational efficiency and sustainability by reducing the energy consumption currently needed to operate the visitor center; to accomplish needed improvements simultaneously; and to provide visitor services and educational and recreational opportunities, including access consistent with the Americans with Disabilities Act (ADA). Under the no action alternative, current operation of the visitor center would continue, and structural and safety issues would remain largely unresolved. The staff would continue to be hampered by functionality issues related to the building in its current state.

Two alternatives were considered:

**Alternative A, No Action:** Use of the existing park visitor center would continue. The roof would continue to leak, cracks due to soil movement would remain and potentially worsen, the electrical and heating and cooling systems would continue to operate poorly, and both visitors and staff would be exposed to health and safety risks. The museum objects in the exhibits area would continue to be at risk. Presumably, repairs or replacement would take place if a building component fails totally.

**Alternative B, Completely Rehabilitate and Renovate the Visitor Center:** The park's visitor center would be completely rehabilitated and renovated to meet professional standards and codes, including NPS standards for preservation and protection of museum collections. The existing footprint of the building would remain substantially the same, retaining the existing square footage of the building, though interior spaces would be reconfigured for efficiency and performance. The changes to the building would improve its overall functionality for visitors and staff, and all health and safety deficiencies would be corrected. All existing roof-top equipment would be removed, and replacement equipment would instead be installed on the ground next to the building. Heating and cooling systems would be more effective and energy-efficient. During the construction period, temporary buildings (trailers and/or yurts) would be installed at the edge of the visitor center parking lot to serve visitors. The work should take between 12 and 18 months. During construction, park staff would work either in the temporary buildings, park

housing temporarily converted to office space, or in existing offices in the park's maintenance complex. Alternative B is the National Park Service's preferred alternative.

This environmental assessment evaluates the effects of these alternatives on natural and cultural resources, as well as on visitor experience and the human environment. Among other benefits, the rehabilitation and renovation would correct all health and safety deficiencies, and provide comfortable and energy-efficient offices and public spaces in a cost effective and efficient manner. The alternatives analyzed in this environmental assessment would not result in major adverse environmental impacts or impairment to park resources or values.

### **Public Comment**

If you wish to comment on the environmental assessment, you may mail comments to the name and address below, or post comments online at <http://parkplanning.nps.gov/chcu>. This environmental assessment will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you may ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.



Barbara J. West  
Superintendent  
Chaco Culture National Historical Park  
P.O. Box 220  
Nageezi, New Mexico 87037

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# PURPOSE AND NEED

## Introduction

Chaco Culture National Historical Park was designated as Chaco Canyon National Monument in 1907 by Executive Order under the Antiquities Act. It was later expanded and designated Chaco Culture National Historical Park to recognize the interconnections between the park and its 40,000-square-mile area of influence. The characteristic building of the Chacoan civilization is the “great house,” a multi-storied, multi-roomed structure found in Arizona, northern New Mexico and Utah. From the 9th to the 13th centuries, Chaco Canyon was the center of a civilization of social, political and architectural sophistication. An engineered system of roads and evidence of a vast trading network are indicators of its former inhabitants’ relationship with a broader area of influence. The park extends over 33,000 acres and contains more than 4,000 recorded archeological sites. In recognition of its superb resources, Chaco Culture NHP was named a UNESCO World Heritage Site in 1987.

The purpose of Chaco Culture National Historical Park is to:

- Recognize and preserve the archeological resources associated with the prehistoric Chacoan culture in the San Juan Basin and surrounding area;
- Preserve and interpret these resources unimpaired for the enjoyment of present and future generations;
- Facilitate research activities associated with these resources; and
- Facilitate and cooperate in the protection, preservation, maintenance, and administration of the Chaco Culture Archeological Protection Sites to further preserve, interpret and research Chacoan culture.

The purpose of this environmental assessment is to examine the environmental impacts associated with the proposal to rehabilitate and renovate the park’s only visitor center, which also serves as its administrative headquarters. The rehabilitated structure would essentially be a replacement in kind of the existing visitor center, retaining its building footprint and approximate square footage, but incorporating a number of needed structural and functional improvements.

This environmental assessment was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR §1508.9), and National Park Service Director’s Order-12 *Conservation Planning, Environmental Impact Analysis, and Decision-making*.

## Background

The National Park Service is planning to rehabilitate and renovate the park’s visitor center/headquarters building. This facility is the only visitor contact station in the park. Visitors come to the visitor center to pay entrance and camping fees, orient themselves to the park, view the park film, see artifacts associated with Chacoan culture in the park’s small museum, and attend lectures and special events. The visitor center also houses a sales area for the Western National Parks Association. Most park employees have their work stations in the headquarters building (except for the maintenance staff).

The Chaco Culture NHP visitor center was built in the mid-1950s and was last remodeled in 1978. Additional modifications were made to the exterior in the 1980s. In the 1990s, a separate

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restroom facility was constructed adjacent to the visitor center (and the restrooms in the visitor center were closed). The center also includes a museum and exhibits where fragile, centuries-old museum objects are displayed. Because the building was a prototype for the NPS “Mission 66” program and is now over 50 years old, the park consulted with the State Historic Preservation Office (SHPO) concerning its eligibility for listing on the National Register of Historic Places. In a May 27, 2008 letter, the SHPO concurred in the park’s finding that the building has lost integrity as a result of numerous alterations and is not eligible for listing on the National Register.

The visitor center is now in poor condition. The electrical wiring and control panels are undersized and inadequate for the loads they carry. The wood window and door frames are in varying states of deterioration—some wholly rotted through. The interior ceilings are stained, moldy and damaged as a result of roof and pipe leaks. The floor is cracked and uneven which allows access by rodents to the detriment of health and safety for both visitors and staff in this hantavirus-prone area. The carpet is stained, torn and worn out. The heating and cooling systems are so inadequate that variations of up to twenty degrees are possible between parts of the building. The HVAC system is so noisy that meetings cannot take place when the blower is on; the units are obsolete, rusted, and leaking, as well. Replacement parts for them are no longer available.

The flat roof has leaked repeatedly, even after the membrane was replaced in 2004. To keep the roof from leaking (and damaging electronic equipment, library materials and priceless Chacoan artifacts), all the HVAC components need to be removed from the roof and placed on the ground adjacent to the building.

There are no UV screens to protect the museum objects displayed and there is no fire suppression system. The park is 90 minutes (50 miles) from the nearest fire station in normal times. There are times when the park is wholly inaccessible if Escavada Wash (outside the park) is flowing. (There is an at-grade wash crossing; in times of significant precipitation or snowmelt, the wash flow can be significant.)

Phased repairs are not recommended by the consulting engineers because of the interrelationship of the building components. The building is not currently energy efficient and the rehabilitation may provide an opportunity to improve its efficiency as well as its utility.

## **Purposes and Objectives (Needs)**

The specific purposes of the visitor center rehabilitation and renovation proposal are: 1) to protect public and employee health, safety, and welfare; 2) to improve the existing visitor center’s operational efficiency and environmental sustainability; 3) to accomplish needed facility improvements in an efficient manner, and at an appropriate value; and 4) to afford the park’s many and diverse visitors suitable opportunities to learn about, experience, and enjoy the park’s significant resources.

The project is needed to accomplish the following objectives (needs):

- 1) Correct existing deficiencies in meeting Occupational Safety and Health Administration (OSHA) standards, Uniform Building Code, and National Fire Codes.
- 2) Minimize the environmental impacts of visitor center operations by reducing energy and water consumption, and by utilizing environmentally sustainable building design and construction practices.

- 3) Accomplish needed structural, mechanical, and other improvements simultaneously, in order to avoid compromises in the design, function, and costs of the park's visitor center.
- 4) Provide a pleasant and comfortable visitor center experience to all of the park's visitors, including providing access consistent with the Americans with Disabilities Act.

## Relationship to Other Plans and Policies

Current plans and policy that pertain to this proposal include the 1985 Chaco Culture National Historical Park *General Management Plan/Development Concept Plan* (CHCU 1985), the 2006 National Park Service *Management Policies* (NPS 2006), the 2007 Chaco Culture National Historical Park *Centennial Strategy* (CHCU 2007a), and the 2007 Chaco Culture National Historical Park *Foundation for Planning and Management* (CHCU 2007b). Following is more information on how this proposal meets the goals and objectives of these plans and policies:

- The 1985 Chaco Culture National Historical Park *General Management Plan/Development Concept Plan* (GMP/DCP) did not specifically address the need for such extensive work on the visitor center facility when the plan was developed twenty-four years ago, though the plan was only written to cover a period of 10 to 15 years. The plan estimated that the park would receive 60,000 to 70,000 visitors annually during the projected life of the plan if NM 57 remained unpaved, and as many as 150,000 annual visitors if NM 57 was upgraded to an all-weather road. Under that assumption, the 1981 visitor center expansion was deemed to be of sufficient size to accommodate park visitors. Today, the road remains substantially unpaved and the park receives only about 45,000 visitors per year, which would suggest that the existing building size remains adequate for its intended purposes. Though no significant adverse effects on park resources are expected as a result of the proposed project, the GMP/DCP identifies that the visitor center is located in the park development subzone where some adverse effects may occur due to the concentration of use and development. In part because the proposed project is essentially a replacement in kind of the existing visitor center, the proposed rehabilitation and renovation are consistent with the 1985 Chaco Culture National Historical Park GMP/DCP.
- The proposal is consistent with the goals and objectives of National Park Service *Management Policies* 2006. Section 1.9.5.2 states “[t]he National Park Service will provide visitor and administrative facilities that are necessary, appropriate, and consistent with the conservation of park resources and values. Facilities will be harmonious with park resources, compatible with natural processes, esthetically pleasing, functional, energy-efficient, water-conserving, cost-effective, universally designed, and as welcoming as possible to all segments of the population. Park facilities and operations of all sizes will demonstrate environmental leadership by incorporating sustainable practices to the maximum extent practicable in planning, design, siting, construction, and maintenance.” The proposed visitor center rehabilitation meets the goals and objectives of §9.1.1 *Facility Planning and Design*, §9.1.2 *Accessibility for Persons with Disabilities*, §9.1.3 *Construction*, §9.1.7 *Energy Management*, §9.3 *Visitor Facilities*, §9.4 *Management Facilities*, and all other relevant NPS management policies, including policies for park management, appropriate use of park resources, park planning, resource protection, and visitor use and experience.
- In its 2007 National Park Service *Centennial Strategy*, Chaco Culture NHP identified goals for the park that would provide a margin of excellence for the upcoming centennial anniversary of the national park system in 2016. Goals identified include a complete renovation of the existing visitor center that would maintain the existing building exterior—so as not to compete with the remains of the Chacoan civilization—while making needed

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improvements to the interior space. The rehabilitation would incorporate sustainable (“green”) building strategies, including the use of energy efficient utilities and mechanical systems in order to be Leadership in Energy and Environmental Design (LEED) Silver certifiable. The proposed visitor center rehabilitation project would implement these goals.

- Chaco Culture NHP’s 2007 *Foundation for Planning and Management* is a statement of its core mission, offering basic guidance for all the decisions to be made about the park. Desired conditions identified in the 2007 plan relevant to the visitor center proposal include: park funding and staff will be able to keep up and efficiently maintain visitor facilities; there will be adequate emergency and law enforcement services; and the visitor center will be modernized and upgraded to a safe, modern visitor center. The proposed project would help the park to achieve these conditions by reducing maintenance burdens and expenses associated with the visitor center building; providing additional law enforcement and emergency services capacity; and bringing the visitor center into conformance with safety and accessibility codes, as well as functional standards that it does not currently meet.

## Appropriate Use

Sections 1.4 and 1.5 of NPS *Management Policies 2006* direct that the National Park Service must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 of NPS *Management Policies 2006, Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

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

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it. More information on the definition of unacceptable impacts as cited in §1.4.7.1 of NPS *Management Policies 2006* can be found in the *Environmental Consequences* chapter.

Both a visitor center and an administrative headquarters are common and vital structures in most national park units. As with many national parks, at Chaco Culture National Historical Park these functions are combined in a single building. Proper location, sizing, as well as construction materials and methods would help ensure that unacceptable impacts on park resources and values would not occur. The proposed rehabilitation and renovation of the visitor center building is consistent with the park’s general management plan and other related park plans. With this in mind, the NPS finds that the proposed project is an acceptable use at Chaco Culture National Historical Park.

## Scoping

Scoping is a process to identify the range of resources that may be affected by a proposed action, and to explore possible alternative ways of achieving its objectives while minimizing adverse impacts. Internal scoping was conducted by an interdisciplinary team comprised of key staff from Chaco Culture NHP and Aztec Ruins National Monument, and technical professionals of the National Park Service's Santa Fe and Denver support offices. Team members also consulted with subject matter experts from the agency's Planning & Environmental Quality Division and Geologic Resources Division, and the New Mexico State Historic Preservation Office. The interdisciplinary team defined the project purpose and need; identified alternatives to address the needs identified; determined what the likely issues and impacts would be; and identified the relationship, if any, of the proposed action to other planning efforts at the park.

In response to the identified need to correct multiple visitor center deficiencies (soil erosion; settling of the foundation; heating, air conditioning, electrical, and other problems), engineers and technical experts from the Intermountain Region Office recommended studying a complete building rehabilitation or replacement rather than undertaking multiple individual projects in an inefficient and costly manner and with significant design compromises. In response, a Value Analysis Study was conducted on July 31 and August 1, 2008 with the purpose of evaluating the rehabilitation or replacement of the park's visitor center, to improve visitor contact services, protect park resources, reduce operation costs, and improve operations and staff efficiencies (IMRO 2008).

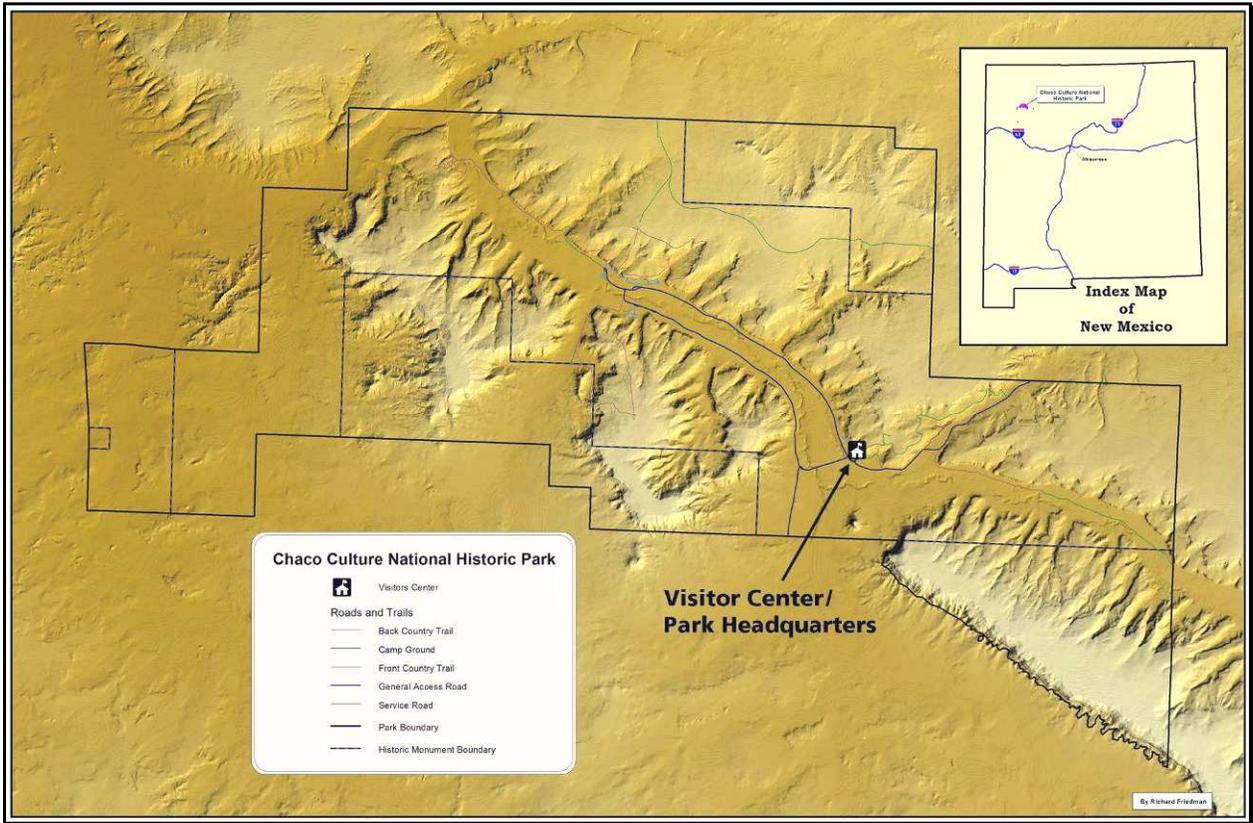
A Functional Analysis was conducted by the study team, through which critical components of the visitor center and its important design elements were identified. This analysis helped to inform the selection and refinement of alternatives and evaluation factors for rehabilitation or replacement of the visitor center. The team then conducted a Choosing By Advantages (CBA) evaluation through which a recommended alternative was identified, based on its much higher ratio of incremental benefits to incremental cost than the other alternatives considered (discussed in the *Alternatives Considered and Dismissed* section of this document). The recommended alternative is based on reconfiguring interior spaces of the existing visitor center building to provide the needed building functionality without increasing its size.

Interdisciplinary team members conducted site visits and gathered background information about park resources that could be affected. Potential environmental impacts were further identified and evaluated, along with past, present, and reasonably foreseeable projects that could have cumulative effects and potential mitigation measures.

Consultation with the New Mexico SHPO began with a recommendation by the park that the visitor center is not eligible for listing on the National Register of Historic Places. On May 27, 2008, the SHPO concurred with the park's findings, primarily due to substantial loss of historic integrity in the past 30 years (SHPO 2008). While not eligible, the building does retain some original elements that the park would strive to retain in the rehabilitation/renovation process.

A second Value Analysis was conducted in January 2009 to assess the various needs and staff preferences associated with the temporary physical relocation of the visitor center and its functions, including administration and visitor services. Participating in the analysis were park employees, regional technical support staff, and representatives of the Western National Parks Association (operator of the visitor center bookstore). This process helped to further identify potential short- and long-term effects of the project and appropriate mitigation strategies.

**Figure 1 – Project Location**



Location of Chaco Culture NHP Visitor Center/Park Headquarters (NPS)

## Impact Topics Retained for Further Analysis

Impact topics are the resources of concern that could be affected by a proposed action. Impact topics for this project have been identified on the basis of federal laws, regulations, and orders; NPS *Management Policies* 2006; and National Park Service knowledge of resources at Chaco Culture National Historical Park. Impact topics that are carried forward for further analysis in this environmental assessment are listed below along with the reasons why the impact topic is further analyzed. For each of these topics, the text that follows also describes the existing setting or baseline conditions (i.e. affected environment) within the project area. This information will be used to analyze impacts against the current conditions of the project area in the Environmental Consequences chapter.

### Archeological Resources

The National Park Service, as steward of many of America's most important cultural resources, is charged to preserve cultural resources 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 National Park Service *Management Policies* 2006 and the appropriate NPS Director's orders.

National Park Service Director's Order-28 *Cultural Resource Management Guideline*; and NPS *Management Policies* 2006 require the consideration of impacts on historic properties that are listed on, or eligible to be listed on, 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 on properties listed on or eligible for the National Register of Historic Places.

In addition to the National Historic Preservation Act and National Park Service *Management Policies* 2006, NPS Director's Order-28B *Archeology* affirms a long-term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the national park system. As one of the principal stewards of America's heritage, the 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 system reflect a commitment to the conservation of archeological resources as elements of our national heritage.

The entirety of Chaco Culture National Historical Park has been surveyed for archaeological materials, revealing a great number of archaeological resources throughout Chaco Canyon and surrounding areas, including sites located in areas near the visitor center. No archaeological sites are known to exist within the proposed project area. A survey was completed for areas within the original national monument boundary, which included the visitor center area (Hayes 1981). This survey was completed about 14 years after the visitor center was built. There are no records indicating that an archaeological survey was done prior to the initial construction, nor if any cultural resources were encountered during the initial construction or renovations. Because no archaeological sites are known to exist within the proposed project area, it is unlikely that construction activities would disturb buried archaeological deposits. In the event that any

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archeological resources are inadvertently discovered during construction, appropriate steps would be taken in accordance with relevant cultural resource laws and policies, and in following procedures agreed upon with the SHPO.

Archaeological resources are known to exist within 300 feet of the project area and may be susceptible to vibration-caused disturbance or damage. Common causes of vibration associated with building construction include pile-driving or similar high-impact construction activities, use of various types of powered machinery (jackhammers, compactors, augers, etc.) and movement of trucks and other vehicles. One National Register of Historic Places listed site exists within the 100-ft cultural resources buffer identified in the assessment of effect. Information regarding the site's identity and location is considered sensitive, so certain details are only being discussed in the park's official correspondence with the SHPO. Construction activities that would produce vibrations of a magnitude or quality that could disturb or damage known archaeological resources would not be permitted.

Because there is a possibility of discovering buried archaeological deposits in the course of construction work, and because construction-related vibrations could affect known archaeological resources if not properly mitigated, the topic of archaeological resources has been carried forward for additional analysis in this document.

## **Museum Collections**

National Park Service Director's Order-24 *Museum Collections*, requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, National Park Service museum collections. According to NPS *Management Policies* 2006, the National Park Service will "protect, preserve, and foster appreciation of the cultural resources in its custody and demonstrate its respect for the peoples traditionally associated with those resources through appropriate programs of research, planning, and stewardship."

Section 9.4.2 of NPS *Management Policies* 2006: *Museum Collections Management Facilities* specifically states that "Park curatorial facilities should be adapted to the needs of each park. They may share space in visitor centers or administrative office buildings, or be housed in completely separate buildings. Incorporation with facilities in which there would be a heightened danger of fire, chemical spills, and similar accidents should be avoided. Curatorial facilities will meet each collection's special requirements for security, fire suppression, and environmental controls.

Approximately 98 percent of park's collections objects are housed at the University of New Mexico's Hibben Center in Albuquerque—well away from the project area, and therefore would not be directly affected by the proposed project. Only about two percent of the park's collection is housed at the park in a designated collections storage facility in the park's maintenance area, and within the existing visitor center building (in the exhibits area and in office spaces). The existing visitor center building does not currently meet NPS guidelines for museum collections management, lacking adequate fire detection and suppression, climate control, pest management, collections security, and protection from overhead water lines.

Museum objects and records currently housed at the visitor center would need to be temporarily relocated and stored during the construction period, then moved back to the visitor center once the work is completed. The relocation of objects and records would be done or directly supervised by the park's curatorial and cultural resources staff. These items would be moved to the secure, climate-controlled storage facility in the park's maintenance area. Should any artifacts be discovered as a result of construction activities, they would be accessioned

according to NPS policy and standards. Improvements made to the existing visitor center building are expected to have substantial beneficial consequences for the protection of the park's museum collection; therefore, the topic of museum collections has been carried forward for additional analysis in this document.

## Geologic Resources and Soils

National Park Service *Management Policies* 2006 requires that the NPS preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue. The term “geologic features” describes the products and physical components of geologic processes. Examples of geologic features in parks include rocks, soils, and minerals; geysers and hot springs in geothermal systems; cave and karst systems; canyons and arches in erosional landscapes; sand dunes, moraines, and terraces in depositional landscapes; dramatic or unusual rock outcrops and formations; and paleontological and paleoecological resources such as fossilized plants or animals or their traces. These policies also state that the National Park Service 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.

Soils within the project area are silty fine sandy/clay alluvium that are susceptible to erosion from water and wind unless stabilized. The natural patterns of precipitation in the canyon— heavy but infrequent rain storms—contribute to that erosion. Previous disturbance of the visitor center site, combined with the natural erosive properties of the soil and ineffective stormwater management, contributed directly to the current problems with the building's foundation. Among the primary purposes for the project are correcting the soil piping conditions that have led to the building's structural problems and preventing future soil erosion and transportation, in part by providing adequate site drainage. Construction activities would include disturbance of soils, primarily within and adjacent to the existing building's footprint. Soils may also be disturbed and compacted on a temporary basis within the construction area, as well as in the immediate area of the temporary visitor contact stations (trailer and/or yurt) that would be used until construction of the new building is complete.

The walls of Chaco Canyon are composed primarily of Cliff House sandstone, a massive formation that is about 360 feet thick in the area. It is underlain by the coal-bearing Menefee formation, which crops out at the base of the canyon walls (CHCU 1985). The canyon walls are subject to highly protracted erosional processes that result in talus accumulation at their base. Additionally, infrequent mass-wasting events—often accelerated by precipitation—result in the accumulation of rocks of varying sizes at the base of canyon walls and within the talus. The visitor center site sits in close proximity to the north canyon wall at the edge of the talus slope. As described in the discussion of archaeological resources impacts, construction activities produce various types of vibrations that can affect nearby resources. Though construction activities that would result in the quality, intensity, and/or duration of vibrations that could disturb or damage geologic resources—or that couldn't be mitigated by requiring and adopting low-vibration construction techniques and practices—are not expected, such possibilities merit further consideration. Because of the expected impacts on soils, and the possibility of impacts on canyon features, the topic of geologic resources and soils has been carried forward for additional analysis in this document.

## Floodplains

Executive Order 11988 *Floodplain Management* requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modifications of floodplains, and to avoid direct and indirect support of floodplain development

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wherever there is a practicable alternative. It directs all federal agencies to avoid, if possible, development and other activities in the 100-year (or base) floodplain. Existing structures or facilities in such areas and needing rehabilitation, restoration, or replacement will be subject to the same scrutiny as for new facilities or structures. Highly significant and irreplaceable records, historic objects, structures, or other cultural resources may not be located in the 500-year floodplain. No critical actions (actions for which even a slight risk is too great, such as clinics, hazardous materials storage, major fuel storage facilities, and 40,000 gpd or larger sewage treatment facilities) will occur in the 500-year floodplain.

Section 4.6.4 of National Park Service *Management Policies* 2006 states that the NPS will manage for the preservation of floodplain values and minimize potentially hazardous conditions associated with flooding. According to NPS Director's Order 77-2 *Floodplain Management*, certain construction within a regulatory floodplain requires preparation of a statement of findings for floodplains. The project area is not within a 100-year floodplain; however, the existing visitor center building is located within the 500-year floodplain of Gallo Wash, an ephemeral stream (Simons 1982). Therefore, a statement of findings (SOF) has been prepared for the proposed project, which is included in this document as Appendix A. The SOF includes a description of the flood hazard assumed by implementation of the proposed project and measures that would be taken to mitigate potential adverse impacts.

As expressed in the floodplain statement of findings, the National Park Service concludes that there is no practicable alternative placement for the visitor center in a reasonably foreseeable timeframe, and that its rehabilitation and renovation at the current site is warranted. Therefore, the proposed project is in compliance with Executive Order 11988 *Floodplain Management*. Implementation of the proposal would likely result in the prolongation of flood risk on park resources due to the continued occupation of the 500-year floodplain. Though deemed to be prudent and reasonable, certain flood risks would be assumed under the preferred alternative, as well as under the no-action alternative; therefore, the topic of floodplains has been carried forward for additional analysis in this document.

## **Energy Use, Conservation Potential and Sustainability**

According to NPS *Management Policies* 2006, the National Park Service would strive to construct facilities with sustainable designs and systems to minimize potential environmental impacts. To the extent possible, the design and management of facilities would emphasize environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings. The National Park Service also reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology. Energy efficiency is incorporated into the decision-making process during the design and acquisition of buildings, facilities, and transportation systems that emphasize the use of renewable energy sources.

Further, §9.1.1.6 of NPS *Management Policies* 2006 states “any facility development, whether it is a new building, a renovation, or an adaptive reuse of an existing facility, must include improvements in energy efficiency and reduction in greenhouse gas emissions for both the building envelope and the mechanical systems that support the facility. Maximum energy efficiency should be achieved using solar thermal and photovoltaic applications, appropriate insulation and glazing strategies, energy-efficient lighting and appliances, and renewable energy technologies. Energy-efficient construction projects should be used as an educational opportunity for the visiting public. All projects that include visitor centers or major visitor services facilities must incorporate LEED (Leadership in Energy and Environmental Design) standards to achieve a silver rating.”

A primary objective of the visitor center proposal is to minimize the environmental impacts of visitor center operations by reducing energy and water consumption, and by utilizing environmentally sustainable building design and construction practices. The proposed project would replace outdated and inefficient heating, air conditioning, and lighting systems with more energy- and cost-efficient systems. More efficient toilets and water appliances would also reduce water consumption. The building design would include a new insulated roof, new efficient doors and windows, and improved building insulation and glazing strategies—all contributing to reduced energy costs and greenhouse gas use. The design would also take advantage of the abundance of local solar radiation through passive solar heat capture. Use of recycled and non-toxic materials is also a goal of the project, and would contribute to the goal of the project being LEED Silver certifiable. The park would emphasize the environmental benefits of the project in its educational materials and presentations. Because of the substantial improvements expected, the topic of energy use, conservation potential and sustainability has been carried forward for additional analysis in this document.

### **Health and Safety of Employees and the Visiting Public**

According to NPS *Management Policies* 2006, the National Park Service will work to identify public health issues and disease transmission potential in the parks and to conduct park operations in ways that reduce or eliminate these hazards. Park managers will pursue these goals with technical assistance provided under the auspices of a Service-wide public health program.

Cracks in walls and floors of the existing visitor center caused by soil movement have allowed rodents unfettered access to the building. Employees routinely complain of rodent sightings and droppings in and around the existing office workspaces. Rodents have the potential to carry hantaviruses or other diseases. Hantaviruses, in particular, can be contracted by humans in the form of *Hantavirus pulmonary syndrome*. *Hantavirus pulmonary syndrome* is a potentially deadly disease transmitted by infected rodents through urine, droppings, or saliva. Humans can contract the disease when they breathe in aerosolized virus. *Hantavirus pulmonary syndrome* was first recognized in 1993 in the Four Corners area of the United States, and has since been identified throughout the country.

Section 4.4.5.1 of NPS *Management Policies* 2006 defines pests as “living organisms that interfere with the purposes or management objectives of a specific site within a park or that jeopardize human health or safety.” Section 4.4.4 identifies that the National Park Service may control native pests, among other reasons, “to protect facilities in developed areas and to protect against a significant threat to human safety.” The proposed project would remove rodents and other pests from the visitor center building, remediate the soil conditions that aided their entry, and rehabilitate the structure so that future rodent intrusions are less likely.

The rehabilitation and renovation of the park’s visitor center is proposed in part to address human health and safety risks. In particular, levels of rodent infestation in this facility are unacceptably high, which increases the risk of employees being exposed to diseases carried by rodents. The existing building also contains a number of structural deficiencies including an unstable foundation, poorly functioning climate controls, undersized electrical wiring, and a lack of fire detection and suppression system. The proposed project would minimize these health and safety risks. Because of the potential risks to health and safety of employees and the visiting public, this impact topic has been carried forward for additional analysis in this document.

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## Visitor Use and Experience

According to 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.

NPS Director's Order-42 states that "It is the goal of the NPS to ensure that all people, including the estimated 54 million citizens with disabilities, have the highest level of accessibility that is reasonable to our programs, facilities and services in conformance with applicable regulations and standards. Accordingly, the NPS will seek to provide that level in the planning, construction, and renovation of buildings and facilities and in the provision of programs and services to the public and to our employees."

A typical visitor stay at Chaco Culture National Historical Park is less than 24 hours; fifty percent of the park's visitors spend between two and six hours in the park, while twelve percent stay between six and twelve hours (Lee 1992). The primary visitor activity is driving the park's nine-mile loop road and visiting the various greathouse sites and other historic structures along the way—and perhaps hike on one or more of the park's backcountry trails to experience some of its more remote sites. Once in the park, visitors typically make their first stop at the visitor center to pay entrance and/or campground fees and to orient themselves to the park and its resources. Accessible restrooms and potable water are available here. Visitors normally stop at the main desk to talk with park staff or volunteers about things to do in the park, pick up printed guides and interpretive materials, and perhaps obtain a backcountry trail permit. Visitors often spend some time in the exhibits area to study the interpretive displays, view a limited selection of objects from the park's museum collection, and learn about the history of Chaco Canyon and its former inhabitants, as well as contemporary Indian communities having ancestral ties to the early Chacoans. Many visitors take the time to watch a park orientation film and visit the park's only bookstore/gift shop operated by the Western National Parks Association.

While providing visitors with a wide range of services, the existing facility is deficient in a number of ways that affect visitors, including health risks associated with infestations of rodents and other pests, inadequate fire detection and suppression, deficiencies in accessible building features, heating and cooling systems that fail to provide comfortable indoor conditions, and a roof that leaks during snow melt or rain events, among others. These and other building deficiencies and design shortcomings would be remedied by the rehabilitation and renovation of the building.

During the construction period, all visitor services currently provided in the visitor center would have to be provided elsewhere—either in temporary modular structures erected in the visitor parking lot, or at alternative sites. Visitors would have full access to restrooms, potable water, trails, archaeological sites, and emergency services. They would likely experience some limitations or modifications in parking, interpretive programs and displays, park orientation film screenings, and items for sale through the park's cooperating association. Temporary facilities near the existing visitor center would provide some services and temporary shelter from the elements. Museum objects would be unavailable during construction. Noise, vibrations, odors, dust, visual clutter, and high activity levels associated with construction activities would affect visitor services irregularly and to varying degrees at the temporary visitor contact station near the existing visitor center, the Fajada Butte Overlook, and the Una Vida archaeological site.

Because park visitors would be impacted by either the ongoing conditions associated with retaining the existing visitor center building, or the temporary changes resulting from closing the park's primary visitor contact station, the topic of visitor use and experience has been carried forward for additional analysis in this document.

## Park Operations

National Park Service *Management Policies* 2006 does not contain a specific chapter on park operations. However, virtually every NPS action or proposal has either a direct or indirect effect on park operations. NPS policies and guidelines regarding maintenance, law enforcement, visitor safety and emergency response, interpretation and education, natural and cultural resource management, and other park concerns are covered within a wide range of NPS policy statements. There are also a number of NPS Director's orders that pertain to park operations as well. Determining the consequences of a proposal is accomplished by analyzing the level of effect the proposed action would have on current staffing, operations, facilities and equipment, and visitor and employee safety at the park unit.

Most of the park's administrative functions are performed within the visitor center, in the portion of the building designated for those purposes. Maintenance and some curatorial functions are largely accomplished within the park's maintenance area. Both the visitor center and the maintenance areas, along with park housing, are contained within the park's development subzone. Approximately 18 park staff and volunteers have their work stations in the visitor center, along with an administrative work area for the Western National Parks Association.

Park operations within the existing visitor center are compromised in a number of important ways. Unstable soils, foundation damage, a leaky roof, and problems with outdated and inefficient mechanical, electrical, and communications systems have created an undue burden on maintenance and technical staff. Repairs have become costly for the park and are often ineffective. Rodents and other pests in the building present health hazards to employees and visitors. Climate controls do not work properly, making employees and visitors uncomfortable, and putting the park's museum collections at risk of damage and deterioration. The building does not have a proper fire detection and suppression system and does not meet many standards for accessibility. Work spaces are organized inefficiently for current needs and subject to the legacy configuration of spaces which pre-date computerization, modern mechanical systems, and sustainable design standards.

All visitor center functions would need to be relocated during the building's rehabilitation. Temporary office spaces would be created in existing park housing (temporarily converted for such use), and in existing maintenance buildings suitable for office space. Locks would be re-keyed as necessary and temporary network and phone lines would be strung. What office furniture, equipment, files and supplies would be needed for a 12 to 18-month period would be moved to these locations. Other physical property would be stored at alternate locations in the park or disposed if appropriate. A temporary visitor contact station (trailer and/or yurt) would be erected at the edge of the visitor center public parking lot to provide many of the services that would normally occur at the visitor center. These temporary structure(s) would be removed following completion of construction. If a yurt is purchased for this purpose, it would either be retained by the park for future use, or sold or donated according to established procedures. A modular office unit (trailer) would be rented for the construction period only, and then returned.

Rehabilitation and renovation of the park's visitor center building, along with the substantial effort to plan and implement a temporary relocation of the park's administrative and visitor services functions, would have a measurable effect on the park's staff—as well as its cooperating association—and how/where they conduct their work. Likewise, not rehabilitating

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the visitor center would have meaningful consequences for park operations. For these reasons, the topic of park operations has been carried forward for additional analysis in this document.

## Impact Topics Dismissed From Further Analysis

Some impact topics have been dismissed from further consideration because during the scoping process it was determined that none of the proposed activities, alone or in combination, was likely to have more than minor or negligible effects when evaluated in terms of context, duration and intensity. Because the interdisciplinary team determined that there was no potential for significant impacts, no further analysis is necessary. In the event that resource effects are unknown or presently unknowable, are at the minor to moderate level of intensity, and some impacts are likely, then they have been included in the analysis.

For the purposes of this section, an impact of negligible intensity is one that is at the lowest levels of detection, barely perceptible, and not measurable. An impact of minor intensity is one that may be measurable or perceptible but is slight, localized, and results in a limited alteration in a limited area. The park's reasoning in dismissing further evaluation of resource topics is stated for each resource.

### Historic Structures

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 NPS *Management Policies 2006* and applicable Director's orders.

Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); National Park Service Director's Order-28 *Cultural Resource Management Guideline*; and NPS *Management Policies 2006* 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 on properties listed on or eligible for the National Register of Historic Places.

The term "historic structures" refers to both historic and prehistoric structures, which are defined as constructions that shelter any form of human habitation or activity. Because the existing visitor center was constructed more than 50 years ago, the park initiated a formal evaluation of its eligibility for the National Register of Historic Places. Consultation with the New Mexico SHPO began with a recommendation by the park that the visitor center is not eligible for listing on the National Register of Historic Places. Subsequently, the SHPO formally concurred with the park's findings, primarily due to the building having substantially lost its historic integrity during the past 30 years. Therefore, the visitor center is not considered a historic structure for the purposes of this evaluation.

The proposed action would merely refurbish an already existing building which is not eligible for the National Register of Historic Places; therefore the project would have no effect on historic structures. Further, since no historic structures would be affected by the project, no

unacceptable impacts would occur; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006 and this topic is dismissed from further analysis in this document.

## Cultural Landscapes

According to National Park Service 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 formal cultural landscape inventories have not been conducted for Chaco Canyon National Historical Park, it is assumed that all the lands of the park are part of larger cultural landscapes associated with ancient inhabitants of the area, beginning at least 8,000 years ago with almost continuous occupation up to the early 1900s. These layered landscapes are of significance to the tribes who claim cultural affiliation with Chaco. Although the visitor center building is assumed to be located within one or more cultural landscapes, the visitor center, itself, is not what makes those landscapes significant and is not a contributing element to them. Since the proposed project would merely rehabilitate and renovate an existing building, with no changes to its location and scale and only minor changes to its appearance, cultural landscapes would only be affected by the proposed project to the extent that archaeological resources are impacted. Impacts on archaeological resources are discussed under the *archaeological resources* impact topic which is being carried forward for further analysis in this document. Construction activities and other components of the visitor center's relocation (such as the placement of a modular visitor contact station at the edge of the parking lot) are temporary in nature and these structures would not contribute to a significant cultural landscape.

Since the proposed action would only refurbish an already existing building that is not a contributing element to any cultural landscape, there would be no- or negligible effects on cultural landscapes. Further, since no- or only negligible effects are expected, no unacceptable impacts would occur; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006 and this topic is dismissed from further analysis in this document.

## Ethnographic Resources

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

There are at least 26 Indian tribes that claim some cultural affiliation with Chaco Culture National Historical Park, and with whom the park consults on a regular basis. The proposed project covered by this analysis is located within the park's developed area. In previous consultations with the park's affiliated tribes, there have been no indications that the visitor center area contains significant ethnographic resources that are not otherwise addressed in this document under the *archeological resources* impact topic, which is being carried forward for further analysis. The park would undertake special steps to protect cultural resources, as outlined in the analysis of archeological resources, and in other parts of this document.

Since the proposed project would merely renovate and rehabilitate an existing building, with no changes to its location or scale, and only minor changes to its appearance, the proposed action is expected to have no- or negligible effects on ethnographic resources. Further, since no- or only negligible effects are expected on ethnographic resources, no unacceptable impacts would

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occur; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006 and this topic is dismissed from further analysis in this document.

## **Paleontological Resources**

According to NPS *Management Policies* 2006, paleontological resources (fossils), including both organic and mineralized remains in body or trace form, will be protected, preserved, and managed for public education, interpretation, and scientific research. Section 4.8.2.1 of NPS *Management Policies* 2006 states that “[a]ll NPS construction projects in areas with potential paleontological resources must be preceded by a preconstruction surface assessment prior to disturbance. For any occurrences noted, or when the site may yield paleontological resources, the site will be avoided or the resources will, if necessary, be collected and properly cared for before construction begins. Areas with potential paleontological resources must also be monitored during construction projects.

Paleontological resources are present in and near Chaco Canyon; however, no significant concentrations of paleontological resources are known to exist within the proposed project area. The visitor center site is located on alluvial soils; paleontological localities identified in the park most often occur in the Menefee formation, so the likelihood of a significant paleontological discovery is low (Lyttle 2008). However, because the potential exists for paleontological resources to be unearthed by construction activities, a park resource specialist would monitor all ground disturbances. Should any fossils be discovered during construction of the visitor center, the park’s resource specialist would evaluate the significance of those resources and take such steps as necessary to protect and preserve fossil discoveries in accordance with NPS policies for paleontological resources. Any paleontological specimens that are to be retained permanently are subject to National Park Service policies for museum objects.

Because of the low probability of significant paleontological resources being unearthed, and because NPS resource monitors would be present during any ground disturbance, effects on paleontological resources are expected to be no greater than negligible. Further, such effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Therefore, this topic is dismissed from further analysis in this document.

## **Vegetation**

According to the NPS *Management Policies* 2006, the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants. Where there is vegetation on the site of the visitor center, sagebrush, rabbit brush, four-wing saltbush, and other native shrubs, forbs and grasses predominate. There are no trees growing near the visitor center and much of the immediate area surrounding the building is hardscaped. What vegetation exists is common in the park and readily replicable once construction activities have ceased.

Vegetation would be displaced, disturbed, and/or compacted solely within the designated construction zone and, to a lesser degree, at the edge of the parking lot where the temporary visitor contact station (trailer and/or yurt) would be installed. No new paths or service roads (temporary or permanent) are planned that would disturb existing vegetation. Disturbed areas would be rehabilitated using soils from the project area and revegetated with native seed stock immediately following construction. The park would also make special efforts to prevent the establishment of cheat grass, Russian thistle, tamarisk, and other invasive species in the disturbed areas.

Removal and/or disturbance of vegetation in the project area is expected to result in only negligible-to-minor adverse effects on vegetation. Further, such negligible or minor effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Wildlife**

According to the NPS *Management Policies* 2006, the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of animals. Wildlife commonly found in the park include elk and mule deer; jackrabbits and desert cottontails; 15 species of bats; bobcats, coyotes, porcupines, badgers, skunks, puma and foxes; 15 species of rodents; six species of snakes, seven species of lizards, and over 100 species of birds. There are also numerous insect species. The visitor center is among the most heavily used areas of the park and hence is generally avoided by the larger animals, though coyotes are occasionally observed in the vicinity.

The visitor center is located within the park's development subzone where the majority of the maintenance, administration, and visitor contact activities take place. This is a substantially disturbed area of the park that contains little to no water and minimal vegetation. The presence of humans, human-related activities, and structures have removed or displaced much of the native wildlife habitat in the project area which has limited the number and variety of wildlife occurrences. Some smaller wildlife such as rodents, reptiles, and amphibians and their habitat could be displaced or eliminated during the visitor center rehabilitation. Disturbed areas would be rehabilitated and revegetated following construction, which would result in negligible-to-minor adverse effects on the wildlife and wildlife habitat in and near the construction area.

During construction, noise would also increase, which may disturb wildlife in the general area. Construction-related noise would be temporary, and existing sound conditions would resume following construction activities. Therefore, the temporary noise from construction would have a negligible-to-minor adverse effect on wildlife. Rodents and other small animals living in and around the existing visitor center building would be displaced or eliminated during the building's rehabilitation. This would have a negligible-to-minor effect on the population of rodents and other building pests in the project vicinity.

The actions of the proposed project would displace or eliminate some individual animals but would have only negligible-to-minor effects on wildlife populations. Further, such negligible or minor effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Special Status Species**

The Endangered Species Act of 1973 requires examination of impacts on all federally-listed threatened, endangered, and candidate species to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In addition, National Park Service *Management Policies* 2006 and NPS Director's Order-77 *Natural Resources Management Guidelines* require the National Park Service to examine the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species.

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*Endangered* species are those in danger of extinction throughout all or a significant portion of their range (Endangered Species Act §3(6)). *Threatened* species are those likely to become endangered in the foreseeable future through all or a significant portion of their range (ESA §3(20)). *Sensitive* species or *species of concern* are informal terms that refer to those species that the U.S. Fish and Wildlife Service believes could be in need of concentrated conservation actions.

For the purposes of this analysis, federal, state, county, regional, Navajo Nation, and park resources were reviewed to identify threatened and endangered species and species of concern within Chaco Culture NHP. A Threatened and Endangered Species Survey was completed in July 2001 for the purpose of assessing the presence or absence of such species in the project areas (North Wind 2001). This survey did not identify any threatened or endangered species within park lands. In addition, a series of biological inventories have been conducted over the past five years by the Southern Colorado Plateau Inventory and Monitoring Network for the purpose of assessing the presence or absence of species across park habitat types. This park-wide inventory identified no suitable habitat for threatened and endangered species (North Wind 2001).

There are five species of concern identified by the U.S. Fish and Wildlife Service that may be found in the park. A riparian vegetation survey was conducted and finished in 2004 (Floyd-Hanna 2004) and a rare plants survey (Barlow-Irich 2008) recently gathered data park-wide. *Aletes macdougallii* (San Juan false carrot), a state sensitive species, has been surveyed on cretaceous sandstone benches in the main park unit that consist of gravelly/sandy soils. No *Aletes* species—or suitable habitat—is located in the project area. The only wildlife species of concern that may occur in the vicinity of the project area are two species of bat (Fringed Myotis and Townsend's big-eared bat), the burrowing owl, and the loggerhead shrike. There would be no adverse effects on any of these species from the proposed project.

No threatened or endangered species, or their critical habitats, are known to exist in the project area and no species of concern would be adversely affected by the project; therefore, there would be no- or only negligible effects on special status species. Further, such effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because the effects on special status species would be minor or less in degree, and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **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 system units. Section 118 of the Clean Air Act requires park units 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 §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.

Air quality in CHCU is generally good, due to its remote location and setting. Construction activities such as hauling materials and operating heavy equipment could result in temporary

increases of vehicle exhaust, emissions, and fugitive dust in the general project area. In addition, since the project would be conducted by contractors who would have to travel back and forth to the park daily, auto emissions are likely to increase during the construction period. Any exhaust, emissions, and fugitive dust generated from construction activities would be temporary and localized and would likely dissipate rapidly because air stagnation at Chaco Culture National Historical Park 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 construction. The Class II air quality designation for Chaco Culture National Historical Park would not be affected by the proposal. Further, because the Class II airshed would not be affected and no air quality analysis would be required under New Mexico law, there would be no unacceptable impacts; the proposed action is consistent with §1.4.7.1 of *NPS Management Policies 2006*. Because there would be no more than negligible effects on air quality, and the proposed action would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## Water Resources

National Park Service policies require protection of water quality consistent with the Clean Water Act and other statutes. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To implement this goal, the U.S. Army Corps of Engineers has been charged with evaluating federal actions that result in potential degradation of waters of the United States and issuing permits for actions consistent with the Clean Water Act. The U.S. Environmental Protection Agency and the State of New Mexico also have responsibility for oversight and review of permits and actions that affect waters of the United States.

The proposed project area does not contain surface waters and is mostly dry except for periodic runoff during precipitation events. The groundwater environment consists of a shallow water table aquifer beneath the floor of Chaco Wash and the main floor of Chaco Canyon. Water quality, water quantity, and drinking water are not expected to be affected by the project. The visitor center rehabilitation calls for maintaining the existing building footprint (approximately 7683 square feet), resulting in no change in the amount of impervious surface or erosion potential. To further assist with erosion and water quality, disturbed areas would be recontoured and revegetated following construction. The proposed action would result in only negligible effects on water resources. Further, such negligible effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of *NPS Management Policies 2006*. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## Wetlands

For regulatory purposes under the Clean Water Act, the term wetlands is defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, §404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge or dredged or fill material or excavation within waters of the United States. National Park Service policies for wetlands as stated in *National Park Service Management Policies 2006* and NPS

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Director's Order 77-1 *Wetlands Protection* strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In accordance with DO 77-1 *Wetlands Protection*, proposed actions that have the potential to adversely impact wetlands must be addressed in a statement of findings for wetlands. Since no wetlands are located in the project area, a statement of findings for wetlands will not be prepared.

None of the Chaco Culture NHP acreage is listed in the New Mexico Wetlands Inventory (NMED 2000). Sites not listed specifically as Wetlands can still qualify for protection under Section 404 of the Clean Water Act if meeting the criteria for "jurisdictional wetlands". Qualification as a jurisdictional wetlands area requires that the three (3) wetlands characteristics as described in the USACE Wetlands Management Handbook (Schneider 2000) be present. These are: undrained hydric soils that develop anaerobic conditions, 5% or greater hydrology (persistence of water), and the presence of hydrophytic vegetation. The NRCS Chaco Culture NHP Soils Inventory indicates that there are no hydric soils located in the project area (Zschetzsche 2004). As a result, the criteria for "jurisdictional wetlands" are not met for the visitor center area. The proposed project would have no effect on wetlands; therefore, there would be no unacceptable impacts and the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because there are no wetlands in the project area and because there would be no unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Soundscapes**

In accordance with National Park Service *Management Policies* 2006 and NPS Director's Order-47 *Sound Preservation and Noise Management*, an important component of the National Park Service'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 national park system units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

The visitor center rehabilitation and renovation project would take place in the development subzone of Chaco Culture National Historical Park. Existing sounds in this area are most often generated from vehicular traffic (visitors and employees entering/leaving the park), people, climate controls on the buildings, some wildlife such as birds and coyotes, and wind. Sound generated by the long-term operation of the rehabilitated visitor center may include climate controls (such as heating or air conditioning units) and people using the building. Because the area already contains man-made noises, the long-term operation of the building is not expected to appreciably increase the noise levels in the general area, and may actually decrease noise levels as a result of more efficient and quieter mechanical systems being installed.

During construction, human-caused sounds would likely increase due to construction activities, equipment, vehicular traffic, and construction crews. Any sounds generated from construction would be temporary, lasting only as long as the construction activity is generating the sounds, and would have only negligible-to-minor short-term adverse effects on visitors and employees. Further, such negligible or minor effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## Lightscaapes

In accordance with NPS *Management Policies* 2006, the National Park Service strives to preserve natural ambient lightscaapes, which are natural resources and values that exist in the absence of human caused light. Dark night skies and their relationship to the people who created built environment are important resources at Chaco Culture National Historical Park. The ability to view the seasonal patterns in the dark night sky including the stars, moon, and other celestial bodies—and the sun in the daytime sky—are among the park’s fundamental resources and values (CHCU 2007b).

Chaco Culture National Historical Park strives to limit the use of artificial outdoor lighting to that which is necessary for basic safety requirements. The park also strives to ensure that all outdoor lighting is shielded to the maximum extent possible to keep light on the intended subject and out of the night sky. The visitor center, together with the adjacent housing and maintenance areas (and on a less regular basis, the nearby Gallo Campground), are the primary sources of artificial light in the park. As with the existing visitor center, the proposed action may incorporate minimal exterior lighting on the renovated building, but the lighting would be directed toward the intended subject with appropriate shielding mechanisms and would be placed in only those areas where lighting is needed for safety reasons. Construction activities associated with the proposed project would only take place during daylight hours and security lighting would be prohibited at the construction site.

New lighting on the rehabilitated visitor center would have only negligible effects on ambient lightscaapes. Further, such negligible effects would not result in unacceptable impacts; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## Land Use

National Park Service *Management Policies* 2006 (Chapter 3: *Land Protection*) states, “[t]he National Park Service will use all available authorities to protect lands and resources within units of the national park system, and the Park Service will seek to acquire nonfederal lands and interests in land that have been identified for acquisition as promptly as possible. For lands not in federal ownership, both those that have been identified for acquisition and other non-federally owned lands within a park unit’s authorized boundaries, the Service will cooperate with federal agencies; tribal, state, and local governments; nonprofit organizations; and property owners to provide appropriate protection measures. Cooperation with these entities will also be pursued, and other available land protection tools will be employed when threats to resources originate outside boundaries.”

The proposed visitor center rehabilitation and renovation project is not expected to have an appreciable effect on land use plans, policies, or controls—or on specific land uses within or adjacent to Chaco Culture National Historical Park. The proposed project would essentially be a replacement in kind of the existing facility, and would not alter the use of the property or its surroundings. The park’s general management plan places the visitor center site within the park’s development subzone; no change in management zoning would occur as a result of the project (CHCU 1985). The project would not prompt a park boundary change or land acquisitions, would not appreciably affect the number and type of visitors the park receives, would not affect land use policies or plans of other agencies, and would not affect land use patterns or uses outside of the boundaries of Chaco Culture NHP.

The proposed alternative would have no appreciable effect on land use; therefore, there would be no unacceptable impacts and the proposed action is consistent with §1.4.7.1 of NPS

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*Management Policies 2006*. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

### **Prime or Unique Farmlands**

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects on prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). *Prime* farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. *Unique* farmland produces specialty crops such as fruits, vegetables, and nuts.

According to the NRCS, the project area does not contain prime or unique farmlands (Zschetzsche 2004). Because there are no prime or unique farmlands in the project area, there would be no effect on these resources; therefore, there would be no unacceptable impacts and the proposed action is consistent with §1.4.7.1 of NPS *Management Policies 2006*. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

### **Unique Ecosystems, Biosphere Reserves, or World Heritage Sites**

In recognition of its superb cultural features believed to possess outstanding universal value to humanity, Chaco Culture National Historical Park was named a UNESCO World Heritage Site in 1987. The park was designated under selection criterion iii of the *Operational Guidelines for the Implementation of the World Heritage Convention*, which is "to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared." National Park Service *Management Policies 2006* (§4.3 *Special Designations*) recognizes that "special designations apply to parts or all of some parks to highlight the additional management considerations that those designated areas warrant. These designations include research natural area, experimental research area, wilderness area, national wild and scenic river, national natural landmark, biosphere reserve, and world heritage listing. These designations do not reduce the Service's authority for managing the parks, although in some cases they may create additional management requirements or considerations." Placement on the World Heritage List does not alter the purposes for which a park was established, or its management requirements, or NPS jurisdiction over the park.

Chaco Culture National Historical Park features its World Heritage Site designation in its public information products and interpretive programs; a marker outside the visitor center prominently recognizes the park's special status. In part through the World Heritage Site designation, the park promotes sustainable tourism (tourism that does not adversely affect park resources and values) and the preservation of the world's natural and cultural heritage. The cultural features for which the park was designated a World Heritage Site would be largely unaffected by the proposed project. The park's significant archeological resources associated with the prehistoric Chacoan culture would not be affected by the project and visitors to the park would continue to enjoy those resources throughout the construction period. The commemorative marker outside the visitor center would be protected and would remain in place as part of the rehabilitated visitor center.

The proposed action would have only negligible effects on the park's status as a World Heritage Site. Further, such negligible effects would not result in unacceptable impacts; the proposed action is consistent with §1.4.7.1 of *NPS Management Policies 2006*. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Socioeconomics**

The proposed action would neither change local or regional land use, nor appreciably affect local businesses or other agencies. Implementation of the proposed project could have a negligible beneficial effect on some San Juan County businesses due to minimal increases in employment opportunities for the construction workforce and additional revenues for local businesses and governments generated from construction activities and workers. Any increases in workforce and revenue would be temporary and negligible in degree, lasting only as long as the project's construction. The project is unlikely to have a noticeable effect on park visitation since, despite the extended evacuation of the building, most visitor services would continue to be offered and the park's primary resources would remain open to public visitation. The proposed project would have only negligible effects on the socioeconomic environment. Further, such negligible effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of *NPS Management Policies 2006*. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Indian Trust Resources**

Secretarial Order 3175 *Departmental Responsibilities for Indian Trust Resources* requires that any anticipated impacts on Indian trust resources from a proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. Departmental responsibilities are identified in 512 DM §2. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal (and allotted) 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 four tracts within the main unit of Chaco Culture National Historical Park and four additional tracts in detached units of the park that qualify as Indian trust resources. The land in these tracts is used primarily for grazing, and all tracts remain unimproved. No tract is located within the development subzone of the park, and the nearest such tract to the visitor center is approximately one mile distant. Because the Indian trust resources within the park are not likely to be affected by any of the activities proposed in the visitor center project, the proposed project would have no more than negligible effects on Indian trust resources. Further, any such effects would not result in any unacceptable impacts; the proposed action is consistent with §1.4.7.1 of *NPS Management Policies 2006*. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Hazardous Materials in Interior Spaces**

Because the visitor center was constructed prior to 1978 (the year lead-based paint was banned for consumer use) and before 1989 when the Environmental Protection Agency imposed a ban on asbestos production and imports, it is assumed to contain these hazardous substances until proven otherwise. Lead compounds were historically an important component of many paints and were used extensively. Lead dust and chips are generated by mechanical disturbance of lead paint, such as grinding or sanding. Lead exposure by inhalation poses the greatest risk

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because lead fumes and fine dust are readily absorbed into the blood system. Most lead poisonings are the result of prolonged exposure, not a single event. Asbestos has been used extensively in a variety of construction materials including pipe and duct insulation, floor tiles, ceiling tiles, wall board, and roof and floor mastics because of its insulating and fire retardant properties. Asbestos presents a health hazard when particulates become airborne and are inhaled.

Federal regulation at Title 40 Code of Federal Regulations 261-272 established identification, handling, and disposal requirements for lead containing wastes. In 1992, programs were established to reduce exposure to lead, principally from paint. The Interim Final Regulations of Lead in Construction Standards (29 CFR 1926.62) issued by the Department of Labor, Occupational Safety and Health Administration established permissible exposure limits and associated health and safety requirements for workers involved in lead-based paint activities. The Environmental Protection Agency also has jurisdiction for setting standards for lead abatement and controls the handling and disposal of hazardous waste generated during a removal project.

The Environmental Protection Agency regulates asbestos as a hazardous waste under the Toxic Substance Control Act, the Comprehensive Environmental Response, Compensation, and Liability Act, and the National Emission Standards for Hazardous Air Pollutants. The Occupational Safety and Health Act also regulates asbestos in regard to worker safety in production and removal of asbestos. Training and notification are necessary for any employee handling asbestos, including sampling and removal. Required work practices are covered in the Construction Standard for the Asbestos Industry (40 CFR 1926.1101 or CFR Title 8 §1529).

Prior to construction, surveys and sampling would be conducted to identify, characterize, and quantify the existence of hazardous substances present in work areas and the extent to which these materials would be disturbed. Once the extent of lead and asbestos presence and the degree of disturbance is determined, a hazardous materials management plan would be developed to protect workers, the public, and the environment from exposure to lead and asbestos dust and particles. This plan would comply with Occupational Safety and Health Act and Environmental Protection Agency regulations for the handling and disposal of these materials.

Using prescribed tools and methods, demolition and removal of lead and asbestos materials would have negligible-to-minor short-term adverse effects on the safety of work crews. Potential adverse effects on park staff and visitors would be negligible. With proper handling, the potential for adverse effects on human health from hazardous materials in interior spaces would be only minor or less; therefore, there would be no unacceptable impacts and the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## **Environmental Justice**

Executive Order 12898 *General Actions to Address Environmental Justice in Minority Populations and Low-income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

The visitor center is open to all member of the public, and would continue to be so regardless of the alternative selected. Health, safety, and accessibility improvements would be realized by all visitors and employees, regardless of race, ethnicity, or income. Therefore, the proposed action

would not have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the U.S. Environmental Protection Agency's Environmental Justice Guidance (1998). Further, since no disproportionate health or environmental effects would take place, no unacceptable impacts would occur; the proposed action is consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

## ALTERNATIVES CONSIDERED

A total of six action alternatives and the no-action alternative were originally identified for this project. Of these, five of the action alternatives were dismissed from further consideration for various reasons as described later in this chapter. One action alternative and the no-action alternative are carried forward for further evaluation in this environmental assessment. A summary table comparing alternative components is presented at the end of this chapter.

### Alternatives Carried Forward

#### Alternative A – No-Action

Under the No Action alternative, current use of the Chaco visitor center/park headquarters would continue without significant changes to maintenance or operation of the facilities. No major rehabilitation or construction efforts would be undertaken. Ongoing repair activities would continue as components fail, although these repairs would not address the critical flaws inherent in the structure and its systems. This alternative would not remedy non-compliance with the Americans with Disabilities Act or National Fire Codes.

The roof would continue to leak, museum objects would continue to be at risk, and the electrical, HVAC, health and safety issues, and other deficiencies of the building would not be systematically remedied. Cracks in walls caused by foundation instability would continue to appear and worsen. The building would continue to be inefficient in terms of its function, energy use, and cost. There would be short-term fixes to some problems as they arise without any major actions or changes in course.

#### Alternative B – Completely Rehabilitate and Renovate the Visitor Center

This alternative consists of a complete rehabilitation and renovation of the park's visitor center within the existing building footprint that would meet professional standards and codes, including NPS standards for preservation and protection of museum collections. Construction would take between 12 and 18 months, during which time all administrative functions, visitor services, and physical property would be relocated from the existing building to alternative sites within the park. The project would have the following components and features:

- **Building Features** – The existing footprint of the building would remain substantially the same, retaining the existing building area (approximately 7683 square feet), though interior spaces would be reconfigured for efficiency and performance. The cracked concrete floor would be removed and re-poured. All existing roof-top equipment would be removed, and replacement equipment would instead be installed on the ground next to the building. The roof, itself, would be replaced. The building would be equipped with a modern climate control system, which would include heating, ventilation, and air conditioning (HVAC). Electrical service would be replaced and efficient lighting would be installed. A fire protection

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system for the entire building, consisting of smoke and heat detection alarms and sprinklers, would also be provided. New telephone and network lines would be installed. In an effort to “green the parks,” rehabilitation of the building would, to the extent possible, decrease reliance on non-renewable resources and approach the maximum attainable recycling of depletable resources. Passive solar heat would be incorporated into the design. The facility would have new energy-efficient doors, windows, and insulation throughout, and would be certifiable to LEED Silver standards. A security system would be installed to protect against unauthorized entry. Design improvements would provide fully compliant exits and accessibility, consistent with the Americans with Disabilities Act, National Fire Protection Association 101 Life Safety Code, the Uniform Building Code, and Occupational Safety and Health Administration standards.

- **Facility Use and Operation** – The visitor center would largely continue its current visitor services and park administration uses, with a number of changes being made to the building that would improve its overall functionality for visitors, cooperating association employees, and park staff. The building would provide office space; common meeting, work, and library areas; resource records storage; an emergency medical station; a law enforcement processing area; and equipment storage. The facility would continue to accommodate year-round visitor services, and would include an information desk, sales area for the Western National Parks Association, and staging areas for groups. A vestibule would provide protection from harsh weather, and the patio would continue to provide exterior interpretive space. Visitors who arrive after hours would benefit from a dedicated area outside the locked portions of the building where essential safety, resource protection, and interpretive messages are made available. Interior interpretive space would be reconfigured to improve visitor experience. This would allow for better circulation and enhanced education and interactive exhibits, such as a theatre showing the park film, new interactive exhibits, and both temporary and permanent displays. A separate entrance door to the building’s theater and classroom areas would enable park staff to secure the sensitive exhibits area during evening programs, reducing the risk of vandalism or theft of museum objects.
- **Temporary Administrative Offices** – Temporary office spaces would be created in existing park housing (temporarily converted for such use), and in existing maintenance buildings suitable for office space. Locks would be re-keyed as necessary and temporary network and phone lines would be strung. What office furniture, equipment, files and supplies would be needed for a 12 to 18-month period would be moved to these locations. Other physical property would be stored at alternate locations within the park.
- **Temporary Visitor Contact Station** – During the construction period, temporary buildings (trailers and/or yurts) would be installed at the edge of the visitor center’s public parking lot to serve visitors. Temporary electrical service and telecommunications lines would be routed to these structures as needed. Appropriate heating and cooling systems would be installed. All temporary structures and services would be removed following completion of construction. If a yurt is purchased for this purpose, it would either be retained by the park for future use, or sold or donated according to established procedures. A rented trailer would be removed from the site once construction activities are completed and once the visitor center is again opened to the public.
- **Exhibits Protection, Removal and Storage** – Before major construction activities begin, the building would be closed to the public and visitors would instead be directed to the temporary visitor contact station. Exhibit components that do not require removal would be covered and protected in place. All other exhibit and display components would be disassembled and removed from the building. What is not retained for use at the temporary visitor contact station would be stored appropriately in temporarily-converted park housing

or in spaces within the park's maintenance area. Museum objects would be removed from the building and transported for temporary storage in the park curation facility under the supervision of the park's curatorial and cultural resources staff.

- **Construction Operations** – Construction activities would be restricted to the approved and marked construction zone, and to existing paved roads for transportation of personnel, equipment, and supplies. The existing employee parking area (within the construction zone) would be used for construction staging. Materials storage would occur only where approved within the construction zone. If needed and appropriate, park management may approve temporary materials storage in the park maintenance area. Construction activities would occur only during daylight hours, according to a pre-approved schedule. All construction activities would be subject to approved mitigation strategies to protect park resources.
- **Site Preparation** – In accordance with recommendations made by professional engineers during a geotechnical evaluation of the visitor center site, the existing building foundation would be stabilized and reinforced. Soils would be remediated to eliminate soil pipes that have formed beneath the visitor center. Improved site drainage would help to prevent future soil piping and transport from occurring.
- **Utilities** - The visitor center would be reconnected to existing utility lines currently serving the building, including water, sewer, electric, gas, phone, and network IT connections. Reconnecting utilities would entail minor excavation work within a short distance of the building footprint. Utility connection procedures would be determined through the building design process.
- **Site Restoration and Revegetation** – Existing vegetation in the project area would be preserved to the extent possible; however, no plant species of special concern exist in the project area and existing vegetation is considered replaceable. All previously-vegetated areas disturbed by construction activities would be recontoured and revegetated in a manner consistent with the native landscape using only approved native seed sources. Native vegetation, rocks, or other natural features would be used as appropriate. Landscaping components disturbed by construction would be restored or replaced according to approved plans. All remaining construction materials and debris would be removed from the site following construction and site restoration.

Figure 2 – Visitor Center Area Map



Imagery: New Mexico 1-m Imagery - 2005 NM DOQQ Collection

## Mitigation Measures

The following mitigation measures were developed to minimize the degree and/or severity of adverse effects and would be implemented during construction of the action alternative, as needed:

- Construction limits would be identified and clearly marked with construction fencing, tape, flagging, snow fencing, or some similar material. The contractor would be responsible for ensuring that all work and all contract employees stay inside the construction limits. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting activities beyond the construction limits. Temporary structures such as erosion control fencing may be placed outside the area of potential effect only after explicit approval from park management to ensure the protection of natural and cultural resources and to avoid conflicts with visitors and park operations. In addition, the National Park Service would ensure that all contractors and subcontractors are informed that damage to resources outside the scope of work is subject to prosecution, fine, restitution costs, and other penalties. The NPS project engineer would ensure that the project is confined within the parameters established in the compliance documents, and that mitigation measures are properly implemented.
- Construction vehicles and equipment, as necessary, would be confined to the designated construction area, and existing roads (for transportation purposes only). Vehicle and equipment movement over the area would be minimized to reduce soil compaction and damage to vegetation, geologic features, and other resources. Equipment staging would occur only within the visitor center's employee parking lot, or other specifically approved locations. Fueling would occur only as needed within the park, and only in areas specifically designated for that purpose. Daily maintenance of all machinery and vehicles would be conducted only in equipment staging or other approved areas. Any spill of hazardous materials, fuel, etc., would be immediately cleaned up and reported to park management. Hazardous materials clean-up kits would be available at the staging area and on any fuel and oil trucks. Equipment would be checked daily to identify and repair any leaks. Storage of hazardous construction materials would only be allowed where specifically authorized.
- All demolition debris, including visible concrete and metal pieces, would be hauled from the park to an appropriate disposal location, and not be allowed to accumulate unnecessarily. All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion. No materials would be moved from the park during this project, unless specifically authorized or when clearly identified as items for disposal. Any asphalt or concrete surfaces damaged due to work on the project would be repaired.
- Though no blasting is contemplated as part of the project, concern over construction-related vibrations (from pounding, drilling, large truck movement, etc.) prompted park managers to consider the effects of those vibrations on nearby geologic formations. Prior to beginning construction, design engineers would be required to evaluate significant construction-related vibrations and any potential effects that such vibrations could have on nearby geologic features—in particular, the canyon walls that are susceptible to fracture and mass wasting, and the underlying talus slope. Design engineers would be required to submit a vibration management plan in order to minimize significant vibration-generating activities during the visitor center's construction and avoid resource damage. This plan would be subject to review and approval by the National Park Service's Geologic Resources Division. At minimum, the plan would evaluate and characterize significant expected vibration sources,

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establish measurable geologic resource impact thresholds, vibration monitoring techniques and protocols, and action procedures for any non-conformance with established thresholds.

- Contractors and subcontractors would ensure that construction crews and supervisors are aware of hantavirus exposure risks associated with rodents inhabiting the visitor center. Supervisors and crews would be provided with basic information regarding the transmission of hantavirus to humans, associated symptoms of illness, health implications of exposure, and precautionary measures that should be taken to mitigate exposure risk. To reduce exposure risk, work crews would take appropriate steps to minimize the transport of fugitive construction dust, residues, etc., through the air, and would ensure that no person is subjected to airborne particle releases that have a high potential for containing hantavirus (e.g. areas of the roof or walls that have been determined to contain mouse nests). Crews would also be made aware of the possibility of discovering lead, asbestos, or other materials potentially harmful to human health, and would be instructed on how to identify and handle those materials in a manner that would not expose humans or the environment to those materials beyond acceptable limits; to help meet this mitigation measure, contractors and subcontractors would be responsible for ensuring compliance with applicable laws, regulations, and guidelines.
- Work crews and supervisors would be required to meet with park cultural and natural resource specialists before starting work, so that they can be directly informed about how working in a unit of the national park system differs from other construction areas, and so that all construction personnel are fully informed of their responsibilities. The special sensitivity of the park's values, pertinent laws or regulations, and appropriate housekeeping practices would be discussed, along with information about acceptable conduct within the national park setting. NPS staff would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties. Contractors and subcontractors would also be instructed by the park's resource specialists on procedures to follow in case previously unknown paleontological or archeological resources, or human remains, are uncovered during construction. Similarly, construction personnel would be informed about special status species and what actions should be taken if a special status species is encountered.
- A National Park Service cultural resources specialist would be on site during project implementation (i.e. whenever ground disturbance takes place) to determine appropriate management actions should undocumented cultural resources be discovered. Should construction unearth previously undiscovered archeological resources, work would be stopped and the park would consult with the state historic preservation officer/tribal 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. Equipment and materials staging areas would also avoid known archeological resources.
- The contractor or subcontractor would be responsible for ensuring that endangered, threatened, or sensitive species are protected according to the Endangered Species Act and other applicable laws. To the extent possible, an NPS natural resources specialist would be available during project implementation. If a previously unknown or undiscovered endangered, threatened, or sensitive species is discovered in the project area, all work would cease until the park staff evaluates the project's effect on the discovery. If required, a Section 7 consultation with the U.S. Fish and Wildlife Service would be conducted, and any needed modification of the construction contract would be determined. If any wildlife (lizards,

rodents, snakes, etc.) are found, the contractor would contact a park biologist and ask for guidance or assistance in its removal. The contractor would be required to maintain strict trash control so that no wildlife is attracted to the project area. No food scraps would be discarded or fed to wildlife.

- To mitigate effects on unknown paleontological specimens (fossils) during construction, a park resource specialist would monitor all ground disturbing activities. Should any fossils be discovered during construction of the visitor center, all construction activities would be halted until the materials can be analyzed and recovered. The park resource specialist would evaluate the significance of those discoveries and take such steps as necessary to protect and preserve fossil resources in accordance with NPS policies for paleontological resources. Any paleontological specimens that are to be retained permanently are subject to National Park Service policies for museum objects.
- To minimize the amount of ground disturbance, staging and stockpiling areas would be located in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction. Existing vegetation at the site would not be disturbed to the extent possible. Because disturbed soils are susceptible to erosion until revegetation takes place, standard erosion control measures such as silt fences and/or sand bags would be used to minimize any potential soil erosion. Silt fencing fabric would be inspected weekly or after every major storm. Accumulated sediments would be removed when the fabric is estimated to be approximately 75 percent full. In an effort to avoid introduction of exotic plant species, no hay bales would be used. Hay often contains seed of undesirable or harmful alien plant species. Therefore, on a case-by-case basis the following materials may be used for any erosion control dams that may be necessary: rice straw, straws determined by NPS to be weed-free (e.g. Coors barley straw or Arizona winter wheat straw), cereal grain straw that has been fumigated to kill weed seed, and wood excelsior bales.
- Recontouring and revegetation of disturbed areas using park-approved native seed stock (if possible, from genetic stocks originating in the park) would take place following construction. Revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species. Soils used would be from within the project area, unless specifically authorized by park management. The use of conserved topsoil would help preserve micro organisms and seeds of native plants. The topsoil would be re-spread in as near as original location as possible, and supplemented with scarification, mulching, seeding, and/or planting with species native to the immediate area. This would reduce construction scars and erosion. All disturbed areas would be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed. Weed control methods would be implemented to minimize the introduction of noxious weeds. The principal goal is to avoid interfering with natural processes.
- The park would take appropriate measures to ensure that the effects of construction activities are kept to a minimum and do not diminish the value of visitors' experiences while at the park. The park would communicate construction plans and activities as early as possible on its website, over the park's traveler's information system (TIS) AM radio broadcast, and through various informational materials (signs, flyers, kiosk messages, etc.) that would be made available to affected visitors. Visitors would learn about why the project is being constructed, specific design plans and features, sustainable design improvements, and updates on the progress of construction. The park would strive to keep available as many programs and other visitor services as possible at normal levels, though some may have to be altered or scaled back somewhat. All key park sites would be open to the public as usual. A temporary visitor contact station would provide the most essential visitor

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services and key interpretive information, as well as a first aid/comfort station. Visitors would have full access to bathrooms and potable water as usual. Temporary facilities would be climate controlled and accessible. Campgrounds would remain open, and are expected to be at full capacity throughout the construction period.

- To mitigate potential conflicts with park visitors, a number of measures would be taken. To minimize effects of construction on the natural ambient soundscape and night skies, all construction operations (including machinery use) and traffic within the park would be strictly confined to hours determined by park management to be reasonable. Activities would occur during daylight hours only, and not within the quiet hours established for the park campground. All equipment would be appropriately muffled, and shut down when not in use. Quiet construction techniques would be selected over louder processes whenever possible and reasonable. Fugitive dust generated by construction would be controlled by spraying water on the construction site, if necessary. Work crews would be required to provide their own portable restroom facilities; public restrooms would not be shared with construction crews. There may be some limited occasions when construction work may require a short and temporary road closures (e.g. for materials delivery), but the flow of vehicle traffic on the main park road would be maintained during the construction period. All efforts would be made to reduce road closures as much as possible and to alert park staff as soon as possible if delays longer than normal are expected. Visitors would be informed of construction activities and delays via the park's TIS radio system, the park's website, and through other forms of communication within the park.
- To the extent possible, the effects of construction activities on park operations would be avoided or minimized. Desirable features of the existing visitor center building and its exterior surroundings would be removed if at risk of damage, or preserved and protected in place if removal is not practical. In particular, stone exhibit walls would be protected in place if at all practicable. Remaining landscaping features would be protected and avoided, unless removal and/or replacement are part of the approved building and site design. Museum objects and records would be carefully removed from the exhibits area and relocated to a secure, climate-controlled storage area by park curatorial and cultural resources staff.
- In the 500-year flood event, flood waters in the visitor center are estimated to reach two feet in depth around the building, according to the park's General Management Plan. Since all the museum objects are located in reinforced glass cases well above ground level, the park has concluded that there is some likelihood of effect but that the likelihood of damage to the museum objects is not high. In an effort to minimize hazards to human life and property, the park will prepare a flood preparedness and evacuation plan. Park staff will be familiar with the plan and be able to react quickly to flooding conditions by informing the public of appropriate actions.

## Alternatives Considered and Dismissed

The following five alternatives were considered for project implementation, but were ultimately dismissed from further analysis. Reasons for their dismissal are provided in the following alternative descriptions.

- **Sequential Upgrades to Existing Building and its Mechanical Systems** – This alternative would address the visitor center's structural and mechanical systems problems in a staggered manner—one at a time and within programmed funding. The existing building would be preserved and its numerous structural deficiencies remediated. Aging and inefficient mechanical systems would be repaired or replaced one by one. This alternative

was early perceived to be unattractive because: the cumulative costs associated with multiple projects implemented independently would be significantly greater than if addressing all facilities improvement needs in one comprehensive project; certain compromises in the quality and function of the improvements would result due to the inherent constraints of retro-fitting various components; and the disruption to park operations and visitor services would be more protracted and less predictable due to the sequential nature of multiple projects. The various problems associated with this alternative provided the incentive to conduct a value analysis study for the visitor center's rehabilitation which, in part, helped to identify the proposed project discussed in this environmental assessment. During the value analysis study, this alternative emerged as the least preferred alternative in every factor of the evaluation. It would not address health and safety problems, reduce building maintenance needs, or deal with operational deficiencies, and so was dismissed from consideration.

- **Complete Rehabilitation, Renovation and Expansion of Existing Building** – This alternative would have many similarities with the proposed project, with the most notable difference being the expansion of the building footprint by between 600 and 1200sf based on an architectural programming study of required functionality and space requirements. While this alternative would have offered more opportunity for benefits, the recommended alternative from the value analysis study offered a much higher ratio of incremental benefits to incremental cost than the other alternatives considered. (The recommended alternative—which is also the proposed project—was chosen on the basis on this benefit to cost analysis.) This alternative was dismissed from consideration due primarily to its lower ratio of incremental benefits.
- **Partial Replacement of Existing Building** – This alternative would replace the south “half” of the existing building with a reconstructed administrative area to address deficiencies based on the architectural programming study. The north half of the building containing existing public spaces would be retained. In the course of the value analysis study, the cost of this alternative was projected to be approximately twice that of the recommended alternative. The study team concluded that the value of any additional benefits this alternative offered did not merit the additional cost, and so it was dismissed from consideration.
- **Total Building Replacement on Existing Site** – In this alternative, the existing visitor center building would be demolished and a brand new visitor center would be built in its place on the existing site. This alternative was dismissed from consideration during value analysis study and was not carried forward through the “choosing by advantages” decision-making process. This alternative was eliminated because the cost was expected to range from *somewhat* to *much* higher than the other alternatives considered, the advantages offered over other alternatives were nominal, and the probability of accomplishing this alternative in a timely manner to address urgent needs was perceived to be very low.
- **Alternative Visitor Center Location** – In this alternative, the park would abandon and restore the existing visitor center site and either: 1) construct a new visitor center in another location within the park, 2) construct a new visitor center outside of the park boundary, or 3) purchase or rent an existing facility outside of the park. Several factors made this option impractical and undesirable from a park operations and management perspective. The infrastructure (water, power, sewer, telecommunications, etc.) required to support a new visitor center in another location within the park does not exist; it would have to be built from scratch at a considerable cost of time, money, and effort. In addition, new effects on park resources could not be avoided in a scenario where currently undeveloped areas of the park are disturbed and developed. To relocate administrative and visitor services functions

outside the park (variations 2 and 3 above) also would not meet park management and operations needs. Because of its remote and sometimes difficult-to-reach location, the park relies on park protection and visitor services staff to reside in park housing within the park's residential area. To move the visitor center outside of the park boundary—to a nearby community or on vacant land acquired for new construction—would more often leave the park unattended, putting its significant resources at greater risk of theft or damage, and would result in decreased visitor service levels. Furthermore, it is believed that this alternative would cost significantly more than other alternatives considered, and would not address the visitor center's imminent public health and maintenance issues in an expedient and reasonable timeframe. The park considered this alternative in addition to those evaluated during the value analysis study, but dismissed it because it would not meet park operations and management needs.

**Figure 3 – Visitor Center Area from Above**



Chaco Culture NHP Visitor Center/Park Headquarters Area from Above (NPS photo)

## Alternative Summaries

Table 1 summarizes the major components of Alternatives A and B, and compares the ability of these alternatives to meet the project objectives (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the following table, Alternative B meets each of the objectives identified for this project, while the No Action Alternative does not address all of the objectives.

**Table 1 – Alternatives Summary and Project Objectives**

Alternative A – No Action	Alternative B – Rehabilitate Visitor Center
<p>Use of the existing park visitor center would continue. Maintenance would be done within existing budget and staffing realities; repairs or replacement would take place if a building component fails completely. The roof would continue to leak, cracks due to soil movement would remain and potentially worsen, the electrical, heating, and cooling systems would continue to operate poorly, and both visitors and staff would be exposed to health and safety risks. The building would not have required fire detection and suppression. The park's museum collections would continue to be at risk of degradation, destruction and loss. Existing functional space inefficiencies would continue. Restrictions on accessibility would continue. Energy and resource use would remain virtually unchanged.</p>	<p>The visitor center would be completely rehabilitated and renovated to meet professional standards and codes, including NPS standards for preservation and protection of museum collections, Occupational Safety and Health Administration (OSHA) standards, Uniform Building Code, and National Fire Codes. Administrative and visitor service functions would be temporarily relocated for a 12 to 18-month period. Soils and problems with the building foundation would be remediated and rodent-proofing could be accomplished. Interior spaces would be reconfigured for efficiency and performance. Heating and cooling systems would be more effective and energy efficient. Low-flow appliances and other efficiency improvements would be installed (doors, windows, insulation, lighting, etc.)</p>
Meets Project Objectives?	Meets Project Objectives?
<p>No. Continuing the existing conditions would not provide for an employee work area or visitor contact area that meets current health and safety recommendations in terms of the existing building's structural deficiencies and pest problems. The building, its valuable items, and the staff and visitors who use it would not be protected by fire detection and suppression systems. The park's museum collections would not meet management standards. Repairs would be costly, would not address the critical flaws inherent in the structure and its systems; therefore, the building's design and function would not meet current needs. Compromises in visitor comfort would not be remedied. Reductions in energy and water consumption would not be realized. Repairs could not be accomplished simultaneously and would be hard to predict, creating ongoing disruption to visitors and employees. This alternative would not remedy non-compliance with the Americans with Disabilities Act and National Fire Codes.</p>	<p>Yes. Changes to the building would improve its overall functionality for visitors and staff and all health and safety deficiencies would be corrected. It would correct the building's structural deficiencies and underlying soil problems. The project would provide appropriate fire detection and suppression for the protection of museum collections and other assets. It would reduce energy and water consumption and utilize environmentally sustainable building design and construction practices. It would accomplish needed structural, mechanical, and other improvements simultaneously, in order to avoid compromises in the design, function, and costs of the park's visitor center. A rehabilitated and remodeled visitor center would provide a pleasant and comfortable visitor experience to all of the park's visitors, including providing access consistent with the Americans with Disabilities Act.</p>

Table 2 summarizes the anticipated environmental effects for alternatives A and B. 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 effects.

**Table 2 – Environmental Impact Summary by Alternative**

Impact Topic	Alternative A – No Action	Alternative B – Preferred Alternative
<b>Archaeological Resources</b>	No effects would be expected on known archaeological resources as a result of construction activities not taking place.	No effects would be expected on known archaeological resources, though ground disturbance would introduce the possibility of discovering previously unknown archaeological materials. Work would be halted and established procedures would be followed if any cultural materials are discovered. Damage to known archaeological sites from construction-related vibrations would not be expected. A vibration management plan would mitigate the risk of adverse effects.
<b>Museum Collections</b>	Direct, minor-to-moderate, short- and long-term adverse effects would be expected on museum collections resulting from the park’s collections not meeting NPS museum management standards. Deficiencies would continue in climate control, fire detection and suppression, water hazard avoidance, pest control, and collections security.	Direct, minor short-term beneficial effects would be expected on museum collections resulting from the temporary relocation of museum objects and records to a secure, climate-controlled collections storage facility within the park.  Direct, minor-to-moderate long-term beneficial effects would be expected on museum collections resulting from the park’s collections meeting critical NPS museum management standards. Improvements made to the building’s climate controls, fire detection and suppression, water hazard avoidance, pest control, and collections security would have lasting benefits for the protection of park’s museum collections.
<b>Geologic Resources and Soils</b>	No effects would be expected on non-soil geologic resources as a result of construction activities not taking place.  Direct, minor-to-moderate short- and long-term adverse effects would be expected on soils resulting from continued soil erosion and transportation. Soil piping conditions would be expected to worsen, potentially leading to sinkhole formation and further instability, deformation, and cracking of the building foundation.	No effects would be expected on non-soil geologic resources resulting from construction-related vibrations or other actions. Construction activities that would produce vibrations of a magnitude or quality that could disturb or damage non-soil geologic resources would not be permitted.  Direct, minor-to-moderate short- and long-term beneficial effects would be expected on soils resulting from the remediation of soil erosion and transportation problems. Soil piping conditions would not be expected to re-emerge within the lifecycle of the rehabilitated visitor center. Sinkhole formation would not occur and the visitor center foundation would not experience cracking, deformation, or other stability problems.

Impact Topic	Alternative A – No Action	Alternative B – Preferred Alternative
<b>Floodplains</b>	Direct and indirect, mostly minor, short- and long-term adverse effects on floodplains would be expected, resulting from the continued occupation of the Gallo Wash 500-year floodplain.	Direct and indirect, mostly minor, short- and long-term adverse effects on floodplains would be expected, resulting from the continued occupation of the Gallo Wash 500-year floodplain.
<b>Energy Use, Conservation Potential and Sustainability</b>	Direct, minor-to-moderate short- and long-term adverse effects would be expected on energy use, conservation potential and sustainability resulting from energy-inefficient heating, air conditioning, and ventilation systems; retention of high-flow water appliances; inadequate building insulation; inefficient doors, windows, and glazing treatments; and non-conversion to renewable energy sources.	<p>Direct, negligible-to-minor short-term adverse effects would be expected on energy use, conservation potential and sustainability resulting from the additional consumption of energy required for demolition and construction activities. The effect would be lessened by a focus on materials recycling, use of non-toxic materials and supplies, and conservation construction techniques. Effects from the relocation of administrative and visitor services functions would be difficult to determine, having both savings due to evacuation of the existing building and costs associated with the relocation activities themselves.</p> <p>Direct, minor-to-moderate long-term beneficial effects would be expected on energy use, conservation potential and sustainability resulting from installation of energy-efficient heating, air conditioning, and ventilation systems; selection of low-flow water appliances; improving building insulation; installing energy-efficient doors and windows; using proper glazing treatments; and conversion to renewable sources for a significant part of the visitor center's energy needs. The rehabilitated and renovated visitor center would be Leadership in Energy and Environmental Design (LEED) Silver certifiable.</p>
<b>Health and Safety of Employees and the Visiting Public</b>	Direct, minor-to-moderate short- and long-term adverse effects would be expected on the health and safety of employees and the visiting public resulting from continued risk of disease transmission by rodents and other pests; job hazards associated with maintenance and use of failing building components and systems; lack of fire detection and suppression; sub-standard building security; exposure to roof leakage; and inefficient climate controls.	<p>Direct and indirect, negligible-to-moderate adverse and beneficial short-term effects would be expected on the health and safety of employees and the visiting public resulting from evacuating the visitor center. Employees and visitors would avoid the health and safety problems inherent in the existing building, while potentially experiencing fresh risks and hazards from new settings and even unknown sources.</p> <p>Direct, minor-to-moderate long-term beneficial effects would be expected on the health and safety of employees and the visiting public resulting from the elimination of rodents and other potentially disease-carrying pests from the building; reduction in job hazards associated with maintaining and repairing failing building components and systems; addition of a fire detection and suppression system; and installation of a more reliable building security system. Other beneficial effects include a roof that doesn't leak, and a functional HVAC system that improves indoor comfort.</p>

Impact Topic	Alternative A – No Action	Alternative B – Preferred Alternative
<b>Visitor Use and Experience</b>	Direct, minor-to-moderate short- and long-term adverse effects would be expected on visitor use and experience resulting from inaccessible building features; an aesthetically unpleasant and uncomfortable indoor environment; and a lack of modern amenities and visitor services that the public has come to expect and demand at a national park visitor center.	Direct, negligible-to-minor short-term adverse effects would be expected on visitor use and experience resulting from the temporary relocation of visitor services from the existing visitor center building. Effects would include limited visitor services reductions, venue changes, and disruptions associated with construction activities.  Direct, minor-to-moderate long-term beneficial effects would be expected on visitor use and experience resulting from improvements in accessibility; building aesthetics and comfort; and amenity improvements that the public has come to expect and demand at a national park visitor center.
<b>Park Operations</b>	Direct, minor-to-moderate short- and long-term adverse effects would be expected on park operations resulting from retention of inefficient and out-of-date office features and functions; ever-increasing demands on maintenance and administrative staff and park financial resources to support failing building components and systems; inability to provide desired visitor services within the existing building; non-attainment of federal energy efficiency and conservation goals; and inability to adequately protect park resources in the visitor center and throughout the park. Notably, this alternative would also be expected to have an adverse effect on the ability of park managers and staff to carry out the requirement of the NPS Organic Act.	Direct, minor-to-moderate short-term adverse effects would be expected on park operations resulting from planning for and financing a major rehabilitation and renovation project; temporary relocation of park administration and visitor services functions; and subsequent relocation back to the visitor center building—all while needing to conduct park business as usual.  Direct, minor-to-moderate long-term beneficial effects would be expected on park operations resulting from new efficiencies in building layout and design; technological enhancements; decreased demand on maintenance and administrative staff for dealing with building maintenance and repairs; lower maintenance costs; ability to provide desired visitor center services; attainment of federal energy efficiency and conservation goals; and the ability to adequately protect park resources in the visitor center and throughout the park. This alternative would best enable park managers and staff to carry out their responsibilities under the NPS Organic Act.

## 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 the environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's §101, "to the end that the Nation may -

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

Alternative A, *No Action*, only partially meets the above six evaluation factors (goals) because it would not meet health and safety standards in terms of structural deficiencies, rodent problems, fire safety, and accessibility. Basic visitor services and administrative functions would still be provided; the existing facility would continue to offer visitors a base from which to experience the park and its resources, and would provide park staff with the administrative space needed to protect, preserve, and interpret park resources. However, this alternative's maintenance, environmental, and cost burdens—as well as its health and safety risks, productivity constraints, and less aesthetically and culturally pleasing surroundings—fail to meet goals 2, 3, and 6 as expressed in §101. Therefore, this alternative would not be consistent with national environmental policy.

Alternative B is the **environmentally preferred alternative** because it best addresses the six evaluation factors expressed in §101 of NEPA. Basic visitor services and administrative functions would still be provided through the construction period, but in temporary facilities away from many of the existing facility's health and safety threats; the temporary facilities would continue to offer visitors a base from which to experience the park and its resources, and would provide park staff with basic administrative space. In the long term, the visitor center would provide a healthful, safe, pleasing, energy-efficient, and productive space for park staff, volunteers, and cooperating association employees—without the existing maintenance and operational cost burdens; as a result, it would leave the park better equipped to protect, preserve, and interpret the park's resources. Current and future generations of park visitors would benefit from the safer, more accessible, and more aesthetically-pleasing experience. This alternative meets goals 1, 4, and 5 of §101 to a greater extent than Alternative A, while also meeting goals 2, 3, and 6. Therefore, it would better promote the national environmental policy.

Because it meets the purpose and need for the project, the project objectives, and is the environmentally preferred alternative, alternative B is also recommended as the **National Park Service preferred alternative**. For the remainder of the document, alternative B will be referred to as the preferred alternative.

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# ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the proposed project. Topics analyzed in this chapter include: archaeological resources, museum collections; geologic resources and soils; energy use, conservation potential and sustainability; health and safety of employees and the visiting public; visitor use and experience; and park operations. Direct, indirect, and cumulative effects, as well as impairment are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

- **Type** describes 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 and occurs in the same time and place.
  - *Indirect*: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact will occur. Are the effects site-specific, local, regional, or even broader?
- **Duration** describes the length of time an effect will 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.

## Cumulative Effects

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), 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" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and preferred alternative.

Cumulative impacts were determined by combining the impacts of 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, if applicable, the surrounding region. The geographic scope for this analysis

includes elements mostly within the park's boundaries, while the temporal scope includes projects within a range of approximately five years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, with future projects listed last:

- **Pueblo del Arroyo Backfill and Drainage Repair, 2005:** This project involved the completion of backfill and drainage repair at Pueblo del Arroyo which began in 2004. Prior to backfilling, areas of wall in poor condition were treated using routine mortar joint repointing and eroded stone replacement. Backfill materials were hauled to the sites using a temporary access, which was later rehabilitated and closed.
- **Rehabilitation of Upper Lift Station, 2005:** Work involved enclosing all lift station pumps and controls. The work included construction of an underground concrete pump house and removal of the existing 10' diameter corrugated metal pipe structure and steel cover. All plumbing remained the same but all electrical controls, wiring and conduit were brought up to code. The new structure was built in the same footprint as the existing structure.
- **Chip Seal and Stripe Main Park Road, 2005:** This road repair project consisted of pavement patching, bituminous seal and cover aggregate (chip seal), pavement striping, and associated work. All of the work was contained within the existing road easement, and none of the activities was extend beyond the areas of previous disturbance from the original road construction.
- **Peñasco Blanco Trail Emergency Maintenance, 2005:** This project documented emergency repairs to the Peñasco Blanco Backcountry Trail and re-routes completed between October 19 and 24, 2005. The sections requiring emergency stabilization were all areas of evanescent water flows following a precipitation event.
- **Above-ground Storage (AST) Secondary Containment Project, 2006:** A concrete stem wall was constructed around the AST enclosure and fuel pumps, without ground disturbance. The design incorporated a galvanized drain to allow maintenance personnel to remove accumulated rainwater. Electrical upgrades were also required.
- **Replacement of Kin Kletso Composting Toilet with Vault Toilet, 2008:** The existing structure was replaced with an ADA-accessible prefabricated building in the same location. The project required some ground disturbance and a slightly wider footprint within the Chaco Wash 100-year floodplain.
- **Pueblo Bonito Sinkhole Investigation and Repair, 2008:** An investigation of the nature and extent of a sinkhole at Pueblo Bonito was carried out in partnership with the University of New Mexico, Department of Anthropology. Test excavations were undertaken in order to determine the proper treatment of a sinkhole in order to avoid and minimize adverse effects on cultural features.
- **General Management Plan Amendment, 2008 to 2011:** This project focuses on preparing an amendment to Chaco's GMP that will: define the park's visitor experience in both qualitative and quantifiable terms; calculate a carrying capacity for the park; and propose strategies to maintain the visitor experience. A carrying capacity study will prepare the park to deal with these potential changes prior to their effects being felt.
- **Curatorial Facility Expansion and Maintenance Facility Replacement, 2009:** This project will replace a modular collections storage building with a more secure and accessible facility, joined under the same roof as the maintenance office building. The unit will be used primarily to store a collection of large prehistoric beams and other architectural elements. The park's growing natural history collection will also be stored in the expanded area.

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- **Infrastructure Renewal Projects, multi-year, beginning in 2009:** Eleven individual projects comprise this comprehensive infrastructure renewal effort. These planned work projects are independent of the proposed visitor center rehabilitation project:
    - **Gallo Campground Septic Field Replacement, 2009:** Waste previously handled by the campground septic system will instead be treated at the park's wastewater treatment plant. A small pressurized system with a 2" forcemain will be constructed to transport sewage to the housing area wet well. From there, it will be pumped to the treatment plant by the primary lift station. After the system is operational, the two existing campground leach fields will be decommissioned and septic tanks removed.
    - **Gallo Campground RV Dump Station Repair and Rehabilitation, 2009:** Two 500-gallon septic tanks serving the campground's RV dump station will be excavated and replaced with one 2000-gallon tank in the same location. In conjunction with the Gallo Campground Septic Field Replacement, the tanks will be plumbed into the sewage handling system for the campground.
    - **Gallo Campground Water Line Replacement, 2009:** This project will replace 6,000 linear feet of 30- to 50-year-old underground PVC water lines with 80 PVC pipe to provide reliable potable water to the campground. The new lines will be relocated in an adjacent alignment away from archaeological sites. This project will be constructed in conjunction with the campground septic field replacement.
    - **Water Tank Replacement, 2009:** The 75,000-gallon steel mesa-top water tank will be repaired, rehabilitated, or replaced in the same location. The tank provides water and pressure for flushable toilets/comfort stations throughout the park, and serves park fire suppression needs through hydrants.
    - **Propane Line Replacement, 2009:** This emergency project will replace 3,600 linear feet of propane gas line because of widespread leakage of the existing galvanized steel pipe. The gas lines serve more than half of the park's facilities, including the visitor center, campground restrooms, water supply and well house, facilities shop, and sixteen park residences. Existing lines will be replaced with polyethylene pipe and new meters will be installed.
    - **Gallo Wash Campground Flood Control Feature Repairs, 2009:** This project will repair and maintain the erosion control features—specifically the masonry drop structures, dikes, and gabions—that provide flood control to the park's only campground and primary entrance road. Built in the 1950s, these structures have not been routinely maintained.
    - **Telephone Line Deficiency Corrections, 2010:** This project will replace 3,400 linear feet of buried phone lines with 2¼ inch cable within the same telephone system footprint. The existing lines do not meet the capacity needs of the park and have experienced service failures. Emergency fixes have been made, with a temporary line left unburied and exposed. The conduit for the phone lines will be located in the same trench as the new propane lines. All phone lines will be buried.
    - **Potable Water System Valve and Meter Replacement, 2010:** The park will replace eighteen potable water system valves and meters servicing the maintenance complex and housing area buildings. Repair of the valves and meters is not warranted due to the level of deterioration and valve stem breakage.
    - **Water Tank Road Maintenance, 2010:** This project will clean out culverts, add and compact road base, and grade subsections of the park's Water Tank Road.

- **Visitor Center Area Drainage Rehabilitation, 2010:** This project will correct serious erosion and soil piping between the visitor center and the main park loop road. At the end of a two-foot-diameter culvert, several rock gabions and filter fabric sections have failed. The drainage is beginning to undermine the main park loop road and intersection near the visitor center. A new 100-ft section will be added to the existing culvert and the failed erosion control features will be removed.
- **Maintenance of Sandstone Masonry Retaining Walls, 2010:** This project will provide cyclic maintenance on a seven-year cycle for 1200 linear feet of four-foot-high sandstone block retaining walls in the maintenance area.
- **Front Country Trail Upgrade, 2009 to 2013:** This project involves the application of compacted gravel to existing trails in order to provide a hardened all-weather surface.

## Impairment

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

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

1. necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. key to the natural or cultural integrity of the park; or
3. identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, 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.

## Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Park Service applies a standard that offers greater assurance that impairment will not occur by avoiding unacceptable impacts. These are impacts that fall short of impairment, but are still not

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acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

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

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with
  - park programs or activities, or
  - an appropriate use, or
  - the atmosphere of peace and tranquility, or
  - the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park.
  - NPS concessioner or contractor operations or services. (NPS 2006)

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

## Archaeological Resources

### Intensity Level Definitions

Chaco Culture National Historical Park was established to preserve and protect archeological resources associated with the prehistoric Chacoan culture in the San Juan Basin and surrounding area for the benefit and enjoyment of the public and for research purposes. Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Archeological resources have the potential to answer, in whole or in part, such research questions. The methodology used for assessing impacts on archaeological resources is based on the degree to which the alternatives under consideration would affect the physical features for which the park's associated archaeological sites are significant. The thresholds for this impact assessment are as follows:

**Negligible:** Impact is at the lowest levels of detection—barely measurable, with no perceptible consequences 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 §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 §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 §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 Alternative A (No-Action Alternative)**

The no-action alternative would have no effect on known archaeological resources; the visitor center would not be rehabilitated and remodeled, so no activities resulting in ground disturbance or construction-related vibrations would occur.

*Cumulative Effects:* Cumulatively, this alternative would have no effect on known archaeological resources when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The no-action alternative would result in no impacts on archaeological resources because no construction activities would be conducted and no potential for site disturbance would result. As such, this alternative would not contribute to any cumulative disturbance of archaeological resources, when considered with other past, present, and reasonably foreseeable future actions. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would have no effect on known archaeological resources. The entirety of Chaco Culture National Historical Park has been surveyed for archaeological materials, revealing a great number of archaeological resources throughout Chaco Canyon and surrounding areas, including sites located in areas near the visitor center. No archaeological sites are known to exist within the proposed project area. A survey was completed for areas within the original national monument boundary, which included the visitor center area. This survey was completed about 14 years after the building was constructed. There are no records indicating that an archaeological survey was done prior to the initial construction, nor if any cultural resources were encountered during the initial construction or renovations. Because no archaeological sites are known to exist within the proposed project area, it is unlikely that construction activities would disturb buried archaeological deposits. In the event that any archeological resources are inadvertently discovered during construction, appropriate steps

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would be taken in accordance with relevant cultural resource laws and policies, and in following procedures agreed upon with the SHPO.

Archaeological resources are known to exist within 300 feet of the project area and may be susceptible to vibration-caused disturbance or damage. Common causes of vibration associated with building construction include pile-driving or similar high-impact construction activities, use of various types of powered machinery (jackhammers, compactors, augers, etc.) and movement of trucks and other vehicles. Construction activities that would produce vibrations of a magnitude or quality that could disturb or damage known archaeological resources would not be permitted.

*Cumulative Effects:* Cumulatively, this alternative would have no effect on known archaeological resources when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The preferred alternative would result in no impacts on known archaeological resources. There are no known archaeological resources within the project area. Construction activities that would produce vibrations of a magnitude or quality that could disturb or damage known archaeological resources would not be permitted. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

## Museum Collections

### Intensity Level Definitions

Chaco Culture National Historical Park was established to preserve and protect archeological resources associated with the prehistoric Chacoan culture in the San Juan Basin and surrounding area for the benefit and enjoyment of the public and for research purposes. Museum collections (prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens) may be threatened by fire, theft, vandalism, natural disasters, and careless acts. The preservation of museum collections is an ongoing process of preventative conservation, supplemented by conservation treatment when necessary. The primary goal is preservation of artifacts in as stable condition as possible to prevent damage and minimize deterioration. The methodology used for assessing impacts on museum collections is based on the degree to which the alternatives under consideration would affect the condition and integrity of objects and records in the park's museum collection. 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 museum collections.

**Minor:** *Adverse:* would affect the integrity of few items in the museum collection but would not degrade the usefulness of the collection for future research and interpretation.

*Beneficial:* would stabilize the current condition of the collection or its constituent components to minimize degradation.

- Moderate:** *Adverse:* would affect the integrity of many items in the museum collection and diminish the usefulness of the collection for future research and interpretation.
- Beneficial:* would improve the condition of the collection or protect its constituent parts from the threat of degradation.
- Major:** *Adverse:* would affect the integrity of most items in the museum collection and destroy the usefulness of the collection for future research and interpretation.
- Beneficial:* would secure the condition of the collection as a whole or its constituent components from the threat of further degradation.

### Impacts of Alternative A (No-Action Alternative)

The no-action alternative would have direct, minor-to-moderate short- and long-term adverse effects on museum collections, resulting from the park's collections not meeting National Park Service museum management standards. Approximately 98 percent of park's collections objects are housed at the University of New Mexico's Hibben Center in Albuquerque—well away from the project area, and therefore would not be affected by either the no-action or the preferred alternative. About two percent of the park's collection is housed within the park in a designated collections storage facility in the park's maintenance area, and within the existing visitor center building (in the exhibits area and in office spaces) where fragile, centuries-old museum objects are displayed. The existing visitor center building does not currently meet NPS guidelines for museum collections management. In particular, the visitor center building does not have adequate temperature and humidity controls due to its outdated and inefficient heating, cooling, and ventilation systems. The building lacks a fire detection and suppression system, which is considered critical for protecting the objects on display in the exhibits area and records stored in office areas. Overhead water lines in the exhibits area pose a risk of physically damaging collections objects if pipes were to leak or burst. Inadequate pest control puts the park's collection at risk of animal-caused damage. And finally, a sub-standard building security alarm system and an inability to segregate and secure the visitor center's exhibits area from after-hours events and programs puts collection objects at undue risk of theft or damage from vandalism. These and other treats to the integrity and security of museum collections resources would all continue to exist and, in some cases, worsen under the no-action alternative.

*Cumulative Effects:* One park project, combined with the no-action alternative, has the potential to cumulatively affect museum collections resources. In 2009, Chaco Culture NHP will replace a modular collections storage building with a more secure and accessible facility joined under the same roof as the maintenance office building. The unit will be used primarily to store a collection of large prehistoric beams and other architectural elements. The park's growing natural history collection will also be stored in the expanded area. The new collections storage facility is expected to have a beneficial effect on the park's museum collections overall; however, it will not mitigate the risk of degradation, damage, or loss of the objects and records housed in the visitor center building. Therefore, cumulatively, the no-action alternative would still be expected to have direct, minor-to-moderate short- and long-term adverse effects on the park's museum collections when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The no-action alternative would result in direct, minor-to-moderate short- and long-term adverse impacts on museum collections because of continuing deficiencies in heating, ventilation, and cooling systems; fire detection and suppression; pest control; collections security; or protection from overhead water lines. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical

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Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would have direct, minor short-term beneficial effects on museum collections. Museum objects and records currently housed at the visitor center would need to be temporarily relocated and stored during the construction period, then moved back to the visitor center once the work is completed. (The objects would be unavailable to the visiting public during the 12 to 18-month construction period; while this would not have an appreciable effect on museum collections resources, it would affect visitor experience.) The relocation of objects and records would be done or directly supervised by the park's curatorial and cultural resources staff. These items would be carefully moved to the secure, climate-controlled storage facility in the park's maintenance area, and then moved back to the visitor center after construction is complete.

The preferred alternative would also have direct, minor-to-moderate long-term beneficial effects on museum collections, particularly regarding the improvements it would make in the park's ability to meet NPS museum collections management standards. The installation of fire detection and suppression systems, and improved temperature and humidity controls would help to preserve and protect museum objects and records. Ultra-violet light screens would prevent degradation from UV light sources. Water lines would be relocated from above collections display and storage areas. Rodents and other destructive pests would be removed from the building. Security of museum objects would be enhanced by segregating after-hours auditorium or classroom programs from the exhibits area, and by the installation of a new and more effective building security system.

*Cumulative Effects:* As described under the no-action alternative above, replacement of the park's modular collections storage building has the potential for cumulative effects on museum collections. Since both the preferred alternative and the addition of the new collections storage building are expected to have consequential beneficial effects on the security and integrity of the park's museum collections, as well as the park's conformance with NPS museum collections management standards. Therefore the preferred alternative would have an appreciable beneficial cumulative effect on the park's museum collections when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The preferred alternative would result in direct, minor short-term beneficial impacts and direct, minor-to-moderate long-term beneficial impacts on the park's museum collection. As a result of implementing the preferred alternative, museum objects and records housed at the park's visitor center would be better protected from theft, degradation, and damage. The proposed building improvements would leave the park's collections better protected and preserved for the benefit and enjoyment of the public and for research purposes. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

## Geologic Resources and Soils

### Intensity Level Definitions

Geologic resources—the products and physical components of geologic processes—are important parts of the natural and cultural setting of Chaco Canyon National Historical Park. It is the policy of the National Park Service that geologic resources will be preserved and protected as integral components of park natural systems. The methodology used for assessing impacts on geologic resources is based on the extent to which the park's geologic resources and features are preserved and protected from adverse effects of human activity, while allowing natural processes to continue. The thresholds for this impact assessment are as follows:

- Negligible:** Soils and other geologic resources could be affected, but any changes would be so minor as to not have measurable or perceptible consequences.
- Minor:** Changes in soils and other geologic resources would be detectable, but only slight measurable effects would occur that would likely be short-term, localized, and of little consequence to resource integrity. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- Moderate:** Changes in soils and other geologic resources would be readily apparent and measurable. Effects could be long-term or even permanent, cover a broad area, and would have more than trivial consequences. Mitigation measures, if needed to offset adverse effects, could be extensive but would likely be successful.
- Major:** Changes in soils and other geologic resources would be readily apparent, measurable, and result in severely adverse or major beneficial consequences. Effects would likely be long-term or permanent, and could cover a wide-ranging area. Extensive mitigation measures would be needed to offset any adverse effects and their success could not be guaranteed.

### Impacts of Alternative A (No-Action Alternative)

The no-action alternative would have no effect on non-soil geologic resources as a result of construction activities not taking place, and direct, minor-to-moderate short- and long-term adverse effects on soils resulting from continued soil erosion and transportation. Soil piping conditions would be expected to worsen, potentially leading to sinkhole formation and further instability, deformation, and cracking of the building foundation.

The walls of Chaco Canyon are composed primarily of Cliff House sandstone, a massive formation that is about 360 feet thick in the area. It is underlain by the coal-bearing Menefee formation, which crops out at the base of the canyon walls (CHCU 1985). The canyon walls are subject to highly protracted erosional processes that result in talus accumulation at their base. Additionally, infrequent mass-wasting events—often accelerated by precipitation—result in the accumulation of rocks of varying sizes at the base of canyon walls and within the talus. Because no construction work would take place under the no-action alternative, there would be no effect on non-soil geologic resources.

Soils within the project area are silty fine sandy/clay alluvium that are susceptible to erosion from water and wind unless stabilized. The natural patterns of precipitation in the canyon—heavy but infrequent rain storms—contribute to that erosion. Previous disturbance of the visitor center site, combined with the natural erosive properties of the soil and ineffective stormwater management contributed directly to the current problems with the building's foundation. Among

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the primary purposes for the project are correcting the soil piping conditions that have led to the building's structural problems and preventing future soil erosion and transportation, in part by providing adequate site drainage. No excavation or disturbance activities would be conducted, and the existing visitor center would continue to be used; the problems of soil erosion and transportation would continue, the result of which would be direct, minor-to-moderate short- and long-term adverse effects on soils.

*Cumulative Effects:* Any activities that require excavation or ground disturbance, or that would produce significant vibrations, have the potential to affect soil and non-soil geologic resources. The majority of the projects considered for the assessment of cumulative effects include ground disturbance components, and many also generate various types of vibrations. All the projects have been/will be undertaken either to provide or improved infrastructure needed for park operations, or involve needed repairs or rehabilitation of cultural and other park resources. Of these activities, none would contribute to effects on non-soil geologic resources when considered with other past, present, and reasonably foreseeable future actions. Those projects that result in ground disturbance, or that contribute to erosional processes would contribute to adverse cumulate effects when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The no-action alternative would result in no impact on non-soil geologic resources as a result of construction activities not taking place, and direct, minor-to-moderate short- and long-term adverse impacts on soils resulting from continued soil erosion and transportation. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would have no effect on non-soil geologic resources from either construction-related vibrations or other actions, and direct, minor-to-moderate short- and long-term beneficial effects on soils resulting from resulting from the remediation of soil erosion and transportation problems.

The visitor center site sits in close proximity to the north canyon wall at the edge of the talus slope. These nearby geologic formations may be susceptible to vibration-caused disturbance or damage. Common causes of vibration associated with building construction include pile-driving or similar high-impact construction activities, use of various types of powered machinery (jackhammers, compactors, augers, etc.) and movement of trucks and other vehicles. Due in part to the design-build nature of the project, it is not yet precisely known what techniques and processes would be used to complete demolition and construction work. To mitigate potential effects on nearby geological features, the project contractor would be required to produce a vibration management plan subject to review and approval by technical experts in the National Park Service's Geological Resources Division. Construction-related activities and actions that would produce vibrations of a magnitude or quality that could disturb or damage geologic resources would not be permitted; therefore, there would be no effect on non-soil geologic resources under the preferred alternative.

Construction activities would include disturbance of soils, primarily within and adjacent to the existing building's footprint. Soils may also be disturbed and compacted on a temporary basis

within the construction area, as well as in the immediate area of the temporary visitor contact station (trailer and/or yurt) that would be used until construction work is complete. Soil stability issues would be remediated and the building foundation would be stabilized in accordance with underlying soil properties. Engineered solutions (including adequate site drainage) would be implemented to avoid future soil stability problems. Soil piping conditions would not be expected to re-emerge within the lifecycle of the rehabilitated visitor center. Sinkhole formation would not occur and the visitor center foundation would not experience cracking, deformation, or other stability problems. The problems of soil erosion and transportation would be remediated under the preferred alternative, the result of which would be direct, minor-to-moderate short- and long-term beneficial effects on soils.

*Cumulative Effects:* As noted under the no-action alternative above, any activities that require excavation or ground disturbance, or that would produce significant vibrations, have the potential to affect soil and non-soil geologic resources. The majority of the projects considered for the assessment of cumulative effects include ground disturbance components, and many also generate various types of vibrations. Of these activities, none would contribute to effects on non-soil geologic resources when considered with other past, present, and reasonably foreseeable future actions since the preferred alternative would have no effect on those resources. The preferred alternative would have a beneficial effect on soils when considered with other past, present, and reasonably foreseeable future actions that serve to stabilize soil erosion and transport, or remediate such conditions.

*Conclusion:* The preferred alternative would result in no impact on non-soil geologic resources as a result of construction activities not taking place, and direct, minor-to-moderate short- and long-term beneficial impacts on soils resulting from the remediation of soil erosion and transportation problems. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

## Floodplains

### Intensity Level Definitions

It is the policy of the National Park Service to manage for the preservation of floodplain values and minimize potentially hazardous conditions associated with flooding. Records show that the visitor center is located on the outer edge of the 500-year floodplain. The methodology used for assessing impacts on floodplains is based on the extent to which the alternatives under consideration would change floodplain functions and values or increase flood hazards. The thresholds for this impact assessment are as follows:

- Negligible:** Impacts could result in a change to stream morphology, floodplains, and/or riparian functions and values or increase flood hazards, but the change would not be of any measurable or perceptible consequence.
- Minor:** Impacts could result in a change to stream morphology, floodplains, and/or riparian functions and values or increase flood hazards, but the change would be

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of little consequence. Operations would have minimal risk and have few mitigation measures.

**Moderate:** Impacts could result in a change to stream morphology, floodplains, and/or riparian functions and values or increase flood hazards; the change would be measurable and consequential. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

**Major:** Impacts would result in a noticeable change to stream morphology, floodplains, and/or riparian functions and values or increase flood hazards; the change would result in a severely adverse or substantially beneficial impact. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

### **Impacts of Alternative A (No-Action Alternative)**

The no-action alternative would have direct and indirect, mostly minor, short- and long-term adverse effects on floodplains, resulting from the continued occupation of the 500-year floodplain of Gallo Wash. The location of the park in a canyon environment inevitably suggests that there are conditions in which the floodplain location of the visitor center may be affected by flooding. Warning time is believed to be low, perhaps in the range of tens of minutes to a few hours. The fact that the building is on the outer edges of the 500-year floodplain where water velocities are likely to be lower would suggest that adverse effects may be somewhat attenuated.

In the 500-year event, flood waters in the visitor center are estimated to reach 2 feet in depth around the building (CHCU 1985). Since all the museum objects are located in reinforced glass cases well above ground level, the park has concluded that there is some likelihood of effect but that the likelihood of damage to the museum objects is not high. In an effort to minimize hazards to human life and property, the park will prepare a flood preparedness and evacuation plan. Park staff will be familiar with the plan and be able to react quickly to flooding conditions by informing the public of appropriate actions.

*Cumulative Effects:* Most maintenance and infrastructure projects that take place in the park—especially those located within or affecting the canyon floor—have the potential to affect floodplains. Many of the park’s physical infrastructure projects listed under the cumulative impacts section have some negative effects on natural floodplain conditions or function, often by virtue of those projects needing to avoid or repel flood conditions to allow efficient and safe park operations. Some projects involve ground disturbance for utility work, other involve building structural components in the floodplain or purposefully altering the course of potential flood waters. By continuing to occupy the 500-year floodplain of Gallo Wash, the no-action alternative would perpetuate its mainly minor effects on the floodplain, and would therefore contribute to adverse cumulate effects when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The no-action alternative would result in direct and indirect, mostly minor, short- and long-term adverse effects on floodplains, resulting from the continued occupation of the 500-year floodplain of Gallo Wash. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park’s general management plan or other relevant National Park Service planning documents, there would be no impairment of the park’s resources or values. Implementation of this alternative would not

result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would have direct and indirect, mostly minor, short- and long-term adverse effects on floodplains, resulting from the continued occupation of the 500-year floodplain. According to NPS Director's Order 77-2 *Floodplain Management*, certain construction within a regulatory floodplain requires preparation of a statement of findings for floodplains. The project area is not within a 100-year floodplain; however, the existing visitor center building is located within the 500-year floodplain of Gallo Wash, an ephemeral stream (Simons 1982). Therefore, a statement of findings (SOF) has been prepared for the proposed project, which is included in this document as Appendix A. The SOF includes a description of the flood hazard assumed by implementation of the proposed project and measures that would be taken to mitigate potential adverse impacts.

The location of the park in a canyon environment inevitably suggests that there are conditions in which the floodplain location of the visitor center may be affected by flooding. Warning time is believed to be low, perhaps in the range of tens of minutes to a few hours. The fact that the building is on the outer edges of the 500-year floodplain where water velocities are likely to be lower would suggest that adverse effects may be somewhat attenuated.

Since the park has had no experience with a 500-year flood on Gallo Wash, it is not precisely known how much warning time would be available to the park. The major concern would be the potential effects on museum objects. In the 500-year event, flood waters in the visitor center would reach 2 feet in depth around the building (CHCU 1985). Since all the museum objects are located in reinforced glass cases well above ground level, the park has concluded that there is some likelihood of effect but that the likelihood of damage to the museum objects is not high.

As expressed in the floodplain statement of findings, the National Park Service concludes that there is no practicable alternative placement for the visitor center in a reasonably foreseeable timeframe, and that its rehabilitation and renovation at the current site is warranted. Therefore, the proposed project is in compliance with Executive Order 11988 *Floodplain Management*. Implementation of the proposal would likely result in the prolongation of flood risk on park resources due to the continued occupation of the 500-year floodplain.

*Cumulative Effects:* As noted under the no-action alternative above, most maintenance and infrastructure projects that take place in the park—especially those located within or affecting the canyon floor—have the potential to affect floodplains. The preferred alternative would have mainly minor effects on floodplain conditions and values, and would pose a mainly minor risk of disruption and/or damage of park resources. A flood mitigation plan (as proposed) would help to mitigate adverse effects on park resources, however. By continuing to occupy the 500-year floodplain of Gallo Wash, the no-action alternative would perpetuate its mainly minor effects on the floodplain, and would therefore contribute to adverse cumulative effects when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The preferred alternative would result in direct and indirect, mostly minor, short- and long-term adverse effects on floodplains, resulting from the continued occupation of the 500-year floodplain. As identified in the Floodplain Statement of Findings, the proposed project is in compliance with Executive Order 11988 *Floodplain Management*. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning

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documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006*.

## Energy Use, Conservation Potential and Sustainability

### Intensity Level Definitions

The National Park Service strives to construct facilities with sustainable designs and systems to minimize potential environmental impacts. The methodology used for assessing impacts on energy use, conservation potential and sustainability is based on the degree to which the design and management of facilities would emphasize environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings. The thresholds for this impact assessment are as follows:

- Negligible:** No effects would occur or the effects on energy requirements and conservation potential would be below or at the level of detection. The effect would be slight and no long-term effects on energy requirements and conservation potential would occur.
- Minor:** The effects on energy requirements and conservation potential would be detectable, likely short-term. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.
- Moderate:** The effects on energy requirements and conservation potential would be readily apparent and likely long-term. Any effects would result in changes to energy requirements and conservation potential on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.
- Major:** The effects on energy requirements and conservation potential would be readily apparent, long-term, and would cause substantial changes to energy requirements and conservation potential conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed.

### Impacts of Alternative A (No-Action Alternative)

A primary objective of the visitor center proposal is to minimize the environmental impacts of visitor center operations by reducing energy and water consumption, and by utilizing environmentally sustainable building design and construction practices. The no-action alternative would not focus on achieving these goals, and would have direct, minor-to-moderate short- and long-term adverse effects on energy use, conservation potential and sustainability resulting from energy-inefficient heating, air conditioning, and ventilation systems; retention of high-flow water appliances; inadequate building insulation; inefficient doors, windows, and glazing treatments; and non-conversion to renewable energy sources.

Outdated and inefficient heating, air conditioning, and lighting systems would not be replaced with more energy- and cost-efficient systems and the buildings mechanical systems would continue to consume valuable time and personnel resources. Low-flow toilets and water appliances would not be installed. The building would not receive a new insulated roof, and would not benefit from new efficient doors and windows, and improved building insulation and glazing strategies—all of which could contribute to reduced energy costs and greenhouse gas

use. The visitor center would not take advantage of the abundance of local solar radiation by incorporating passive solar capturing design technologies. The park could not achieve a LEED Silver certification for its visitor center and could not use the visitor center as a public demonstration for environmental stewardship.

*Cumulative Effects:* All projects considered for the assessment of cumulative effects have an effect on energy use, conservation potential and sustainability. The park strives to meet federal and other environmental goals by incorporating these elements to the maximum extent feasible in its projects and operations. The infrastructure renewal projects, in particular, attempt to utilize sustainable design elements and incorporate energy-efficient, non-toxic, environmentally-friendly, and culturally-sensitive components into project plans. Cumulatively, the no-action alternative would have an adverse effect on energy use, conservation potential and sustainability when considered with other past, present, and reasonably foreseeable future actions as described above because the building's deficiencies would serve to diminish sustainability gains for the park otherwise made through the implementation of other projects.

*Conclusion:* The no-action alternative would result in direct, minor-to-moderate short- and long-term adverse impacts on energy use, conservation potential and sustainability resulting from energy-inefficient heating, air conditioning, and ventilation systems; retention of high-flow water appliances; inadequate building insulation; inefficient doors, windows, and glazing treatments; and non-conversion to renewable energy sources. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would replace outdated and inefficient heating, air conditioning, and lighting systems with more energy- and cost-efficient systems. More efficient toilets and water appliances would also reduce water consumption. The building design would include a new insulated roof, new efficient doors and windows, and improved building insulation and glazing strategies—all contributing to reduced energy costs and greenhouse gas use. The design would also take advantage of capturing the abundance of local solar radiation through passive solar heat capture. Use of recycled and non-toxic materials is also a goal of the project, and would contribute to the goal of the project being LEED Silver certifiable. The park would emphasize the environmental benefits of the project in its educational materials and presentations.

The preferred alternative would have direct, negligible-to-minor short-term adverse effects on energy use, conservation potential and sustainability resulting from the additional consumption of energy required for demolition and construction activities. The effect would be lessened by a focus on materials recycling, use of non-toxic materials and supplies, and conservation construction techniques. Effects from the relocation of administrative and visitor services functions would be difficult to determine, having both savings due to evacuation of the existing building and costs associated with the relocation activities themselves.

Direct, minor-to-moderate long-term beneficial effects would be expected on energy use, conservation potential and sustainability resulting from installation of energy-efficient heating, air conditioning, and ventilation systems; selection of low-flow water appliances; improving building insulation; installing energy-efficient doors and windows; using proper glazing treatments; and

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conversion to renewable sources for a significant part of the visitor center's energy needs. The rehabilitated and renovated visitor center would be Leadership in Energy and Environmental Design (LEED) Silver certifiable.

*Cumulative Effects:* As described under the no-action alternative above, all projects considered for the assessment of cumulative effects have an effect on energy use, conservation potential and sustainability. Cumulatively, the preferred alternative would have a beneficial effect on energy use, conservation potential and sustainability when considered with other past, present, and reasonably foreseeable future actions because of its greater efficiencies and environmentally-friendly and sustainable design and function.

*Conclusion:* The preferred alternative would result in direct, negligible-to-minor short-term adverse impacts on energy use, conservation potential and sustainability resulting from the additional consumption of energy required for demolition and construction activities. The preferred alternative's emphasis on environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings would result in direct, minor-to-moderate long-term beneficial impacts on energy use, conservation potential and sustainability. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

## Health and Safety of Employees and the Visiting Public

### Intensity Level Definitions

The National Park Service works to identify public health issues and disease transmission potential in the parks and to conduct park operations in ways that reduce or eliminate these hazards. The rehabilitation and renovation of the park's visitor center is proposed in part to address human health and safety risks. The methodology used for assessing impacts on health and safety of employees and the visiting public is based on the degree to which the alternatives under consideration would affect public health. The thresholds for this impact assessment are as follows:

- Negligible:** Public health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on the public health or safety.
- Minor:** The effect would be detectable and would likely be short-term, but would not have an appreciable effect on public health and safety. If mitigation were needed, it would be relatively simple and would likely be successful.
- Moderate:** The effects would be readily apparent and long-term, and would result in substantial, noticeable effects on public health and safety on a local scale. Mitigation measures would probably be necessary and would likely be successful.
- Major:** The effects would be readily apparent and long-term, and would result in substantial, noticeable effects on public health and safety on a regional scale.

Extensive mitigation measures would be needed, and their success would not be guaranteed.

### **Impacts of Alternative A (No-Action Alternative)**

The no-action alternative would have direct, minor-to-moderate short- and long-term adverse effects on the health and safety of employees and the visiting public resulting from continued risk of disease transmission by rodents and other pests; job hazards associated with maintenance and use of failing building components and systems; lack of fire detection and suppression; sub-standard building security; exposure to roof leakage; and inefficient climate controls.

Cracks in walls and floors of the existing visitor center caused by soil movement have allowed rodents unfettered access to the building. Employees routinely complain of rodent sightings and droppings in and around the existing office workspaces. Levels of rodent infestation in this facility are unacceptably high, which increases the risk of employees being exposed to diseases carried by rodents. Rodents have the potential to carry hantaviruses or other diseases. Hantaviruses, in particular, can be contracted by humans in the form of *Hantavirus pulmonary syndrome*. *Hantavirus pulmonary syndrome* is a deadly disease transmitted by infected rodents through urine, droppings, or saliva. Humans can contract the disease when they breathe in aerosolized virus. *Hantavirus pulmonary syndrome* was first recognized in 1993 in the Four Corners area of the United States, and has since been identified throughout the country.

The existing building also contains a number of structural deficiencies including an unstable foundation, poorly functioning climate controls, undersized electrical wiring, and a lack of fire detection and suppression system. Under the no-action alternative, these health and safety risks would continue.

*Cumulative Effects:* Many or all of the projects assessed for cumulative effects have a public health and safety component. In particular, the projects addressing road and trail repairs, faulty gas lines, sinkholes, public toilets, potable water, and problem septic systems could have a cumulative effect with the no-action alternative. To the extent that health and safety hazards continue at the visitor center under the no-action alternative, this alternative would have an adverse effect on the health and safety of employees and the visiting public when considered with other past, present, and reasonably foreseeable future actions, only to the extent that those actions are not completed or do not successfully address the underlying public health and safety problems.

*Conclusion:* The no-action alternative would result in direct, minor-to-moderate short- and long-term adverse impacts on the health and safety of employees and the visiting public resulting from continued risk of disease transmission by rodents and other pests; job hazards associated with maintenance and use of failing building components and systems; lack of fire detection and suppression; sub-standard building security; exposure to roof leakage; and inefficient climate controls. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

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## Impacts of Alternative B (Preferred Alternative)

The preferred alternative would remove rodents and other pests from the visitor center building, remediate the soil conditions that aided their entry, and rehabilitate the structure so that future rodent intrusions are less likely. Functional heating and cooling systems and a non-leaking roof would improve the comfort and well-being of both employees and visitors. Various other structural deficiencies would be remedied, including an unstable foundation, undersized electrical wiring, and a lack of fire detection and suppression system.

The preferred alternative would have direct and indirect, negligible-to-moderate adverse and beneficial short-term effects on the health and safety of employees and the visiting public resulting from evacuating the visitor center. Employees and visitors would avoid the health and safety problems inherent in the existing building, while potentially experiencing fresh risks and hazards from new settings and even unknown sources.

Direct, minor-to-moderate long-term beneficial effects would be expected on the health and safety of employees and the visiting public resulting from the elimination of rodents and other potentially disease-carrying pests from the building; reduction in job hazards associated with maintaining and repairing failing building components and systems; addition of a fire detection and suppression system; and installation of a more reliable building security system. Other beneficial effects include a roof that doesn't leak, and a functional HVAC system that improves indoor comfort.

*Cumulative Effects:* The preferred alternative would have a beneficial effect on the health and safety of employees and the visiting public when considered cumulatively with other past, present, and reasonably foreseeable future actions, to the extent that those actions are completed and successfully address the underlying public health and safety problems.

*Conclusion:* The preferred alternative would result in direct and indirect, negligible-to-moderate adverse and beneficial short-term impacts and direct, minor-to-moderate long-term beneficial impacts on the health and safety of employees and the visiting public. Because there would be no major, adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Chaco Culture National Historical Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

## Visitor Use and Experience

### Intensity Level Definitions

Chaco Culture National Historical Park was established to preserve and protect archeological resources associated with the prehistoric Chacoan culture in the San Juan Basin and surrounding area for the benefit and enjoyment of the public. The enjoyment of park resources and values by people is part of the fundamental purpose of all units of the national park system. The methodology used for assessing impacts on visitor use and experience is based on the degree to which the alternatives under consideration would affect visitors' enjoyment of park resources. The thresholds for this impact assessment are as follows:

- Negligible:** Visitors would not be affected or changes in visitor use and/or experience would be below or at the 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 use and/or experience 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 use and/or experience 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 use and/or experience would be readily apparent and have substantial long-term consequences. The visitor would be aware of the effects associated with the alternative, and would likely express a strong opinion about the changes.

### Impacts of Alternative A (No-Action Alternative)

A typical visitor stay at Chaco Culture National Historical Park is less than 24 hours; fifty percent of the park's visitors spend between two and six hours in the park, while twelve percent stay between six and twelve hours. The primary visitor activity is driving the park's nine-mile loop road and visiting the various greathouse sites and other historic structures along the way—and perhaps hike on one or more of the park's backcountry trails to experience some of its more remote sites. Once in the park, visitors typically make their first stop at the visitor center to pay entrance and/or campground fees and to orient themselves to the park and its resources.

Accessible restrooms and potable water are available here. Visitors normally stop at the main desk to talk with park staff or volunteers about things to do in the park; pick up printed guides and interpretive materials; and perhaps obtain a backcountry trail permit. Visitors often spend some time in the exhibits area to study the interpretive displays, view a limited selection of objects from the park's museum collection, and learn about the history of Chaco Canyon and its former inhabitants, as well as contemporary Indian communities having ancestral ties to the early Chacoans. Many visitors take the time to watch a park orientation film and visit the park's only bookstore/gift shop operated by the Western National Parks Association.

The no-action alternative would have direct, minor-to-moderate short- and long-term adverse effects on visitor use and experience resulting from inaccessible building features; an aesthetically unpleasant and uncomfortable indoor environment; and a lack of modern amenities and visitor services that the public has come to expect and demand at a national park visitor center. While providing visitors with a wide range of services, the existing facility is deficient in a number of ways that affect visitors, including: health risks associated with infestations of rodents and other pests; inadequate fire detection and suppression; deficiencies in accessible building features; heating and cooling systems that fail to provide comfortable indoor conditions, and a roof that leaks during snow melt or rain events, among others. The no-action alternative would not, however, prevent or preclude the visiting public from experiencing the park's primary non-museum resources first hand.

*Cumulative Effects:* Many or all of the projects assessed for cumulative effects could have an effect on visitor use and experience when those other past, present, and reasonably foreseeable future actions are considered in conjunction with either the no-action or the preferred alternative. The no-action alternative would have an adverse effect on visitor use and experience to the extent that other park facilities would be in disrepair, pose health and safety risks, cause discomfort or contribute to an aesthetically unappealing environment.

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*Conclusion:* The no-action alternative would result in direct, minor-to-moderate short- and long-term adverse impacts on visitor use and experience.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would have direct, negligible-to-minor short-term adverse effects on visitor use and experience resulting from the temporary relocation of visitor services from the existing visitor center building. Effects would include limited visitor services reductions, venue changes, and disruptions associated with construction activities.

During the construction period, all visitor services currently provided in the visitor center would have to be provided elsewhere—either in temporary modular structures erected in the parking lot, or at alternative sites. Visitors would have full access to restrooms, potable water, trails and archaeological sites, and emergency services; they would likely experience some limitations or modifications in parking, interpretive programs and displays, park orientation film screenings, and items for sale through the park’s cooperating association. Camping, ranger-led tours, night skies and other programming, and interpretive resources may be modified slightly, but service levels are expected to remain essentially unchanged. Temporary facilities near the existing visitor center would provide some services and temporary shelter from the elements. Museum objects would be unavailable during construction. Noise, vibrations, odors, dust, visual clutter, and high activity levels associated with construction activities would affect visitor services irregularly and to varying degrees at the temporary visitor contact station near the existing visitor center, the Fajada Butte Overlook, and the Una Vida archaeological site.

Direct, minor-to-moderate long-term beneficial effects would be expected on visitor use and experience resulting from improvements in accessibility; building aesthetics and comfort; and amenity improvements that the public has come to expect and demand at a national park visitor center. While providing visitors with a wide range of services, the existing facility is deficient in a number of ways that affect visitors, including: health risks associated with infestations of rodents and other pests; inadequate fire detection and suppression; deficiencies in accessible building features; heating and cooling systems that fail to provide comfortable indoor conditions, and a roof that leaks during snow melt or rain events, among others. These and other building deficiencies and design shortcomings would be remedied by the rehabilitation and renovation of the building. Overall, building improvements would present a more functional and inviting visitor experience.

*Cumulative Effects:* Many or all of the projects assessed for cumulative effects could have an effect on visitor use and experience when those other past, present, and reasonably foreseeable future actions are considered in conjunction with the preferred alternative. Cumulatively, the preferred alternative would have a beneficial effect on visitor use and experience to the extent that: the condition of other park facilities would be improved; health and safety risks would be remedied; and park facilities would be made more useful, comfortable, or aesthetically appealing.

*Conclusion:* The preferred alternative would result in direct, negligible-to-minor short-term adverse impacts and direct, minor-to-moderate long-term beneficial impacts on visitor use and experience.

## Park Operations

### Intensity Level Definitions

Virtually every NPS action or proposal has either a direct or indirect effect on park operations. The decision whether to implement a major project can have real and lasting effects on 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. (For the purpose of this analysis, the park's cooperating association is included with park operations.) The methodology used to assess potential changes to park operations is based on the degree to which the alternatives under consideration would enable the park to fulfill its purposes, including the protection and preservation of vital park resources, continuation of its mandate to facilitate research, and providing for an effective visitor experience. The thresholds for this impact assessment are as follows:

- Negligible:** Park operations would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on park operations.
- Minor:** The effect would be detectable and likely short-term, 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 likely successful.
- Moderate:** The effects would be readily apparent, potentially long-term, 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, long-term, and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.

### Impacts of Alternative A (No-Action Alternative)

The no-action alternative would have direct, minor-to-moderate short- and long-term adverse effects on park operations resulting from the retention of inefficient, out-of-date, and costly office features and functions; ever-increasing demands on maintenance and administrative staff to support failing building components and systems; inability to provide desired visitor services within the existing building; non-attainment of federal energy efficiency and conservation goals; and inability to adequately protect park resources in the visitor center and throughout the park. Notably, this alternative would also be expected to have an adverse effect on the ability of park managers and staff to carry out the requirement of the NPS Organic Act.

Most of the park's administrative functions are performed within the visitor center, in the portion of the building designated for those purposes. Maintenance and some curatorial functions are largely accomplished in the park's maintenance area. Both the visitor center and the maintenance areas, along with park housing, are contained within the park's development subzone. Approximately 18 park staff and volunteers have their work stations in the visitor center, along with an administrative work area for the Western National Parks Association.

Park operations within the existing visitor center are, and would continue to be, compromised in a number of important ways. Unstable soils, foundation damage, a leaky roof, and problems

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with outdated and inefficient mechanical, electrical, and communications systems have created an undue burden on maintenance and technical staff. Repairs have become costly for the park and are often ineffective. Rodents and other pests in the building present health hazards to employees and visitors. Climate controls do not work properly, making employees and visitors uncomfortable, and putting the park's museum collections at risk of damage and deterioration. The building does not have proper fire detection and suppression systems and does not meet many standards for accessibility. Work spaces are organized inefficiently for current needs and subject to the legacy configuration of spaces which pre-date computerization, modern mechanical systems, and sustainable design standards.

*Cumulative Effects:* Any project that occurs in the park has an effect on park operations; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and park operations. Planning projects such as the General Management Plan amendment and planning for improvements to the visitor center typically involve the majority of park staff to contribute their expertise and assistance. Projects such as a sinkhole investigation near an archaeological site would primarily involve resource management staff. Road maintenance or other infrastructure projects would primarily involve the maintenance staff. Visitor contact, interpretation, and safety activities usually involve rangers and interpretive specialists. Under the no-action alternative, there would be an adverse effect on park operations associated with the current and future use of the existing visitor center building; therefore, there would be an adverse effect on park operations when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The no-action alternative would result in minor-to-moderate short- and long-term adverse impacts on park operations.

### **Impacts of Alternative B (Preferred Alternative)**

The preferred alternative would have direct, minor-to-moderate short-term adverse effects on park operations resulting from planning for and financing a major rehabilitation and renovation project; temporary relocation of park administration and visitor services functions; and subsequent relocation back to the visitor center building—all while needing to conduct other park business as usual. These moves would temporarily disrupt employee efficiency to varying degrees, depending on the employee's position and role. Additional time and effort will be required to move offices, exhibits, equipment, and supplies to and from temporary facilities. Park staff would be split between several different buildings during the construction period, introducing additional work environment inefficiencies. The typical work load for employees would also be increased during implementation of this project from the need to finalize project plans, hire contractors, and monitor construction. Once construction is completed, normal workloads and patterns should return.

During the building's rehabilitation and renovation, temporary office spaces would be created in existing park housing that would be temporarily converted for such use, and in existing maintenance buildings suitable for office space. Locks would be re-keyed as necessary and temporary network and phone lines would be strung. What office furniture, equipment, files and supplies would be needed for a 12 to 18-month period would be moved to these locations. Other physical property would be stored at alternate locations in the park. A temporary visitor contact station (trailer and/or yurt) would be erected at the edge of the visitor center public parking lot to provide many of the services that would normally occur at the visitor center. These temporary structure(s) would be removed following completion of construction. If a yurt is purchased for this purpose, it would either be retained by the park for future use, or sold or donated according to established procedures. A modular office unit would be rented for the construction period only.

Direct, minor-to-moderate long-term beneficial effects would be expected on park operations resulting from new efficiencies in building layout and design; technological enhancements; decreased demand on maintenance and administrative staff for dealing with building maintenance and repairs; lower maintenance costs; ability to provide desired visitor center services; attainment of federal energy efficiency and conservation goals; and the ability to adequately protect park resources in the visitor center and throughout the park.

Park operations would see many long-term improvements under the preferred alternative. Unstable soils, foundation damage, a leaky roof, and problems with outdated and inefficient mechanical, electrical, and communications systems would be remediated, greatly reducing the burden on maintenance and technical staff, and costs for the park. Structural repairs would also help to keep rodents and other pests out of the rehabilitated building, mitigating risks of disease transmission and equipment/property damage. Efficient and properly-functioning heating, ventilation, and air conditioning systems would improve the comfort of employees and visitors, and would better protect the park's museum collections from damage and deterioration. Installation of fire detection and suppression equipment would help protect the park's museum collections and other physical resources, and would help safeguard the health and safety of employees and visitors. Along with an improved building security system, the ability to physically segregate the visitor center's exhibits area from areas used for evening events and programs would also help to ensure the park's museum collections are not subject to vandalism or theft. Work spaces would be configured to more efficiently to meet current park administrative needs and would correct many accessibility standards that are not currently being met. Visitor contact areas and WNPA spaces would be reconfigured for efficiency and to better serve the needs of park visitors. Efficiency gains throughout the project would help the park to conserve energy, water, and other resources; meeting LEED Silver certification standards would reinforce the preferred alternative's sustainability.

*Cumulative Effects:* As described under the no-action alternative, any project that occurs in the park has an effect on park operations; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and park operations. Park operations associated with the current and future use of the park's visitor center would be improved under the preferred alternative, which would cumulatively have a beneficial effect on park operations when considered with other past, present, and reasonably foreseeable future actions.

*Cumulative Effects:* Any project that occurs in the park has an effect on park operations; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and park operations. Planning projects such as the General Management Plan amendment and planning for improvements to the visitor center typically involve the majority of park staff to contribute their expertise and assistance. Projects such as a sinkhole investigation near an archaeological site would primarily involve resource management staff. Road maintenance or other infrastructure projects would primarily involve the maintenance staff. Visitor contact, interpretation, and safety activities usually involve rangers and interpretive specialists. Under the no-action alternative, there would be an adverse effect on park operations associated with the current and future use of the existing visitor center building; therefore, there would be an adverse effect on park operations when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The preferred alternative would result in direct, minor-to-moderate short-term adverse impacts and direct, minor-to-moderate long-term beneficial impacts on park operations. In addition, this alternative would best enable park managers and staff to carry out their responsibilities under the NPS Organic Act.

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# CONSULTATION AND COORDINATION

## Project Scoping

Internal scoping was conducted by an interdisciplinary team comprised of key staff from Chaco Culture NHP and Aztec Ruins National Monument, and technical professionals of the National Park Service's Santa Fe and Denver support offices. Team members also consulted with subject matter experts from the agency's Planning & Environmental Quality Division and Geologic Resources Division, and the State Historic Preservation Office. The interdisciplinary team defined the project purpose and need; identified alternatives to address the needs identified; determined what the likely issues and impacts would be; and identified the relationship, if any, of the proposed action to other planning efforts at the park.

Interdisciplinary team members conducted site visits and gathered background information about park resources that could be affected. Potential environmental impacts were further identified and evaluated, along with past, present, and reasonably foreseeable projects that could have cumulative effects and potential mitigation measures. Park partners were asked to take part in the value analysis that resulted in the selection of the proposed action.

Tribal consultation is taking place concurrently with this document as tribes have indicated to the park their desire to be brought into the compliance process when the park has a specific proposal, given the large number of discrete projects that tribes are asked to comment upon.

Consultation with the New Mexico SHPO began with a recommendation by the park that the visitor center is not eligible for listing on the National Register of Historic Places. On May 27, 2008, the SHPO concurred with the park's findings, primarily due to substantial loss of historic integrity in the past 30 years.

## Environmental Assessment Review and List of Recipients

The environmental assessment will be released for public review on February 20, 2009. To inform the public of the availability of the environmental assessment, 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 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://parkplanning.nps.gov/chcu>.

The environmental assessment is subject to a 30-day public comment period ending March 22, 2009. During this time, the public may 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, as needed.

Notices of the environmental assessment's availability are being sent to the following Indian tribes, federal, state and local government agencies, and organizations:

### Federal Agencies

U.S. Bureau of Indian Affairs

U.S. Bureau of Land Management

U.S. Fish and Wildlife Service  
U.S. Forest Service, San Juan National Forest

**Indian Tribes**

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

**State and Local Agencies**

New Mexico Environment Department  
New Mexico State Historic Preservation Office  
San Juan County  
City of Aztec  
City of Bloomfield  
City of Farmington  
Carson Chapter  
Crownpoint Chapter  
Huerfano Chapter  
Lake Valley Chapter  
Nageezi Chapter  
Pueblo Pintado Chapter

**Organizations**

Friends of Chaco  
Western National Parks Association

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## List of Preparers

### Preparers:

Jim Von Haden, Physical Scientist/Compliance Specialist, National Park Service, Mississippi National River and Recreation Area, Minnesota.

Barbara West, Superintendent, National Park Service, Chaco Culture National Historical Park, New Mexico

### Consultants:

*National Park Service, Chaco Culture National Historical Park, New Mexico*

Russ Bodnar, Chief of Interpretation

Tracy Bodnar, Management Assistant

Wendy Bustard, Museum Curator

Dabney Ford, Chief of Cultural Resources

Roger Moore, Vanishing Treasures Archaeologist

Travis Paulson, former acting Chief Ranger

Brad Shattuck, Chief of Maintenance and Natural Resources

Don Whyte, Chief Ranger

*National Park Service, Aztec Ruins National Monument, New Mexico*

Matilda Arviso, Administrative Officer

Grady Griffith, Information Technology Specialist

*Western National Parks Association*

Scott Aldridge, Chief Operations Officer

Evelyn Johnson, Area Manager

*National Park Service, Projects Branch/ Technical Support, IMR-Santa Fe Office*

Jim Brown, Facilities Manager

Harry Carpenter, Cyclic Program Manager

Charles Vickrey, Architect

Liz Whitehead, Civil Engineer

*National Park Service, Facility Management, Design and Engineering, IMR-Denver Office*

Debbie Brown, FLREA Program Manager

Rick Cronenberger, Historical Architect

Bruce Keller, Project Manager

Nathan Souder, Project Manager

*National Park Service, Planning & Environmental Quality Division, IMR-Denver Office*

Cheryl Eckhardt, Environmental Compliance Specialist

Chris Turk, Environmental Quality Coordinator

*National Park Service, Geologic Resources Division, Geoscience and Restoration Branch*

Hal Pranger, Branch Chief

*New Mexico State Historic Preservation Office*

Pilar Cannizzaro, Architectural Planning and Review

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# Appendix A: Floodplain Statement of Findings

**STATEMENT OF FINDINGS  
Chaco Culture National Historical Park  
Visitor Center Renovation**

**FOR  
Executive Order 11988 Floodplain Management**



2/12/2009

**Recommended:** \_\_\_\_\_  
Superintendent, Chaco Culture National Historical Park      **Date**

**Concurred:** \_\_\_\_\_  
Chief, Water Resources Division      **Date**

**Approved:** \_\_\_\_\_  
Director, Intermountain Region      **Date**

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**Statement of Findings for Executive Order 11988  
(Floodplain Management)**

**Renovation and Rehabilitation of  
Chaco Culture National Historical Park  
Visitor Center/Headquarters Building**

**Introduction**

**Proposed Action**

Under the provisions of Executive Order 11988, the National Park Service has a “responsibility to evaluate potential effects of any actions it may take in a floodplain; [and] to ensure its planning program and budget requests reflect consideration of flood hazards and floodplain management.” Additionally, DO-77-2 and its procedural manual, PM-77-2, provide guidance on how to prepare a Statement of Findings for projects that come under the rubric of the Executive Order.

The National Park Service is planning to rehabilitate and renovate the Chaco Culture National Historical Park’s visitor center/headquarters building in northwestern New Mexico. This facility is the only visitor contact station in the park. Visitors come to the center to pay entrance and camping fees, receive orientation to the park, see the park film and artifacts associated with Chaco in the park’s small museum and attend lectures and special events.

The center also includes a museum and exhibits where museum objects are displayed. Because the building was a prototype for the NPS “Mission 66” program and is now over 50 years old, the park consulted with the State Historic Preservation Office (SHPO) concerning its eligibility for listing on the National Register of Historic Places. In a May 27, 2008 letter, the SHPO concurred in the park’s finding that the building has lost integrity as a result of numerous alterations and is not eligible for listing on the National Register.

The visitor center is now in poor condition. The electrical wiring and control panels are undersized and inadequate for the loads they carry. The wood window and door frames are in varying states of deterioration—some wholly rotted through. The interior ceilings are stained, moldy and damaged as a result of roof and pipe leaks. The floor is cracked and uneven which allows access by rodents to the detriment of health and safety for both visitors and staff in this hanta virus prone area. The carpet is stained, torn and worn out. The heating and cooling systems are so inadequate that variations of up to twenty degrees are possible between parts of the building. The HVAC system is so noisy that meetings cannot take place when the blower is on; the units are obsolete, rusted, and leaking, as well. Replacement parts for them are no longer available. The flat roof has leaked repeatedly, even after the membrane was replaced in 2004. To keep the roof from leaking (and damaging electronic equipment, library materials and priceless

Chacoan artifacts), all the HVAC components need to be removed from the roof and placed on the ground adjacent to the building.

Phased repairs are not recommended by the consulting engineers because of the interrelationship of the building components. The building is not currently energy efficient and the rehabilitation may provide an opportunity to improve its efficiency as well as its utility.

### **Site Description**

Chaco Culture National Historical Park is a World Heritage site located in a remote area surrounded by the Navajo Reservation. The park is located at an elevation of 2066 m. (6200 feet) in northwestern New Mexico in a sparsely populated, semi-desert area. Chaco Canyon and the lower Gallo Canyon can be described as rim rock canyon walls with relatively flat, alluvial floors dissected with deep gullies. There is a long history of efforts to stabilize the gullies within the park in order to protect the Great House ruins and numerous cultural sites within the park.

The Visitor Center/Headquarters Building is located on the canyon floor of Chaco Canyon approximately 50 meters from the north canyon wall at a point where the canyon is relatively wide. It is approximately 1300 meters from Fajada Butte (a major geographic feature) and 1550 meters from the west canyon wall to the southwest. The visitor center is located at the outer edge of the 500-year floodplain as calculated in 1982 by Simons and Li Associates (Floodplain Maps for Chaco Culture National Historical Park). The soils are sandy/clay alluvium and highly erodible.

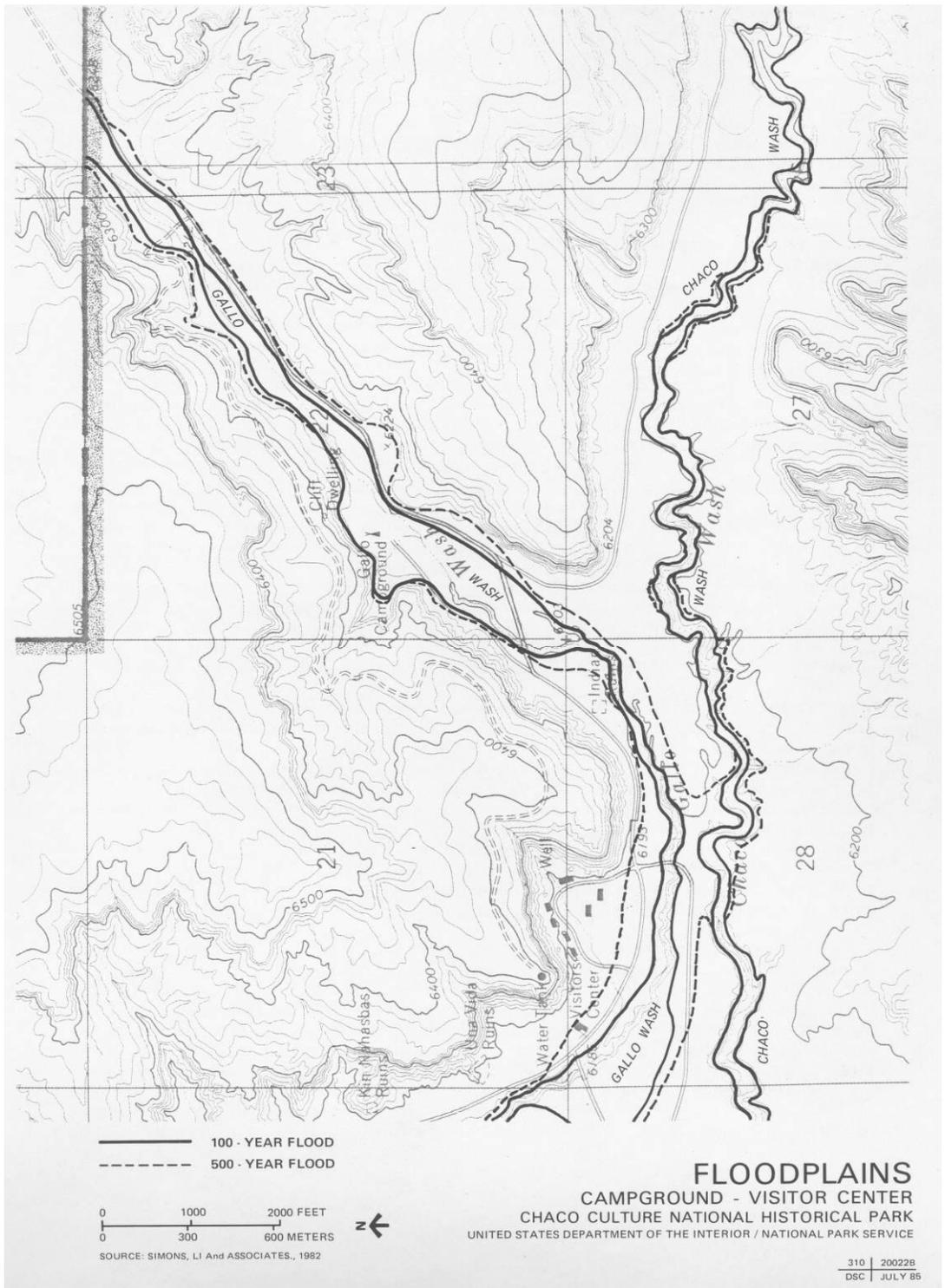
According to the park's 1985 General Management Plan, "the visitor center is on the fringe of the 500-year floodplain of Gallo Wash. Under this extreme event, it is estimated that water would rise to about 0.6 m. (about 2 feet) above ground level around the building." [GMP, page 32]. Because the calculations of the floodplain were done over 25 years ago, the park attempted to obtain more recent FEMA floodplain maps to see if the more recent calculations also included the building in the 500-year floodplain. Unfortunately, the park area has not been mapped by FEMA, so the 1982 data is the best data available. The 500-year floodplain is the "regulatory" floodplain for this action because the visitor center contains irreplaceable records, a museum, and some archeological artifacts (DO-77-2).

### **General Characterization of the Floodplain and Flooding**

Chaco Wash and its tributaries drain a 398,240 acre watershed that is sparsely vegetated and has in the past been severely overgrazed. There generally appears to be less stock use in the watershed now than 25 years ago. Annual rainfall is approximately 7.5 inches.

Precipitation tends to be distributed unevenly over the year with most coming in the form of July and August thunderstorms. There is little vegetation in the canyon – primarily shrubs, forbs and grasses. In the past, in an effort to control erosion, cottonwoods were planted in Chaco Wash. Most are now senescent and there is little evidence of recruitment. The high clay content of the soils and the infrequent but heavy precipitation events leads to rapid runoff. It also causes accelerated erosion including soil pipes and destructive gullies.

A map that shows the relationship between the 500-year floodplain and the visitor center location is appended below. (Chaco GMP, 1985)



## **Justification for Use of the Floodplain**

### **Description of why the proposed action must be located in the Floodplain**

The proposed project is a renovation of an existing building. The park had initially planned to address each building deficiency in sequence. It became clear that so many different aspects of the building needed to be remediated; it made economic and engineering sense to address them simultaneously.

The park conducted a value analysis facilitated by the IMR Facility Management Division and in cooperation with park stakeholders in August, 2008. At that time, a number of different alternatives were considered, including completely removing the building. Using a Choosing by Advantages decision model, the proposed action was selected as providing the greatest advantages at the lowest incremental cost. The alternative of replacing the entire building at the current location was briefly considered and rejected because its cost was expected to be significantly greater than the other alternatives with relatively few additional advantages. In addition, the team believed that there was a low probability of accomplishing (including obtaining funding for) the alternative in a timely manner. An alternative of moving the visitor center to a location wholly out of the floodplain was not considered because the costs of providing utilities – electrical, phone, water, sewer lines, and propane lines -- to an alternative location was considered to be cost prohibitive, especially because of the concentration of cultural resources in the park.

### **Description of Site-Specific Flood Risk**

#### **Recurrence Interval**

Based on the 1982 calculations, the building is on the fringe of the 500-year flood plain.

#### **Hydraulics (depths, velocities)**

According to another 1982 Simons and Li study, “The hydraulic data indicates that depths of flow for events through the 100-year storm are, for the most part, contained within the wash.” They calculated discharges from about 188 cfs for the 2-year flood to about 5,230 cfs for the 100-year flood. Rick Inglis, WRD hydrologist, stated in 2008, “Equations for the 500-year flood were extrapolated to be about 20,000 cfs. He noted, in consultation with WRD hydrologist, Mike Martin, that experience indicates that 500-year floods are usually within about 150 percent of the 100-year flood or about 8,000 cfs.

#### **Time required for flooding to occur**

Since the park has had no experience with a 500-year flood on Gallo Wash, it is not known how much warning time would be available to the park. The major concern would be the potential effects to museum objects. In the 500-year event, flood waters in the visitor center would reach 2 feet in depth around the building (GMP, 1985) Since all the museum objects are located in

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reinforced glass cases well above ground level, the park has concluded that there is some likelihood of effect but that the likelihood of damage to the museum objects is not high.

The location of the park in a canyon environment inevitably suggests that there are conditions in which the floodplain location of the visitor center may be affected by flooding. Warning time is believed to be low, perhaps in the range of tens of minutes to a few hours. The fact that the building is on the outer edges of the 500-year floodplain where water velocities are likely to be lower would suggest that adverse effects may be somewhat attenuated.

### **Flood Mitigation Contingencies**

In the 500-year event, flood waters in the visitor center are estimated to reach 2 feet in depth around the building (GMP, 1985). Since all the museum objects are located in reinforced glass cases well above ground level, the park has concluded that there is some likelihood of effect but that the likelihood of damage to the museum objects is not high. In an effort to minimize hazards to human life and property, the park will prepare a flood preparedness and evacuation plan. Park staff will be familiar with the plan and be able to react quickly to flooding conditions by informing the public of appropriate actions.

### **Summary**

The National Park Service concludes that there is no practicable alternative placement for the Visitor Center in a reasonably foreseeable timeframe and that its renovation and rehabilitation at its current site is warranted. The project will likely result in the continuation of short to long-term, mostly minor, direct and indirect, adverse effects on water resources and floodplains. The National Park Service, therefore, finds that this project is in compliance with Executive Order 11988: "Floodplain Management" and NPS DO-77-2.





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